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

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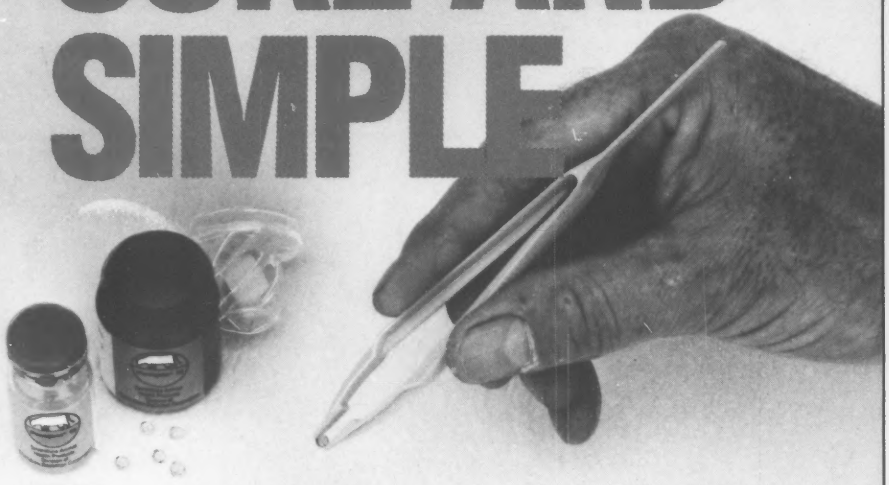

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Dairy and Food Sanitation

CONTENTS **Vol. 7** **No. 8** **AUGUST, 1987**

Dairy and Food Sanitation, Vol. 7, No. 8, Pages 392-394 (August 1987)

Summer Food Safety Tips

by Frank E. Young, M.D., and Karen J. Skinner, Ph.D.

Dr. Young is commissioner of FDA. Dr. Skinner is on temporary assignment as special assistant for science to the commissioner. Reprinted from the June 1987/FDA Consumer.

Summertime, and the living is easy - not just for us, but also for microorganisms that can grow in food and make us sick.

Many view food-borne diseases as nothing more than short-term nuisances. But for certain groups - the very young, the very old, and those with impaired immune systems - foodborne illness can be serious and, tragically, often fatal. Moreover, some foodborne diseases may lead to certain chronic health problems, such as arthritis.

These sobering facts keep FDA constantly alert to the problem of microbiological food safety. But consumers are even more important than FDA in preventing foodborne disease at home, where about 30 percent of all bacteria-related food poisoning outbreaks occur. In this respect, consumers and FDA have a shared responsibility.

Summer - with its warm temperatures ideal for microbial growth - is an excellent time to review food safety principles. To help, here are a few rules to keep in mind.

Rule One: ***Remember the Time-Temperature Danger Zone***

Disease-causing bacteria in food like to grow in the temperature range between 40 and 140 degrees Fahrenheit. **Avoid keeping foods in this temperature danger zone! Don't eat foods that have been kept within this range for more than two hours.** In ensuring food safety, a thermometer is the most important utensil you have. Make a practice of using it to monitor internal food temperatures and food storage temperatures.

By remembering the time-temperature relationship - the "2-40-140" rule (no more than two hours between 40 F and 140 F) - you will have a much better idea of how to handle foods in a variety of situations, especially in the summer. If, for example, you want to buy fried chicken at a carry-out for your picnic, either eat the chicken within two hours, or take it home immediately, cool it quickly in your refrigerator, and then keep it chilled below 40 F as you travel to your picnic site. If you put the hot chicken in an ice chest right away, you might not cool it rapidly enough and will actually accelerate the growth of organisms by causing the chicken to sit in the temperature danger zone for some time.

At church dinners, buffets or potluck dinners, wait as long as possible to prepare the dishes before it's time to eat, and don't leave food sitting at room temperature. Place dishes of cold foods on beds of ice, and hold hot foods above the danger zone (at temperatures greater than 140 F). Some home-style food warmers, like chafing dishes, vary in their ability to warm food throughout. When using these warmers, don't keep food out for more than two hours. Uneven warming may lead to temperature pockets in the danger zone where bacteria happily multiply.

Use shallow dishes to cool foods quickly in the refrigerator. The interior of foods in deep containers may chill very slowly, leaving hazardous warm areas. Defrost meats and other foods, not on your kitchen counter, but in your refrigerator to avoid bacterial growth at room temperature.

If a summer electrical storm interrupts power, your refrigerator probably will remain sufficiently cold for about four to six hours (depending on room temperature), and a half-filled freezer for about one day. Keeping the refrigerator or freezer closed and using block ice in the refrigerator and dry ice in the freezer can help keep contents safely cold.

In summer, temperatures in a car can reach the high end of the danger zone. A good rule of thumb is that perishable groceries like meats and dairy products shouldn't be left in a hot car any longer than it would take ice cream to melt. Never allow more than two hours to pass between purchasing food and getting it into your home refrigerator.

Foods available at fast-food, deli and refrigerated counters are becoming popular items for summer outings. But

if they've been mishandled before you buy them, they already may have been held between 40 F and 140 F. After purchase, even two hours within the danger range for these foods might be risky. Eat them immediately or keep them cooled below 40 F.

The higher temperatures (165 F to 212 F) reached in boiling, baking, frying and roasting kill most types of the bacteria that cause food-borne illness. On cookouts, to be on the safe side, cook red meat until the pink is gone, poultry until there is no red in the joints, and fish until it's flaky.

Colder temperatures slow bacterial growth. With a thermometer, check that your freezer is at zero degrees Fahrenheit or lower and your refrigerator at 40 F or lower. Crowded summer refrigerators (like those on boats and trailers) might develop warm spots in the temperature danger range.

Rule Two: ***Make a Clean Break to Good Sanitation Practices***

Cleanliness is critical to avoiding food contamination. Take extra care to avoid infecting one food with organisms from another, especially when handling raw meats and poultry, on which some bacteria usually are present. At every step of food preparation, wash hands, counters and utensils with warm, soapy water. When barbecuing, don't use the same plate for cooked meat that carried raw meat, unless you've cleaned it first. Remember, an unwashed chopping board or knife may be a reservoir of harmful bacteria. Even that favorite picnic food, watermelon, can be contaminated with a dirty utensil.

Away from home, most hand wipes can help keep hands clean, and paper towels are one solution to the problem of dirty cloth towels harboring bacteria. If you have a cut or an infection, don't' handle food. Animals aren't allowed in food processing plants, and at home, dogs, cats and other pets shouldn't be around food.

Away from home, most hand wipes can help keep hands clean, and paper towels are one solution to the problem of dirty cloth towels harboring bacteria. If you have a cut or an infection, don't handle food. Animals aren't allowed in food processing plants, and at home, dogs, cats and other pets shouldn't be around food.

Sparkling lakes, streams and rivers, tempting to thirsty campers, may contain viruses, bacteria and the parasite *Giardia lamblia,* famous for causing "backpacker's disease" or "beaver fever." When "roughing it," boil water, treat it with purification tablets, or try one of the new filtering devices that remove *Giardia* cysts, as well as other contaminants. Bottled water is another alternative for drinking, cooking and cleaning.

Rule Three: ***Know the Foods Requiring Special Care***

Harmful organisms grow more readily in foods high in protein and moisture. Special care with time, temperature and sanitation is needed for foods like meat, poultry, fish, shellfish, meat and seafood salads, potato salad, milk, milk products, eggs, cream pies, custards, eclairs, cream puffs, cake fillings, and gravies. Cooked pasta also can support microbial growth and should be served hot or properly refrigerated until used.

Cooking can destroy natural barriers to contamination in some foods from plant sources, and can free up nutrients needed by microorganisms to grow in these foods. Outbreaks of food-borne illness have been associated with bean curd (tofu), corn, lima beans, mushrooms, refried beans, rice, squash, and sweet potatoes that were cooked and then held for some time before eating. Except for sealed, commercially processed foods (such as canned foods), these and other moist, low-acid, cooked foods from plant sources should be refrigerated. Don't' leave them at room temperature for more than two hours.

When you buy side orders to take-out foods, or think about piling beans, pasta salads, or other cooked vegetables and cheeses on your salad-bar creations, remember, these are "special care foods," and consider how much time will pass before you eat.

Guarding against deadly botulism toxin, produced in reduced-oxygen environments, always requires special care. Fresh mushrooms in airtight packages recently have been involved in botulism cases. Improperly canned foods - especially low-acid foods such as meat, poultry, fish, string beans, beets, peas, corn and some fruits - also may be good places for the botulinum bacteria to grow. **Do not taste or eat** any foods from leaking,bulging or severely damaged cans; cracked jars; jars with loose or bulging lids; or swollen or puffy pouch containers. Boil all home-canned foods before tasting or serving. If an initial, rapid boil produces off-odors or foaming, **don't eat the food!** Discard suspect foods carefully, so that others, especially children and animals, won't be exposed. If there's no danger-signaling odor, boil high-acid foods for another 10 minutes and low-acid foods for another 20 minutes to destroy any botulinum toxins that nevertheless may be present.

Rule Four: ***Inspect Food Storage***

Proper storage is another vital aspect of preserving the safety and quality of foods. As you restock larders at home and in summer places, take an inventory of existing items and inspect your storage practices.

Generally, pantry storage areas should be about 50 degrees Fahrenheit, clean, and away from leaky pipes, household chemicals, and openings where insects and rodents may enter. It's not safe to assume that all boxed and canned goods may be held at room temperature. During your inspection, check labels to ensure you've properly followed storage instructions, and discard items for which you've made a mistake. Also examine "best if used by" and expiration dates to determine if you've held foods too long. Make sure containers are free from dust

and other matter that could contaminate food when products are opened.

When checking pantries in mountain cottages and other retreats, remember that can left over the winter may freeze - stressing seams and creating microscopic openings through which bacteria and other contaminants may enter. Undamaged, low-acid canned goods generally last two to five years, and high-acid foods (such as tomato products and fruit juices) about 18 months.

Don't forget the refrigerator during your inspection tour. Molds, which may cause allergies and other health problems, like to grow in warm weather, but also are very content living inside refrigerators. To reduce mold buildup, wash the inside of the refrigerator with one tablespoon of baking soda dissolved in a quart of water, then rinse with clear water. Also be sure to clean the gaskets sealing the doors. Scrubbing with a solution of three tablespoons of bleach in a quart of water has been recommended for this purpose, but manufacturers vary in their cleaning instructions, so consult your appliance use and care guides for recommended cleaning procedures.

Rule Five: ***Think Before You Eat***

Because most food poisoning bacteria are odorless, colorless and tasteless, the only sense protecting you against food-borne illness is common sense. When traveling, prudent dietary and hygienic practices are your best safeguard against trouble. Remember these rules wherever you are, whether boating, picnicking, camping, or enjoying some other excursion.

Rule Six: ***Know When to See a Doctor***

When food-borne disease strikes, see a doctor or get hospital help if the symptoms are severe or if the victim is young, elderly or suffers from a chronic illness. If you suspect botulism, get medical help immediately! This disease can be fatal. Botulinum toxin attacks the nervous system, causing double vision, trouble swallowing, and difficult breathing.

Generally, diarrhea, nausea, vomiting and abdominal cramps characterize food-borne illness, but symptoms vary from microbe to microbe and with the amount of contaminants actually eaten. Symptoms usually appear in six to 48 hours, but they can show up much sooner, sometimes even within half an hour. For mild cases of food poisoning, maintain liquid intake to replace fluids lost through vomiting and diarrhea.

Rule Seven: ***Learn More About Food Safety***

These rules are only the highlights of food safety principles. For more information, consult these excellent sources:

- FDA's Consumer Affairs Office - Write to "Food Safety" HFE-88, Food and Drug Administration, 5600 Fishers Lane, Rockville, MD 20857.
- "The Food Keeper" - This brochure describes refrigerator and freezer storage, pantry and dry storage, and foods that need special care. For a copy, send 25 cents and a legal-sized, stamped, self-addressed envelope to: "The Food Keeper," Food Marketing Institute, 1750 K St., N.W., Washington, D.C. 20006.
- The U.S. Department of Agriculture's Meat and Poultry Hotline - Call the toll-free number, 800-535-4555, between 10 and 4 on weekdays for answers to your questions on the proper handling of meat and poultry. You may also write to "The Meat and Poultry Hotline," USDA-FSIS, Room 1165-S, Washington, D.C. 20250. Two very useful booklets, "The Safe Food Book" and "Safe Food to Go," can be obtained through the hotline.

Dairy and Food Sanitation, Vol. 7, No. 8, Pages 396-397 (August 1987)

Out of the Bronzed Age

by Richard C. Thompson
A Member of the FDA's Public Affiars Staff
Reprinted from the June 1987/FDA Consumer

The great American migration seeking fun in the sun is now under way. The stirrings began with the vernal equinox as the winter sun crossed the equator, heading north and increasing the hours of daylight. Over the next three months, from June through Labor Day, that migration will take people to lake shore and ocean front beaches and up into the thin, clear mountain air.

For many of these people, an important part of the fun will be "getting a healthy tan." But in recent years, more and more Americans have been getting the message that there's really nothing healthy about a "healthy tan." For the first time, there may be a generation growing up that understands the risks of tanning and burning and cancer and cataracts that can result from too much sun.

"Too much" can mean a severe sunburn and the temporary punishment of pain and peeling that goes with it. But to physicians, especially dermatologists, it also means a lifetime of exposure to the sun that puts the skin through a repeated cycle of injury, repair and, ultimately, permanent damage.

Skin damage from sunlight is cumulative; the harmful effects build up with each exposure, whether sunburn occurs or not. Effects can include wrinkling and premature aging of the skin and, in time, the almost leathery appearance of long-time desert dwellers and fishermen and others who have spent their lives in the great outdoors.

It is the ultraviolet radiation in sunlight that injures skin cells in exposed and unprotected areas of the body. Although the skin's own repair mechanism will immediately go to work, this does not mean it can undo all the damage. If the cycle is repeated day after day and year after year, the damage can become irreversible.

The most dreaded consequence of excessive exposure to the sun is skin cancer, usually associated with aging, although dermatologists report seeing it in a surprising number of adolescents and young adults. The most prevalent skin cancers are basal cell and squamous cell carcinomas.

Basal cell carcinomas appear on the head, neck, hands and trunk and are the type most often seen among Caucasians. They are slightly raised, slightly translucent nodules that, if untreated, may crust and bleed. They grow slowly and do not spread (metastasize) through the bloodstream to other parts of the body. In time, however, they can penetrate to underlying tissue and form swelling tumorous growths that crowd against and damage organs and tissue. Some 500,000 cases of basal cell carcinoma are expected in the United States this year.

It was a basal cell carcinoma that was removed last year from President Reagan's nose; from the First Lady's upper lip; from Vice President Bush's cheek; and from newsman Ted Koppel's eyelid.

Squamous cell carcinomas are reddish or pink raised nodules or warty growths, most often found on the lips, face, mouth, hands, ears and other areas exposed to the sun. They may bleed and form small ulcers, and they can eventually grow downward within the skin and metastasize to other organs and tissue, causing serious damage, even death. Some 100,000 cases of squamous cell carcinoma are reported each year in the United States.

Both basal cell and squamous cell carcinomas are almost always curable if detected early and removed by simple surgery or freezing with liquid nitrogen.

A more sinister kind of skin cancer is malignant melanoma. Although very rare, it is often fatal, but is more treatable with drugs and surgery than it once was. Some 20,000 cases will likely be reported this year.

Although the relationship between melanoma and the sun is not as clear as for basal cell and squamous cell carcinoma, some experts believe it can be traced to intense, short-term exposure - often before age 20 - accompanied by blistering and painful sunburn. There is evidence that heredity may also be a strong determinant.

Back in 1930, about one person in 1,500 in the United States could expect to develop melanoma in his or her lifetime, according to the American Cancer Society. By 1980, that had risen to one person in 250, and by the year 2000, it could rise still further to one in 100. Tanning was not as fashionable in the thirties as it is today and, if the sun does trigger melanoma, one reason for the increase could be Americans' fascination with tan bodies.

The upper back, torso, head, neck and lower legs are the most common locations for melanomas, which often arise from an existing mole. The average persons' body

will have about two dozen moles, and these should be checked from time to time to be certain they are not changing in shape or color. If any are, see a doctor right away.

Compared to a harmless mole, a melanoma will develop spreading and uneven edges and show colors of black, brown and even red and blue. If not treated with drugs or surgery, a malignant melanoma can lead to death as it spreads through the body. With early diagnosis, survival rates for treated cases are considered good.

The summertime sun over the United States is most intense and its rays most hazardous from 11 a.m. to 3 p.m., and anyone who is out at that time should take sensible precautions. This includes using an effective sunscreen oil or lotion and - for the best protection - wearing a hat an clothing that covers the body.

