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DAIRY, FOOD AND ENVIRONMENTAL

Sanitation

A PUBLICATION OF THE INTERNATIONAL ASSOCIATION FOR FOOD PROTECTION, INC. FEBRUARY 2001

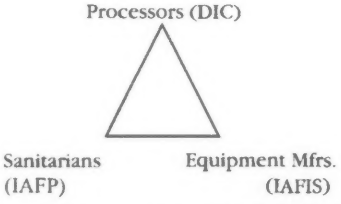
- 2001 Secretary Candidates
- 3-A Holders List

www.foodprotection.org

MARK OF COMPLIANCE

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 IAFP

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

1500 Second Avenue S.E., Suite 209

Cedar Rapids, IA 52403

Phone: 319-286-9221
Fax: 319-286-9290

E-mail: aaasansb@ia.net
Web site: http://zeus.ia.net/~aaasansb

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Photo courtesy of the California Milk Advisory Board.

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DAIRY, FOOD AND ENVIRONMENTAL

Sanitation

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August 5-8

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Minneapolis, Minnesota

2002

June 30-July 3

Hyatt Regency
San Diego
San Diego, California

2003

July 13-16

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DAIRY, FOOD AND ENVIRONMENTAL
Sanitation

International Association for Food Protection

"The mission of the Association is to provide food safety professionals worldwide with a forum to exchange information on protecting the food supply."

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GOLD

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Contact Lisa Hovey, Assistant Director at 800.369.6337; 515.276.3344; E-mail: lhovey@foodprotection.org to find out how your organization could be listed here!

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My Perspective

By JENNY SCOTT
President

"Where would we be without the Internet?"

Have you stopped to think how dependent we have become on the Internet? In the last five years we have gone from very few food safety professionals making use of E-mail and searching online for food safety information to the Internet being absolutely essential to get business done. Nowadays having the E-mail server or Internet provider "go down" is worse than when the phone system was out of service – only a computer crash is worse.

Many of us start our day checking the E-mail – what has happened overnight in food safety? Many of us subscribe to "listservers" to provide us with updates on specific topics – we can rely on someone else to search for food safety news from public sources such as newspapers and food safety-related Web sites and deliver the information, often complete with hyperlinks to the original source, directly to our E-mailboxes. Some of us head directly to the *Federal Register* to see what new regulations the agencies have in store for the food industry today. Others head for the food recall sites to see what foods are being pulled from store shelves and why. Some of us look for our online literature searches or the most current table of contents for journals of interest. How did we manage BI (Before Internet)?

Consider that IAFP has only had a Web site since April 1998. The Web site has evolved from the basic "who we are" to a particularly useful source of information. Have you checked it out lately (**www.foodprotection.org**)? In addition to general information about the Association, we now include information about the Annual Meeting plus an online registration form. Again this year, online submissions for papers and poster abstracts were received. We have put the Membership Directory online for Members only and have included the Table of Contents and Abstracts for the *Journal of Food Protection*. Most of the current issue of *Dairy, Food and Environmental Sanitation* is there (abstracts of peer-reviewed articles are included, but not the full text). Our publications, such as the manual for investigating foodborne illness, can be ordered online. We've come a long way with the Web site, but we're not done yet. We're very lucky to have such an enthusiastic and capable "WebMaster" as Bev Corron. She welcomes your suggestions for improvements to the Web site. Contact her with your ideas at bcorron@foodprotection.org.

Food safety professionals are all busier than ever; anything that can assist us in our jobs quickly becomes essential. And with so much information out there, it sometimes becomes difficult to know where to start. Something that I find particularly useful is a list devoted to Food Safety on the Web. The "links" section of the IAFP Web site is a good place to start. However, for this to be a truly effective site,

you, the Members, have to actively participate by submitting information to the IAFP staff (preferably via E-mail to bcorron@foodprotection.org). In particular, it would be beneficial to enhance the international component of the list, as our links page tends to focus on US-based Web sites. We may also wish to consider providing some descriptive information for some of the links. The type of information that we might consider is illustrated in the following examples.

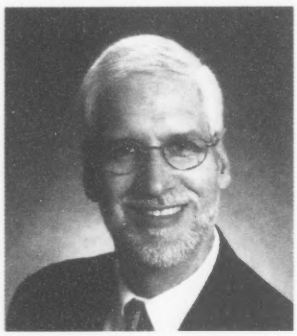
- Institute of Food Science and Technology (UK): www.ifst.org. Particularly useful to food safety professionals are IFST's Information Statements on food-related hot topics such as BSE, *Mycobacterium paratuberculosis* and milk, AIDS and the foodhandler, etc. Searchable. Provides a list of useful food-related mailing lists and newsgroups.
- WHO Food Safety Program: www.who.int/fsf. Provides links to WHO food safety documents, Codex Alimentarius, microbiological risk assessment and more.
- Eurosurveillance Weekly: www.eurosurv.org/update. Publishes news of infectious disease incidents and surveillance data, gathering news from a network of public health centers in the EU and beyond.

As an international association with the mission "to provide food safety professionals worldwide with a forum to exchange information on protecting the food supply," we owe it to ourselves to enhance our Web site to make it the best site to meet our Members' needs for food safety information. This means adding many more links from our site to others – especially international food safety sites. Please help IAFP by providing information to enhance the site.

To wrap up this month, remember Award Nominations are due February 19, 2001. Please nominate a deserving colleague.

COMMENTARY

FROM THE EXECUTIVE DIRECTOR



By DAVID W. THARP, CAE
Executive Director

"One positive thing you can do to prepare for your future as a leader is to become involved with IAFP"

Consider these definitions from Miriam Webster's dictionary:

> Lead: to direct the operations, activity, or performance of (to lead an expedition), to have charge of (to lead a department).
>
> Leadership: the office or position of a leader, capacity to lead, the act or an instance of leading.
>
> Leader: a person who leads.

Do you believe a leadership position is something you can just accept without preparation? How does one become a leader? What traits make up a great leader? This month we will investigate these questions and more.

Are you doing all that you can to become a leader for your company or organization? One positive thing that you can do to prepare for your future as a leader is to become involved with the International Association for Food Protection. Through involvement, you will gain confidence in your ability; your peers will notice you and begin to think of you as a leader.

Involvement in the Association is simple. One easy way to become involved is by joining a Professional Development Group (PDG) by expressing your interest to our office or directly to the PDG Chairperson. PDGs encompass commodities and special interest areas. Through the PDG system, symposia are developed for presentation at the IAFP Annual Meetings. You could achieve a position of leadership by organizing a symposium, by presenting in a symposium or by accepting the Vice Chairperson position. Each of these methods of ground-floor involvement will build your confidence and character. This could be the stepping stone to additional leadership positions within the Association.

Another way to prepare for a leadership role is to change your behavior. Just by adapting or changing your behavior, you can "self-direct" yourself to become leadership material. You may want to change your outlook and vision of the organization. By supporting positive changes that help shape the organization's future, you will again, be recognized by your peers. A positive attitude and enthusiasm works wonders for you and those around you.

Do you practice giving complements? Both developing leaders and established leaders may practice this activity. By complementing co-workers (subordinates, equals and superiors), you are recognizing their efforts exerted. Everyone likes recognition for his or her accomplishments. Through complements, you give encouragement to the individual to continue performing at their best. This is the easiest way to build teamwork and achieve common goals. It is an essential tool for leaders to use.

One "must do" is to maintain your honesty and integrity. Think of leaders that inspire you or have inspired you in the past. These leaders may be inter-

national leaders, local leaders or even family and friends. Now think about what impresses you the most about these leaders. Honesty and integrity are at the top of the list of what it takes to become a leader. Honesty and integrity determine the difference between just doing a job and embodying a concept. By maintaining your honesty and integrity, you lead by example. You then become recognized as a trusted staff member who co-workers rely on for straightforward answers to their questions.

Simplicity, expression and listening are also elements that help create leadership qualities. Sometimes expressing your views in a clear, concise manner rather than adding complexity through big, cumbersome words helps identify you as authentic. Practice clarity in all of your verbal and written communications – even E-mail communication. Listening to others when they speak and really paying attention – full attention – will pay dividends. You show that you value the speaker's input and opinions when you listen carefully.

Some of these ideas just seem like common sense. So much like common sense that many times we forget to practice good leadership skills. Whether you are a new graduate or a long-term employee, paying attention to leadership qualities will help your department or organization. Practicing leadership qualities will improve your attitude and outlook. Seasoned leaders can also do their part in developing new leaders by nurturing younger staff members and expanding their skills.

Shown on page 138 are two leaders in the Association that I want to call your attention to. In this issue, we announce our 2001-2002 Secretary Candidates. Kathy Glass, from the University of Wisconsin and David Golden, at the University of Tennessee are the Candidates. By agreeing to be Candidates, Kathy and David are ready to lead the Association when their time comes. Both Kathy and David are recognized as leaders at their individual universities and within the food science community. Remember that these leadership skills are not something either of them developed overnight. It took many years of hard work, dedication to what they believe in, working with other professionals, providing clear, concise input and listening when necessary.

Now they have achieved another peak in their professional journey through life, to be selected as a Candidate for Secretary of the International Association for Food Protection. We wish them both well during the election knowing that there will be no loser in this election. Yes, one will become the Secretary, but both will continue to be leaders in the Association and at their universities!

Dairy, Food and Environmental Sanitation, Vol. 21, No. 2, Pages 110-122

[1]Presented at the Symposium on Globalization of Foodborne Disease, IAMFES Annual Meeting, Dearborn, Michigan, August 1-4, 1999

Foodborne and Waterborne Disease in Developing Countries — Africa and the Middle East

Ewen C. D. Todd*

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SUMMARY

Foodborne and waterborne diseases are a worldwide problem. Yet, little is known about those affecting developing countries, where they are probably most prevalent and most life threatening. In an attempt to collate existing information and look for data gaps, published literature concerning enteric diseases, including those that are foodborne and waterborne, affecting African and Middle Eastern countries was collected and reviewed. Risk factors reflecting people's environmental and cultural conditions are apparent. In rural areas, sanitation facilities are often inadequate, and once pathogens get into a community, fecal-oral spread of disease can be rapid and extensive. In addition, because keeping food hot or cold is not usually practical, pathogens may be able to grow in both home-prepared foods, and those sold at markets in foodservice operations, and by street vendors. Many countries in Africa and the Middle East are exposed to disaster situations, such as flooding and drought, international conflicts, civil unrest, and the conditions of refugee camps, more frequently than industrialized nations. These situations compound the risks of exposure to enteric infections. Understanding of food safety concepts in general is lacking, particularly concepts of proper home food preparation. Problems in the food processing and foodservice industries result from a high turnover rate of food workers and from language differences that make effective communication difficult. Once these issues are recognized and understood, targeted resources can be directed to the most effective control measures.

A peer-reviewed article.

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INTRODUCTION

Enteric diseases, in particular those that are foodborne or waterborne in origin, are increasing or at least not diminishing in all parts of the world. Most of our knowledge about such diseases comes from studies in industrialized countries, many of which have well-established surveillance systems and research programs focused on national concerns and imported products. It is suspected that much more foodborne disease occurs in developing countries, many of which contain some of the world's largest populations living under crowded conditions and with poor hygienic and sanitation systems. However, relatively little information on foodborne and waterborne disease has been obtained from most of these countries, and what there is has not been analyzed for common risk factors. There are two components to this article: (1) reports of foodborne and waterborne illnesses, and (2) microbiological surveys of food and food environments. Information was obtained from a variety of sources at the national or local level through scientific publications and media releases. Although this summary of information is restricted to Africa and the Middle East, a number of risk factors that can apply more generally can be deduced from the information.

FOODBORNE AND WATERBORNE ILLNESSES

Foodborne disease outbreak surveillance

Very few countries in Africa or the Middle East have surveillance programs that publish summary data on outbreaks. Reports of one or a few outbreaks are more typical. For instance, in Lebanon several outbreaks of salmonellosis have been recorded *(62)*. In the first episode, 50 students were infected with *S.* Typhimurium after eating chicken. In the second, 200 persons in a village suffered from salmonellosis after eating *kibby* containing ground raw mutton contaminated with *S.* Dublin; the most severe cases were the young and the elderly. In the third scenario, lightly cooked chicken infected 40 to 50 persons with *S.* Muenster; the poultry came from a farm with a history of salmonellosis.

Newspaper articles are another source of information but are usually restricted to a short summary. An example of this is an article on Algeria *(13)*, where an outbreak of botulism in July 1998 in the eastern provinces of Setif and Constantine killed 17 people, and made another 100 persons ill after they ate rotten poultry and *kashir*, a processed meat. In addition, during the first half of 1998, 1,400 persons had been reported ill from foodborne disease of unreported origin. Unfortunately, no other details were given on any of these. Another type of report is of a massive number of infections such as occurred when a *Shigella dysenteriae* type 1 epidemic of unknown initial cause resulted in an estimated 24 million cases in South Africa and 5.4 million cases in KwaZulu-Natal in each of two years, 1995 and 1996 *(69)*. For the two countries, there were 54,000 deaths and over 26 million days of lost productivity annually, as well as over 5 million health care visits and 6.23 million hospitalization days. The total costs were expected to be 3,375 million Rand (380 to 430R/household). In South Africa, these figures represent 15% of the annual health budget spent on treating diarrheal disease (1% of the South African gross domestic product); the true costs may be 2.4 times higher, since these are direct costs only. Occasionally, an international episode gets considerable publicity. For example, from December 1994 to February 1995, a savoury kosher snack item exported from Israel and containing *Salmonella* Agona infected 27 people in England and Wales and 10 in the United States *(50)*. The information relayed to Israel helped to identify the cause of more than 2,200 phage type 15 *S.* Agona infections in that country during the same time period *(80)*.

Egypt is one country where an attempt has been made not only to record foodborne disease episodes on a periodic basis but to identify some of the risk factors contributing to the illnesses. Between 1983 and 1986, there were 89 foodborne outbreaks: 77 from *S. aureus*, 9 from *E. coli*, and 3 from *Salmonella (70)*. The main foods implicated were cheese, cream, flour and oil, cabbage and rice, and potatoes. Foodborne disease increased in Egypt between 1989 and 1991; in 1989 there were 25 outbreaks, 115 cases, 3 deaths, and in 1991 there were 146 outbreaks, 551 cases, and 24 deaths (WHO data). The main problem identified was lack of food hygiene training for proper food handling by workers in food processing plants and restaurants, partly because of the high turnover rate of food workers in the industry. From August 1997 to July 1998, 149 outbreaks and 452 associated cases were documented at the Alexandria Poison Center *(35)*. *S. aureus* was the etiological agent most often isolated (54 outbreaks and 181 cases), followed by *Salmonella* (16 outbreaks and 43 cases). Among the salmonellae, *S.* Enteritidis and *S.* Haardt were most frequently responsible for the illnesses. Other outbreaks were caused by *E. coli*, *B. cereus*, *C. perfringens*, *Yersinia enterocolitica*, *Campylobacter* and *Shigella*. Milk and dairy products were the most frequently contaminated foods, where poultry and eggs were much less frequently implicated. Most outbreaks occurred in the home, where keeping foods at room temperature for several hours and then inadequately reheating them was the most important risk factor.

Illnesses affecting armed forces

Because of the need for complete fitness of personnel in the armed forces, any outbreak or potential enteric illness in the military is a concern, both within the country and in overseas areas of service. Three separate foodborne streptococcal outbreaks occurred in the Israeli armed forces in the 1980s and the early 1990s. In 1983, 37 soldiers developed sore throat, exudative tonsillitis and fever from *Streptococcus* Group G after eating egg salad prepared by a food worker who was ill with pharyngitis 10 days before the outbreak; two other workers were asymptomatic *(26)*. According to the authors, a similar Group C outbreak had occurred at a military base several years earlier. In 1991, 55 of 237 soldiers developed sore throat, follicular tonsillitis and fever (pharyngitis) from *Streptococcus pyogenes* Group A strain T28 M56 after eating cabbage salad prepared by a cook who was ill *(79)*. Another 21 soldiers were asymptomatic, and the disease was generally mild, lasting 3 to 5 days. In 1992, 197 air force personnel had pharyngitis from *Streptococcus pyogenes* Group A type 8/25 *(20)*. Processed white cheese served at a lunch was the vehicle. The asymptomatic handler had mixed the cheese with his hands 24 hours before the meal was to be served and had placed it in the refrigerator overnight, because he was going on vacation. The *Streptococcus* probably grew in the cheese during the 6 hours it was at ambient temperature on the table before being refrigerated. Enteric illnesses in the military were not restricted to Israelis. Some US military personnel deployed to several port cities in west Africa from 1985 to 1987 contracted enteric infections *(24)*. The main isolates were rotavirus (36.2% of cases), ETEC (17.0% of cases), Norwalk virus (12.8%), *Salmonella*, *Shigella* and *Aeromonas* (8.5% each). Illnesses were also recorded among troops participating in the Desert Storm operations in Saudi Arabia; in 1991, US Air Force personnel deployed to Jeddah were ill after eating locally catered boxed lunches, and 648 of 1,773 (37%) sought medical care *(29)*. The most likely foods were peanut butter sandwiches or veal sandwiches. Because the incubation period was 3 to 27 (mean 13.4) hours, either *C. perfringens* or *Bacillus cereus* was suspected; however, no pathogen was found. Among the 50,000 British troops in Saudi Arabia at the time, ETEC (mainly ST or ST/LT) were a major cause of diarrhea (26% of isolates, mainly O159) *(89)*. *Shigella sonnei* appeared to play a lesser role (3% of isolates). There were differences from figures for the US troops for whom 21% of isolates were ETEC, mainly O6:H6, and 19% were *S. sonnei*.

Socio-economic and cultural factors leading to illness

Socio-economic and cultural background factors have a great impact on exposure to risk factors in foodborne and waterborne diseases as the following examples show. In Israel in the 1980s, non-Jews were twice as likely to be hospitalized as Jews for bacterial food poisoning (110 versus 52 per 10,000 population, respectively) *(31)*. Different socioeconomic conditions and traditional food preparation habits probably account for the difference. Many of the non-Jewish communities had primitive water systems, inadequate sanitation, and poor food hygiene. A decade later, these differences still seemed to remain. A study of 399 hospitalized Arab infants in the West Bank of Israel, in villages and refugee camps with poor sanitation systems, showed that 44% were infected with ETEC, 58.3% were dehydrated, and 28.5% failed to thrive *(90)*. About 500 Palestinians in a refugee camp suffered from shigellosis after eating spoiled chick pea products such as falafel and hummus *(15)*. In a Mozambican refugee camp in Malawi, hundreds were ill with bloody diarrhea *(68)*; *E. coli* O157:H7 was suspected to be the main causative agent, based on analyses of DNA fragments. The major risk factor was consumption of cooked food from the camp market. Religious differences are reflected in the incidence rate of echinococcosis (hydatidosis) in Israel per 100,000 of the Israeli Arab population: 7.0 for Muslims, 22.5 for Christians, 45.9 for Druze *(91)*. Home slaughter of sheep by the Druze, and hunting of wild pigs and keeping of dogs by Christians and Druze were possible risk factors. Religious and cultural differences are further illustrated by the first reported botulism outbreak in Egypt *(45, 88)*. In 1991, 91 people were hospitalized and 20 died after eating *faseikh*, a salted uneviscerated mullet, that contained *C. botulinum* type E toxin; the case fatality rate was 22%. The mullet had been improperly preserved, so that the toxin could develop from organisms in the fish intestines. This case distribution reflects religious differences: the fish had been purchased from a single store and consumed on the same day, the national Sham-el-Nessim holiday, which in 1991 coincided with Ramadan, and Muslims do not like to eat salty food in the evening. One Muslim woman who was menstruating and was therefore not under the Ramadan fast became ill, but the majority of botulism patients were Coptic Christians who had no constraint on eating such fish on the holiday.

In Liberia, where cooked foods, often wrapped in a cloth and placed on a table, were stored for long periods (mean of 7 hours in an urban slum and 4 hours in rural communities) at ambient temperatures, bacterial contamination levels were high (>10^4 Enterobacteriaceae CFU/g and occasionally 10^7-10^8 CFU/g) *(58)*. In the slum, there was less fuel for heating, people walked long distances to work, and food could be

prepared only once a day. Dysentery in Burundi was responsible for 6 to 12% of deaths in 1991/92 *(21)*. Risk factors leading to infection include being female (possibly because of more exposure to infected feces from children), using a cloth rag for cleaning after defecation, a history of recent weight loss (malnourished individuals and AIDS patients have lowered immunity to *Shigella* infection), and not washing hands before preparing food (washing with soap reduces contamination). One environmental source of pathogens may be sewage effluent; in Sovenga, South Africa, effluent is treated in oxygenation ponds and then reused for irrigation of fields, although analysis of the ponds, irrigation water, and pond overflow into a stream used by villagers showed that 56% of the 803 samples contained *Salmonella (39)*. Players on sports fields and domestic animals on grazing lands are exposed to the pathogen through irrigation, which thus may be a source of infections.

In the Sudan, both *Toxoplasma* and *Brucella* infections may be associated with consumption of raw liver and intestines *(1, 57)*. However, a recent detailed study in the Western Sudan showed that raw milk consumption and handling of infected animals may be significant risk factors *(61)*. The authors found that 13.2% of humans, 26.0% of camels, 18.2% of cattle, 4.3% of sheep, and 4.3% of goats were sero-positive for *Brucella abortus*, and the pathogen was isolated from sero-positive cattle. The human cases, many of whom exhibited severe illness, were nomads tending the animals, abattoir workers slaughtering the cattle, camels, sheep and goats, veterinary staff treating infected cattle in the field, butchers, and cheese processors. The nomads' chief food is raw milk from their cattle and they have direct contact with the animals during abortions. The cheese processors had been drinking contaminated raw milk and eating cheese made from the same milk. *B. melitensis* has also been isolated from sheep in Western Sudan *(60)*. In addition to being likely to be infected with *Brucella*, cattle in the Sudan are mastitic *(56)*; mastitis affects milk nutritive value, and the affected animals are a source of *S. aureus*, *Streptococcus pyogenes*, and Gram negative pathogens. Brucellosis, endemic in Nigeria with a 3.1% seropositive rate in cattle *(5)*, appears to be mainly an occupational disease *(40)*, but consumption of raw milk or raw milk cheese may play a role.

Products gathered from the wild, including snails, may be sources of infection. For example, a Nigerian man who ate fried prefrozen edible land snails collected locally developed an *Aeromonas hydrophila* infection *(4)*. The thawed land snails contained 1×10^9 *A. hydrophila*/g. A survey showed that *A. hydrophila*, *Salmonella* or *Shigella* were isolated from about 40% of land snails in eastern Nigeria. In Liberia, there is a high prevalence of paragonimiasis (lung fluke disease) in young children *(71)*. The probable risk factors are chewing on the legs of raw or poorly cooked freshwater crabs, which are frequently infected with metacercariae of *Paragonimus* species. This situation had also occurred in the Igwun Basin, Nigeria, where shortages of protein foods forced the local population to search for crabs, crayfish, shrimps, and fish to supplement their diet *(86)*. The disease was associated with consumption of crabs, particularly in the dry season when more crabs were available. There was a local belief that raw crabs had more nutritional value than cooked ones, and young adults and children were more likely to be infected.

Until the mid-1990s, isolations of *E. coli* O157:H7 were rare in Africa *(28)*. In a 1996 *E. coli* O157:H7 outbreak in Central African Republic, with 108 ill including several with HUS and 4 deaths, smoked meat in the form of *kanda* sold at roadside stands at ambient temperatures, was implicated. *Kanda* is made by soaking smoked zebu cow meat in water for several hours, after which it is mixed with cooked marrow squash, wrapped in a banana leaf, and steamed *(38)*. It is then displayed at ambient temperatures in markets or roadside stands for up to several days until sold. From November 1997 to April 1998, 298 cases with 45 fatalities occurred in 28 villages in Cameroon *(28)*. Women were more likely than men to be ill, and their death rate was more than twice that of men. The high death rate was probably related to fluid loss, since no deaths were recorded in patients who received oral rehydration salts. Apart from *E. coli* O157, *Shigella dysenteriae*, *S. boydii* and *Entamoeba histolytica* were also isolated, and two or more pathogens were recovered from the stools of many patients. The *E. coli* and *S. dysenteriae* were multiple drug resistant. Although the initial source may have been food or water (this was not determined), the main means of transmission appears to have been person-to-person spread, partly because of poor sanitation and partly because of women taking care of the sick. The sanitation system was non-existent, with no latrines, and human feces was used as manure. This outbreak was similar to one that had occurred early in 1997 in villages about 100 km away *(28)*, where there were no cattle to act as *E. coli* O157 reservoirs.

A large cholera and shigellosis outbreak was reported from Malindi and Mombassa in 1994, again in the wet season *(47)*. The reasons given for the peak in illnesses at this time were the lack of a sewage system, flooding with consequent overflowing of latrines, and contaminated drinking water. The water hyacinth, which is spreading along waterways in parts of Africa and other tropical countries, may play a role in that they

may allow the vibrios to survive longer in water *(77)*, along with zooplankton. In another part of Kenya, one tribe that had feasts at funerals did not stop despite a cholera epidemic with 228 deaths. At these feasts, tribe members shared plates, ate with hands, and used poor standards of hygiene, as well as ignoring the health workers' advice in campaigns *(77)*. Three main factors were associated with cholera: drinking river water, putting hands into drinking water in storage containers, and eating cooked peas kept overnight *(83)*. Foods implicated in African cholera outbreaks have been leftover peanut sauces used as condiments on rice (Guinea), leftover crabs (Guinea-Bissau), rice meals prepared by persons who were preparing cholera victims for burial (Guinea and Guinea-Bissau), and millet gruel (Mali) *(83)*. In the funerals, rice meals for guests were made by women who had prepared dead bodies for burial or who had cleaned the soiled bed sheets. In the millet-gruel outbreak, *V. cholerae* survived < 6 hours in gruel with curdled milk but > 24 hours in gruel alone, which had a higher pH. Because of drought at the time, little milk was available to add to the gruel. Cholera cases increased in 1998, with 29 African countries reporting to WHO (72% of the world total) *(16, 74)*. Because there were no widespread natural disasters or population movements, it was assumed that climate change following the El Nino phenomenon was a major factor. Since September and October 1997, the cholera situation has deteriorated in the Horn of Africa. After heavy rainfall and floods, most of the countries in this region reported a dramatic upsurge in the numbers of cases of, and deaths due to, cholera. The number of cases in 5 of these countries (Democratic Republic of the Congo, Kenya, Mozambique, Uganda, United Republic of Tanzania) ranged from 14,488 to 49,514.

Illnesses in young children

Although breast-feeding is recommended and can reduce enteric infections and high infant death rates, women in low-income families may not produce enough milk for the infants, making supplemental foods necessary. The death rate of Ethiopian children under 5 months, 293 per 1,000 in the early 1990s *(78)*, is not surprising in view of the high bacterial counts found in 100 weaning foods ($1.6 \times 10^5 - 9.9 \times 10^8$ CFU/ml) *(34)*. These samples were also examined for three pathogens; of the 108 isolates, 3 were *Salmonella* Group D, 67 were *S. aureus*, and 38 were *B. cereus*. It was also shown that *Salmonella* could grow 4 log units within 8 hours at ambient temperatures in a typical homemade gruel consisting of a blend of 3 cereals. Contamination probably occurred because bottles tend to be poorly cleaned and because weaning foods are cooked early in the day and kept at ambient temperatures in containers from which feeding bottles are filled. Homes in Lusaka, Zambia, where diarrheal patients lived were examined for risk factors *(75)*. Most likely to be contaminated were leftover cooked foods such as *nshima* (boiled and whipped maize meal used as a weaning food) and maize meal porridge, with $>10^5$ *B. cereus*/g. Campylobacteriosis, studied in Ethiopia by Gedlu and Aseffa *(36)*, had an isolation rate of 13.8% in children visiting Gondar hospital, with the highest rate in children 0.5 to 2 years old. In addition, the isolation rate was higher from malnourished (17.3%) than from well-fed (7.8%) children. These figures are comparable to those from Addis Ababa (15.3%) in Ethiopia and from other nations in Africa, such as Nigeria (11%), Rwanda (9.3%) and Zaire (8.6%). Apart from malnutrition, no other specific risk factors were identified, although the more recent data of Erku and Ashenafi *(34)* indicate that contaminated weaning foods might be at least partially responsible.

ETEC, EPEC, EIEC, EAggEC and VTEC were isolated from children with diarrhea in Nigeria *(6)*. A case-control study in Nigeria showed that diarrhea in households was less related to poor food hygiene practices than to improper disposal of feces *(30, 64)*. However, the pH of *ogi*, a fermented maize porridge used for weaning infants in Nigeria, is low enough to prevent growth of *Salmonella* and EPEC *(63)*. Most fermented foods are not good vehicles for transmitting pathogens, which do not survive at low pH (< 3) *(81)*. However, a weaning food made from fermented maize, guinea corn, or millet (*pap akamu*, also used as a breakfast cereal) was found to have high total aerobic, staphylococci, and Enterobacteriaceae counts (10^5–10^8 CFU/ml) *(67)*. These high counts have the potential to cause illness, and the high staphylococcal levels indicate contamination through handling; however, *pap* is normally boiled before it is made into cereal. In Kinshasa, Zaire, diarrhea-associated pathogens in children under 5 years old included *Strongyloides*, *Entamoeba*, *Trichuris*, *Trichomonas*, and *Salmonella (44)*. *Cryptosporidium* was found in diarrheal (22.2%) and non-diarrheal individuals (12.9%), whereas EPEC were found at low prevalence in both groups. Risk factors for diarrhea included younger age, non-breast feeding, presence of more than one enteric agent in a stool specimen, and living in a household without electricity. In Tanzania, however, *Campylobacter* and ETEC were found to be common causes of diarrhea in children less than 5 years old *(51)*. From 1991 to 1993, stools of 862 diarrhetic children in the coastal town of Malindi, Kenya, contained enterotoxigenic *E. coli* (ETEC), enteropathogenic *E. coli* (EPEC), or enterohemorrhagic *E. coli* (EHEC) (13.8%), *Salmonella* (7.3%), *Shigella* (6.5%), *Campylobacter* (4.9%), *Entamoeba* (7.8%), *Giardia* (4.9%), and rotavirus (16.1%) *(72)*.

There were many cases with multiple infections. The number of patients correlated with the rainfall, and drinking water was contaminated with up to 10^5 coliforms/ml in 72% of households. Similar events had previously occurred in this region. In 1994, 3 children died and 6 others were ill from *E. coli* O157:H7 infections after they ate hamburgers, *koshari*, and dairy products in Egypt *(2)*. In a follow-up survey of 175 foods, *E. coli* O157:H7 was detected in 6% of raw milk, 6% of fresh retail beef, 4% of boneless chicken, and 4% of lamb meat samples. Verotoxigenic *E. coli* may be of concern in Egypt; from an analysis of stools from 150 patients with diarrhea in the Suez Canal University Hospital, two non-O157 strains producing Shiga-like toxins were isolated *(33)*.

