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Articles

Quality and Stability of 2%-Fat Ultrapasteurized Fluid Milk Products ................................................................. 78
   Kathryn J. Boor and Dorothy N. Nakimbugwe

Occurrence of Clinical Mastitis and Antimicrobial Residues on Dairy Farms in Trinidad ......................................... 83
   Abiodun A. Adeleye, Lloyd A. Webb, and Helen T. Romain

Measure MUN and Evaluate Dairy Cow Nutrition ........................................................................................................ 89
   Jamie Jonker and Rick Kohn (Reprinted from Maryland Dairy Talk, Fall Issue, Volume 1)

3-A Sanitary Standards Focus: Why Have 3-A Standards for Rubber Materials? .......................................................... 90
   Thomas M. Gilmore and Kirk Snyder

Association News

Sustaining Members ......................................................................................................................................................... 71
Comments From Your President ...................................................................................................................................... 74
Commentary From the Executive Director ........................................................................................................................ 76
New IAMFES Members .................................................................................................................................................... 92

Departments

Updates .................................................................................................................................................................................. 93
News .................................................................................................................................................................................. 94
Industry Products ............................................................................................................................................................ 97
Business Exchange .......................................................................................................................................................... 122
Coming Events ................................................................................................................................................................. 126
Advertising Index ............................................................................................................................................................. 128

Extras

1998 IAMFES Secretary Candidates ................................................................................................................................. 100
3-A Holders’ List ............................................................................................................................................................ 102
IAMFES 85th Annual Meeting Preview ............................................................................................................................. 123
IAMFES 85th Annual Meeting Registration Form ........................................................................................................ 124
IAMFES Booklet Order Form ........................................................................................................................................... 130
IAMFES Membership Application .................................................................................................................................... 132

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Executive Director
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Editorial Board
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The Black Pearl Award, sponsored by Wilbur Feagan and F&H Food Equipment Company, was first presented in 1994. The Black Pearl Award was established to recognize a company for its outstanding commitment to and achievement in corporate excellence in food protection. For more information and to receive nomination criteria, contact the IAMFES office at 800.369.6337 or 515.276.3344; Fax: 515.276.8655; E-mail: iamfes@iamfes.org.
Have you ever thought about your name? Your name is the shortest definition of you that anyone will ever have. If you think about it, though it is completely beyond your realm of control, you hope your name gives you a favorable review when you are introduced or someone mentions your name.

Take a moment to think about the name of our association; say the International Association of Milk, Food and Environmental Sanitarians out loud. How much of that phrase do you think you can say before the person hearing it loses interest? I personally can get about to “milk” before I speed up and trail off as I speak.

Our first impression with a prospective new member or other supporter will come from our name, just as we as people form opinions of others first from their name, then from the correspondence or communication we have with them. International Association of Milk? Is that what we are about? Milk is a big part of the picture we wish to paint, but is it the focus? After all, milk is a food; everything that provides nourishment can be considered a food.

Would calling ourselves the International Association for Food Protection be more representative of our mission? We would like to be perceived by those making initial contact with us as closely as possible to what we really are. This association needs to make its mission as an organization clear without having the luxury of time it takes to explain what we do. We are often referred to as simply IAMFES; those who know us know exactly what that means, everyone else has to ask. Even people who have had a good deal of exposure to IAMFES are not quite sure of what each letter of the acronym actually stands for. If we changed our name we might still use an acronym, but one that is much easier to remember and one that defines us, right from the start.

Changing our name is a step I believe IAMFES has to consider. Especially with all the food safety issues in today's news and since this is the key focus of our members.

I have welcomed comments from members since I first accepted a term on the IAMFES Executive Board, but those comments are more important to me now than ever. Please contact me at 513.762.4209; Fax: 513.762.4372; or E-mail: gprince@kroger.com with your ideas on this issue. We need your input to make decisions that reflect the thoughts and feelings of our membership.
What is the IAMFES Foundation Fund?

The Foundation Fund is supported by membership of IAMFES sustaining members and from individual members. Sustaining members are corporations, companies and individuals whose business interests reflect the goals and mission of IAMFES. Funds in the Foundation are kept separate from the operating funds of IAMFES and are used for worthy causes which enrich the Association.

What does the Foundation Fund support?

Revenue from the Foundation Fund currently supports the IAMFES:

- Ivan Parkin Lecture
- Audio-Visual Lending Library
- Co-sponsorship of the Crumbine Award
- Developing Scientist Oral and Poster Competition
- Shipment of volumes of surplus JFP and DFES journals to developing countries through FAO in Rome
- Recruitment of exceptional speakers for IAMFES Annual Meetings

Why should I contribute to the IAMFES Foundation Fund?

Any contribution, no matter how large or small will help build a secure Foundation for the future of IAMFES. The future of IAMFES depends on how well we can meet the needs of our membership in providing educational programs, journals, products, and services, and on how well IAMFES fulfills its mission. The Foundation Fund was created to provide a long-lasting legacy of information and service for protecting the milk, food, water, and environment throughout the world.

To support the IAMFES Foundation Fund, send donations (marked Foundation) to:
IAMFES, 6200 Aurora Avenue, Suite 200W,
Des Moines, IA 50322-2863
“You have an opportunity to build the stature of deserving colleagues”

Have you taken time recently to tell someone they have done a great job or that you appreciate their work? Everyone needs positive reinforcement to encourage them to continue exerting their highest effort. Today, you have an opportunity to build the stature of deserving colleagues through recognition from all IAMFES members by nominating individuals or companies for an IAMFES Award. You must act quickly though – the deadline for nominations is February 20.

Awards will be presented at the IAMFES Annual Meeting in Nashville, Tennessee this coming August. Our Awards Banquet is a fitting conclusion to the Meeting and provides an opportunity to recognize deserving individuals, companies, groups, and organizations. This recognition helps make their hard work and dedication worthwhile. Four individual awards are given: Sanitarian, Educator, Industry, and Citation. These awards recognize IAMFES members for their years of dedication to the ideals and objectives of IAMFES and to their profession. Affiliate Awards, Honorary Life Membership Awards, and the Black Pearl Award are also presented. The Black Pearl Award recognizes a company for its outstanding achievement of corporate excellence in food safety and quality. If you want to learn more about any of these awards, please call our office today!

We are fortunate to have other awards presented at our Awards Banquet, such as the Norbert F. Sherman Award, the Samuel J. Crumbine Award, and a new award this year, the NFPA Food Safety Award. These awards are administered by other groups and are also a great source for recognizing dedicated food safety professionals.

Do you have your plans in place to attend the 85th IAMFES Annual Meeting in Nashville? Congratulations if you do, and if you don’t, may I suggest you begin planning now. Plans are underway for this year’s Meeting, which includes over 250 presentations on the latest developments in food safety, over 80 educational exhibits, Committee and Professional Development Group meetings, and the opportunity to network with leading people in food safety from around the globe. We know you will not want to miss out on this year’s Meeting.

Two groups help us present such an outstanding Annual Meeting – The Program Advisory Committee and the Local Arrangements Committee. Both groups are busy planning and developing this year’s Meeting. The Program Advisory Committee, under the direction of Chairperson Susan Sumner, just completed their meeting in January. The Committee spent many exhausting hours pouring over submitted abstracts and symposia. They are responsible for analyzing and reviewing abstracts, accepting, categorizing, and then scheduling the program.

The Local Arrangements Committee met in December and will meet many times between now and August. This Committee consists of members from the Tennessee Association of Milk, Water and Food Protection and is co-chaired by Ann Draughon and Ruth Fuqua. Their responsibilities are to provide input on events held in conjunction with the Annual Meeting and to fill volunteer positions such as helpers at the registration desk and hospitality hosts during the Meeting.

Both the Local Arrangements and the Program Advisory Committees have done an excellent job of preparation and are to be commended. Without the help of these dedicated individuals, the Annual Meeting would not be what it is today! Our thanks goes out to everyone involved.
Food Microbiology
Fundamentals and Frontiers

Editors: Michael P. Doyle, University of Georgia
Larry R. Beauchat, University of Georgia
Thomas J. Montville, Rutgers, The State University of New Jersey

Edited by renowned food scientists Michael P. Doyle, Larry R.
Beauchat, and Thomas J. Montville, Food Microbiology: Funda-
mentals and Frontiers describes the current state of food micro-
biology with a focus on the molecular and mechanistic aspects of the
subject.

An advanced text written for graduate students and researchers in
food microbiology, this book covers nine major areas of the field, includ-
ing microbial spoilage, foodborne pathogenic bacteria, mycotoxigenic
molds, viruses, foodborne and waterborne parasites, preservative and
preservation methods, food fermentations, advanced techniques in food
microbiology, and more.

Each of these areas discusses the how and why of food microbiology
at a basic scientific level, but with a more quantitative and mechanistic approach to
the science. Wherever possible, the detailed mechanisms responsible for the topic
being discussed are stressed.

As a special feature, this text includes discussion and information on a valu-
able computer modeling program, available on the Internet, that is especially useful
as a research or teaching tool. This program, the USDA's Pathogen Modeling
Program, provides powerful demonstrations of how the interactions of environmental
factors influence microbial growth and thus reinforces many concepts covered
throughout this book.

Food Microbiology fulfills the need of research microbiologists, graduate
students, and professors of food microbiology courses for an in-depth treatment of
food microbiology and provides current, definitive factual material written by
experts on each subject covered.

Contents (Sections)

I. Factors of special significance to food microbiology
II. Microbial spoilage of foods
III. Foodborne pathogenic bacteria
IV. Mycotoxigenic molds
V. Viruses

VI. Foodborne and waterborne parasites
VII. Preservatives and preservation methods
VIII. Food fermentations
IX. Advanced techniques in food microbiology

Index
Quality and Stability of 2%-Fat Ultrapasteurized Fluid Milk Products

Kathryn J. Boor and Dorothy N. Nakimbugwe

SUMMARY

Four batches each of raw and ultrapasteurized (UP) milk were sampled from each of two processing plants at approximately 3-month intervals. UP samples were stored at 7°C (±1°C) and analyzed for microbiological, organoleptic, and chemical stability after 1, 4, 7, and 10 weeks of storage. The microbiological quality of the raw milk varied among batches and between processing plants. No viable bacteria were isolated from any processed milk sample during the 10-week storage period. The organoleptic quality of the milk samples was acceptable, as judged by a trained sensory panel throughout the test period. An increase was observed in the tyrosine values of the UP milk during the 10-week period, suggesting some post-processing protein degradation, but the maximum levels were below the threshold at which adverse flavor notes are normally detected. Acid Degree Values (ADV) were stable throughout the test period. The highest measured ADVs (0.5 to 0.7 meq FFA/liter) were below the threshold (1.0 to 1.5 meq/liter) at which rancidity is generally detected by sensory analysis. Vitamins A and D levels were stable during the 10-week test periods. Results indicate that ultra-pasteurization can produce organoleptically acceptable fluid milk products that are microbiologically and chemically stable for at least 10 weeks.

INTRODUCTION

Fluid milk products with extended shelf lives are value-added products with the potential to improve the economic competitiveness of dairy products in the beverage market. Efforts to extend the shelf lives of dairy products include the application of processing technologies such as ultra-high-temperature (UHT) thermal processing and ultra-pasteurization (UP). Product quality will ultimately determine consumer acceptance and demand for extended-shelf life dairy products in the United States. While many factors influencing the shelf life and quality of UHT fluid whole milk products have been described (1, 2, 5, 6, 7, 9, 10, 13, 18, 19, 22, 23), UP product quality has not been extensively characterized.

In the United States, thermal processes for UHT milk must comply with Food and Drug Administration (FDA) requirements for sterilizing low-acid foods. Commercially sterile UHT milk is aseptically packaged, yielding a product that is shelf stable for several months. UP milk is heated to 280°F (138°C) for at least 2 s and generally has a shelf life of several months.
weeks under refrigerated conditions (3). In contrast, High Temperature Short Time (HTST) pasteurized milk, which must be heated to 161°F (72°C) for a minimum of 15 s or the equivalent, is usually coded for a last-day-of-sale between 10 and 21 days of refrigerated storage after the date of processing.

UP products may be susceptible to quality problems associated with UHT products, but they may in addition share some HTST product spoilage characteristics. To illustrate, some proteolytic and lipolytic enzymes survive UHT heat processing treatments (1, 2, 6, 7, 21). These enzymes are endogenous to raw milk (1, 18) and also may be produced by psychrotrophic bacteria that are usually present in raw milk. Residual enzymatic activity can cause product degradation with extended storage, even at refrigeration temperatures (21). In addition, because UP products are not aseptically packaged, they may be re-inoculated with spoilage organisms during filling. Such post-pasteurization contamination occurs frequently with HTST products (11).

Vitamins A and D levels in fortified 2%-fat fluid milk products must meet the minimum legal standards of 2000 IU/qt and 400 IU/qt, respectively. In this study, vitamins A and D levels were monitored throughout post-processing storage to determine the stability of vitamins added to fortify UP milk products. In addition, the microbiological, organoleptic, and chemical stability of UP 2%-fat fluid milk products were assessed over 10 weeks of storage at 7°C.

**MATERIALS AND METHODS**

**Sample collection**

Four batches comprised of five sets of fifteen UP milk samples packaged in 3-layer (polyethylene/paperboard/polyethylene) half-pint (ca. 235 ml) gable-top cartons were obtained from each of two processing plants at approximately 3-month intervals. Raw milk samples (the whole and skim milk used in the formulation of the 2% UP milk and the raw 2% milk fortified with added vitamins A and D) were collected into sterile Whirlpak® bags (Nasco, Ft. Atkinson, WI) according to Standard Methods for the Examination of Dairy Products (20). All samples were transported at 4°C in insulated coolers. Upon arrival in the laboratory, UP samples were examined for SPC, PPG and aerobic sporeformers (20) upon arrival and after 4, 7, and 10 weeks of storage.

**Sensory evaluation**

Ten trained panelists from the Department of Food Science at Cornell University evaluated the sensory quality of the processed milk samples upon their arrival in the laboratory and after 4, 7, and 10 weeks (4, 27). Panelists were provided with two ballots. On one ballot, each sample was scored for overall quality on a scale of 1 to 10 (10 = "no defects detected"). The second ballot was used for identification of specific quality defects. At each testing period, contents of cartons were mixed by inversion; then approximately 2 oz. (ca. 60 ml) of milk was poured into 5-oz. (ca. 150-ml) plastic cups labeled with three-digit codes. The cups were capped and presented to panel members. To enhance evaluation of defects, samples were allowed to warm to approximately 59°F (15°C) before evaluation.

**Microbiological analyses**

Raw milk samples were analyzed upon arrival in the laboratory by standard methods for determining microbial numbers using the following procedures: Standard Plate Count (SPC), Psychrotrophic Plate Count (PPC), Laboratory Pasteurization Count (LPC), Coliform Plate Count (CPC), and Gram Negative Count (GNC) (20). The processed milk samples were examined for SPC, PPC and aerobic sporeformers (20) upon arrival and after 4, 7, and 10 weeks of storage.

**TABLE 1. Bacterial counts (CFU/ml x 10⁵) for raw whole, skim, and 2%-fat milk**

<table>
<thead>
<tr>
<th>Test</th>
<th>Whole milk</th>
<th>Skim milk</th>
<th>2% milk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Plant 1</td>
<td>Plant 2</td>
<td>Plant 1</td>
</tr>
<tr>
<td>SPC</td>
<td>68 [37]*</td>
<td>43 (6)</td>
<td>35 (50)</td>
</tr>
<tr>
<td>GNC</td>
<td>37 (23)</td>
<td>10 (7)</td>
<td>7 (9)</td>
</tr>
<tr>
<td>PPC</td>
<td>37 (24)</td>
<td>17 (16)</td>
<td>25 (40)</td>
</tr>
<tr>
<td>LPC</td>
<td>4 (5)</td>
<td>0.7 (0.8)</td>
<td>4 (7)</td>
</tr>
<tr>
<td>CPC</td>
<td>2 (0.8)</td>
<td>0.08 (0.1)</td>
<td>0.4 (0.3)</td>
</tr>
</tbody>
</table>

SPC, Standard Plate Count; GNC, Gram Negative Count; PPC, Psychrotrophic Plate Count; LPC, Laboratory Pasteurized Count; CPC, Coliform Plate Count

*mean (S.D.)
**Chemical tests**

Free fatty acids present in the milk samples, expressed as Acid Degree Value (ADV), were measured using variation II of the modified copper soap solvent extraction method (26). Vitamin A levels were measured at week 1, 4, 7, and 10 by standard methods that use an HPLC system (20). Vitamin D levels were quantitated by HFLC using a modification (24) of the method of Kobayashi et al. (16). Proteolysis in the processed milk samples throughout the storage periods was estimated by determining tyrosine values (14, 15) at 1, 4, 7, and 10 weeks.

**Statistical analyses**

A two-way ANOVA was performed at a 0.05 with the Minitab Version 10 (Minitab Inc., State College, PA) to determine if results varied significantly between weeks within a sample batch. A repeated measures split plot ANOVA at a 0.1 with the JMP Statistical Analytical Systems (SAS Institute, Inc., Cary, NC) computer software was performed to determine if analytical results from samples varied significantly between batches within the same processing plant and also to determine if significant differences existed between milk processed by one plant and milk processed by the other.

**RESULTS**

**Microbiology**

Table 1 shows results of microbial analyses of raw milk (whole, skim, and 2%) used for production of the UP milk samples. Although counts varied greatly among batches for each plant, SPCs for all samples were below the bacterial limits of 300,000 CFU/ml for commingled grade A raw milk (3). Except for the PPC for the blended 2% milk, counts for the raw milk samples from Plant Two were consistently lower than those from Plant One. In general, bacterial counts were lowest in the raw skim milk samples, specifically those from Plant Two. These reduced counts are attributed to a pre-pasteurization heat treatment applied during the skimming process.

Regardless of the counts in the raw milk samples, no viable bacteria were found by the given procedures in any UP 2%-fat milk samples plated after 1, 4, 7, or 10 weeks of storage at 7°C.

**Sensory quality and flavor defects**

Samples from both plants received an average score of approximately 7 on a scale of 1 to 10 throughout the 10-week period. Mean flavor scores for samples from all batches from both plants did not vary significantly from 7 ($P > 0.05$) throughout the 10-week period.

Although overall product quality did not vary between sampling intervals throughout the test period or between batches for each plant ($P > 0.05$), descriptive analyses of defects revealed trends in detection of "cooked flavor" and "lacked freshness" flavor notes. The pronounced cooked flavor defect, noted in over 90% of the samples from both plants after one week, was noted in only 80% in Plant One samples and 70% in Plant Two samples after 10 weeks (see Fig. 1). Other flavor defects, collectively described as "lacked freshness," increased from 20 to 50% in Plant One and 30 to 40% in Plant Two during the 10-week trial.

**Chemical analysis**

In all samples analyzed, tyrosine values (TVs) increased significantly ($P < 0.1$) during the test period, suggesting that some protein degradation had occurred. TVs for processed milk samples from Plant One were uniformly stable, at approximately 200 μg/ml for the first 7 weeks of storage, but had increased to an average of 330 μg/ml after 10 weeks. Although the mean TV was initially lower for Plant Two milk samples than Plant One samples, week 10 measurements were similar for the two plants. The mean TV for Plant Two milk samples was 175 μg/ml at week 1; 198 μg/ml at week 4; 250 μg/ml at week 7; and 320 μg/ml at week 10. In no instance did the TV of a milk sample reach the level (1,500 μg/ml) necessary for detection of off-flavors.

Free fatty acid levels (expressed as ADV) for the processed milk samples were consistent at approximately 0.7 meq/liter ($P > 0.05$) for all milk samples from both plants throughout the 10-week test period.
No rancid flavors were detected in the samples.

Mean vitamin A and vitamins D levels (in IU/qt) were 1,965 and 395, respectively, for Plant One samples, and 2,446 and 420, respectively, for Plant Two samples. In all cases, vitamin levels were stable in samples from both plants throughout the 10-week sample period.

**DISCUSSION**

U.S. consumers accustomed to conventionally pasteurized milk have been reported to detect a distinct cooked flavor in some UHT milk products (8, 12, 13). Other reported UHT fluid milk defects include the possible development of oxidized and stale flavors (11), creaming or fat separation (25), gelation or sediment formation (19) and proteolytic or lipolytic deterioration (1, 2, 5, 6, 7, 10, 18, 22, 23). In general, except for cooked flavor (8), most UHT flavor and texture defects have been reported to increase in severity with increased storage time and temperatures (7, 9, 10, 18, 19, 23).

In this study, over 90% of the UP milk samples from both plants were initially described as having a pronounced “cooked” flavor. Although all packaged samples from Plant One were processed at 145°C for 2 s, 80% retained “cooked” flavor notes, even 10 weeks after processing. The proportion of samples with “lacked freshness” defects rose from 20% to 50% during the test period. While all packaged samples from Plant Two were processed at 140°C for 4 s, 65% were described as tasting “cooked” after 10 weeks, with “lacked freshness” defects increasing from 30% after one week to 40% at 10 weeks. Prolonged product contact with paperboard containers might have contributed to development of the “lacked freshness” flavor notes (17).

Microbiology results indicate that UP processing, i.e., 140°C(284°F) for 4 s or 145°C(295°F) for 2 s, destroys even the highly variable numbers of microorganisms found in the skim and whole milk used as raw material for UP 2%-fat milk. Products from both plants were adequately protected from post-processing contamination. Levels of Vitamins A and D were stable for up to 10 weeks in UP 2%-fat milk samples stored at 7°C in three-layer half-pint paperboard cartons. Our findings indicate that ultra-pasteurization can produce organoleptically acceptable fluid milk products that are microbiologically and chemically stable for at least 10 weeks.

**ACKNOWLEDGMENTS**

We gratefully acknowledge assistance from Steven Murphy, Lorraine Rosenberry, Scott Fletcher, and the personnel from the two dairy processing plants. DNN was supported throughout her MS program by a scholarship from the Ugandan government. This work was supported by the New York State Milk Promotion Board through NYS Department of Agriculture and Markets contract 2001-44.

**ABOUT THE AUTHORS**

Department of Food Science, Stocking Hall, Cornell University, Ithaca, NY 14853; Phone: 607.255.3111; Fax: 607.254.4868; 'Present Address: Department of Food Science and Technology, Makerere University, Kampala, Uganda.