The sun products industry in the United States has been growing at the rate of 10 percent a year for the past five years, with more than half of these sun products sold from June to September.

One reason for this growth was FDA's proposed regulation in 1978 requiring that products containing a sunscreen or sun-blocking agent carry a "sun protection factor" (SPF) number that indicates to users the degree of protection the product provides.

The U.S. cosmetics industry quickly picked up on this and began using SPFs in their sunscreen promotions and advertising.

SPF numbers range from 2 to 15 and appear in bold numerals on sunscreen packages. The higher the number, the greater the protection. SPF-15, for example, means that the user can spend 15 hours in the sun and absorb the same amount of tanning rays that would be absorbed in one hour without a sunscreen. SPF-2 means the user can spend two hours in the sun and absorb the rays that would be absorbed in an hour without a screen.

Anyone seeking a tan should know his or her skin type (see accompanying chart) and then choose the sunscreen that offers the appropriate protection.

A system similar to SPF is being tried by the cosmetic industry with products such as soaps and shampoos. These include a styling gel to protect hair from the bleaching effects of the sun and even a lotion to protect a balding scalp. Whether they work is debatable.

Some firms in the United States and abroad are attempting to go beyond SPF-15 and are getting into the SPF-20s.

Firms are also marketing "tan accelerator" lotions, creams and powders that supposedly pre-release melanin - the skins' darkening protective pigment - in the skin and allow faster tanning if used a day or so before going out in the sun. FDA is cautioning these firms that - because these substances act on and in the body - they may have to be classified as drugs and come under stricter regulation.

For all the benefits of sunscreens, sunblocks and public awareness, the occurrence of skin cancer in the United States is increasing. Part of the reason may be found in a University of Florida study done last year.

More than 90 percent of those surveyed knew that too much sunlight causes skin cancer and aging. More than 80 percent understood the SPF system and know that the right sunscreen would give protection. Yet, knowing all this, most still persisted in saying a "tan is healthy," and only half used sunscreens regularly.

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Viruses in Products of Food Animals

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Although products prepared from infected food animals are thought to be significant sources of human infections, there is a paucity of evidence for such a direct relationship.

The transmission of infectious hepatitis through the ingestion of bivalves obtained from polluted marine waters has been documented (25, 30, 51). Enterovirus infections, a frequent human occurrence, have arisen from the consumption of food products prepared with contaminated liquids or by food handlers with active enteric infections (24, 28, 56).

Human viral pathogens, such as poliovirus; coxsackie viruses A_5 and A_20; echovirus 8; reovirus 1, 2 and 3; and influenza virus A_2, have all been isolated from food animals (44). Viruses have also occurred in animal products (Table 1) such as raw and pasteurized milk (6, 34, 35, 40, 49) dairy products (11, 33, 59), shellfish (31, 46) eggs, (17) and ground beef (63).

Although reported isolations of human viruses from these products have been few, the role of contaminated food in disease transmission should not be minimized. However, replication and persistence of infectious viral agents in tissues and products have been studied extensively with pathogens of lower animals (11, 27, 32).

Contaminated animal products have been implicated as the causative agents in a number of disease outbreaks in food animal populations (9, 47, 59-61). Feeding of meat scraps to susceptible swine populations has led to outbreaks of African swine fever (ASF) in Portugal, Spain and Italy (3, 61) and swine vesicular disease (SVD) in the United Kingdom (6). At various times in the first half of the century in the United States, livestock diseases such as vesicular exanthema of swine (VES) and foot-and-mouth disease (FMD) have arisen from the freeing of infected meat scraps and offal as well as from exposure to contaminated products, such as vaccines of hay (42, 48, 58, 59, 62).

Economic Aspects of a Disease Outbreak

The indemnities paid during an outbreak of SVD in the United Kingdom amounted to $12 million in the first five years after the initial diagnosis of the disease (60). The predicted cost of widescale outbreaks of FMD in the United States alone would be $4 billion in direct losses and ten times that amount in indirect losses (51).

Persistence of Infectious Agents* in Animal Tissues

Livestock in the United States are totally susceptible to a number of exotic infectious agents. The major viral diseases of concern are ASF, FMD, SVD, rinderpest (RP) and hog cholera (HC) (11). The respective persistence of the above exotic agents varies. For example, FMD virus is very acid-labile and is inactivated in skeletal muscle within 48 hr. due to pH change (pH 5.8 and below) associated with rigor mortis (18). However, when the virus is present in the protected environment of lymph nodes, clotted blood or bone marrow, it remains viable for four to six months (38). On the other hand, acid-stable SVD persists in swine carcasses for upwards of one year and in fecal debris and contaminated blood in the soil for longer periods (23, 27). Rinderpest virus has survived for intermediate periods of up to one and a half months in carcasses of experimentally infected cattle (32). The virus has been detected up to 45 days in milk from recovered cows. African swine fever virus persisted for 150 days at 4°C and for 104 days at -4°C in skeletal muscle, and for six months in bone marrow when held at -4°C (43). Hog cholera virus persists in skin for 33 days and in skeletal muscle for 73 days (2).

Virucidal Effect of Food Processing

Consumer tastes dictate the method of processing of a given food product. Low temperature-long time heating, controlled acid formation and the "rediscovered" use of irradiation are all means of achieving desired traits. The optimum situation would be to employ those processing methods that are also virucidal.

Although FMD virus persisted for significant periods in lymph nodes of infected cattle, the virus was inactivated in these tissues when processed under retort conditions (38). When present in meatball and ground beef products prepared from infected cattle, the virus was inactivated after thermal processing to core temperatures of 93°and 98°C, respectively (10).

In the milk of infected cows, FMD virus survived high temperature-short time (HTST) processing (at least 71.7°C for at least 15 sec.) as well as HTST pasteurization followed by evaporation to 50% total solids (42). The virus not only survived 71.7°C pasteurization for 5 min. but also heating at 138°C for 2-3 sec. (21).

Foot-and-mouth disease virus present in the components of whole milk (cream, skim milk, pelleted cellular debris) had comparable stability after HTST pasteurization (6). Higher concentrations of FMD virus were routinely found in the cream. The virus was not detected in the skim milk after 71.7°C pasteurization for 5 min. followed by evaporation (6), or in whole milk after UHT heating at 148°C for 2-3 sec. (21).

The acid lability of FMD virus at a pH of 6.0 and below is utilized in principle in the decontamination of laboratory and contaminated premises. However, in those dairy products produced by controlled acid development in milk from infected lactating cows, the virus was quite stable.

For example, in cheese types cured at pH of 5.2 to 5.5, the virus was routinely detected in various stages of the curing period (5). In bacterial-ripened Cheddar cheese types, FMD virus was detected after processing but not after 30 days of curing. In raw milk Cheddar cheese, the virus persisted 90 days into the curing period but not after 120 days. In Italian soft cheeses, such as mozzarella, the virus was not detected after manufacture. In mold surface-ripened cheeses, such as Camembert cheese, FMD virus persisted for 21 days after processing. Virus survival in Camembert cheese but not in mozarella is of interest because the manufacturing schemes of both cheeses involved HTST pasteurization of the original milk and curd coagulation by the same type lactic acid culture. Heating of the curd in a water bath at 85°C for 30 min. was an additional processing step in mozzarella cheese manufacture.

*African swine fever is an acute, highly fatal disease of swine; FMD is an extremely contagious disease of a wide variety of animal species causing minimal mortality but serious economic losses. Swine vesicular disease is an extremely contagious disease of swine with a morbidity rate of up to 65%; RP is a highly acute febrile disease of ruminants with a high mortality rate; HC is an acute highly contagious disease of swine with variable mortality; not only survived 71.7°C pasteurization for 5 min. but also heating at 138°C for 2-3 sec. (21).

In butter, FMD virus survived processing (pasteurization of cream at 93°C for 15 sec; acidulation of cream by lactic acid cultures and churning) and for a minimum of four months when held at 4°C (7).

Isoelectric precipitation of casein from skim milk at pH 4.6 was not a deterrent to FMD virus survival. The virus persisted for 2 months in dried casein (19, 20). The virus also survived in sweet whey but not in whey products: A-lactalbumin, B-lactoglobulin or lactose (8).

In meat products such a brined hams prepared from infected swine, ASF and HC viruses persisted for over two months respectively (53). In hams prepared by Parma ham processing, SVD virus persisted for at least six months (54).

In those products produced by controlled acid development, ASF and HC viruses persisted for 15 and 30 days respectively (53); however, SVD virus was detected through one year in dry salami and pepperoni sausage and through two years in intestinal casings (52). In respective samplings of infected casings, HC virus survived for 147 days, FMD virus for 250 days and SVD virus for a minimum of 780 days (53, 54).

In addition, Dhenin and co-workers detected FMD virus up to 56 days in sausages, 183 days in ham fat and 190 days in salted bacon (26). However, retort processing of tissues and products from animals infected with exotic viruses has been effective (37, 53, 54).

Protective Mechanisms

Viral infection of a susceptible cell is initiated by a series of steps encompassing attachment, penetration, synthesis of components of the mature virus particle or virion and release of the virion from the cell.

Thus the antiviral activity of a given process would be reflective of subsequent interference with one or more of the replicative steps in the infectious process of virus present in the food product.

Specifically, alteration of viral surface proteins by heating (as would be the case in thermal processing of a food) or by high acid formation (as would be the case in fermentation) prevents attachment to a susceptible cell (11, 42) and both irradiation and prolonged heating cause breaks in the viral nucleic acid core, thereby precluding viral replication (11, 42). Food composition, however, confers a protective effect on virus present. Bone marrow, clotted blood and lymph nodes are examples of micro-environments which insulate virus from conditions which cause inactivation (4). The enhanced stability o FMD virus in milk and dairy products suggests a protective effect covered by milk constituents, such as milk fat globule (MFG) in cream, casein in skim milk or a combi-

nation of the two. The virus was not detected in the acid whey (pH 4.6) by-product of casein manufacture. However, the fact that FMD virus survived in desiccated and wet casein slurries (pH 4.6) and in sweet whey (pH 6.2) by-product of Camembert and Cheddar cheese manufacture suggested that the composition of casein, as well as that of respective whey samples, was a factor in virus survival and more importantly that protective complexes apparently were being formed at the level of the secretary epithelial cell. In fact such structures were observed by electron microscopy (10). Virus-like particles in exocytosed MFG were observed in preparations in which an increase in viral titer was detected in the buttermilk fraction of such samples released during churning (12).

Strong electron microscopic and biological evidence exists that complexes of FMD virus with secretary cell synthetic products, casein, MFG, as well as with anucleated membrane-limited structures derived from SE cells, are major factors in the enhanced stability of FMD virus in the milk of infected cows. A likely consequence of this type of FMD virus-milk constituent association is the survival of FMD virus in raw milk Cheddar cheese for more than 90 but less than 120 days (7). As reported by Knoop, the initial micellar structure in cheese is broken down to sub-micellar units after three months of the ripening of the rennet curd, eventually resulting in an apparently structure-less homogeneous mass (44). Thus a dissociation of the micelle into its component subunits would expose FMD virus to environmental inactivants.

In another observance, the shattering of the casein micelle during UHT heating and not at lower temperatures (51) and the concomitant inactivation of FMD virus (at the higher temperature but not at lower temperatures) suggest that a protective association existed before the complex was altered (21).

Approaches to Current Processing

Effective processing insures that all parts of a food product receive a desired amount of heat hydrogen ion concentration or irradiation energy. The dynamics of heat transmission in any food product is such that there is a specific area that is last to come to temperature. This area or "coldspot" is defined by the physical character of the cooking container and must be determined experimentally (11). The thoroughness of the cooking process of bulk consignments of meat imported into the U.S. is monitored by government inspectors who observe the intensity of color of the fluid expressed from a representative meat sample: the pink juice test. If the color is judged to be pink, the entire consignment of meat is refused entry. The examination is highly subjective and dependent upon the visual acuity.

Viral inactivation can be related to structural changes in major proteins of the cooked food product, but this type of approach has not yet been developed for practical use in port inspections. However, highly sensitive temperature indicator devices are currently available (11).

Discussion

In contrast to only isolated reports of human viral agents detected in food animals, infectious hepatitis virus has been isolated routinely from infected shellfish but even more importantly, it has been determined that consumption of such bivalves has resulted in outbreaks of the disease.

Epidemiological reports also strongly suggest that a significant number of enteric infections have been caused by eating contaminated shellfish. In contrast, transmission of diseases in lower animals by eating contaminated food products has been extensively documented. For example, McKercher reported that SVD can be transmitted to swine by feeding contaminated meat scraps (52).

Outbreaks of FMD have been attributed to contaminated milk (36, 64). This virus has been shown to be more pH and heat-stable in the milk of infected lactating cows than in buffer solutions (11). This enhanced stability may be due in part to the formation of complexes of FMD virus with constituents in the mammary gland secretory epithelial cells. Entrapment of FMD viral particles within membrane-limited fragments of cytoplasm and association of viral antigens with the MFG membrane suggest that other viruses may also escape virucidal conditions through normal cellular mechanisms. The slow viruses of Kuru and Creutzfeldt-Jakob (C-J) disease in humans may be similarly protected in infected brain cells. Kuru is transmitted by ritual cannibalism while C-J disease is spread from the consumption of meat products prepared from infected sheep brains (1, 29).

More research is needed to determine the possible frequency with which viral diseases are transmitted by food. In the laboratory, state-of-the-art diagnostic tools such as molecular probes, enzyme-linked immunosorbent assays and Western Blot assays are sensitive enough to detect low concentrations of virus in animal products. The use of these and other assays in combination with animal inoculation studies of infectivity, will generate the needed data.

TABLE 1. Animal products as reservoirs of virus

Product	Virus Isolated
Milk and dairy products	Tick-borne encephalitis virus, FMD virus Riderpest virus
Meat products	SVD virus, FMD virus, Creutzfeldt-Jakob disease virus
Eggs	Infectious bronchitis virus
Shellfish, fish	Infectious hepatitis virus, gastroenteritis-associated viruses.
Human brain	Kuru virus

Determination of the extensiveness of such a linkage will require greater research support than is presently available. Food technologists, microbiologists, veterinary virologists and the epideoniologists must cooperate fully to define the role of viruses in disease transmission through contaminated food products.

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Packaged Milk, Cream and Cottage Cheese Can Be Monitored for Freshness Using Polymer Indicator Labels

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Introduction

Most dairy products like pasteurized milk, cream and cottage cheese, etc., are highly perishable and involuntary temperature abuse may jeopardize product shelf life. How long dairy products last is known to be affected by initial product quality and temperature at which the food is handled. The problems and the spoilage of short shelf-life dairy products due to microbiological factors have been well documented.

However, problems of warm school milk temperature and milk acceptability first came to light in 1973 when researchers from the Department of Food Science at Cornell University found that product temperature in 48% of the milk provided children exceeded 7.2°C (45°F) at the time of delivery, 23% during the storage and 38% of the milk offered students on serving lines. They also reported when milk tasted good, average consumption approximated 90%. When milk was judged fair to poor, consumption was reduced to about 60%.

Quality and flavor changes in perishable dairy products are mostly due to organic reactions were chemical changes are either expedited or added to by the growth of micoorganisms. The rate of change and the growth of psychrotrophs, for example, are markedly affected by fluctuations of temperature at which dairy products are held. The combined effect of initial quality and time-temperature exposures of perishable foods determines product shelf life.

Pasteurized milks and creams generally have 8 to 12 day sell-by date codes imprinted on packages to ensure product freshness at time of consumption. However, it is not uncommon to find some product spoiled before its advertised expiration date. For the most part, perceptible freshness of a food in a sealed container is not known until the package is opened or tasted.

Allied Corporation of Morristown, New Jersey developed its Lifelines™ (2) Inventory Management System, a computerized time-temperature monitoring system, for measuring the freshness of semiperishable and perishable foods during storage and distribution. Studies were conducted at Cornell University, Ithaca, New York to evaluate the feasibility of the Lifelines System for monitoring the freshness of perishable dairy products held at different temperatures. This paper reports the results of a study adapting the Lifelines™ System to packaged milk, cream and cottage cheese.

Briefly, the system incorporates proprietary color-changing polymers printed on a label in a bar code format. The indicator label is attached to packaged product. Indicator polymer goes through an irreversible increase in color intensity as a result of cumulative exposure to temperature. The degree of color change can be estimated visually; however, more accurate changes in intensity are determined using a color-reading instrument where data are recorded for later analysis.

Objectives and Methods

Work was initiated to determine the growth of microorganisms in relation to the quality changes and the shelf life in samples of pasteurized homogenized milk, pasteurized cream and cottage cheese by storing them at refrigeration temperatures and above. In addition, a program was initiated to study the value and ability of the Lifelines™ Inventory Management System to measure product freshness and shelf life under test. The use of

the time temperature monitoring system has previously been described by Zall and others (4) (5) and (6).