Illnesses associated with school children

In a 1983 study in Riyadh of children diagnosed as suffering from food poisoning (5.5% of admissions), *Bacillus cereus*, *Clostridium perfringens*, or *S. aureus* were isolated from their gastric aspirates *(43)*. Dairy foods, chicken, eggs, lamb, and other meat were implicated, and it was recommended that a special education campaign on foodborne disease be initiated for school children. Nevertheless, illnesses in school children continued. In 1992, 19 residents of a town in Saudi Arabia contracted typhoid fever after eating a cake *(12)*. Most of those ill were school children who shared in a potluck dinner; the cake, which had a cream topping, had been kept overnight at room temperature. Following this, the risks of improper storage of potentially hazardous food were to be taught in the home economics class. Such a situation was not unique to Saudi Arabia. A hazard analysis for the preparation, storage and handling of school meals in Bahrain indicated potential problem areas *(8)*. Typically, sandwiches (made with meat, eggs, cheese, or liver) and beef burgers were prepared in small shops and bakeries. Ingredients were cooked between 4 and 5 a.m. with appropriate time/temperatures, but the temperature had decreased to room temperature within 4 hours. Contamination of food was possible from hands, sponges, and cloths used for wiping. The food was delivered to schools and stored there at 17 to 41°C for up to 12 hours because there were no hot-holding facilities. Refrigerators were used only for ice cream and soft drinks. Toilets generally did not contain hot water or soap, and most of the workers, from the Indian subcontinent, had difficulty communicating in Arabic or English. Clearly, when food is stored and served at schools where there is no refrigeration, the risk of foodborne illness is high.

MICROBIOLOGICAL SURVEYS OF FOOD AND FOOD ENVIRONMENTS

Meat

Mycobacterium species have been found in the organ tissues of abattoir-killed animals in six Nigerian states *(18)*. These were mainly *M. bovis* in cattle, but *M. avium* and *avium* complex were also found in goats, sheep, pigs, and chickens, and *M. tuberculosis* in pigs. No tuberculous lesions were seen in the sheep and goats examined. There is little information on human tuberculosis and other mycobacterial infections in Nigeria, and these findings indicate a potential reservoir for the disease. In Zimbabwe, 50 crocodile farms produce leather, with tail meat as a by-product *(53)*. In 9 tail meat samples, the total aerobic count was 3.3–5.2 log CFU/g meat, and fecal coliforms ranged from non-detectable to 4.1 log CFU/g. *Salmonella* was found in three of these samples. The sources of salmonellae are often food supplies as well as environmental sources such as excreta from flies, reptiles, and small rodents being washed into the crocodile ponds *(46)*. Under stress conditions in the animals, the pathogen may become systemic and invade the internal organs and muscles, thus making the meat internally contaminated. The use of pelleted feed, closed ponds, and humane shooting of the crocodiles to reduce stress may reduce the incidence. *Mycobacterium avium* from feeding the animals carcasses of infected pigs, and parasites (tapeworms and *Trichinella*) from infected meat or rodents, have occasionally been found in crocodiles reared in captivity. Fortunately, *Trichinella spiralis* appears to be non-existent or rare in commercial piggeries in Zimbabwe *(87)*. Another African wild animal being reared for human consumption is the ostrich, but salmonellae have not yet been found on the meat and have been found only occasionally from fecal swabs *(46)*.

Poultry

Poultry is a likely source of foodborne illness, because it is widely eaten and pathogens are present on the carcasses. In Kenya, where the isolation rate for *Campylobacter* was 77% for poultry and 2% for beef, the main species was *C. jejuni*; this could be the major vehicle for the pathogen in Kenya, inasmuch as about 12% of human diarrheic feces contains *Campylobacter jejuni*. *Campylobacter* is found in poultry and meat parts sold at the retail level in Nairobi *(66)*. In Jordan, *Salmonella* is widespread in poultry farms, among broiler, layer, and breeder flocks, with 70% of birds having evidence of infection by serological testing *(11)*. The serotypes most frequently isolated were *S.* Gallinarum, *S.* Enteritidis, and *S.* Typhimurium. Chickens in Kuwait also contained pathogens; neck skin sampled on two separate days had 6.5 - 6.6 log total CFU/g, *E. coli* 4.1–4.9 log CFU/g, *Campylobacter* 4.7–5.2 log CFU/g, and 2.7 –4.1 *S. aureus* log CFU/g *(3)*.

Salmonella was present on all birds examined (*S.* Ohio, *S.* Enteritidis, *S.* Paratyphi and *S.* Krefeld) with total counts highest after scalding and defeathering. In Saudi Arabia, 4% of poultry and environmental samples contained *Salmonella (9)*; the main serovars were *S.* Enteritidis (mostly either PT 4 or untypable), Virchow, Paratyphi B var. java, and Infantis.

A survey of chickens at a South African poultry processing plant showed that transport cages, rubber fingers, defeathering curtains, shackles, and conveyor belts had aerobic plate counts of $>10^5$ CFU/25 sq. cm *(37)*. At different steps in the processing, *Salmoneila* was found in 20 - 80%, *S. aureus* in 20 - 40%, and *Listeria monocytogenes* in up to 75% of samples. In both developing and industrialized countries, feed for chickens is increasingly being supplemented by antibiotics to decrease the risk of illness and improve feeding efficiency for more rapid weight gain *(54)*, a practice that is at the cost of increasing antibiotic-resistant strains of pathogens. Chicken breasts from the abattoir and retail stores in Cape Town were examined to see if such resistance was occurring in South Africa *(54)*. Most strains were resistant to tetracycline, and a large number had multiple resistance. Therefore, chickens are likely to become a major source of antibiotic-resistant enteric pathogens for Africans as they are in other continents. Campylobacteriosis is a likely poultry-borne disease in Kenya, inasmuch as about 12% of human diarrheic feces contains *Campylobacter jejuni*, and the isolation rate for *Campylobacter* (mainly *C. jejuni*) in poultry and meat parts sold at the retail level in Nairobi was 77% for poultry and 2% for beef *(66)*.

Eggs

When shell eggs were examined from 8 retail outlets in Lusaka *(42)*, many bacteria, including pathogens, were isolated from 10-egg pooled contents of 2,400 eggs. The shell membranes yielded *E. coli* (41.0%), *Proteus* sp. (10.5%), *Salmonella* (4.8%), *Bacillus* spp. (3.3%), *Staphylococcus* spp. (3.3%), and *Streptococcus* (2.4%), and yolk contents yielded *E. coli* (40.3%), *Salmonella* (22.8%), Proteus (5.4%), *Staphylococcus* spp. (2.0%), *Bacillus* spp. (1.3%), and *Streptococcus* (0.7%). The *Salmonella* serotypes were not determined. In Zambia, eggs are not refrigerated at any point in the chain from farm production to retail sale, and probably not in the home either. This information indicates that eggs reaching the market are liable to be contaminated with spoilage bacteria and, in many cases pathogens, particularly *Salmonella*. Some of these may arise from transovarian transmission, but others from penetration of the albumen through the shell. High ambient temperatures during storage would allow breakdown of the vitelline membrane between the albumen and the yolk and thus permit penetration by bacteria into the yolk.

Seafood

Shrimps collected from shops in five areas of Riyadh, Saudi Arabia, had psychrotroph counts of 4.5–6.1 log CFU/g, coliforms 2.6–3.7 log CFU/g, and *S. aureus* 2.3–3.3 log CFU/g. Foods sold with higher counts came from shops where mishandling was observed, such as display in open air, no refrigeration, and poor cleaning *(7)*. Many of the prawns sold in Egypt may contain pathogens *(76)*. In a study of market products, samples were found to contain *S. aureus* (8 - 16%), *E. coli* O127 or O112 (4 - 12%), *Shigella boydii* (4 - 8%), *Shigella flexneri* (8 -12%), *Salmonella* Reading (0–8%), and the Arizona group (4–8%). The source of the *S. aureus* is most likely post harvest *(76)*. Of 110 prawns examined, those newly caught had < 2 log CFU/g, but those in the markets after handling and storage had higher levels, raw in shell, 2 -5 log CFU/g, mean 5 log CFU/g; raw peeled, 2–5 log CFU/g, mean 4 log CFU/g; frozen in shell, 2–5 log CFU/g, mean 4 log CFU/g; frozen peeled, 3–5 log CFU/g, mean 4 log CFU/g. The high *S. aureus* counts and pathogen counts in market samples indicate poor hygienic practices with the potential for causing foodborne illness.

In Marrakesh, Morocco, 365 *Vibrio cholerae* strains isolated from raw sewage and stabilization ponds were all non-O1, and 13% of those from sewage and 20% from ponds were resistant to one or more antibiotics *(48)*. The *V. cholerae* levels in the ponds ranged from 40 MPN/100 ml in the cold season to 20,000 MPN/100 ml in the hot season. *V. cholerae* O1 strains associated with zooplankton were found in a lagoon in the Côte d'Ivoire, where there were heavily populated riverine areas *(52)*, which suggests that one source of the pathogen in Africa may be lagoons or slow flowing rivers. The same scenario may apply to mussels marketed in Rabat, Morocco *(23)*. Wild mussels are harvested, often in areas closed because of sewage pollution, boiled to allow shucking and washing of the shellfish, and then transported to the market area, where the meat is stored for about 6 to 8 hours at ambient temperatures. The boiling process reduced bacterial loads, but these increased to $> 10^4$ fecal coliforms MPN/100 g on storage. Some *Vibrio* species were present, but not *V. parahaemolyticus* or *Salmonella*.

Food trade with industrialized countries has been reduced because of embargoes on seafood products liable to be contaminated with *V. cholerae*. In the past, Mozambique had a yearly catch of 20,000 tons of fish, of which more than 50% was exported to the European Union (EU). As a result of a cholera epidemic beginning in August 1997 and causing over 30,000 cases and 780 deaths, the EU banned export of fish from Mozambique to EU countries, cost-

ing Mozambique US $240 million *(14)*. In December 1998, 890 of 16,000 cases in one province died either of cholera or of organochlorate pesticide poisoning after eating fish, resulting in a local ban on fishing for one month.

Non-microbial problems have also been associated with fish. For instance, a large outbreak of ciguatera-type illness occurred in Madagascar in 1993 *(22)* when over 500 people were affected, with 200 hospitalized, after they ate a shark on the east coast of Madagascar. A total of 98 died, with death typically preceded by a deep coma, which is not typical of ciguatera poisoning. Two new potent heat-stable liposoluble toxins, carchatoxin A and B, isolated from the shark were thought likely to be causes of the severe illnesses. Such illnesses may be significantly underreported.

Dairy products

In Morocco, *Y. enterocolitica* was found in raw milk in 30.0% of 30 samples, risen from 40% in a previous study *(41)*. The prevalence in fermented milk was 6.3% of 63 samples, in raw milk cheese 4.1% of 49 samples, and in pasteurized milk cheese 0.0% of 45 samples. The isolates were mainly *Y. enterocolitica* Biotype 1 (30 strains), but also Biotype 2 *(2)*, and Biotype 3 *(1)*.

Vegetables

The yield of eggplants irrigated with treated effluent in Jordan was twice that under conventional fertilizer application *(10)*. However, the wastewater used for drip irrigation was shown to contain high levels of fecal coliforms: 4.6×10^1 /100 ml after chlorination and 8.1×10^3 /100 ml at the irrigation site. The fecal coliform count was over 100 times higher in irrigated soil than in dry soil. However, all fruits and leaves were negative for *Salmonella* and *Shigella* and had very low coliform counts.

Ready-to-eat foods, including street-vended foods

Shawarma (donairs or kebabs) are popular meat sandwiches in the Middle East, since they can be made from beef, lamb, or chicken and are ready to eat hot. Very few outbreaks from these foods have been documented, but a survey in Riyadh in 1984 found that up to 10^6 *C. perfringens* or *S. aureus*/g could be found in cooked meat sliced off the rotating skewer, and that 12% of the samples contained *Salmonella (19)*. Similar situations could probably be encountered today in many parts of the Middle East. Even if the meat were more thoroughly cooked, opportunities exist for cross contamination through knives, drips, and handling by food workers. An analysis of 90 commercially bottled nonalcoholic drinks made from local raw materials because the economic situation prevented importation of ingredients *(65)* showed that bacteria were the most frequent contaminants but were nonpathogenic; 7% of isolates were *Aspergillus niger*. The pH values of drinks such as cola, orange, lemon, and soda were below 4, but the malt drink had a range of 5.1 to 5.5. In eastern Nigeria, of 880 samples of meat, fish and vegetable ready-to-eat foods examined, 48% contained enterotoxigenic *S. aureus (82)*, most strains of which produced enterotoxin A or B. No *S. aureus* counts were done. Meat and fish products were more likely than drinks to contain *S. aureus*, because of repeated hand contact; for instance, sellers and potential purchasers each pick up the items on display to assess their value and haggle over prices until purchases are made.

Street-vended foods have been recognized as sources of foodborne disease in many developing countries, and overall examples are described below. Street-vended foods in Johannesburg, South Africa, were examined by Mosupye and von Holy *(59)*, who showed that although total aerobic plate counts did not exceed 10^5 CFU/g food (or 10^4 CFU/ml for water), some samples contained *B. cereus* (22%), *C. perfringens* (16%), and *Salmonella* (2%). Cooked foods were held at 42 - 94°C and salads at 29 - 39°C. In Egypt, street vendors sell from carts or stands on the streets in cities and village centers. Study of a variety of foods sampled over 3 years indicated that counts were unacceptably high; 41% contained *S. aureus*, most with > 10^3 CFU/g; 37% had *B. cereus*, 50% with ≥10^3 CFU/g; 27% had *C. perfringens (32)*. Neither *Salmonella* nor *V. parahaemolyticus* was isolated, but *Shigella* was found in two vegetable products (greens and fried beans and parsley).

Case-control studies of diarrheal diseases in Zambia identified ingestion of relish (cooked meat or vegetable dishes) prepared by street vendors as a risk factor in an epidemic of *Shigella dysenteriae* type 1 *(85)*. In a Lusaka city market and stalls, raw ground meat, chicken, chicken intestines, and dried minnows were contaminated with *Salmonella*; pasteurized milk contained 10^5 *S. aureus*/ml; caterpillars had 10^7 *B. cereus*/g; and leftover beef stew, chicken, and rice contained large populations of *C. perfringens*, *S. aureus* and *B. cereus*, respectively *(49)*. Most cooked foods at street vending operations in a small Zambian town were left at ambient temperatures all day and overnight *(25)*. Salmonellae were isolated from river water used by vendors, and from cooked meat balls and dried ants. Where reheating was done, temperatures were not high enough to destroy any pathogens present. In Africa, street vending in general is an industry that has grown rapidly, especially in urban areas, providing low cost, convenient, and often nutritious food. However, these vendors are not aware of how to provide safe as well as attractive food. Many vendors are children or youths who are earning income for themselves or their

TABLE 1. Risk factors contributing to foodborne and waterborne disease

Environmental

o) horvesting of shellfish from woter contoining sewoge

b) use af sewage effluent /waste water in irrigatian

c) grozing of domestic animols on lond odjacent to treotment ponds ar sprayed with effluent

d) endemic pathagens such as are camman in developing countries

e) multiple-drug-resistant pathagens resulting fram inappropriate use af antibiatics

f) spreading of woter hyacinth alang waterwoys, allowing *Vibrio choleroe* ta ottoch and survive langer in water

g) floading in the rainy seasan, with resulting averflaw af latrines and cantaminatian af drinking water

h) during drought, too little milk ovoilable far curdled milk ta be added ta gruel to lower pH ond prevent growth af pathagens

i) after disasters such as cyclones and earthquakes, reduced capacity af infrastructure ta prevent enteric diseases fram occurring or treat victims

j) under odverse conditions, the need to eat rotten or spailed foad

Cultural and social

a) weight loss, including thot seen in people suffering from AIDS, with resulting lowered immunity

b) failure af diarrheic patients ta receive aral rehydratian salts

c) yaunger age, which increases risk af being ill and dying far children

d) malnutrition, which causes children to be more frequently ill with diorrheo thon well-fed children, becouse of lawered immunity

e) non-breast feeding of infonts, specifically, by women in law-incame fomilies wha may not produce enaugh milk to breast-feed infants and who therefore use supplemental foods that are unhygienically prepared

f) wamen wha, passibly because af mare expasure ta infected feces fram children ar caring far thase wha are already ill, are at higher risk than men

g) the need ta walk lang distances ta work, sa that food con be prepared anly ance a day

h) living in o household without electricity

i) primitive water systems, including river water as o saurce of drinking woter

j) putting hands inta drinking water in starage cantainers

k) not woshing hands befare preparing faad

l) storoge af leftaver cooked foods ot ombient temperoture for long periods of time

m) temperatures nat high enaugh ta destray pathagens in reheated faads

n) person-to-person spreod after a foodborne or woterborne infection becouse of poor sonitotion

o) use of o cloth rog for cleoning ofter defecotion

p) impraper dispasal af feces, including lack af a sewerage system ar latrines

q) use af human feces as manure

r) the choice af faads, and haw they are prepared and stared, as may be influenced by different religiaus beliefs

s) feasting ot funerals, where wamen wha hod prepared the bodies for the funerol or had cleaned the sailed bed sheets make the food eoten by tribe members; plotes ore shared; faad is eoten with honds; stondords of hygiene ore poar; and compoigns af heolth workers ore ignored

t) subjectian by daminant papulatians af minarity religiaus graups ar ather natianalities ta refugee status ar lawer saciaecanamic conditians, thus increasing enteric disease risks

TABLE 1. ***(continued)***

u) horvesting of wild plonts, onimols, ond tropicol fish (contoining either toxins or pothogens)

v) nomodic roising of cottle infected with pothogens

w) reoring of wild animals os food, e.g., crocodile, ostrich

x) lock of educotion on home food preporotion

Food sold at markets and by street vendors

o) disploy of food in open oir

b) holding of cooked food ot ombient temperotures until sold

c) lock of refrigerotion facilities

d) repeoted hond contoct with foods os seller ond potentiol purchoser determine selling prices

e) poor cleoning of utensils ond equipment, including use of sponges ond cloths for wiping

f) vendors who ore young ond uneducoted obout food sofety

g) use of non-potoble woter for food preporotion ond cleoning

Foodservice facilities

o) inodequote cooking

b) lack of hot holding focilities or refrigeration

c) general lack of hot woter or soop in toilets

d) infected food workers

e) excessive use of hands in food preporotion

f) cross contominotion through utensils, row food, ond drips from row food

g) longuoge differences creoting difficulty in communicoting food sofety concepts

h) high turnover rate of food workers in food processing and foodservice industries

families, who tend to be dropouts from school, and who may be juvenile delinquents. Although this group of people needs to be educated (a difficult task because of their itinerant nature), so do the members of the public who purchase and eat this food. An appeal has been made for consumers to lobby governments to improve the safety of street vending operations.

CONCLUSIONS

Food and water are important vectors in the transmission of enteric disease in both Africa and the Middle East. Pathogens present in the environment, including those in water contaminated from sewage, are also found in a variety of foods that are kept under conditions that may allow their rapid growth. Where enteric disease has had an economic impact as in South Africa and KwaZulu-Natal, considerable productivity is lost annually, affecting the gross domestic product and taxing an already-overburdened health care system to the limit *(69)*. Although similar economic studies do not appear to have been carried out and published for many other developing countries, this type of situation is probably the same. It is interesting that most of the African studies focused on village rather than city environments but that the reverse is true for studies in the Middle East. Although many Africans live in isolated communities with limited infrastructure, large cities also create conditions, such as inadequate housing, that encourage the spread of enteric diseases. The different types of risk factors for these diseases, including those that are foodborne and waterborne, are listed in groups in Table 1, although the groupings often overlap. Factors associated with cultural conditions tend to reflect local or regional customs and traditions, and it is clear that, although many of these risk factors are similar to those in industrialized countries, many are specific to developing countries. Unlike some of the foodborne disease es-

timates for countries such as the United States, Canada, Australia, and the nations of Europe, where millions of cases and many deaths occur each year and cost billions of dollars *(17, 55, 73, 84)*, no such estimate has been made for developing countries, although, it is highly likely that case and death rates are higher in these nations. Only by studying and understanding these risk factors, together with targeting resources to reduce them, can progress be made. It is also important to know what control measures are possible for the economies of these countries and what may be possible only with international resources.

Existing control mechanisms have been limited by the demographics of the communities and the resources available for improved infrastructures (water and sewage facilities) and education (of homemakers and vendors). One example of a control mechanism that might be practical in isolated communities is reduction of pathogens present in drinking water by means of solar radiation. A study with the Maasai people of Kenya showed that exposing drinking water in plastic bottles to full sunlight reduced diarrhea in children 5 to 16 years old *(27)*. This method could be used in communities where no other means exist for making water potable.

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Impediments to Global Surveillance of Infectious Diseases: Consequences of Open Reporting In a Global Economy

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SUMMARY

Globalization has led to an increase in the spread of emerging and re-emerging infectious diseases. International efforts are being launched to control their dissemination through global surveillance, a major hindrance to which is the failure of some countries to report outbreaks. Current guidelines and regulations on emerging and re-emerging infectious diseases do not sufficiently take into account the fact that when developing countries report outbreaks they often derive few benefits and suffer disproportionately heavy social and economic consequences.

In order to facilitate full participation in global surveillance by developing countries there should be: better and more affordable diagnostic capabilities to allow for timely and accurate information to be delivered in an open and transparent fashion; accurate, less sensationalist news reporting of outbreaks of diseases; adherence by countries to international regulations, including those of the World Trade Organization and the International Health Regulation; financial support for countries that are economically damaged by the diseases in question.

The article presents two cases – plague in India and cholera in Peru – that illuminate some of the limitations of current practices. Recommendations are made on measures that could be taken by WHO and the world community to make global surveillance acceptable.

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INTRODUCTION

Globalization has heightened the attention being paid to the international movement of people, goods, and information. In addition to expanding trade and travel, such movement accelerates the scale and speed of the transmission of infectious diseases. Most of these diseases are those once considered to be under control, ones that have emerged recently, or drug-resistant strains of existing pathogens. However, over the past two decades at least 30 new diseases have emerged, many with a potential for rapid spread across borders (*1*). The HIV/AIDS pandemic exemplifies the ease with which pathogens can spread in today's globalized society.

It is widely agreed that the global surveillance system for infectious diseases would help significantly to control their spread. Interest in disease surveillance dwindled between the late 1950s and the early 1990s because developed countries no longer perceived infectious diseases to be a serious threat. Such optimism resulted from advances made in vaccines and treatment, the eradication of smallpox, a preoccupation with chronic diseases, and a confidence among health leaders that infectious diseases were a problem of the past (*2, 3*). There were a few exceptions; for example, global influenza surveillance began in 1948 and led to the annual design of effective vaccines. Other comparable endeavors, however, were not sustained. In the absence of interest in global surveillance, the corresponding funds and infrastructure declined, together with the capacity to detect outbreaks. Inaccurate disease surveillance reports continue to be made by developing countries because of a fear of unduly harsh treatment from the world community (*2, 3*).

Global surveillance finds its beginnings in 1896 when it was agreed at the International Sanitary Conference that there was a need for international health surveillance (*4*). Before this date, individual countries had monitored and often contained cases through quarantine. The *Organization internationale d'Hygiène publique* was established in Paris in 1907 to gather information on disease outbreaks for eventual distribution to participating countries. The reporting of cholera and plague was required initially, while yellow fever, typhus and relapsing fever were added later. European countries feared that these diseases would cross their borders from the poorer countries where they principally occurred (*2*). Some countries signed additional health treaties before the Second World War. Despite these efforts, international health legislation proved ineffective because the treaties did not keep pace with scientific advances, were not recognized by all countries, and failed to secure the compliance of the poorer countries, which did not report diseases for fear of possible repercussions (*2*).

After the Second World War the *Organisation internationale d'Hygiène publique* was replaced by the World Health Organization. In 1951, WHO issued the International Sanitary Regulations, which were renamed the International Health Regulations in 1969 and later revised in 1981. These regulations required Member States to notify WHO within 24 hours of outbreaks of cholera, yellow fever and plague. The aim was to achieve the greatest possible security against the spread of disease and minimal disruption of international traffic (*3*). WHO possessed no enforcement powers, and it was hoped that persuasion and recommendation would induce countries to comply. Unfortunately, they did not always do so, often fearing unwarranted reactions that would affect travel and trade (*5*). Non-reporting countries justified their fears in terms of the costly repercussions that reporting countries faced in the past. The present International Health Regulations cover only three diseases (cholera, plague, and yellow fever), failing to address all other re-emerging and emerging infectious diseases that may have a potential for international spread. It is widely agreed that the goals of maximum security and minimal disruption have not been met because of the issues outlined above (*3*).

Global surveillance today

The spread of cholera, human immunodeficiency virus (HIV) and tuberculosis, as well as concerns over Ebola fever and other diseases, led to various initiatives aimed at cooperative global surveillance of emerging and re-emerging infectious diseases (*6*). In 1995 the World Health Assembly urged all Member States to strengthen surveillance of infectious diseases in order to detect re-emerging diseases and identify new infectious diseases promptly (*6*). The Health Assembly noted that success in this area depended on accurate information on diseases outbreaks and a willingness to share it. The European Union and the Group of Eight countries, among others, supported the formation of the surveillance network. WHO and the Centers for Disease Control and Prevention (CDC) in the USA have outlined plans to control emerging and re-emerging infectious diseases (*7, 8*). In 1999, however, WHO found it necessary to admonish Member States for failing to confront infectious diseases adequately and warned of possible international outbreaks (*9*).

The current global surveillance initiative, directed in many respects by WHO, consists of a network of information sources and is based on the International Health Regulations, currently under revision, which oblige countries to report data. WHO plans to utilize a variety of sources, classified as formal or informal, to compile information on potentially dangerous outbreaks (*6*). Among the formal sources are government and university research centers,

WHO regional and country offices, other United Nations agencies, and military networks (*6*); included also in this category are government clinics, individual scientists and public health practitioners. Informal sources include Internet sites and email list-servers. In addition, WHO maintains a web page of confirmed outbreaks (http://www.who.int/disease-outbreak-news/index.html) extracted from hundreds of postings that occur around the world each day – the primary aim being to verify rumors, not to repeat them. News organizations are a valuable source of information on outbreaks, and search engines are being tested by WHO that rapidly scan the World Wide Web to seek outbreak reports. The United States Committee on International Science, Engineering and Technology Working Group on Emerging Infectious Disease and other groups also plan to collaborate with WHO on the specifics of building surveillance capacity and communication networks (*10*).

Because of the ineffectiveness of the International Health Regulations, the World Health Assembly commissioned an informal working group in 1995 to re-examine them. The process of revision, intended to strengthen the role of the regulations in global disease control, takes into account the reluctance to report for fear of excessive reactionary measures, the lack of capacity for adequate detection, and the restricted scope of the regulations in the past. There are two major components: a framework document outlining appropriate public health measures at the time of an outbreak and legal provisions relating to the operation of the International Health Regulations; annexes describing specific requirements and recommendations (*11*).

The revised International Health Regulations will widen the scope of diseases that require reporting to include any disease of urgent international public health importance (*12*). According to proposed WHO operational guidelines the diseases to be included will be associated with: a high potential for spread outside the community; an unexpectedly high case fatality rate; an unusual or unexpected event; a newly recognized syndrome; a high political or media profile; a possibility of trade or travel restrictions *(12)*.

It is to be hoped that countries will report diseases because of the assistance WHO can offer in response to immediate disclosure and because of the credibility that the Organization can provide. WHO recently completed a pilot study in 21 countries to assess the effectiveness of the revised International Health Regulations.

In order to respond to concerns about excessive restrictions on trade and travel, both the revised regulations and World Trade Organization (WTO) Agreement on the Application of Sanitary and Phytosanitary Measures specify appropriate actions. The original International Health Regulations outlined in broad terms the reasonable measures that countries could employ, with specific guidelines for outbreaks of cholera, plague and yellow fever. The regulations also provided general rules concerning arrivals and departures of ships and aircraft and the treatment of imported goods; they were not, however, specific for particular situations. The International Health Regulations revision group intends to study this matter and to include annexes with specific limits on appropriate actions, but no definitive recommendations have yet been made (*13*). It is also intended that arbitration committees settle disputes on trade practices after an outbreak has occurred.

WTO currently uses the Sanitary and Phytosanitary Measures to provide basic rules on when and to what extent countries can apply measures that would normally be considered unfair trade practices to restrict the entry of unsafe goods. The rules stipulate that countries have the right to protect their citizens but that they should refrain from extreme measures unless justified by scientific evidence (*14*). There is an increased likelihood that countries will apply protectionist measures because of the relaxation of trade restrictions following the General Agreement on Tariffs and Trade (*15*). To ensure that this does not occur, the Sanitary and Phytosanitary Measures permit countries to raise disputed policies before a panel of experts for review and consultation. They also provide for a committee to facilitate ad hoc consultations or negotiations among members on specific sanitary and phytosanitary issues (*14*). In order to harmonize the numerous country guidelines, WTO recognized certain groups, such as the Codex Alimentarius Commission and the International Office of Epizootics, as providing international standards for appropriate action.

Because of their common goal of maximum health protection and minimum international traffic disruption, WHO and WTO intend to collaborate in order to prevent conflict between the two sets of regulations. No specific agreements exist between the two organizations but recent discussions raise the potential for WHO to assist WTO in monitoring whether countries take appropriate public health measures during outbreaks. It will be WTO's role to assess trade practices.

Strengths and weaknesses of the latest global surveillance initiative

The plans for collecting information and revising the International Health Regulations make significant changes favoring the creation of an effective global surveillance system. They do not, however, fully address provision of an adequate surveillance infrastructure and the reluctance to report for fear of sanctions. While the first problem can probably be addressed through training and in-

vestment, that of reporting requires more than the outlining of maximum allowable measures in the International Health Regulations and the Sanitary and Phytosanitary Measures.

Even in the presence of the international help, the main burden of collecting information falls on government infrastructures. Although most developed countries possess some disease-monitoring capabilities, developing countries largely lack trained personnel, diagnostic laboratories and funds than can support surveillance activities. Where countries do not have an adequate surveillance capability, inaccurate reports and rumors can rapidly lead to social disruption nationally and unwarranted panic internationally.

While WHO and CDC, along with other groups, aim to encourage countries to build their surveillance capacities, there are no clear plans on the funding and maintenance of such efforts. It is necessary to focus on training of epidemiologists, improvement of specimen collection, and updating of laboratory facilities. Although building such an infrastructure requires considerable amounts of time and money, there seems to be enough interest to ensure that this will eventually be achieved.

With regard to non-reporting the prospects seem less favorable. Plans to expand the number of reportable diseases will increase the frequency with which the International Health Regulations may be applied to outbreaks *(16)*. This could lead to increased use of trade and travel restrictions in an attempt to prevent the entry of infectious agents. It is intended that international be used to prevent overreaction, even though such measures failed in the past. The revision process may improve the situation but regulations in themselves cannot completely address this issue. As discussed below, the recent examples of plague in India and cholera in Peru clearly demonstrate how the international community reacts to outbreaks, how the responses affect developing countries, and how global surveillance could be changed to prevent such reactions in the future.

PLAGUE IN INDIA

Setting

On September 20, 1994, Surat Civil Hospital, Gujurat, admitted seven patients with pneumonia-like symptoms. Despite penicillin treatment, two of the patients died within a day. Other hospitals in the area admitted many other individuals with similar symptoms, all from the poor sections of Surat. Examination of patient sputum samples revealed the presence of rod-shaped bacilli resembling the plague bacillus but no bacteriological confirmation was obtained. Government officials had to decide whether to declare an outbreak of plague immediately or wait for laboratory confirmation a week later *(17)*. They chose the former course of action and a sequence of events was set in motion that led to widespread panic, worldwide apprehension, and severe economic losses for India.