**REFERENCES**


Occurrence of Clinical Mastitis and Antimicrobial Residues on Dairy Farms in Trinidad

Abiodun A. Adesiyun, Lloyd A. Webb, and Helen T. Romain

SUMMARY

The prevalence of clinical mastitis in lactating cows and antimicrobial residues in bulk milk from selected dairy farms in Trinidad was studied. The etiological agents of mastitis, frequency of use of veterinary services, and the practice of raw milk consumption were also investigated. Of 1,204 lactating cows studied, 29 had ongoing clinical mastitis, but 25 of 177 dairy farms investigated had cows with clinical mastitis. Staphylococcus aureus was the predominant pathogen recovered, with 9 of 14 mastitic milks testing positive for the pathogen, while Streptococcus agalactiae was isolated from 4 samples. Resistance to penicillin was most common among 5 of 9 aureus strains with 5 of 9 exhibiting resistance. Among 177 dairy farmers, 105 rarely used veterinary services, compared with 27 who were frequent users, and the difference was statistically significant ($P \leq 0.001$; $X^2$). Of 173 dairy farmers, 140 claimed adherence to a required withdrawal period following antibiotic use, and only 5 of 176 bulk samples were positive for antimicrobial residues. Penicillin accounted for 80% of the identified residues. Overall, 55 of 177 dairy farmers consumed raw cows’ milk.

It was concluded that clinical mastitis was low among dairy cows studied in Trinidad, but the low level of veterinary services usage coupled with the presence of antimicrobial residues in milk, often consumed raw, may pose a health hazard.

INTRODUCTION

Clinical mastitis, which may be caused by several pathogens, is an important source of economic loss in the dairy industry (7, 13, 19). Subclinical mastitis, often unknown to the dairy farmer, has been reported to be prevalent on dairy farms (4, 25, 27) and has been associated with decreased milk production with obvious economic implications (13, 15). Reports have suggested that misuse of antimicrobial agents has caused development of resistance in microorganisms responsible for mastitis (30, 31). In developing countries, legislation to control the use of antimicrobial agents by farmers and enforcement of these laws are often lacking, with farmers frequently having ready access to these drugs (2, 30).

The presence of antimicrobial agents in milk is a longstanding health concern (8, 9) because they can cause the development of resistance in enteropathogens (16). Consumption of raw milk has also resulted in several milk-borne outbreaks worldwide (17, 22, 26). Milk originating from dairy farms in Trinidad has been found to contain verocytotoxigenic Escherichia coli and enterotoxigenic Staphylococcus aureus, often in high
numbers (1, 4). The risks associated with consumption of raw cows’ milk therefore cannot be ignored.

This study was conducted to determine the prevalence of clinical mastitis and the associated etiologic agents on dairy farms in Trinidad; to investigate the frequency of use of veterinary services as well as the adherence to the withdrawal periods when antibiotics are used; and to determine the prevalence of antimicrobial residues in bulk milk and the practice of consumption of raw milk.

**MATERIALS AND METHODS**

**Experimental design**

Trinidad is a small island with approximately 700 dairy farms and 4,000 milking cows.

Clinical mastitis was studied on dairy farms that supplied milk to collection centers earlier investigated by Adesiyun et al. (4). To select the farms to study, a computer printout of all dairy farms from each milking area was collected from the main milk processing plant in Trinidad. Every other dairy farm on the list was selected.

**Questionnaire information**

A comprehensive questionnaire was made available to each dairy farmer selected, and completed questionnaires were collected during or after the sampling visit. Information was obtained on the number of lactating cows on each farm; usage of veterinary services, classified as rare (hardly used or not used), moderate (once in 6 months), or frequent (1 to 3 times monthly); administration of therapy to dairy cows by farmers; knowledge of and adherence to requirements for withdrawal periods following use of antimicrobial agents; consumption of raw cows’ milk and reason for consumption of raw milk.

**Collection of milk samples**

Milk samples were collected from cows that were clinically mastitic between October 1994 and February 1995. All lactating cows clinically diagnosed as mastitic but not receiving current therapy were sampled. Approximately 25 ml of milk was pooled from all quarters of each mastitic cow.

Bulk milk samples were collected from each dairy farm by trained veterinary public officers, pooled from all 48 kg stainless steel churns containing milk. Approximately 25 ml of sample was collected aseptically into sterile universal bottles. Each cow was sampled once during the study period.

All milk samples, bulk and mastitic, were transported to the laboratory ice-cooled within 2 h of collection.

**California mastitis test**

The California mastitis test (CMT), interpreted as described by Ullmann et al. (28), was used to estimate the somatic cell count of all mastitic milk. Test results were classified as negative, 1+, 2+, 3+ and 4+. Clinical mastitis was determined by clinical examination of affected mammary glands combined with CMT reactions of 3+ or 4+ as criteria.

**Total aerobic plate count of milk**

To determine the total aerobic plate count decimal dilutions of milk were prepared in sterile saline and 0.1 ml was inoculated onto nutrient agar plates, after which sterile glass spreaders were applied. Inoculated plates were incubated at 37°C for 24 h and the colonies enumerated on a Quebec Darkfield colony counter (Cambridge Instruments Inc., United States). The counts were expressed as total aerobic plate count per ml of milk.

**Isolation and identification of pathogens**

Of each milk sample, 0.1 ml was inoculated into blood agar, MacConkey agar, and Baird-Parker agar plates and streaked for isolation. Inoculated plates were incubated aerobically at 37°C for 24 to 48 h. Pathogens were identified by standard methods (21).

**Detection of antimicrobial residues in milk**

The Delvotest SP 5 Pack test kit (Canada Colours and Chemical Limited, Canada) was used to screen bulk milk for antimicrobial residues as recommended by the manufacturer. Penicillin was specifically detected by treating all samples that showed antimicrobial activity with penicillinase at concentration of 100,000 i.u./ml. To detect sulfas in milk, milk samples with inhibition were treated with para-amino benzoic acid (PABA) at 100 µg/ml. The sensitivity of the assay system for penicillin and sulfas was 0.003 to 0.004 i.u./ml and 0.1 to 0.25 µg/ml of milk, respectively. All samples with antimicrobial activity but not inhibited by either penicillinase or PABA were classified as positive for “antimicrobial residue, not penicillin or sulfa (NPS).”

**Statistical analysis**

The prevalence of events were compared using the chi-square test for independence, with one degree of freedom for cells with five or more observations.

**RESULTS**

The prevalence of clinical mastitis in lactating cows and dairy farms is shown in Table 1. Clinical mastitis was detected in 25 of 177 dairy farms (14.1%) studied. Only 29 of 1,204 lactating cows (2.4%) were positive for clinical mastitis.
TABLE 1. Prevalence of clinical mastitis in dairy cows and dairy farms in Trinidad between October 1994 and February 1995

<table>
<thead>
<tr>
<th>Milking Center</th>
<th>No. of farms sampled</th>
<th>No. of farms with cows experiencing clinical mastitis</th>
<th>Prevalence of bovine clinical mastitis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1C</td>
<td>43</td>
<td>10 (23.3)</td>
<td>497</td>
</tr>
<tr>
<td>5C</td>
<td>35</td>
<td>4 (11.4)</td>
<td>173</td>
</tr>
<tr>
<td>5H</td>
<td>33</td>
<td>1 (3.0)</td>
<td>114</td>
</tr>
<tr>
<td>2G</td>
<td>16</td>
<td>2 (12.5)</td>
<td>84</td>
</tr>
<tr>
<td>2C</td>
<td>15</td>
<td>2 (13.3)</td>
<td>55</td>
</tr>
<tr>
<td>2B</td>
<td>14</td>
<td>5 (35.7)</td>
<td>181</td>
</tr>
<tr>
<td>6H</td>
<td>11</td>
<td>0 (0.0)</td>
<td>27</td>
</tr>
<tr>
<td>3G</td>
<td>10</td>
<td>1 (10.0)</td>
<td>73</td>
</tr>
<tr>
<td>Total</td>
<td>177</td>
<td>25 (14.1)</td>
<td>1,204</td>
</tr>
</tbody>
</table>

( ) Percent

*Mean number of milking cows per farm in each milking center is: 1C (12 ± 3), 5C (5 ± 2), 5H (3 ± 2), 2G (5 ± 2), 2C (4 ± 2), 2B (13 ± 5), 6H (2 ± 1) and 3G (7 ± 10)

TABLE 2. Use of veterinary services and frequency of treatment of dairy cows by farmers in Trinidad, October 1994 to February 1995

<table>
<thead>
<tr>
<th>Milking Center</th>
<th>No. of farms</th>
<th>Rare*</th>
<th>Moderate*</th>
<th>Frequent*</th>
<th>No. of herds with farmers administering treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1C</td>
<td>43</td>
<td>19</td>
<td>13</td>
<td>11</td>
<td>25</td>
</tr>
<tr>
<td>5C</td>
<td>35</td>
<td>19</td>
<td>10</td>
<td>6</td>
<td>20</td>
</tr>
<tr>
<td>5H</td>
<td>33</td>
<td>18</td>
<td>10</td>
<td>5</td>
<td>22</td>
</tr>
<tr>
<td>2G</td>
<td>16</td>
<td>9</td>
<td>3</td>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td>2C</td>
<td>15</td>
<td>14</td>
<td>1</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>2B</td>
<td>14</td>
<td>11</td>
<td>3</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>6H</td>
<td>11</td>
<td>6</td>
<td>4</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>3G</td>
<td>10</td>
<td>9</td>
<td>1</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>177</td>
<td>105</td>
<td>45</td>
<td>27</td>
<td>107</td>
</tr>
</tbody>
</table>

*Rare defined as hardly used or not used, moderate as used once in 6 months and frequently used 1 to 6 times monthly.

Of the 14 mastitic milk samples studied (not exposed to any therapy), the CMT result was 3+ for 11 samples and 4+ for 3 samples. The total aerobic plate count (TAPC) of over $10^6$ CFU/ml was most prevalent (in 7 samples) but only 1 sample had a count as high as $4.1 \times 10^6$. *S. aureus* was the most frequently isolated pathogen, with 9 of 14 positive, compared with 4 and 1 positive results for *S. agalactiae* and *Klebsiella pneumoniae*, respectively. Among the nine *S. aureus* strains, resistance to penicillin (55.6%; 5 of 9) and kanamycin (55.6%; 5 of 9) was relatively high, while 3 (33.3%) and 1 (11.1%) strains exhibited resistance to ampicillin and methicillin, respectively. Of the 4 strains of *S. agalactiae*, 4 (100.0%) and 3 (75.0%) were resistant to kanamycin and methicillin, respect-
A total of 107 (60.5%) of the 177 dairy farmers administered treatment to their dairy cows. Of 173 dairy farmers, 157 (90.8%) admitted knowledge of the withdrawal period for antimicrobial agents (Table 3). One hundred and forty of 155 (90.3%) dairy farmers claimed adherence to the withdrawal period following use of antimicrobial agents. For all farms studied, the mean number of days observed as withdrawal period was 3.8 ± 0.6.

Only 5 of 176 (2.8%) bulk milk samples contained antimicrobial agents (Table 4). Penicillin was detected in 4 of 5 samples (80.0%) positive for detectable antimicrobial residues.

### TABLE 3. Possession of knowledge and adherence to withdrawal period for antibiotics

<table>
<thead>
<tr>
<th>Milking Center</th>
<th>No. of responding farmers</th>
<th>No. with knowledge</th>
<th>Adherence to withdrawal period</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>No. of responding farmers</td>
</tr>
<tr>
<td>1C</td>
<td>42</td>
<td>40</td>
<td>41</td>
</tr>
<tr>
<td>5C</td>
<td>34</td>
<td>31</td>
<td>33</td>
</tr>
<tr>
<td>5H</td>
<td>31</td>
<td>31</td>
<td>26</td>
</tr>
<tr>
<td>2G</td>
<td>16</td>
<td>15</td>
<td>16</td>
</tr>
<tr>
<td>2C</td>
<td>15</td>
<td>13</td>
<td>11</td>
</tr>
<tr>
<td>2B</td>
<td>14</td>
<td>13</td>
<td>12</td>
</tr>
<tr>
<td>6H</td>
<td>11</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>3G</td>
<td>10</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>Total</td>
<td>173</td>
<td>157</td>
<td>155</td>
</tr>
</tbody>
</table>

*Number of farmers that responded to specific questions relevant to knowledge of and adherence to withdrawal period.

### TABLE 4. Prevalence of antimicrobial residue(s) in bulk milk samples

<table>
<thead>
<tr>
<th>Milking Center</th>
<th>No. of bulk milk samples tested</th>
<th>No. of bulk samples positive</th>
<th>Detection of antimicrobial residue</th>
</tr>
</thead>
<tbody>
<tr>
<td>1C</td>
<td>42</td>
<td>2</td>
<td>P [2]</td>
</tr>
<tr>
<td>5C</td>
<td>35</td>
<td>1</td>
<td>PS [1]</td>
</tr>
<tr>
<td>5H</td>
<td>33</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>2G</td>
<td>16</td>
<td>1</td>
<td>P [1]</td>
</tr>
<tr>
<td>2C</td>
<td>15</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>2B</td>
<td>14</td>
<td>1</td>
<td>NPS [1]</td>
</tr>
<tr>
<td>6H</td>
<td>11</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>3G</td>
<td>10</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>176</td>
<td>5</td>
<td>P [3], PS [1], NPS [1]</td>
</tr>
</tbody>
</table>

1 P, Penicillin; PS, Penicillin and Sulfa; NPS, Not Penicillin or Sulfa

[ ] Number of samples

A total of 107 (60.5%) of the 177 dairy farms tested exhibited resistance to one or more of the antimicrobial agents tested. Overall, all 4 types of pathogenic tested exhibited resistance to one or more of the antimicrobial agents tested.

For 177 dairy farms sampled, 105 (59.3%), 45 (25.4%) and 27 (15.3%) used veterinary services rarely, moderately and frequently, respectively (Table 2).
A total of 55 of 177 (31.1%) dairy farmers and their families consumed raw cows' milk. The reasons for consuming raw milk among 177 farmers were taste (27.3%), nutritious nature (23.6%), lack of time to boil (10.9%), preference (2.8%) and habit or custom (2.3%). A total of 12 farmers (21.8%) gave no reasons for consuming raw milk.

**DISCUSSION**

The prevalence of clinical mastitis (2.4%) in lactating cows detected in the present study is low, although similarly low prevalences have been documented elsewhere (6, 12, 14). A similar Caribbean study in Jamaica, another Caribbean country, reported a prevalence of 0.8% for clinical mastitis in dairy herds (31). Jung et al. (18), however, reported a higher prevalence, 8.3% for clinical mastitis in South Korea. Several reasons, among which are weather, breed of dairy cow, and management practices, have been reported to affect the occurrence of clinical mastitis (23). The relatively small sizes of dairy farms in Trinidad, coupled with a predominance of hand-milking practised by over 95% of the dairy farmers (Adesiyun and others, unpublished data) may in part, explain the low prevalence of clinical mastitis detected. Machine milking, if done improperly, has been found to result in mastitis (23). It is also known that low incidence of clinical mastitis is often due to high incidence of subclinical mastitis, especially with contagious microorganisms such as *S. aureus* which usually causes subclinical mastitis (25).

It was of interest to observe that *S. aureus*, the predominant etiological agent of clinical mastitis in lactating cows sampled, was responsible for mastitis in 64% of the cows and caused clinical mastitis in three of the five milking centres affected. This finding agrees with reports by others (19, 20, 31). In Europe and the United States, however, it is known that most cases of clinical mastitis are caused by environmental pathogens such as streptococci and coliforms, because contagious pathogens such as *S. aureus* have been controlled (25).

Although the somatic cell count was not determined in the present study, the CMT used in its estimation (28) detected reactions of 3+ and 4+, highly suggestive of high somatic cell counts in mastitic milk, coupled with the relatively high total aerobic plate count per ml. High somatic cell counts have been associated with clinical mastitis (12, 14), although clinical mastitis has been known to occur in farms with low somatic cell counts (6).

It was significant that resistance to penicillin was highly prevalent among *S. aureus* strains responsible for most clinical mastitis, as 56% of the isolates exhibited resistance. However, it did not come as a surprise, as milk originating from the milking centers but sampled at the collection centers using milk from non-clinical mastitis cows exhibited a high prevalence of resistance. High prevalence of resistance to penicillin has been reported by others (16, 20), which reflects the fact that most *S. aureus* strains have the penicillinase enzyme, known to be common in animal and human strains. Adesiyun et al. (4) reported that 48 of 100 strains of *S. aureus* were resistant to penicillin. *S. aureus* is well known to be associated with subclinical mastitis, which has been documented to be highly prevalent in Trinidad (1, 4) and in dairy farms elsewhere (20, 24, 27). Subclinical mastitis has also been reported to cause a 19% to 50% reduction in milk production, with associated economic losses (11, 12).

The rather high prevalence of resistance to penicillin may be explained, in part, by the fact that approximately 60% of dairy farmers in the farms studied did not use veterinary services but treated animals themselves. A recent change from free veterinary practices provided by government veterinarians to fee-paying services is a relevant factor to consider. In developing countries such as Trinidad and Tobago, antimicrobial agents are readily available and the possibility of misuse or abuse cannot be ignored, as has been pointed out by others (31). The economic impact of antibiotic resistance by etiological agents of mastitis is therefore important, as milk yield is consistently reduced and the potential for the spread of resistant pathogens to other cows also exists (29, 31).

Another public health concern associated with unsupervised treatment of their dairy cows by dairy farmers is failure to observe stipulated withdrawal periods following therapy; the major processing plant in Trinidad does not test for antimicrobial residues in milk from these farms. The risk may, however, be extremely low, as 90% of the farmers questioned claimed that they possessed knowledge of the requirement of a withdrawal period and in fact observed it. The observance of stipulated withdrawal periods may therefore account for the relatively low prevalence (2.8%) of antimicrobial residues in milk. Higher prevalences of antimicrobial residues in milk have been reported by others (8, 10).

Of food hygiene significance was the fact that close to a third of the dairy farmers and their families consumed raw cows' milk. Consumption of raw milk has been responsible for several epidemics (17, 22, 26). A number of milk-borne pathogens have been detected in livestock in Trinidad (3). The possibility of these pathogens gaining access to raw milk therefore exists. A second risk associated with consumption of raw milk is exposure to antibiotic residues. It was of interest to observe that approximately 20% of those consuming raw milk in the present study did so without specific reasons. It is therefore possible that the institution of an educational program to discourage raw milk consumption may be effective with these individuals. To date, information is not available on the percentage of the general population that also has access to raw milk from the dairy and that may consume raw milk.

In conclusion, although the prevalence of clinical mastitis in lactating cows studied is low, the
unsupervised use of antimicrobial agents by dairy farmers and the consumption of raw cows' milk are health concerns. It is therefore imperative that educational campaigns be instituted to address the problems.

ACKNOWLEDGMENTS

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ABOUT THE AUTHORS

1School of Veterinary Medicine, Faculty of Medical Sciences, University of the West Indies, St. Augustine, Trinidad; 2Veterinary Public Health Unit, Ministry of Health, Port of Spain, Trinidad.

REFERENCES

Measure MUN and Evaluate Dairy Cow Nutrition

Jamie Jonker, Resident Graduate Assistant
and Rick Kohn, Assistant Professor, Department of Animal and Avian Sciences

Milk testing laboratories now report levels of milk urea nitrogen (MUN) when measuring milk composition. MUN is important because of its effect on reproduction and nutrition. High levels of MUN have been associated with reduced conception rates and longer calving intervals, which result in lost income to the dairy farmer.

High MUN levels are often attributed to specific causes, including too much rumen degraded protein, too little energy, an imbalance of carbohydrate and protein ratios, not enough un-degraded rumen protein. None of these reasons alone tells the complete story; high levels of MUN depend on a combination of factors.

In simplest terms, high MUN levels indicate a general excess of nitrogen in the cow based on the animal’s level of production. Excess nitrogen might be the result of excess protein. The wasted protein, excreted in the cow’s urine, results in loss of income to the dairy farmer. Two few calories in the diet result in lost production by the cow. Because of this loss, the protein cannot be used, and high MUN results.

The rule of thumb is that levels of MUN in an average herd should fall between 12 and 16 milligrams per deciliter. If the average MUN level is outside this range, it is a good idea to try to determine the cause. We recommend a minimum of 10 cows be sampled to determine an average MUN value for a herd. Dairy Herd Improvement Association (DHIA) testing laboratories now routinely analyze milk for MUN. Including this analysis with your monthly DHIA sampling is convenient and might be cost effective for all cows in the herd. Bulk tank samples might save money, but they will not show differences among different groups of cows.

We need to systematically isolate the true cause of high MUN levels. The following checklist should help determine the cause and lead to solutions for correcting the problem.

MUN Checklist

1. Milk Production—Are the cows producing as much milk as we expected?
2. Diet Formulation—Is the diet formulated to meet the cow’s nutrient requirements?
3. Feed Analysis—Are all forages analyzed routinely?
4. Feed Digestibility—Do any of the feeds have heat damage?
5. Feeding Management—Are we feeding the cows the diets, as formulated, or is something lost in the translation from nutritionist > manager > feeder?
6. Animal Consumption—Are the cows eating what is offered or are they selecting part of the ration?
At first glance, the 3-A Sanitary Standards for Rubber and Rubber-Like Materials Used as Product Contact Surfaces in Dairy Equipment, Number 18-02, may seem unnecessary. After all, acceptable rubber materials intended for repeated use “in producing, manufacturing, packing, processing, preparing, treating, packaging, transporting, or holding food” are defined in the Code of Federal Regulations, Title 21, Part 177.2600 (21 CFR, Part 177.2600). So why would we need 3-A standards for materials that are already accepted by the FDA? The simple answer is that the CFR section on rubber materials and the 3-A standards for rubber materials address fundamentally different issues.