Samples of pasteurized homogenized milks were obtained both from Cornell's milk processing plant operated by the Department of Food Science, at Ithaca, New York and from two commercial plants in the state. Samples of cream were obtained from Cornell and off-campus operations while samples of cottage cheese were obtained from off-campus factories only where product freshness was verified.

Analysis of the milk, cream and cottage cheese samples were carried out according to standard methods for the examination of dairy products (3). Tests used included psychrotrophic bacteria counts (PBC), acid degree value (ADV) and taste panel methodology. The Lifeline™ indicator labels were used to monitor and to predict degree of the freshness in test samples at prescheduled intervals.

Pasteurized, homogenized milk and pasteurized cream products were stored in controlled environments at 4, 7, and 10 degrees C, while cottage cheese samples were stored at 4, 10, and 15 degrees C. Monitoring 57_1 labels were scanned for polymer reflectance. At the same time, samples were judged by taste panel analysis using a 5-point Hedonic scale with 3.0 representing unacceptable product. The taste panel was made up from 4-8 people from the Department of Food Science.

Results and Discussions

Packaged pasteurized homogenized milks from Cornell University's dairy plant were randomly selected from two different lots processed two weeks apart. Two series of tests were carried out in sequence with 1/2 pints (236 ml) freshly packaged milk. Test results are reported as the averaged values from the two series of tests.

The reflectances of the polymer labels were read using an optical wand and were recorded in a portable microcomputer. Multiple readings were taken from each label and the data averaged. Table 1 shows the changes in reflectance as the function of time-temperature exposures. Figure 1 duplicates data for those who prefer information in graphic form.

Analysis of results for milk samples include taste scores, PBC and ADV data which are listed in Table 2. Decline in taste scores for the milk exposed at different time temperatures were in good agreement with the increase in psychrotroph counts and ADV results of test milks. The correlation between the milk analysis data and label reflectance was statistically challenged using computer minitab analysis.

When a milk sample scored 3 or less, it was considered unacceptable. Milk quality faded faster at elevated temperatures over time as seen in Table 2. The decrease in milk freshness appeared to be in good correlation with the decline in indicator label reflectance as shown in Table 2. In addition to the Cornell milk, 1/2 pint (236 ml) packages of pasteurized homogenized milk were collected from New York State processing plants and subjected to select analysis with results shown in Table 3.

Samples of packaged pasteurized heavy and light creams used in the experiments were obtained from freshly packaged stock from three different lots of product processed at industry plants. Test data from these trials are shown in Table 4. Acid degree values for cream seem low in relation to psychrotroph counts found in the cream samples if we think about how high counts affect ADV in milk. However, cream spoilage during storage at different temperatures were in agreement with changes in psychrotrophs and reflectance data.

As for the cottage cheese data presented in Table 5, the growth of psychrotrophs in cottage cheese and the percentage of samples spoiled seem to confirm that organoleptic spoilage in samples of cheese would agree with increased numbers of psychrotrophs found in product.

Psychrotroph growth appears to be directly influenced by time-temperature exposure. As shown in Table 2, 3, 4 and 5, microbial growth accelerates rapidly as temperatures increase. Psychrotroph growth in refrigerated products appears to be the predominant factor that contributes to product spoilage. A considerable amount of information exists that shows that the growth of psychrotrophs in dairy products is a function of time and temperature exposure. Clearly, not only is microbial growth the function of time-temperature exposure combinations, but the decline in flavor test scores for milk taste also results. The manufacturer of a given product such as milk described in Tables 2 and 3 needs to develop the history or kinetics of commodity degradation in order to match a polymer of choice for monitoring purposes. Polymer 57 showed the Cornell milk was acceptable after 14 days at 4°C while the samples of commercial milk were questionable after 7 days based upon psychrotrophic counts. The reflectance values were much the same as indicated in Table 1. The data show that a polymer other than #57 would probably be preferred to monitor the non-Cornell milk samples. The change in taste with Cornell milk could be followed as it occurred by changes in the reflectance of indicator labels. This study shows that the degree of freshness in the dairy products cited can be estimated by the use of Lifeline™ Inventory Management System. However, unlike previous work in which product was subjected to variations in temperature (4), this was not done in this study and there is need to examine milk behavior when stressed with varied temperature/time fluctuating storage conditions. The polymers together with electronic transfer of information system make the concept attractive for a host of different products.

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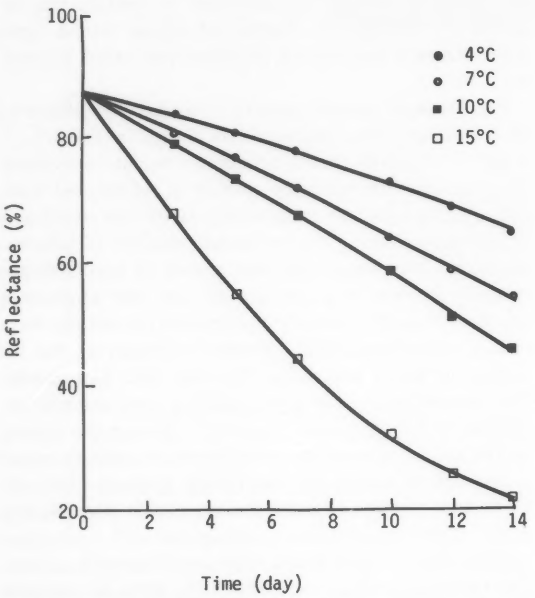

Figure 1. Reflectance of polymer label #57 over time when stored at different temperatures.

Table 1. Reflectance of polymer label #57 after exposure over time at different temperatures.

Days	4°C	7°C	10°C	15°C
		(percent)		
0	87.26	87.26	87.26	87.26
3	83.94	80.44	78.76	67.96
5	80.96	76.18	73.33	54.89
7	77.83	71.00	67.50	43.33
10	73.21	63.68	58.03	32.13
12	68.40	58.28	50.37	25.18
14	64.85	54.08	45.82	21.55

Table 2. Taste, psychrotroph counts and acid degree values in samples of pasteurized homogenized milk processed at Cornell and stored under different time temperature conditions.

Temp (°C)	Days of Storage 0	3	5	7	10	12	14	Number of Trials	Correlation with the Indicator Reflectance
				(Taste Score)*					
4	5	5	5	5	4.6	3.9	3.4	10	0.910
7	5	4.8	4.2	4.0	3.4	3.0	-	10	0.990
10	5	4.3	3.5	2.2	0.9	-	-	10	0.988
				(Log of Psychrotroph Bacteria Counts)					
4	0.5	0.5	-	1.4	1.6	2.8	-	10	-0.961
7	0.5	1.2	-	7.5	7.9	-	-	10	-0.947
10	0.5	4.6	7.5	8.2	8.6	-	-	10	-0.912
				(Acid Degree Value)					
4	0.65	-	0.79	0.83	0.87	0.90	1.27	10	-0.882
7	0.65	-	0.77	0.92	1.12	1.27	-	10	-0.980
10	0.65	-	0.79	1.14	1.65	2.01	-	10	-0.956

*Score Scale

5	4	3	2	1	0
good	fair	poor	very poor	highly objectionable	coapletely apoiled

Table 3. Select analymin of commercial pasteurized homogenized samples of milk atored at different temperatures over time.

Temp (°C)	Days of Storage 0	3	7	10	14	Number of Trials	Correlation with the Indicator Reflectance
			(Log of Psychrotroph Counts)				
4	1	2.1	5.3	7.3	8.3	12	-0.968
7	1	5.8	8.1	8.2	-	12	-0.907
10	1	6.2	8.2	9.3	-	12	-0.931
			(Acid Degree Value)				
4	0.84	-	0.88	1.06	1.44	12	-0.918
7	0.84	-	0.93	1.16	-	12	-0.895
10	0.84	-	1.31	1.41	-	12	-0.988

Table 4. Psychrotroph counts and acid degree value in samples of pasteurized cream stored at different temperatures over time.

Temp. (°C)	Days of Storage 0	3	7	10	14	Number of trials	Correlation with the Indicator Reflectance
			(Log of Psychrotroph Counts)				
4	2.41	3.95	5.69	6.75	7.63	8	-0.966
7	2.41	4.91	6.74	7.89	-	8	-0.983
10	2.41	5.95	8.11	8.34	-	8	-0.930
			(Acid Degree Value)				
4	0.78	-	0.91	0.95	1.01	8	-
7	0.78	-	0.93	0.95	1.03	8	-
10	0.78	-	1.11	1.20	-	8	-
			(% Nuaber of the Sample Judged to be Spoiled)[1]				
4	0	0	0	-	25	8	-
7	0	0	0	13	38	8	-
10	0	0	38	63	88	8	-

[1] Organoleptic examinations performed by 2 or more trained specialists

Table 5. Psychrotroph counts in sample of cottage cheese stored at different temperatures together with correlation of indicator label reflectance.

Temp. (°C)	Days of Storage 0	3	7	14	Number of trials	Correlation with the Indicator Reflectance
		(Log of Psychrotroph Counts)				
4	2.6	2.9	3.7	4.0	11	-0.929
10	2.6	3.1	5.8	7.4	11	-0.968
15	2.6	6.6	7.5	-	11	-0.913
		(% Nuaber of Saaples Judged to be Spoiled)[1]				
4	0	0	0	0	11	-
10	0	0	0	20	11	-
15	0	0	20	60	11	-

[1] Organoleptic examination performed by 2 or more trained specialists

Keep America Beautiful 1987 National Awards & Mrs. Lyndon B. Johnson Award Nominations

Keep America Beautiful, Inc. (KAB) is now accepting entries for its 1987 National Awards. Nominations are also open for the 1987 Mrs Lyndon B. Johnson Award. The entry deadline is August 21.

KAB's National Awards honor community programs in ten categories (encompassing civic and youth groups, schools, business and industry, government agencies, the media and KAB-certified clean city committees) which maintain an ongoing effort to motivate individual responsibility toward environmental improvement.

The Mrs. Lyndon B. Johnson Award--KAB's highest honor--began in 1968 during a "Salute to Women for Beautification" program honoring the former First Lady for her litter prevention and community improvement activities. Since then, 35 outstanding women have received the Mrs. LBJ Award in recognition of their leadership in the movement for a cleaner, more beautiful America.

Winners will be selected in October by a panel of judges representing business and industry, civic and youth organizations, schools, government, and the media; the Awards will be presented on December 11 at KAB's National Awards Luncheon in Washington, D.C.

For entry forms and information, contact Roger Baumgarten, Awards Program Coordinator, Keep America Beautiful, Inc., 9 West Broad Street, Stamford, CT 06902. Telephone: 203-323-8987.

Founded in 1953, Keep America Beautiful, Inc. is a national, nonprofit, public service organization dedicated to building a national cleanliness ethic.

Acid Environment Slows, Stops Listeria Growth

A University of Wisconsin-Madison food science researcher had some good news and bad news for cheese manufacturers at the recent Cheese Research and Technology conference in Madison.

The good news was that Listeria monocytogenes, the bacterium implicated in a number of dairy-product recalls and food-borne illnesses, does not grow in fluid milk-based products having a pH of 5.2 or lower.

The bad news was that it doesn't die in them, either.

Food microbiologist Elliot Ryser, working with E.H. Marth, inoculated cheese wheys from Camembert cheese with four strains of Listeria. After 35 days of storage at 6 degrees C/43 degrees F, he found that none of the strains grew at a pH of 5.2 or lower in regular whey or whey cultured with the cheese-ripening mold Penicillium camemberti. Two strains grew slowly at a pH of 5.4. At higher pH levels, all strains grew faster and to higher populations in mold-cultured whey than in regular whey, reaching final populations of 10 million to 500 million cells per milliliter after 35 days.

"Based on these results, it appears unlikely that appreciable growth of Listeria can occur in fluid milk-based products having a pH of 5.2 or lower," Ryser said.

"Whey is a delicate product," he continued. "It has to be held under refrigeration. To prevent growth of Listeria, whey must be at a pH of 5.2 or less.

"However, the organism will survive in whey under these conditions, although it won't grow. It's important to prevent contamination of the whey if it's going to be used further."

"The New, Advanced National Food Processing and Warehousing Sanitation Course"

THE AMERICAN SANITATION INSTITUTE will hold an updated version of its sanitation seminar on September 22 and 23, 1987. The new seminar, entitled "The New, Advanced National Food Processing and Warehousing Sanitation Course," will be held in St. Louis and will cover several new topics, including Food Microbiology, Mold Control, and the Importance of Refrigeration and Freezing.

Standard topics to be covered include pesticide labels, employee practices, sanitation hazards, and insect and bird control. Instruction in the above topics, will be enhanced through the use of slides and films.

In addition to presentations by entomologist J.D. Foulk and other specialists from A.S.I., there will be experts from Kraft, Anheuser-Busch, Con Agra, and other major companies on the program.

This workshop is of special interest to food industry plant management, Q.A. and Q.C. managers, directors of sanitation, sanitarians and pest control operators.

Seminar participants can attend a cardinals baseball game on the evening of September 22 if they so desire. In addition, St. Louis offers many attractions for visitors, such as the Gateway Arch, Union Station and the riverfront area known as Laclede's Landing.

For more information and/or registration materials, contact Christine Verplant toll-free at 800-325-3371 or, in Missouri, 314-725-2555, or write The American Sanitation Institute, P.O. Box 24198, St. Louis, MO 63130.

AOAC's 101st Annual International Meeting & Exposition

AOAC's 101st Annual International Meeting & Exposition for analytical scientists, with a spotlight on robotics will be held in San Francisco, California, September 14-17, 1987.

Five symposia are scheduled to provide the most current information in the areas of Robotics, Biotechnology, Industrial Analytical Chemistry, Mycotoxins and Cholesterol Oxides.

The meeting will also feature a trade show of over 80 exhibitors, and an exciting social program.

Biotechnology Processing Engineering Center Third Annual Symposium

The Biotechnology Processing Engineering Center at M.I.T. will present its third annual symposium to be held October 19-21, 1987 at the Massachusetts Institute of Technology, Cambridge, Massachusetts 02139.

This symposium will present recent research activities of the BPEC. Presentations will be made by persons actively involved in the Center as well as by faculty from M.I.T. and other institutions and researchers from industry. The following five focal topic areas will be addressed:

- Genetics and Molecular Biology Relevant to Mammalian Cell Culture.
- Concepts in Bioreactor Design and Operation.
- Downstream Processing: Product Isolation and Purification.
- Immunotechnology.
- Biochemical Process Monitoring and Systems Engineering.

For further information, please contact: Diana Kenney, MIT, Room 20A-207, Cambridge, MA 02139.

Women's Calcium Intake Is Increasing, But It's Still Not Enough

Like the old good news-bad news jokes, consumption of calcium-rich foods is on the rise, but, unfortunately, it still falls short of recommended levels for women ages 19 to 50.

Mary Darling, nutritionist with the University of Minnesota's Extension Service, says a U.S. Department of Agriculture survey on women's eating habits done in 1977 and again two years ago suggests some major changes in calcium intake.

"Calcium consumption by the 19- to 50-year-old women increased from an average of 69 percent of the recommended dietary allowance in 1977 to 78 percent in 1985," Darling says. "But many authorities think the recommended levels are too low. They think the recommended levels of 800 milligrams of calcium per day should be raised to 1,000 milligrams for premenopausal women and 1,500 milligrams daily for postmenopausal women."

Darling explains a woman accumulates calcium in her bones during the first 30 to 35 years of her life, making them more dense. This bone density reduces the risk of osteoporosis, the thinning of the bones that often results in hip fractures and crushed vertebrae among elderly women.

"This survey suggests that calcium consumption is improving, but on the day of the survey only about half of the women drank milk. One-third ate cheese, 25 percent ate cream- or milk-based desserts and fewer than 5 percent consumed yogurt," Darling says.

Dieting plays a role in women's food choices, Darling suspects. "Women may want to avoid calories in dairy products, especially those high in fat. But a lifetime of such dieting may contribute to osteoporosis," she adds.

The survey revealed that women have decreased their use of whole milk by 35 percent in eight years while they increased their consumption of low-fat milk by 60 percent. Eight ounces of any type of milk contain 300 milligrams of calcium, which is about one-third of the current recommended daily consumption.

Despite weight-consciousness, women's consumption of such desserts as ice cream has increased by 21 percent. Darling says women's tastes for gourmet ice creams and cheeses may contribute to their enjoyment of eating. Still, switching to lower-fat dairy products would be wiser if they hope to increase calcium without adding unwanted calories to their diets.

The flurry of interest in calcium consumption as prompted some food manufacturers to add it to bread and cereal products. However, Darling isn't convinced that calcium in this form is as readily available to

the body as it is in dairy foods. She says, "We do know that the body's absorption of calcium is aided by the presence of vitamin D and lactase, the simple sugar in milk."