By September 23, 1994, there were media reports of a plague outbreak in Surat and these reports quickly spread throughout the world. As many as 500,000 people fled Surat and the surrounding area, and this led to fears that plague might be carried to other large Indian cities and beyond *(18)*. A low-threshold case definition was adopted in order to include all possible cases, and in consequence the number of suspected cases rose throughout western India *(19)*. Drastic nationwide measures were taken during the next week in the hope of stopping the spread of the suspected disease. Schools were closed and persons showing any respiratory symptoms, such as bloody sputum and persistent cough, were placed in quarantine. The Indian Ministry of Health, in accordance with the International Health Regulations, formally notified WHO, examined all persons leaving the country with any plague-like symptoms, and fumigated cargo from all ports of departure against rodents *(19)*. On October 3, 1994, India declared that the epidemic was under control and by the end of the month WHO declared the outbreak to be over *(20)*.

On October 7, 1994, because of international concern, WHO announced that it was sending an independent team of investigators to evaluate the situation. The team reported that there was evidence of a limited outbreak of plague in Surat but not of person-to-person transmission in major Indian cities; indeed, no cases were found in these cities *(19)*. The team concluded that the lack of adequate diagnostic equipment in the affected area led to overreporting and subsequent panic among the residents of Surat, and that excessive measures were adopted, i.e. flea control as a means of preventing the spread of plague through commerce and antibiotic prophylaxis for unaffected individuals. At the time, official reports indicated 52 deaths in the country from plague and 876 clinically confirmed cases *(21)*. A subsequent report from the All India Institute of Hygiene and Public Health indicated that not a single case of plague was confirmed on the basis of WHO bacteriological standards *(22)*.

Established policy on response to plague

The International Health Regulations provide some guidance on how countries should respond to an outbreak of plague. They do not, however, state what specific actions can be taken, except that cargoes and goods may be regulated if they come from infected areas and if the health authority has reason to believe that they may have become contaminated by the agent of the disease. The regulations also stipulate that each country shall employ all means in its power to diminish the danger from the spread of plague by rodents and their ectoparasites. During the

1994 outbreak, India claimed to have fumigated all ships and relevant cargoes before they left port to ensure that all rodents were killed. However, there was no evidence of plague in the country's port cities.

Perhaps more significantly, the regulations stipulate that a ship or aircraft is considered to be infected with plague only if there has been a human case on board, or if there is evidence of abnormal rat mortality that might be attributable to plague, or if someone on board has come from an infected area without being quarantined. A ship ceases to be regarded as infected or suspect if the affected country follows quarantine protocol, which India did. If a ship or aircraft comes directly from an infected area but does not meet the above-mentioned three criteria for suspicion, it should be regarded on arrival as healthy according to the International Health Regulations.

WHO regulations indicate that the response to India's epidemic should have ensured: adequate monitoring of departing aircraft and ships by Indian public health officials; adequate de-ratting of cargoes and ships before they left port; monitoring of arriving ships and aircraft by other countries for infections on board and preparedness to respond but not to deny entry; availability of adequate supplies of appropriate antibiotics in countries so that any cases that occurred could be quickly treated.

International response

Before the scientific confirmation of the 1994 plague outbreak had been carried out, press releases were giving estimates of the level of disease and television broadcasts were showing people wearing cloth masks fleeing from the affected area. Within a week of the initial reports, countries throughout Asia and the Eastern Mediterranean stopped flights to and from India (*23*). Before a single case was confirmed in western India, Bangladesh stopped the movement of goods and people at border crossings with India. Bangladesh, Oman, Qata, and the United Arab Emirates stopped importing all foodstuffs from India, and many other countries followed suit. Canada, France, Germany, Italy, the United Kingdom, and the USA issued warnings to their citizens on travel to India. Italy placed an immediate embargo on all goods from India at all Italian ports, while Sweden, a major trading partner of India, cancelled all textile shipments (*24*). These measures were taken even though WHO requested that no travel or trade restrictions be imposed on India.

Although the reported cases were confined to the poor in defined areas, many people changed their plans for travelling to India at the height of the tourist season (*25*). The outbreak also affected Indians travelling abroad, as they were often held up at airports, placed in quarantine, or even sent back to India (*24*). Even some Indian citizens resident in other countries were subjected to unwarranted scrutiny. Such measures against citizens of countries suffering from an outbreak are prohibited by the International Health Regulations (*5*). Because of its historical importance, plague rapidly placed a stigma on India that took months to fade.

Only after the lifting of all sanctions and the normalization of travel and trade patterns did the full cost of the outbreak become clear. In 1994, India's trade deficit rose to more than twice that of the previous year (*26*). In response to the loss of at least 2.2 million tourists during the season, the Ministry of Tourism reduced its hotel prices by 50% (*25*). Estimates of quantifiable losses vary, but most reports place total losses associated with the reported outbreak at over US$ 2 billion (*27*). Long-term projections of losses will probably prove higher.

Was India treated in a manner consistent with the treatment of other countries where plague occurs? In the western USA, where plague is endemic, cases have been regularly reported in Arizona, California, and New Mexico for the past 20 years (*28*). During 1994 there were 14 confirmed cases of plague in the USA and two deaths occurred, whereas in India the disease has been reported in only one of the last 15 years, namely 1994, when there were 876 unconfirmed cases and 52 deaths. Most of the reports of unconfirmed cases in India were based on nonspecific, clinically broad criteria, and most occurred among the impoverished inhabitants of inland city. More confirmed cases were reported in Peru and Viet Nam in 1993 and 1994 than in India, yet no travel or trade restrictions were imposed on either of these countries on these occasions (*21*).

The response to the Indian outbreak appears to be both inequitable and motivated by media presentations. Both CDC and WHO concluded that it was excessive and unnecessary (*22*). Other countries, observing the price that India paid, will probably be more reluctant to report similar outbreaks in the future.

CHOLERA IN PERU

Setting

In January 1991 an epidemic of cholera began in Peru and eventually spread throughout South America. On January 29 the Peruvian Ministry of Health received reports of an increase in gastroenteritis in Chancay, a coastal region north of Lima. A field research team went to the site and identified *Vibrio cholerae* 01, biotype El Tor. Between January 24 and February 9, 1991, a total of 1,859 people in Peru with clinically diagnosed cholera required hospitalization and 66 deaths were reported (*29*).

Subsequently, cholera appeared along the Pacific coast in Chile, Colombia, and Ecuador and spread inland towards the Amazon and Brazil. From January 1991 to September 1994, CDC reported a total of 1,041,422 cases and 9,642 deaths with a case fatality rate of 0.9% (*29*). WHO declared the epidemic to be over in 1995.

Established policy in response to cholera

The International Health Regulations provide limited guidance to countries on how to respond to outbreaks of cholera. They stipulate that cargoes and goods should only be subject to control measures when proceeding from infected areas and when officials suspect the presence of an infectious agent. No documented outbreaks of cholera have resulted from commercially imported food (*30*). Most exported food products are safe because, in general, the cholera bacteria do not survive cooking and drying. Countries often ban fish imports when cholera outbreaks occur, even though the evidence suggests that the risk of transmission from contaminated imported fish is negligible (*30*).

In relation to the outbreak in Peru, CDC noted on February 15, 1991, that there was only a low risk that citizens of the USA would acquire cholera in the areas of endemicity. During the first 20 years of the current global pandemic only ten cases of cholera in travelers from the USA were reported to CDC, a frequency of less than 1 per 500,000 returning people (*29*). On April 5, 1991, WHO and CDC published reports on food safety and cholera that pointed out that there is no documented evidence of a cholera outbreak attributable to the importation of food across an international border (*31*). The report stated that on no account should travel be restricted because of cholera. CDC also noted that since 1961 some people had acquired cholera while traveling but that there were no records of secondary transmission in the USA (*29*). CDC attributed the prevention of secondary transmission to the quality of sanitation system.

International response

Because cholera spread through Peru initially, the international response began with actions focused on that country. Bolivia, Chile, and Ecuador banned imports of Peruvian perishable foods, and soon afterwards Argentina banned all fish products from Peru (and even suspended an international soccer match). Within two weeks of the beginning of the outbreak the European Community had imposed a complete boycott of all Peruvian fish, thereby crippling one of the country's primary industries (*32*). The European Community proceeded to ban all imports from Peru and other countries followed suit. On February 26 the Prime Minister of Peru accused many countries of taking restrictive measures that unfairly blocked the country's export trade (*33*). The embargoes continued and were expanded, and other countries introduced specifications on the number of days required between cargoes leaving Peru and arriving in foreign ports, usually well in excess of advice given by WHO. By mid-March 1991 many Peruvian exports were subjected to international embargoes. Certain countries, among them the USA, required all food products from Peru to be tested for cholera, again going beyond WHO recommendations.

The President of the Peruvian Chamber of Tourism claimed that news releases led to the cancellation of half the reservations made by foreign travelers to the country. It was estimated that Peru's tourist industry lost US$ 150 million. Even in the tourist center of Cusco, where few cholera cases had been reported, half the hotels had closed and most of the others were empty (*34*). Many European countries placed restrictions on Peruvian travelers, some of whom were sent back to Peru on arrival in Europe.

Meanwhile, cholera continued to spread in South America. In April some European countries widened the ban on fish exports to include Colombia and Ecuador (*35*). Chile predicted economic losses of over US $300 million, and losses for other countries in the region were expected to be similar (*36*). These estimates did not include unmeasured effects on future tourism, trade and overall reputation. For Peru the economic losses on trade alone in 1991 were estimated at more than US $770 million (*37*).

Cholera had spread among the poor in Peru because of unhygienic water supplies and sanitation. The international reaction only added to the poverty that had led to these conditions.

Lessons and recommendations

Global surveillance should confront the following matters in order that the devastating experiences of India and Peru may not be repeated:

- Inability to acquire timely and accurate information early in an outbreak because of low diagnostic capabilities in poorer areas and the use of extremely vague case definitions in diagnosis.
- Rapid spread of press reports that are often inaccurate, sensationalist and lacking in sound advice;
- Failure of countries to adhere to international standards, including the International Health Regulations and WTO regulations relating to appropriate conduct in response to disease outbreaks;
- Lack of substantive support for developing countries economically damaged by disease outbreaks.

Because of the vast reach of technology and the media it is increasingly unlikely that countries will be able to conceal disease outbreaks. WHO can, however, provide assistance to countries that report outbreaks and facilitate their rapid containment. Countries retain the power, however, to prevent foreign health organizations from operating within their borders. Many countries need the assistance of WHO to control the

spread of diseases within their borders and to provide scientific credibility. In the interest of controlling diseases internationally, it is necessary that countries give WHO access to correct information and allow the world body to conduct investigations on their territory if there is an evident need for this. Only by preventing international overreaction can WHO and the world community begin to foster a cooperative relationship with the countries concerned.

Obtaining timely and accurate information

Reliable information is needed for documenting and controlling outbreaks and also for informing the international community so that it can take appropriate measures. India and Peru were unable to collect reliable information sufficiently rapidly to inform others of the nature of outbreaks in a timely fashion, and both these countries created unnecessary alarm when their use of broad case definitions led to high numbers of cases. In India a lack of functioning diagnostic laboratories led health officials to use excessively sensitive clinical diagnoses rather than to confirm diagnoses through culture. Indeed, deficiencies in the collection of specimens would have prevented culturing in most cases. Similarly, Peru treated every person who reported having acute watery diarrhea as a cholera patient, without using culture or dark-field microscopy to confirm the diagnosis. Such shortcomings can lead to inflated case numbers and overreaction by the international community.

Both WHO and CDC are assisting countries to improve their disease surveillance infrastructure through the training of field epidemiologists and laboratory personnel. However, accurate reporting from rural or poor urban areas remains problematic. Outbreaks of diseases often occur among the poor or in areas distant from major health centers and trained personnel. Moreover, personnel in such areas often lack the supplies and equipment required for characterizing pathogens, preserving specimens, and making diagnoses. A possible approach would be to support more research on inexpensive, easily used detection methods and inexpensive equipment. For example, a research group substantially reduced the cost of the polymerase chain reaction by simplifying the protocol, reagents, and equipment and then optimizing it for disease detection in the developing world (*38*). For many years, the Program for Appropriate Technology in Health (PATH), a nongovernmental organization, has been engaged in the development of inexpensive diagnostic tests. Low-cost approaches could conceivably allow field personnel to begin characterizing outbreaks at a relatively early stage.

Plans to expand the number of reportable diseases require that countries have specific criteria for identifying cases so that disease burdens are neither overestimated nor underestimated. Health officials should be aware of appropriate case definitions and should be encouraged to use them throughout outbreaks. WHO, CDC and other organizations should also consider what sorts of case definitions are used when public statements are made about the level of an outbreak.

Dissemination of valid information via the press

News organizations, the Internet and other forms of communication allow groups and individuals to gather information about events occurring anywhere in the world and disseminate it almost instantaneously. Unfortunately, information on disease outbreaks is often inaccurate. Furthermore, the increasingly competitive environment in which they operate forces news organizations to describe outbreaks in a manner that captures the reader's attention but does not necessarily reflect their true nature. All of these factors lead to outbreaks being described in exaggerated and sensationalist terms, with the consequence that the international community overreacts. People read about plague in India and saw images of persons fleeing from Surat, but were not told that the risk was low and that the spread of the disease was limited. As a result, many individuals were disinclined to travel to India, while importers stopped the receipt of Indian products before any official policies were announced.

WHO, CDC and national health organizations should issue reliable and credible press releases about outbreaks at an early stage and should continue to update the information. This could be accomplished by both releasing specific statements to the press and maintaining easily accessible web sites providing accurate information on the diseases, reasonable trade and travel policies, and other relevant information. If such measures were taken while outbreaks were being characterized, the interval between press releases and official reports could be minimized.

Global surveillance should be proactive in order to tackle the problem of the inaccurate spread of information. News organizations should understand the consequences of sensationalized reports for developing countries. Educational initiatives could be developed to inform the international and national media about the principles of surveillance, the true threat of outbreaks, and the importance of transmitting accurate information. Such initiatives could take the form of courses or conferences for journalists in bot the print and television media.

International reactions to disease outbreaks

The international community tends to overreact to reports about disease outbreaks. Improving the quality of information and its dissemination may reduce inappro-

priate global reaction. Paradoxically, when a country reports an outbreak, the international community may benefit relatively little, whereas the reporting country itself may suffer great losses. Many countries do respond appropriately, observing WTO and WHO guidelines, but many others do not and take extreme action with little bearing on scientific information, disease risk, or established preventive measures. As in India and Peru the potential for the spread of disease through trade was very small, as was the danger to tourists.

When guidelines fail to protect reporting countries, international organizations should alter their regulations and create new, more effective policies. In order to improve the situation, it is necessary to strengthen and enforce international guidelines and to educate national ministries and regional trade organizations proactively.

WHO has limited powers to enforce the International Health Regulations, including those parts concerned with international responses to epidemics. Heavy reliance on the International Health Regulations may not be the most effective international legal strategy for the control of emerging diseases. Whatever legal approach is eventually taken will have to confront a fundamental paradox: globalization jeopardizes disease control nationally by eroding sovereignty, while the need for international solutions allows sovereignty to frustrate disease control internationally (*39*). The legal documents should deal directly with the issue of interference with trade and tourism in a specific manner. WHO's informal consultation on the revision of the International Health Regulations took a step in this direction by recommending that the Organization should be able to prohibit Member States from applying extreme health measures until approval had been obtained from a panel of experts (*3*). It remains to be seen whether Member States will accept that this power will be given to WHO and whether they will accept WHO's authority. Finally, the arbitration committees proposed in the International Health Regulations should have the strength to resolve disputes among Member States effectively. It is important for developing countries to know that they have a means of appeal if they are unfairly treated by other Member States.

WTO can enforce its Agreement on the Application of Sanitary and Phytosanitary Measures in order to settle disputes among its Member States. Thus, Peru appealed to the General Agreement on Tariffs and Trade, WTO's predecessor, for compensation because of unfair trade practices during the 1991 cholera outbreak (*40*). Since 1995, when WTO adopted a formal mechanism of recourse, nearly 50 requests for consultations have been made in respect of unfair trading practices under the Agreement. The potential exists for WTO and WHO to collaborate so as to ensure that countries reporting disease outbreaks are not unfairly punished (*41*). Such collaboration is vital for the avoidance of excessive measures.

Since few specific regulations exist, national ministries and trade organizations have the freedom to set their own standards. Organizations such as the European Union and the North American Free Trade Agreement need to be educated on the appropriateness of various measures so that their member countries have a basis for deciding which ones to adopt. These bodies often set the tone that determines how the international community responds to an outbreak. Once they issue reasonable standards, reporting countries that are treated unfairly will be able to cite specific grounds for claiming compensation. WHO could also produce reports, similar to those already produced for the press, containing specific trade and travel guidelines, and could supply them to all countries and trade organizations.

WHO and other organizations should be willing to made clear directives at an early state of an outbreak for the benefit of the affected countries, with regular updates to deal with any changes that occur. If the mode of spread is uncertain, as with the recent bovine spongiform encephalopathy outbreak in the United Kingdom, international bodies should rapidly arrange for experts in the disease to design appropriate measures on the basis of the available data. No international organization has been willing to take responsibility for defining regulations early in an outbreak. Such inaction stems in part from fear that recommended measures may not prove to be appropriate once an outbreak is fully defined.

Long-term effects

It is unlikely that all excessive international reaction to outbreaks of disease will be prevented. Furthermore, there is no support, economic or otherwise, to assist reporting countries confront the long-term effects of embargoes and loss of tourism. In order to encourage reporting on the one hand and treat reporting countries equitably on the other, measures could be taken to provide a safety net for rebuilding tourism and trade ties and possibly recovering losses after an outbreak.

The following steps could both mitigate economic losses and encourage reporting:

- international organizations could advocate that economic aid be given to countries affected by outbreaks;
- organizations could consider creating funds, administered by WTO on the basis of recommendations from WHO, which would be available to help countries suffering economic losses;

- reporting countries could be actively supported, when appropriate, in their efforts to obtain compensation through appeals to groups such as the appeals committee of the Agreement on the Application of Sanitary and Phytosanitary Measures.

CONCLUSIONS

Efforts to improve global surveillance for emerging and re-emerging infectious diseases are making progress. In order to achieve complete and accurate reporting, more attention should be given to preventing harsh international responses against countries that report disease outbreaks. Poorer countries are vulnerable because they are more susceptible to disease outbreaks, have fewer means for accurately reporting outbreaks, and experience harsher economic consequences when outbreaks are reported. The outbreaks of cholera in Peru and plague in India demonstrate the limitations of international regulations to prevent economic losses and social disruption. WHO and other international organizations should educate international leaders, the press, and the international community before outbreaks occur and also at an early stage during outbreaks in order to prevent such losses. This requires increased openness by countries so that WHO and other organizations can support them. Low-cost diagnostic technologies, clearer case definitions, and improved dissemination of information may also help to limit losses. WHO and WTO should enforce their existing policies and consider new ways of protecting the interests of reporting countries. Otherwise, countries are likely to continue trying to conceal epidemics, and the goals of global surveillance are unlikely to be fully achieved.

International Association for Food Protection

HISTORY

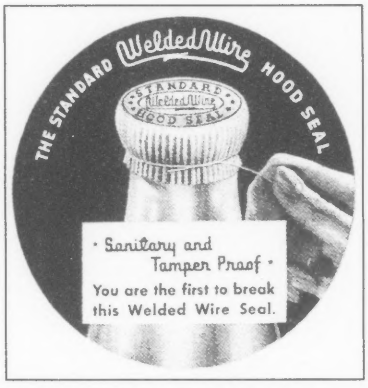
1911-2000

THE '30S

By the '30s, because of increased travel, especially by automobile, health concerns of a city or town were no longer strictly a local matter. The health of the people in one place had become of vital concern to cities hundreds or even thousands of miles away. Milk, and by implication foods in general, had to be safe wherever travelers went, or the health of all was in danger. This fact led to the recognition of the need for uniform systems of protecting and evaluating milk and milk products, so that findings of one city could be compared with findings of other cities which formerly may have been considered too distant to threaten health.

It was recognized that the need for uniformity in protection of the food supply could be met in more than one way: inspection could be centralized with the federal government, or the federal government could limit its role to providing principles and information to serve as the basis for efficient local control.

The economic depression of the '30s was another factor that made the safety of milk more important than ever. As people were forced to decrease their consumption of other foods, especially the more expensive ones, milk became a more conspicuous proportion of total intakes. Obviously, education of the public on the health benefits of milk had been effective, so that the decline in consumption was much less extreme for milk than for many other types of food.

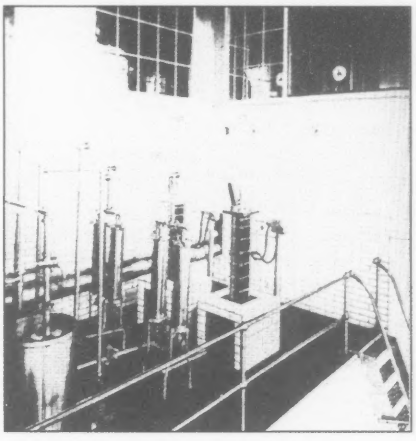


Standard Cap and Seal Corporation, Chicago, Illinois. Reprinted from the *Twenty-fifth Annual Report of the International Association of Milk Sanitarians,* 1936.

Within the organization, problems included the following: When considering the "international" aspect of the name, did the Association offer assistance to countries throughout the world, some of which had public health problems rarely or never seen in relatively wealthy countries such as the United States? The Association continued its concern regarding qualifications of milk inspectors; at the time the Association was founded, practically all inspectors were government employees, but by the '30s, many non-government employees were engaged in various roles in the dairy industry. These inspectors, many of whom knew dairy work thoroughly, might be more effective inspectors than the government-employed inspectors; even those who were

IAFP History...

Beginning with the January 2001 issue of *DFES* we are printing sections from the book, the "International Association for Food Protection History 1911-2000." See page 137 to obtain your copy of this informative book.



Electropure Pasteurizer. Reprinted from the *Twentieth Annual Report of the International Association of Dairy and Milk Inspectors,* 1931.

veterinarians with extensive academic knowledge of diseases of animals did not ensure broad practical knowledge of dairy work.

Equipment design was proceeding rapidly, and new forms of equipment were being installed and used without any control beyond the assurance of the manufacturer that the equipment was effective in protecting public health. Thus appeared another layer of potential liability: should the producer be held responsible for the condition of the milk delivered from the farm, or should the manufacturer of new equipment be held accountable for demonstrating its effectiveness in safeguarding health?

Membership in the Association increased after 1931, when another class of Member, the Associate Member, was proposed for those interested in promoting dairy sanitation. Active Membership would be reserved for those Members officially engaged in dairy or milk inspection, including laboratory control or administration of such inspection, and of those officially engaged in research or educational activities related to dairy or milk inspection.

The control of milk sanitation was recognized as one of the more important functions of a Department of Health, for several reasons. First, milk was the sole food available during early infancy for babies who were not breast fed. Second, milk was an important food, if not the only food, suitable for people recovering from certain diseases. Remember, this was years before medical and nutritional advances such as special baby formulas, baby cereals, strained fruits and vegetables in jars, and total parenteral nutrition for use in hospitalized patients.

Finally, milk was almost universally used by the American public. Almost everybody drank some, and for most it was a daily part of their lives. Thus, safe milk had an extraordinary opportunity to improve peoples' health by providing a sizable share of their daily nutritional needs, but at the same time, unclean milk had a day-by-day opportunity to cause infection in large numbers of those who consumed it.

In addition to posing a threat because of its condition at the moment it was obtained from the cow, milk had numerous opportunities to become dangerous by virtue of its being one of the most perishable of foods. The many manipulations unavoidable between the moment it leaves the cow and the moment it enters the consumer make milk highly susceptible to contamination time after time, at each step along the way.

The growing importance of the new science of nutrition was obvious by the early 1930s, when several talks on the nutritive value of milk appeared on the program at the Annual Meetings. Raw milk was compared to pasteurized milk from the point of view of nutritional differences, rather than from the bacteriological viewpoint alone; production of antirachitic milk by changing the feed of dairy cattle was described; and the responsibility of milk commissions for control of nutritive factors in certified milk was stressed. A paper on natural and induced variations in the vitamin values of milk was another example of the growing emphasis on nutritive value rather than bacteriological safety exclusively.

However, the primary emphasis continued to be bacteriological quality. In a round table discussion, "Is a single grade of pasteurized milk sufficient?" One health official took the affirmative and another the negative position. The need for uniformity in milk laws and regulations – uniformity between states as well as within a state – continued to be discussed, and essential requirements for clean safe milk for pasteurization were identified and discussed over and over, with consideration at every level: the herd, the farm, the receiving station, and the milk handler.

Milkborne epidemics became less frequent as pasteurization became more common in the 1930s, but a few outbreaks continued to occur, most commonly resulting from a combination of two factors: milk from cows with chronic mastitis caused by hemolytic streptococci, and lack of pasteurization of this milk (i.e., consumption of raw milk). Other diseases, notably bovine tuberculosis, had been largely eradicated by programs carried out by Federal and State Departments of Agriculture.

By 1934, sales of milk had declined because of the economic depression in the United States. The Bureau of Home Economics in the USDA set a standard for use of milk – one quart a day per child and one pint a day per adult – but economic realities made this impossible for many families. Adequate milk was available; in fact milk surpluses were common, but welfare programs were inadequate for purchasing surplus milk and distributing it to people who could not afford the purchase price.

As pointed out at the Association meeting in 1936, typhoid carriers (those who may not have a recognized case of typhoid fever but who harbor the organism in the intestinal tract and who can infect others through food) continued to be employed in the milk

and food industries, and "careless men in the dairy industry" who continued to milk cows with ulcers on their udders were still all-too-common threats to public health.

The Association proposed that state associations, which during the 1930s existed only in a few of the larger states, should be formed in all states that had 25 or more International Association of Milk Inspectors Members. The advantages of a state association would be to accord to milk sanitarians professional privileges not otherwise available; to increase their local prestige; to publicize the work of milk sanitarians; to serve as a unifying body, similar to a union; to give sanitarians a voice that could be heard with regard to local measures related to health; and to improve their work by allowing them to pool their knowledge.

In 1933, the International Association of Milk Sanitarians recognized the need for a journal to replace the Annual Reports that met the needs of the Association for years. A special committee on Association Publication was appointed and after thorough study of the subject, it presented comprehensive reports at the 1934 and 1935 Annual Meeting outling the editorial and managerial requirements involved. At the 1936 Annual Meeting, the subject was referred to the Executive Board. The Board requested the special committee to establish a journal. The result was the creation of the *Journal of Milk Technology*. The first bi-monthly publication was issued in January 1938.

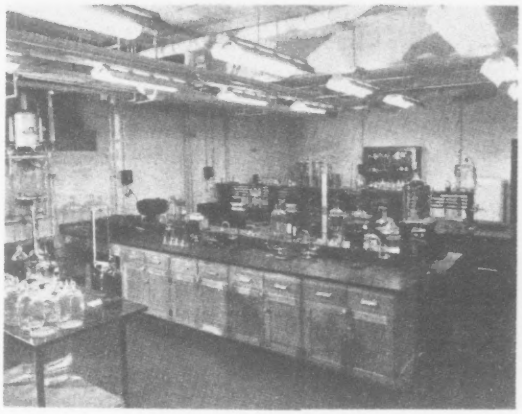
The end of the 1930s saw continued growth of the Affiliates and the *Journal of Milk Technology* was a major factor in that growth. The Journal quickly gained many individuals, institutions, and companies as subscribers and received requests from numerous libraries around the world. The primary function of the Journal was to keep the Membership informed about new developments in dairy technology, to serve as a medium for publication of the papers presented at Annual Meetings, and to maintain communication between officers and Members throughout the year.

In an open letter in the January 1938 issue of the Journal, the President urged Members to seek to secure an even greater Membership: "Let every one of us try and secure a new Member – one who is truly interested in the sanitary production of milk and its products. We are not interested in mere numbers. We are looking for real quality, not just quantity." This philosophy still holds today. It should be emphasized that the Association was playing a vital role in improving health, in the nation and in the world. Early in the century, many outbreaks of diseases such as typhoid fever, diphtheria, and *Staphylococcus* and *Streptococcus* infections had been associated directly with milk and milk products, as had been discussed at both Affiliate and Association meetings. A closer liaison was being developed between the sanitarians on one hand, and academia and industry on the other. Early on, news of the Affiliates was published in the Journal, and some Affiliates publicized their upcoming meeting dates and the titles of topics to be discussed.

The *Journal of Milk Technology* published notices from several local or regional associations in 1939. The New York State Association of Dairy and Milk Inspectors pointed out the continuing problem of sales of "questionable raw milk" on the outskirts of cities in which the sale of such milk was prohibited. The Central States Milk Sanitarians announced plans for its first annual meeting and urged members of that group to "make the *Journal of Milk Technology* our meeting place between the yearly meetings." The following year, several other announcements from state associations were published in the *Journal of Milk Technology*. The California Association of Dairy and Milk Inspectors announced that members had appointed a legislative committee to represent it in matters of legislation affecting its members' work; the Central States group reported attendance by about 100 members at its first annual meeting and pointed out the obvious interest in having such an association, in which those interested in milk quality could unite; the Chicago Dairy Technology Society reported a meeting at which a device, the Vacreator, was described and research on control of proteolytic organisms in milk cans was summarized; and the Massachusetts Milk Inspectors Association presented speakers on such diverse topics as Bang's disease, food poisoning, and new equipment shown at the latest national dairy show in Atlantic City.

The '40s

The 1940s found the World engulfed in war, and many of the Association's Members went into uniform. The 1941 Membership was 1,146, of whom 255 were new Members. Members now represented 43 states, the District of Columbia, Mexico, Colombia, the West Indies, Ireland, England, and Thailand. Circulation of the Journal exceeded 2,300. That year's secretary wrote in the Journal that the Association had an important part to play in our national defense program, and it was imperative for milk control officials to take a common-sense attitude toward the policies of the Priorities Board of the Office of Production Management (OPM): "No one person or agency has the slightest desire to hinder or retard any effort which is being made to promote public health or diminish the gains already made. However, we have been depending up until now upon materials and labor which are now essential for national defense. Starting now, we will be using material which is new to us, yet will do the job we desire. We will have to get along with used equipment which in times past we would have called 'obsolete' or 'worn out'... Cooperation with the OPM will not result in lowering the standards which have been set for a safe milk supply. The dairy industry is an essential food industry."



Sanitary Chemistry Laboratory. Reprinted from the *Journal of Milk and Food Technology*, Volume 11, No. 2, 1948.

With the country at war, state and local regulatory officials assumed increasing responsibilities for milk, food and environmental sanitation. In many sections of the country, large influxes of both military and civilian populations burdened health officials with maintaining an adequate and safe food supply, safe water, and solid and liquid waste disposal systems. Additionally, regulatory personnel worked with the military to ensure that off-base food service operations and housing met appropriate standards. More sanitarians were employed, many of whom joined the Affiliates and the Association, both of which provided avenues for disseminating information. Affiliates' news releases listed presentations with titles such as "Interesting Development in the Feeding of Soldiers" and "Milk Control in the Defense Program." A 1942 meeting featured a discussion on "The Problem of Sabotage in Dairy Plants." One of the challenges of the day was to increase the shelf life of dairy products, because the Office of Defense Transportation (ODT), had decreed that milk deliveries be reduced from daily to every other day. Industry achieved this readily.