The Code of Federal Regulations, Title 21, which covers food and drugs, is further divided into parts (numbered 170 through 199), each of which covers specific aspects of food and drugs for human consumption. Part 177, titled “Indirect Food Additives: Polymers,” covers materials (plastics and rubbers) that are used in food contact surfaces. Specifically, Part 177.2600 covers “rubber articles intended for repeated use.” To comply with 21 CFR, Part 177.2600, articles must meet the following conditions:

- The articles must be made from acceptable substances. Acceptable substances include those that are generally recognized as safe (GRAS) for use in food or food packaging (these are listed in 21 CFR, Part 182); those listed in 21 CFR, Part 177.2600, paragraph (c)(4), which specifically names a number of acceptable rubber components, and those covered by other regulations.
- The total amount of material extracted during extraction with distilled water (for articles to be used with aqueous foods) or n-hexane (for articles to be used with high-fat foods) must be below certain limits.
- Substances intended to have an effect on the food may not be used.
- A substance may be used only in the necessary amount.
- Rubber articles to be used with dry foods must be made in accordance with good manufacturing practices that ensures that the articles are suitable for repeated use.
- The rubber articles must be thoroughly cleansed before they come in contact with food.

The scope of the 3-A Sanitary Standards for Multiple-Use Rubber and Rubber-Like Materials Used as Product Contact Surfaces in Dairy Equipment, Number 18-02, includes “the material and serviceability requirements of rubber and rubber-like materials intended for multiple-use as product contact surfaces or solution contact surfaces in the production, processing, and handling of milk or milk products.” These requirements are found in Sections C (Materials) and D (Compatibility with Cleaning and Sanitizing Agents). To comply with Section C, the material must be nontoxic, must not adversely affect the product, and must comply with 21 CFR, Part 177.2600. In addition, it must:

- meet minimum tensile strength and elongation requirements;
- meet tolerance limits for changes in hardness, weight, and volume after immersion in a high-fat medium (butter oil or anhydrous milk fat) at specified time and temperature settings;
- meet tolerance limits for changes in hardness, weight, and volume after immersion in distilled water at specified time and temperature settings; and
- meet tolerance limits for changes in hardness after exposure to heated air for a specified length of time (the temperature varies according to material type).
To comply with 3-A 18-02, Section D, the material must meet tolerance limits for changes in hardness, weight, and volume after immersion in:

- an acid cleaning solution;
- an alkaline cleaning solution; and
- a chlorine sanitizing solution.

Each immersion test follows a separate testing procedure and is performed at appropriate time and temperature settings.

To summarize, the requirements of 21 CFR, Part 177.2600 ensure that components used in rubber product contact surfaces are nontoxic, have no effect on the product, and are present only in the necessary quantity. If any material is incidentally extracted into the product, these regulations ensure that the amount of material extracted will be inconsequentially small and will not present a threat to public health.

In addition to referencing these CFR requirements, the criteria specified in 3-A 18-02 address the physical properties of the rubber and rubber-like materials. These criteria ensure that materials used as product contact surfaces will maintain their original strength, elongation, hardness, weight, and volume characteristics throughout the processing, cleaning, and sanitizing phases. The testing procedures in Section C simulate the effects of processing conditions, while the tests specified in Section D simulate the effects of cleaning and sanitizing solutions over an extended period of regular use. Thus, they are accelerated use-simulating tests, not normal processing, cleaning, and sanitizing procedures.

Therefore, although 21 CFR, 177.2600 and 3-A 18-02 may initially appear to be redundant documents, they actually work in conjunction to guarantee that any rubber or rubber-like material used as product contact surfaces in dairy equipment is safe, is cleanable, and does not affect public health.

ABOUT THE AUTHOR
Kirk Snyder served as technical assistant, IAFIS, Thomas M. Gilmore*, Ph.D., 1451 Dolley Madison Boulevard, McLean, VA 22101, U.S.A.; Phone: 703.612.2600; Fax: 703.612.4354.
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New IAMFES Sustaining Member

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Dr. Robert Bosselman, FMP, Appointed Academic Ambassador

The Educational Foundation of the National Restaurant Association has appointed Dr. Robert Bosselman, FMP, as Academic Ambassador.

Bosselman will be the liaison between academic instructors at four-year universities and The Educational Foundation. He will also represent The Foundation at regional and national events and will serve on The Foundation’s curriculum development advisory committee, which provides insight on development of programs for two- and four-year curriculum and continuing education.

Bosselman currently serves as Associate Director of Graduate Studies and Research for the William F. Harrah College of Hotel Administration, at the University of Nevada, Las Vegas. His specific responsibilities include managing the master’s degree program, and supervising research activities of the college. He also holds the rank of Associate Professor in the Department of Food and Beverage Management, and carries a full teaching load each semester.

Bosselman has written more than 30 academic papers with research interests in food sanitation, foodservice operations, labor relations and hospitality education. He was the founding Editor of the Hospitality and Tourism Educator, and also served a term as Editor of the Hospitality Research Journal.

He received his doctorate in food systems administration from Oklahoma State University, a master’s degree in hotel and restaurant administration from Florida International University and a bachelor’s degree in biological sciences from SUNY, Buffalo. He is also a registered Dietitian.

Wirtz Promoted to Vice President at AIB

Ron Wirtz has been promoted to Vice President, Information Services and Distance Learning, to coordinate activities formerly carried out by three AIB departments: information services, communications, and distance learning.

Wirtz is a native Kansan who received his Ph.D. in Education from Kansas State University in 1994. He began at AIB as Director of the Ruth M. Emerson Library in 1987 and was named Director of Information Services and Distance Learning in 1995 and 1996, respectively. The combination of the three departments will allow Wirtz to continue his work in the Emerson Library while adding leadership to all of AIB’s remote learning programs, including correspondence courses, CD-ROM programs, and AIB’s Internet marketing efforts.

Prior to coming to AIB, Wirtz worked as a media specialist in public schools in Kansas and Nebraska and taught French at William Woods College and Emporia State University.

He has a language certificate from the Sorbonne in Paris, France, a bachelor’s degree in French from Kansas State, a master’s in French from Colorado State University, and an MLS in library science from Emporia State University. Wirtz is a member of the American Society of Bakery Engineers, the Society for Applied Learning Technology, the Library and Information Technology Association, and the Association for Supervision and Curriculum Development.

Sales Executives Join A & B Process Systems

A & B Process Systems Corp. announces the appointment of William R. Griffin as Vice President—Western Division, and Dan B. Look as Sales Coordinator.

Griffin will maintain A & B’s Western Division office in Portland, OR. He comes to A & B with a strong background in processing environments. Previously employed by another international provider of process flow systems and related equipment, he has filled key technical and managerial roles in turnkey projects. Griffin holds a bachelor of technology degree in mechanical engineering from the Rochester Institute of Technology in Rochester, NY.

Dan Look comes to A & B from a nationwide welding distributorship and industrial sales group, where he served as an Account Manager since 1989. He has a broad range of sales experience with products that directly relate to the welding and safety industries, and has a good understanding of plant floor operations. He will coordinate internal aspects of the sales department as well as handling inside sales responsibilities and management of select outside sales accounts.
FDA Backgrounder: Food Irradiation

The Food and Drug Administration has approved irradiation to control microorganisms on fresh and frozen red meats including beef, lamb and pork. This FDA approval was based partly on research by Chemist Donald W. Thayer of USDA’s Agricultural Research Service. The following is an overview of irradiation and some of Thayer’s findings over the years.

Irradiation passes through food in the form of radiant energy, without leaving any residue. Ionizing radiation which produces enough energy to kill bacteria and other pathogens in food, involves the use of gamma rays produced by cobalt or cesium, or X-rays or electrons from machine sources. The FDA has declared that low-dose irradiation of food presents no health risk. In the 1920s, a French scientist discovered that irradiation could preserve food. During World War II, the U.S. Army tested irradiation on fruits, vegetables, dairy products and meat. Irradiated food has been routinely used for years by NASA.

Not only does irradiation extend the shelf life of fruits and vegetables, it also kills pests. Thayer likens irradiation to pasteurization: when used with the proper handling and processing techniques, irradiation greatly reduces the risk that contaminated meat, poultry, and other foods will reach consumers.

According to Thayer, during the irradiation process, food never comes in contact with any radioactive material. The gamma rays, X-rays, or electrons used in the process do not make food radioactive. Irradiation is similar to exposure to sunlight or being X-rayed for medical reasons. Specific doses of radiation can kill rapidly growing cells, such as those of insects or spoilage and pathogenic bacteria. But the process has little effect on the food itself because there is no cellular activity in the food. The changes that do occur are similar to the effects of canning, cooking or freezing food.

Thayer reports that irradiation can minimally affect some very sensitive vitamins like B1 in pork. It has been estimated that if all the pork in the U.S. were to be irradiated, Americans would lose only 3.2 percent of the vitamin B1 in their diets. "Irradiation converts small amounts of vitamin C in fruit to another equally usable form, so nothing is lost. In fact, multigenerational studies of animals fed irradiated foods show that not only is it safe, but the nutritive value remains virtually unchanged." Herbs, spices and seasonings can introduce bacteria that may cause spoilage or foodborne disease in food that must be stored or transported before reaching consumers. Some food processors treat spices with methyl bromide to kill insects or with ethylene oxide to control bacteria and mold. Both these chemicals are extremely toxic. But most spices, herbs, and dry vegetable seasonings in the U.S. are treated with ionizing radiation, which was sanctioned for this particular use by FDA in 1986.

In 1963, FDA authorized the first use of irradiation to treat food in the U.S. Wheat and wheat flour were irradiated to rid them of insects. An electron beam is used to kill insects on about 400,000 tons of wheat a year at the port of Odessa, Ukraine. This irradiation treatment is not used in the U.S. because we have other fumigants and methods of getting pests out of grain. In 1986, irradiation was approved to control insects and inhibit growth and ripening in fruits, vegetables, and grain.

Irradiation increases the shelf life of very perishable sweet onions to three months and not only extends the shelf life of tomatoes, but also allows them to be picked when fully ripe. Zapped by irradiation, mushrooms can last for three weeks without browning or cap separation and strawberries can stay in the refrigerator for three weeks without decay or shrinkage. Even Cyclospora succumbs to irradiation. "We used a dose of irradiation that is recommended for fresh fruit on raspberries infected with Cyclospora. Not only does irradiation inactivate the parasite, but it also doubles the raspberries' shelf life," Thayer reports. "More research is planned on irradiating Cyclospora, but it reacts in much the same way as Toxoplasma gondii, a species of organism that continues to sporulate after irradiation but does not multiply in its host."

Thayer was the first to discover that E. coli O157:H7 could be controlled by radiation. He and colleagues have successfully used irradiation against other foodborne pathogens including Bacillus cereus, Clostridium botulinum, Listeria monocytogenes, Salmonella, Staphylococcus aureus and Toxoplasma gondii on meat and poultry.

Davis Calvin Wagner Sanitarian Award

The American Academy of Sanitarians announces the call for nominations for the Annual Davis Calvin Wagner award. The award will be presented by the Academy during the Annual Educational Conference of the National Environmental Health Association. The award consists of a plaque and a $500.00 honorarium.
Nominations for this award are open to all diplomates of the academy.

The deadline for receipt of nominations is April 15, 1998. Three copies of the nomination must be sent to John G. Todd, Dr. P.H., Chairman, A.A.S. Davis Calvin Wagner Award, 17309 Fletcher Drive, Poolesville, Maryland 20837.

**Enhanced Diatomaceous Earth and Heat Treatment Being Tested as Possible Replacement for Methyl Bromide Fumigation**

The combined use of enhanced diatomaceous earth (EDE) and superheated air is showing promise as one alternative to structural fumigations with methyl bromide of flour and feed mills. PCO Services, Inc., Toronto, used EDE and heat to treat a 260,000-cubic foot Rogers Foods, Ltd., grain mill in Armstrong, British Columbia. The commercial trial has been successful based on monitoring of results since the treatment in May 1997.

Bernie McCarthy, Chairman of the company’s fumigation committee, says its commercial use of EDE and heat follows research done in March 1997 with Quaker Oats of Canada, and the Canadian and U.S. governments as part of an effort to identify alternatives to methyl bromide. The fumigant, widely used in flour and feed mills to control grain-infesting insects, is being phased-out globally because it damages the Earth’s ozone layer.

“Research is showing that enhanced diatomaceous earth and heat can provide commercial levels of insect control in flour and feed mills,” McCarthy says. “In the Rogers Foods plant we gained 100 percent control of exposed test insects placed in the plant to monitor control. Following the treatment, a three-hour test run using industrial flour in treated sifter bins produced no live insects. We were very pleased with these results.”

Portable heaters were used to generate temperatures of 110 degrees Fahrenheit (43.2 degrees Celsius). Protect-it’s from Hedley Technologies, Vancouver, an enhanced diatomaceous earth (EDE) product, was applied at a rate of 0.038 grams per cubic foot with an electric duster.

EDE and heat have been used to control insects in grain facilities, but the combination provides a synergistic effect to greatly improve efficacy, says Zia Siddiqi, Ph.D., B.C.E., Technical Director of PCO Services and Prism Integrated Sanitation Management, Miami.

“Diatomaceous earth kills insects through dehydration by damaging their waxy protective outer coating,” Siddiqi says. “Heat creates a dryer environment that enhances the dehydration effect of diatomaceous earth. Together, diatomaceous earth and heat kill insects faster and at lower temperatures.”

Diatomaceous earth is nontoxic to mammals, nonflammable and is allowed as a food additive to a level of 100 ppm. It can be added directly to grain.

McCarthy says PCO Services is working on ways to improve the EDE and heat technique.


For its efforts in working to identify alternatives to methyl bromide, PCO Services was nominated for a CCME Pollution Prevention Recognition and Award by the Canadian government.

**Discovery Links New Form of Inheritance in Yeast to “BSE” Type Diseases**

Researchers from the Howard Hughes Institute at the University of Chicago have discovered a chaperone protein from yeast, which helps proteins to change their shapes, controls a new, protein-only form of inheritance, called a yeast prion. They have isolated the chaperone and prion proteins and shown that they can produce such shape changes in a test tube. The chaperone is very specific for certain target proteins and ignores most other proteins in the cell. Remarkably, the same yeast chaperone reacts with prion proteins from mammals. Prions are responsible for BSE in cattle, scrapie in sheep, Creutzfeldt-Jakob, and other fatal ailments in humans. Prions have amazed scientists by their ability to cause disease by a new protein-only mechanism. When prion proteins fold into a different shape they produce indigestible tangles which can kill or damage nerve cells. This change in shape spreads to other proteins and other cells, killing the animal and producing new infectious material. The same yeast chaperone also interacts with beta-amyloids, fibrous peptides that forms the destructive tangles which are believed to cause Alzheimer’s disease.

These findings, reported in papers in the December 9 issue of the *Proceedings of the National Academy of Sciences*, add considerable weight to the prion hypothesis, linking the mechanism responsible for the new form of inheritance in yeast to neurodegenerative diseases of humans and animals. They provide a new target for potential therapies, and furnish a model system for more rapid and less expensive study of prion diseases and treatments. Perhaps more important, they indicate that prion-like variations in protein folding may be vastly more common than previously imagined.

The yeast protein, Hsp 104, is a chaperone, a member of a family of proteins that escort other proteins...
to their destinations within the cell and help them fold correctly. Hsp 104, for example, is a heat-shock protein. It protects cells from environmental stresses such as high temperatures or toxins by promoting changes in shape in stress-damaged proteins, restoring them to their working forms. It was also found that a chaperone protein from bacteria (GroEL) can interact with prion proteins too.

Mounting evidence has linked Hsp 104 to a role in regulating whether the yeast prion folds into its normal working or abnormal non-functional conformation. Today's study provides the first direct evidence of the Hsp 104-prion interaction.

The real surprise was the powerful affinity between the yeast and bacterial chaperones and the mammalian prion. The primary structure of the mammalian prion protein is completely different from that of the yeast prion protein. But both have a very unusual ability to change shape and to spread this change in shape from cell to cell. Unlike BSE prions, the yeast prion doesn't kill cells, but it alters their appearance and activity.

**FSIS Gives Notice of ‘Zero Tolerance’ in HACCP**

FSIS announced in the Federal Register a notice to ensure that owners and operators of federally inspected slaughter establishments are aware that it views visible fecal material on live-stock carcasses at post-mortem inspection and poultry carcasses about to enter the chilling tank or thereafter as a food safety standard. It goes on to state that a HACCP for slaughter must be designed to ensure that by the time the livestock or poultry carcasses reach these points, no visible fecal material is present. The lengthy, and sometimes repetitive notice reaffirms that FSIS regards “zero tolerance for visible fecal material” as a food safety standard under both the F米A and PPIA. Further, that fecal material is a vehicle for microbial pathogens, and microbiological contamination is a food safety hazard that is reasonably likely to occur in the slaughter production process. They go on to state that under the HACCP system regulations, critical control points to eliminate contamination with visible fecal material are both predictable and essential components of all slaughter establishments' HACCP plans. Thus, the agency will be looking in HACCP plans for how this will be controlled.

It further states that FSIS personnel will continue to verify compliance with the zero tolerance standard in slaughter establishments that are subject to part 417 requirements. It will use both visual observations and other ways to evaluate the effectiveness of both preventive controls and corrective actions for fecal material.

**FDA Publishes Guidance on Industry-Supported Activities**

In the Federal Register, FDA announced the publication of “Final Guidance on Industry-Supported Scientific and Educational Activities.” This guidance document was prepared by FDA's Intra-Agency Working Group on Advertising and Promotion.

FDA is providing this guidance to describe the Agency’s enforcement policy with regard to scientific and educational activities supported by industry. The guidance seeks to clarify the distinction the Agency draws between scientific and educational activities that FDA considers nonpromotional and those that the Agency considers promotional, and to provide guidance on how industry may support such activities without being subject to the labeling and advertising provisions of the Federal Food, Drug, and Cosmetic Act (the Act). This jurisdictional line is important because the constraints on advertising and labeling, when applied to scientific and educational activities, can restrict the freedom of participants to discuss their data or express their views. In particular, discussions of unapproved uses, which can be an important component of scientific and educational activities, are not permissible if programs that are or can be subject to substantive influence by companies that market products related to the discussion. The Agency recognizes that industry-supported activities can be both nonpromotional and educational.

FDA does not intend to regulate, under the labeling and advertising provisions of the Act, industry-supported scientific and educational activities that are independent of the influence of the supporting company. Companies and providers who wish to ensure that their activities will not be subject to regulation should design and carry out their activities free from the supporting company’s influence and bias, based on factors FDA considers in evaluating activities and determining independence. These factors are listed in the guidance document.

Copies of “Final Guidance on Industry-Supported Scientific and Educational Activities” (CVM number 65) may be obtained from the on-line library at CVM's Internet Home Page (http://www.cvm.fda.gov/) or by calling CVM's communications staff at 301.594.1755.
Monitoring Supply Chain Made Easy with New Ryan Recorder

Ryan Instruments introduces its latest in humidity and temperature monitors, the HAT. This affordable, easy-to-use monitor provides the user with the critical information on environmental conditions needed to manage perishables throughout the supply chain.

The HAT can be programmed to monitor in one of three ways; humidity only, temperature only or both temperature and humidity. Whether the HAT is monitoring parameters in the field, in storage coolers, warehouses, at retail in display cases, or during the transportation of sensitive materials or perishable products, users are able to collect vital humidity and/or temperature information about the conditions in which their products were handled. The HAT will meet HACCP standards for humidity and temperature.

The HAT has many unique features such as a dual LCD readout with real time updates at the push of a button, and Ryan's out-of-bounds at a glance technology providing users with a visual alert to either humidity or temperature samples that are outside desired limits. This monitor has been designed with comfort and ease-of-use in mind. It offers user friendly WIN 3.1 or WIN95 HATWare software, and information provided in graphic and tabular reports. The user has the ability to replace the 9 volt battery in the field, which saves time and money.

The HAT temperature range is -4°F to 131°F (-20°C to 55°C) with an accuracy of ±0.9°F ±32°F (± 0.5°C at ≥ 0°C) and ±1.8°F at < 32°F (± 1.0°C at < 0°C). Humidity range is 10% to 100% with a standard accuracy of ±4% over the full range and upon request custom calibration is offered to ±3%. The HAT can record up to 16,000 samples, by using one of a list of selected intervals or in one minute increments from 1 through 250 minutes. All these features and more are found in the small, efficiently designed package (5 1/4" x 2 3/4" x 1 1/4" and weighs only 4.8 oz.).

Ryan Instruments, Redmond, WA

Validation Package for MicroLog™ System

The U.S. Food and Drug Administration has published its Guidelines on General Principles of Process Validation. Meeting these guidelines is required under the current good manufacturing practices (GMP) regulations for medical devices. In the Guidelines, the FDA defines process validation as “establishing documented evidence which provides a high degree of assurance that a specific process will consistently produce a product meeting its predetermined specifications and quality characteristics.”

To assist customers in meeting these requirements, Biolog, Inc. has developed and made available for purchase a validation package for the MicroLog Microbial Identification System. The package includes documentation, two sets of 24 ATCC® organisms, and the associated ancillary products. The package, formatted in an easy to use step-by-step fashion, is designed to meet the requirements for process validation. Documentation to meet Instrumentation Qualification, Operator Qualification, and the MicroLog System component maintenance is included.

Biolog Inc., Hayward, CA
lagoons. The technology was developed in Austria and the rods are manufactured there. The Energizer Rod is a double configuration of two sturdy, eleven inch stainless steel rods connected by steel bars. The rods contain a fluid, which is charged with specifically designed frequencies, creating a permanent magnetic field around the rod. The resulting effect is the realignment of water molecules that accelerate the absorption of oxygen into the lagoon, increasing and activating the aerobic bacteria.

The water’s reduced surface tension quickly saturates the crust of the lagoon, which gradually breaks up and dissolves. An odor-inhibiting foam forms on the surface as ammonia is effectively converted, reducing harmful nitrates to near zero levels. Activated by increased oxygen levels aerobic bacteria multiply rapidly, converting the raw manure into field-safe, nutrient-rich fertilizer. When the treated manure is sprayed on fields it does not stick to the plants, nor burn them, but quickly slides off soaking into the ground and releasing nutrients. The nitrogen and oxygen released into the soil starts greening up the plants within 24 to 48 hours.

The Energizer Rod is ideal for dairy operations and one rod will handle the manure from 500 to 700 cows, provided there is at least 50% water in the lagoon to keep it liquid. If solids are screened out the process is speeded up. The rods are easy to install and require no power source, no maintenance and will provide years of trouble-free use. Note: The rods must be protected from freezing. The Energizer Rod comes with a two-year factory warranty and 90 day money-back guarantee.