Similarly, calcium supplements are finding eager buyers. Darling says the cost of these is often excessive. And as is the case with calcium-fortified foods, absorption of supplemental calcium is improved by taking it with meals, with milk and at several times during the day rather than all at once.

Reduce Total Fats In Your Diet

Many people are trying to cut back on saturated fat because of its association with elevated blood cholesterol levels and increased risk of heart disease.

"What people often don't understand is that to decrease their intake of cholesterol from saturated fats, they must change their overall eating habits to reduce total fat," maintains Mary Kinney Sweeten, a Texas A&M University Agricultural Extension Service nutritionist.

"It's not simple to cut out saturated fats alone since fats in foods are mixtures of saturated and unsaturated fats," she explains.

In general, foods containing saturated fats are solid at room temperature, says Sweeten. They include animal products such as poultry, fish, meat, eggs and some dairy products.

There are two types of unsaturated fats.

Mono-unsaturated fats do not seem to have any effect on cholesterol levels, and polyunsaturated fats seem to lower blood cholesterol. Unsaturated fats are usually from plant sources and are liquid at room temperature.

"But even a polyunsaturated oil, such as a standard vegetable oil, will contain 40 percent polyunsaturated fat and 13 percent saturated fat," she remarks.

"Palm oil and coconut oil are also important exceptions to note," says the nutritionist. "Both these vegetable oils, which are used extensively in processed foods and commercial baked goods, are over 80 percent saturated fat."

Sweeten says it would be very difficult for many people to eat only foods that are low unsaturated fats.

"Most people want and need to include some foods from animal sources in their diets, because they are a major source of protein. Trimming visible fat, eating lean cuts of meat and removing the skin from poultry will help reduce saturated fats from these protein foods," she says.

The nutritionist advises building a diet lower in total fat around the recommended two servings daily of protein foods and rounding it out with fruits, vegetables, breads and cereals, and low-fat dairy products.

"Simply watching your intake of fried foods and the fats you're getting from processed foods will also help reduce both saturated and unsaturated fats in your diet," adds Sweeten.

Antifungal Agents, Acidifiers Affect Listeria Survival

Listeria monocytogenes can survive in cold-pack cheese food, but combinations of antifungal agents and acidifiers seem to reduce survival rates, according to University of Wisconsin-Madison researchers.

Food microbiologist Elliot Ryser, working with E.H. Marth, prepared eight different cheese-food formulations from aged cheddar cheese, nonfat dry milk, dried whey, butter and water. They contained potassium sorbate or sodium propionate as antifungal agents. Some contained added lactic acid, acetic acid or both.

He inoculated the different batches of cheese food with four strains of Listeria, and stored them at 4 degrees C/39 degrees F. All strains survived 42 to 84 days in cheese food at that temperature, he said.

"Potassium sorbate appeared to be slightly more effective than sodium propionate in decreasing the Listeria population in non-acidified cheese," Ryser said. "In cheese containing potassium sorbate and acid, the sharpest decrease was seen in cheese acidified with acetic acid, followed by lactic plus acetic acid, and then lactic acid."

Sodium propionate produced similar results, except that the combination of lactic and acetic acid was more effective than acetic acid alone in decreasing Listeria numbers.

The results also show that Listeria apparently did not grow in acidified cheese food at pH 5.0 to 5.1, or in non-acidified cheese food at pH 5.3 to 5.4, he said.

Ryser discussed his findings at the Cheese Research and Technology Conference held recently in Madison.

New Product News

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

New Food Hygiene Training Package

• A high quality, food hygiene training package for the food service and related industries has been produced by a group of Australian industry, governmental and professional organizations. The title of the package is "Don't Poison Your Patrons - The Principles of Food Hygiene'. It introduces people at all levels in food service establishments to the procedures that they should follow to ensure that they do not cause bacterial food-borne illness.

The package includes two videotapes, a manual and a handy hints leaflet. One videotape (19 min) is aimed at managers, supervisors and trainers. It explains the importance of good food hygiene and shows managers and supervisors how to ensure that their staff use acceptable techniques for preparing and storing food. The other videotape (16 min) is aimed at food handlers. It shows food handlers why hygiene is also their responsibility and demonstrates how to apply the principles of food hygiene in their day-to-day activities. Both videos use a subtle, entertaining approach that avoids stern, disciplinarian methods and negative images.

The manual (55 pages) contains practical information presented without scientific terminology. After discussing food-borne illness and its causes and consequences, the manual describes the principles of food hygiene and explains how they should be applied. The manual also contains advice on training techniques and questions and answers for assessing the effectiveness of training. The leaflet summarizes the critical points and is designed to be taken home by food handlers.

The structure of the package allows it to be used by people with different types of expertise and varying needs, including: (1) technically qualified people (e.g. food technologists) conducting training, (2) people using the package for self-instruction, (3) managers, supervisors or trainers who need to train others but who do not have formal training in food science. The package is relevant to food service operations of all sizes.

The price of the package is $150 (1/2 inch videotape). Extra copies of the components of the package are available. The package or further information is available from: The Consumer Liaison Officer, CSIRO Division of Food Research, P.O. Box 52, North Ryde NSW 2113, Australia.

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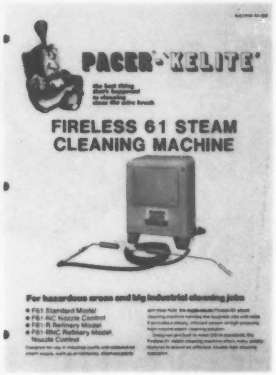

Steam Cleaner Uses Plant Steam

• Now for efficiency, use your *plant process steam* for sanitation and maintenance cleaning in meat processing plants. The PACER Fireless (F-61) Steam Cleaner (caster mounted) along with your established plant steam supply and its *own solution tank and reciprocating piston pump*, can be moved to many locations for your sanitation needs.

Other models with their rugged design, to 18.3 GPM and 325°F available.

For more information, contact PACER STEAM CLEANER, Div. ASM Industries, Inc., 1234 Depot St., Glenview, IL 60025. Telephone: 1-800-323-5431.

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Stick Kitty, New Product Line Glue Traps

• Glue traps sold direct to the Dairy and Food Sanitation Industry at distributer prices. Erlinger Sales Co. announces a new product line called Sticky Kitty. High quality, super sticky, non flowing glue traps at a price you can afford. Available in either peel off cardboard or plastic type in mouse or rat size with attractant. Increase your profit base with an attractive retail package for your over the counter customers.

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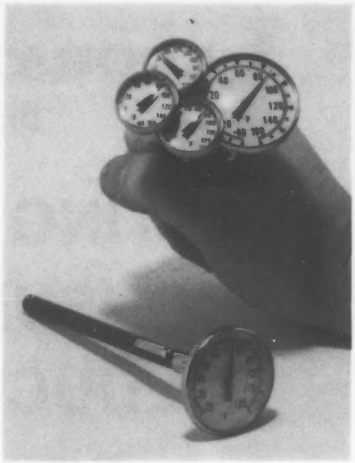

"Easy-Test" Pocket Size Dial Type Stem Thermometers

• Accurate temperature readings are critical to the proper functioning of many processing machines in the manufacture of numerous industrial and consumer products.

The convenience of on-the-spot checking was formerly available to professional users only. Now, Harvey-Westbury Corp., makes available, for the first time, a complete range and selection of 5" pocket type dial thermometers suitable for every application where temperature readings are critical and for use by anyone whether it be a technician or assembly line worker.

States Elliot Huff, Jr., marketing manager of Harvey Westbury Corp. "Our thermometers are constructed with the same high quality features demanded by professionals but with added versatility and applications and at a considerably lower cost. They are of rugged rustproof stainless steel construction, shock resistant, have a 5" long stem for accuracy and come with a handy pocket clip protective carrying case. All have adjustable calibration for zeroing."

Mr. Huff continues, "Our thermometers have a 1" diameter magnified dial or an equally easy-to-read 1-3/4" diameter dial. Both sizes are available in one of 3 different ranges to suite the application: 1) (-)40°F - 160°F 2) 25°F - 125°F 3) 0°F - 220°F.

For more information, contact Elliot Huff, Jr. at Harvey Westbury Corporation, 75 Urban Ave., Westbury NY 11590. Telephone: NY State call collect: 516-334-7770; Out of State call 1-800-433-0008.

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Sensall's Latest Innovation In Liquid Level Controls

• Sensall, a Rosemount division, is proud to announce its latest innovation in liquid level controls. The Series 521 offers the user two-wire simplicity with current loop operation and a unique self diagnostic test capability.

The Series 521 provides all the advantages of ultrasonic point level detection including no moving parts, no maintenance, and high reliability in problem liquids, while offering a new special feature--automatic self test.

All Sensall point level sensors operate through the use of two piezoelectric crystals. Ultrasound passes through the gap between the crystals in a wet condition but will not cross the gap when no liquid is present. Self test is achieved through the use of two additional crystals attached to the main sensing crystals. Every ten seconds the self-test circuitry automatically connects these "self-test" crystals. The result is a simulation of what happens when there is a liquid in the gap.

The unit is completely exercised on a periodic basis, testing the entire system from crystals through electronics and wiring in a simulated wet condition without immersing the sensor. If the device is not working properly, a signal is produced which can be separately discriminated or perceived like an actual alarm to prompt appropriate action.

The two-wire transmission capability allows for low installation cost, current system compatibility, and no AC field wiring.

Solid-state design, low-power circuitry and explosion-proof housing assure high reliability, long life and the option of using the Series 521 in intrinsically safe or explosion-proof installations.

The Series 521 will be the unit of choice where maximum confidence in a level detector's operation is mandatory. Frequently it will be employed as an alarm where less reliable techniques are used for primary level control. It will also be the choice where the low installation costs of a two-wire system and lack of AC field wiring are appealing.

For more information about the Sensall Series 521 or the theory of self-test, call your local Sensall representative or write: Kathryn S. Dallow, Sensall, 250 Marcus Boulevard, Hauppauge, New York 11788. Telephone: 516-273-6190

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High Shear Mixer Improves Water Absorption 15% in Meat and Poultry Products

• A major benefit in processing meat and poultry is maximizing fluid absorption.

To achieve optimum results requires proper preparation or mixing of the brine, pickling, curing or flavoring solutions.

Enzyme, protein and nitrate additives are difficult to dissolve. Often these expensive ingredients "settle out" and are wasted. Absorption is less and the processor ends up with a sludge that needs to be disposed of. Unlike propeller or other types of mixers, the Eastern Rotostat produces the necessary degree of shear and flow for a uniform suspension and solution stability. The net result is a product that retains the solution without "weeping."

The USDA approved Model X-5 features a patented rotor/stator design. The unique revolving "Stator" with mixing blades produces fluid flow to insure tank turnover producing a consistent mix in half the time of other designs. The revolving stator also promotes improved temperature uniformity in the batch through excellent heat dispersion.

The shearing action between the high speed rotor and the calibrated ports in the stator assure fine particle dispersion and suspension.

The shearing action between the high speed rotor and the calibrated ports in the stator assure fine particle dispersion and suspension

The 5 HP motor is TENV and is rated for CIP service.

Tube frames required by other designs are eliminated and the mixing head is detachable, two features that greatly simplify disassembly and cleaning.

The design offers exceptional energy savings over conventional mixers. The circulation rate cuts the process time by 60%. Applications normally requiring 10 HP can be accomplished with a 5 HP Rotostat.

Other models are available from 2 to 20 HP. All feature polished 316 SS wetted parts. Options include 2 speed or variable speed motors and a variety of mounting stands or clamps.

For more information, contact: James M. Donkin, EMI, Inc., PO Box 912, Clinton, CT 06413.

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Automatic Removal of Effluent Grease/Oils/Fats

• BIG DIPPER Automatic Grease/Oils/Fats Removal Units have a 97-99% separation efficiency for removing food oils/fats from a facility's effluent stream. After separating the oils/fats, these units *automatically* "skim-off" the separated oils/fats as a water-free product suitable for sale to rendering firms.

Automatic Grease/Oils/Fats Removal Units are ideal for use in food-processing and restaurant facilities where reduced effluent grease/oils emission standards are being enforced by water treatment plant utilities. The daily self-skimming feature is particularly desirable for operations that seek to avoid unsanitary downstream drain line failures caused by accumulated grease/fats deposits. In addition, Automatic Grease/Oils Removal Units eliminate the pumping/cleaning costs of conventional grease traps and their associated environmental disposal hazards.

BIG DIPPER systems feature sanitary stainless steel construction and are available in 15, 20, 25, 35, 100, 200 and 250 gallons per minute flow rates. A full line of Solids/Sediment Removal Units are also available to efficiently remove effluent food solids.

For more information, contact: Thermaco, Inc., Water Treatment Division, P.O. Box 2548, Asheboro, NC 27204. Telephone: Call Collect at 919-629-4651.

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Technical Bulletin IMSS

• Technical Bulletin IMSS provides universal specifications and ordering information regarding stainless steel chain, shackles, hooks, swivels, eye bolts and other fittings. As an ordering guide, it can be used to purchase from any supplier of stainless steel specialty products. Prepared by International Marine & Specialty Supply, Inc., Pearland, TX, the 12-page booklet contains 11 pages of product illustrations and standardized dimensions, along with reference information regarding chemical composition and physical properties of major types of stainless steel.

Stainless steel hardware is recommended for use in virtually any environment wherein metals are generally subject to corrosive action.

For more information, contact: International Marine & Specialty Supply, Inc., P.O. Box 1169, Pearland TX 77588. Telephone: 512-454-1789.

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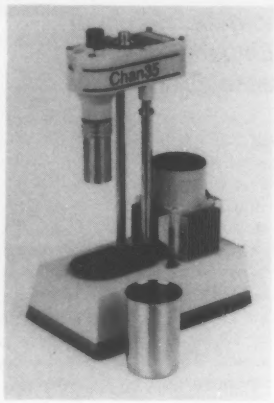

New 12-Speed, Direct-Indicating Viscometer Is Now On The Market

• The new Chan 35™ direct-indicating viscometer is used to measure the rheological properties of a wide variety of fluid materials.

The new unit is a 12-speed instrument (1 to 600 rpm), suitable for either laboratory or field use. It utilizes a Couette type coaxial cylinder sensor system. Absolute dynamic viscosity in centipoise or MilliPascal seconds is indicated on a dial at 300 rpm. Viscosity at other test speeds is a simple multiplier of the scale deflection.

The Chan 35 is accurate ±0.01 rpm 1 to 600 rpm independent of variation in line frequency. Torque accuracy is ±0.5 dial reading from 10 to 260 degrees. The unit has an operating temperature range of 30°F to 130°F (0 to 55°C), but fluids can be tested over a wider range with the addition of temperature control.

For more information, contact EG&G Chandler Engineering, 7707 East 38th Street, Tulsa, Oklahoma 74145. Telephone: 918-627-1740.

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Atlas Furnane Flooring Systems

• Recent laboratory tests prove that Atlas Red and Black Furnane Systems will not support the growth of bacteria (including Listeria Monocytogenes), mold or mildew in dairy applications. In addition, these same tests show that the systems' resin binders do not support growth, nor do they exude substances upon which these organisms could survive.

Furnane corrosion-resistant flooring systems, originally developed and patented by Atlas, feature dual cement construction. These long-lasting floors provide excellent chemical and thermal resistance, are easy to maintain in a sanitary condition, are versatile and easy to install, and provide dairy owners with an attractive appearance.

For a copy of the independent laboratory test results on bacteria, mold and mildew growth and Atlas Furnane System Bulletin 3-3, write Ron Kern, Sales Promotion Manager, Atlas Minerals and Chemicals, Inc., Mertztown, PA 19539. Telephone: 215-682-7171.

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Rebuildable Caster Offers Significant Savings

• A totally new caster designed especially for the food industry has been announced by L.G.B. Industries of Hustisford, Wisconsin. Manufactured from precision machined parts rather than stampings, the innovative design offers the feature of rebuilding which significantly extends total product life.

"We have field reports from our customers that our casters last up to four times longer than the catalog products they had been using," reported L.G.B. president, Lon Berndt. "Conventional casters for the food industry are expensive," he added, "but their performance leaves much to be desired. We decided we could produce casters that would run better and last a whole lot longer. Our new design proves we have been successful."

L.G.B. Industries reports the casters, longer life and smoother performance are attributable to the precision machined components. The bearings are totally enclosed to keep corrosive liquids out and to maintain lubricants longer. A removable center bolt permits bearing replacement. The new casters are available in wheel sizes of 3,4,5,6, and 8 inches.