The 1943 Annual Meeting was cancelled in response to a request from ODT, which cited the burden that conventions and association meetings placed on the country's war-stressed transportation facilities. Between 1942 and 1944, therefore, Members relied on the Affiliates and the Journal for the exchange of information normally provided by the Annual Meeting. In 1944, the Annual Meeting was revived and held in Chicago.

The ODT had asked, as it had in 1943, that no conventions be held unless they were vital to the country's military efforts. Why was a Meeting even held in 1944? The Executive Board considered the ODT's request, but

Report of Special Committee on Association Publication

Presented at the Annual Meeting,
Louisville, Kentucky — October, 1937

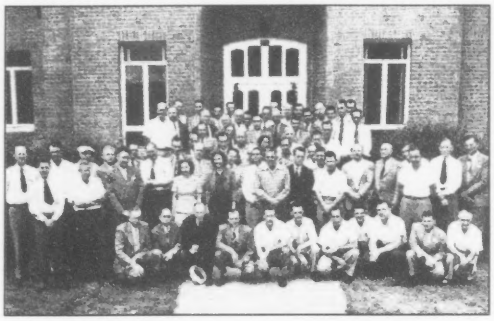
At the Twentieth Annual Meeting of the Association of Milk Sanitarians held in Montreal, Canada in 1931, the suggestion was made, and renewed at subsequent meetings, that consideration be given to the establishment of an Association journal. Following the 1933 Annual Meeting, a Special Committee on Association Publication was appointed. After thorough study of the subject it presented comprehensive reports at the 1934 and 1935 Annual Meetings outlining the editorial and managerial requirements involved. At the 1936 Annual Meeting in Atlantic City, NJ, the subject was referred to the Executive Board with power to act. The original Special Committee on Association Publication, with additions, was requested by the Executive Board to establish a journal, if practicable, subject to the approval of the Board. Several meetings were held during the year, one being a joint session with the Executive Board. After consideration of all phases of the problem including possible affiliation with other publications, it was decided that a journal is essential in the field of milk technology and the Association is able and ought to proceed with such a publication. There are ample indications that with proper management such a journal can be made financially self-sustaining.

Accordingly, and acting with the approval of the Executive Board and with the personal assistance of the Association President, the Special Committee on Association Publication has established and presents herewith the JOURNAL OF MILK TECHNOLOGY. The first issue, published without cost to the Association, is a Special Convention Number for the Association's Twenty-sixth Annual Meeting, Louisville, Kentucky. It is presented as a part of this report.

The Special Committee on Association Publication recommends: that the International Association of Milk Sanitarians formally designate the JOURNAL OF MILK TECHNOLOGY as its official publication to be published in lieu of the Annual Report; that, beginning in January 1938, the Journal be inaugurated as a bi-monthly publication; that the Association take action at the 1937 Annual Meeting on the following: publication policies; and management, including editing and business; finances; management be made responsible to the Executive Board of the Association.

Respectfully submitted, Wm. B. Palmer, C. Sidney Leete, J. J. Regan, J. H. Shrader, and J. A. Tobey.

Reprinted from the *Journal of Milk Technology, Volume 1 — 1937-1938.*



Florida Association of Milk Sanitarians met at the Dairy Products Laboratory on the University Campus for the 5th Annual Meeting. Reprinted from the *Journal of Milk and Food Technology*, Volume 12, No. 1, 1948.

concluded unanimously that the problems confronting Members of the Association were such that it would have been a disservice to the industry, and to all organizations having contact with the industry, if the Association failed to use every means available and make every effort possible to solve those problems. Thus, the Executive Board believed that holding the Annual Meeting was in conformance to the wishes and policies of the ODT because participation of Members in those deliberations fully met the standard of being "vital to the war effort."

The Presidential Address was also revived in 1944 in spite of the objections of some Members who saw it as a long, boring time infringing on other activities. The President felt it necessary to speak before the group because of the two years that had passed since the last Meeting and because he wished to offer suggestions for future policy and action. One major problem he pointed out was the inactivity of several committees. (It is interesting to note that most organizations encounter problems with committees, and the Association would continue to struggle with Members' involvement on Committees.) The President proposed that any Member of the Association or Affiliate who would like to participate in a committee project write to the President and identify his or her committee preference. In that manner, committee chairpersons would be assured of enthusiasm on the part of some of the Members of their committees, and the task of the President would be simplified and facilitated. Implementation of such a custom would advance the welfare of the Association by providing a means for new, relatively unknown Members to participate actively in committee activities and to "bring their lights out from under a bushel." Even today, many new Members are reluctant to express interest in serving on a particular committee or becoming an officer.

Five state associations became Affiliates of the International Association in 1944, resulting in a healthy increase in Membership. The President indicated that restaurant and food sanitarians were becoming organization-minded, with starting a national association and publishing their own journal as their ultimate objectives. Many of these restaurant sanitarians were also milk sanitarians because of their employment in health departments of counties and small municipalities. One such local organization of restaurant sanitarians had inquired about affiliation with this Association. The pros and cons of accepting restaurant sanitarians into the Association, including the impact on the *Journal of Milk Technology*, were laid out, and the President urged the Affiliates and the Executive Board to give mature consideration to the subject.

The following year opened with the world still at war and with the country unified in meeting the challenges of war. The term "sacrifice" had been redefined. Industry was operating on a 24-hour schedule to turn out ships, planes, tanks, and other war materials, and the dairy and food industries were geared to provide safe products for the troops and to develop new foods, including rations, powdered eggs, dried milk, and new types of canned goods, for use throughout the world, from the steaming tropics to the frozen tundra.

By May of 1945, the war ended in Europe, and a few months later, the war with Japan came to an end. World War II had been extremely devastating in terms of both loss of life and physical destruction, but the world responded and began to use its knowledge and technology to rebuild. Because of the war effort, the 1945 Annual Meeting was cancelled.

The war had enhanced the rate of growth in technological areas, as was quite evident in the areas of milk and food processing and packaging. The Association continued to do much to unify and standardize the science of milk control and to provide the latest information on changes through the bi-monthly *Journal of Milk Technology*, whose circulation was more than 3,000 and which was being sent to 17 countries by 1946.

At the 34th Annual Meeting in 1946, it was reported that the consensus of the correspondence from Members favored including food and restaurant sanitarians in the Association. Members voted to adopt this proposal, along with other amendments to the Constitution. Considerable time was spent discussing the position of Secretary-Treasurer, particularly the increasing demands of the position and the need for compensation for his time and work. It was proposed that arrangements be made for a Secretary-Treasurer to be employed full time; in the interim period, the Secretary-Treasurer's office should be a part-time position.

The Association's President formally declared in 1947 that the official name of the Association was now the International Association of Milk and Food Sanitarians (IAMFS). This name change was in response to adding food and restaurant sanitarians to the Membership. Also at the 1947 Annual Meeting, a Past Presi-

dent presented a resolution that IAMFS make available, at reasonable cost, reprints of the sanitary standards published in the *Journal of Milk and Food Technology,* the resolution was adopted.

It was pointed out in the 1948 Journal, that, since the war's end, development in the field of detergents and bactericides had been so numerous and rapid as to confuse many milk and food sanitarians as well as many users of these products. Products flooding the market had not always been evaluated regarding their effectiveness in use. Cleaners and sanitizers were therefore popular topics of discussion on agendas that year. The 1949 Journal reported on a National Sanitation Conference, held under the auspices of the National Sanitation Foundation, to consider the need for, and means of, further development of sanitation. Twenty-eight national organizations participated, representing public health, medicine, education, industrial hygiene, and other areas. Out of this conference came a popular quote, "Sanitation is a way of life," as exemplified by the clean house, the clean business and industry, the clean neighborhood, and the clean community.

International Association for Food Protection

2001–2002

Secretary Election

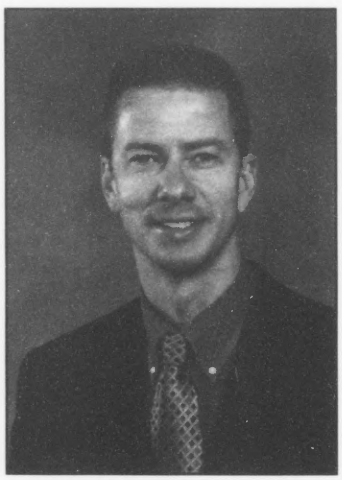
The following page contains biographical information for the 2001-2002 Secretary candidates. Review the information carefully as you make your voting decision.

Ballots were mailed to all International Association for Food Protection Members during the first week of February. Completed ballots are due back to the Association office by March 23, 2001. Sealed ballot envelopes are forwarded to the Tellers Committee for opening and counting. Watch for the election results in the May issue of *Dairy, Food and Environmental Sanitation*.

If you have questions about the election process, contact David W. Tharp, CAE, Executive Director at 800.369.6337, or 515.276.3344, or E-mail dtharp@foodprotection.org.

The Candidates

Kathleen A. Glass



David A. Golden

Biographical Information

Kathleen A. Glass

Kathleen A. Glass is a Food Safety Microbiologist at the Food Research Institute at the University of Wisconsin-Madison. She designs and coordinates microbial challenge studies and assists the food industry in developing formulation-safe foods. Her research interests include the safety of low acid refrigerated foods, processed meat and process cheese products, focusing on the control of *Clostridium botulinum*, *Listeria monocytogenes*, and *Escherichia coli* O157:H7.

Ms. Glass has been an active Member of IAFP and its Wisconsin Affiliate (WAMFS) since 1990. Within IAFP, she has served as a member of the Program Committee, Meat and Poultry Safety and Quality Professional Development Group, Nominating Committee, Black Pearl Selection Committee, and as Chairperson of the Developing Scientist Awards Committee. She has organized and chaired numerous Annual Meeting symposia as well as presented technical papers. On the local level, she was elected to the WAMFS Executive Board in 1999 and will serve as President during the 2001-2002 term. Ms. Glass is the 2001 Conference Chairperson for an annual conference held jointly between WAMFS and Wisconsin Environmental Health Association and Wisconsin Association of Dairy Plant Field Representatives.

In addition to IAFP and WAMFS, Ms. Glass is a member of the Institute of Food Technologists, American Society of Microbiology, and Sigma Xi. She has published 17 scientific papers, has been an invited speaker at numerous workshops on food microbiology, dairy HACCP, process meat safety, and *Listeria* control methods, and is a guest lecturer for undergraduate and graduate UW-Madison courses in food bacteriology and food fermentation.

Ms. Glass received her undergraduate degree in Biology from the University of Wisconsin-Eau Claire. She taught high school biology for four years before earning her Master of Science degree from Northern Illinois University in 1985. She joined the Food Research Institute in 1985, and is also currently completing a Doctorate in Food Microbiology and Safety at the University of Wisconsin-Madison.

David A. Golden

David A. Golden, Ph.D., is an Associate Professor of Food Microbiology with the Department of Food Science and Technology at the University of Tennessee. He joined the faculty at the University of Tennessee in 1993. Before that, Dr. Golden spent two years as a microbiologist with the Food and Drug Administration in Washington, D.C., where he worked in the areas of food safety research and regulatory compliance as related to food safety.

Since joining IAFP in 1993, he has been an active Member in the Association, presenting technical papers at Annual Meetings and serving on IAFP committees. He served as a member of the Developing Scientist Awards Committee from 1993 through 1997 and chaired the committee in 1996. Dr. Golden served as a member of the IAFP Program Committee from 1995 through 2000, chairing the committee in 2000. Additionally, he is presently, and has been for several years, a member of the *Journal of Food Protection* Editorial Board. At the local level, Dr. Golden served as a member of the Local Arrangements Committee for the 1998 Annual Meeting in Nashville.

Other professional affiliations for Dr. Golden include: Professional Member of the Institute of Food Technologists; Co-Editor of the IFT/ASM *Food Microbiology Newsletter*, and Associate Editor of the *International Journal of Food Microbiology*. At the University of Tennessee, he has received awards from Gamma Sigma Delta for excellence in research and teaching, the College of Agricultural Sciences and Natural Resources Outstanding Faculty Advisor Award, and the Institute of Agriculture's T.J. Whatley Distinguished Young Scientist Award. He has authored or co-authored over 35 publications on food microbiology and safety and over 50 technical presentations given at professional meetings.

Dr. Golden received his M.S. and Ph.D. degrees in Food Science and Technology, with a focus on food microbiology, and his B.S. degree in microbiology, all from the University of Georgia. His current research focuses on ecology, detection, and control of foodborne pathogens, such as *Escherichia coli* O157:H7 and *Listeria monocytogenes* in foods.

New Members

CANADA

Sylvain Fournaise
Olymel SEC/LP
St-Hyacinthe, Quebec

Barbara Scott
Regional Municipality
of Waterloo, Waterloo, Ontario

JAPAN

Fumiko Kasuga
National Institute of Infectious
Diseases
Shinjuku-ku, Tokyo

Shigenobu Koseki
Hokkaido University
Sapporo

SPAIN

Antonia Murcia Tomas
Universidad De Murcia
Murcia

UNITED STATES

Alabama

Tollie H. Meggs
Tuscaloosa Co. Health Dept.
Tuscaloosa

California

Amy O. Charkowski
USDA-ARS, Albany

Connecticut

Mort Flaraty
City of Bridgeport
Bridgeport

District of Columbia

Laurie B. Williams
Food Marketing Institute
Washington

Idaho

Jeff Kronenberg
University of Idaho
Caldwell

Gulhan U. Yuksel
University of Idaho-Moscow
Moscow

Indiana

Ziad W. Jaradat
Purdue University
W. Lafayette

Kansas

Manpreet Singh
Kansas State University
Manhattan

Leslie K. Thompson
Kansas State University
Manhattan

Kristen L. Wright
Manhattan

Minnesota

Terry Bates
DCI, Inc., St. Cloud

Lois T. Branch
Ecolab Inc.
Mendota Heights

Kirsten Howe
Ecolab Inc.
Mendota Heights

Thomas Johnson
Johnson Commerical Agents
Mendota Heights

LouAnn Marshman
Ecolab Inc.
Mendota Heights

Jeremy D. Wedel
Sunny Fresh Foods
Brooklyn Park

New Jersey

Donald Schaffner
Rutgers University
New Brunswick

New York

Richard Febles
NCT, Germantown

Oregon

Timothy R. Nagel
Jana's Classics
Tualatin

Pennsylvania

Troye A. Cooper
Wengert's Dairy/Dean Foods
Lebanon

Tennessee

Joo-Sung Kim
University of Tennessee
Knoxville

Updates

Dairy Expert Joins Celsis

Celsis Inc., a provider of rapid microbial risk management products and services across the world, welcomed Scott Scdoris as senior technical representative – dairy & beverage product specialist to its organization in June 2000.

Scdoris, a former quality manager of Morningstar Foods, brings numerous years of experience and industry expertise to Celsis' technical support team. Prior to Morningstar, Scdoris has held similar positions with both Sunshine Dairy Foods and Resers Fine Foods. Scdoris joins Celsis with an array of experience in the quality of finished products, laboratory operations, processing and packaging, testing, sanitation procedures and HACCP.

In his most recent role of quality manager at Morningstar Foods, Scdoris was responsible for the selection, implementation and use of the Celsis System for the rapid screening of Morningstar's UHT fluid milks, creams and extended shelf-life egg product. Scdoris has a B.S. from Portland State University, with an emphasis in food science and microbiology.

Silliker Announces Corlett, Brock Appointments

Silliker Laboratories Group Inc. announced the appointments of Norman Corlett as western region manager and Gordon Brock as laboratory director at its Modesto, CA, testing facility.

Prior to joining Silliker, Corlett, a recognized dairy industry expert, served in quality assurance and microbiology management positions with the Dairy Farmers of America and Milk Marketing, Inc. He will oversee the day-to-day activities and business plans at Silliker's testing facilities in northern (Modesto) and southern (Carson) California. Corlett brings over 20 years of experience and techncial expertise to his position.

Brock joined the Modesto lab, then Dairy and Food Lab in 1992. He has held several key positions, including microbiology operations manager, and for the past five months has served as acting director. As lab director, Brock manages the lab's quality systems, scientific operations and staff to ensure accurate, timely services for the food industry. Prior to working at DFL/Silliker, Brock was a laboratory manager at Foster Poultry Farms. He is a graduate of the University of California-Davis with a master's in food science and has an extensive ana!ytical background in poultry, feed, and nuts.

Scott Smith Joins Bell Laboratories, Inc. as Midwest Technical Sales Representative

Scott Smith recently joined the sales staff of Bell Laboratories, an exclusive manufacturer of rodent control products. As the technical sales representative for the Midwest, he advises distributors and pest management professionals (PMP) through individual consultations and trade shows. With PMPs he also visits rodent infestation sites providing technical assistance.

Smith earned a bachelor of science degree in agricultural economics from Kansas State University in Manhattan, KS. After college, he used his agriculture background in marketing posts for Wilbur-Ellis Company, out of Liberty, KS, manufacturer of seed and grain protectants.

Smith also has strong sales and product management expertise. He previously worked as a regional sales manager and as a territory sales representative for Tuthill Corporation in Lakeland, TN, which sold liquid control system for petroleum and chemical industries.

Roman Joins Elgin Dairy as Industrial Sales Manager

Elgin Dairy Foods, Inc., has appointed Thomas Roman as new industrial sales manager to service new clientele as well as maintain existing customer relationships.

Roman comes to Elgin Dairy with over ten years of extensive sales experience in the food industry. As a sales executive for US Food Service and others, he was responsible for providing customer service to multi-million dollar accounts. He graduated with a bachelor's degree in marketing from University of Illinois.

John Delmage Appointed General Manager at Fristam Pumps

John Delmage has been named general manager of Fristam Pumps, Inc., Middleton, WI. He has been with the company for 7 years and previously held the position of vice president of sales & marketing. Along with ten years of additional industry experience, John holds a B.A. degree from Albany State University in Albany, NY.

David Brown Named FoodHandler Inc. National Account Manager

FoodHandler Inc., a provider of food safety protective products and educational programs for the foodservice industry, has named Dave Brown as national account manager.

Dave's responsibilities include increasing market share by achieving sales objectives, and developing and managing national multi-unit business.

Prior to joining FoodHandler, Dave was in national account sales with Multifoods Specialty Distribution.

Kemin Foods Names Martin Mitchell as Market Analyst

Kemin Foods L.C., the international manufacturer and marketer of natural antioxidant ingredients for the food, dietary supplement and personal care industies, announced the appointment of Martin Mitchell as market analyst.

Mitchell is a 1999 graduate of University of Northern Iowa, where he earned a bachelor of arts degree in communication/public relations, with a minor in Portuguese. Prior to joining Kemin Foods, he completed an internship with Itaca Laboratories in Rio de Janero, Brazil, where he assisted the president of the company.

FPM&SA Elects New Officers, Directors at Annual Meeting

At the 115th Annual Meeting of the Food Processing Machinery & Supplies Association (FPM&SA), three new board members were elected to serve three-year terms on the Board of Directors. The current chairman and vice chairman were re-elected.

Jim Ekedahl, vice president of Burrell-Leder Beltech, Inc. (Skokie, IL), graduated from the University of Illinois, Champaign campus in 1968 with a BS in industrial psychology.

Jan Erik Kuhlmann, president of Wolfking Inc. (Columbus, OH), established the company in the United States in the fall of 1983. His first role was general manager and later as president. Kuhlmann is a graduate of the Danish Academy of Foreign Trade (1983). He is also a graduate of the executive program of the University of Michigan (1997).

Allen Stucky, executive vice president of Malo Inc. (Tulsa, OK), has served in various positions with Malo since joining them in 1970. Allen received his bachelor's degree in marketing from Wichita State University in Kansas and did graduate studies in marketing at The University of Tulsa in Oklahoma.

FPM&SA's officers will continue in their positions for one more year: Larry S. Hagopian, president, Commercial Manufacturing (Fresno, CA)—chairman of the board; G. Joseph Olney II, vice president, G.J. Olney, Inc. (Westernville, NY)—vice chairman; and Jerry Houghland, director/general manager, FranRica (a business of FMC FoodTech)—past chairman.

Food Research to Benefit Consumers

Consumers will be the winners from the allocation of an additional $2.2m of CSIRO funds to support collaborative research with the Australian food industry.

The funds are being made available for research into nutrition, food safety and food quality through a new research initiative called the Virtual Centre for Nutrition Enhancement and Food Safety. "The new venture aims to foster cooperative research between CSIRO and the Australian food industry, resulting in safer and healthier foods on the supermarket shelf," according to CSIRO researchers Mr. Roger King and Dr. Martin Cole.

Australian food companies are invited to express interest in the initiative which provides CSIRO funding on a matching dollar for dollar basis. "Along with tax deductibility for research and development, this leveraging makes the program particularly attractive," says Mr. King. The program will also attract industry support because of its strong focus on current and emerging consumer interests, according to Mr. Steve Marshall, chair of the food industry group that advises CSIRO on its research directions.

Among research options being discussed by CSIRO and the food industry is a method to provide accurate information on the resistant starch content of foods and its health benefits. Resistant starch is a food component important in promoting bowel health and accurate measurement would help produce starch-enriched foods with increased health benefits.

"There is also funding to find ways to estimate more accurately what portion of nutrients from the food we eat is available for utilization by the body. This will enable the food industry to address increasing consumer interest in the amounts of nutrients in foods and to maximize the value of minerals such as calcium and iron and vitamins such as folic acid in foods," says Mr. King.

International Association for Food Protection

In addition to nutrition-based studies, the consumer also stands to gain from new food safety research initiatives according to CSIRO food safety and quality spokesman Dr. Cole. "The food industry has already shown interest in working with us to develop options and guidelines for the use of preservatives and mild heat to improve the safety of acid-preserved products such as condiments, dressings and sauces. There are many other exciting possibilities including research for safer chilled products and studies to help better understand and control harmful bacteria called *Listeria monocytogenes* in meat processing," says Dr. Cole.

Projects funded under the scheme will commence progressively during 2001, as proposals from the food industry are considered.

It's a Wrap: A New Way to Eat Those Fruits and Vegetables

An edible film made from strawberry puree can add flavor to a banana and help keep it fresh as well, according to research presented during the 2000 International Chemical Congress of Pacific Basin Societies. The report claims that film wraps made from broccoli, oranges, carrots, strawberries and other fruits and vegetables can be good and tasty oxygen barriers.

The week-long scientific meeting, held once every five years, is hosted by the American Chemical Society, in conjunction with its counterparts in Australia, Canada, Japan and New Zealand.

Tara McHugh, Ph.D., a research food technologist with the US Department of Agriculture (USDA) in Albany, CA, described the technology for the first time, including specific findings, such as how an apple wrap can significantly extend the shelf life of fresh-cut apple slices. "If you look at the film alone, it looks a lot like a sheet of paper – opaque and orange, if it's made from carrots, for example. Strawberry is red and broccoli is green. But in contrast to other edible films, it's very flexible without having to add plasticizers like glycerol," said McHugh. She believes that's due to the naturally occurring sugars in the fruits and vegetables.

The idea is to make preformed sheets of the films into envelope-like wraps. Other produce, baked goods, confectioneries and perhaps even meat would be tucked inside. "These films are meant not to replace synthetic packaging, but maybe to simplify it, and they could help make the wrap recyclable. From a marketing standpoint, it would be a new and fun way to sell fruit and vegetable products while providing the added benefit of improving shelf life and quality. The USDA is currently looking to sign cooperative agreements with industry to develop the technology further," explained McHugh. Meanwhile, a patent has been filed and ideas keep coming in she said. "You could even imagine wrapping a cut of meat in a peach film, for example. It could melt upon cooking and turn into a peach glaze." McHugh's research shows her films tend to be as good as synthetic films at keeping out oxygen – a major culprit in the spoiling of foods. "The polymer chains are very tightly packed," she said.

Puree films work best in low humidity, she noted, because they are soluble in water, including saliva, a necessary feature to eating them easily. McHugh has tested fresh-cut apple slices by dipping them in liquid apple

puree and by wrapping them in a puree sheet. After 12 days, the dipped slices lost nearly as much moisture as those simply left exposed: 48 percent and 50 percent, respectively. In contrast, the wrapped slices lost only 30 percent of their moisture. Since the sheets could be made from off-grade produce, they could become a new outlet for farmers, McHugh added.

Commission Establishes Expert Group to Coordinate TSE Reseach in Europe

On December 15, a first meeting of national TSE (transmissible spongiform encephalopathies) experts and researchers took place in Brussels.

The meeting is being organized by DG Research in consultation with DG Health and Consumer Protection. The expert group will examine current European research in this field and suggest ways of improving its impact, in particular through better coordination of national and Community research activities. The Commission has provided more than $50 million of support for research on TSE since it launched the European Research Action Plan on TSE diseases in 1996.

Its Joint Research Centre conducts scientific work to underpin the Commission's policy measures in the field of BSE. "Recent developments in BSE have shown that research must play a more significant role in ensuring the safety of consumers. Knowing what research is being done throughout Europe will enable us to combine our efforts to tackle the problem," said Philippe Busquin, Commissioner for Research. Commissioner Byrne added that further research is essential to provide answers to the many questions which remain in relation to TSEs.

On November 16, the Council of Research Ministers requested the establishment of a group with national experts whose mission it is to make an inventory of research undertaken in Europe; to encourage the exchange of information between research groups and, to identify research activities to be reinforced and new actions to be launched.

The European Parliament has also called for more research, especially in relation to diagnostic tests for TSEs.

The expert group includes experts from all member states and experts from the Ad-hoc Group on TSE, which is linked to the Commission's Scientific Steering Committee. The expert group will meet again on February 16 and a preliminary report is due to be delivered at the end of February 2001.

Outbreaks of Legionella Infection in Spain, 2000

Seven outbreaks of Legionnaires' disease have been notified to Spain's national Centre for Epidemiology in 2000. In four of them, patients acquired infection in the community and in three the infection was hospital acquired.

The European Working Group for Legionella Infections (EWGLI) has also reported four clusters of legionellosis in tourists who visited Spain in 2000; 15 cases were identified. This report describes three large community acquired outbreaks.

From September 16 to October 8, 2000, 70 cases of legionellosis (43 men and 27 women; aged 20 to 95 years) were reported by the local health authorities of Alcoi, in the Valencia region. Two patients died. Cases were diagnosed on the basis of urinary antigen tests for *Legionella pneumophila* and in three cases *L. pneumophila* serogroup (sg) 1 Pontiac Knoxville was isolated.

Preliminary enquiries revealed an association with visiting and living in a certain area of the city. Exposure to this same area focused the investigation on the possibility of aerosol transmission from contaminated cooling towers. Clinical isolates and water samples from cooling towers from the area were sent to the national reference laboratory. All the cooling towers in the suspected area were disinfected. Intensified surveillance is continuing.

On October 9, five cases of Legionnaires' disease were diagnosed on the basis of urinary antigen tests for *L. pneumophila*, and an increased number of cases of atypical pneumonia was notified to the regional health authorities of Galicia by a hospital in Vigo. The epidemiological investigation resulted in the identification of 28 cases (21 men and 7 women; aged 30 to 79 years), three of whom died. The first case became ill on September 18, 2000, and no cases with dates of onset since October 1 have been notified.

Preliminary enquiries on October 10 showed an association with visiting and living in a certain area of the city. A hospital based matched case control study carried out on October 11 with 17 cases and 37 controls confirmed that living, working, or walking in the area near the hospital was associated with illness (odds ratio 4.29; 95% confidence interval 1.6 to 18.0). One clinical isolate and water samples from cooling towers from the area were sent to the National Reference Laboratory. The clinical isolate was identified as *L. pneumophila* SG 1 Pontiac and all the environmental samples were negative. All the cooling towers in the suspected area were disinfected.

From September 14 to November 16, 2000, 40 cases of legionellosis were reported by the local health authorities of Barcelona, Catalonia. One patient died. Cases were diagnosed on the basis of urinary antigen tests for *L. pneumophila*. Preliminary enquiries showed an association with visiting and living in a neighborhood of the city of Barcelona. Exposure to this area and the absence of any other potential source focused the investigation on the possibility of aerosol transmission from contaminated cooling towers. Samples from suspect cooling towers were taken, and the towers were then disinfected. Intensified surveillance is continuing.

Canadian Cattle Producers Initiate Action Plan for Industry on *E. coli* O157:H7

The Canadian Cattlemen's Association (CCA) has initiated a new action plan for the industry on the issue of *E. coli* O157:H7 as the result of a two-day conference held November 27 and 28 in Calgary.

"This is the first time everyone involved in this issue has sat down at one table and examined this issue from both a food safety and water quality perspective. We've taken a hard look at what has been accomplished, the areas where we need more information, and what can be done to ensure we're doing all that we can," says Dennis Laycraft, CCA executive vice president.

The conference has resulted in a commitment by the cattle industry to take a leadership role in the establishment of an O157:H7 Industry Management Committee to influence future research, management practices and producer and consumer education with the goal of reducing *E. coli* O157:H7 illness. The cattle industry will be involving a broad cross section of industry stakeholders in the O157:H7 Industry Management Committee.

"We have learned that in many areas Canada is a leader in research into *E. coli* O157:H7, including our cattle-industry funded research into a livestock vaccine against this bacteria. However we have also identified areas where more research is needed. We will be focusing our efforts on areas including better understanding the ecology and physiology of this bacteria and its intermittent presence in cattle and manure. We've also learned that at the processing level our federally inspected plants, which produce most of the red meat in Canada, are using all pathogen-reducing interventions currently available. The HACCP (Hazard Analysis Critical Control Points) food production systems used in these plants are the most effective food safety systems available to date," said Laycraft. "Our focus must now be turned to reducing the level of this pathogen in the cattle population itself. We are already funding research projects into areas like vaccines and the effect of livestock drinking water quality; we will encourage research into other promising areas such as probiotics. We will also examine current good production practices developed by the industry to determine their effectiveness in controlling this bacteria. We will endeavour to expand our extension activities to ensure that all cattle producers in Canada are operating in a manner that minimizes this bacteria in the cattle population."

One thing that has been brought home during this conference is that there is no one "magic bullet" that will resolve this issue. As an industry we are committed to continue developing and working with a wide range of interventions.

Hydrodynamic Pressure Process May Make Meat Safer

A process to make ground meat more tender may also make it safer to eat, Agricultural Research Service administrator Floyd Horn announced.

In the process, called the Hydrodynamic Pressure Process (HDP), ARS scientists place meat in a container of water, then detonate a small amount of explosives that create a shock wave in the water. The shock wave tenderizes meat by severing the stringy striations that can make meat tough. "The scientists initially used this process to tenderize meats, but new studies have found that it also reduces foodborne pathogens in meat. A treatment such as HDP would certainly be a boost for food safety in this country and good news for consumers," Horn said.

Escherichia coli and other pathogens can live and grow in ground meat, causing illness if the meat is improperly handled. But concerns about meat being contaminated with dangerous pathogens may be relieved by HDP.

Scientists conducted additional studies with a technologically superior mechanism to refine the process. Surprisingly, the advanced mechanism—a metal, thick-walled tank (called the mini-tank) imbedded in the ground—did not tenderize meat as well. But the scientists found an added benefit. There seemed to be fewer bacteria on the meat than before.

Scientists had already proven that HDP penetrated throughout whole cuts of meat, making them more tender. At that point, they wanted to see if bacteria were reduced throughout ground meats as well.

Studies were conducted to determine the effect of HDP on naturally occurring spoilage or

shelf-life bacteria found in ground beef. The studies showed a "three-log" reduction in shelf-life bacteria. This would be similar to reducing 30,000 colony-forming units (CFUs) to 30 CFUs. A five-log reduction is the "gold standard" for bacterial reduction, so studies are ongoing to further reduce bacterial levels.