Aqua Life Products Limited, Bellingham, WA

Fluid Metering, Inc. is available in 110 VAC, as well as 220 VAC CE Approved and Explosion-Proof (Model QDX).

Fluid Metering, Inc., Syosset, NY

New Tri-Clover Mainstream® Strainer/Filter Features Unique Basket

Quality filtering without the maintenance and mess of filter bags has been made possible through Tri-Clover’s introduction of a new Mainstream® SEBW with Vee-Wire® strainer basket. The new Mainstream SEBW strainer enables filtering to 150 micron. Short and long models are available with inlet/outlet diameters of 2, 3, and 4 inches.

The Mainstream filter’s unique Vee-Wire basket meets 3A requirements for cleaning out-of-place and reuse, enhancing maintenance and reducing replacement expense. The VeeWire is constructed of v-shaped wire that is welded to perpendicular support rods. By providing just two points of contact at the screen surface — unlike the multiple contact points in perforated metal and wire mesh screens — the design minimizes clogging and enhances process efficiency at high capacities. Tri-Clover’s filters and strainers can be used individually or in tandem to remove coarse, medium or fine particles from a process stream.

Tri-Clover, Kenosha, WI

Cold Weather Nitrification Improvement

A new product from Bioscience, Inc. improves oxidation of ammonia to nitrates in wastewater treatment plants when cold weather or adverse conditions inhibit the growth of natural nitrifying microorganisms.
Known as MICROCAT®-XNL, the biological formulation is a liquid suspension of adapted microorganisms selected for their ability to oxidize ammonium ions to nitrite and then to nitrate. It is used to start up, reseed or maintain nitrifying systems and to enhance treatment plant performance under toxic, inhibitory and/or cold weather conditions. When used for preventive maintenance, MICROCAT-XNL restores consistent nitrification and improves overall system performance. The product is also available as a refrigerated concentrate, MICROCAT-XNC.

In a 3 MGD municipal treatment plant, consisting of two 15 million gallon aerated lagoons in series, followed by settling basins, MICROCAT-XNL reduced effluent ammonia-nitrogen levels to below 3 mg/l permit limits when temperatures were in the 10 to 14°C range and the plant was experiencing high BOD loading from industrial discharges. The liquid product was added to the second lagoon by a chemical pump system after the pH of the wastewater had been adjusted to optimum conditions for nitrification using soda ash. Ammonia-nitrogen removal rates with MICROCAT-XNL averaged 83 percent, compared to 43 and 52% respectively in two previous winters without bioaugmentation.

Bioscience, Inc., Bethlehem, PA

Share’s PRO-FOAM Sanitizing System Designed for Food Facility Clean-up

Share Corporation introduces PRO-FOAM, a new sanitizing system specifically designed to provide easy cleaning and sanitizing of walls, floors and equipment at food processing facilities. PRO-FOAM combines washing, rinsing and sanitizing into one easy-to-use unit. The system uses a special trigger applicator which allows users to simply point at surfaces and spray them with a foaming cleaner, a clean water rinse and an air drying disinfectant. PRO-FOAM also eliminates the need for difficult hand scrubbing.

The PRO-FOAM system mounts to almost any wall to provide immediate cleaning where it’s most needed within a facility. Using regular garden hose, the unit hooks up to a standard faucet as a source of fresh water for rinsing. Share also provides many cleaning and sanitizing solutions designed to kill germs, bacteria and dangerous viruses. PRO-FOAM meets USDA and EPA standards and is ideal for use at meat and seafood packing plants, produce processing facilities, grocery stores, delis and bakeries.

Share Corporation, Milwaukee, WI

Delco Offers Compact and Powerful Pressure Washer

Delco’s versatile VERSA 2100 and VERSA 2100XL Hot High Pressure Washers cut clean-up time down to size. Blast away dirt, grease and grime from farm equipment, truck and car fleets, and a variety of other surfaces with a combination of hot water and high pressure.

Delco’s VERSA 2100 and VERSA 2100XL pressure washers come equipped with duplex ceramic plunger pumps producing 2.1 gpm for the VERSA 2100 and 2.2 gpm for the VERSA 2100XL at 1000 psi. The 115 volt, 1.5 hp capacitor start, capacitor run motor delivers the power for these compact but powerful hot high pressure washers. Standard features include a high limit temperature switch, and a heavy duty 55 foot power cord with ground fault circuit interrupter (GFCI) for operator safety.

VERSA 2100 units are equipped with an open type gun with a 1/4", x 25' hose and 10 1/2" rubber tires.

While VERSA 2100XL models have a trigger-type gun with a 3/8" x 40' hose and pneumatic tube tires. Both have fuel tanks with a 5.8 gallon capacity and accept #1 and #2 Diesel fuel.

Add versatility for customer use, Delco’s VERSA 2100’s are equipped with low amperage draw burner systems. When you need an efficient pressure washer for your business, you need the economically priced VERSA 2100.

Clarke/Delco Industries, Springdale, AK

Ecolab Introduces Convenient Liquid Membrane Cleaning System

Ecolab has introduced a convenient and effective way to clean Reverse Osmosis/ ultra filtration (RO/UF) membrane systems. The company’s new Ultrasil Liquid cleaners and automated dispensing system are designed to maximize RO/UF system performance and help extend membrane life.

Ultrasil Liquid products are specially designed to break down soils, helping to bring membranes’ flux rates back to maximum levels. The liquid can be used in a variety of processing applications, including dairy, meat and poultry, produce, juices, sugar, and sweeteners, grain milling, agriculture, brine and plasma.

A pre-programmed controller accurately dispenses Ultrasil Liquid products. With the push of a button, a time-feed system dispenses the liquid for consistent and accurate allocation with no spills or waste. There is also less operator exposure to concentrated chemicals.

The preprogrammed controller also documents dispensing times, cycles and product amounts to help processors optimize the cleaning process.

Ecolab, St. Paul, MN
IAMFES SECRETARY CANDIDATES

John C. Bruhn

John C. Bruhn is Director of the Dairy Research and Information Center, a program that helps facilitate the conduct of dairy production and dairy foods research and education within the University of California. The program also allows those outside the university to seek research and educational resources from the university. Dr. Bruhn is a Dairy Foods Processing Specialist with Cooperative Extension in the Department of Food Science and Technology as well. As a Cooperative Extension Specialist, he has the responsibility of developing applied research and educational programs for the California dairy foods processing industry. Dr. Bruhn first joined the University of California in 1963 as a Research Assistant; prior to that he was a Research Specialist with Continental Can, Chicago, Illinois.

In 1962 he received his B.S. in food science from Michigan State University. He received his Ph.D. in 1968 from the University of California-Davis in dairy bacteriology. His research and educational programs for the dairy industry have emphasized factors relating to the quality and safety of raw milk, processed milk, and dairy foods.

Dr. Bruhn has been an active member of IAMFES since 1970. His involvement has included Chair of the Dairy, Food and Environmental Sanitation Management Committee; Chair of the Affiliate Council 1996-97; member of the Editorial Board for both IAMFES journals; member of the Program Advisory Committee; and organizer for Annual Meeting symposia. He has published many articles in both IAMFES journals. He is also active in his local affiliate the California Association of Dairy and Milk Sanitarians (CADMS). Other professional involvement for Dr. Bruhn includes: California Dairy Industries Association, California Creamery Operators Association, Institute of Food Technologists, and the American Dairy Science Association.

Honors Dr. Bruhn has received in recognition of his accomplishments include: the IAMFES Educator Award, CADMS Sanitarian Award, Outstanding Alumnus Award from MSU, and the Alfa-Laval, Inc. De Laval Agricultural Division Award from ADSA.

Jim Dickson

Jim Dickson is Interim Department Executive Officer and Associate Professor for the Department of Microbiology, Immunology and Preventative Medicine at Iowa State University, Ames, Iowa. Prior to his employment with Iowa State University, Dr. Dickson held positions as Research Food Technologist and Lead Scientist at USDA-ARS Meat Animal Research Center, Clay Center, Nebraska; Microbiologist, Tony's Pizza Service, Salina Kansas; and Manager, Food Irradiation Applications, Radiation Technology, Inc., Rockaway, New Jersey.

Dr. Dickson received his Ph.D. from the University of Nebraska-Lincoln in 1984. He began his academic career at Clemson University where he received his B.S. in 1977. He received his M.S. from the University of Georgia in 1980.

Research interest for Dr. Dickson includes the microbiological safety of foods of animal origins. Within this area, his interest is in the growth and physiological activity of bacteria of public health concern, especially the Gram negative bacteria, as affected by food processing and storage. He has also conducted research on bacterial attachment to food and food contact surfaces. The result of this research has led to a patent on a process to reduce bacterial contamination on animal carcasses.

Dr. Dickson has been an active member of IAMFES since 1987. His involvement includes serving on the Nominating Committee in 1995 and 1996; Vice-Chair of the Applied Laboratory Methods Professional Development Group in 1991-92; Current Vice-Chair of the Meat Safety and Quality Professional Development Group; and a member of the Journal of Food Protection Management Committee. He has also published numerous articles in the Journal of Food Protection and serves on its Editorial Review Board. Other professional involvement includes membership in the American Academy of Microbiology, American Society for Microbiology, Institute of Food Technologists and the International Meat and Poultry HACCP Alliance Expert Committee on Certification.

An outstanding performance award and three certificates of merit for outstanding performance in research from the USDA are among the numerous honors Dr. Dickson has achieved. Others include a Fellow in the American Academy of Microbiology, and a member of Phi Kappa Phi, Phi Tau Sigma, and Gamma Sigma Delta.
The 3-A Symbol Story

The 3-A Sanitary Standards Symbol Administrative Council, known throughout the industry as the "3-A Symbol Council," was organized in 1956. Its purpose is to grant authorization to use the 3-A Symbol on equipment that meets 3-A Sanitary Standards for design and fabrication.

A Modern Concept

The modern concept of the 3-A program was established in 1944 when the Dairy Industry Committee (DIC) was formed. DIC is one of the three industry segments involved in the preparation of 3-A Sanitary Standards. These industry segments are:

- **Processors**, represented by DIC
- **Equipment Manufacturers**, represented by IAFIS
- **Sanitarians**, represented by IAMFES

Use of the Symbol

Voluntary use of the 3-A Symbol on dairy equipment:
- assures processors that equipment meets sanitary standards
- provides accepted criteria to equipment manufacturers for sanitary design & fabrication
- establishes guidelines for uniform evaluation and compliance by sanitarians.

3-A Sanitary Standards Symbol Administrative Council

3020 Bluff Road
Columbia, SC 29209-3502

803-783-9258 phone 803-783-9265 fax
**Holders of 3-A Symbol Council Authorization as of February 1998**

Questions or statements concerning any of the holders’ authorizations listed below, model numbers or the equipment fabricated should be addressed to:

Administrative Officer, 3-A Symbol Council, 3020 Bluff Rd., Columbia, SC 29209; Phone 803.783.9258; Fax 803.783.9265

### 01-07 Storage Tanks for Milk and Milk Products

<table>
<thead>
<tr>
<th>No.</th>
<th>Manufacturer</th>
<th>City, State</th>
<th>Model Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>APV Crepaco</td>
<td>Lake Mills, Wisconsin 53551</td>
<td>(5/1/56)</td>
</tr>
<tr>
<td>28</td>
<td>Waukesha Cherry-Burrell</td>
<td>Little Falls, New York 13365</td>
<td>(10/3/56)</td>
</tr>
<tr>
<td>117</td>
<td>DGI Inc.</td>
<td>P.O. Box 1227, 600 No. 5th Avenue St. Cloud, Minnesota 56301</td>
<td>(10/28/59)</td>
</tr>
<tr>
<td>127</td>
<td>Paul Mueller Co.</td>
<td>P.O. Box 828 Springfield, Missouri 65801</td>
<td>(6/29/60)</td>
</tr>
<tr>
<td>440</td>
<td>Scherping Systems</td>
<td>801 Kingsley Street Winsted, Minnesota 55965</td>
<td>(2/28/85)</td>
</tr>
<tr>
<td>51</td>
<td>Walker Stainless Equipment Co., Inc.</td>
<td>902 - 2nd Main Street Elroy, Wisconsin 53929-0126</td>
<td>(10/4/56)</td>
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### 02-09 Pumps for Milk and Milk Products

<table>
<thead>
<tr>
<th>No.</th>
<th>Manufacturer</th>
<th>City, State</th>
<th>Model Numbers</th>
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</thead>
<tbody>
<tr>
<td>68R</td>
<td>APV Fluid Handling-Americas</td>
<td>Lake Mills, Wisconsin 53551</td>
<td>(4/29/57)</td>
</tr>
<tr>
<td>946</td>
<td>APV Fluid Handling-America</td>
<td>Lake Mills, Wisconsin 53551-1799</td>
<td>(11/25/97)</td>
</tr>
<tr>
<td>636</td>
<td>Abel Pumps Corporation</td>
<td>79 North Industrial Park 511 North Avenue Sewickley, Pennsylvania 15143-2339</td>
<td>(7/10/91)</td>
</tr>
<tr>
<td>568</td>
<td>Allweiler AG, Werk Bottrop Kirchhellenring 77-79 D-46244 Bottrop Germany</td>
<td></td>
<td>(5/15/89)</td>
</tr>
</tbody>
</table>

(U.S. Rep.: Shanley Pump and Equipment, Inc. 2525 South Clearbrook Drive Arlington Heights, IL 60005)  
793 Ampco Pumps Co. 4000 W. Burnham Street Milwaukee, Wisconsin 53215  
212R Babson Brothers Company Dairy Systems Division 20905 West Gale Avenue Galesville, Wisconsin 54630-0659  
923 Bombas Bornemann S.R.L. Armenia 28981 (1605) Munro, Argentina  
(US. Rep.: Bornemann Pumps, Inc. P.O. Box 1769 Matthews, North Carolina 28105)  
205R Boumatic 1919 S. Stoughton Road P.O. Box 8050 Madison, Wisconsin 53716  
759 CSF Inox S.P.A. Strada per Bibbiano 7 - Montecchio E. (RE) Italy  
(U.S. Rep.: Sanchelima Int. 1781-83 N.W. 93rd Avenue Miami, Florida 33172)  
709 Conexiones Inoxidables de Puebla S.A. de C.V. Vicente Guerrero No. 211 Xicotencos de Juarez Edo. Puebla, Mexico  
(U.S. Rep.: Ben Dolphin Consulting 4735 Lansing Drive North Olmsted, Ohio 44070)  
820 Drum Industries, Inc. 2501 Constant Comment Place Louisville, Kentucky 40299  
(Mfg. by: Alfa Laval Pumps, LTD Eastbourne East Sussex UK)  
671 Flowtech Inc., - Teknoflow, Inc. 1701 Spinks Drive Marietta, Georgia 30067  

(5/14/91)  
(9/14/94)  
(2/20/70)  
(5/16/97)  
(5/22/69)  
(5/25/93)  
(1/18/93)  
(5/17/95)  
(4/1/92)
<table>
<thead>
<tr>
<th>Company</th>
<th>Address</th>
<th>Phone</th>
<th>Fax</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sine Pump</td>
<td>c/o Sundstrand Fluid Handling</td>
<td>1484 West 6th Street</td>
<td>Arvada, Colorado 80004</td>
<td>(7/21/87)</td>
</tr>
<tr>
<td>Stainless Products, Inc.</td>
<td>1649-72nd Avenue</td>
<td>P.O. Box 169</td>
<td>Somers, Wisconsin 53171</td>
<td>(4/4/89)</td>
</tr>
<tr>
<td>Sudmo North America, Inc.</td>
<td>4786 Colt Road</td>
<td>Rockford, Illinois 61109</td>
<td>(Mfg. by: Sudmo Schleicher AG Industriest. 7 D-75469, Reisburg Germany)</td>
<td>(11/28/95)</td>
</tr>
<tr>
<td>L.C. Thomsen Inc.</td>
<td>1303-43rd Street</td>
<td>Kenosha, Wisconsin 53140</td>
<td></td>
<td>(8/14/57)</td>
</tr>
<tr>
<td>Tri-Clover, Inc.</td>
<td>9201 Wilmot Road</td>
<td>Kenosha, Wisconsin 53141</td>
<td></td>
<td>(9/29/56)</td>
</tr>
<tr>
<td>Tuthill Corp.</td>
<td>Tuthill Pump Division</td>
<td>12500 S. Pulaski Road</td>
<td>Alsip, Illinois 60007</td>
<td>(12/12/90)</td>
</tr>
<tr>
<td>Und Maschinenfabrik</td>
<td>Lederle GmbH Pumpen Gewerbestraße 53 D-79191 Gundelfingen, Germany (U.S. Rep.: Alto Systems Inc. P.O. Box 60667 Houston, Texas 77205)</td>
<td></td>
<td></td>
<td>(12/31/96)</td>
</tr>
<tr>
<td>Viking Pump, Inc.</td>
<td>A Unit of IDEXX Corporation 106 State Street, P.O. Box 8 Cedar Falls, Iowa 50613 (Mfg. by: Johnson Pump Highfield Ind. Estate, Edison Road Eastbourne, E. Sussex UK BN 23 6PT)</td>
<td></td>
<td></td>
<td>(12/31/56)</td>
</tr>
<tr>
<td>Waukesha Cherry-Burrell</td>
<td>611 Sugar Creek Road</td>
<td>Delavan, Wisconsin 53115</td>
<td></td>
<td>(10/3/56)</td>
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**04-04 Homogenizers and High Pressure Pumps of the Plunger Type**

<table>
<thead>
<tr>
<th>Company</th>
<th>Address</th>
<th>Phone</th>
<th>Fax</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>APV Homogenizer Group</td>
<td>500 Research Drive</td>
<td>Wilmington, Massachusetts 01887</td>
<td></td>
<td>(9/26/57)</td>
</tr>
<tr>
<td>American Lewa, Inc.</td>
<td>132 Hopping Brook Road</td>
<td>Holliston, Massachusetts 01740 (Mfg. by: Lewa, Germany)</td>
<td></td>
<td>(6/9/83)</td>
</tr>
<tr>
<td>Bran &amp; Luebbe, Inc.</td>
<td>1025 Busch Parkway</td>
<td>Buffalo Grove, Illinois 60015</td>
<td></td>
<td>(4/14/73)</td>
</tr>
<tr>
<td>Microfluidics Corp.</td>
<td>P.O. Box 9101</td>
<td>30 Ossipee Road</td>
<td>Newton, Massachusetts 02164-9101</td>
<td>(11/4/91)</td>
</tr>
<tr>
<td>Niro Soavi S.p.A.</td>
<td>41000 Parma (Italy)</td>
<td>VIA M. Du Erba Edoari, 29/A</td>
<td></td>
<td>(1/3/89)</td>
</tr>
</tbody>
</table>

(Distributed in the U.S. by: Niro Hudson, Inc. 1600 Country Road F Hudson, Wisconsin 54016)