For more information, contact Lon Berndt, L.G.B. Industries, P.O. Box 502, Hustisford, Wisconsin 53034. Telephone: 414-349-3580

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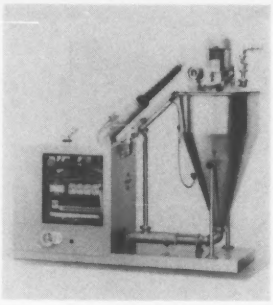

Jaygo/Koruma Thin-Film Vacuum Deaerators

• The Jaygo/Koruma thin-film vacuum deaerators are designed to completely remove all trapped gases in any material up to 2,000,000 centipoise. The material to be deaerated is drawn into the vacuum chamber where it passes over and through a high speed rotating distributor system which spins the product out into a thin film, thus exposing a tremendous surface area to the vacuum and allowing rapid and efficient removal of gases. The deaerated product is continually discharged from the vacuum chamber,thus giving continuous flow of the deaerated product. A fully automatic control regulates every speck of the operation. This complete system includes a watering vacuum pump, discharge pumps, and complete integrated controls.

These deaerators can be completely constructed of stainless steel, including frame and control panels.

Sizes are available from a small laboratory model which can deaerate just a few pounds to the largest production machine which can handle 44,000 pounds per hour.

For more information, contact: Jaygo, Incorporated, 40 Whitney Road, Mahwah, NJ 07430. Telephone: 201-848-0200.

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Foodborne Gastroenteritis Associated With Buffet Service of Turkey, Riverton, Wyoming, December, 1986

An outbreak of acute gastrointestinal illness occurred shortly after a buffet dinner served to 101 people at a Riverton, Wyoming anniversary party on December 6, 1986. A total of 52 (51.5%) of the attendees were ill with nausea, vomiting, diarrhea and prostration, or 3 of these 4 symptoms. Of the 52 cases, 49 required emergency medical treatment or inpatient care, reporting nausea (100%); vomiting (98%); diarrhea (90%); abdominal cramps (83%); prostration (62%); chills (52%); sweating (35%); and blood pressure/temperature depression (21%).

Incubation periods ranged from 1 to 7 1/2 hours. Illness was significantly associated with consumption of turkey at the buffet (p 1.3 X 10-6). The meal was a "carry-in" buffet with most foods, including the turkey, prepared in home kitchens.

No stool or vomitus specimens were collected by the hospital nor by the 5 physicians called in to treat patients, and after 36 hours when the Health Department was notified, symptoms had remitted. A frozen vomitus sample saved in a plastic bag by one of the cases yielded coagulase positive staphylococci in high numbers, (12 X 10^6/gm and 19 X 10^6/gm). Meat recovered from the turkey carcass (no sliced meat was left over) showed a large population of coagulase positive staph (1 X 10^6). One food handler, (who deboned and handled turkey) had an acneiform facial rash which was erupting at the time of the food preparation. Improper handling procedures, storage and serving deficiencies were identified. At least one of three turkeys was improperly thawed; all 3 were improperly cooled after cooking and improperly held for serving for 4 to 4 1/2 hours in a steam table without preheating to service temperature. These procedures could have allowed proliferation of bacteria both before and during serving.

Special training programs are underway for food handlers and the general public in this community. An effort to promote more timely reporting by emergency room staff and physicians throughout the state is planned in an effort to minimize the duration and size of foodborne outbreaks in Wyoming.

FDA AND THE PRACTICE OF VETERINARY MEDICINE

For years the Food and Drug Administration has assured the veterinary profession that FDA does not wish to interpose itself into the practice of veterinary medicine. At the same time FDA told veterinarians that they could not use certain drugs to treat certain animals (e.g., chloramphenicol in food-producing animals), and initiated regulatory action against some veterinarians for the manner in which they sold or used drugs, sending investigators to conduct investigations at veterinary offices or other establishments. Therefore, some confusion may exist among veterinarians about FDA's position with regard to the practice of veterinary medicine.

State governments have licensing authority for health professionals and professional associations establish codes of professional ethics. The FDA has the broad authority and responsibility to assure the safety and effectiveness of drugs (including animal drugs) and the safety of the food supply. This authority is derived from the Federal Food, Drug, and Cosmetic Act (the Act). The Act was amended in 1968 to include sections which specifically address animal drugs. It was the intent of these amendments to insure that animal drugs are safe and effective for their intended uses and that they do not result in unsafe residues in foods from treated animals.

Section 512 of the Act, the basic statutory provision governing new animal drugs, provides that a new animal drug shall be deemed unsafe unless there is in effect an approval of a new animal drug application. The intended use of the drug and its labeling must conform to the approved application. A drug which does not conform to the provision of section 512 is deemed adulterated and is subject to the enforcement provisions of the Act. Virtually all animal drugs are "new animal drugs" within the meaning of that term in the Act, and so are subject to section 512 of the Act.

The Act makes no distinction between drugs used by veterinarians and those intended for use by laymen. A strict interpretation of these sections of the Act would severely restrict how veterinarians use drugs in their practice. On the other hand, unrestricted use of drugs by veterinarians may risk increasing the incidence of unsafe residues in animal products. Therefore, FDA has chosen a course of action intended to insure that public health is protected while permitting veterinarians the flexibility to make medical judgements involving the extra-label use of drugs under certain conditions.

FDA will not ordinarily initiate regulatory action against veterinarians based on the extra-label use of drugs in food-producing animals when the health of animals is immediately threatened and suffering or death would result from failure to treat affected animals, provided these conditions are met:

1. A careful medical diagnosis is made by an attending veterinarian within the contest of a valid veterinarian-client-patient relationship;
2. A determination is made that, (a) there is no marketed drug specifically labeled to treat the condition diagnosed, or (b) drug therapy at the dosage recommended by the labeling has been found clinically ineffective in the animals to be treated;

3. Procedures are instituted to assure that identity of the treated animals is carefully maintained; and
4. A significantly extended time period is assigned for drug withdrawal prior to marketing meat, milk or eggs; steps are taken to assure that the assigned time frames are met, and no illegal residues occur.

Due to the significance of the risk of residues in treated animals, chloramphenicol and DES are not to be used in food animals under any circumstances. Similar policy statements regarding other drugs may be made in the future.

The effect of this action is that, while FDA is not attempting to directly regulate the practice of medicine in carrying out its legal responsibilities relating to the use of drugs in food animals, it does preclude some options that would otherwise be available to veterinarians.

FDA Veterinarian Sept. Oct. '86

United States of America vs. Bronson Farms, Inc., et al. - Injunction

Over the past several months, a precedent-setting case has involved Bronson Farms, Inc., and its president. Bronson Farms, Inc. is a poultry farm in Florida which was mixing medicated feeds which were then sold by contractual agreement to farms. The mixing facility was found not in compliance with current good manufacturing practice regulations; unapproved drug combinations were being mixed. The FDA charged that the firm was manufacturing animal drugs under conditions which resulted in the drugs becoming adulterated after shipment in interstate commerce. The firm filed a Motion to Dismiss the case in which they stated in part that the FDA had no jurisdiction over their operation since they did not distribute their products outside the state of Florida and that all their medicated feed was intended for their own consumption and not held for sale.

Judge Susan Black denied the Motion to Dismiss based on her opinion that feeds given to animals (in this case, poultry) whose products would later be sold to the consuming public are in fact being held for sale. The court found that the "held for sale" requirement in section 301 (1) of the Act merely means any purpose other than for personal consumption, and the medicated feed obviously was not for personal consumption.

Judge Black issued a Preliminary Injunction. A recommendation for Permanent injunction against Bronson Farms, Inc., et. al. is now under consideration.

FDA Vet Sept./Oct. '86

Update: United States of America vs. Bronson Farms, Inc., et al.

Bronson Farms, an integrated broiler operation in Sorento, Florida, signed a consent decree of permanent injunction rather than go to trial. The firm is under permanent injunction due to good manufacturing practice violations and manufacturing of feeds containing illegal drug combinations in their feed mixing operations.

The firm had filed a motion to dismiss the action because the feed was not held for sale, but was fed only to their own chickens. The court denied the motion, holding that the "held for sale" requirement of Section 301(k) of the FFDCA means any purpose other than for personal consumption.

FDA Vet. Nov/Dec '86

How to Prevent Viral Infections and Chemical Poisonings

by Robert E. Harrington
Assistant Director of Technical Services and Safety for the National Restaurant Association

Reprinted with permission from the National Restaurant Association magazine *Restaurants USA* (formerly *NRA News*).

The only way to prevent viral and chemical illnesses is to prevent contamination by keeping them out of foods.

The heart of the SAFE (Sanitation Assessment of Food Environment) program is using time and temperature controls to limit bacterial growth in potentially hazardous foods. But these controls are not enough to protect against viral or chemically caused illnesses. Viruses do not require incubation time in foods, and many chemical poisons are not destroyed by heating. The only way to prevent viral and chemical illnesses is to prevent contamination by keeping them out of foods.

Viruses

Viruses are very simple organisms, but they cause many diseases - from the common cold to polio. Viruses must penetrate a living cell in order to reproduce. Therefore, they do not multiply in foods. Because viruses can be very resistant to heat and cold, and because fewer viruses than bacteria are needed to trigger a disease, they must be kept out of foods.

One of the most serious foodborne viruses is *hepatitis*, a liver infection. It is chiefly spread by infected workers, contaminated water or shellfish from polluted waters. Other viruses are commonly found in people's noses and throats, and these can be spread through coughing or sneezing. There also are intestinal viruses that can cause vomiting and diarrhea; these are spread by poor toilet hygiene. Your best protection against viral diseases is two-fold.

1. Use only shellfish from approved, inspected, reputable suppliers (and save the shipping tag) and

2. Stress good personal hygiene among food workers. Thorough handwashing is an absolute must after smoking, eating or drinking; using the toilet or after sneezing or coughing.

Institute policies that restrict ill or infected workers from food-handling duties. Employees with minor illnesses might be reassigned until they recuperate, but generally it is best that your sick workers do not come to work. This precaution applies to management personnel as well.

AIDS

The virus which causes AIDS is *not* spread by food. In its November 15, 1985 issue of *Morbidity-Mortality Weekly Report,* the U.S. Public Health Service, Centers for Disease Control, reported, "Because AIDS is not transmitted through preparation or serving of food and beverages,...foodservice workers infected with AIDS should not be restricted from work unless they have another infection or illness for which such restriction would be warranted."

For more information about AIDS, contact NRA's Information Service and ask for "Facts about AIDS," a Current Issues Report published by NRA in December 1985.

Chemicals

Many of the common chemicals used in foodservice operations, such as cleansers, detergents, sanitizers and pesticides are hazardous.

Chemical poisoning can range in severity from mild stomach upset to severe chemical burns or nerve damage. Preventing chemical contamination is simple, and, like most SAFE procedures, involves common-sense procedures.

1. Store and use all chemicals away from food and food utensils.

2. Read and follow all label directions. Do not increase use concentrations, and never mix chemicals unless the label tells you to.

3. Never store chemicals in anything other than the original manufacturer's container.

4. Use only food containers for food. Avoid galvanized, metal-glazed ceramic or non-food plastics; acid foods (like fruit juices) can dissolve and absorb toxic materials from this type of container.

5. Keep food-processing machines in good repair, and use only recommended lubricants. Food-processing equipment out of adjustment can drop nuts and bolts into foods. Dull can openers can rip cans and drop metal slices into foods.

6. Store and use employee medications where they cannot spill into foods.

Editor's note: *A summary of the SAFE program - Sanitary Assessment of Food Environment - discussed in the April, May, June/July and August issues of* ***Restaurants USA/NRA NEWS,*** *will be available in bulletin form this fall. An educational seminar on the program will start in January 1987.*

Letters to the Editor

Dear Ms. Hathaway:

In the May, 1987 *Dairy and Food Sanitation* (p. 239) under "News and Events," the article "New Warnings Required for Sulfites" contains misleading information. The lead paragraph states that FDA "...has announced that warning statements on labels will be required when sulfiting agents are used in processed and packaged foods..." This is incorrect. The Agency has issued no requirement for a warning statement on foods but has amended its regulations at 21 CFR 101.100 (a)(4) to require the *ingredient declaration* of sulfites if present at a level of 10 parts per million or more in the product regardless of whether the sulfiting agent serves a function in the product (51 *Federal Register* 25012). Sulfite sensitive individuals should be instructed to read the ingredient statement as should individuals who may be allergic to other food ingredients such as milk, peanuts, corn, or wheat.

In paragraph seven the article indicates a warning statement will be required on labels of alcoholic beverages under Bureau of Alcohol, Tobacco and Firearms (BATF) regulations. Actually BATF will require the statement "contains sulfites" or "contains a sulfiting agent" or a statement identifying a specific sulfiting agent (51 *Federal Register* 34706, September 30, 1986).

As noted in paragraph six of the article, the FDA will require a warning statement on prescription drugs (21 CFR 201.11) by June 3, 1987 (51 *Federal Register* 43900). Prescription drugs for human use containing a sulfite, except epinephrine for injection when intended for use in allergic or other emergency situations, shall bear the warning statement "contains (insert the name of the sulfite, e.g., sodium bisulfite), a sulfite that may cause allergic-type reactions including anaphylactic symptoms and life-threatening or less severe asthmatic episodes in certain susceptible people. The overall prevalence of sulfite sensitivity in the general population is unknown and probably low. Sulfite sensitivity is seen more frequently in asthmatic than in nonasthmatic people."

"Sulfite-containing epinephrine for injection for use in allergic emergency situations shall bear the warning statement "Epinephrine is the preferred treatment for serious allergic or other emergency situations even though this product contains (insert the name of the sulfite, e.g., sodium metabisulfite), a sulfite that may in other products cause allergic-type reactions including anaphylactic symptoms or life-threatening or less severe asthmatic episodes in certain susceptible persons. The alternatives to using epinephrine in a life-threatening situation may be satisfactory. The presence of a sulfite(s) in this product should not deter administration of the drug for treatment of serious allergic or other emergency situations."

If you have any questions concerning these labeling regulations, please contact me.

Sincerely,

Allen Matthys, Ph.D.
Director, Regulatory Affairs Division
Eastern Research Laboratory
National Food Processors Association
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Washington, D.C. 20005

Dear Ms. Hathaway:

Allegations of a link between MSG (monosodium glutamate) and Chinese Restaurant Syndrome reported in the April issue of the *Dairy & Food Sanitation,* fail to mention the most definitive research to date regarding MSG.

Dr. Richard Kenney, of George Washington University Medical School, has been studying possible intolerance to glutamates for the past 17 years. His research is designed to challenge the self-identified MSG-responder in a double-blind fashion. Dr. Kenney has concluded that the MSG link to Chinese Restaurant Syndrome (termed this because MSG is commonly used in Chinese cuisine), is not supportable and that the syndrome itself may be a misnomer. The "classic" symptoms associated with CRS (typically burning, tightness or numbness in the chest, neck or face) were not evident in Dr. Kenney's research. Moreover, his research fails to confirm a cause and effect relationship between MSG and more specific symptoms (e.g., headaches, nausea), reported by those tested.

It is important to note that many people, (nearly one-half of the American population) experience after-eating discomfort following ingestion of many common foods and food ingredients. Garlic, pepper, chocolate, wheat, corn, strawberries, shellfish and other foods and ingredients too numerous to mention are sometimes implicated.

The Glutamate Association is an organization of manufacturers, national marketers and processed food users of glutamic acid and its salts, including monosodium glutamate.

Sincerely,

Julie M. Wilgus
Staff Associate
The Glutamate Association
United States
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Atlanta, GA 30342

Shown in picture, from left to right: Ed Smith, John Ulp, Gary Wangrin, Janie Park, Jack Reiter, Dick Grebb, Al Votion, Randy Mullins and Michael Wyder.

Two hundred and eighty individuals registered for the Fifth Annual Texas Association of Milk, Food and Environmental Sanitarians meeting held June 9th and 10th at the Austin South Plaza Hotel, Austin, Texas. A golf tournament with over 60 players was held prior to the conference. That night an early bird reception was hosted by Borden Company. The general session started Tuesday afternoon with the Hon. Ann Cooper, District 47, speaking on "Updates and Progress Concerning Recent Public Health Legislation". Other talks given were "What to do When the Press Calls": "Psychological Profiles in Consumer Product Tampering"; and "Current Procedures for Testing Pathogenic Bacteria". On Wednesday, June 9, separate food and dairy sessions were held. Featured speaker's for the food session included talks on State Health Department Update; FDA Update; epidemology/investigation; medical risks of pesticides and other environmental concerns. Speakers for the milk session covered topics such as State Department of Health Update; I.M.S. conference; electronic somatic cell count; controlling environmental pathogens.

Plaques and certificates were awarded to those companies and individuals who have been so generous with equipment, money, time and support in making the "Basic Pasteurization Course" ann outstanding success. The training equipment used in this course was on display for the meeting.