Additional studies were performed to determine the effect HDP has on *E. coli* O157:H7 in fresh ground beef, again with encouraging results. Ground beef that had been seeded with *E. coli* O157:H7 had no detectable levels of the dangerous organism after HDP treatment.

"HDP doesn't kill all bacteria, but this may be a good thing. Lactobacilli, which are good bacteria, remain. HDP seems to inactivate most meat pathogens, such as *E. coli*," said ARS meat science researcher Morse Solomon.

Further studies are necessary to determine if HDP can be put to practical use in a commercial setting. "HDP can penetrate through a product, reducing or eliminating pathogens throughout ground meat," said Solomon. "The ability to treat packaged meats may substantially reduce health risks in the future." ARS is the US Department of Agriculture's chief scientific research agency.

FDA Finalizes Safe Handling Labels and Refrigeration for Marketing Shell Eggs

Consumers will soon have more safe handling information and new refrigeration requirements to help prevent foodborne illness from eggs contaminated with *Salmonella enteritidis*.

The US Food and Drug Administration (FDA) issued a final regulation, to improve food safety as it pertains to eggs. The refrigeration requirement will be effective in 6 months, while the safe handling requirement will be effective in 9 months.

"The Clinton administration has consistently demonstrated its commitment to food safety and ensuring that the United States continues to have one of the safest food supplies in the world. Today's efforts should go a long way toward preventing illness that has been attributed to eggs in the past," said Dr. Jane E. Henney, FDA Commissioner.

Today's regulation will require shell egg cartons to bear safe handling instructions because of eggs' association with *Salmonella enteritidis* (SE), a bacterium responsible for foodborne illness. Approximately one out of every 20,000 eggs produced in the United States is estimated to be contaminated with SE. The required statement is as follows:

Safe Handling Instructions: To prevent illness from bacteria: keep eggs refrigerated, cook eggs until yolks are firm, and cook foods containing eggs thoroughly.

SE outbreaks have been attributed to undercooked eggs and foods containing undercooked eggs served in homes, private gatherings and commercial establishments.

"For consumers, eggs can be an important source of nutrition. You just need to cook your eggs thoroughly—no sunny-side up, no over easy. This is a case when it's better to be safe than sorry," says Dr. Henney.

Persons infected with SE may experience diarrhea, fever, abdominal cramps, headache, nausea and vomiting. However, children, the elderly and persons with weakened immune systems may develop severe or even life-threatening illness.

Additionally, the rule requires that eggs be placed promptly under refrigeration at 45 degrees Fahrenheit or lower upon delivery at retail establishments (supermarkets, restaurants, delis, caterers, vending operations, hospitals, nursing homes and schools). Refrigeration at an ambient temperature of 45 degrees Fahrenheit or cooler slows the growth and development of SE.

This rule is one part of the larger Egg Safety Action Plan, a farm-to-table approach for ensuring the safety of our nation's egg supply, which was announced by the President on December 11, 1999. The Plan, a joint effort by the FDA and the Department of Agriculture, seeks to reduce by 50 percent the number of SE illnesses attributed to contaminated eggs by 2005 and eliminate egg-associated SE illnesses by 2010.

The Egg Safety Action Plan will further enhance the strides that have already been made in reducing the incidence of SE. Efforts by federal regulatory agencies, public health prevention initiatives, egg producer quality assurance programs, and consumer education have significantly contributed to the decrease in SE incidence.

FSIS Proposes to Allow Online Reprocessing of Poultry Meeting Stringent Pathogen Limits

The US Department of Agriculture's Food Safety and Inspection Service (FSIS) proposed a change to its regulations that will allow the online reprocessing of pre-chill poultry carcasses if significantly lower pathogen reduction standards for *E. coli* and *Salmonella* are met. Poultry carcasses contaminated with digestive tract contents will be allowed to remain on the main processing line for removal of the digestive tract contents, rather than having to be moved off the main line.

Voluntary adoption of this online reprocessing approach will be coupled with requirements for

the reduction of *Salmonella* and *E. coli* on raw poultry below the present performance standards.

This proposed change reinforces the agency's goal of pathogen reduction. In addition, it should help to reduce the risk of foodborne pathogens from cross-contamination by decreasing the handling of contaminated carcasses to off-line reprocessing.

If this proposal is adopted, pre-chill carcasses with no visible contamination may undergo the same antimicrobial treatment as those carcasses with visible contamination. Plants would be allowed to use food-grade processing agents, such as trisodium phosphate and sodium chlorite, to reduce pathogen levels. The on-line treatment would expose all carcasses to rinsing and to antimicrobial treatment. However, birds whose entire carcasses are affected with contamination or are mutilated would not be permitted to be reprocessed on-line. Each bird would still be required to meet the current agency zero tolerance policy on fecal contamination prior to application of the on-line treatment.

FSIS is not proposing specific pre-chill *Salmonella* and *E. coli* standards because, at this time, various antimicrobial treatments have been demonstrated to have differing effects. FSIS invites comments, especially in the form of data, on specific performance standards that establishments would be required to meet.

FSIS recognizes that there are other treatments for removing visible contamination that may be more cost effective and more appropriate for small plants; therefore, the proposed changes will be voluntary. This gives establishments and the industry the freedom to seek out new products and equipment that will be effective in pathogen reduction.

This proposal was announced in the Dec. 1 Federal Register. Written comments on this proposal were due by Jan. 30, 2001, to the FSIS Docket Clerk, Room 102, Cotton Annex Building, 300 12th Street, SW, Washington, D.C. 20250-3700 and should refer to Docket Number 98-062P. Copies of all comments submitted in response to this proposal will be available for public inspection in the FSIS Docket Room between 8:30 a.m. and 4:30 p.m., Monday through Friday.

Poultry Irradiation to be Approved in Canada

The management team of Fresh N' Safe Ltd., a start-up food irradiation services company, announced that they have received notification from Health Canada that a review of their petition requesting approval of irradiation of poultry has been completed and has received a favorable recommendation.

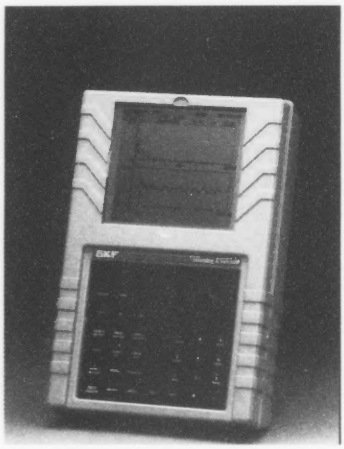
In a fax received the morning after the recent federal election, a representative of Health Canada's Bureau of Chemical Safety advised that amendments to section B.26.005 of the Food and Drug Regulations are expected to be drafted shortly and published in the *Canada Gazette* as a means of public consultation. The amendments, as initially proposed, would allow the irradiation of both fresh and frozen poultry at designated dosages as part of a Hazard Analysis Critical Control Point (HACCP) program.

"This is a hallmark day in the Canadian food industry's efforts to continuously improve the quality and safety of products they deliver to consumers," says Dr. John Lynch author of the petition. "With the addition of irradiation processing to the other safeguards and hurdles already instituted, the poultry industry will have the first raw product processors to be able to offer a true and complete HACCP process. In addition to the added safety of irradiated products, consumers, foodservice outlets, retailers and wholesalers will benefit from the convenience and cost-savings of the extended shelf-life which irradiation processing provides. Irradiation processing may also open up potential new export markets for fresh poultry."

The petition Fresh N' Safe Ltd. presented to Health Canada almost five years ago summarized not only the scientific literature on the safety and efficacy of the process, but the documented need for this process in Canada to reduce the impact of poultry-associated foodborne disease. The principal focus of the petition was reduction of *Salmonella* contamination, but it also cited the benefits from reduction of other pathogens including *Listeria* and *Campylobacter*. Some of the data which elucidated the largely avoidable deaths, illness and lost productivity from these foodborne agents came directly from Health Canada's own scientific publications. Reductions in the staggering health care costs for treatment of foodborne illness will be another welcome benefit for all Canadians, particularly for the more serious and costly illnesses suffered by high-risk consumers such as children, the elderly, pregnant women and individuals with compromised immune systems.

Approval of food irradiation for poultry and poultry products will bring Canada in line with twenty-three other countries, including the USA and Mexico, which have enabling legislation in place allowing irradiation for chicken or poultry. Verbal communications from Health Canada to Lynch indicate that the remaining stages of the regulatory process will be proceeding promptly. This should preclude challenges to existing restrictive Canadian regulations as unfair technical barriers under current trade agreements.

Industry Products



SKF USA, Inc.

Newest Version of SKF® Microlog Facilitates Reduction in Data Collection Time

SKF® proudly announces the newest addition to its Microlog family of data collectors/analyzers. The CMVA 60 Version 3.81 continues SKF's tradition of offering real world instrumentation for the hands-on vibration professional by building on the foundation of the versatile and feature-rich CMVA 60.

The Microlog CMVA 60 has been upgraded to V3.81 with new firmware featuring a timesaving Configuration Wizard®, improved self-test capability, and automatic triaxial data collection via a new Triax Accelerometer. Furthermore, V3.81 incorporates several firmware enhancements to facilitate greater efficiency, accuracy and flexibility in the data collection and analysis process.

Configuration Wizard allows the Microlog user to store up to six user-defined preset application configurations. Therefore, a user can customize configurations for specific applications, assigning unique names to identify and recall them from the Applications menu.

This significant feature benefits both new and experienced Microlog users who repeatedly perform analysis. Users quickly and easily call up a saved Microlog configuration by selecting from a pull down menu. In addition, if the Microlog is shared with more than one user, each user can customize the Microlog to their own individual preferences without having to reconfigure the Microlog each time they pick up the unit. A key benefit for plants with fewer Micrologs than users.

The Triax Accelerometer, used in combination with the SKU Stud Adapter and the MARLIN QuickConnect™ stud, is SKF's system for fast, automatic measurement of triaxial (horizontal, vertical and axial) data and is typically used in route-based applications where large volumes of data are collected.

The studs are permanently located on the machine reducing time spent on positioning the Microlog sensor for each separate measurement. Accuracy is increased because variations in location, angle of measurement and pressure applied are also eliminated.

Beta test sites have reported up to a 30% reduction in route-based data collection time using these new features. With the Microlog V3.81, users can expect to reduce data collection time and improve measurement accuracy, reliability and stability.

SKF USA, Inc., Kulpsville, PA

Reader Service No. 235

BD Diagnostic Systems, New Bactrol™ Plus Quality Control Cultures in Vials will Replace Bactrol Disks

BD Diagnostic Systems announces the immediate availability of BD Bactrol™ Plus Quality Control Cultures in vials, for use in the quality control testing of microbiological media, reagents and identification systems. The Bactrol Plus vials of lyophilized microorganisms offer many advantages over the well-known Bactrol Disks, which they will be replacing. The Bactrol Plus vials present a wider range of quality control organisms than the Bactrol Disks, in a format that's user-friendly. And because the vials are easily reconstituted, there's less chance of contamination compared to the handling requirements of disks.

To use Bactrol Plus Quality Control Cultures, the vial must be reconstituted with 0.25 ml of Trypticase™ Soy Broth, saline

or distilled, or deionized water for aerobic bacteria and fungi. Anaerobic and microaerophilic bacteria should be rehydrated with 0.25 ml of Thioglycollate Broth. The resulting suspension is ready for inoculation onto appropriate plating media.

Cultures contained in the Bactrol Plus vials are derived from nationally recognized culture collections, such as the American Type Culture Collection (ATCC™). Laboratories often use these cultures to evaluate their procedures and practices because the organisms have consistent biochemical profiles or known susceptibility patterns. Many accrediting organizations require the use of quality control organisms as part of a laboratory quality assurance/quality control program.

BD Diagnostic Systems, Sparks, MD

Reader Service No. 236

APV Systems

Invensys APV Systems Launches the Intelligent Integrator

Invensys APV Systems has launched a new intelligent Integratory range of products. They will provide an extremely viable alternative to Programmable Logic Controllers (PLCs), which traditionally have been the de-facto standard in the food and beverage industries. With considerably more functionality than a PLC, the Integrator's scalable architecture has fully integrated Wonderware InControl™ and FactorySuite™ application software.

The Integrator has a very wide range of configurations for applications in the food and beverage industries. It can interface with existing PLCs, it can replace PLCs, it can provide an optimal migration platform to enable existing APV ACCOS customers to take advantage of new technologies and open platforms as well as cost-effectively replace other product ranges.

In the pre-release period APV established a number of reference projects ranging from 250 I/O to in excess of 4500 I/O, demonstration the scalability of the platform.

Now, food, beverage, and healthcare industry manufacturers can benefit from APV's "Process to Boardroom" automation by using the remote monitoring and networking through the Internet/Intranet. This enables access of information from anywhere within the enterprise and elsewhere in the supply chain and helps to keep business structures lean and efficient.

APV Systems, Rosemont, IL

Reader Service No. 237

IONICS' Purebrine System for Food Processing Applications

Ionics, Incorporated, a separations technology company, offers the PureBrine system for food processing applications. Ionics' PureBrine system is a complete USDA-approved membrane filtration process for clarifying brine solutions. It allows for continuous reuse of solutions for hot dog brines, pickling brines, cheese brines and meat solutions, eliminating the costly disposal of contaminated brine solutions. PureBrine removes proteins and fats from brine while virtually eliminating microbial loading and mold count.

For ensuring food safety and quality, the PureBrine system is Hazard Analysis Critical Control Point (HACCP) registered in the meat industry. The system, which is designed for easy operation and clean up, consists of a feed/balance tank, PureBrine membranes and housings, a recirculation pump, associated piping, gauges and monitoring devices, and a stainless steel storage tank. The PureBrine system is inexpensive to operate and suits a variety of meat, dairy and vegetable processing applications.

Ionics, Incorporated, Watertown MA

Reader Service No. 238

Dickson Introduces NIST Traceable Temperature and Humidity Fax Logger™

Dickson is pleased to introduce the FX420™, remote location temperature and humidity fax logger. The Fax Logger, FX420™ is a temperature and humidity data logger that records and sends data to you via fax or E-mail. The FX420™ plugs into any standard phone outlet and can monitor temperature ranges from 0 to 100°F and humidity ranges from 0 to 95% RH. Simply place these units in your building, across town or half way around the world and automatically receive a graphical history of the temperature and humidity.

Dickson's Fax Loggers are ideal for keeping you informed of critical food storage and testing conditions, especially those run during evenings, weekends and holidays. If is also perfect for monitoring remote site refrigerators, freezers, incubators, etc.

Dickson Company, Addison, IL

Reader Service No. 239

Food Pathogens Become Easier to Detect with New Technology from Advanced Technologies

Capturing and identifying the germs that cause thousands of cases of food poisoning in the United States every year may soon become faster and more accurate following testing of new technologies developed by an Idaho company and the US Navy. A collaborative research agreement between Rocky Mountain Resource Labs (RMR Labs) of Jerome, ID, and the Naval Medical Research Center (NMRC), will validate improved methods for detecting four dangerous food pathogens: *Salmonella, Listeria, E. coli,* and *Campylobacter.* The agreement was facilitated by the MSU TechLink center, Bozeman, MT, and the NMRC Office of Technology Transfer.

The project links two exciting new food safety technologies. The first, developed by the Naval Medical Research Center, is SELeCT *(Salmonella, Listeria, E. coli, Campylobacter* Test) that can detect and quantify any of the four pathogens in 24 hours or less. This compares with up to four days using conventional methods that require incubation of bacterial culture. In matters of public health, time is critical. Foodborne pathogens cost the United States more than $1 billion annually in lost wages, productivity and food recalls. According to the Center for Disease Control in Atlanta, the *E. coli* bacteria alone causes an estimated 73,000 cases of food poisoning a year and 60 fatalities. It is especially dangerous to children under 5 years of age and the elderly.

The other technology is a wet-vacuum microbial sampling unit known as the Microbial-Vac™ (M-Vac) developed by Rocky Mountain Resource Labs. This novel sampling device lifts pathogens from cracks and crevices in foods and other surfaces, enhancing the accuracy of microbial sampling. The M-Vac functions like a hand-held wet vacuum: a technician emits a rinse solution onto the contaminated surface, then vacuums the fluid back through a series of filters that collect and concentrate the pathogens. The novel M-Vac system is more effective in collecting bacteria from crevices where pathogens accumulate, and leaves the microbial cells intact, which may be important for subsequent testing, particularly if DNA identification techniques are involved.

Advanced Technology, Bozeman, MT

Reader Service No. 240

The Dow Chemical Co. Describes How Versene Food-grade Chelating Agents can Prevent Flavor Changes, Odor Changes, and Discoloration in Beverages and Food

A new set of technical briefs from The Dow Chemical Company describe how Versene™ food-grade EDTA chelating agents can be used in different food and beverage applications. Versene food-grade chelating agents inactivate free metal ions, preventing discoloration, flavor changes, and odor changes in beverages and food.

The briefs explain why metal ions are a problem in each application and how Versene food-grade EDTA can help. Each sheet lists the Versene food-grade EDTA products available for that application and describes the agents' typical properties. A discussion of current FDA regulations is also given for each application. Where applicable, specifically allowed uses and permitted concentrations axe listed for each application. Technical briefs are available for beverages, dressings and sauces, pickled products, canned beans and potatoes, and canned seafood.

Trace metals occur naturally in plant and animal tissues, are commonly found in process water, and can also be introduced by processing equipment. Versene food-grade EDTA chelating agents inhibit unwanted metal catalyzed reactions by forming complexes with metal ions.

Two Versene food-grade EDTA products are available from Dow, Versene CA and Versene NA. Versene CA food-grade EDTA is highly purified calcium disodium EDTA, and Versene NA food-grade EDTA is highly purified disodium EDTA. Versene CA food-grade EDTA is particularly effective in soft drinks and other beverage applications, preserving color, flavor, vitamins, and other ingredients.

The Dow Chemical Co., Midland, MI

Reader Service No. 241

Dairy, Food and Environmental Sanitation, Vol. 21, No. 2, Pages 152-173

Holders of 3-A Symbol Council Authorization as of February 1, 2001

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, 1500 Second Avenue, SE, Suite 209, Cedar Rapids, IA 52403; Phone 319.286.9221; Fax 319.286.9290; E-mail: vmills@mcleod.net

01-07 Storage Tanks for Milk and Milk Products

2 APV Americas-Lake Mills
100 South CP Avenue
Lake Mills, WI 53551-1799

117 DCI Inc
PO Box 1227
600 North 54th Ave
St. Cloud, MN 56302

127 Paul Mueller Co
PO Box 828
1600 West Phelps
Springfield, MO 65801

440 Scherping Systems
801 Kingsley St
Winsted, MN 55395

02-09 Centrifugal and Positive Rotary Pumps for Milk and Milk Products

975 Alfa Laval Flow
Birch Road
Eastbourne, East Sussex BN 23 6PQ
UK

65 Alfa Laval Flow Inc., G&H
PO Box 581909
Pleasant Prairie, WI 53158-0909

1105 Alfa Laval Pumps Ltd.
Birch Road
Eastbourne, East Sussex BN23 6PQ
United Kingdom

793 Ampco Pumps Inc
4424 W. Mitchell Street
Milwaukee, WI 53214

63 APV Americas- Lake Mills
100 South CP Avenue
Lake Mills, WI 53551-1799

946 APV Americas-Lake Mills
100 South CP Avenue
Lake Mills, WI 53551-1799

999 BLACKMER/MOUVEX
1809 Century Avenue S.W.
Grand Rapids, MI 49509

923 Bombas Bornemann S.R.S.
Munro, Argentina
(US Rep.: Bornemann Pumps Inc.
P.O. Box 1769
Matthews, NC 28105)

205 Bou-Matic
PO Box 8050
1919 S Stoughton Rd
Madison, WI 53716-8050

709 Conexiones Inox. (CIPSA)
Vicente Guerrero 211
Xicotepec de Juarez Edo
Puebla, Mexico

1095 Continental Pump Company
11811 Westline Industrial Dr.
St. Louis, MO 63146-3369

739 CSF Inox SpA
Strada per Bibbiano, 7
42027 Montecchia Emilia (RE),
Italy

671 FLOWTECH DIV
Teknoflow, Inc.
1701 Spinks Drive
Marietta, GA 30067-8925

466 Fluid Metering Inc
5 Aerial Way, Suite 500
Syosset, NY 11791

828 Flux Pumps Corporation
4330 Commerce Circle
Atlanta, GA 30336

306 Fristam Pumps
PO Box 620065
2410 Parview Rd
Middleton, WI 53562

1083 HOVAP TYCO Valves & Controls
Prof. Zernikestraat 8
8606 JV
SNEEK,
The Netherlands
(US Rep.: TYCO Valves & Controls
1467 Elmwood Avenue
Cranston, RI 02910)

1091 HYPRO Corporation
375 Fifth Avenue NW
New Brighton, MN 55112-3288

502 Inoxpa, S.A.
Carrer dels Telers
Banyoles, 54-17820
Spain
(US Rep.: Jensen Fittings Corp.
North Tonawanda, NY)

145 ITT Jabsco
1485 Dale Way
Costa Mesa, CA 92628-2158

314 Ivarson, Inc.
3100 W. Green Tree Rd
Milwaukee, WI 53209

997 Joh. Heinr.Bornemann GmbH
Industriestr 2
Obernkirchen, D-31683
Germany

996 Johnson Pump (UK) Ltd.
Highland Industrial Estate
Edison Road
Eastbourne,, East Sussex BN236PT
UK
(US Rep.: Viking Pump, Inc.
406 State Street
P.O. Box 8
Cedar Falls, IA 50613)

1089 Johnson Pump N.V.
Steylstraat 75
1020 Brussels,
Belgium

841 Johnson Pumps (UK)
Highfield Ind Est
Edison Road
Eastbourne, East Sussex BN236PT
UK
(US Rep.: Viking Pump, Inc.
406 State Street
P.O. Box 8
Cedar Falls, IA 50613)

604 Johnson Pumps (UK) Ltd.
Highfield Ind. Estate
Edison Rd.,
Eastbourne, E. Sussex BN23 6PT
UK
(US Rep.: Viking Pump, Inc.
406 State Street
P.O. Box 8
Cedar Falls, IA 50613)

603 Johnson Pumps (UK) Ltd.
Highfield Ind Est
Edison Rd.
Eastbourne, E. Sussex BN236PT
UK
(US Rep.: Viking Pump, Inc.
406 State Street
P.O. Box 8
Cedar Falls, IA 50613)

325 Johnson Pumps (UK) Ltd.
Highfield Ind Estates
Edison Rd.,
Eastbourne, E. Sussex BN23 6PT
UK

72 L.C. Thomsen Inc
1303 - 43rd Street
Kenosha, WI 53140

899 Lederle GmbH, Pumpen-und
Maschinenfabrik
Gewerbestrasse 53
D-79194 Gundelfingen,
Germany
(US Rep.: Alto Systems, Inc.
P.O. Box 60667
Houston TX)

654 Mono Pumps/Dresser Div
PO Box 14
Martin St, Audenshaw
Manchester, M34 5DQ
UK

148 Monyo Incorporated
Div of Robbins & Myers
1895 West Jefferson Street
Springfield, OH 45501

400 Netzsch Inc
119 Pickering Way
Exton, PA 19341

1090 Niagara Pump Corporation
255 Great Arrow Avenue
Buffalo, NY 14207

810 O.M.A.C. S.R.L Pompe
Via G. Falcone 8
1-42048 Rubiera (RE),
Italy

827 PACKO INOX NV
Diksmuide Branch
Cardijnlaan 10
B8600 Diksmuide,
Belgium

701 Pierre Guerin SA
179 Grand Rue
BP.12
Mauze, 79210
France

934 Pladot Ein Harod Meuhad
Kibbutz Ein Harod
Meuhad -18965,
Israel
P.O. Box 4595
Gettysburg, PA 17235-4595)

1004 Q-Pumps s.a.de c.v.
Acceso A # 108
Fracc. Ind.. Jurica
76130 Queretaro,
Mexico

595 seepex, Inc.
511 Speedway Drive
Enon, OH 45323

568 Shanley Pump & Equipment
2525 So. Clearbrook Drive
Arlington Heights, IL 60005

678 Shanley Pump & Equipment
2525 So. Clearbrook Dr.
Arlington Heights, IL 60005

911 Sigma Equipment Corporation
39 Westmoreland Avenue
White Plains, NY 10606

507 Sine Pumps
Sundyne Corporation
14845 West 64th Avenue
Arvada, CO 80007

567 Stainless Products
PO Box 169
1649 - 72nd Ave
Somers, WI 53171

820 Syltone Industries LLC
2501 Constant Comment Pl
Louisville, KY 40299

26 Tri-Clover Inc
P.O. Box 1413
Kenosha, WI 53141-1413

1011 Tuchenhagen North America, Inc.
9160 Red Branch Road
Columbia, MD 21045

52 Viking Pump Inc
PO Box 8
406 State Street
Cedar Falls, IA 50613-0008

29 Waukesha Cherry-Burrell
611 Sugar Creek Road
Delavan, WI 53115

241 WCB de Mexico, S.A. de C.V.
Alfredo B. Nobel #39
Fracc. Ind. Puente de Vigas
Tlalnepantla., Edo de Mexico C.P. 54070
Mexico

212 Westfalia Surge Technologies, Inc.
20903 West Gale Avenue
Galesville, WI 54630-0659

04-04 Homogenizers and Reciprocating Pumps

390 American Lewa Inc
132 Hopping Brk Rd
Holliston, MA 01746

75 APV Homogenizer Group
100 So. CP Avenue
Lake Mills, WI 53551-1799

247 Bran & Luebbe
1025 Busch Pkwy
Buffalo Grove, IL 60089

657 Microfluidics International Corp.
PO Box 9101
30 Ossipee Road
Newton, MA 02164-9101

558 Niro Soavi S.p.A.
Via M
Da Erba Edoari 29/A
43100 Parma,
Italy

1045 Sonic Corporation
1 Research Drive
Stratford, CT 06615

847 Stork Food & Dairy Systems, Inc.
P.O. Box 1258
1024 Airport Pkwy.
Gainesville, GA 30503

770 Tetra Pak, Inc.
101 Corporate Woods Pkwy.
Vernon Hills, IL 60061

87 Waukesha Cherry-Burrell
611 Sugar Creek Rd
Delavan, WI 53115

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

756 Beall Trailers of CA
1301 South Avenue
Turlock, CA 95380-5108

379 Brenner Tank Mauston Inc
N3760 Hwy 12 & 16
Mauston, WI 53948

70 Brenner Transp.
PO Box 670
450 Arlington Ave
Fond du Lac, WI 54936-0670

40 Hills Stainless Steel
PO Box 987
505 W Koehn St
Luverne, MN 56156-0987

943 LBT Stainless, Inc.
Route 5, Box 480
Manning, SC 29102

513 Nova Fabricating
PO Box 231
404 County Rd 50
Avon, MN 56310

85 Polar Tank Trailer
12810 County Rd 17
Holdingford, MN 56340-9773

653 TREMCAR
1 Tougas Street
Iberville, Quebec J2X 2P7
Canada
(US Rep.: TREMCAR USA
1150 Rt. 11
Champlain, NY 12919)

25 Walker Stainless Equip
PO Box 202
625 State St
New Lisbon, WI 53950-0202

437 West Mark
PO Box 100
2704 Railroad Ave
Ceres, CA 95307

1096 Worldwide Stainless Inc.
8880 Depot Road
Lynden, WA 98264

10-04 Milk and Milk Products Filters Using Single Service Filter Media

593 Filtration Systems
10304 NW 50th St
Sunrise, FL 33351

296 L.C. Thomsen Inc
1303-43rd Street
Kenosha, WI 53140

1026 Pall Europe Ltd.
Walton Road
Portsmouth, Hampshire PO6 1TD
UK

435 Sermia Intl
100-742 Boulevard Industriel
Blainville, Quebec J7C 3V4
Canada

35 Tri-Clover Inc.
P.O. Box 1413
Kenosha, WI 53141-1413

1024 ultrafilter, inc.
3560 Engineering Drive
Norcross, GA 30092

1046 Zander, Inc.
1785 Corporate Dr., Ste. 650
Norcross, GA 30093

11-05 Plate-Type Heat Exchangers for Milk and Milk Products

880 AGC Engineering
8969 SE 58th Avenue
Portland, OR 97206

650 API Schmidt-Bretten, Inc.
2777 Walden Avenue
Buffalo, NY 14225

20 APV Americas
P.O. Box 1718
1200 W. Ash Street
Goldsboro, NC 27533-1718

365 APV Heat Exchangers A/S
PO Box 823
8 Platinvej
DK-6000 Kolding,
Denmark

14 Chester Jensen Co.,
PO Box 908
5th & Tilghman Streets
Chester, PA 19016

120 DeLaval Inc.
11100 N Congress Ave
Kansas City, MO 64153-1296

670 Flomax International LTD
c/o Massport Inc
6140 McCormick Dr
Lincoln, NE 68507-3296

468 GEA Ecoflex North America, Inc.
7150 Distribution Drive
Louisville, KY 40258-2528

1071 I.E.C. Engineering Ltd.
111 Madison Avenue
Cresskill, NJ 07626

622 ITT Standard
175 Standard Pkwy
Cheektowaga, NY 14227

414 Paul Mueller Co
PO Box 828
1600 W. Phelps St
Springfield, MO 65801-0828

912 Pladot Ein Harod
Kibbutz Ein Harod
Meuhad, 18965
Israel

1093 Schmidt Thermal Processing Ltd.
57 Stanley Avenue
P.O. Box 31-247 Milford
Auckland,
New Zealand

17 Tetra Pak Processing
101 Corporate Woods Pkwy.
Vernon Hills, IL 60061

791 The Coburn Company Inc
Box 147
Whitewater, WI 53190

658 Thermaline Inc
180 - 37th Street NW
Auburn, WA 98001

885 TRANTER PHE, INC.
1900 Old Burk Hwy
Wichita Falls, TX 76306

610 Universal Dairy Equip, Inc
11100 N. Congress Ave
Kansas City, MO 64153-1296

30 Waukesha Cherry-Burrell
Process Equip Div
PO Box 35600
Louisville, KY 40232-5600

718 Westfalia-Surge Technologies, Inc.
20903 West Gale Ave.
Galesville, WI 54630

1005 Westfalia-Surge Technologies, Inc.
20903 W. Gale Avenue
Galesville, WI 54630

12-05 Tubular Heat Exchangers for Milk and Milk Products

1085 Advanced Process Solutions
221 Mt. Zion Road
Henryville, IN 47126

248 Allegheny Bradford
PO Box 200
Route 219 South
Bradford, PA 16701

886 API-Ketema Heat Transfer Tech.
2300 W. Marshall Drive
Grand Prairie, TX 75051

438 APV Americas Engineered Systems
395 Fillmore Ave
Tonawanda, NY 14150

1055 APV Nordic Engineered Systems
Pasteursvej
8600 Silkeborg, DK-8600
Denmark

96 C.E. Rogers Co
P.O. Box 118
1895 Frontage Road
Mora, MN 55051

103 Chester-Jensen
PO Box 908
Chester, PA 19016

712 Enerquip Inc
PO Box 467
611 North Road
Medford, WI 54451

298 Feldmeier Equipment
PO Box 474
Syracuse, NY 13211

889 FMC-FranRica Systems
PO Box 30127
Stockton, CA 95213-0127

217 Girton Mfg Co
PO Box 900
Main Street
Millville, PA 17846

971 Hydro-Thermal Corp.
400 Pilot Court
Waukesha, WI 53188

238 Paul Mueller Co
PO Box 828
1600 West Phelps
Springfield, MO 65801

1058 Peterson Custom Stainless,Inc.
1100 Industrial Drive
Watertown, WI 53094

532 Scherping Systems
PO Box 10
801 Kingsley St
Winsted, MN 55395

392 Stork Food & Dairy Systems, Inc.
P.O. Box 1258
1024 Airport Pkwy.
Gainesville, GA 30503

614 Tetra Pak Processing
101 Corporate Woods Pkwy.
Vernon Hills, IL 60061

951 Thermaline, Inc.
180 37th Street N.W.
Auburn, WA 98001

605 Waukesha Cherry-Burrell
PO Box 35600
Louisville, KY 40232-5600

632 Yula Corp
330 Bryant Ave
Bronx, NY 10474

13-09 Farm Milk Cooling and Holding Tanks

802 BIDESA
Adolfo Aymes 153
Ciudad Ind. De Torreon, Coahuila
Mexico
(U.S. Rep.: BIDESA, 601 High Plain Dr.
Bel Air, CA 21024)