**05-14 Stainless Steel Automotive Milk Transportation Tanks for Bulk Delivery and/or Farm Pick-up Service**

<table>
<thead>
<tr>
<th>Company</th>
<th>Address</th>
<th>Phone</th>
<th>Fax</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brenner Tank Mauston, Inc.</td>
<td>N. 3760 Hwy. 12 &amp; 16</td>
<td>Mauston, Wisconsin 53948</td>
<td></td>
<td>(3/15/83)</td>
</tr>
<tr>
<td>Beall Trailers of California</td>
<td>1301 South Avenue</td>
<td>Turlock, California 95380-5108</td>
<td></td>
<td>(2/21/94)</td>
</tr>
<tr>
<td>Brenner Tank, Inc.</td>
<td>450 Arlington Avenue, P.O. Box 670</td>
<td>Fond du Lac, Wisconsin 53936</td>
<td></td>
<td>(8/5/57)</td>
</tr>
<tr>
<td>Hills Stainless Steel &amp; Equipment Co., Inc.</td>
<td>505 W. Koehn Street</td>
<td>Laverne, Minnesota 56156</td>
<td></td>
<td>(10/20/56)</td>
</tr>
<tr>
<td>Paul Krohnert Mfg. Ltd.</td>
<td>811 Steele Avenue, P.O. Box 126</td>
<td>Milton, Ontario, Canada L9T 2Y3 (Not available in the U.S.A.)</td>
<td></td>
<td>(4/1/68)</td>
</tr>
<tr>
<td>Nova Fabricating, Inc.</td>
<td>401 City Road</td>
<td>P.O. Box 231 Avon, Minnesota 56310</td>
<td></td>
<td>(8/24/87)</td>
</tr>
<tr>
<td>Polar Tank Trailer, Inc.</td>
<td>Holdingford, Minnesota 56340</td>
<td></td>
<td></td>
<td>(12/20/57)</td>
</tr>
<tr>
<td>Tremcar</td>
<td>1, Tougas Street</td>
<td>Iberville, Quebec, Canada J2X 2P7 (U.S. Rep.: Bay State Tr. &amp; Tr. 527 Winthrop Rehobeth, Massachusetts 02769)</td>
<td></td>
<td>(10/10/91)</td>
</tr>
<tr>
<td>Walker Stainless Equip. Co., Inc.</td>
<td>625 State Street</td>
<td>New Lisbon, Wisconsin 53950</td>
<td></td>
<td>(9/28/56)</td>
</tr>
<tr>
<td>Walker Stainless Eq. Co., Inc.</td>
<td>560 E. Burleigh Boulevard</td>
<td>P.O. Box 558 Tavares, Florida 32778</td>
<td></td>
<td>(3/28/91)</td>
</tr>
<tr>
<td>West-Mark</td>
<td>2704 Railroad Avenue, P.O. Box 100 Ceres, California 95307</td>
<td></td>
<td></td>
<td>(11/30/84)</td>
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</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Company</th>
<th>Address</th>
<th>Phone</th>
<th>Fax</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filtration Systems</td>
<td>Div. of Mechanical Mfg. Corp.</td>
<td>10304 N.W. 50th Street</td>
<td>Sunrise, Florida 33351</td>
<td>(3/2/90)</td>
</tr>
<tr>
<td>Company Name</td>
<td>Address</td>
<td>Contact Person</td>
<td>Date Received</td>
<td></td>
</tr>
<tr>
<td>--------------</td>
<td>---------</td>
<td>----------------</td>
<td>---------------</td>
<td></td>
</tr>
<tr>
<td>R-P Products</td>
<td>Box 388, 407 Jefferson Street</td>
<td>Three Rivers, Michigan 49093</td>
<td>3/19/93</td>
<td></td>
</tr>
<tr>
<td>L. C. Thomsen, Inc.</td>
<td>1303 43rd Street Kenosha, Wisconsin 53140</td>
<td></td>
<td>8/25/77</td>
<td></td>
</tr>
<tr>
<td>Tri-Clover, Inc.</td>
<td>9201 Wilmot Road Kenosha, Wisconsin 53141</td>
<td></td>
<td>10/15/56</td>
<td></td>
</tr>
<tr>
<td>11-05 Plate-type Heat Exchangers for Milk and Milk Products</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AGC Engineering</td>
<td>8509 Quarry Road</td>
<td>Manassas, Virginia 22110</td>
<td>6/7/96</td>
<td></td>
</tr>
<tr>
<td>APV Heat Exchanger AS</td>
<td>Platinvej, 8 P.O. Box 329 DK-6000 Kolding Denmark</td>
<td>(Not available in the U.S.A.)</td>
<td>9/8/82</td>
<td></td>
</tr>
<tr>
<td>APV Heat Transfer Technologies</td>
<td>395 Fillmore Avenue</td>
<td>Tonawanda, New York 14150</td>
<td>9/4/56</td>
<td></td>
</tr>
<tr>
<td>Alfa-Laval, Agri, Inc.</td>
<td>11100 No. Congress Avenue Kansas City, Missouri 64153</td>
<td></td>
<td>12/3/59</td>
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<tr>
<td>Tetra Pak Engineering</td>
<td>8400 Lake View Parkway Pleasant Prairie, Wisconsin 53158</td>
<td>(Mfg. by: Alfa Laval Thermal Lund, Sweden)</td>
<td>8/30/56</td>
<td></td>
</tr>
<tr>
<td>Waukesha Cherry-Burrell Process Equipment Division</td>
<td>P.O. Box 35600</td>
<td>Louisville, Kentucky 40232</td>
<td>10/2/56</td>
<td></td>
</tr>
<tr>
<td>Chester-Jensen Co., Inc.</td>
<td>5th &amp; Tilghman Sts., P.O. Box 908 Chester, Pennsylvania 19016</td>
<td></td>
<td>8/15/52</td>
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</tr>
<tr>
<td>The Coburn Co., Inc.</td>
<td>834 E. Milwaukee Street, Box 117 Whitewater, Wisconsin 53190</td>
<td>(Mfg. by: Elmega S.L. Apartado De Cerros, 1 Camino Vrejo De Mengrelle, S/N 15840 [Santa Comba] La Coruna Spain)</td>
<td>9/14/94</td>
<td></td>
</tr>
<tr>
<td>Tuchenagen NA, Inc.</td>
<td>196 Western Avenue Fond du Lac, Wisconsin 54936-1158</td>
<td>(Mfg. by: GEA Alborn GmbH Co. P.O. Box 1180 Voss-Strasse 11/13 D-5203 Sarstedt Germany)</td>
<td>2/2/86</td>
<td></td>
</tr>
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<table>
<thead>
<tr>
<th>Company Name</th>
<th>Address</th>
<th>Contact Person</th>
<th>Date Received</th>
</tr>
</thead>
<tbody>
<tr>
<td>ITT Standard</td>
<td>175 Standard Parkway Checktowaga, New York 14227</td>
<td></td>
<td>2/25/91</td>
</tr>
<tr>
<td>Kusel Equipment Co.</td>
<td>820 West Street, P.O. Box 87 Watertown, Wisconsin 53094</td>
<td></td>
<td>8/15/56</td>
</tr>
<tr>
<td>Laffranchi Wholesale Co.</td>
<td>P.O. Box 338 Ferndale, California 95536</td>
<td></td>
<td>7/12/82</td>
</tr>
<tr>
<td>Paul Mueller Co.</td>
<td>P.O. Box 820 Springfield, Missouri 65801</td>
<td></td>
<td>12/13/83</td>
</tr>
<tr>
<td>Schmidt-Bretten, Inc.</td>
<td>300 E. Central Avenue</td>
<td>Bohemia, New York 11716</td>
<td>10/3/91</td>
</tr>
<tr>
<td>Flomax International, Ltd.</td>
<td>2 Robert Street P.O. Box 11537 Panmunje, Auckland New Zealand (U.S. Rep.: Masport, Inc. 6140 McCormick Drive Lincoln, Nebraska 68507)</td>
<td></td>
<td>4/1/92</td>
</tr>
<tr>
<td>Thermaline</td>
<td>180-57th Street</td>
<td>Auburn, Washington 98001</td>
<td>11/15/91</td>
</tr>
<tr>
<td>Tramex, Inc. Texas Division</td>
<td>1900 Old Burk Highway Wichita Falls, Texas 76304</td>
<td></td>
<td>7/11/96</td>
</tr>
<tr>
<td>Universal Dairy Equipment</td>
<td>11100 N. Congress Avenue Kansas City, Missouri 64153</td>
<td>(Mfg. by: Alfa Laval Agri, Inc. Kansas City, Missouri 64153-1296)</td>
<td>12/13/90</td>
</tr>
<tr>
<td>12-05 Tubular Heat Exchangers for Milk and Milk Products</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>API Ketema Heat Transfer Technology</td>
<td>2500 W. Marshall Drive Grand Prairie, Texas 75051</td>
<td></td>
<td>7/16/96</td>
</tr>
<tr>
<td>APV Heat Transfer Tech.</td>
<td>395 Fillmore Avenue Tonawanda, New York 14150</td>
<td></td>
<td>12/10/84</td>
</tr>
<tr>
<td>Allegheny Bradford Corp.</td>
<td>P.O. Box 200, Route 219 South Bradford, Pennsylvania 16701</td>
<td></td>
<td>4/16/73</td>
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<tr>
<td>Babson Brothers Company</td>
<td>Dairy Systems Division 20903 West Gale Avenue Galesville, Wisconsin 53120-0659</td>
<td></td>
<td>10/31/72</td>
</tr>
<tr>
<td>Company Name</td>
<td>Address/Location</td>
<td>Phone Number</td>
<td>Contact Person</td>
</tr>
<tr>
<td>--------------------------------------------------</td>
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<tr>
<td>3-09 Farm Milk Cooling and Holding Tanks</td>
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<td></td>
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</tr>
<tr>
<td>Refinox S.A. DE C.V.</td>
<td>Ind. Torreon, Coah, Mexico</td>
<td>(11/10/94)</td>
<td></td>
</tr>
<tr>
<td>(U.S. Rep.: James Read)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M. E. Stainless</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>601 High Plain Drive</td>
<td>Bel Air, Maryland 21014</td>
<td>(12/5/56)</td>
<td></td>
</tr>
<tr>
<td>Alfa Laval Agri, Inc.</td>
<td>11100 North Congress Avenue</td>
<td>(9/6/72)</td>
<td></td>
</tr>
<tr>
<td>Kansas City, Missouri 64153</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Babson Brothers Company</td>
<td>1600 West Phelps Street</td>
<td>(6/15/56)</td>
<td></td>
</tr>
<tr>
<td>Dairy Systems Division</td>
<td>Springfield, Missouri 65801</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heavy Duty Products (Preston) Ltd.</td>
<td>1261 Industrial Road Cambridge (Preston)</td>
<td>(3/8/77)</td>
<td></td>
</tr>
<tr>
<td>Ontario, Canada N4H 4W3</td>
<td>(Not available in the U.S.A.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paul Mueller Co.</td>
<td>600 W. Phelps, P.O. Box 828</td>
<td>(7/3/56)</td>
<td></td>
</tr>
<tr>
<td>Springfield, Missouri 65801</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Universal Dairy Equipment</td>
<td>11100 N. Congress Avenue Kansas City, Missouri 61453</td>
<td>(12/15/90)</td>
<td></td>
</tr>
<tr>
<td>(Mfg. by: Alfa Laval Agri Inc.)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Kansas City, Missouri 64153</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>16-05 Evaporators and Vacuum Pans for Milk and Milk Products</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>APV Anhydro</td>
<td>182 Wales Avenue</td>
<td>(10/26/60)</td>
<td></td>
</tr>
<tr>
<td>Tonawanda, New York 14150</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contherm, Inc.</td>
<td>P.O. Box 352, 111 Parker Street</td>
<td>(8/19/76)</td>
<td></td>
</tr>
<tr>
<td>Newburyport, Massachusetts 01950</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dedert Corporation</td>
<td>20000 Governors Drive Olympia Fields, Illinois 60461</td>
<td>(4/9/87)</td>
<td></td>
</tr>
<tr>
<td>Marriott Walker Corp.</td>
<td>925 E. Maple Road</td>
<td>(9/6/66)</td>
<td></td>
</tr>
<tr>
<td>Birmingham, Michigan 48011</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Niro, Inc.</td>
<td>Food and Dairy Division</td>
<td>(5/20/76)</td>
<td></td>
</tr>
<tr>
<td>1600 O'Keefe Road</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hudson, Wisconsin 54016</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Niro-Sterns, Inc.</td>
<td>421-6th Street South Winsted, Minnesota 55395</td>
<td>(7/10/91)</td>
<td></td>
</tr>
<tr>
<td>Marriott Walker Corp.</td>
<td>925 E. Maple Road</td>
<td>(7/31/58)</td>
<td></td>
</tr>
<tr>
<td>Birmingham, Michigan 48011</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>107R C.E. Rogers Co.</td>
<td>P.O. Box 118</td>
<td>(7/31/58)</td>
<td></td>
</tr>
<tr>
<td>Winsted, Minnesota 55395</td>
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</tr>
<tr>
<td>Niro-Sterns, Inc.</td>
<td>421-6th Street South Winsted, Minnesota 55395</td>
<td>(7/10/91)</td>
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<tr>
<td>Stork Food Machinery, Inc.</td>
<td>P.O. Box 1258, Airport Parkway Gainesville, Georgia 30503</td>
<td>(11/16/77)</td>
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</tbody>
</table>

106 Dairy, Food and Environmental Sanitation – FEBRUARY 1998
17-08 Formers, Fillers and Sealers of Single Service Containers for Milk and Milk Products

366 Autoprod, Inc. (9/15/83) 5355 115th Avenue N. Clearwater, Florida 34620

939 BWI KP Aerofil (10/16/97) 807 West Kimberly Road Davenport, Iowa 52808-3848

382 Combibloc, Inc. (4/15/83) 4800 Roberts Road Columbus, Ohio 43228 (Mfg. by: PKI Verpackungssysteme, Germany)

192 Evergreen Packaging (1/3/67) 2400-6th Street S.W., P.O. Box 3000 Cedar Rapids, Iowa 52406

488 BWI Ford Holmatic, Inc. (12/22/86) 1750 Corporate Drive, Suite 700 Norcross, Georgia 30093

619 Hassia Verpackungsaudien GmbH 63689 Ransstadt, Hessen, Germany (U.S. Rep.: Hassia USA, Inc. 1 Harvard Way, #4 Somerville, New Jersey 08876)

473 International Paper Company (6/12/86) Liquid Pkg. Division 6238 Tri Ridge Boulevard Loveland, Ohio 45140

735 Kvalitetsproduktion AB S-693 29 Degerfors, Sweden (U.S. Rep.: Flowtech, Inc. 1900 Lake Park Drive, Suite 345 Smyrna, Georgia 30080)

330 Miliken Packaging (8/26/80) P.O. Box 736 White Stone, South Carolina 29365 (Mfg. by: Chubukkikai, Japan)

442 Miliken Packaging (3/21/85) P.O. Box 736 White Stone, South Carolina 29386

137 Elopak, Inc. (10/17/62) 50000 South Hill Road New Hudson, Michigan 48165

941 Odan Corporation (10/28/97) 255 Great Arrow Avenue Buffalo, New York 14207-3024

281 Purity Packaging Corp. (11/8/77) 800 Kaderly Road Columbus, Ohio 43228 (Mfg. by: Purity Packaging Corp. 25 Aylmer Street Peterborough, Ontario, Canada K9J 6Y8)


848 Sechipack, Inc. (9/24/95) 2313 Benson Mill Road Sparks, Maryland 21159 (Mfg. by: ARCII 4, Avenue de l’Europe ZAC des Hawks de Chatou 78482 Chatou Cedex, France)

482 Serac, Inc. (8/25/86) 300 Westgate Drive Carol Stream, Illinois 60188


220 Tetra Rex Packaging Systems 451 East Industrial Boulevard Minneapolis, Minnesota 55413


19-04 A1 Bath Continuous Freezers for Ice Cream, Ices, and Similarly Frozen Dairy Foods, as Amended

141 APV Crepaco, Inc. (4/15/65) 100 South CP Avenue Lake Mills, Wisconsin 53551

146 Waukesha Cherry-Burrell Corp. (12/10/63) P.O. Box 35600 Louisville, Kentucky 40223-5600

903 Coldelite Corp. of America (1/10/97) Cattabriga Division of Carpigiani P.O. Box 4069, North Station Winston-Salem, North Carolina 27115 (Mfg. by: Carpigiana Via Emilia 45 Amzola Emilia Bologna, Italy)

928 Ross’ Frozen Custard Corporation (7/14/97) 1605 Sheridan Road Escanaba, Michigan 49829

286 Tetra Laval Food Hoyer, Inc. (12/8/76) 7711 95th Street, P.O. Box 9002 Pleasant Prairie, Wisconsin 53158-0902 (Mfg. by: Tetra Laval Food Hoyer Denmark)

355 Emery Thompson Machine & Supply Co. (3/9/82) 15+9 Inwood Avenue Bronx, New York 10452

22-07 Silo-type Storage Tanks for Milk and Milk Products

151 APV of North America, Inc. (2/10/65) 100 South CP Avenue Lake Mills, Wisconsin 53551

168 Waukesha Cherry-Burrell Corp. (6/16/65) 575 E. Mill Street Little Falls, New York 13365

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

312 Feldmeier Equipment, Inc. (9/15/78) 6800 Town Line Road P.O. Box 474 Syracuse, New York 13211
23-02 Equipment for Packaging Viscous Dairy Products

<table>
<thead>
<tr>
<th>No.</th>
<th>Company Name</th>
<th>Address</th>
<th>City, State, Zip</th>
<th>Phone</th>
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<tr>
<td>174</td>
<td>APV Crepaco, Inc.</td>
<td>A Division of APV North America, Inc. 100 South CP Avenue Lake Mills, Wisconsin 53551</td>
<td></td>
<td>(9/28/85)</td>
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<tr>
<td>902</td>
<td>A.T.S. Engineering, Inc.</td>
<td>7270 Torbram Road, Unit 23 Mississauga, Ontario Canada L4T 5Y7</td>
<td></td>
<td>(1/10/97)</td>
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<tr>
<td>858</td>
<td>Cryovac Division</td>
<td>W.R. Grace &amp; Co-Con P.O. Box 1464 Duncan, South Carolina 29223-0464</td>
<td></td>
<td>(3/5/97)</td>
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<td>853</td>
<td>Elmar Industries</td>
<td>200 Gould Avenue, P.O. Box 215 Buffalo, New York 14043-0245</td>
<td></td>
<td>(10/11/95)</td>
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<tr>
<td>674</td>
<td>Hayssen Manufacturing</td>
<td>225 Spartangreen Boulevard Duncan, South Carolina 29334</td>
<td></td>
<td>(4/20/92)</td>
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<tr>
<td>447</td>
<td>GEI Mateer-Burt Co., Inc.</td>
<td>434 Devon Park Drive Wayne, Pennsylvania 19087</td>
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<td>(7/22/85)</td>
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<tr>
<td>942</td>
<td>Oden Corporation</td>
<td>255 Great Arrow Avenue Buffalo, New York 14207-3024</td>
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24-02 Non-coil Type Batch Pasteurizers

<table>
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<tr>
<th>No.</th>
<th>Company Name</th>
<th>Address</th>
<th>City, State, Zip</th>
<th>Phone</th>
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<tr>
<td>158</td>
<td>APV Crepaco, Inc.</td>
<td>100 South CP Avenue Lake Mills, Wisconsin 53551</td>
<td></td>
<td>(3/24/65)</td>
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<tr>
<td>161</td>
<td>Waukesha Cherry-Burrell</td>
<td>575 E. Mill Street Little Falls, New York 13365</td>
<td></td>
<td>(4/5/65)</td>
</tr>
<tr>
<td>187</td>
<td>DCI, Inc.</td>
<td>P.O. Box 1227, 600 No. 5th Avenue St. Cloud, Minnesota 56302</td>
<td></td>
<td>(9/26/66)</td>
</tr>
<tr>
<td>166</td>
<td>Paul Mueller Co.</td>
<td>P.O. Box 828 Springfield, Missouri 65801</td>
<td></td>
<td>(4/26/65)</td>
</tr>
<tr>
<td>878</td>
<td>Walker Stainless Equipment</td>
<td>625 State Street New Lisbon, Wisconsin 53950</td>
<td></td>
<td>(5/14/96)</td>
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25-02 Non-coil Type Batch Processors for Milk and Milk Products

<table>
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<tr>
<th>No.</th>
<th>Company Name</th>
<th>Address</th>
<th>City, State, Zip</th>
<th>Phone</th>
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</thead>
<tbody>
<tr>
<td>159</td>
<td>APV Crepaco, Inc.</td>
<td>100 South CP Avenue Lake Mills, Wisconsin 53551</td>
<td></td>
<td>(3/24/65)</td>
</tr>
<tr>
<td>162</td>
<td>Waukesha Cherry-Burrell</td>
<td>575 E. Mill Street Little Falls, New York 13365</td>
<td></td>
<td>(4/5/65)</td>
</tr>
<tr>
<td>188</td>
<td>DCI, Inc.</td>
<td>P.O. Box 1227, 600 No. 5th Avenue St. Cloud, Minnesota 56302</td>
<td></td>
<td>(9/26/66)</td>
</tr>
<tr>
<td>725</td>
<td>Inox-Tech, Inc.</td>
<td>6705 Route 132 Ville Ste-Catherine Quebec, Canada J0L 1E0</td>
<td></td>
<td>(4/14/93)</td>
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</table>
710  Lee Industries, Inc.  P.O. Box 687  514 West Pine Street  Philippiburg, Pennsylvania 16866  (2/10/93)

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

687  SANIFAB  528 North Street  Stratford, Wisconsin 54484  (8/3/92)

448  Scherping Systems  801 Kingsley Street  Winsted, Minnesota 55955  (8/1/85)

520  Stainless Fabrication, Inc.  445 W. Kearney  Springfield, Missouri 65803  (12/8/87)

837  Viatiec Process Incorporated  500 Reed Street  Belding Michigan 48809  (7/10/95)

202  Walker Stainless Equip. Co., Inc.  625 State Street, P.O. Box 202  New Lisbon, Wisconsin 53950-0202  (9/24/68)

26-03 Sifters for Dry Milk and Dry Milk Products

752  Andritz Sprout-Bauer  35 Sherman Street  Munce, Pennsylvania 17756  (1/28/94)

363  Kason Corp.  67.71 East Willow Street  Millburn, New Jersey 07041  (7/28/82)

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

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

656  Separator Engineering, Ltd.  810 Ellingham Street  Pointe Claire, Quebec, Canada H9R 3S4  (U.S. Rep.; Kason Corp.  1301 E. Linden Avenue  Linden, New Jersey 07036)  (11/4/91)

172  Sweco, Inc.  (Division of Emerson Electric Company)  7120 Buffaloing Road  Florence, Kentucky 41042  (9/1/65)

27-03 Equipment for Packaging Dry Milk and Dry Milk Products

353  All-Fill, Inc.  418 Creamery Way  Exton, Pennsylvania 19341  (3/2/82)

935  Borsar S.A.  Poligono Industrial Roca C/. San Marti s/n.  08100 Martorells (Barcelona)  Spain  (8/8/97)

28-03 Flow Meters for Milk and Milk Products

270  ABB Instrumentation, Inc.  P.O. Box 20550  Rochester, New York 14602-0550  (2/9/76)

272  Accurate Metering Systems, Inc.  1651 Wilkening Court  Schaumburg, Illinois 60173  (4/2/76)

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


359  Brooks Instruments  Highway 301 North  Statesboro, Georgia 30458  (6/11/82)

660  Danfoss A/S  DK-6130  Nordborg, Denmark  (U.S. Rep.; Danfoss Electronics  2995 Eastrock Drive  Rockford, Illinois 61109)  (11/20/91)
550 Sparling Instruments Co., Inc.
4097 N. Temple City Boulevard
El Monte, California 91731
(10/26/88)

715 Thermal Instrument Co.
217 Stemar Mill Road
Trevose, Pennsylvania 19053
(2/25/93)

803 Turck, Inc.
3000 Campus Drive
Plymouth, Minnesota 55441-2656
(Mfg. by: EGE - Elektronik
Ravensberg 34
D-24214 Gehorf
Germany)
(11/18/94)

29-01 Air Eliminators for Milk
and Fluid Milk Products

340 Accurate Metering Systems, Inc.
1651 Wakingen Court
Schaumburg, Illinois 60173
(6/2/81)

662 G/H Products Corp.
P.O. Box 909
Pleasant Prairie, Wisconsin 53158-0909
(11/21/91)

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

30-01 Farm Milk Storage Tanks

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

31-02 Scraped Surface Heat Exchangers

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

323 Waukesha Cherry-Burrell
Process Equipment Division
P.O. Box 35600
Louisville, Kentucky 40232-5600
(7/26/79)

274 Contherm, Inc.
111 Parker Street
Newburyport, Massachusetts 01950
(6/25/76)

496 FMC Corp
Fran Rica Systems
P.O. Box 30127
Stockton, California 95213-0127
(2/23/87)

361 N.V. Terlet
P.O. Box 62
7200 AB Zutphen
Netherlands
(U.S. Agent Manning & Lewis-NJ)
(7/12/82)

32-02 Uninsulated Tanks for Milk
and Milk Products

397 APV Crepaco
Division of APV North America, Inc.
100 South CP Avenue
Lake Mills, Wisconsin 53551
(6/21/83)

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

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

708 Lee Industries, Inc.
P.O. Box 688
Phillipsburg, Pennsylvania 18666
(1/12/93)

844 Paul Mueller Co.
1600 West Phelps Street
Springfield, Missouri 65801
(8/24/95)

354 C.E. Rogers Co.
1895 Frontage Road, P.O. Box 118
Mora, Minnesota 55051
(3/3/82)

683 SANIFAB
A Division of A&B Process Systems Corp.
P.O. Box 86
Stratford, Wisconsin 54484
(7/9/92)

441 Scherping Systems
801 Kingsley Street
Winsted, Minnesota 55395
(5/1/85)

852 Viatec, Inc.
500 Reed Street
Belding, Michigan 48809
(10/18/95)

339 Walker Stainless Equip. Co., Inc.
625 State Street
New Lisbon, Wisconsin 53950
(6/2/81)

33-01 Polished Metal Tubing for Dairy Products

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

812 A.T.I. s.r.l.
Viale Resegone 7
22036 Erba (Como)
Italy
(U.S. Rep.: Norca Corporation
185 Great Neck Road
Great Neck, New York 11022)
(1/26/95)