Officers for T.A.M.F.E.S. for 1987-88 are Wendell Littlefield, Texas Department of Health; Ray McCoy, Dean's Foods Company/Gandy's Dairies, Vice President; Janie Park, Texas Department of Health and Treasure Ron Richter, Texas A & M University and Past President, James Roberson, Grapevine, Texas.

A Bar-B-Que and Country Western dance at the Manchaca Volunteer Fire Department highlighted the entertainment program.

Other displays were provided by I.A.M.F.E.S., Texas Department of Health, Division of Milk and Dairy Products, American Mfg. Co., Dayco Rubber and texas Rubber Supply, Inc.

Affiliate Calendar

1987

September 14-15, 1987 ASSOCIATED ILLINOIS MILK, FOOD, AND ENVIRONMENTAL SANITARIANS in a joint conference with the Cooperative Extension Service of the University of Illinois, to be held at the Chancellor Inn, Chicago, IL. For more information contact: Dr. Clem Honer, Sec AIMFES, Gorman Publishing Co., 8750 Bryn Mawr, Chicago, IL 60631. 312-693-3200 or Dr. Gary Harpestad, Extension Dairymen, U of IL, 315 Animal Sciences Lab., 1207 W. Gregory Dr., Urbana, IL 61801. 217-333-0510.

September 15-16, 1987 ANNUAL CONVENTION OF THE SOUTH DAKOTA STATE DAIRY ASSOCIATION, to be held at Howard Johnson's, Sioux Falls, SD. For more information contact: Shirley W. Seas, South Dakota State Dairy Association, University Dairy Building, Brookings, SD 57007. 605-688-5420.

September 17-18, MINNESOTA SANITARIANS ASSOCIATION ANNUAL MEETING, to be held at the Earle Brown Center, Univ. of Minnesota, St. Paul Campus. For more information contact: Roy E. Ginn, Dairy Quality Control Inst., 2353 N. Rice St., Room 110, St. Paul, MN 55113. 612-484-7269.

September 21-23, NEW YORK STATE ASSOCIATION OF MILK & FOOD SANITARIANS ANNUAL MEETING, to be held at the Sheraton Inn Syracuse, (Liverpool, NY). For more information contact: Paul J. Dersam. 716-937-3432.

September 30-October 2, KANSAS ASSOCIATION OF SANITARIANS ANNUAL MEETING, to be held at the Holidome in Lawrence, Kansas. For more information contact: John M. Davis. 316-268-8351.

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Cheyenne, WY 82001
307-638-8545

Holders of 3-A Symbol Council Authorization on August 15, 1987

Questions or statements concerning any of the holders authorizations listed below, or the equipment fabricated, should be addressed to: Robert E. Holtgrieve, Sec'y.-Treasurer, W255 N477 Grandview Blvd., Suite 100, Waukesha, Wisconsin 53188

01-06 Storage Tanks for Milk and Milk Products

115 A-L Stainless Inc. (9/28/58)
(Not available in USA)
113 Park St., South
Peterborough, Ontario Canada K9J 3R8

2 APV Crepaco, INC. (5/1/56)
100 South CP Ave.
Lake Mills, Wisconsin 53551

28 Cherry-Burrell Corporation (10/3/56)
(A Unit of AMCA Int'l., Inc.)
575 E. Mill St.
Little Falls, New York 13365

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

117 DCI, Inc. (10/28/59)
P.O. Box 1227, 600 No. 54th Ave.
St. Cloud, Minnesota 56301

76 Damrow Company (10/31/57)
(A Div. of DEC Int'l., Inc.)
196 Western Ave., P.O. Box 750
Fond du Lac, Wisconsin 54935-0750

127 Paul Mueller Co. (6/29/60)
P.O. Box 828
Springfield, Missouri 65801

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

432 TCI-Superior Division, (11/9/84)
Mueller Canada Inc.
6500 Northwest Dr.
Mississauga, Ontario, Canada L4V 1K4

31 Walker Stainless Equipment Co., Inc. (10/4/56)
Elroy, Wisconsin 53929

02-08 Pumps for Milk and Milk Products

63R APV Crepaco, INC. (4/29/57)
100 South CP Ave.
Lake Mills, Wisconsin 53551

325 Albin Pump, Inc. (12/19/79)
120 Interstate N. Pkwy. E.#208
Atlanta, Georgia 30339-2103

451 Albin Pump, Inc. (8/28/85)
120 Interstate N. Pkwy, E. #208
Atlanta, GA 30339-2013

214R Ben H. Anderson Manufactures (5/20/70)
Morrisonville, Wisconsin 53571

212R Babson Brothers Company (2/20/70)
Dairy Systems Division
1400 West Gale
Galesville, WI 54630

29R Cherry-Burrell Corp. (10/3/56)
(A Unit of AMCA Int'l., Inc.)
2400-6th St. SW, P.O. Box 3000
Cedar Rapids, Iowa 52406

205R Dairy Equipment Co. (5/22/69)
1919 S. Stoughton Rd., P.O. Box 8050
Madison, Wisconsin 53716

377 Energy Service Co. (2/4/83)
B200 Walker Bldg., 734 15th St., NW
Washington, DC 20005

462 Enprotech Corporation (12/5/85)
335 Madison Avenue
New York, New York 10017

466 Fluid Metering Inc. (1/10/86)
29 Orchard St.
Oyster Bay, New York 11771

306 FRISTAM PUMPS, INC. (5/2/78)
2410 Parview Road
Middleton, WI 53562

404 Fullwood-Packo N.V. (8/25/83)
(Not available in USA)
Cardijnlaan 10
8160 Diksmuide, Belgium

65R G & H Products Corp. (5/22/57)
7600-57th Avenue
P.O. Box 1199
Kenosha, WI 53141

492 A. Gusmer Inc. (1/15/87)
Mfg. by Philip Hilge GmbH
27 North Avenue East
Cranford, NJ 07016

145R ITT Jabsco Products (11/20/63)
1485 Dale Way
Costa Mesa, California 92626

502 INOXPZ, S.A. (4/27/87)
(not to be sold in USA)
c/. Telers, 54
Banyoles (Gerona) Spain

314 Len E. Ivarson, Inc. (12/22/78)
3100 W. Green Tree Rd.
Milwaukee, Wisconsin 53209

372 The Kontro Co., Inc. (12/20/82)
450 W. River St., P.O. Box 30
Orange, Massachusetts 01364

373 Luwa Corporation (12/27/82)
P.O. Box 16348
Charlotte, North Carolina 28297-6348

364 M D Pneumatics, Inc. (7/28/82)
4840 W. Kearney
Springfield, Missouri 65803

319 Mono Group, Inc. (3/21/79)
847 Industrial Dr.
Bensenville, Illinois 60106

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

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

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

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

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

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

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

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

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

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

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

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

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

408 Westfalia Systemat (10/18/83)
1862 Brummel Drive
Elk Grove Village, IL 60007

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

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

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

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

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

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

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

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

425 TCI-Superior Division, (8/31/84)
Mueller Canada Inc.
6500 Northwest Dr.
Mississauga, Ontario, Canada L4V 1K4

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

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

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

388 Frell, Inc. (5/24/83)
5657 Bear Lane-P.O. Box 4977
Corpus Christi, Texas 78469-4977

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

40 Hills Stainless Steel & Equip., Inc. (10/20/56)
405 S. Water
Hills, MN 56138

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

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

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

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

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

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

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

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

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

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

450 APV International Limited (8/22/85)
(Not available in USA)
P.O. Box 4, Manor Royal

Crawley
West Sussex RH10 2QB
England

484 APV ROSISTA, INC. (10/22/86)
1325 Samuelson Road
Rockford, Illinois 61109

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

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

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

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

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

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

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

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

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

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

478 CIPRIANAl, INC., Fratelli Tassalini (7/31/86)
21695 Belerma Street
Mission Viejo, California 92695

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

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

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

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

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

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

350 H&K, Inc.-Rosista Div. (1/7/82)
880 Bahcall Court
P.O. Box 1508
Waukesha, Wisconsin 53186

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

505 U.S. Coupling Corp/Dayco (6/8/87)
1465 W. El Segundo Blvd.
Compton, CA 90222

250 Universal Cooperatives, Dairy (6/11/73)
Dairy Division
U.S. Hwy 33 East/Box 115
Goshen, Indiana 46526

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

458 APV International Limited (10/15/85)
(Not available in USA)
P.O. Box 4, Manor Royal
Crawley
West Sussex RH10 2QB
England

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

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

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

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

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

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

362 Kroeze Dairy Equipment, Inc. (7/20/82)
14393 Euclid Ave.
Chino, California 91710

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

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

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

365 Niro Atomizer Food & Dairy Inc. (9/8/82)
1600 County Road F
Hudson, Wisconsin 54016

491 On-Line Instrumentation, Inc. (1/2/87)
P.O. Box 541

Hopewell Junction, New York 12533

279 The Schlueter Co. (8/30/76)
112 E. Centerway
Janesville, Wisconsin 53545

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

426 TCI-Superior Division, (8/31/84)
Mueller Canada Inc.
6500 Northwest Dr.
Mississauga, Ontario, Canada L4V 1K4

12-05 Tubular Heat Exchangers for Milk and Milk Products

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

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

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

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

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

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

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

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

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

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

13-08 Farm Milk Cooling and Holding Tanks

49R A-L Stainless Inc. (12/5/56)
113 Park St., South
Peterborough, Ontario Canada K9J 3R8

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

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

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

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

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

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

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

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

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

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

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

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

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

446 Sterner Industries, Inc. (7/8/85)
P.O. Box 70
Winsted, Minnesota 55395

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

427 TCI-Superior Division, (8/31/84)
Mueller Canada Inc.
6500 Northwest Dr.
Mississauga, Ontario, Canada L4V 1K4

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

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

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

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

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

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

382 Combibloc, Inc. (4/15/83)
4800 Roberts Rd.
Columbus, OH 43228

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

137 Ex-Cell-O Corp. (10/17/62)
850 Ladd Rd., Bldg. "A"
Walled Lake, Michigan 48088

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

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

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

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

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

330 Milliken Packaging (8/26/80)
White Stone, South Carolina 29353

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

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

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

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

211 Twinpak, Inc. (Canada) (2/4/70)
2225 Hymus
Dorval, Quebec, Canada H9P 1J8

18-00 Multiple-Use Rubber & Rubber-Like Materials Used as Product Contact Surfaces in Dairy Equipment

429 Bepex Corporation (9/25/84)
P.O. Box 880
Santa Rose, CA 95402

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

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

489 Catalox Corp. d/b/a SaniServ (12/22/86)
2020 Production Drive
P.O. Box 41240
Indianapolis, Indiana 46241

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

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

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

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

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

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

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

262 A-L Stainless Inc. (11/11/74)
113 Park St., South
Peterborough, Ontario Canada K9J 3R8

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

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

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

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

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

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

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

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

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

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

434 TCI-Superior Division, (11/9/84)
Mueller Canada Inc.
6500 Northwest Dr.
Mississauga, Ontario, Canada L4V 1K4

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

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

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

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

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

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

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

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

24-01 Non-coil Type Batch Pasteurizers

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

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

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

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

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

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

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

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

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

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

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

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

26-02 Sifters for Dry Milk and Dry Milk Products

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

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

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

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

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

172 SWECO, Inc. (9/1/65)
6033 E. Bandini Blv.
P.O. Box 4151
Los Angeles, California 90051

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

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

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

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

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

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

28-00 Flow Meters for Milk and Liquid Milk Products

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

386 Turbo Instruments Inc. (5/11/83)
4 Vashell Way
Orinda, California 94563

29-00 Air Eliminators for Milk and Fluid Milk Products

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

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

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

30-01 Farm Milk Storage Tanks

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

31-01 Scraped Surface Heat Exchangers, as Amended

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

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

361 BFM Machinery Corp. (7/12/82)
P.O. Box 117
Fall River, Wisconsin 53932

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

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

32-00 Uninsulated Tanks for Milk and Milk Products

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

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

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

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

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

433 TCI-Superior Division, (11/9/84)
Mueller Canada Inc.
6500 Northwest Dr.
Mississauga, Ontario, Canada L4V 1K4

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

33-00 Polished Metal Tubing for Dairy Products

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

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

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

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

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

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

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

35-00 Continuous Blenders

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

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

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

36-00 Colloid Mills

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

37-00 Presure and Level Sensing Devices

318 Anderson Instrument Co., Inc. (4/9/79)
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481 Control Systems Design, Inc. (8/14/86)
P.O. Box 1689
Manchester, Missouri 63011

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

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

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

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

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

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

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

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

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

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

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

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

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

38-00 Cottage Cheese Vats (In Press)

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

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

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

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

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

453 MikroPul Corporation (9/4/85)
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456 C. E. Rogers Company (9/25/85)
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Abstracts of papers in the August Journal of Food Protection

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Viability of *Listeria monocytogenes* in Milk Treated with Hydrogen Peroxide, Lucas Dominguez, Jose F. F. Garayazabal, Elias R. Ferri, Jose A. Vazquez, Esperanza Gomez-Lucia, Claudia Ambrosio and Guillermo Saurez, Departamento de Microbiologia, Facultad de Veterinaria, Universidad Complutense, 28040 Madrid, Spain, and Unidad de Microbiologia, Facultad de Veterinaria, Universidad de Extremadura, 10004 Caceres, Spain

J. Food Prot. 50:636-639

The susceptibility of *Listeria monocytogenes* to hydrogen peroxide in sterilized and raw milk was studied. In raw milk, *L. monocytogenes* was less susceptible to H_2O_2 than milk microflora. The ratio of *L. monocytogenes* to total milk microorganisms (natural microflora plus added *L. monocytogenes*) increased when raw milk was stored at refrigeration temperature (4°C), due to a selective enrichment of *Listeria* present in milk. In sterilized milk, a concentration of 0.0495% H_2O_2 and 9 h were required to produce complete destruction of *L. monocytogenes* when this microorganism was in pure culture, although a reduction in listeria counts was observed at 1.5 h. When sterilized milk was simultaneously contaminated with *L. monocytogenes, Staphylococcus aureus* and *Streptococcus faecalis,* a decrease in *L. monocytogenes* count during the first 24 h was observed at 0.0495% H_2O_2. From this time *L. monocytogenes* recovered and multiplied reaching levels similar to the initial counts at the end of the experiment.

Automated Turbidometry — A Method for Enumeration of Bacteria in Food Samples, T. Mattila, Food Research Laboratory, Technical Research Centre, Biologinkuja 1,02150 Espoo, Finland

J. Food Prot. 50:640-642

The Bioscreen analyzer was used to determine bacterial counts in cooked food samples (sausages, hamburgers and French fries). The results indicated that the bacterial count as determined by the plate count method can be predicted accurately with the Bioscreen analyzer by using turbidometric parameters of bacterial growth. Stepwise regression analysis by the turbidometric variables was performed for the different food samples to develop a formula for predicting bacterial growth. The detection time of bacterial growth was considered the most important predictor selected by the stepwise regression analysis.

Evaluation of the Petfifilm SM and VRB Dry Media Culture Plates for Determining Microbial Quality of Poultry, J. S. Bailey and N. A. Cox, USDA, ARS, RRC, P.O. Box 5677, Athens, Georgia 30613

J. Food Prot. 50:643-644

A self-contained sample-ready system, Petrifilm, which has been developed as an alternative method to the standard aerobic plate count (SPC) and coliform counts as determined by violet red bile (VRB) pour plates, was evaluated for the first time with poultry samples. Swab samples were taken of 109 broiler carcasses at various degrees of freshness, and SPC and VRB pour plates were compared to Petrifilm counts. The correlation coefficient of $\log_{10}$ SPC and $\log_{10}$ Petrifilm SM count was 0.926 with a regression line slope of 1.009 and an intercept of -0.106. A correlation was not determined with coliform counts because when the total number of colonies on a plate is greater than 300 and the coliforms make up less than 10% of the total population of microorganisms capable of growing on the VRB nutrients it is difficult to count the gas producing colonies. The frequency of countable isolates producing gas from brilliant green lactose bile broth was 44% from standard VRB and 86% from Petrifilm gas producers. This study suggests that for poultry products, the Petrifilm SM provides an adequate alternative to the SPC, and that the Petrifilm VRB gives a higher predictive value for the number of coliforms present, but would not be suitable under all conditions.