4 Dairy Equip Co
PO Box 8050
1919 S Stoughton Rd
Madison, WI 53708-8050

49 DeLaval Inc.
11100 N Congress Ave
Kansas City, MO 64153-1296

12 Paul Mueller Co
PO Box 828
1600 W. Phelps St
Springfield, MO 65801

611 Universal Dairy Eqpt, Inc.
11100 N. Congress Ave
Kansas City, MO 64153-1296

240 Westfalia Surge, LLC
Dairy Equipment Division
20903 W. Gale Avenue
Galesville, WI 54630-0659

16-05 Milk and Milk Products Evaporators and Vacuum Pans

277 Alfa Laval Thermal Inc.
111 Parker Street
Newburyport, MA 01950

132 APV Americas
395 Fillmore Avenue
Tonawanda, NY 14150-0366

107 C.E. Rogers Co
PO Box 118
1895 Frontage Road
Mora, MN 55051

500 Dedert Corp
20000 Governors Dr
Olympia Fields, IL 60461

186 Marriott Walker Corp
925 E. Maple Rd
Birmingham, MI 48009

273 Niro, Inc. Evaporator Division
9165 Rumsey Road
Columbia, MD 21045

299 Stork Food & Dairy Systems, Inc.
P.O. Box 1258
1024 Airport Pkwy.
Gainesville, GA 30503

17-09 Formers, Fillers, and Sealers of Single-Service Containers for Fluid Milk and Fluid Milk Products

1031 ACMA USA, Inc.
501 Southlake Blvd.
Richmond, VA 23236

137 Elopak Inc
30000 South Hill Rd
New Hudson, MI 48165

192 Evergreen Pkg Equip
PO Box 3000
2400-6th St SW
Cedar Rapids, IA 52406-3004

694 F.D.O. Inc.
80 Inverlochy Blvd., Ste. 202
Thornhill, Ontario L3T 4P3
Canada

1009 Federal Manufacturing Co.
201 West Walker St.
Milwaukee, WI 53204-0215

1064 FMC Europe N.V.
Breedstraat 3
2700 Sint-Niklaas,
Belgium
(US Rep.: FMC Foodtech
2300 Ind. Ave.
Madera,CA)

1029 Formseal
1 rue de l'Epee Royale
14700 Falaise,
France

1052 Glopak, Inc.
4755 Blvd. Des Grandes Prairies
St. Leonard, Quebec H1R 1A6
Canada

619 Hassia, USA, Inc.
1210 Campus Drive West
Morganville, NJ 07751

1073 I.E.C. Engineering Ltd.
111 Madison Avenue
Cresskill, NJ 07626

735 Kvalitetsproduktion AB
PO Box 900
S-693 29 Degerfors,
Sweden
(US Rep.: Flowtech, Inc.
1900 Lake Park Drive
Suite 345
Smyrna, GA 30080)

330 Milliken Pkg Co
PO Box 736
White Stone, SC 29386

442 Milliken Pkg Co
PO Box 736
White Stone, SC 29386

941 Oden Corporation
255 Great Arrow Avenue
Buffalo, NY 14207-3024

989 PACK LINE, Ltd
4, Hapatish Street
Industrial Zone Holon, 58815
Israel

488 Packaging Technologies
807 W. Kimberly Road
Davenport, IA 52806

1015 ProTherm Engineering Co.
3475 W. Shaw Ave., Suite 106
Fresno, CA 93711

281 Purity Packaging
PO Box 727
Glen Falls, NY 12801-0727

967 RAPAK
2801 Faber Street
Union City, CA 94587

1001 Remy Equipment
Avenue de la patrouille de France
Octeville-sur-Mer BP 627
76059 Le Havre Cedex,
France
(US Rep.: SIDEL Inc., 5600 Sun Ct.
Norcross, GA 30092)

924 Robert Bosch Corporation
P.O. Box 1127
Waiblingen, D-71301
Germany
(US Rep.: Robert Bosch Corporation
9890 Red Aroow Highway
Bridgman, MI 49106)

482 SERAC,Inc.
300 Westgate Dr
Carol Stream, IL 60188

681 Shikoku Kakoki Co Ltd
10-1 Nishinokawa
Tarohachisu, Kitajima, Itano-Gun,
Tokushima 771-02
Japan
(US Rep.: Elopak, Inc.
3000 South Hill Road
New Hudson, MI 48165)

382 SIG COMBIBLOC, Inc.
4800 Roberts Rd
Columbus, OH 43228-9699

351 Tetra Pak, Inc.
3300 Airport Road
Denton, TX 76207

220 Tetra Rex Inc
451 E Industrial Blvd
Minneapolis, MN 55413-2930

1020 Tetra Rex Inc.
909 Asbury Drive
Buffalo Grove, IL 60089-4525

18-03 Multiple-Use Rubber and Rubber-Like Materials Used as Product Contact Surfaces in Dairy Equipment

1056 Newman Sanitary Gasket Co.
P.O. Box 222
Lebanon, OH 45036

1103 Rubber Fab Mold & Gasket, Inc.
Box 626
Limecrest Road
Andover, NJ 07821

1099 SIMOLEX Rubber Corporation
38281 Abruzzi Drive
Westland, MI 48185

1041 Superior Seals Ltd.
Woolsbridge Ind. Park
Three-Legged Cross,
Wimborne, Dorset BH21 6SR
UK

1063 Titan Industries
P.O. Box 1007
11121 Garfield Avenue
South Gate, CA 90280

19-05 Batch and Continuous Freezers for Ice Cream, Ices, and Similarly Frozen Dairy Foods

903 Coldelite Corporation of America
3760 Industrial Drive
Winston-Salem, NC 27105

355 Emery Thompson Machine
& Supply Company
1349 Inwood Avenue
Bronx, NY 10452

1076 MITO 27 s.r.l.
Via della Solidarieta, 2/1
40056 Crespellano (Bologna),
Italy

286 Tetra Pak Hoyer Inc.
753 Geneva Parkway
P.O. Box 0280
Lake Geneva, WI 53147

146 Waukesha Cherry-Burrell
P.O. Box 35600
100 So. CP Avenue
Louisville, KY 40232-5600

20-20 Multiple-Use Plastic Materials Used as Product Contact Surfaces for Dairy Equipment

1104 Rubber Fab Mold & Gasket, Inc.
Box 626
Limecrest Road
Andover, NJ 07821

1053 Victrex USA Inc.
3 Caledon Court
Suite A
Greenville, SC 29615

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

154 APV Americas-Lake Mills
100 South CP Avenue
Lake Mills, WI 53551

160 DCI Inc
PO Box 1227
600 N 54th Ave
St. Cloud, MN 56302

312 Feldmeier Equipment
PO Box 474
6800 Town Line Road
Syracuse, NY 13211

439 JV Northwest Inc
390 S. Redwood Street
Canby, OR 97013

155 Paul Mueller Co
PO Box 828
1600 W Phelps St
Springfield, MO 65801-0828

503 Ripley Stainless (1997) Ltd.
RR # 3 Site 41, Comp. 10
Summerland, British Columbia V0H 1Z0
Canada

479 Scherping Systems
PO Box 10
801 Kingsley Street
Winsted, MN 55395

675 Stainless Fabrication
PO Box 1127
4455 W Kearney
Springfield, MO 65801-1127

165 Walker Stainless Equip
625 State Street
New Lisbon, WI 53950

23-03 Equipment for Packaging Viscous Dairy Products

902 A.T.S. Engineering, Inc.
7270 Torbram Road, Unit #23
Mississauga, ONTARIO L4T 3Y7
Canada

366 AutoProd, Inc
5355-115th Ave N
Clearwater, FL 34620

965 BENHIL-GASTI Verpack GmbH
Jagenbergstrasse 1
D-41468 Neuss, GERMANY
(US Rep.: Autoprod, Inc.
5355 115th Avenue
Clearwater, FL 33760)

679 Consolidated Biscuit Co
312 Rader Road
McComb, OH 45858

868 Cryovac North America
P.O. Box 464
Duncan, SC 29334-0464

891 ELF MACHINERY, LLC-World Cup
1535 S. Highway 39
LaPorte, IN 46350

1030 Formseal
1 rue de l'Epee Royale
14700 Falaise,
France

447 GEI International, Inc.
700 Pennsylvania Drive
Exton, PA 19341-0439

674 Hayssen Mfg
225 Spartangreen Blvd
Duncan, SC 29334

1074 I.E.C. Engineering Ltd.
111 Madison Avenue
Cresskill, NJ 07626

635 Interbake Foods
2245 Tomlynn Street
Richmond, VA 23294

760 Jordan Manufacturing
1688 County Road 192
Crossville, AL 35962

870 Machinery Engineering & Technology, LLC
P.O. Box 2656
2626 E. Delavan Drive
Janesville, WI 53546

537 Osgood Industries
601 Burbank Rd
Oldsmar, FL 34677

990 PACK LINE, Ltd
4, Hapatish Street
Industrial Zone Holon, 58815
Israel

666 Rapidpak Inc
PO Box 9015
Appleton, WI 54911-9015

740 Raque Food Systems
PO Box 99594
11002 Decimal Dr
Louisville, KY 40269

1066 Research & Development Pkgng. Corp.
KEY-PAK Machines
1221 Highway 22
Lebanon, NJ 08833

222 Sweetheart Cup Company
10100 Reisterstown Road
Owings Mills, MD 21117

343 Tetra Pak Hoyer, Inc.
PO Box280
753 Geneva Parkway
Lake Geneva, WI 53147

174 Waukesha Cherry-Burrell Ice Cream
267 Livingston Street
Northvale, NJ 07647

1081 Zitropack, Ltd.
720 County Line Road
Bensenville, IL 60106

853 Elmar Industries Inc.
PO Box 245
200 Gould Avenue
Buffalo, NY 14043-0245

942 Oden Corporation
255 Great Arrow Avenue
Buffalo, NY 14207-3024

24-02 Non-Coil Type Batch Pasteurizers for Milk and Milk Products

158 APV Americas-Lake Mills
100 South CP Ave
Lake Mills, WI 53551-1799

402 Coldelite Corporation of America
3760 Industrial Drive
Winston-Salem, NC 27105

187 DCI Inc
PO Box 1227
St. Cloud, MN 56302-1227

1072 I.E.C. Engineering Ltd.
111 Madison Avenue
Cresskill, NJ 07626

166 Paul Mueller Co
PO Box 828
1600 W Phelps St
Springfield, MO 65801

1025 Pladot Ein Harod
Kibbutz Ein Harod
Meuhad, 18965
Israel

878 Walker Stainless Equip
P.O. Box 202
625 State St.
New Lisbon, WI 53950-0202

25-02 Non-Coil Type Batch Processors for Milk and Milk Products

687 A&B Process Systems
PO Box 86
201 S. Wisconsin Avenue
Stratford, WI 54484

159 APV Americas-Lake Mills
100 South CP Ave
Lake Mills, WI 53551-1799

188 DCI Inc
PO Box 1227
St. Cloud, MN 56302-1227

725 Inox-Tech Inc
6705 Route 132
Ville Ste. Catherine, QUEBEC J0L 1E0
Canada

710 Lee Industries, Inc.
PO Box 687
514 W Pine St
Phillipsburg, PA 16866

167 Paul Mueller Co
PO Box 828
1600 W Phelps St
Springfield, MO 65801

448 Scherping Systems
801 Kingsley St
Winsted, MN 55395

520 Stainless Fabrication
PO Box 1127
4455 W Kearney
Springfield, MO 65801-1127

1097 Terlet N.V.

837 Viatec, Incorporated
1220 West State Street
Hastings, MI 49058

202 Walker Stainless
PO Box 202
625 State St
New Lisbon, WI 53950-0202

26-03 Sifters for Dry Milk and Dry Milk Products

752 Andritz Inc.
35 Sherman St.
Muncy, PA 17756

363 Kason Corp
67-71 East Willow Street
Millburn, NJ 07041

430 Midwestern Industries, Inc.
PO Box 810
Massillon, OH 44648-0810

185 Rotex Inc
1230 Knowlton St
Cincinnati, OH 45223-1845

656 Separator Engineering Ltd.
810 Ellingham St
Pointe Claire PQ, Quebec H9R 3S4
Canada

172 SWECO
Div of Emerson Elec Co
7120 New Buffington Rd
Florence, KY 41042

27-04 Equipment for Packaging Dry Milk and Dry Milk Products

353 All-Fill Inc
PO Box 652-C
418 Creamery Way
Exton, PA 19341

1039 BOSSAR USA,Inc.
1145 Commerce Blvd. N.
Sarasota, FL 34243

831 Custom Equipment Design
PO Box 4807
1057 Highway 80 East
Monroe, LA 71203

409 GEI International, Inc.
700 Pennsylvania Avenue
Exton, PA 19341-0439

922 Heat & Control, Inc.
21121 Cabot Blvd
Hayward, CA 94545-1132

1092 Heat and Control, Inc.
21121 Cabot Boulevard
Hayward, CA 94545-1132

625 Ishida Co Ltd
44-Sanno-Cho, Shogoin
Sakyo-Ku
606 Kyoto
Japan

1068 MATCON USA, INC.
233 North Delsea Drive
Sewell, NJ 08080

1062 Multipond America, Inc.
2666 N. Packerland Dr.
Green Bay, WI 54303-4856

905 Pacmac, Inc.
PO Box 360
1611 Armstrong Ave.
Fayetteville, AR 72702-0360

998 SIG Pack EAGLE Corp
2107 Livingston St.
Oakland, CA 94606

497 Triangle Pkg Machinery
6655 W Diversey Ave
Chicago, IL 60707

618 Yamato Scale Co.,Ltd.
5-22 Saemba-cho,
Akashi
Hyogo 673-8688, 29334
Japan

28-03 Flow Meters for Milk and Milk Products

884 ABB Automation Products GmbH
Dransfel Strasse
Gottingen 37079,
Germany
(US Rep.: ABB Automation Inc.
Instrumentation Division
125 East County Line Road
Warminster, PA 18974)

270 ABB Instrumentation Inc
125 East County Line Road
Warminster, PA 18974

272 Accurate Metering Systems
1651 Wilkening Rd
Schaumburg, IL 60173

1075 Advanced Flow Technology co.
P.O. Box 906
2700 Interstate Drive
Lakeland, FL 33802

661 Alfa Laval Flow Inc.
G&H Division
PO Box 581909
Pleasant Prairie, WI 53158-0909

253 Badger Meter Inc
P.O. Box 245036
4545 W. Brown Deer Rd
Milwaukee, WI 53224-9356

938 Badger Meter Inc.
6116 East 15th Street
Tulsa, OK 74112

956 Blancett Fluid Flow Meters
100 E. Felix Street So., Suite 190
Fort Worth, TX 76115-3548

660 Danfoss A/S
DK - 6430
Nordborg,
Denmark

950 DELTA M Corp.
1003 Larsen Drive
Oak Ridge, TN 37830

692 Endress & Hauser Flowtec AG
Kagenstrasse 7
Ch-4153 Reinach BL1,
Switzerland

265 Flow Automation
9303 Sam Houston Pkwy S.
Houston, TX 77099-5298

506 Flow Technology, Inc.
4250 E Broadway Rd
Phoenix, AZ 85040

535 FMC Invalco
2825 West Washington St.
Box 1377
Stephenville, TX 76401

717 Gemu Valves Inc
Suite 110, Bldg. 2600
3800 Camp Creek Pkwy
Atlanta, Ga 30331

649 GEO Technology Corp
2015 East 3rd Street
Tulsa, OK 74104

512 Hoffer Flow Controls
107 Kitty Hawk Lane
Elizabeth City, NC 27909

744 Honeywell IAC
Industrl Contrls Div
1100 Virginia Dr
Ft. Washington, PA 19034

733 Honeywell Inc
1100 Virginia Drive
Fort Washington, PA 19034-3260

1035 ISOIL INDUSTRIA S.p.A.
Via F.lli Gracchi 27
20092 CINISELLO BALSAMO
MILANO,
Italy

840 KOBOLD Instruments
1801 Parkway View Dr
Pittsburgh, PA 15205

529 Krohne, Inc.
7 Dearborn Road
Peabody, MA 01960

972 Liquid Controls, LLC
105 Albrecht Drive
Lake Bluff, IL 60044-2242

1034 Liquid Controls, LLC
105 Albrecht Drive
Lake Bluff, IL 60044-2242

778 Magnetrol International, Inc.
5300 Belmont Rd
Downers Grove, IL 60515

979 Metron Technology
2005 10th Street
Boulder, CO 80302

378 Micro Motion
7070 Winchester Circle
Boulder, CO 80301

729 ONIX Measurement
London Rd, Kings Worthy
Winchester, Hampshire S023 7QA
UK

1019 Pacific Flow Controls-ASA Magmeters
3000 Danville Blvd. #177
Alamo, CA 94507

1065 PMC-Global Industries, Inc.
P.O. Box 4781
2500 Steven Road
Odessa, TX 79760

490 Rosemount Inc
Mail Stop PK04
8200 Market Boulevard
Chanhassen, MN 55317-1126

359 Rosemount, Inc.
8200 Market Blvd.
Chanhassen, MN 55317

587 Schlumberger Industries
1310 Emerald Rd
Greenwood, SC 29646

585 Solartron, Inc.
19408 Park Row, Suite 320
Houston, TX 77084
(US Rep.: Solartron
19408 Park Row, Suite 320
Houston, TX 77084)

550 Sparling Instruments
4097 N Temple City Blvd
El Monte, CA 91731

1077 Sponsler Co., Inc.
2363 Sandifer Boulevard
Westminster, SC 29693

224 The Foxboro Co
NO1-3B
33 Commercial St
Foxboro, MA 02035-2099

715 Thermal Instrument Co
217 Sterner Mill Rd
Trevose, PA 19053

1021 Toshiba Int. Corp.
1, Toshiba-cho
Fuchu-shi
Tokyo, 183
Japan
(US Rep.: Toshiba Int. Corporation
13131 West Little York Rd.
Houston, TX 77041)

1107 Toshiba International Corporation
13131 West Little York Road
Houston, TX 77041

803 TURCK Inc
5000 Fernbrook Lane
North Plymouth, MN 55446

574 Venture Measurement LLC
150 Venture Blvd
Spartanburg, SC 29306

764 Yokogawa Corporation of America
2 Dart Road
Newnan, GA 30265-1040

29-01 Air Eliminators for Milk and Milk By Products

340 Accurate Metering
1651 Wilkening Rd.
Schaumburg, IL 60173

662 Alfa Laval Flow Inc.
G&H Division
PO Box 581909
Pleasant Prairie, WI 53158-0909

1057 Krebs Engineers
5505 West Gillette Road
Tucson, AZ 85743

436 Scherping Systems
801 Kingsley St
Winsted, MN 55395

30-01 Farm Milk Storage Tanks

421 Paul Mueller Co
PO Box 828
1600 W Phelps St
Springfield, MO 65801

31-02 Scraped Surface Heat Exchangers

274 Alfa Laval Thermal Inc.
111 Parker St
Newburyport, MA 01950

290 APV Americas - Lake Mills
100 South CP Avenue
Lake Mills, WI 53551

496 FMC Corp/FranRica Sys
PO Box 30127
2807 S Highway 99
Stockton, CA 95213-0127

964 Schroder NA Corp
4745 S. Mendenhall Road
Memphis, TN 38141
(US Rep.: Schroder NA Corp
4745 S. Mendenhall Road
Memphis, TN 38141)

361 Terlet N.V.
PO Box 62
7200 AB Zutphen,
The Netherlands
(US Rep.: Manning & Lewis Eng.
New Jersey)

323 Waukesha Cherry-Burrell
PO Box 35600
Louisville, KY 40232-5600

32-02 Uninsulated Tanks for Milk and Milk Products

683 A&B Process Systems
PO Box 86
201 S. Wisconsin Ave.
Stratford, WI 54484

397 APV Americas - Lake Mills
100 South CP Avenue
Lake Mills, WI 53551

354 C.E. Rogers Co
PO Box 118
1895 Frontage Road
Mora, MN 55051

268 DCI, Inc
PO Box 1227
600 North 54th Ave
St. Cloud, MN 56302-1227

708 Lee Industries Inc
PO Box 688
514 West Pine St
Philipsburg, PA 16866

844 Paul Mueller Co
1600 West Phelps St
Springfield, MO 65801

441 Scherping Systems
801 Kingsley St
Winsted, MN 55395

852 Viatec Incorporated
1220 W. State Street
Hastings, MI 49058

339 Walker Stainless Equip
PO Box 202
625 State St.
New Lisbon, WI 53950-0202

33-01 Polished Metal Tubing for Milk and Milk Products

310 Allegheny Bradford
PO Box 200
Bradford, PA 16701

413 AZCO Inc
PO Box 567
2150 Holly Rd
Appleton, WI 54912

1102 Jacob Tubing, L.P.
3948 Willow Lake Blvd.
Memphis, TN 38118

776 Kurt Orban Partners
450 Kings Rd
Brisbane, CA 94005

736 Kvalitetsproduktion AB
PO Box 900
S-693 29 Degerfors,
Sweden
(US Rep.: Flowtech, Inc
1900 Lake Park Drive
Suite 345
Smyrna, GA 30080)

812 Norca Corporation
185 Great Neck Road
Great Neck, NY 11022

308 Rath Mfg Co., Inc
2505 Foster Ave
Janesville, WI 53545

368 Rodger Industries
PO Box 40/ RR #1
Blenheim, ON N0P 1A0
Canada

1044 SYNCRO VAC, INC.
803 Ames Avenue
Milpitas, CA 95035

775 Trent Tube
2015 Energy Drive
P.O. Box 77
East Troy, WI 53120

331 United Industries
1546 Henry Avenue
Beloit, WI 53511

34-02 Portable Bins for Dry Milk and Milk Products

916 Custom Metalcraft, Inc.
PO Box 10587 GS
2332 E. Division
Springfield, MO 65808

647 Tote Systems/Kinetics
PO Box 2916
Fort Worth, TX 76113-2916

35-00 Continuous Blenders

869 Admix Inc
234 Abby Road
Manchester, NH 03103-3332

1050 ADMIX, Inc.
234 Abby Road
Manchester, NH 03103

527 Arde Barinco Inc
500 Walnut St
Norwood, NJ 07648

1069 Bran+Luebbe, Inc.
1025 Busch Parkway
Buffalo Grove, IL 60089-4516

590 Chemineer Inc
125 Flagship Dr
N Andover, MA 01845

825 GEI International,Inc.
700 Pennsylvania Dr.
Exton, PA 19341

914 International Mixing Technologies
Avenue de la Gironde
59640 Dunkerque,
France
(US Rep.: IMT/USA
10140 Caminito Volar
San Diego, CA 92126)

642 Mondomix B.V.
Reeweg 13, PO Box 98
1394 ZH Nederhorst den Berg,
The Netherlands
(US Rep.: Mondomix-USA Branch
1900 Tyler Rd., Unit 400
St. Charles, IL 60174)

1027 Polar Process Inc.
P.O. Box 190
Plattsville, Ontario NOJ 1SO
Canada

680 Quadro Engineering Inc
613 Colby Drive
Waterloo, Ontario N2V 1A1
Canada
(US Rep.: Quadro Engineering Inc.
55 Bleeker Street
Millburn, NJ 07041-1414)

766 Semi-Bulk Systems
159 Cassens Court
Fenton, MO 63026-2543

724 Silverson Machines
PO Box 589
355 Chestnut St
E. Longmeadow, MA 01028

417 Waukesha Cherry-Burrell
PO Box 35600
Louisville, KY 40232-5600

36-00 Colloid Mills

808 Boston Shearpump Inc
33 Brighton Street
Belmont, MA 02478

846 IKA Works Inc
2635 North Chase Pkwy SE
Wilmington, NC 28405-7499

608 Kinematica Inc
260 Northland Blvd., Suite 335
Cincinnati, OH 45246-3502

293 Waukesha Cherry-Burrell
611 Sugar Creek Road
Delavan, WI 53115-1337

38-00 Cottage Cheese Vats

541 Kusel Equip
PO Box 87
Watertown, WI 53094

385 Stoelting Inc
502 Hwy 67
Kiel, WI 53042-1600

39-00 Pneumatic Conveyors for Dry Milk and Dry Milk Products

1100 PIAB AB
Box 4501
S-183 04
Taby,
Sweden
(US Rep.: PIAB USA
55 Accord Park Drive
Rockland, MA 02370

1042 Wm. W. Meyer & Sons, Inc.
8261 Elmwood Avenue
Skokie, IL 60077

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

456 C.E. Rogers Co
PO Box 118
1895 Frontage Rd
Mora, MN 55051

381 Marriott Walker Corp
925 E Maple Rd
Birmingham, MI 48009

41-01 Mechanical Conveyors for Dry Milk and Dry Milk Products

631 Flexicon Corp
PO Box 5269
1375 Strykers Rd
Philipsburg, NJ 08865

894 Spiroflow Systems, Inc.
2806 Gray Fox Road
Monroe, NC 28110

42-01 In-Line Strainers for Milk and Milk Products

855 Flowtech
Div of Teknoflow, Inc
1701 Spinks Drive
Marietta, GA 30067-8925

655 Tri-Clover
P.O. Box 1413
Kenosha, WI 53141-1413

1023 ultrafilter, inc.
3560 Engineering Drive
Norcross, GA 30092

606 Waukesha Cherry-Burrell
611 Sugar Creek Road
Delavan, WI 53115

44-02 Air, Hydraulically, or Mechanically Driven Diaphragm Pumps for Milk and Milk Products

958 LEWA Herbert Ott GmbH & Co.
Ulmerstrasse 10
71229 Leonberg,
Germany
(US Rep.: American LEWA, inc.
132 Hopping Brook Road\
Holliston, MA 01746-1499)

1012 VERSA-MATIC PUMP
6017 Enterprise Drive
Export, PA 15632-8969

713 Warren Rupp Inc
PO Box 1568
(800 N Main St)
Mansfield, OH 44901-1568

833 Wilden Pump & Engineering
22069 Van Buren Street
Grand Terrace, CA 92313-5651

45-01 Crossflow Membrane Modules

813 Coors Tek
1100 Commerce Park Dr.
Oak Ridge, TN 37830

807 Corning Incorporated
HP-CB-03-01
Corning, NY 14831

1067 Filtration Engineering Co., Inc.
12255 Ensign Avenue
Champlin, MN 55316

786 North Carolina SRT Inc
221 James Jackson Ave
Cary, NC 27513

1084 Pall Filtron Corporation
50 Bearfoot Road
Northboro, MA 01532

46-02 Refractometers and Energy-Absorbing Optical Sensors for Milk and Milk Products

981 AW Company
8809 Industrial Drive
Franksville, WI 53126-9337

785 Bran + Luebbe, Inc.
1025 Busch Pkwy
Buffalo Grove, IL 60089-4516

955 Brimrose Corp. of America
5020 Campbell Blvd.
Baltimore, MD 21236-4968

783 dba Advantec Proc Sys
95 Wyngate Dr
Newnan, GA 30265

859 Electron Machine Corp
PO Box 2349
15824 CR 450 West
Umatilla, FL 32784

800 Epsilon Industrial Inc
2215 Grand Avenue Parkway
Austin, TX 78728

767 Foss NIRSystems, Inc
12101 Tech Rd
Silver Spring, MD 20904

919 Foss NIRSystems, Inc.
12101 Tech Road
Silver Spring, MD 20904

940 K-Patents OY
PO Box 77
Fin-01511 Vantaa,
Finland
(US Rep.: K-Patents, Inc.
1804 Centre Point Circle
Suite 106
Naperville, IL 60563)

697 Liquid Solids Control
PO Box 259
Farm Street
Upton, MA 01568

751 Maselli Misure S.p.A.
c/o Maselli Meas.
PO Box 7571
Stockton, CA 95267

921 optek-Danulat, Inc.
279 So. 17th Ave., Suite #10
West Bend, WI 53095

750 PT Papertech Inc
301-2609 Westview Drive
North Vancouver, BC V7N 4M2
Canada

742 Reflectronics, Inc
3009 Montavesta Rd
Lexington, KY 40502

47-00 Centrifugal and Positive Rotary Pumps for Pumping, Cleaning and Sanitizing Solutions

1087 Alfa Laval Flow Inc.
8201 104th St.
P.O. Box 581909
Pleasant Prairie, WI 53158-0909

897 Ampco Pumps Co.
4424 W. Mitchell Street
Milwaukee, WI 53214

50-00 Level Sensing Devices for Dry Milk and Dry Milk Products

705 Venture Measurement LLC
150 Venture Blvd.
Spartanburg, SC 29306

51-01 Plug-Type Valves for Milk and Milk Products

772 Alfa Laval Flow Inc.
G&H Division
PO Box 581909
Pleasant Prairie, WI 53158-0909

787 Cipriani Inc
23195 LaCadena Dr Ste 101
Laguna Hills, CA 92653

239 LUMACO
9-11 East Broadway
Hackensack, NJ 07601

781 Robert-James Sales, Inc.
699 Hertel Ave Suite 260
Buffalo, NY 14207

357 Tanaco Products
3860 Loomis Trail Rd
Blaine, WA 98230

777 Tech Controls Enterprise Co. Ltd.
3725 N. Murray Rd
Otis Orchards, WA 99027

790 Tri-Clover Inc.
P.O. Box 1413
Kenosha, WI 53141-1413

759 VNE Corporation
1149 Barberry Dr
Janesville, WI 53545

761 Waukesha Cherry-Burrell
611 Sugar Creek Rd
Delavan, WI 53115

788 WCB de Mexico, S.A. de C.V.
Alfredo B. Nobel #39
Fracc. Ind.Puente de Vigas
Tlalnepantla, Edo de Mexico 54070
Mexico

52-02 Plastic Plug-Type Valves for Milk and Milk Products

907 L'A'UFER International AG
Finkenweg 2
D-88709 Meersburg,
Germany

577 Ralet Defay
66, Blvd Poincare
1070 Brussels,
Belgium

53-01 Compression-Type Valves for Milk and Milk Products

1038 AERRE INOX s.r.l.
Via delle Arti 26
26010 FIESCO(CR),
Italy
(US Rep.: CMG Industries, Inc.
23195 La Cadena Dr., Ste. 101
Laguna Hills, CA 92653)