413 Azco, Inc.
P.O. Box 567
Appleton, Wisconsin 54912
(12/8/83)

809 Damascus-Bishop Tube Co.
795 Reynolds Industrial Park Road
Greenville, Pennsylvania 16125
(1/2/95)

736 Kvalitetsproduktion AB
S-693 29 Degerfors, Sweden
(U.S. Rep.: Flowtech, Inc.
1900 Lake Park Drive, Ste. 345
Smyrna, Georgia 30080)
(6/11/93)

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

368 Rodger Industries Inc.
P.O. Box 186, R.R. 1
Blenheim, Ontario
Canada N0P 1A0
(Not available in the U.S.A.)
(10/7/82)

776 TGPRO
Bangkok, Thailand
(U.S. Rep.: Kurt Orban Partners
Kurt Orban
450 Kings Road
Brisbane, California 94005)
(7/18/94)

FEBRUARY 1998 – Dairy, Food and Environmental Sanitation 111
34-02 Portable Bins
916 Custom Metalcraft, Inc.
2332 East Division
P.O. Box 10587 GS
Springfield, Missouri 65808

35-00 Continuous Blenders
869 ADMIX, Inc.
23 Londonderry Road
Londonderry, New Hampshire 03053

527 Arde Barinco, Inc.
500 Walnut Street
Norwood, New Jersey 07648

590 Chemineer, Inc.
125 flagship Drive
North Andover, Massachusetts 01845

417 Waukesha Cherry-Burrell
Process Equipment Division
P.O. Box 35600
Louisville, Kentucky 40232-3600

526 Hosokawa Bepex Corporation
333 Taft Street NE
Minneapolis, Minnesota 55413

914 International Mixing Tech. s. a. r. l.
469 Avenue Louis Herbeaux
F-59240 Dunkerque
France
(U.S. Rep.: Peregine Consumer Tech.
2004 E. 67 Street
Los Angeles, California 90001)

642 Mondomix Howden B.V.
Reeweg 13
P.O. Box 98
1394 ZH Nederhorst den Berg
The Netherlands
(U.S. Rep.: Mondomix Howden
1 West Illinois Street, Suite 500
St. Charles, Illinois 60174)

680 Quadro Engineering, Inc.
613 Colby Drive
Waterloo, Ontario
Canada N2V 1A1

36-00 Colloid Mills
808 Boston Shearpump, Inc.
170 Linden Street
Wellesley, Massachusetts 02181-7919

846 IKA Works, Inc.
2635 North Chase Parkway, S.E.
Wilmington, North Carolina 28405-7499

915 IKA Works, Inc.
2635 North Chase Parkway, S.E.
Wilmington, North Carolina 28405-7499

608 Kinematica, Inc.
19 Normandy Road
Newton, Massachusetts 02166
(Mfg. by: Kinematica AG
CH-4001 Littau/Lucerne, Switzerland)

293 Waukesha Cherry-Burrell
611 Sugar Creek Road
Delavan, Wisconsin 53115

38-00 Cottage Cheese Vats
541 Kusel Equipment Company
820 West Street
Watertown, Wisconsin 53094

385 Stoelting, Inc.
502 Highway 67
Kiel, Wisconsin 53042-0127

40-01 Bag Collectors for Dry Milk
and Dry Milk Products
453 Hosokawa MikroPul E. Systems
20 Chatham Road
Summit, New Jersey 07901

381 Marriott Walker Corp.
925 E. Maple Road
Birmingham, Michigan 48009

456 C. E. Rogers Company
P.O. Box 118
Mora, Minnesota 55051

41-01 Mechanical Conveyors
631 Flexicon Corporation
1375 Stryker's Road
Phillipsburg, New Jersey 08865

894 Spiroflow-Orthos Systems, Inc.
2806 Gray Fox Road
Monroe, North Carolina 28110

U.S. Rep.: Quadro, Inc.
55 Bleeker Street
Milburn, New Jersey 07041-1414

2004 E. 67 Street
Los Angeles, California 90001

U.S. Rep.: Kinematica AG
CH-4001 Littau/Lucerne, Switzerland

U.S. Rep.: Quadro, Inc.
55 Bleeker Street
Milburn, New Jersey 07041-1414

2004 E. 67 Street
Los Angeles, California 90001

U.S. Rep.: Quadro, Inc.
55 Bleeker Street
Milburn, New Jersey 07041-1414

2004 E. 67 Street
Los Angeles, California 90001
<table>
<thead>
<tr>
<th>42-00 In-Line Strainers</th>
<th>42-00 In-Line Strainers</th>
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<tbody>
<tr>
<td>855 Flowtech Inc. (10/30/95)</td>
<td>859 The Electron Machine Corp. (11/4/95)</td>
</tr>
<tr>
<td>1701 Spinks Drive S.E. Marietta, Georgia 30067-8925</td>
<td>15820 CR 450 West P.O. Box 2345 Umatilla, Florida 32784</td>
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<tr>
<td>655 Tri-Clover, Inc. (10/23/91)</td>
<td>800 Epsilon Industrial Inc. (10/24/94)</td>
</tr>
<tr>
<td>9201 Wilmot Road Kenosha, Wisconsin 53141</td>
<td>2215 Grand Avenue Parkway Austin, Texas 78728</td>
</tr>
<tr>
<td>606 Waukesha Cherry-Burrell (9/18/90)</td>
<td>783 James C. Camp dba Advance Process Systems 95 Wyngate Drive Newman, Georgia 30265 (Mfg. by: BTG Inc. 2364 Park Central Boulevard Decatur, Georgia 30035-3987)</td>
</tr>
<tr>
<td>611 Sugar Creek Road Delavan, Wisconsin 53115</td>
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<tr>
<th>44-02 Air Driven Diaphragm Pumps</th>
<th>44-02 Air Driven Diaphragm Pumps</th>
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<tr>
<td>937 Versa-Matic Pump Company (9/18/97)</td>
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<tr>
<td>6017 Enterprise Drive Export, Pennsylvania 15632-8969</td>
<td>940 K-Patents OY (10/23/97)</td>
</tr>
<tr>
<td>713 Warren Rupp, Inc., A Unit of IDEXX Corp. (2/5/93)</td>
<td>P.O. Box 77 Finn01511 Vantaa, Finland</td>
</tr>
<tr>
<td>800 North Main Street P.O. Box 1568 Mansfield, Ohio 44905</td>
<td>(U.S. Rep.: K-Patents, Inc. 253 W. Joe Orr Road Chicago Heights, Illinois 60411)</td>
</tr>
<tr>
<td>22069 Van Buren Street Grand Terrace, California 92313-5651</td>
<td>117 South Street Hopkinton, Massachusetts 01748-2273</td>
</tr>
<tr>
<td>805 Tri-Clover (11/18/94)</td>
<td>697 Liquid Solids Control, Inc. (10/21/92)</td>
</tr>
<tr>
<td>9201 Wilmont Road Kenosha, Wisconsin 53141 (Mfg. by: KWW Dusseldorf, Germany)</td>
<td>P.O. Box 259 Farm Street Upton, Massachusetts 01568</td>
</tr>
<tr>
<td>927 Yamada America, Inc. (6/18/97)</td>
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<tr>
<td>1575 High Point Drive Elgin, Illinois 60123</td>
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<tr>
<th>45-00 Cross Flow Membrane Modules</th>
<th>45-00 Cross Flow Membrane Modules</th>
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<tr>
<td>807 CeraMem Separations (11/30/94)</td>
<td></td>
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<tr>
<td>12 Clematis Avenue Waltham, Massachusetts 02154</td>
<td>771 Maselli Misurc S.p.A. (1/20/94)</td>
</tr>
<tr>
<td>813 Coors Ceramics Company (2/2/95)</td>
<td>Via Baganza, 4/3 43100 Parma, Italy (U.S. Rep.: Maselli Measurements, Inc. P.O. Box 7571 774-46 Lorraine Avenue Stockton, California 95267)</td>
</tr>
<tr>
<td>4545 McIntyre Street Golden, Colorado 80403</td>
<td></td>
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<tr>
<td>786 North Carolina SRT, Inc. (9/24/94)</td>
<td>882 optek-Danulat Inc. (6/25/96)</td>
</tr>
<tr>
<td>221 James Jackson Avenue Cary, North Carolina 27513 (Mfg. by: Tohshin Seiko Co., Ltd. 42-2 Aza Shimizu Tazawa Okhuma Watari-Chi, Watari-Gun Miyagi 889-23 Japan)</td>
<td>279 S. 17th Avenue, Suite 10 West Bend, Wisconsin 53905 (Mfg. by: optek-Danulat GmbH Hadenkampstrasse 18 D-45143 Essen Germany)</td>
</tr>
<tr>
<td>785 Maselli Misuric S.p.A. (12/18/94)</td>
<td>921 optek-Danulat Inc. (4/30/97)</td>
</tr>
<tr>
<td>95 Wyngate Drive Newnan, Georgia 30265 (Mfg. by: BTG Inc. 2364 Park Central Boulevard Decatur, Georgia 30035-3987)</td>
<td>279 South 17th Avenue, Suite 10 West Bend, Wisconsin 53905 (Mfg. by: optek-Danulat, Inc. Hadenkampstrasse 18 D-45143 Essen Germany)</td>
</tr>
<tr>
<td>697 Liquid Solids Control, Inc. (10/21/92)</td>
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</tr>
<tr>
<td>751 Maselli Misuric S.p.A. (1/20/94)</td>
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</tr>
<tr>
<td>1025 Busch Parkway Buffalo Grove, Illinois 60089 (Mfg. by: Bran &amp; Lubbe Nordrstedt GMBH [Germany])</td>
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<th>46-00 (Refractometers and Optical Sensors)</th>
<th>46-00 (Refractometers and Optical Sensors)</th>
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<tr>
<td>904 AW Company (2/7/97)</td>
<td>767 Foss NIR Systems, Inc. (6/6/94)</td>
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<tr>
<td>8809 Industrial Drive Franksville, Wisconsin 53126 (Mfg. by: TTS Technologies Tampereen Teollisuussahko Oy Nokianite 2 33270 Tampere Finland)</td>
<td>12101 Tech Road Silver Spring, Maryland 20904</td>
</tr>
<tr>
<td>785 Bran &amp; Lubbe, Inc. (9/2/94)</td>
<td>750 PT Papertech, Inc. #501 - 2609 Westview Drive North Vancouver B. C. Canada V7N 4M2 (U.S. Rep.: BD Services Corporation 300 North Commercial Street Bellingham, Washington 98227)</td>
</tr>
<tr>
<td>1025 Busch Parkway Buffalo Grove, Illinois 60089 (Mfg. by: Bran &amp; Lubbe Nordrstedt GMBH [Germany])</td>
<td></td>
</tr>
</tbody>
</table>

FEBRUARY 1998 - Dairy, Food and Environmental Sanitation 113
742 Reflectronics, Inc. (9/15/93)
3009 Montavesta Road
Lexington, Kentucky 40502

817 Technion Labs Inc. (2/24/95)
555 Briarwood Court
Troy, Ohio 45373

47-00 Pumps for Cleaning & Sanitizing Solutions
897 Ampco Pumps Company (12/10/96)
4000 West Burnham Street
Milwaukee, Wisconsin 53215

50-00 Level Sensing Devices
705 Bindicator Company (12/29/92)
1915 Dove Street
Port Huron, Michigan 48060

51-00 (Formerly 08-17R) Plug-Type Valves
787 Cipriani, Inc. (8/27/91)
Tassalini S.P.A.
23195 LaCadena Drive, Suite 103
Laguna Hills, California 92653

772 G & H Products (6/10/57)
P.O. Box 909
Pleasant Prairie, Wisconsin 53158-0909

780 L. C. Thomsen, Inc. (8/31/57)
1303 - 45th Street
Kenosha, Wisconsin 53140

239 LUMACO
9-11 East Broadway
Hackensack, New Jersey 07601

788 Puriti, S.A. De C.V. (9/12/72)
Alfredo Nobel No. 39
Fracc. Ind. Pte. de Vargas
Tlanepanaha, Mexico

781 Robert James Sales, Inc. (8/31/94)
609 Hertel Avenue, Suite 260
Buffalo, New York 14207

357 Tanaco Products (4/15/82)
3860 Loomis Trail Road
Blaine, Washington 98230

777 Tech Control Ent. (8/2/85)
3725 N. Murray Road
Otis Orchard, Washington 99027
(Mfg. by: Tech Control, Taipei, Taiwan)

271 The Foxboro Company (3/8/76)
33 Commercial Street, No. 05-4A
Foxboro, Massachusetts 02035

790 Tri-Clover, Inc. (10/15/56)
9201 Wilmont Road
Kenosha, Wisconsin 53141-1413

759 VNE Corporation (3/16/78)
1149 Barbary Drive
Janesville, Wisconsin 53545

761 Waukesha Cherry-Burrell (12/17/57)
611 Sugar Creek Road
Delavan, Wisconsin 53115

52-01 (Formerly 08-17H) Thermoplastic Plug Type Valves
907 L’AUFER International AG (2/25/97)
Finkenweg 2
De-88709
Meersburg, Germany
(U.S. Rep.: M. G. Newell Corporation
115 N. 20th Street
Tampa, Florida 33605)

577 Ralet-Defay (11/2/89)
66, Boulevard Poincare
1070 Brussels, Belgium
(U.S. Agent GENICANAM, Chazy, New York)

53-00 (Formerly 08-17A) Compression Type Valves
484 APV Fluid Handling-Americas (10/22/86)
100 South CP Avenue
Lake Mills, Wisconsin 53551-1799

730 APV Crepaco (4/1/93)
100 South CP Avenue
Lake Mills, Wisconsin 53551-1799

552 APV Fluid Handling-America, Inc. (11/23/57)
100 South CP Avenue
Lake Mills, Wisconsin 53551-1799

245 Babson Brothers Company (2/12/73)
Dairy System Division
P.O. Box 659
20903 West Gale Avenue
Galesville, Wisconsin 54630
(Mfg. by: Superior Stainless, Inc.
611 Sugar Creek Road
Delavan, Wisconsin 53115)

443 Badger Meter, Inc. (4/30/85)
6116 East 15th Street
Tulsa, Oklahoma 74112

686 Bardiani Valvole S.R.L. (8/3/92)
Via G. Vittorio, 30/B
43045 Fornovo (PR) Italy
(U.S. Rep.: Sanchelima Int. 1763 Northwest 95th Avenue
Miami, Florida 33172)

538 Cipriani, Inc.-Tassalini S.P.A. (7/31/88)
23195 La Cadena Drive, Suite 103
Laguna Hills, California 92653
(Mfg. by: Fratelli Tassalini, Italy)

716 Conexiones Inoxidables (3/4/93)
de Puebla S.A. de C.V.
Vicente Guerrero No. 211
Xicotepec de Juarez
Edu, Puebla Mexico
(U.S. Rep: Ben Dolphin Consulting
4755 Lassoing Drive
North Olmsted, Ohio 44070)

376 Defontaine of America, Inc. (1/25/83)
16720 W. Victor Road
New Berlin, Wisconsin 53151
(Mfg. by: Defontaine S.A. - Dept. Definox
3, rue Louis Renault - BP 329
44803 Saint-Herblain Cedex
France)

530 G & H Products Corp. (5/31/88)
P.O. Box 909
Pleasant Prairie, Wisconsin 53158-0909
54-01 (Formerly 08-17B) Diaphragm-Type Valves

565 APV Fluid Handling-Americas
100 South CP Avenue
Lake Mills, Wisconsin 53551-1799
(Mfg. by: APV Rossita, Inc., W. Germany & Denmark)

877 APV Fluid Handling
Division of APV North America, Inc.
100 South CP Avenue
Lake Mills, Wisconsin 53551-1799

615 AsepCo
1101 San Antonio Road, #301
Mountain View, California 94043

814 Burkert Contromatic Corp.
2602 McGaw Avenue
Irvine, California 92714
(Mfg. by: Buerkert Steuer-Und Regeltechnik Christian-Buerkert-Str 13-17 D-74653 Ingelfinger Germany)

745 Cashco, Inc.
P.O. Box 6, Hwy. 140 West
Ellsworth, Kansas 67439-0006
(12/9/93)
617 Defontaine of America, Inc. (2/1/91)
16720 W. Victor Road
New Berlin, Wisconsin 53151
(Mfg. by: Defontaine S.A. - Dept. Definox
3, rue Louis Renault - BP 329
44803 Saint-Herblain Cedex
France)
856 Flowtech, Inc. (10/30/95)
1900 Lake Park Drive, No. 345
Smyrna, Georgia 30080
637 Gemu Valves, Inc. (7/10/91)
3800 Camp Creek Parkway
Bldg. 2400, Suite 102
Atlanta, Georgia 30331
514 H. D. Bauman Inc. (8/24/87)
55 Mirona Road
Portsmouth, New Hampshire 03801-5317
203R HT Engineered Valves (11/27/68)
33 Centerville Road
Lancaster, Pennsylvania 17603-2064
494 Saunders Valve, Inc. (2/10/87)
16516 Air Center Boulevard
Houston, Texas 77032-5103
55-01 Boot Seal Valves for Milk & Milk Products
839 G & H Products Corp. (7/11/95)
P.O. Box 909
Pleasant Prairie, Wisconsin 53158-0909
(Mfg. by: Keflitt A/S
Snaremosvej 27
DK-7000 Fredericia
Denmark)
821 Keflitt, Inc. (3/17/95)
1001 W. Glen Oaks, Suite 221
Mequon, Wisconsin 53092
(Mfg. by: Keflitt A/S
Snaremosvej 27
DK-7000 Fredericia
Denmark)
56-00 (Formerly 08-17E) Inlet and Outlet
Leak-Protector Plug Valve
34E Tri-Clover, Inc. (10/15/56)
9201 Wilmot Road
Kenosha, Wisconsin 53141
57-01 (Formerly 08-17F) Tank Outlet Valve
531 G & H Products Corp. (5/31/88)
P.O. Box 909
Pleasant Prairie, Wisconsin 53158-0909
534 Lumaco
9-11 East Broadway
Hackensack, New Jersey 07601
643 Paul Mueller Company (8/22/91)
1600 West Phelps
Springfield, Missouri 65801
58-00 (Formerly 08-17M) Vacuum Breakers
and Check Valves
843 APV Crepaco (8/24/95)
A Division of APV North America, Inc.
100 South CP Avenue
Lake Mills, Wisconsin 53551
691 Defontaine of America, Inc. (9/19/92)
16720 W. Victor Road
New Berlin, Wisconsin 53151
(Mfg. by: Defontaine S.A. - Dept. Definox
3, rue Louis Renault - BP 329
44803 Saint-Herblain Cedex
France)
835 G & H Products Corp. (6/22/95)
P.O. Box 909
Pleasant Prairie, Wisconsin 53158-0909
834 Stanfos, Inc. (6/22/95)
3908 - 69th Avenue
Edmonton, Alberta
Canada T6B 2V2
(U.S. Rep.: Andron Stainless Corporation
8901 Farrow Road, Suite 101
Columbia, South Carolina 29203)
857 Steel & O'Brien, Mfg. Co. (10/30/95)
12850 Route 39
Sardinia, New York 14134
689 VNE Corporation (8/17/92)
1149 Barberry Drive
Janesville, Wisconsin 53547
908 Waukesha Cherry-Burrell (4/25/97)
611 Sugar Creek Road
Delavan, Wisconsin 53115
59-00 (Formerly 08-17D) Automatic Positive
Displacement Sampler
291 Accurate Metering Systems Inc. (6/22/77)
(Mfg. by: Diessel, Germany)
1650 Wilkening Court
Schaumburg, Illinois 60173
284 Bristol Equipment Co. (11/18/76)
210 Beaver Street
P.O. Box 696
Yorkville, Illinois 60560-0696
60-00 (Formerly 08-17G) Rupture Discs
407 Continental Disc Corp. (10/14/83)
3160 W. Heartland Drive
Liberty, Missouri 64068
854 Fikex Metal Prod. Div. Fike Corp.
704 South 10th Street
Blue Springs, Missouri 64015
892 Oklahoma Safety Equipment Company (OSECO)
1701 West Tacoma
Broken Arrow, Oklahoma 74012
61-00 (Formerly 08-17I) Steam Injected Heaters
728 APV Unit Systems Inc. (4/14/93)
395 Fillmore Avenue
Tonawanda, New York 14150
811 Hydro-Thermal Corporation (1/1/95)
400 Pilot Court
Waukesha, Wisconsin 53188
560 Pick Heaters, Inc. (1/19/89)
P.O. Box 516
West Bend, Wisconsin 53095