Use of Laminated High and Low Density Polyethylene Flexible Packaging to Store Trout (*Salmo Gairdneri*) in a Modified Atmosphere, Harold J. Barnett, Jim W. Conrad and Richard W. Nelson, U.S. Department of Commerce, NOAA, National Marine Fisheries Service, Northwest and Alaska Fisheries Center, Utilization Research Division, 2725 Montlake Boulevard East, Seattle, Washington 98112

J. Food Prot. 50:645-651

The effect on extension of refrigerated shelf life of boned trout, treated or not treated with a 2.3% potassium sorbate dip and packaged in laminated high/low density "semi-permeable" polyethylene bags in the presence of a CO_2-enriched modified atmosphere (MA), was studied. The combination of packaging, refrigeration, and MA was effective in doubling the fresh shelf life of the trout product. Potassium sorbate limited bacterial growth but did not extend shelf life beyond what was obtained with MA alone. Changes in pH and ammonia concentration in the fish samples were not good quality indicators in this study. Although not detected by sensory evaluations, TBA analyses indicated the possible development of oxidative rancidity in the MA-held fish. Carbon dioxide content in the flesh of the trout appeared to be a function of CO_2 in the headspace of the bags

which was reduced by about 50% during the first 20 d of storage. Based on changes in organoleptic characteristics, the quality of the raw trout, including the potassium sorbate-treated trout, was only marginally acceptable after 25 d of storage in the MA. However, the cooked product was rated favorably by a consumer type taste panel. The maximum post-MA refrigerated shelf life of the trout held under the experimental conditions of this study, including those treated with potassium sorbate, was about 1 week.

Rapid Estimation of Microbial Numbers on Meat and Poultry by the Direct Epifluorescent Filter Techique, B. G. Shaw, C. D. Harding, W. H. Hudson and L. Farr, Institute of Food Research - Bristol Laboratory, Langford, Bristol BS18 7DY, U. K.

J. Food Prot. 50:652-657

The direct epifluorescent filter technique (DEFT) for rapid estimation of microbial numbers was evaluated by comparison with the plate count on a variety of uncooked red meat and poultry samples. Good agreement [correlation coefficient (r) = 0.95-0.96] was obtained from samples with plate counts of 5×10^3/g or /cm^2 and above from red meat carcasses (surface swabbed), aerobic or vacuum packed chill-stored joints (surface sampled - stomachered) and frozen beef (thawed - stomachered). For stored and unstored raw poultry sampled by skin scraping or stomachering of muscle and skin good overall correlation (r = 0.88-0.89) was obtained between the DEFT count and the plate count in the ranges 1.1×10^3 to 1.3×10^7/cm^2 (skin scraping) and 1×10^4 to 9.5×10^6/g (muscle and skin) even though the DEFT always overestimated counts on samples on which no growth had occurred (plate count $< 7 \times 10^4$/cm^2 or $< 1 \times 10^5$/g). However, good linearity between DEFT and plate counts allowed use of the regression equation to obtain a good estimate of the plate count on these samples. The DEFT was unsuitable for application to poultry neck skin sampled by shaking because particulate material interfered with counting. This was also a problem with Mechanically Recovered Meat although the DEFT gave a fair estimate (r = 0.72) of the plate count on certain types (beef and veal) of this product. The DEFT was capable of providing counts within 35 to 45 min and its applicability to the rapid estimation of bacterial numbers in meat and poultry is discussed.

Dynamics of *Salmonella* Isolation with Modified Semi-Solid Rappaport-Vassiliadis Medium, Jozef M. De Smedt and Robert F. Bolderdijk, Laboratories of Van Houten International, Montezume-laan 1, B-2410 Herentals, Belgium and Susterfelder-strasse 190, D-5100 Aachen, West Germany

J. Food Prot. 50:658-661

The effect of low *Salmonella* cell concentrations in combination with high numbers of competitive flora after pre-enrichment on subsequent isolation with motility enrichment in modified semisolid Rappaport-Vassiliadis (MSRV) was studied. *Salmonella* was always detected on MSRV if the cell concentration in the preenrichment culture was at least 60 per ml, even if they were outnumbered by competitive bacteria by a factor of 10^7. In a total of 52 experiments, *Salmonella* detection on MSRV directly after preenrichment was successful in 46 tests. Combination of direct motility enrichment with additional motility enrichment after 8 h in tetrathionate brilliant green (TBG) broth resulted in 49 positive tests, compared to only 33 positive results after enrichment in TBG for 24 h with subsequent plating on selective agars.

Viability of *Vibrio cholerae* 01 on Frog Legs under Frozen and Refrigerated Conditions and Low dose Radiation Treatment, Florence C. Sang, Martin E. Hugh-Jones and Harry V. Hagstad, Department of Epidemiology and Community Health, School of Veterinary Medicine, Louisiana State University, Baton Rouge, Louisiana 70803

J. Food Prot. 50:662-664

Frog legs were contaminated with *Vibrio cholera* 01, Inaba serotype, ElTor biotype. The organism remained viable for more than 28 and 2 d when stored at -20°C and 4°C, respectively. Exposure to a multicurie ^{60}Cobalt source of 50 and 100 kilorads eliminated *V. cholerae* from both the frozen and fresh frog legs.

Impedance Measurement as an Alternative to the Plate Count Method for Estimating the Total Count of Bacteria in Raw Milk, F. F. J. Nieuwenhof and J. D. Hoolwerf, Netherlands Institute for Dairy Research (NIZO), P.O. Box 20, 6710 BA Ede, Netherlands

J. Food Prot. 50:665-668

An improved impedance method is described with a good standard deviation of repeatability ($s_m = 0.05$ log unit) and a fair standard deviation of the estimate of the plate count from the detection time [$(s_y)_x = 0.33$ log unit]. Compared with the standard deviation of repeatability of the plate count method (0.07 log unit), the standard deviation of repeatability of the impedance method described is a significant improvement. The impedimetric experiments were done with a Bactometer M123. The detection times as measured by this instrument were compared with the plate counts at 30°C for samples of raw refrigerated farm milk. With this technique a good indication of the microbiological quality of raw milk can be obtained within 15 h.

Thermal Destruction of *Staphylococcus aureus* in Human Milk, F. Jane Lin, Jeffery N. Morgan, Ronald R. Eitenmiller, Harold M. Barnhart, Romeo T. Toledo and Frances Maddos, Department of Food Science, University of Georgia, Athens, Georgia 30602

J. Food Prot. 50:669-672

Rates of thermal destruction of *Staphylococcus aureus* were determined in mature human milk using a continuous flow high-temperature short-time pasteurization system. D and z values for inactiviation of *S. aureus* were determined from data on survivors capable of forming colonies in an appropriate selective medium. The effects of thermal injury on D and z values were assessed by survivor colony forming units (CFU) on Staphylococcus medium 110 (SM110), nutrient agar (NA), Trypticase Soy Agar (TSA), Trypticase Soy Agar with 7.5% NaCl (TSAS) and Baird-Parker medium (BP) (Difco Laboratories, Detroit, MI).

D values for inactivation of *S. aureus* at 52, 58 and 60 and 62°C were used to predict D at 60°C of 15.3 s and 24.3 s when based on survivor CFU in SM 110 and nutrient agar, respectively. The z value was 4.9°C in either medium. D-values for inactivation of *S. aureus* at 60, 62, 64 and 67°C were used to predict D at 60°C of 41.2 s, 41.0 s and 34.7 s when based on survivor CFU in BP, TSA and TSAS, respectively. The z values were 6.5, 6.5 and 6.4°C, respectively.

Effect of Chemical Treatments on Microbiological, Sensory and Physical Qualities of Individually Shrink-Wrapped Produce, D. A. Golden, E. K. Heaton and L. R. Beuchat, Department of Food Science and Technology, University of Georgia, Agricultural Experiment Station, Experiment, Georgia 30212-5099

J. Food Prot. 50:673-680

Effects of four chemical treatments on microbiological, sensory and physical qualities of individually shrink-wrapped bell peppers, tomatoes, peaches and cantaloupes stored at 0 to 21°C were determined. With the exception of produce treated with guazatine, higher populations of microorganisms were detected on shrink-wrapped produce than on unwrapped produce as storage time increased. Treatment of wrapped produce with guazatine generally controlled microbial populations at about the same levels or at lower levels than those detected on unwrapped produce treated with imazalil, chlorine and a quaternary ammonium compound. Little inhibition of microbial growth compared to untreated produce was observed on fruits and vegetables treated with the latter three chemicals. None of the chemicals had deleterious effects on sensory or physical qualities of produce, with the exception of imazalil which caused severe brown discoloration on wrapped and unwrapped peaches. Shrink-wrapping retarded loss of firmness of chemically treated and untreated bell peppers, but had little effect on changes in firmness of the other produce during storage.

Effect of Heating on Water Soluble Biuret-Positive Compounds of Canned Cured Pork Picnic Shoulder, Carl E. Davis, B. G. Lyon, J. O. Reagan and W. E. Townsend, USDA, ARS, RRC, P.O. Box 5677, Athens, GA 30613 and Animal and Dairy Science Department, University of Georgia, Athens, Georgia 30602

J. Food Prot. 50:681-684

Protein solubility loss as a result of heat denaturation/coagulation was followed by a ratio of extractable biuret positive compounds (EBPR). Extracts of water-soluble proteins were evaluated by isoelectric focusing (IEF) on polyacrylamide gels. Four heat treatments (60°C, 62.8°C, 65.6°C and 68.8°C) were employed in processing canned (No. 300×407) cured pork. Center cores from canned samples were ground for water soluble protein extraction utilizing a 1:3.3 meat-to-water ratio by high-speed blending (Sorvall Omni-mixer) for 1 min at 0-2°C, centrifuging 10 min at $27,000 \times g$ at 0-2°C and filtering (0.45-μm) with vacuum assist. Eight ml of the clear extract was reheated in a glass tube for 15 min at 70°C, removed, and chilled (0-2°C) immediately. Coagulum was removed by filtration. EBPR was calculated from mg of protein/ml of initial muscle extract divided by mg of protein/ml of reheated extract for each temperature treatment. EBPR values were 1.75, 1.24, 1.13, and 1.10, respectively. Using 70°C as the critical temperature, an upper 95% confidence limit EBPR value of 1.12 was calculated. Portions of protein extract were isoelectrofocused on thin layer (0.8 mm) low concentration (5% monomer) polyacrylamide gels (pH gradient 3-10). IEF gels generally showed resolution of 12 to 23 protein bands in the muscle extracts, depending upon temperature treatment. Certain bands with apparent isoelectric points (pIs) ranging from 7.4 to 8.5 decreased in staining intensity (silver stain) as temperature increased. The general protein separation profiles correlated with decreasing EBPR values as temperature increased.

Fluorometic Method for Enumeration of *Escherichia coli* in Molluscan Shellfish, Scott R. Rippey, Linda A. Chandler and William D. Watkins, U.S. Public Health Service, Food and Drug Administration, Davisville, Rhode Island 02852

J. Food Prot. 50:685-690

A novel procedure for enumerating *Escherichia coli* in molluscan shellfish has been developed and evaluated. The method, a singular modification of the APHA most probable number (MPN) procedure, incorporates a fluorogenic molecule, 4-methylumbelliferyl-β-D-glucuronide (MUG), into the confirmed medium (EC) at a concentration of 50 μg/ml. The substrate could not be incorporated into the presumptive medium (LST) because of fluorescence resulting from the shellfish tissues themselves. After incubation, tubes were examined for fluores-

cence under long-wave ultraviolet light. Fluorescence indicated presence of *E. coli*. Of 1151 EC tubes examined for *E. coli*, both positive and negative for fluorescence, the confirmed positive rate was 91% and the false-negative rate was 11%. Certain problems inherent to the classical MPN procedure itself may understate and overstate these rates, respectively. Of more than 500 *E. coli* and non-*E. coli* isolates examined for β-glucuronidase activity, 95% of the *E. coli* isolates were positive for this enzyme, and only one non-*E. coli* isolate (a *Shigella* species) produced the enzyme. The MUG method, which requires only 48 h for enumeration of *E. coli* in shellfish, provides a considerable saving in time and labor over the standard APHA MPN procedure.

Review of Compounds Affecting the Biosynthesis or Bioregulation of Aflatoxins, Laura L. Zaika and Robert L. Buchanan, Microbial Food Safety Research Unit, Eastern Regional Research Center, U.S. Department of Agriculture, 600 East Mermaid Lane, Philadelphia, Pennsylvania 19118

J. Food Prot. 50:691-708

We have attempted to review the literature dealing with compounds that have been tested for their ability to inhibit growth and/or aflatoxin production by *Aspergillus flavus* and *A. parasiticus*. Although the list presented is by no means exhaustive, it serves as an indication of the type of research that has been carried out to date. A number of compounds and substances have been found that effectively inhibit fungal growth and aflatoxin production, while others have stimulatory properties. Unfortunately, most of these assessments have only dealt with fungal growth and/or aflatoxin production, and relatively few studies have attempted to identify possible mechanisms of action. Further research into the means by which other compounds influence aflatoxin synthesis is warranted and potentially could be highly beneficial to expand our understanding of mycotoxigenesis. Such studies are likely to yield knowledge that would lead to isolation of additional intermediate compounds of the pathway leading to aflatoxins, identification of key bioregulatory loci controlling aflatoxin synthesis and development of basic knowledge that would provide insights into new strategies for controlling aflatoxin formation in foods and feeds.

New Advances in Humane Slaughter of Meat Animals, A. B. Childers, Department of Veterinary Public Health, Texas A&M University, College Station, Texas 77843-4468

J. Food Prot. 50:709-710

On June 18, 1985, the U.S. Department of Agriculture approved a new method of humane slaughter for meat animals - "electrical slaughter" or deep stunning. In this method, the heart is stopped by cardiac arrest. The amount of blood loss and quality of the meat is the same as in conventional slaughter. Heart stoppage practically eliminates blood splashing and speckling.

Update on *Standard Methods for the Examination of Dairy Products*, 15th Edition, R. T. Marshall, R. A. Case, R. E. Ginn, J. W. Messer, T. Peeler, G. H. Richardson and H. M. Wehr, Department of Food Science and Nutrition, University of Missouri, Columbia, Missouri 65201

J. Food Prot. 50:711-714

Alcoholic Beverages. Edited by G. G. Birch and M. G. Lindley, Elsevier Science Pub. Co., New York.

This book covers the latest processing methods of beer, wines, and other alcoholic beverages. It gets into the importance of enzymes and hops in the brewing industry. It covers new developments and advancements in the spirits industry.

Several chapters discuss the methods used in the authentication of wines and chemical indices of wine quality; also, on section specifically for port wine.

This book also discusses the physiological, nutritional, and metabolic effects and damage caused in various stages of alcohol intake. It also presents new approaches used in alleviating alcoholic intoxication.

David Peper
Siouxland District Health Dept.
Sioux City, IA

Developments in Dairy Chemistry - 3. Edited by P.F. Fox, Elsevier Applied Science Publishers, New York.

Developments in Dairy Chemistry - 3 is the third book in the developments series devoted to dairy chemistry. While each of the first two books in this series dealt with one major component of milk, namely proteins and lipids, this book has the unenviable task of attempting to cover the remaining components of the milk system. Overall, this book was found to be the least satisfying of the three, mainly because it does try to cover a very broad range of topics.

The first five chapters or approximately 40% of the book are devoted to a discussion of lactose. The first of these chapters deals with the chemical and physiochemical properties of lactose. Covered are such topics as solubility, crystalline forms, behavior of lactose in various dairy products, lactose hydrolysis, and the manufacture of lactose. The most indepth part of this chapter is a discussion of the water absorption properties of lactose systems. In the second chapter is a cataloging of various chemical modifications, e.g., halogenated derivatives, is presented and lactosides. Following this is a brief discussion of applications of these derivatives to various systems. Modification of lactose with β-galactosidase is addressed in the third chapter. Topics included are mechanism of action, sources of the enzyme, means of measuring activity and characteristics of various microbial sources of the enzyme. The last part of the chapter deals with applications of the enzyme to various dairy systems, e.g., fluid milk and whey. The fourth and fifth chapters discuss the nutritional aspects of lactose. Lactose intolerance or malabsorption is the topic of the first of these chapters while the metabolism of the lactose molecule after absorption is the focus of the other chapter. Both chapters are written in an informative manner and should not overwhelm the reader with technical information.

Chapters six and seven cover the milk salts from secretion and physical chemistry to their metabolism in the body. The emphasis from the physical chemical point of view is on the equilibria among calcium, magnesium, and phosphate and how the various compounds of the minerals are distributed in milk. The metabolism of the minerals is approached by comparing human and bovine milks for their mineral composition and then briefly discussing the more prominent ones, such as calcium, magnesium, and sodium with respect to their role in good health.

Flavor of dairy products and the enzymes of milk are given a broad and general discussion in chapters eight and nine. The two chapters touch on many topics, thus giving the reader a basic understanding of the complexity of the areas. One could use the extensive reference lists to help begin a more critical study of these topics. The tenth chapter is a little more defined in its scope, discussing the non-immunoglobulin protective proteins of milk. In particular, lysozyme, lactoferrin, and lactoperoxidose are the proteins of concern with aspects of each, such as mode of action, being discussed in some depth. The final chapter is devoted to an overview of the vitamins of bovine and human milk. Generally, the structure of the vitamin is given, followed by its physiological role and the relationships of the vitamin to milk is discussed.