530 Alfa Laval Flow Inc.
G&H Division
PO Box 581909
Pleasant Prairie, WI 53158-0909

484 APV Americas- Lake Mills
100 South CP Ave
Lake Mills, WI 53551-1799

730 APV Americas- Lake Mills
100 South CP Ave
Lake Mills, WI 53551-1799

952 APV Americas-Lake Mills
100 South CP Avenue
Lake Mills, WI 53551-1799

443 Badger Meter
PO Box 581390
6116 E 15th St
Tulsa, OK 74158-1002

686 Bardiani Valvole S.p.A.
Via G. Di Vittorio 30/B
Fornovo Taro (PR), 43045
Italy
(US Rep.: ProTherm Engineering Co. Inc.
3475 W. Shaw Avenue
Ste 106
Fresno, CA 93711)

1010 CANDIGRA y CIA
c/telers, 54
Aptdo 174
17820 Banyoles,
Spain

538 Cipriani Corp.-Tassalini
#103
23195 LaCadena Rd
Laguna Hills, CA 92653

716 Conexiones Inox (CIPSA)
Vicente Guerrero 211
Xicotepec de Juarez, Edo Puebla
Mexico
(US Rep.: Ben Dolphin Consulting
4735 Lansing Drive
N. Olmstead, OH 44070)

376 Defontaine of America, Inc.
16720 W Victor Road
New Berlin, WI 53151

607 Flowserve FCD Corporation Kammer Valves
1300 Parkway View Drive
Pittsburgh, PA 15205-1410

1043 HOVAP
Professor Zernikestrasse 8
Sneek, 8606 JV
The Netherlands
(US Rep.: TYCO Valves & Controls
1467 Elmwood Avenue
Cranston, RI 02910)

1082 HOVAP TYCO Valves & Controls
Prof. Zernicke Straat 8
8606 JV SNEEK,
The Netherlands
(US Rep.: Tyco Valves & Controls R & D
1467 Elmwood Avenue
Cranston, RI 02910)

883 Keystone/Tyco Flow Control
12-14 Kaimiro St., Pukete Ind. Estate
Pukete
Hamilton,
New Zealand
(US Rep.: Keystone Valve USA, Inc.
Houston, TX)

542 L.C. Thomsen, Inc.
1303-43rd Street
Kenosha, WI 53140

881 Lucas & Associates
642 Alvarado St., No. 306
San Francisco, CA 94114-3256

570 LUMACO
9-11 East Broadway
Hackensack, NJ 07601

483 On-Line Instrumentation
PO Box 541
Route 376
Hopewell Junc, NY 12533

652 Pierre Guerin Technologies
179 Grand Rue
BP.12
MAUZE, 79210
France

149 Q-Controls
93 Utility Court
Rohnert Park, CA 94928

978 Relco Unisystems Corp.
PO Box 1689
Willmar, MN 56201

748 Richards Industries
3170 Wasson Rd
Cincinnati, OH 45209-2381

944 Samson Controls,Inc.
4111 Cedar Blvd.
Baytown, TX 77520

762 Stainless Products
PO Box 169
1649 - 72nd Ave
Somers, WI 53171-0169

806 Steri Technologies Inc
857 Lincoln Ave
Bohemia, NY 11716

804 Sudmo North America
6918 Forest Hills Road
Rockford, IL 61111

823 Sudmo-North Ameica
6918 Forest Hills Road
Rockford, IL 61111

954 Taylor Valve Technology, Inc.
8300 SW 8th Street
Oklahoma City, OK 73128

34 Tri-Clover Inc.
P.O. Box 1413
Kenosha, WI 53141-1413

467 Tuchenhagen North America
9160 Red Branch Road
Columbia, MD 21045

1008 Univalve S.A.
Z.A. du Mittelfeld 1
rue Alfred Kastler
F 67305 Schiltigheim,
France

561 Vacu-Purg Inc.
P.O. Box 272
214 West Main
Fredericksburg, IA 50630

584 Valvinox Inc
650 -1 Rue
Iberville, Quebec J2X 3B8
Canada

796 VNE Corporation
PO Box 1698
1149 Barberry Drive
Janesville, WI 53547

555 Waukesha Cherry-Burrell
611 Sugar Creek Rd
Delavan, WI 53115

551 WCB de Mexico, S.A. de C.V.
Alfredo B. Nobel #39
Fracc. Ind. Pte. Vigas,Tlalnepantla
54070 Edo. MEXICO, MX 54070

245 Westfalia Surge Technologies, Inc.
20903 W. Gale Ave
Galesville, WI 54630

54-02 Diaphragm-Type Valves for Milk and Milk Products

877 APV America-Lake Mills
100 South CP Avenue
Lake Mills, WI 53551-1799

565 APV Americas-Lake Mills
100 South CP Ave
Lake Mills, WI 53551-1799

980 APV Americas-Lake Mills
100 South CP Avenue
Lake Mills, WI 53551-1799

615 ASEPCO, Inc.
Suite 301
1101 San Antonio Rd
Mountain View, CA 94043

814 Burkert Contromatic Corp
2602 McGaw Avenue
Irvine, CA 92714

953 Burkert Contromatic Corp.
2602 McGaw Avenue
Irvine, CA 92614

745 Cashco Inc
PO Box 6
Hwy 140 West
Ellsworth, KS 67439-0006

617 Defontaine of America, Inc
16720 W Victor Rd
New Berlin, WI 53151

856 Flowtech
Div of Teknoflow, Inc
1701 Spinks Drive
Marietta, GA 30067-8925

637 Gemu Valves, Inc
Bldg 2600 Ste 110
3800 Camp Creek Pkwy
Atlanta, GA 30331

514 H.D. Baumann Inc
35 Mirona Road
Portsmouth, NH 03801-5317

203 ITT Engrd Valves
PO Box 6164
33 Centerville Rd
Lancaster, PA 17603-2064

494 Tri-Clover, Inc
P.O. Box 1413
Kenosha, WI 53141-1413

55-01 Boot Seal-Type Valves for Milk and Milk Products

821 Keofitt a/s
Snaremosevej 27
DK-7000 Fredericia,
Denmark
(US Rep.: Keofitt c/o R.,B.,V.,N.,&R.
1000N.Water St.
Milwaukee, Wi 53202)

56-00 Inlet and Outlet Leak-Protector Plug-Type Valves for Milk and Milk Products

34 Tri-Clover Inc.
P.O. Box 1413
Kenosha, WI 53141-1413

57-01 Tank Outlet Valves for Milk and Milk Products

534 LUMACO
9-11 East Broadway
Hackensack, NJ 07601

643 Paul Mueller Co
1600 W. Phelps Street
Springfield, MO 65801

58-00 Vacuum Breakers and Check Valves for Milk and Milk Products

835 Alfa Laval Flow Inc.
G&H Division
P.O. Box 581909
Pleasant Prairie, WI 53158-0909

843 APV Americas-Lake Mills
100 South CP Avenue
Lake Mills, WI 53551-1799

986 Bradford Cast Metals
PO Box 33
Elm Grove, WI 53122

1014 Check-All Valve Mfg. Co.
P.O. Box 835
Des Moines, IA 50304

691 Defontaine of America, Inc
16720 W Victor Rd
New Berlin, WI 53151

995 DURABLA Fluid Technology
140 Sheree Blvd.
Exton, PA 19341-0566

968 MarketNet
2241 Quebec Avenue South
Saint Louis Park, MN 55426
(US Rep.: MarketNet
2241 Quebec Ave. So.
St. Louis Park, MN 55426)

834 Stanfos Inc
3908-69th Avenue
Edmonton, Alberta T6B 2V2
Canada
(US Rep.: Andron Stainless Corp.
Suite 101, 8901 Farrow Rd.
Columbia, SC 29203)

857 Steel & O'Brien Mfg Inc
12850 Route 39
Sardinia, NY 14134

689 VNE Corporation
P.O. Box 1698
1149 Barberry Drive
Janesville, WI 53547

908 Waukesha Cherry-Burrell
611 Sugar Creek road
Delavan, WI 53115

59-00 Automatic Positive Displacement Samplers for Milk and Milk Products

291 Accurate Metering Systems
1651 Wilkening Rd.
Schaumburg, IL 60173

1037 AERRE INOX s.r.l.
Via delle Arti 26
26010 FIESCO (CR),
Italy
(US Rep.: CMG Industreis, Inc.
23195 La Cadena Dr., Ste. 101
Laguna Hills, CA 92653)

284 Bristol Equipment Co
PO Box 696
210 Beaver Street
Yorkville, IL 60560-0696

60-00 Rupture Discs for Milk and Milk Products

407 Continental Disc
3160 Heartland Dr
Liberty, MO 64068-3850

854 Fike Corporation
704 South 10th Street
Blue Springs, MO 64015

892 OSECO
1701 West Tacoma
Broken Arrow, OK 74012

61-00 Steam Injection Heaters for Milk and Milk Products

728 APV Americas -
Heat Transfer Division
395 Fillmore Ave
Tonowanda, NY 14150

811 Hydro-Thermal Inc
400 Pilot Court
Waukesha, WI 53188

991 Komax Systems, Inc.
508 East "E" Street
Wilmington, CA 90744

560 Pick Heaters Inc
PO Box 516
730 Indiana Ave
West Bend, WI 53095

874 Q-Jet DSI, Inc.
P.O. Box 748
303 State Street
North Haven, CT 06473

62-01 Hose Assemblies for Milk and Milk Products

795 Able Hose & Rubber Inc
2307 E Hennepin Ave
Minneapolis, MN 55413

758 Crouch Supply Co
PO Box 163829
902 S Jennings
Ft Worth, TX 76161

721 Dixon Valve & Coupling
800 High St
Chestertown, MD 21620

757 Nelson-Jameson Inc
PO Box 647
2400 E 5th St
Marshfield, WI 54449

799 R/W Connection
936 Links Ave
Landisville, PA 17538

727 Saint-Gobain Performance Plastics
460 Milltown Road
Bridgewater, NJ 08807

698 Sanitary Couplers Inc
275 South Pioneer Blvd.
Springboro, OH 45066

774 The Briggs Co
3 Bellecor Drive
New Castle, DE 19720

700 Titan Industries Inc
11121 Garfield Avenue
South Gate, CA 90280

63-02 Sanitary Fittings for Milk and Milk Products

349 A.P.N. Inc
921 Industry Road
Caledonia, MN 55921

1018 Advance Fittings Corp.
P.O. Box 678
218 West Centralia Street
Elkhorn, WI 53121

1036 AERRE INOX s.r.l.
Via delle Arti 26
26010 FIESCO (CR),
Italy
(US Rep.: CMG Industries, Inc.
23195 La Cadena Dr.,Ste. 101
Laguna Hills, CA 92653)

67 Alfa Laval Flow Inc., G&H Div.
P.O. Box 581909
Pleasant Prairie, WI 53158-0909

380 Allegheny Bradford Corp
PO Box 200
Bradford, PA 16701

682 Andron Stainless Ltd
6170 Tomken Road
Mississauga, Ontario L5T 1X7
Canada
(US Rep.: Andron Stainless Corp.
8901 Farrow Road #101
Columbia, SC 29203)

79 APV Americas-Lake Mills
100 South CP Avenue
Lake Mills, WI 53551-1799

900 APV Americas-Lake Mills
100 South CP Avenue
Lake Mills, WI 53551-1799

1016 Becker, Inc.
P.O. Box 1258
6705 14th Ave.
Kenosha, WI 53140

985 Bradford Cast Metals
PO Box 33
Elm Grove, WI 53122

621 Bradford Castmetals, Inc.
PO Box 33
Elm Grove, WI 53122

949 CANDIGRA y CIA
C/. Telers,54-Aptdo.174
Banyoles,
Spain

645 Cipriani Inc
23195 LaCadena Dr #101
Laguna Hills, CA 92653

962 CIVACON
416 East Alondra Blvd.
Gardena, CA 90248

696 Conexiones Inox. (CIPSA)
Vicente Guerrero 211
Ciudad Xicotepec de Juarez, Edo Puebla
Mexico
(US Rep.: Ben Dolphin Consulting
4735 Lansing Drive
N. Olmsted, OH 44070)

1088 Danflow Industria E Comercio Ltda.
Av. Atalaia Do Norte, 1050
BL.3-CEP 07240-120, JD Cumbica
Guarulhos/SP,
Brazil
(US Rep.: Norca Industrial Co., LLC
185 Great Neck Road
Great Neck, NY 11022)

1003 Dixson Valve and Coupling Company
800 High Street
Chestertown, MD 21620-1196

677 Excel-A-Tec Inc
W 140 N5958 Lilly Rd.
Menomonee Falls, WI 53051

947 FLOW MECA, INC.
608 Main Street
Pleasanton, CA 94566-6639

925 Hassia USA, Inc.
1210 Campus Drive West
Morganville, NJ 07751

1054 Hyjoin, Ltd.
28 Clifton Hill
London NW8 0QG,
UK

917 Irving Polishing & Mfg Co., In
5704 46th Street
Kenosha, WI 53144-1899

1080 J. Chen Business Company, Ltd.
No.7 Lane 135 Sec. 2
Shi-Tzuen St.
Sunhlin City, Taipei, Taiwan
Roc

454 Jensen Fittings Corp
107-11 Goundry St
N. Tonawanda, NY 14120-5998

933 King Lai International Co., LTD
No.10 6th East St.
Youth Industrial Zone
Tachia,Taichung, Taiwan ROC

960 Kurt Orban Partners
450 Kings Road
Brisbane, CA 94005

73 L.C. Thomsen Inc
1303-43rd Street
Kenosha, WI 53140

389 Lee Industries
PO Box 688
514 W Pine St
Philipsburg, PA 16866

969 MarketNet
2241 Quebec Avenue South
Saint Louis Park, MN 55426

703 Parker Hannifin Corp
UHP Products Division
1005 A Cleaner Way
Huntsville, AL 35805

200 Paul Mueller Company
PO Box 828
1600 West Phelps Street
Springfield, MO 65801

838 Quality Management Inc. (QMI)
426 Hayward Avenue North
St. Paul, MN 55128

424 Robert-James Sales, Inc.
699 Hertel Ave. Ste 260
Buffalo, NY 14207

699 Rodger Industries
PO Box 40
Blenheim, ONTARIO NOP 1A0
Canada

726 Saint-Gobain Performance Plastics
460 Milltown Road
Bridgewater, NJ 08807

1059 Sani-Fit, Inc.
54 Carolina Street
Springville, NY 14141

334 Stainless Products, Inc
PO Box 169
1649 - 72nd Ave
Somers, WI 53171-0169

741 Steel & O'Brien Mfg
12850 Route 39
Sardinia, NY 14134

391 Stork Food & Dairy Systems, Inc.
P.O. Box 1258
1024 Airport Pkwy.
Gainesville, GA 30503

688 Swagelok
29500 Solon Road
Solon, OH 44139

992 Taitech Precision Industries
2000 North Ivar Avenue
Los Angeles, CA 90068

449 Tech Control Enterprise Co., Ltd.
3725 N. Murray Road
Otis Orchards, WA 99027

1060 Thai-German Products Pb.Co.Ltd.
170/25-28 Ocean Tower1, 10 Flr.
Ratchadaphiseak Rd.,Klongtoey
Bangkok 10110,
Thailand
(US Rep.: Norce Industrial LLC
Great Neck, NY 11022)

34 Tri-Clover Inc.
P.O. Box 1413
Kenosha, WI 53141-1413

987 Trident Stainless Mfg. Ltd.
4635 Burgoyne St.
Units 17-18
Mississauga, Ontario L4W 1V9
Canada

1017 United Pacific Distributors Supply,Inc.
1040 Wallace Place
City of Industry, CA 91748

707 Valvinox Inc.
SGRM Div
650-1st St.
Iberville, QUEBEC J2X 3B8
Canada

948 VNE Corporation
1149 Barberry Drive
Janesville, WI 53547

773 VNE Corporation
PO Box 1698
Janesville, WI 53547

304 VNE Corporation
1149 Barberry Dr
Janesville, WI 53545

31 Walker Stainless Equip
PO Box 202
625 State Street
New Lisbon, WI 53950-0202

82 Waukesha Cherry-Burrell
611 Sugar Creek Road
Delavan, WI 53115

242 WCB de Mexico, S.A. de C.V.
Alfredo B. Nobel #39
Fracc. Ind. Pte. Vigas,
Tlalnepantla, Edo de Mexico 54070
Mexico

1007 Westfalia -Surge Technologies, Inc.
20903 W. Gale Avenue
Galesville, WI 54630

1006 Westfalia-Surge Technologies, Inc.
20903 W. Gale Avenue
Galesville, WI 54630

64-00 Pressure Reducing and Back Pressure Regulating Valves for Milk and Milk Products

753 Alfa Laval Flow Inc.
Sanitary Flow Division
PO Box 581909
Pleasant Prairie, WI 53158-0909

782 CASHCO
PO Box 6
607 W. 15th St.
Ellsworth, KS 67439-0006

769 Richards Industries
Valve Group
3170 Wasson Rd
Cincinnati, OH 45209-2381

65-00 Sight and/or Light Windows and Sight Indicators in Contact with Milk and Milk Products

867 J.M. Canty, Inc.
6100 Donner Road
Lockport, NY 14096

849 Jacoby TarBox Division of
The Clark Reliance Corp
16633 Foltz Ind Pkwy
Strongsville, OH 44136

845 L.J. Star Incorporated
PO Box 1116
2201 Pinnacle Parkway
Twinsburg, OH 44087

970 MarketNet
2241 Quebec Avenue South
Saint Louis Park, MN 55426
(US Rep.: MarketNet
2241 Quebec Ave. So.
St. Louis Park, MN 55426)

929 SHAE Industries
PO Box 1268
Healdsburg, CA 95448

974 Steel & O'Brien Mfg., Inc.
12850 Route 39
Sardinia, NY 14134

994 Taitech Precision Industries
2000 North Ivar Ave
Los Angeles, CA 900681

818 Tri-Clover Inc
P.O. Box 1413
Kenosha, WI 53141-1413

68-00 Ball-Type Valves for Milk and Milk Products

1032 Bowlswitch USA, INC
6580 Valley Center Drive
Box 6
Radford, VA 24141

1022 Bradford Castmetals, Inc.
P.O. Box 33
Elm Grove, WI 53122

1101 DynaQuip Controls
10 Harris Industrial Park
St. Clair, MO 63077

898 Fluid Transfer
Div of Lee Ind., Inc
514 W Pine Street
Philipsburg, PA 16866

1048 IBCC Industries, Inc.
3200 S. 3rd Street
Milwaukee, WI 53207

1106 INLINE Industries Inc.
4701-A Littlejohn Street
Baldwin Park, CA 91706

931 LUMACO
9-11 East Broadway
Hackensack, NJ 07601

73-00 Shear Mixers, Mixers, and Agitators

901 Admix, Inc.
234 Abby Road
Manchester, NH 03103

957 Admix, Inc.
234 Abby Road
Manchester, NH 03103-3332

1098 Sulzer Chemtech USA, Inc.
1605 S. Battleground Rd.
LaPorte, TX 77571

74-01 Sensors and Sensor Fittings and Connections Used on Fluid Milk and Milk Products

738 ABB Automation, Inc.
Instrumentation Division
125 East County Line Road
Warminster, PA 18974

896 ABB Instrumentation
2175 Lockheed Way
Carson City, NV 89706

747 Alloy Engr Co Inc
PO Box 4036
304 Seaview Ave
Bridgeport, CT 06607-0036

1086 Alltemp Sensors Inc.
9328-37 Avenue
Edmonton, Alberta T6E 5K3
Canada

576 AMETEK
Test/Calibration Inst. Div.
8600 Somerset Dr
Largo, FL 33773

822 Ametek
820 Pennsylvania Blvd
Feasterville, PA 19053

405 AMETEK Drexelbrook
205 Keith Valley Rd
Horsham, PA 19044

318 Anderson Intruments
156 Auriesville Rd
Fultonville, NY 12072

428 ARi Industries, Inc.
381 Ari Court
Addison, IL 60101

872 Brookfield Eng Lab Inc
11 Commerce Boulevard
Middleboro, MA 02346

315 Burns Engineering
10201 Bren Road East
Minnetonka, MN 55343

525 Caldwell Systems Corp
600 S. Sunset, Unit D
Longmont, CO 80501

850 Chicago Stainless Equip
1280 S.W. 34th Street
Palm City, FL 34990-3308

672 Computer Instruments
1000 Shames Drive
Westbury, NY 11590

829 DCT Instruments/ Sensotec, Inc.
2080 Arlingate Lane
Columbus, OH 43228-4112

862 Delta Controls Corp
585 Fortson Street
Shreveport, LA 71107

586 DiverseyLever Equipment
2841 Mission Street
Santa Cruz, CA 95060-2142

866 Dovex S.S. Inc
770 Tower Drive
Medina, MN 55340

663 Dresser Equipment Group
Instrument Division
210 Old Gate Lane
Milford, CT 06460

640 Dresser Industries
250 E. Main St
Stratford, CT 06614-5145

861 Dwyer Instruments Inc
PO Box 373
Michigan City, IN 46361-0373

459 Endress + Hauser GmbH + Co.
P.O. Box 246
2350 Endress Place
Greenwood, IN 46143

1051 Endress+Hauser Conducta
Dieselstrasse 24
D-70839 Gerlingen,
Germany

936 ENFM-USA, Inc.
11339 East Distribution Avenue
Jacksonville, FL 32256

524 Flow Technology, Inc.
4250 E Broadway
Phoenix, AZ 85040

598 FMC Invalco Inc
2825 W. Washington
Stephenville, TX 76401

984 Garner Industries
4200 North 48th Street
Lincoln, NE 68504

963 GLI International, Inc.
9020 West Dean Road
Milwaukee, WI 53224

668 GP:50 New York LTD
PO Box 1150
2770 Long Road
Grand Island, NY 14072

651 Granzow Inc
2300 Crownpoint Exec Dr
Charlotte, NC 28227

633 Griffith Ind Products
PO Box 111
Pearl Avenue
Putnam, CT 06260

832 H O Trerice Co
12950 W Eight Mile Road
Oak Park, MI 48237-3288

749 Haenni Instruments AG
Bernstrasse 59
CH-3303 Jegenstorf,
Switzerland
(US Rep.: Haenni Instruments Inc.
1107 Wright Avenue
Gretna, LA 70056)

557 Honeywell, Inc
1100 Virginia Dr
Ft Washington, PA 19034

794 Honeywell, Inc.
1100 Virginia Drive
Fort Washington, PA 19034

977 ifm efector inc.
A subsidiary of ifm electronic
805 Springdale Drive
Exton, PA 19341

629 ISE Magtech
907 Bay Star Blvd.
Webster, TX 77598-1531

572 ITT Conoflow
PO Box 768
5154 Highway 78
St. George, SC 29477-0768

285 K Systems Corp
Tank Mate Division
4931 Butterfield Road
Hillside, IL 60162

930 Kamstrup A/S, Process Division
Jacob Knudsens Vej 12
DK-8230 Abyhoj,
Denmark

798 Kay-Ray/Sensall Inc
1400 Business Center Dr, Ste.100
Mount Prospect, IL 60056

961 KDG Instruments
Crompton Way
Crawley, W. Sussex RH102YZ
UK

945 Kemotron,Inc.
1090 Northcase Parkway Suite 200 S.
Marietta, GA 30067

396 King Engineering
PO Box 1228
Ann Arbor, MI 48106

893 Kistler-Morse Corp
19021 - 120th Ave. N.E.
Bothell, WA 98011-9511

842 Klay Instruments B.V
Nijverheidsweg 5
P.O. Box 13
NL 7991 CZ Dwingeloo,
The Netherlands
(US Rep.: HiTech Technologies, Inc.
301 Oxford Valley Road
Yardley, PA 19067-7706)

620 Larad Equipment
18 Menfi Way
Hopedale, MA 01747

501 Lumenite Control Technology
2331 North 17th Ave
Franklin Park, IL 60131

596 Magnetrol Intl
5300 Belmont Rd
Downers Grove, IL 60515

1061 Maselli Measurements, Inc.
7746 Lorraine Avenue
Stockton, CA 95210

906 Mettler-Toledo
Process Analytical, Inc.
299 Washington St.
Woburn, MA 01801

1002 Milltronics
Nikkelstraad 10
NL4823 AB
Breda,
The Netherlands

627 Milltronics
PO Box 4225
1954 Technology Drive
Peterborough, ONTARIO K9J 7B1
Canada
(US Rep.: Milltronics, Inc.
709 E. Stadium Dr.
Arlington, TX 76001)

588 Minco Products
7300 Commerce Lane
Minneapolis, MN 55432-3177

768 MTS Sensors Div
3001 Sheldon Dr
Cary, NC 27513

863 Nelson-Jameson
PO Box 647
2400 East Fifth Street
Marshfield, WI 54449

597 Nuova Fima S.p.A.
Via C. Battisti 59
28045- INVORIO (NO),
Italy
(US Rep.: MDI Industrial Sales
9868-33 Ave.
Alberta, Canada T6N 1C6)

966 ODEN CORPORATION
255 Great Arrow Avenue
Buffalo, NY 14207-3024

909 Ohmart/VEGA
4241 Allendorf Drive
Cincinnati, OH 45209-9961

983 OHMART/VEGA Corp.
4241 Allendorf Drive
Cincinnati, OH 45209

563 P I Components
1951 Hwy 290W
Brenham, TX 77833

523 Paper Machine Comp
Miry Brook Road
Danbury, CT 06810

554 Par-Sonics Inc
158 Par Sonics Road
Centre Hall, PA 16828

763 PerkinElmer Instruments, Inc..
801 S. Illinois Ave.
Oak Ridge, TN 37831-0895

1070 Pondus Instruments AB
Box 178
S-162 12
Vallingby,
Sweden
(US Rep.: ABB Instrumentation

644 Princo Instruments
1020 Industrial Blvd.
Southampton, PA 18966-4095

1000 pro/M/tec, inc.
1201 Braddock Ave., Suite 2
Pittsburgh, PA 15218

815 ProMag Ltd
11552 Merchant Drive
Baton Rouge, LA 70809

487 Pyromation Inc
5211 Industrial Rd
Fort Wayne, IN 46825-5152

1094 R.J. Global Technologies
5650 Guhn Road
Suite 106
Houston, TX 77040

367 RdF Corporation
PO Box 490
23 Elm Avenue
Hudson, NH 03051-0490

982 Reotemp Instr.-Corp.
10656 Roselle Street
San Diego, CA 92121

495 Rosemount Analytical, Inc.
2400 Barranca Pkwy
Irvine, CA 92606

876 Rosemount Inc
8200 Market Blvd., Mail Stop PK04
Chanhassen, MN 55317-1126

328 Rosemount Inc., Mail Stop PK04
8200 Market Blvd.
Chanhassen, MN 55317-1126

583 S.J. Controls
2248 Obispo Ave., Ste. 203
Long Beach, CA 90806

1028 SAN-TRAN.COM, INC.
7524 W. 98th Place
Bridgeview, IL 60455

1033 SAN-TRAN.COM, INC.
7524 W. 98th Place
Bridgeview, IL 60455

732 SensorTec Inc
7620 DiSalle Blvd.
Fort Wayne, IN 46825

784 Sensotec, Inc.
2080 Arlingate Lane
Columbus, OH 43228-4112

515 Setra Systems Inc
159 Swanson Road
Boxborough, MA 01720

873 Smar Equipamentos Industriasis, Ltd
Av. Dr. Antonio Furlan Jr., 1028
Sertaozinho-SP, 14160.000
Brazil

1108 Solartron Inc.
19408 Park Row, Suite 320
Houston, TX 77084

875 SOR Inc
14685 West 105th Street
Lenexa, KS 66215

420 Stork Food & Dairy Systems, Inc.
P.O. Box 1258
1024 Airport Pkwy.
Gainesville, GA 30503

641 Tempress A/S
P.O. Box 2090
Nordlandsvej 64-66
Risskov, DK8240
Denmark

206 The Foxboro Company
NO2-3B
33 Commercial St
Foxboro, MA 02035-2099

910 The Wellmark Company
1903 S.E. 29th Street
Oklahoma City, OK 73129

765 Tri-Clover Inc
P.O. Box 1413
Kenosha, WI 53141-1413

444 Tuchenhagen N America
9160 Red Branch Road
Columbia, MD 21045

706 Venture Measurement LLC
150 Venture Blvd.
Spartanburg, SC 29306

659 Venture Measurement LLC
150 Venture Blvd.
Spartanburg, SC 29306

410 Viatran Corp
300 Industrial Drive
Grand Island, NY 14072

1047 Viatran Corporation
300 Industrial Drive
Grand Island, NY 14072

779 Wahl Instruments Inc
234 Weaverville Hwy
Asheville, NC 28804

522 Weed Instrument Co
PO Box 300
707 Jeffrey Way
Round Rock, TX 78680

569 Weiss Instruments
905 Waverly Avenue
Holtsville, NY 11742

600 Weksler Instruments
Dresser Industries
250 E Main Street
Stratford, CT 06497

646 WIKA Instruments Corp
1000 Wiegand Blvd
Lawrenceville, GA 30243-5868

685 Winters Thermogauges
121 Railside Road
Toronto, Ontario M3A 1B2
Canada
(US Rep.: Winters Instruments
6010-4 No. Bailey Ave.
Buffalo, NY 14226)

879 Zurich Acessorio Ind Ltda
Rua Serra da Predade, 183
Sao Paulo-SP, 03131-080
Brazil

75-00 Belt-Type Feeders

1078 Brabender Technologie Inc.
6500 Kestrel Road
Mississauga, Ontario L5T 1Z6
Canada

78-00 Spray Devices to Remain in Place

988 Holdren Brothers, Inc.
PO Box 459
301 Runkle Street
West Liberty, OH 43357

993 Lechler, Inc.
445 Kautz Road
St. Charles, IL 60174-5301

1040 Spraying Systems Co.
P.O. Box 7900
Wheaton, IL 60189-7900

81-00 Auger-Type Feeders

1079 Brabender Technologies Inc.
6500 Kestrel Road
Mississauga, Ontario L5T 1Z6
Canada

1049 Tetra Pak Hoyer
P.O. Box 280
753 Geneva Parkway
Lake Geneva, WI 53147

CONTRIBUTE
to the Fourth Annual Foundation Fund Silent Auction Today!

The Foundation of the International Association for Food Protection will hold its Annual Silent Auction during IAFP 2001, the Association's 88th Annual Meeting in Minneapolis, Minnesota August 5-8, 2001. The Foundation Fund supports the:

- Ivan Parkin Lecture
- Travel support for exceptional speakers at the Annual Meeting
- Audiovisual Library
- Developing Scientist Competition
- Shipment of volumes of surplus *JFP* and *DFES* journals to developing countries through FAO in Rome

Support the Foundation by donating an item today. A sample of items donated last year included:

- Food Safety Videos
- California Salted Pistachios
- Pearl Necklace
- Missouri Country Sugar Cured Ham
- New Jersey Devils Hockey Jersey
- Waterford Crystal Vase
- IAFP Polo Shirts
- Wine

Complete the form and send it in today. Notification of donated items must be received by June 15, 2001 to be listed in the Program and Abstract Book.

Description of auction items _____

Estimated Value _____

Name of Donor _____

Company (if relevant) _____

Mailing Address _____

(Please specify: ❒ Home ❒ Work)

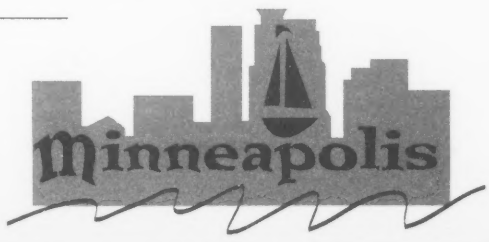
City _____ State or Province _____

Postal Code/Zip + 4 _____ Country _____

Telephone # _____ Fax # _____

E-mail _____

Return to:
Donna Gronstal
International Association for Food Protection
6200 Aurora Avenue, Suite 200W
Des Moines, IA 50322-2863, USA
Fax: 515.276.8655
E-mail: dgronstal@foodprotection.org



SPONSORSHIPS

We invite you to participate as a sponsor for IAFP 2001. Sponsorship participation provides an excellent opportunity to position your company or organization as a supporter of the Association.