116 Dairy, Food and Environmental Sanitation — FEBRUARY 1998
<table>
<thead>
<tr>
<th>Business</th>
<th>Address</th>
<th>Phone</th>
<th>Fax</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>874 Q-Jet Systems, Inc.</td>
<td>704 Powell Lane, P.O. Box 350, Lewiston, New York 14092-0350</td>
<td>(4/2/96)</td>
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<tr>
<td>620-01 (Formerly 08-17L) Hose Assemblies</td>
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<tr>
<td>795 Able Hose &amp; Rubber, Inc.</td>
<td>2307 E. Hennepin Avenue, Minneapolis, Minnesota 55413</td>
<td>(9/14/94)</td>
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<tr>
<td>774 The Briggs Co.</td>
<td>3 Bellecor Drive, New Castle, Delaware 19720</td>
<td>(7/18/94)</td>
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<tr>
<td>758 Crouch Supply Co.</td>
<td>P.O. Box 163829, Ft. Worth, Texas 76161</td>
<td>(2/22/94)</td>
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<tr>
<td>721 Dixon Valve &amp; Coupling Co.</td>
<td>800 High Street, Chestertown, Maryland 21620-1196</td>
<td>(3/23/93)</td>
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<tr>
<td>913 JGB Enterprises, Inc.</td>
<td>115 Metropolitan Drive, Liverpool, New York 13088</td>
<td>(4/9/97)</td>
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<tr>
<td>757 Nelson-Jameson, Inc.</td>
<td>P.O. Box 617, 2400 East 5th Street, Marshfield, Wisconsin 54449</td>
<td>(2/21/94)</td>
<td></td>
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<tr>
<td>727 Pure Fit, Inc.</td>
<td>924 Marcon Boulevard, Allentown, Pennsylvania 18103</td>
<td>(4/14/93)</td>
<td></td>
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<tr>
<td>799 Rubber World</td>
<td>936 Links Avenue, Landisville, Pennsylvania 17538</td>
<td>(10/21/94)</td>
<td></td>
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<tr>
<td>698 Sanitary Couplers, Inc.</td>
<td>696-698 Pleasant Valley Drive, Springboro, Ohio 45066</td>
<td>(10/23/92)</td>
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<tr>
<td>700 Titan Industries, Inc.</td>
<td>P.O. Box 1007, 11121 Garfield Avenue, South Gate, California 90280-7590</td>
<td>(10/23/92)</td>
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<tr>
<td>63-01 (Formerly 08-17R) Sanitary Fittings</td>
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<tr>
<td>470 Advance Fittings Corp.</td>
<td>218 West Centralia Street, Elkhorn, Wisconsin 53121</td>
<td>(3/30/86)</td>
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<tr>
<td>380 Allegheny Bradford Corp.</td>
<td>P.O. Box 200 Route 219 South, Bradford, Pennsylvania 16701</td>
<td>(3/21/83)</td>
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<tr>
<td>798 APV Fluming Handling-America, Inc.</td>
<td>100 South CP Avenue, Lake Mills, Wisconsin 53551-1799</td>
<td>(11/23/57)</td>
<td></td>
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<tr>
<td>682 Andron Stainless, Ltd.</td>
<td>6170 Tomken Road, Mississauga, Ontario Canada L5T 1X7</td>
<td>(6/30/92)</td>
<td></td>
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<tr>
<td>319 APN. Inc.</td>
<td>921 Industry Road, Caledonia, Minnesota 55921</td>
<td>(12/15/81)</td>
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<tr>
<td>900 APV Fluid Handling America</td>
<td>100 South CP Avenue, Lake Mills, Wisconsin 53551-1799</td>
<td>(12/31/90)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>621 Bradford Castmetals</td>
<td>P.O. Box 33, Elm Grove, Wisconsin 53122</td>
<td>(2/25/91)</td>
<td></td>
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<tr>
<td>688 Swagelok</td>
<td>9760 Shepard Road, Macedonia, Ohio 44056-1199</td>
<td>(8/4/92)</td>
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<tr>
<td>645 Cipriani, Inc. - Tassalini S.P.A.</td>
<td>23195 LaCadena Drive, Suite #103, Laguna Hills, California 92653</td>
<td>(8/27/91)</td>
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<tr>
<td>696 Conexiones Inoxidables de Puebla S. A. de C. V.</td>
<td>Edo. Puebla, Mexico</td>
<td>(10/1/92)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>528 Mark IV Industrial Dayco Industrial Division</td>
<td>1 Prestige Place, Miamiburg, Ohio 45142</td>
<td>(3/16/88)</td>
<td></td>
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</tr>
<tr>
<td>947 FLOWMECA</td>
<td>47 rue du Bois Chalend, Lisses, 91029 Evry Cedex, France</td>
<td>(12/22/97)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>925 Hassia Verpackungsmaschinen GmbH</td>
<td>P.O. Box 1120, D-63589 Ranstadt, Germany</td>
<td>(6/5/97)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>773 Herrli AG</td>
<td>3210 Kerzers, Switzerland</td>
<td>(7/15/94)</td>
<td></td>
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<tr>
<td>917 Irving Polishing &amp; Mfg., Co., Inc.</td>
<td>5704 46th Street, Kenosha, Wisconsin 53144-1899</td>
<td>(4/17/97)</td>
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</tr>
<tr>
<td>454 Jensen Fittings Corp.</td>
<td>107-111 Goundry Street, North Tonawanda, New York 14120-5998</td>
<td>(9/11/85)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>933 King Lai International Co., Ltd.</td>
<td>No. 10, The 6th Street, Youth Industrial Zone, Tachia, Taichung, Taiwan ROC</td>
<td>(7/31/97)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
64-00 (Formerly 08-17N) Pressure Reducing and Back Pressure Regulating Valve

782 CASHCO, Inc.
P.O. Box 6
Ellsworth, Kansas 67439-0006
(8/31/94)

753 G & H Products
P.O. Box 909
Pleasant Prairie, Wisconsin 53158-0909
(2/1/94)

769 Richards Industries Valve Group
3170 Wasson Road
Cincinnati, Ohio 45209-2381
(6/6/94)

65-00 Sight &/or Light Windows & Sight Indications & Contact with Milk & Milk Products

849 Jacoby TarBox Division of Clark Reliance Corp.
16633 Foltz Industrial Parkway
Strongsville, Ohio 44136
(9/25/95)

867 J.M. Canty, Inc.
590 Young Street
Tonawanda, New York 14150
Strongsville, Ohio 44136
(2/19/96)

929 Darrell A. Beer
d.b.a. SHAE Industries
P.O. Box 1268
121 W. North Street
Healdsburg, California 95448
(7/18/97)

845 L. J. Star Inc.
P.O. Box 1116
2201 Pinnacle Parkway
Twinsburg, Ohio 44087
(9/7/95)

898 Fluid Transfer
Division of Lee Ind., Inc.
514 W. Pine Street
Philipsburg, Pennsylvania 16866
(12/12/96)

931 LUMACO
9-11 East Broadway
Hackensack, New Jersey
(Mfg. by: Dairy Pipe Lines, Ltd.
Shirehill Industrial Estate
Saffron Walden, Essex
England)
(7/18/97)

73-00 Shear Mixers, Mixers and Agitators

Admix, Inc.
23 Londonderry Road
Londonderry, New Hampshire 03053
(1/2/97)
<table>
<thead>
<tr>
<th>Company Name</th>
<th>Address</th>
<th>Phone Number</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABB Instrumentation, Inc.</td>
<td>P.O. Box 20550, Rochester, New York 14602-0550</td>
<td>(6/25/93)</td>
<td>738</td>
</tr>
<tr>
<td>Ametek/Mansfield &amp; Greenfield</td>
<td>8600 Somerset Drive, Largo, Florida 34643</td>
<td>(10/13/89)</td>
<td>576</td>
</tr>
<tr>
<td>Anderson Instrument Co., Inc.</td>
<td>156 Auriesville Road, Fultonville, New York 12072</td>
<td>(4/9/79)</td>
<td>318</td>
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<tr>
<td>APV Heat Transfer Tec</td>
<td>395 Fillmore Avenue, Tonawanda, New York 14150</td>
<td>(1/25/96)</td>
<td>865</td>
</tr>
<tr>
<td>Bindicator Company</td>
<td>1915 Dove Street, Port Huron, Michigan 48060</td>
<td>(11/20/91)</td>
<td>659</td>
</tr>
<tr>
<td>Bindicator Company</td>
<td>1915 Dove Street, Port Huron, Michigan 48060</td>
<td>(12/29/92)</td>
<td>706</td>
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<tr>
<td>BOURDON - SEDME S.A.</td>
<td>125, rue de la Marre, Vendome Cedex, France</td>
<td>(6/18/97)</td>
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</tr>
<tr>
<td>Brookfield Eng. Lab, Inc.</td>
<td>214 Cushing Street, Stoughton, Massachusetts 02072-2398</td>
<td>(3/28/96)</td>
<td>872</td>
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<tr>
<td>Burns Engineering, Inc.</td>
<td>10201 Bren Road, East Minnetonka, Minnesota 55343</td>
<td>(2/5/79)</td>
<td>315</td>
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<tr>
<td>Caldwell Systems Corporation</td>
<td>1200 Diamond Circle, Unit K Lafayette, Colorado 80026</td>
<td>(3/4/88)</td>
<td>525</td>
</tr>
<tr>
<td>CEMCO Mfg., Inc.</td>
<td>1120 North Peoria, Tulsa, Oklahoma 74106-1904</td>
<td>(3/7/97)</td>
<td>910</td>
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<tr>
<td>Chicago Stainless Equip.</td>
<td>511 Weston Ridge Drive, Naperville, Illinois 60563</td>
<td>(9/28/95)</td>
<td>850</td>
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<tr>
<td>Computer Instruments Corp.</td>
<td>1000 Shames Drive, Westbury, New York 11590</td>
<td>(4/3/92)</td>
<td>672</td>
</tr>
<tr>
<td>DCT Instruments</td>
<td>2080 Arlingate Lane, Columbus, Ohio 43228-1112</td>
<td>(4/13/95)</td>
<td>829</td>
</tr>
<tr>
<td>Delta Controls Corporation</td>
<td>585 Fortson Street, Shreveport, Louisiana 71107</td>
<td>(11/30/95)</td>
<td>862</td>
</tr>
<tr>
<td>Diversey Lever Equipment</td>
<td>151 Harvey West Boulevard, Santa Cruz, California 95060</td>
<td>(12/14/89)</td>
<td>586</td>
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<tr>
<td>Dowex S.S., Inc.</td>
<td>2400 N.E. 2nd Street, Minneapolis, Minnesota 55418</td>
<td>(1/29/96)</td>
<td>866</td>
</tr>
<tr>
<td>Dresser Industries Instrument Division</td>
<td>250 East Main Street, Stratford, Connecticut 06497</td>
<td>(7/16/91)</td>
<td>640</td>
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<tr>
<td>Dresser Industries Instrument Division</td>
<td>210 Old Gate Lane, Milford, Connecticut 06460</td>
<td>(12/4/91)</td>
<td>663</td>
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<tr>
<td>Drexelbrook Engineering Co.</td>
<td>205 Keith Valley Road, Horsham, Pennsylvania 19044</td>
<td>(9/27/83)</td>
<td>405</td>
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<td>Dywer Instruments, Inc.</td>
<td>P.O. Box 373, Michigan City, Indiana 46360</td>
<td>(11/28/95)</td>
<td>861</td>
</tr>
<tr>
<td>EG &amp; G Berthold Laboratorium Prof.</td>
<td>D-75471 Bad Wildbad 1, Germany</td>
<td>(4/21/94)</td>
<td>763</td>
</tr>
<tr>
<td>Endress + Hauser, Inc.</td>
<td>11339 East Distribution Avenue, Jacksonville, Florida 32256</td>
<td>(8/28/97)</td>
<td>936</td>
</tr>
<tr>
<td>Endress + Hauser GmbH</td>
<td>D-79689 Maulburg, Germany</td>
<td>(10/17/85)</td>
<td>459</td>
</tr>
<tr>
<td>Fisher Rosemount Singapore</td>
<td>8510 Endress Place, Greenwood, Indiana 46142</td>
<td>(5/14/96)</td>
<td>876</td>
</tr>
<tr>
<td>FMC Invalco, Inc.</td>
<td>1 Pandal Crescent, Singapore 0512</td>
<td>(5/14/96)</td>
<td>876</td>
</tr>
<tr>
<td>Flow Technology, Inc.</td>
<td>4250 E. Broadway Road, Phoenix, Arizona 85040</td>
<td>(1/14/88)</td>
<td>521</td>
</tr>
<tr>
<td>Endress * Hauser, Inc.</td>
<td>2350 Endress Place, Greenwood, Indiana 46142</td>
<td>(10/17/85)</td>
<td>459</td>
</tr>
<tr>
<td>Fisher Rosemount Singapore</td>
<td>1 Pandan Crescent, Singapore 0512</td>
<td>(3/22/90)</td>
<td>598</td>
</tr>
<tr>
<td>Private Limited</td>
<td>1 Pandal Crescent, Singapore 0512</td>
<td>(3/22/90)</td>
<td>598</td>
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FEBRUARY 1998 - Dairy, Food and Environmental Sanitation
<table>
<thead>
<tr>
<th>Company Name</th>
<th>Address</th>
<th>City, State, Zip</th>
<th>Date</th>
</tr>
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<tbody>
<tr>
<td>The Foxboro Company</td>
<td>33 Commercial Street</td>
<td>Foxboro, Massachusetts 02035</td>
<td>(8/11/98)</td>
</tr>
<tr>
<td>Claud S. Gordon Co.</td>
<td>5710 Kenosha Street</td>
<td>P.O. Box 500</td>
<td>Richmond, Illinois 60071</td>
</tr>
<tr>
<td>GP: 50 New York, Ltd.</td>
<td>2770 Long Road</td>
<td>P.O. Box 1150</td>
<td>Grand Island, New York 14072</td>
</tr>
<tr>
<td>Griffith Industrial Products Company</td>
<td>P.O. Box 111</td>
<td>Putnam, Connecticut 06260</td>
<td>(6/21/91)</td>
</tr>
<tr>
<td>Haenni Cie &amp; AG</td>
<td>CH-3303</td>
<td>Jegernstorf, Switzerland</td>
<td>(1/17/94)</td>
</tr>
<tr>
<td>HEINRICH KUBLER AG</td>
<td>CH-6341 Baar</td>
<td>Switzerland</td>
<td>(10/3/91)</td>
</tr>
<tr>
<td>Honeywell, Inc.</td>
<td>1100 Virginia Drive</td>
<td>Fort Washington, Pennsylvania 19034</td>
<td>(9/14/94)</td>
</tr>
<tr>
<td>Honeywell, Inc.</td>
<td>Industrial Controls Div.</td>
<td>1100 Virginia Drive</td>
<td>Fort Washington, Pennsylvania 19034</td>
</tr>
<tr>
<td>H.O. Trerice Co.</td>
<td>12950 W. Eight Mile Road</td>
<td>Oak Park, Michigan 48237-3288</td>
<td>(5/12/95)</td>
</tr>
<tr>
<td>ISE-Magtech</td>
<td>907 Bay Star</td>
<td>Webster, Texas 77598-1531</td>
<td>(5/20/91)</td>
</tr>
<tr>
<td>ITT Conoflow</td>
<td>P.O. Box 768, Rt. 78</td>
<td>St. George, South Carolina 29477</td>
<td>(9/25/89)</td>
</tr>
<tr>
<td>Kay-Ray/Sensall, Inc.</td>
<td>1400 Business Center Drive</td>
<td>Mount Prospect, Illinois 60056</td>
<td>(10/14/94)</td>
</tr>
<tr>
<td>Kamstrup A/S</td>
<td>Process Division</td>
<td>Jacob Knudsen Vej 12</td>
<td>Denmark</td>
</tr>
<tr>
<td>Kemotron, Inc.</td>
<td>1090 Northchase Parkway, Suite 200 South</td>
<td>Marietta, Georgia 30067</td>
<td>(11/25/97)</td>
</tr>
<tr>
<td>Klay Instruments B.V.</td>
<td>Nijverheidsweg 5 NL 7991 CZ Dwingeloo</td>
<td>The Netherlands</td>
<td>(8/18/95)</td>
</tr>
<tr>
<td>King Engineering Corp.</td>
<td>P.O. Box 1228</td>
<td>Ann Arbor, Michigan 48106</td>
<td>(6/13/83)</td>
</tr>
<tr>
<td>Kistler-Morse Corporation</td>
<td>19021-120th Avenue N.E. Bothell, Washington 98011-9511</td>
<td>(10/31/96)</td>
<td></td>
</tr>
<tr>
<td>K Systems Corp.</td>
<td>4919 Butterfield Road</td>
<td>Hillside, Illinois 60162</td>
<td>(12/7/96)</td>
</tr>
<tr>
<td>Larad Equipment</td>
<td>213 Airport Drive Extension</td>
<td>Hopedale, Massachusetts 01747</td>
<td>(2/25/91)</td>
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<tr>
<td>Lumenite Control Technology Inc.</td>
<td>2331 N. 17th Avenue</td>
<td>Franklin Park, Illinois 60131</td>
<td>(4/27/87)</td>
</tr>
<tr>
<td>Magnetrol International</td>
<td>5300 Belmont Road</td>
<td>Downers Grove, Illinois 60515</td>
<td>(3/20/90)</td>
</tr>
<tr>
<td>MTS Systems Corporation</td>
<td>Sensors Division</td>
<td>3001 Sheldon Drive</td>
<td>Cary, North Carolina 27513</td>
</tr>
<tr>
<td>Mettler-Toledo Process Analytical, Inc.</td>
<td>261 Ballardvale Street</td>
<td>Wilmington, Massachusetts 01887</td>
<td>(2/14/97)</td>
</tr>
<tr>
<td>Milltronics, Inc.</td>
<td>P.O. Box 4225</td>
<td>Peterborough, Ontario Canada K9J 7B1</td>
<td>(4/12/91)</td>
</tr>
<tr>
<td>Minco Products, Inc.</td>
<td>7300 Commerce Lane</td>
<td>Minneapolis, Minnesota 55432</td>
<td>(12/20/89)</td>
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<tr>
<td>Nelson-Jameson</td>
<td>2400 East 5th Street, P.O. Box 647</td>
<td>Marshfield, Wisconsin 54449</td>
<td>(1/11/96)</td>
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<tr>
<td>NUOVA FIMA S.p.A.</td>
<td>Via C. Battisti 59</td>
<td>28045 - INVORIO (NO) Italy</td>
<td>(3/20/90)</td>
</tr>
<tr>
<td>Ohmart/VEGA</td>
<td>4241 Allendorf Drive</td>
<td>Cincinnati, Ohio 45209-9961</td>
<td>(3/4/97)</td>
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<tr>
<td>Number</td>
<td>Company Name</td>
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<tr>
<td>523</td>
<td>Paper Machine Components, Inc.</td>
<td>Miry Brook Road, Danbury, Connecticut 06810</td>
<td>(1/3/88)</td>
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<tr>
<td>554</td>
<td>Par Sonics, Inc.</td>
<td>R.D. #1 - Box 505, Centre Hall, Pennsylvania 16828</td>
<td>(11/30/88)</td>
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<tr>
<td>563</td>
<td>PI Components Corp.</td>
<td>1951 Highway 290W, Brenham, Texas 77833</td>
<td>(2/13/89)</td>
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<td>644</td>
<td>Princo Instruments, Inc.</td>
<td>1020 Industrial Highway, Southampton, Pennsylvania 18966-4095</td>
<td>(8/22/91)</td>
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<tr>
<td>815</td>
<td>ProMag PM LTD</td>
<td>11552 Merchant Drive, Fort Wayne, Indiana 46825</td>
<td>(2/24/95)</td>
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<tr>
<td>487</td>
<td>Pyromation, Incorporated</td>
<td>5211 Industrial Road, Hudson, New Hampshire 03051</td>
<td>(12/16/86)</td>
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<td>367</td>
<td>RDF Corporation</td>
<td>23 Elm Avenue, Hudson, New Hampshire 03051</td>
<td>(10/2/82)</td>
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<td>495</td>
<td>Rosemount Analytical, Inc.</td>
<td>2400 Barranca Parkway, Irvine, California 92606</td>
<td>(2/13/87)</td>
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<tr>
<td>328</td>
<td>Rosemount, Inc.</td>
<td>12001 Technology Drive, Eden Prairie, Minnesota 55344</td>
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<td>732</td>
<td>SensorTec, Inc.</td>
<td>16355-7 Lima Road, Huntertown, Indiana 46748</td>
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<tr>
<td>784</td>
<td>Sensotec, Inc.</td>
<td>2080 Arlington Lane, Columbus, Ohio 43228-4112</td>
<td>(9/2/94)</td>
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<td>515</td>
<td>Setra Systems, Inc.</td>
<td>159 Swanson Road, Boxborough, Massachusetts 01719</td>
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<tr>
<td>583</td>
<td>S. J. Controls, Inc.</td>
<td>2248 Obispo Avenue #203, Long Beach, California 90806</td>
<td>(11/11/89)</td>
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<tr>
<td>873</td>
<td>Smar Equipamentos</td>
<td>7240 Britmoore, Suite 118, Houston, Texas 77041</td>
<td>(4/2/96)</td>
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<tr>
<td>875</td>
<td>SOR</td>
<td>14685 W. 105th Street, Lenexa, Kansas 66215-5964</td>
<td>(4/15/96)</td>
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<td>638</td>
<td>Millipore Corporation</td>
<td>P.O. Box 860709, Plano, Texas 75086-0709</td>
<td>(7/10/91)</td>
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<td>896</td>
<td>TBI-Bailey Controls Company</td>
<td>2175 Lockheed Way, Carson City, Nevada 89706</td>
<td>(12/3/96)</td>
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<td>641</td>
<td>Tempress A/S</td>
<td>P.O. Box 2000, DK-8240, Russekov, Denmark</td>
<td>(7/16/91)</td>
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<tr>
<td>690</td>
<td>Texas Thermowell, Inc.</td>
<td>P.O. Box 1535, Hwy. 96 North, Silsbee, Texas 77656</td>
<td>(8/25/92)</td>
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<tr>
<td>765</td>
<td>Tri-Clover, Inc.</td>
<td>9201 Wilmot Road, Kenosha, Wisconsin 53141</td>
<td>(4/27/94)</td>
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<td>444</td>
<td>Tuchenhagen North America, Inc.</td>
<td>196 Western Avenue, Fond du Lac, Wisconsin 54936-1458</td>
<td>(6/17/85)</td>
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<tr>
<td>836</td>
<td>Valmet Automation</td>
<td>30 Thomas Drive, Westbrook, Maine 04092</td>
<td>(7/2/95)</td>
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<td>410</td>
<td>Viatran Corporation</td>
<td>300 Industrial Drive, Grand Island, New York 14072</td>
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<td>Wahl Instruments, Inc.</td>
<td>234 Weaverville Highway, Ashville, North Carolina 28804</td>
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<td>Weed Instrument Company, Inc.</td>
<td>707 Jeffrey Way, Round Rock, Texas 78664</td>
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<td>WEISS Instruments, Inc.</td>
<td>85 Bell Street, West Babylon, New York 11704</td>
<td>(5/24/89)</td>
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<td>600</td>
<td>Weksler Instruments Corporation</td>
<td>250 E. Main Street, Stratford, Connecticut 06957</td>
<td>(4/27/90)</td>
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<tr>
<td>646</td>
<td>Wika Instrument Corp.</td>
<td>1000 Wiegand Boulevard, Lawrenceville, Georgia 30243</td>
<td>(9/10/91)</td>
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<td>685</td>
<td>Winter’s Thermogauges, Ltd.</td>
<td>2220-3 Midland Avenue, Scarborough, Ontario Canada M1P 3E6</td>
<td>(8/3/92)</td>
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<tr>
<td>679</td>
<td>Zurich Industria E</td>
<td>R. Serra da Piedade, 183, Sao Paulo - SP - Brazil 03151-080</td>
<td>(6/3/96)</td>
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Department of Health and Human Services, Food and Drug Administration, Center for Veterinary Medicine is seeking two research microbiologists to conduct research in environmental microbiology associated with the food animal production environment. This research will investigate the ecology of human foodborne pathogens associated with preharvest animal production and phenomena related to resistance development in pathogens from antibiotic usage. Position number FDA-8-4004 requires experience in food/environmental microbiology. Position number FDA-8-4005 requires experience in environmental microbiology/microbial genetics. Candidates with a Ph.D. and 0-5 years experience preferred. Positions are located at Laurel, Maryland. U.S. Citizenship required. Please contact (301) 827-4287 to receive a faxed copy of either of the vacancy announcements or contact Mary Goodson at (301) 594-0195. Candidates should submit an Application for Federal Employment and/or resume with transcripts to: FDA, OHRMS, Room 211, Metro Park North I, HFA-423, 7520 Standish Place, Rockville, MD 20857. Applications will be accepted through March 10, 1998. FDA is an equal opportunity employer and has a smoke free environment.
IAMFES 85th Annual Meeting
August 16-19, 1998
Nashville, Tennessee

Preview Program*

**Symposia Topics:**
- The Leading Edge of Foodborne Disease Surveillance
- Sensory Characteristics of Dairy Products
- Risk Management of Food from Farm to Fork
- HACCP Reflection — One Year After Implementation
- Basic Dairy Field Workshop I and II
- Moving Meat Inspection into the Future
- Potential Foodborne Pathogens Associated with Pork
- Farm to Table: Ecology of Pathogens Associated with Poultry
- Bringing Science to Restaurant Inspection
- Factors Affecting Bacterial Attachment to Meat Surfaces
- Food Worker Hand Hygiene: A Factor in Foodborne Illness
- New Approaches to Food Inspection
- Mandatory Sanitation — SSOP’s; A Review
- Pest Control as We Approach 2000
- Computerized Process Control and Record Keeping in the Dairy Industry

**Technical & Poster Sessions:**
Will include presentations of leading research in food safety from around the world.

REGISTER TODAY! See registration information on the following pages.