As stated earlier, this is the least satisfying of the three books in the series mainly because such a wide range of topics is covered. The book is, however, a worthwhile one for giving the reader an overview of a topic and, with the extensive list of citations for each chapter, will allow the reader to research deeper into a given topic.

David E. Smith
Dept. of Food Science
University of Minnesota
St. Paul, MN 55108

Calendar

1987

August 16-18, WISCONSIN DAIRY PRODUCTS ASSOCIATION, INC. JOINT ANNUAL MEETING & CONVENTION WITH MIDWEST DAIRY PRODUCTS ASSOCIATION, INC., to be held at The Abbey on Lake Geneva, Fontana, WI. For more information, contact: Norm E. Kirschbaum, 1400 E. Washington Ave., Suite 185, Madison, WI 53703.

August 16-18, MICHIGAN DAIRY FOODS ASSOCIATION ANNUAL CONVENTION, to be held at Boyne Highlands Resort, Harbor Springs, MI. For more information, contact: Frank Koval, 748 N. Cedar St., Lansing, MI 48906.

August 17-21, BIOTECHNOLOGY: MICROBIAL PRINCIPLES AND PROCESSES FOR FUELS, CHEMICAL AND BIOLOGICALS, to be held at the Massachusetts Institute of Technology, Cambridge, MA. For more information, contact: Director of Summer Session, MIT, Room E19-356, Cambridge, MA 02139.

August 31-September 4, 71ST ANNUAL SESSIONS OF THE INTERNATIONAL DAIRY FEDERATION, to be held in Helsinki, Finland. For more information, contact: Harold Wainess, Secretary, U.S. National Committee of the IDF (USNAC, 464 Central Avenue, Northfield, IL 60093. 312-446-2402.

September, WAMFES ANNUAL MEETING, to be held in Eau Claire, WI. For more information, contact: Randy Daggs. 608-266-9376.

September 1-2, FOOD PROCESSING WASTE CONFERENCE, Radisson Hotel, Atlanta, GA. For more information, contact: Edd Valentine or Chuck Ross, Georgia Tech Research Inst., Economic Development Laboratory, Environmental, Health and Safety Division, O'Keefe Building, Atlanta, GA 30332. 404-894-3412.

September 2-3, 1ST VIRGINIA DAIRY QUALITY CONTROL CONFERENCE, to be held at the Sheraton Red Lion Inn, Blacksburg, VA. For more information, contact: J. Russell Bishop, Dept. Food Science and Technology, VPI&SU, Blacksburg, VA 24061. 703-961-4921.

September 8-10, BASIC PASTEURIZATION COURSE, to be held at the Viscount Hotel in Houston, Texas, 713-526-4571. For more information, contact: Ms. Janie F. Park, TAMFES, P.O. Box 2363, Cedar Park, TX 78613-2363. 512-458-7281.

September 9-10, NEBRASKA DAIRY INDUSTRIES ASSOCIATION ANNUAL CONVENTION, to be held at the Best Western Regency West, Omaha, NE. For more information, contact: Michael Liewen, 134 Filley Hall, University of Nebraska, Lincoln, NE 68583-0919.

September 9-10, UNITED DAIRY INDUSTRY ASSOCIATION ANNUAL MEETING, to be held at the Marriott O'Hare, Chicago, IL. For more information, contact: Edward A. Peterson, 6300 N. River Road, Rosemont, IL 60018.

September 10-13, DAIRY PRODUCTS INSTITUTE OF TEXAS FALL BOARD OUTING, to be held at Horseshoe Bay Resort, TX. For more information, contact: Glenn R. Brown, 201 Vaughn Building, Austin, TX 78701.

September 14-15, ASSOCIATED ILLINOIS MILK, FOOD, AND ENVIRONMENTAL SANITARIANS FALL SEMINAR AND ANNUAL MEETING, a joint conference with the Coop Extension Service, University of Illinois to be held at the Chancellor Inn, Champaign, IL. For more information contact: Dr. Clem Horner, Secretary, Gorman Publishing Co., 8750 W. Bryn Mawr, Chicago, IL 60631 (312) 693-3200 or Dr. Gary Harpestad, Extension Dairyman, University of IL., 315 Animal Sciences Lab, 1207 W. Gregory Dr., Urbana, IL 61801. (217) 333-0510.

September 14-17, AOAC TO HOLD 101ST ANNUAL INTERNATIONAL MEETING, to be held at The Cathedral Hill Hotel, in San Francisco. For more information, contact: the AAOAC office at 1111 N. 19th St., Suite 210, Arlington, VA 22209. 703-522-3032.

September 14-18, FOOD MICROBIOLOGY SHORT COURSE, sponsored by the University of California and University Extension. To be held at the Department of Food Science and Technology, Cruess Hall, UC Davis Campus. For further information, contact: Kathryn J. Boor, Food Science and Technology, University of California, Davis, CA 95616. 916-752-1478.

September 15-16, 1987 ANNUAL CONVENTION OF THE SOUTH DAKOTA STATE DAIRY ASSOCIATION, to be held at Howard Johnson's, Sioux Falls, SD. For more information, contact: Shirley W. Seas, South Dakota State Dairy Association, University Dairy Building, Brookings, SD 57007. 605-688-5420.

September 17-18, WISCONSIN LABORATORY ASSOCIATION ANNUAL EDUCATION CONFERENCE, to be held at the Holiday Inn, Fond du Lac, WI. For more information, contact: Sharon Kluender, 616 1/2 Garfield Ave., Wausau, WI 55401. 715-848-1406.

September 17-18, MINNESOTA SANITARIANS ASSOCIATION ANNUAL MEETING, to be held at the Earle Brown Center, Univ. of Minnesota, St. Paul Campus. For more information, contact: Roy E. Ginn, Dairy Quality Control Inst., 2353 N. Rice St., Room 110, St. Paul, MN 55113. 612-484-7269.

September 20-23, NATIONAL DAIRY COUNCIL OF CANADA 70TH ANNUAL CONVENTION, to be held at the Quebec Hilton, Quebec, Canada. For more information, contact: Dale A. Tulloch, 141 Laurier Avenue West, Ottawa, Ontario, Canada K1P 5J3.

September 21-23, NEW YORK STATE ASSOCIATION OF MILK & FOOD SANITARIANS ANNUAL MEETING, to be held at the Sheraton Inn Syracuse, (Liverpool, NY). For more information, contact: Paul J. Dersam. 716-937-3432.

September 24-25, SWEETENERS IN FOODS: SENSORY, PROCESSING AND HEALTH ASPECTS, to be held at Kansas State Union, Kansas State University, Manhattan, KS. For more information, contact: Dr. Carol Setser or Dr. Karen Penner, Department of Foods and Nutrition, Justin Hall, Kansas State University, Manhattan, KS. 913-532-5508.

September 28-29, SEMINAR ON "CONTEMPORARY QUALITY ASSURANCE," jointly sponsored by the International Dairy Federation and USNAC. To be held in McCormick Place, Chicago, IL. For more information, contact: Harold Wainess, Secretary, U.S. National Committee of the IDF (USNAC), 464 Central Avenue, Northfield, IL 60093. 312-446-2402.

September 30-October 2, KANSAS ASSOCIATION OF SANITARIANS ANNUAL MEETING, to be held at the Holidome in Lawrence, Kansas. For more information, contact: John M. Davis. 316-268-8351.

October 5-9, 13TH INTERNATIONAL SYMPOSIUM OF THE IUMS-ICFMH & FECS-WPFC, "Toxins in Foodborne Disease" and "Microbiology of Drinking Water," to be held in Halkidiki, Greece. For more information, contact: Prof. J. A. Papadakis, Omirou 24, 10672 Athens, Greece.

October 10-15, 1987 30TH ANNUAL NATIONAL EDUCATIONAL CONFERENCES AND EXPOSITION OF THE ENVIRONMENTAL MANAGEMENT ASSOCIATION AND ITS SUBSIDIARIES, to be held at the Clarion Hotel, St. Louis, MO. For more information, contact: Registrar, 1019 Highland Ave., Largo, FL 33540. 813-586-5710.

October 12-14, BIOTECHNOLOGY PROCESSING ENGINEERING CENTER THIRD ANNUAL SYMPOSIUM, to be held at the Massachusetts Institute of Technology, Cambridge, MA 02139. For more information, contact: Diana Kenney, MIT, Room 20A-207, Cambridge, MA 02139. 617-253-0805.

October 18-21, CORNELL SYMPOSIUM ON CHEESE BIOTECHNOLOGY AND INTERNATIONAL FOOD DEVELOPMENT, to be held at Cornell University, Ithaca, NY. For more information, contact: Richard A. Ledford, Chairman, Department of Food Science, Cornell University, Ithaca, NY 14853-7201. 607-255-7616.

October 19-21, DESCRIPTIVE ANALYSIS, to be held in Palo Alto, California. Preregistration required. For more information, contact: Herbert Stone, President, Tragon Corporation, 365 Convention Way, Redwood City, CA 94063. 415-365-1833 or Telex WUI 6502215776 (access MCI).

October 19-21, BIOTECHNOLOGY PROCESSING ENGINEERING CENTER THIRD ANNUAL SYMPOSIUM, to be held at the Massachusetts Institute of Technology, Cambridge, MA 02139. For more information,

contact: Diana Kenney, MIT, Room 20A-207, Cambridge, MA 02139. 617-253-0805.

November, CANADA'S AMFES ANNUAL MEETING, to be held in Edmonton, Alberta. For more information, contact: Jim Eisen. 451-0817.

November 8-11, DAIRY INSTITUTE OF CALIFORNIA ANNUAL FALL MEETING, to be held at The Lodge, Pebble Beach, CA. For more information, contact: Robert D. Boynton, Suite 718, 1127 - 11th Street, Sacramento, CA 95814.

November 10-12, BASIC PASTEURIZATION COURSE, to be held in Texarkana, Texas. Location to be announced. For more information, contact: Ms. Janie F. Park, TAMFES, P.O. Box 2363, Cedar Park, Texas 78613-2363. 512-458-7281.

November 15-18, SOUTHERN ASSOCIATION OF DAIRY FOOD MFRS., INC. 73RD ANNUAL CONVENTION, to be held at Colonial Williamsburg Foundation, Williamsburg, VA. For more information, contact: John E. Johnson, P.O. Box 10506, Raleigh, NC 27605

November 17-19, INTERNATIONAL CATERERS' SHOW AND CONFERENCE (ICS), to be held at the Merchandise Mart Expo Center, Chicago, IL. For more information, contact: Helen Brett Enterprises, 220 S. State St., Suite 1416, Chicago, IL 60604. 312-922-0966.

November 30-December 3, NATIONAL MILK PRODUCERS FEDERATION ANNUAL MEETING, to be held at the Hyatt Regency, New Orleans, LA. For more information, contact: James C. Barr, 1840 Wilson Blvd., Arlington, VA 22201.

November 30-December 4, THE FIRST LATIN AMERICAN CONGRESS ON FOOD MICROBIOLOGY AND THE I ARGENTINE SYMPOSIUM ON PRESERVATION OF FOODS, to be held in Buenos Aires, Argentina. For more information, contact: Dr. Ricardo Sobol, Secretary General, Bulnes 44 P.B. "B", 1176 Buenos Aires, Argentina. Additional information: Dr. Fernando Quevedo, 525 Twenty Third St., N.W., Washington, D.C. 20037.

December 8-11, WORKSHOP IN INSTRUMENT SERVICE AND REPAIR, to be held at the Anderson training facility and dairy processing plant in Fultonville, NY. For more information, contact: Michael D. Cunningham, Anderson Instrument Company, Inc., R.D. #1, Fultonville, NY 12072. Telephone: 518-922-5315.

1988

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

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

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

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

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

March 13-16, DAIRY & FOOD INDUSTRIES SUPPLY ASSN. ANNUAL CONFERENCE, to be held at Americana Canyon Resort, Palm Springs, CA. For more information, contact: Bruce D'Agostino, 6245 Executive Blvd., Rockville, MD 20852.

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

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

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

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

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

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

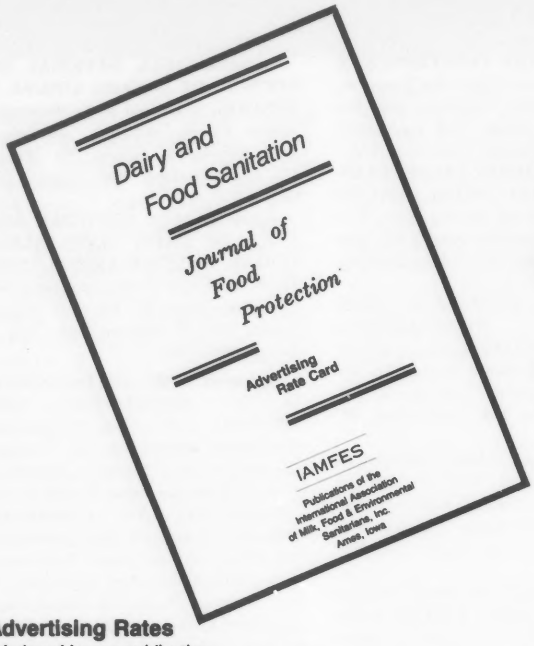
September 11-14, SOUTHERN ASSOCIATION OF DAIRY FOOD MANUFACTURERS, INC. 74TH ANNUAL CONVENTION, to be held at the Boca Raton Hotel & Club, Boca Raton, FL. For more information, contact: John E. Johnson, P.O. Box 1050, Raleigh, NC 27605.

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

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

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

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



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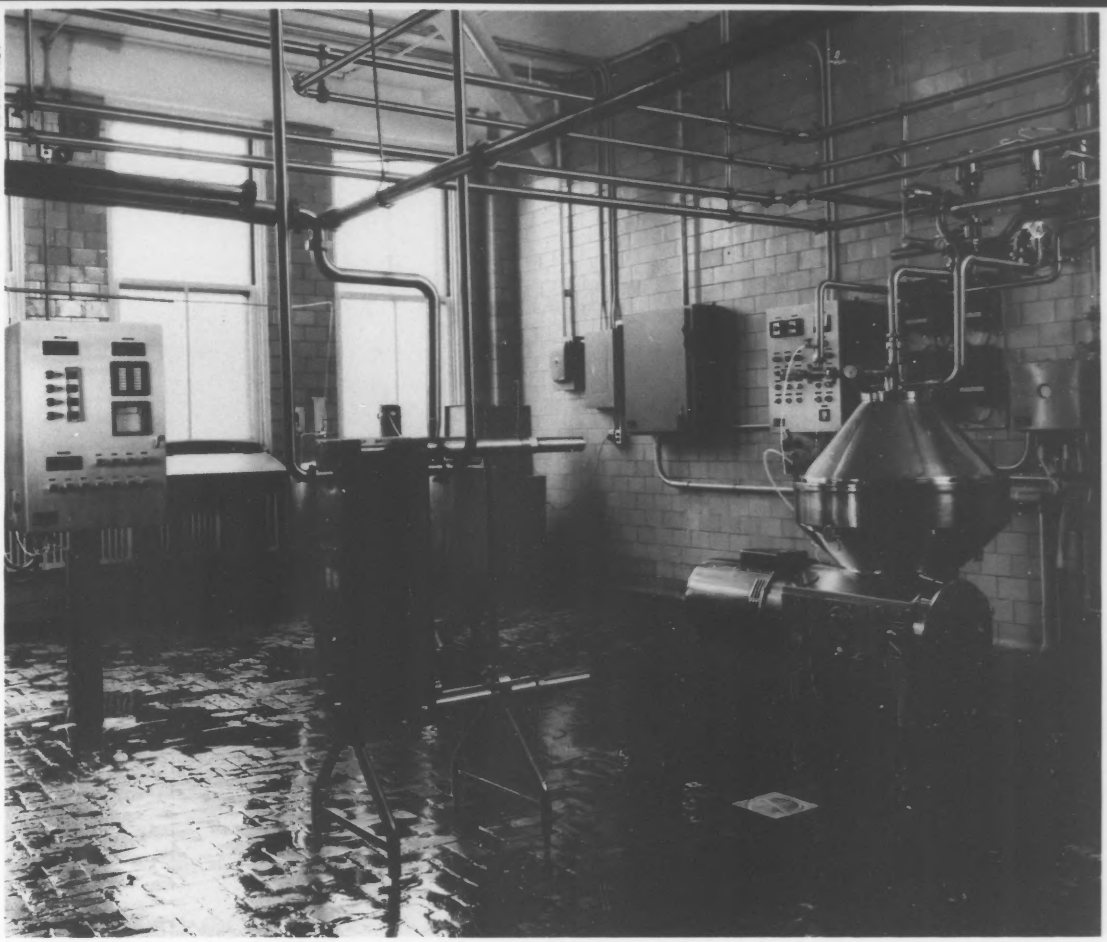

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