Several exciting opportunities will be available in 2001. Please review the event listing to select the one that will best position your organization. Reservations will be taken in order received for any open sponsorship events.

Sponsorship Event List

Full Support	Partial Support	Event
$16,000	$5,000 - $9,000	Monday Evening Social
$13,000	$5,000 - $7,000	Opening Reception Wine (Sunday)
$13,000	$5,000 - $6,000	Exhibit Hall Reception (Monday)
$7,500	$3,500 - $4,000	Leather Badge Holders w/Lanyards
$3,000	$1,000 - $2,000	Exhibit Hall Pastries and Coffee (Monday Morning)
$2,500	$1,250 - $1,500	Exhibit Hall Coffee Break (Monday Afternoon)
$3,000	$1,000 - $2,000	Exhibit Hall Pastries and Coffee (Tuesday Morning)
$2,500	$1,250 - $1,500	Coffee Break (Tuesday Afternoon)
$3,000	$1,000 - $1,500	Coffee Break (Wednesday)
$3,000	$1,000 - $1,500	IAFP New Member Orientation (Saturday)
$3,500	$1,500 - $2,500	Spouse/Companion Hospitality Room
$2,000	$750 - $1,000	Exhibitor Move-in Refreshments (Sunday)
$2,000	$750 - $1,000	Student PDG Luncheon (Sunday)
$1,750	$500 - $800	Awards Banquet Flowers (Wednesday)
$1,500	$500 - $800	Committee Day Refreshments (Sunday)
$1,000	$400 - $750	Speaker Travel Support
$600	$150 - $300	Golfers' Continental Breakfast (Sunday)
$Various	$75 - $300	Golf Tournament Prizes (Sunday)

SPONSORSHIP PARTICIPANT

Name _____

Company _____

Address _____

City _____ State or Province _____

Country _____ Postal Code/Zip + 4 _____

Phone _____ Fax _____

E-mail _____

Desired Event to Sponsor _____

Contact:

Dave Larson
Phone: 515.987.1359
Fax: 515.987.2003
E-mail: larson6@earthlink.net

IAFP 2001

88th Annual Meeting

Experience the City of Lakes

August 5-8, 2001

International Association for Food Protection

Hilton Minneapolis

Proposed Symposia

1. A New Paradigm for Retail Food Protection Services
2. FAO/WHO Initiative in Microbial Risk Assessment
3. Dairy Plant HACCP (Where Are We and Where Are We Going?)
4. Quality and Safety of Extended Shelf-Life Dairy Products
5. Allergic Awareness in Dairy Products
6. Antimicrobial Resistance and Growth Promotants
7. Zero Tolerance – Boon or Bust
8. The Benefits of Better Government/ Industry Relation in Assuring Food Safety
9. Food Safety and the Digital Age
10. Communicating Science Effectively
11. Distribution Containers, Equipment and Vehicles Poster Symposium
12. USDA Competitive Grants in Food Safety and Awards Process
13. HACCP: How to Evaluate Success
14. ILSI North America-Sponsored Research Updates
15. Establishing Food Safety Objectives for Raw Meats and Produce
16. *Mycobacterium paratuberculosis*
17. Microbial and Chemical Concerns in Seafoods
18. Visibility and Use of Irradiation in the Food Industry and How It is Being Communicated to the Public
19. Detection and Control of Human Pathogens in Fresh Fruits and Vegetables
20. Prevention and Elimination of Pathogens on Fruit and Vegetables
21. Water Quality and Its Impact on Food Safety
22. Indicator Microorganisms: What do They Indicate, and is It of Any Use?
23. Organic Farming
24. A Social Marketing Approach to Educating Food Service Workers
25. Social Marketing Principles and the Nature of the New Workforce in Food Service
26. Risk Management Strategies for Food Safety

International Association for Food Protection

88th Annual Meeting

6200 Aurora Avenue, Suite 200W
Des Moines, IA 50322-2863, USA
Phone: 800.369.6337 • 515.276.3344
Fax: 515.276.8655
E-mail: info@foodprotection.org
Web site: www.foodprotection.org

August 5-8, 2001
Minneapolis, Minnesota

IMPORTANT! Please read this information before completing your registration form.

Meeting Information

Register to attend the world's leading food safety conference.

Registration includes:

- Technical Sessions
- Symposia
- Poster Presentations
- Ivan Parkin Lecture
- Exhibit Hall Admittance
- Cheese and Wine Reception
- Exhibit Hall Reception
- Program and Abstract Book

4 Easy Ways to Register

To register, complete the Attendee Registration Form and submit it to the International Association for Food Protection by:

Phone: 800.369.6337; 515.276.3344

Fax: 515.276.8655

Mail: 6200 Aurora Avenue, Suite 200W, Des Moines, IA 50322-2863

Web site: www.foodprotection.org

The early registration deadline is July 6, 2001. After July 6, 2001 late registration fees are in effect. Pick up registration materials on site at the Hilton Minneapolis.

Refund/Cancellation Policy

Registration fees, less a $50 administration fee and any applicable bank charges, will be refunded for written cancellations received by July 13, 2001. No refunds will be made after July 13, 2001; however, the registration may be transferred to a colleague with written notification. Refunds will be processed after August 13, 2001. Additional tickets purchased are nonrefundable.

Exhibit Hours

Sunday, August 5, 2001 — 8:00 p.m. – 10:00 p.m.

Monday, August 6, 2001 — 9:30 a.m. – 1:30 p.m.
3:00 p.m. – 6:30 p.m.

Tuesday, August 7, 2001 — 9:30 a.m. – 1:30 p.m.

Hotel Information

For reservations, contact the hotel directly and identify yourself as an International Association for Food Protection Annual Meeting attendee to receive a special rate of $129 per night, single or double. Make your reservations as soon as possible; this special rate is available only until July 6, 2001

Hilton Minneapolis
1001 Marquette Avenue
Minneapolis, Minnesota 55403
612.376.1000
1.800.HILTONS

Evening Events

Sunday, August 5, 2001

Opening Session (7:00 p.m. – 8:00 p.m.)

Cheese and Wine Reception (8:00 p.m. – 10:00 p.m.)

Monday, August 6, 2001

Exhibit Hall Reception (5:00 p.m. – 6:30 p.m.)

Monday Night Social, **Mississippi Dinner Cruise** (6:00 p.m. – 10:00 p.m.)

Tuesday, August 7, 2001

Chanhassen Dinner Theatre (5:30 p.m. – 11:00 p.m.)

Minnesota Twins Baseball Game (6:00 p.m. – 10:00 p.m.)

Wednesday, August 8, 2001

Awards Banquet (7:00 p.m. – 9:30 p.m.)

Daytime Tours

(Lunch included in all daytime tours)

Sunday, August 5, 2001

Twin Cities Highlights (9:30 a.m. – 2:30 p.m.)

Monday, August 6, 2001

Historic Stillwater (9:30 a.m. – 3:30 p.m.)

Tuesday, August 7, 2001

Mansions & Museums (9:30 a.m. – 3:30 p.m.)

International Association for
Food Protection
6200 Aurora Avenue, Suite 200W
Des Moines, IA 50322-2863, USA
Phone: 800.369.6337 • 515.276.3344
Fax: 515.276.8655
E-mail: info@foodprotection.org
Web site: www.foodprotection.org

Attendee Registration Form

August 5-8, 2001
Minneapolis, Minnesota

Name (Print or type your name as you wish it to appear on name badge) _____ Member Number: _____

Title _____ Employer _____

Mailing Address (Please specify: ❒ Home ❒ Work) _____

City _____ State/Province _____ Country _____ Postal/Zip Code _____

Telephone _____ Fax _____ E-mail _____

❒ First time attending meeting Member since: _____

❒ Regarding the ADA, please attach a brief description of special requirements you may have.

❒ IAFP occasionally provides Attendee's addresses (excluding phone and E-mail) to vendors and exhibitors supplying products and services for the food safety industry. If you prefer NOT to be included in these lists, please check the box.

PAYMENT MUST BE RECEIVED BY JULY 6, 2001 TO AVOID LATE REGISTRATION FEES

REGISTRATION FEES:	MEMBERS	NONMEMBERS	TOTAL
Registration (Awards Banquet included)	$ 275 ($325 late)	$415 ($465 late)	
Association Student Member*	$ 45 ($ 55 late)	Not Available	
Retired Association Member*	$ 45 ($ 55 late)	Not Available	
One Day Registration: ❒ Mon. ❒ Tues. ❒ Wed.	$ 155 ($180 late)	$210 ($235 late)	
Spouse/Companion* (Name): _____	$ 45 ($ 45 late)	$ 45 ($ 45 late)	
Children 15 & Over* (Names): _____	$ 25 ($ 25 late)	$ 25 ($ 25 late)	
Children 14 & Under* (Names): _____	FREE	FREE	
*Awards Banquet not included			

EVENTS:		# OF TICKETS	
Student Luncheon (Sunday, 8/5)	$ 5 ($ 10 late)		
Monday Night Social, Mississippi Dinner Cruise (Monday, 8/6)	$ 39 ($ 44 late)		
Children 14 and under	$ 34 ($ 39 late)		
Chanhassen Dinner Theatre (Tuesday, 8/7)	$ 75 ($ 80 late)		
Minnesota Twins Baseball Game (Tuesday, 8/7)	$ 21 ($ 26 late)		
Awards Banquet (Wednesday, 8/8)	$ 45 ($ 50 late)		

DAYTIME TOURS: (Lunch included in all daytime tours)			
Twin Cities Highlights (Sunday, 8/5)	$ 40 ($ 45 late)		
Historic Stillwater (Monday, 8/6)	$ 47 ($ 52 late)		
Mansions & Museums (Tuesday, 8/7)	$ 49 ($ 54 late)		

Payment Options:

❒ Check Enclosed ❒ VISA ❒ MasterCard ❒

TOTAL AMOUNT ENCLOSED $ _____
US FUNDS on US BANK

JOIN TODAY AND SAVE!!!
(Attach a completed Membership application)
(See page 192 of this issue for a membership application)

Name on Card _____

Signature _____ Expiration Date _____

EXHIBITORS DO NOT USE THIS FORM

Coming Events

MARCH

·**13-14, Juice Processing, Quality and Safety Workshop,** University of California-Davis campus, Davis, CA. For more information, call 800.752.0881.

·**14-16, Idaho Environmental Health Association Annual Spring Conference,** Owyhee Plaza Hotel, Boise, ID. For further information, contact Angela Markham at 208.233.9080 ext. 231.

·**14-16, Michigan Environmental Health Association's 57th Annual Educational Conference,** Holiday Inn West, Lansing, MI. For further information, contact Keith Krinn at 248.424.7099.

·**16, Controlling *Listeria* in Your Plant,** Oak Brook, IL. Designed to assist quality assurance, sanitation, and operations personnel in understanding how *Listeria* grows in food plants. For additional information, contact Silliker Laboratories Group, Inc., at 800.829.7879 or fax 708.957.8405.

·**17-19, United Fresh Fruit and Vegetable Association International Convention,** Tampa, FL. For additional information, phone 703.836.3410.

·**21, 3-A Third Party Accreditation Meeting,** Disney's Yacht & Beach Club Resort, Orlando, FL. Contact Philomena Short at 703.761.2600.

·**22, Ontario Food Protection Association Spring Meeting,** Delta Meadowvale, Mississauga, Ontario, Canada. For further information, contact Glenna Haller at 519.823.8015.

·**22-25, International Association of Food Industry Suppliers Annual Conference,** Disney's Yacht & Beach Club Resort, Orlando, FL. Contact Dorothy Brady at 703.761.2600.

·**26, Food Education Conference,** Scottsdale Marriott, Scottsdale, AZ. Sponsored by Instron Corporation®. For additional information, contact Richard McManius at phone: 800.564.8378 ext. 5210; E-mail: instroninstitue-@m2usa.com.

APRIL

·**4-6, Missouri Milk, Food and Environmental Health Association Annual Educational Conference,** Ramada Inn, Columbia, MO. For additional information, contact Steve St. Clair at 573.221.1166.

·**5-7, International Fresh-cut Produce Association 14th Annual Conference,** Hyatt Regency Phoenix, Phoenix, AZ. For more information, call Stephanie Grunenfelder at 703.299.6282 or fax: 703.299.6288.

·**16, 3-A Sanitary Standards Committee Annual Meeting,** Sheraton Four Points Hotel, Milwaukee Airport. For more information, contact Tom Gilmore at 703.761.2600; E-mail: tgilmore@iafis.org or Philomena Short at 703.761.2600; E-mail: pshort@iafis.org.

·**17, Upper Midwest Dairy Industry Association Meeting,** Best Western Hotel, North Mankato, MN. For further information, contact Paul Nierman at 612.785.0484.

·**17-18, Food Safety Summit and Expo,** Marriott Wardman Park, Washington, D.C. For additional information, call 800.746.9646.

·**18, Upper Midwest Dairy Industry Association Meeting** Holiday Inn Alexandria, Alexandria, MN. For further information, contact Paul Nierman at 612.785.0484.

·**19, Indiana Environmental Health Association, Inc. Spring Conference,** Valle Vista, Greenwood, IN. Contact Helene Uhlman at 219.853.6358 for further information.

·**20-22, Voorjaarsdagen Congress 2001,** Netherlands Association for Companion Animal Medicine, Amsterdam RAI, The Netherlands. For additional information, contact Ms. J. Grootenboer at 31.30.253.5479; fax: 31.30.253.3667; E-mail: vjd@fbu.uu.nl.

·**24-30, 16th International Trade Fair for Packaging Machinery, Packaging and Confectionery Machinery,** Düsseldorf, Germany. For more information, contact Messe Düsseldorf North America, phone: 312.781.5180; Fax: 312.781.5188.

·**26, Guelph Food Technology Centre Trade Show — Innovation & Change in the Food Industry.** For further information, contact Cliona Reeves at phone: 519.821.1246; fax: 519.836.1281; E-mail: gftc@uoguelph.ca.

MAY

·**8-9, Food Plant Sanitation Workshop,** Seattle, WA. For additional information, contact AIB International, at phone: 785.537.4750; fax: 785.537.1493.

·**14-16, Practical HACCP for Food Processors,** Oak Brook, IL. Designed for food processors of all types. For additional information, contact Silliker Laboratories Group, Inc., at 800.829.7879 or fax 708.957.8405.

·**15-16, Pennsylvania Association of Milk, Food and Environmental Sanitarians Annual Conference,** Nittany Lion Inn, University Park, PA. For further information contact, Gene Frey at 717.397.0719.

·**15-17, Penn State Food Microbiology Short Course, Detection and Control of Foodborne Pathogens,** University Park, PA. For more information, contact Dr. Hassan Gourama at 610.396.6121; E-mail: hxg7@psu.edu or Dr. Catherine Cutter at 814.865.8862; E-mail: cnc3@psu.edu.

·**28-29, HACCP I: Documenting Your HACCP Prerequisite Program,** Guelph Food Technology Centre, Guelph, Ontario,

Canada. For more information, phone 519.821.1246; fax: 519.836.1281; E-mail: gftc@uoguelph.ca.

JUNE

•4-6, Texas Association of Milk, Food and Environmental Sanitarians Annual Meeting, Holiday Inn South, Austin, TX. For further information, contact Ron Richter at 979.845.4409.

•7-8, HACCP Workshop, Minneapolis, MN. For additional information, contact AIB International, at phone: 785.537.4750; fax: 785.537.1493.

•10-14, Values in Decisions on Risk Symposium, held in Stockholm. The symposium will address the role of experts, media and regulators in complex decisions. For further information, contact Kjell Andersson, phone: 46.8.510.14755; fax: 46.8.510.14756; E-mail: kjell.andersson@karintakonsult.se.

•13-15, Expo Dairy Show, Lacteo's 2001, Expo Guadalajara, Guadalajara, Mexico. For further information, phone 564.70.40/564.70.68; fax: 52.5.564.03.29; E-mail: gefemani@iwm.com.mx.

•13-15, NIZO Dairy Conference on Food Microbes 2001, Ede, The Netherlands. For more information, contact Jane Macmillan at 44.1865.245685.

•14-17, Seafood China Expo 2001, Dalian Xinghai Convention and Exhibition Centre, Dalian, China. For additional information, contact Ms. Ling Chan at 852.2865.2633; Fax: 852.2866.1770; 2865.5513; or E-mail: enquiry@bitf.com.hk.

•25-26, Sanitation Solutions Course, Guelph Food Technology Centre, Guelph, Ontario, Canada. For more information, phone 519.821.1246; fax: 519.836.1281; E-mail: gftc@uoguelph.ca.

JULY

•6-13, International Workshop and Mini-Symposium on Rapid Methods and Automation in Microbiology XXI, Kansas State University, Manhattan, KS. For further information, contact Daniel Y. C. Fung at 785.532.5654; Fax: 785.532.5681; E-mail: dfung@oznet.ksu.net.

•13, HACCP: An Executive Summary, Guelph Food Technology Centre, Guelph, Ontario, Canada. For more information, phone 519.821.1246; fax: 519.836.1281; E-mail: gftc@uoguelph.ca.

AUGUST

•5-8, IAFP 2001, the Association's 88th Annual Meeting, Minneapolis, Minnesota. Registration materials available in this issue of *DFES* on page 179 or contact Julie Cattanach at 800.369.6337; 515.276.3344; fax: 515.276.8655; E-mail: jcattanach@foodprotection.org. Visit our Web site at **www.food protection.org** for the most current Annual Meeting information.

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Research Notes

* Asterisk indicates author for correspondence.

Career Services Section

Microbiology Specialist

Mead Johnson Nutritionals has a **Microbiology Specialist** position vacancy. We are looking for a team-oriented professional with proven technical expertise who will thrive in a dynamic, customer-focused and outcome-oriented environment.

The successful applicant should have a bachelor's degree in Microbiology. Professional certification is a plus. Two to four year's experience in food plant sanitation and HACCP principles is also required. Candidates should have working knowledge of specific laboratory processes, quality assurance/control systems and processes as well as understanding of regulatory, safety, Infant Formula Act, GMP and environmental requirements. Basic understanding of human and organizational behavior and technical mastery of the scientific field appropriate to the laboratory are also required.

The selected candidate will be responsible for leading and facilitating the routine operations of the Microbiology Laboratory; providing consultation services to internal and external customers regarding sanitation, HACCP, food safety, and organoleptic issues; and working along side team members in daily laboratory activities to test and release finished product and support stability studies.

The most qualified candidate will be selected on the basis of application, interviews, work history, and reference checks.

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Food and Drug Scientist (Foods) Emergency Response Team

Under the direction of the Food Safety Section Chief, the Food and Drug Scientist Foods assists in the following areas: developing policies and guidelines for the Emergency Response Team, reviewing and compiling scientific literature on foodborne pathogens, developing and implementing applied research and surveillance on foodborne pathogens in high risk commodities, completing risk assessment for foodborne pathogens in high risk commodities, (i.e., industry wide assessment of sprouts), and summarizing the results of applied research and risk assessments. Duties include but are not limited to:

30% Plans and conduct environmental investigations of foodborne illness outbreaks.

20% Develops, implements, and coordinates industry-wide risk assessments of high-risk commodities.

15% Coordinates with local health departments, other state agencies, CDC, and Department staff during environmental investigations of foodborne outbreaks.

10% Participates in the development and implementation of training programs for growers and processors of high-risk commodities.

10% Develops summaries of and recommendations from applied research and risk assessment for publication in peer reviewed scientific journals, presentations to lay audiences and communication of results to managers and supervisors.

10% Develops press releases and health advisories.

5% Other duties as necessary.

Please contact Johnnie Perry at 916.445.2264 for further information.

Career Services Section

ADVERTISING INDEX

Journal of Food Protection Seeks *Scientific Co-editor*

Dr. Larry Beuchat will resign his position as Scientific Editor effective December 31, 2001. To allow for a smooth transition, the *Journal of Food Protection* is conducting a search for a new co-editor to assume the duties and responsibilities before Dr. Beuchat's departure.

Candidates, including individuals from outside of North America, are encouraged to submit their names and C.V. for consideration. A monthly stipend to cover out-of-pocket expenses is provided. Complimentary registration to the Association's Annual Meeting, as well as travel, lodging and meal expense to attend the Meeting is also provided.

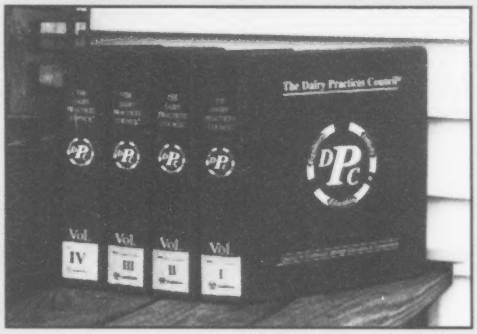
Please review the "Duties and Responsibilities" for the Scientific Co-editor and, if interested in the position, forward your name and C.V. to the Selection Committee Chairperson:

Dr. Donald Conner
Auburn University
Department of Poultry Science
236 Ann Upchurch Hall
Auburn, AL 36849-5416 USA

C.V.s must be received not later than March 1, 2001.

Duties and Responsibilities for the Scientific Co-editor

The *JFP* Scientific Co-editor works closely with the IAFP editorial staff to manage the peer-review process for manuscripts submitted for publication in *JFP*. Essentially, the co-editor serves as the intermediary between manuscript reviewers and authors. Primary duties include: assignment of reviewers for submitted manuscripts; evaluation of reviewers' comments; determination of scientific acceptability of manuscripts; and timely communication with authors, reviewers and IAFP staff. Final decisions on acceptance or rejection of manuscripts are the responsibility of the Scientific Co-editor. Scientific Co-editors also determine the sequence of manuscripts for each *JFP* issue. This position is accountable to the *JFP* Management Committee; thus, the Scientific Co-editor is required to prepare and submit an annual report for presentation to the *JFP* Management Committee.



IAFP Offers "Guidelines for the Dairy Industry" from The Dairy Practices Council®

This newly expanded Four-volume set consists of 66 guidelines.

1 Planning Dairy Freestall Barns
2 Effective Installation, Cleaning, and Sanitizing of Milking Systems
3 Selected Personnel in Milk Sanitation
4 Installation, Cleaning, & Sanitizing of Large Parlor Milking Systems
5 Directory of Dairy Farm Building & Milking System Resource People
6 Natural Ventilation for Dairy Tie Stall Barns
7 Sampling Fluid Milk
8 Good Manufacturing Practices for Dairy Processing Plants
9 Fundamentals of Cleaning & Sanitizing Farm Milk Handling Equipment
10 Maintaining & Testing Fluid Milk Shelf-Life
11 Sediment Testing & Producing Clean Milk
12 Tunnel Ventilation for Dairy Tie Stall Barns
13 Environmental Air Control and Quality for Dairy Food Plants
14 Clean Room Technology
15 Milking Center Wastewater
16 Handling Dairy Products from Processing to Consumption
17 Causes of Added Water in Milk
18 Fieldperson's Guide to Troubleshooting High Somatic Cell Counts
21 Raw Milk Quality Tests
22 Control of Antibacterial Drugs & Growth Inhibitors in Milk and Milk Products
23 Preventing Rancid Flavors in Milk
24 Troubleshooting High Bacteria Counts of Raw Milk
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27 Dairy Manure Management From Barn to Storage
28 Troubleshooting Residual Films on Dairy Farm Milk Handling Equipment
29 Cleaning & Sanitizing in Fluid Milk Processing Plants
30 Potable Water on Dairy Farms
31 Composition & Nutritive Value of Dairy Products
32 Fat Test Variations in Raw Milk
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36 Dairy Farm Inspection
37 Planning Dairy Stall Barns
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58 Sizing Dairy Farm Water Heater Systems
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71 Farmers Guide To Somatic Cell Counts In Sheep
72 Farmers Guide To Somatic Cell Counts In Goats
73 Layout of Dairy Milk Houses for Small Ruminant Operations
80 Food Allergen Awareness In Dairy Plant Operations

IAFP has agreed with The Dairy Practices Council to distribute their guidelines. DPC is a non-profit organization of education, industry and regulatory personnel concerned with milk quality and sanitation throughout the United States. In addition, its membership roster lists individuals and organizations throughout the world.

For the past 30 year, DPC's primary mission has been the development and distribution of educational guidelines directed to proper and improved sanitation practices in the production, processing, and distribution of high quality milk and milk products.

The DPC Guidelines are written by professionals who comprise six permanent task forces. Prior to distribution, every guideline is submitted for approval to the state regulatory agencies in each member state. Should any official have an exception to a section of a proposed guideline, that exception is noted in the final document.

The guidelines are renown for their common sense and useful approach to proper and improved sanitation practices. We think they will be a valuable addition to your professional reference library.

If purchased individually, the entire set would coat $289. We are offering the set, packaged in four looseleaf binders for $205.00.

Information on how to receive new and updated guidelines will be included with your order.

To purchase this important source of information, complete the order form below and mail or fax (515-276-8655) to IAFP.

Please enclose $205 plus $12 shipping and handling (outside U.S., $25 for shipping and handling) for each set of guidelines. Payment in U.S. $ drawn on a U.S. bank or by credit card.

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The Audiovisual Library offers International Association for Food Protection Members an educational service through a wide variety of quality training videos dealing with various food safety issues. This benefit allows Members free use of these videos.

How It Works ...

1) Members simply fill out an order form (see page 189) and fax or mail it to the IAFP office. Members may also find a Library listing and an order form online at the IAFP Web site at www.foodprotection.org.
2) Material from the Audiovisual Library is checked out for a maximum of two weeks (three weeks outside of North America) so that all Members can benefit from its use.
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How to Contribute to the Audiovisual Library ...

1) As the IAFP Membership continues to grow, so does the need for additional committee members and materials for the Library. The Audiovisual Committee meets at the IAFP Annual Meeting to discuss the status of the Audiovisual Library and ways to improve the service. New Members are sought to add fresh insight and ideas.
2) Donations of audiovisual materials are always needed and appreciated. Tapes in foreign languages (including, but not limited to Spanish, French, Chinese [Manderin/Cantonese]), are especially desired for International Members who wish to view tapes in their native language.
3) Members may also make a financial contribution to the Foundation Fund. The Foundation Fund sponsors worthy causes that enrich the Association. Revenue from the Foundation Fund supports the IAFP Audiovisual Library. Call Lisa Hovey, Assistant Director or Lucia Collison, Association Services at 800.369.6337 or 515.276.3344 if you wish to make a donation.

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	*Developing HACCP Plans – A Five-Part Series (as published in *DFES*)	15.00	15.00	
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The International Association for Food Protection, 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 Should Join?*

The Association is comprised of a diverse membership of 3,000 people from 50 nations. The International Association for Food Protection Members belong to all facets of the food protection arena including: Industry, Government and Academia.

✳ *Why Should They Become Association Members?*

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

The Annual Meeting — Is a unique educational event; three days of technical sessions, symposia and exhibits provide attendees with over 250 presentations on current topics in food protection. The International Association for Food Protection Members receive a substantially reduced registration fee.

✳ *Help Others Find Out About the Association...*

To learn more about the Association and the **many** other benefits and opportunities available to a Member, visit our Web site: www.foodprotection.org or please call 515.276.3344 or 800.369.6337; Fax: 515.276.8655; E-mail: info@foodprotection.org. We will be happy to send new Member information if you provide us the necessary mailing information.

International Association for Food Protection

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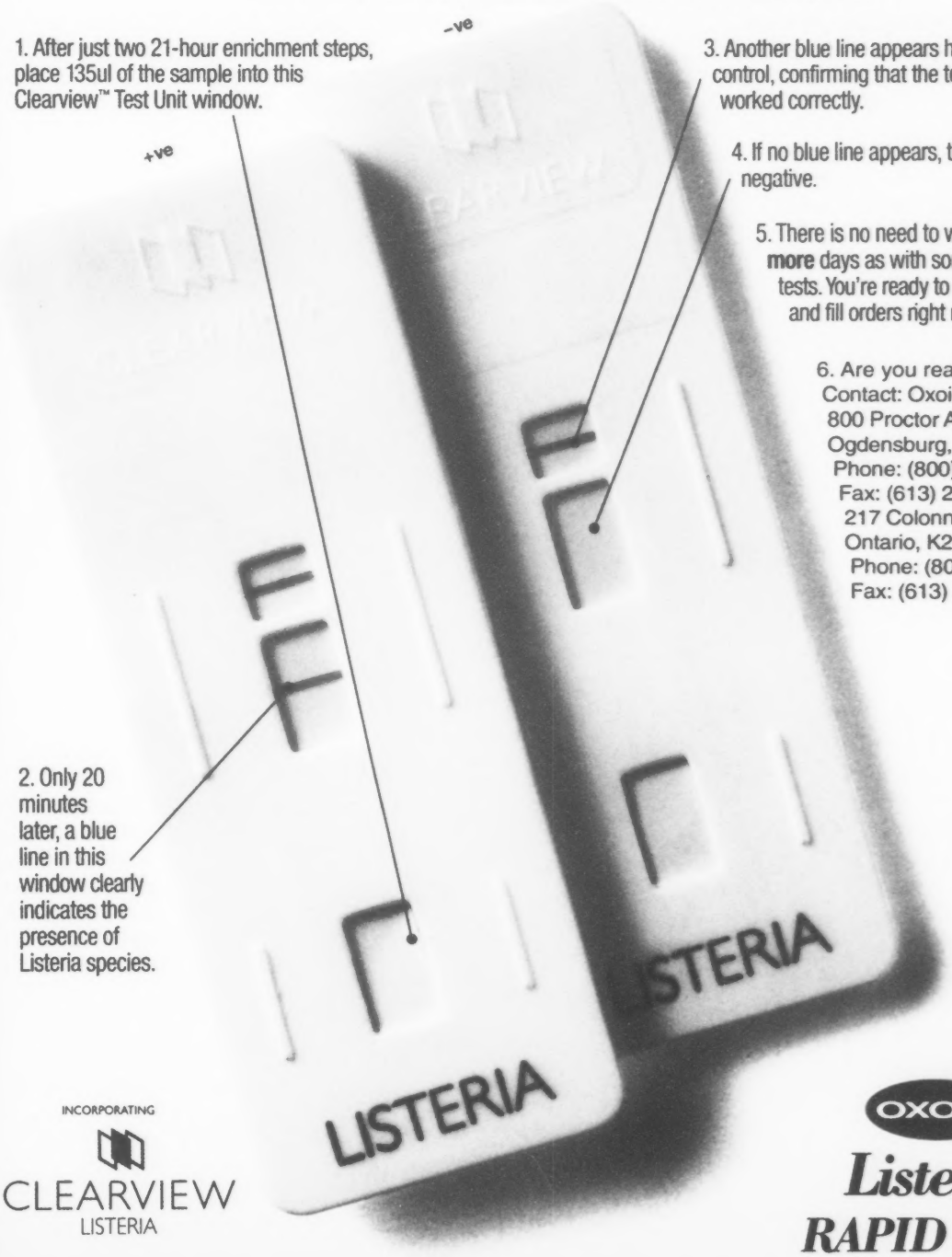

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