*Program subject to change.
IMPORTANT! Please read this information before completing your registration form.

Meeting Information
Register today to obtain valuable information on advancing food safety worldwide through the most contemporary methods of food microbiology, processing, safe handling, and current regulatory aspects of food safety. Registration fee includes all technical sessions; symposia; poster presentations; a Cheese and Wine Reception; admittance to the exhibit hall; and a program and abstract book containing general program information and abstracts of symposia, technical papers, and posters. Appropriate dress for the Meeting is business casual.

Registration Information
Please mail the registration form with payment today. Registrations post-marked after July 15, 1998 must pay the late registration fee. Checks should be made payable to: IAFMFS, Inc., 6200 Aurora Avenue, Suite 200W, Des Moines, IA 50322-2863, U.S.A. For faster service, use your credit card and call 800.369.6337, or fax the completed registration form with credit card information to 515.276.8655.

Refund/Cancellation Policy
Requests for cancellations must be received in writing no later than July 31, 1998 (registration fee less a $50 processing charge will be refunded). Cancellations received after July 31, 1998 will not receive a refund, but the registration may be transferred to a colleague with written notification.

New Membership Fees
$75.00 Dairy, Food and Environmental Sanitation
$120.00 Dairy, Food and Environmental Sanitation and Journal of Food Protection
$37.50 *Student Membership with Dairy, Food and Environmental Sanitation or Journal of Food Protection
$60.00 *Student Membership with Dairy, Food and Environmental Sanitation and Journal of Food Protection

*Tuition/student verification required.

SHIPPING CHARGES: OUTSIDE THE U.S.
SURFACE RATE - $22.50 per journal title
AIRMAIL - $95.00 per journal title

TICKET INFORMATION
- Cheese and Wine Reception (August 16, 1998)
  Share in what has become an IAFMFS tradition for Annual Meeting attendees and guests. The Cheese and Wine Reception begins immediately following the Ivan Parkin Lecture on Sunday evening in the IAFMFS exhibit hall. Enjoy conversation with exhibitors, colleagues, and friends.

- Monday Night Social Event
  Hot Country Night — (August 17, 1998)
  There’s no time like a good time, and the Wildhorse Saloon is just the place to find it. The evening includes dinner, music, dancing, and a few surprises. Children ages 14 and under must be accompanied by an adult.

- Awards Banquet — (August 19, 1998)
  The IAFMFS Annual Meeting concludes with an evening of recognition for deserving food safety professionals. A reception opens the evening outside the banquet hall. Dinner is served in an elegant setting prior to the award presentations. Additional tickets are available. Business attire is requested for this special evening.

- Other Events
  Grand Ole Opry — Saturday, 8/15
  IAFMFS Golf Tournament — Sunday, 8/16
  Music City Sites — Sunday, 8/16
  Historic Nashville — Monday, 8/17
  Jack Daniel’s Distillery — Tuesday, 8/18
  Children’s Banquet — Wednesday, 8/19

HOTEL INFORMATION
For reservations, contact the hotel directly and identify yourself as an IAFMFS attendee to receive a special rate of $116 per night, single or double.

Renaissance Nashville Hotel
611 Commerce Street
Nashville, Tennessee 37203
Phone: 615.255.8400; Fax: 615.255.8163

CHILD CARE
Adult supervised activities for children ages 4 to 12 will be available Monday through Wednesday, 8:30 a.m. to 12:00 p.m. and 1:30 p.m. to 5:00 p.m. A pre-registration fee of $20.00 per day for each child is required; snacks will be provided. The room is subject to a minimum attendance. Participants will be notified if cancellation is necessary by July 24, 1998.
REGISTRATION FORM

☐ Please register me for the IAMFES 85th Annual Meeting – Nashville, Tennessee – August 16-19, 1998

First Name (please print — will appear on badge) M.I. Last Name
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Status (Please check applicable boxes)
☐ 20 Yr. Member ☐ 30 Yr. Member ☐ 50 Yr. Member ☐ Past President ☐ Speaker ☐ Honorary Life Member ☐ Sustaining Member

REGISTER BY JULY 15, 1998 TO AVOID LATE REGISTRATION FEES

REGISTRATION:
MEMBERS
Registration (Awards Banquet included) $230 ($280 late)
Student $35 ($45 late)
Retired IAMFES Member $35 ($45 late)
One Day Registration: ☐ Mon. ☐ Tues. ☐ Wed. $115 ($140 late)
Spouse/Companion (Name): $35 ($35 late)
Children (15 & Under, Names): $25 ($25 late)
Child Care (Ages 4 to 12): ☐ Mon. ☐ Tues. ☐ Wed. FREE

NONMEMBERS
Registration (Awards Banquet included) $335 ($385 late)
Student Not Available
Retired IAMFES Member Not Available
One Day Registration: ☐ Mon. ☐ Tues. ☐ Wed. $150 ($170 late)
Spouse/Companion (Name): $35 ($35 late)
Children (15 & Under, Names): $25 ($25 late)
Child Care (Ages 4 to 12): ☐ Mon. ☐ Tues. ☐ Wed. FREE

AMOUNT

OTHER EVENTS:
Grand Ole Opry (Sat., 8/15) $25
IAMFES Golf Tournament (Sun., 8/16) $80 ($95 late)
Music City Sites (Sun., 8/16) $28 ($33 late)
Historic Nashville (Mon., 8/17) $41 ($46 late)
Hot Country Night (Mon. Night Social, 8/17) $36 ($41 late)
Children’s Rate (14 & Under) $21 ($26 late)
Jack Daniel’s Distillery (Tues., 8/18) $29 ($34 late)
IAMFES Awards Banquet (Wed., 8/19) $40 ($45 late)
Children’s Banquet (Wed., 8/19) $20 ($25 late)

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

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Coming Events

MARCH

- 3-5, Practical HACCP for Food Processors, in San Diego, CA. For further information, contact Silliker Laboratories. Phone: 800.829.7879; Fax: 708.957.8405.
- 3-5, Milkfat as a Food Ingredient Course, University of Wisconsin-Madison, Madison, WI. The course is intended for people manufacturing or using milkfat ingredients. It will provide a better understanding of milkfat's chemical and physical properties, and how to select milkfat-derived ingredients for best performance in foods. For program information, contact Kerri Kaylegian, Program Coordinator-CDR at Phone: 608.265.5086; E-mail: kaylegia@cdr.wisc.edu.

- 9-10, Getting Ready for HACCP, Edmonton. An introduction to Agriculture & Agri-Food Canada's Food Safety (CFIA) Enhancement Program (FSEP) with a focus on HACCP Prerequisites and a HACCP case study. This workshop will take a "train the trainer" approach to teaching microbial hazards and food plant sanitation to your personnel. For additional information, contact Guelph Food Technology Centre, 88 McGilvray St., Guelph, Ontario, N1G 2W1; Phone: 519.767.5036; Fax: 519.856.1281.

- 16-17, CAMFES Annual Meeting, in Charlotte, NC. For more information contact Beth Johnson, Phone: 803.935.6201.

- 17, AAMFES Annual Meeting, University of Alberta, Edmonton. Keynote speaker is IAMFES Vice President, Jack Guzewich. For more information contact Lawrence Roth, Phone: 403.427.4054; Fax: 403.436.9454.

- 17-18, Basic Food Microbiology Seminar, Holiday Inn-Portland Airport, Portland, OR. This course will introduce the participant to the fundamental characteristics of microorganisms, and relate the application of microbiology to foods, food safety, and sanitation. For further information, contact Jack Brook, Dept. of Food Science Technology, Mt. Hood Community College, 26000 S.E. Stark St., Gresham, OR 97030; Phone: 503.667.7473; E-mail: brook@mhcc.cc.or.us.

- 17-18, HACCP Workshop, Chicago, IL. For additional information, contact ALB, 1213 Bakers Way, P.O. Box 3999, Manhattan, KS 66505-3999; Phone 785.537.4750; Fax: 785.537.1495.

- 18-20, MEHA 54th Annual Educational Conference, at the Novi Hilton, Novi, MI. For more information contact the MEHA office at Phone: 517.372.7391; Fax: 517.372.7340.

- 23-25, Principles of Quality Assurance, Manhattan, KS. For additional information, contact ALB, 1213 Bakers Way, P.O. Box 3999, Manhattan, KS 66505-3999; Phone 785.537.4750; Fax: 785.537.1493.

- 23-27, Laboratory Methods in Food Microbiology, South Holland, IL. For further information, contact Silliker Laboratories, Phone: 800.829.7879; Fax: 708.957.8405.

- 23-27, PanAmerican Congress on Mastitis Control and Milk Quality, Co-sponsored by IAMFES. International authorities from 20 countries throughout the world will present papers. Several plenary sessions will be held along with six workshops. For more information, contact Dr. W. Nelson Philpot, P.O. Box 120, Homer, LA 71040, U.S.A.; Phone: 318.927.2388; Fax: 318.927.3133.

APRIL

- 1-2, Introduction to Microbiological Criteria and Sampling Plans, in Las Vegas, NM. For further information, contact Silliker Laboratories, Phone: 800.829.7879; Fax: 708.957.8405.

- 2, UK Dairy Industry—3rd Annual Conference, London. For further information, contact Agra Europe (London) Ltd, 25 Frant Road, Tunbridge Wells, Kent, TN2 5JT, England; Phone: 44 (0)1892 511807 or Fax: 44 (0)1892 527758/544895.

- 2-3, Applied Sensory Evaluation Techniques, New Brunswick, NJ. This course is designed to familiarize food and pharmaceutical industry professionals with the essential basic and advanced applied sensory evaluation techniques needed to develop high quality products for today's marketplace. For further information, contact Keith Wilson at Phone: 732.932.9271; Fax: 732.932.1187; or E-mail: ocepe@aesop.rutgers.edu.

- 2-4, Introduction to Statistical Methods for Sensory Evaluation of Foods, University of California-Davis, Davis, CA. This course introduces statistical analysis to the beginning sensory scientist with little or no statistical background and demonstrates how to perform the tests and provides a solid basis of understanding for sensory analysis. To register call 800.752.0881; after November 1, 1997, call 530.757.8777. For program information, contact Michael O'Mahony, at 916.752.6389; E-mail: maomhony@ucdavis.edu.

- 6-9, Seoul Food '98, Korea Exhibition Center, (Kocex), Seoul, Korea. For additional information, contact Sue Na. International Trade Specialist, Korea Machinery Information Center, 111 E. Wacker Dr., Suite 2229, Chicago, IL 60601, U.S.A.; Phone: 312.644.3233; Fax: 312.644.4879.

- 8-9, Microbiological Techniques for Dairy Quality Control, offered by the University of Wisconsin-Madison, Dept. of Food Science. This course will teach entry-level laboratory personnel the basis of routine microbiology analyses used in the dairy industry. For further information, contact Steve Ingham at 608.265.4801.

- 15-16, The Food Industry: Pennsylvania's Opportunities for the New Millennium, Eden Resort Inn and Conference Center, Lancaster, PA. Sponsored by Penn State Dept. of Food Science. Invited to attend are R&D food scientists and engineers, marketing and plant managers from food processing and
manufacturing companies. For more information, contact Dr. Hassan Gourama, Food Science Dept., Penn State-Berks Campus, Phone: 610.396.6121; E-mail: hxg7@psu.edu.

- 17-19, HACCP Workshop, sponsored by the Food Processors Institute. This course is designated to meet the educational requirements cited in both the FDA regulation requiring HACCP for seafoods and the USDA rule on pathogen reduction and HACCP. For more information, contact Valente Alvarez at 614.292.6281.

- 20-21, Food Micro '98, Holiday Inn Select in Old Town Alexandria, VA. The workshop will focus on methods of controlling microbial foodborne illness, with speakers to include experts from universities, government agencies, and the food industry in general. The workshop is presented by the National Food Processors Association and is sponsored by the Food Processors Institute. For registration information, call Eric A. Forste, Program Coordinator, Phone: 202.593.0890; E-mail: eforste@nfpafood.org.

- 24-29, Conference for Food Protection, Swissotel, Boston, MA. To receive additional information, contact Leon Townsend, CFP Executive Secretary, 110 Tecumseh Trail, Frankfurt, KY 40601; Phone or Fax: 502.695.0253; E-mail: lcintosh@dcr.net.

- 27-28, Getting Ready for HACCP, Edmonton. An introduction to Agriculture & Agri-Food Canada's Food Safety Enhancement Program with a focus on HACCP Prerequisites and a HACCP case study. This workshop will take a "train the trainer" approach to teaching microbial hazards and food plant sanitation to your personnel. For additional information, contact Guelph Food Technology Centre, 88 McGilvray St., Guelph, Ontario, NIG 2W1; Phone: 519.767.5036; Fax: 519.836.1281.

- 28-30, Seafood Processing Europe, Brussels Exhibition Centre, Brussels, Belgium. For more information, contact Brad MacCachran at 207.842.5504.

MAY

- 7-8, HACCP for Foodservice, offered by Select Concepts, Dallas, TX. This 2-day workshop covers pre-requisite programs and HACCP principles. For more information, contact Leslie Wisniewski, Select Concepts, 3701 W. Northwest Hwy., Suite 169C, Dallas, TX 75220; or Phone: 214.350.8644.

- 18-19, PAMFES 1998 Annual Meeting, at the Nittany Lion Inn, State College, PA. For additional information, contact Gene Frey at 717.597.0719.

- 19-21, Principles of Food Microbiology, Philadelphia, PA. For further information, contact Silliker Laboratories, Phone: 800.829.7879; Fax: 708.957.8405.

- 20-21, Applied Dairy Chemistry, offered by the University of Wisconsin-Madison, Dept. of Food Science, Madison, WI. This course will cover the chemistry of milk and milk products as they relate to specific dairy processing and control functions. For further information, contact Dr. Bill Wendorff at 608.263.2015.

JUNE

- 3-5, Practical HACCP for Food Processors, Chicago, IL. For further information, contact Silliker Laboratories, Phone: 800.829.7879; Fax: 708.957.8405.

- 7-12, 4th World Congress Foodborne Infections and Intoxications, in Berlin. The continued increase of foodborne diseases and the emergence of new or newly recognized agents of diseases all over the world underline the importance of the congress. For further information, contact Congress Office 4th World Congress, Federal Institute for Health Protection for Consumers and Veterinary Medicine, Diedersdorfer Weg 1, D - 12277 Berlin, Phone: 49.30.8412.2158; Fax: 49.30.8412.2957; E-mail: w.koffic@bgv.de.

- 8-10, Mykotoxin Workshop, in Detmold, Germany. The workshop is organized by the Institute for Biochemistry of Cereals and Potatoes, Federal Centre for Cereal, Potato, and Lipid Research, Schützenberg 12, D - 32756 Detmold, Germany. For information, contact Dr. Wolff at Phone: 49.5231.741.121 (131); Fax: 49.5231.741.130 (100); E-mail: betschebagk@t-online.de.

- 16-18, Hazard Analysis & Development of Your HACCP Plan, Guelph. A practical, business approach to help you in designing your own HACCP plan. You'll build product descriptions, conduct a hazard analysis, determine critical limits and control measures—all on your own processing line. For additional information, contact Guelph Food Technology Centre, 88 McGilvray St., Guelph, Ontario, NIG 2W1; Phone: 519.767.5036; Fax: 519.836.1281.

JULY

- 10-11, 18th International Workshop on Rapid Methods and Automation in Microbiology, at Kansas State University, Manhattan, KS. Hands-on experiments, demonstrations, lectures, colloquium, scientific poster sessions and competition will occur. For scientific content, contact: Daniel Y. C. Fung, Director; Phone: 785.532.5654; Fax: 785.532.5681; E-mail: dfung@oz.oznet.ksu.edu.

- 27-31, Laboratory Methods in Food Microbiology, South Holland, IL. For further information, contact Silliker Laboratories, Phone: 800.829.7879; Fax: 708.957.8405.

AUGUST

- 16-19, IAMFES Annual Meeting, in Nashville, Tennessee at the Renaissance Nashville Hotel. Registration information available in this issue of DFES on pages 124-125 or contact Julie Cattanach at Phone: 800.360.6337; 515.276.8334; Fax: 515.276.8655; E-mail: jccattanach@iamfes.org.

- 24-28, The 10th International Conference on Production Diseases in Farm Animals, Utrecht, The Netherlands. For additional information, contact the Congress Secretariat: Royal Netherlands Veterinary Association, P.O. Box 14031, 5508 SB Utrecht, The Netherlands; Phone: 31 30 251 01 11; Fax: 31 30 251 17 87; E-mail: knmvd@pobox.ruu.nl; Internet: http://www.knmvd.nl.
In Memory of...

Ken Kirby
Edgerton, WI

We extend our deepest sympathy to the family of Mr. Kirby who recently passed away.

Ken was a long-time IAMFES member and recipient of the 1988 Harold Barnum Award.

IAMFES will always have sincere gratitude for his contribution to the Association and the profession.
HAVE YOU JOINED THE IAMFES FOOD PROTECTION REGISTER?

We invite you to become a part of the IAMFES Food Protection Register. Registry Members may be called upon to answer questions received through the IAMFES office and other sources. If you are willing to serve the Association in this manner, please fill out the information below and return to:

IAMFES
Attn: Rick McAtee
6200 Aurora Ave., Suite 200W
Des Moines, IA 50322-2863
Fax: 515.276.8655
E-mail: iamfes@iamfes.org

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Please attach additional paper if more space is needed.

I agree to provide information to other professionals as referred by IAMFES in areas of my interest. I also understand that if a referral is made to me and I am not comfortable in answering the question or do not feel I have the expertise, I can indicate this and decline answering. I agree to allow IAMFES to publish my name and areas of interest in Dairy, Food and Environmental Sanitation as as member of the Food Protection Register.

Signature: ___________________________ Date: ___________________________
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The International Association of Milk, Food and Environmental Sanitarians, founded in 1911, is a non-profit educational association of food safety professionals with a mission "to provide food safety professionals worldwide with a forum to exchange information on protecting the food supply."

* Who are IAMFES Members?

The Association is comprised of a diverse membership of 2,800 from 50 nations. IAMFES Members belong to all facets of the food protection arena including: Industry, Government and Academia.

* What are your Benefits as an IAMFES Member?

Dairy, Food and Environmental Sanitation — A reviewed monthly publication that provides practical and applied research articles and association news, updates, and other related information for food safety professionals. All IAMFES Members receive this publication as part of their membership.

Journal of Food Protection — An international, refereed scientific journal of research and review papers on topics in food science and food aspects of animal and plant sciences. This journal is available to all individuals who request it with their membership.

The IAMFES Lending Library — Provides quality training videos dealing with various food safety issues. IAMFES Members are allowed free use of these videos.

The IAMFES Annual Meeting — Is a unique educational event; three days of technical sessions, symposia and exhibits provide attendees with over 200 presentations on current topics in food protection. IAMFES Members receive a substantially reduced registration fee.

* To Find Out More...

To learn more about IAMFES and the many other benefits and opportunities available to you as a Member, please call 515.276.3344 or 800.369.6337; Fax: 515.276.8655; E-mail: iamfes@iamfes.org.
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