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# Dairy and Food Sanitation®

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

Time Temperature Monitoring System for Measuring Freshness of UHT Milk

7th Annual Wisconsin Joint Educational Conference September 24-25

Dr. Norman F. Olson receives the 1986 Harold Macy Award

Plumbing Cross Connections in Food Service Facilities

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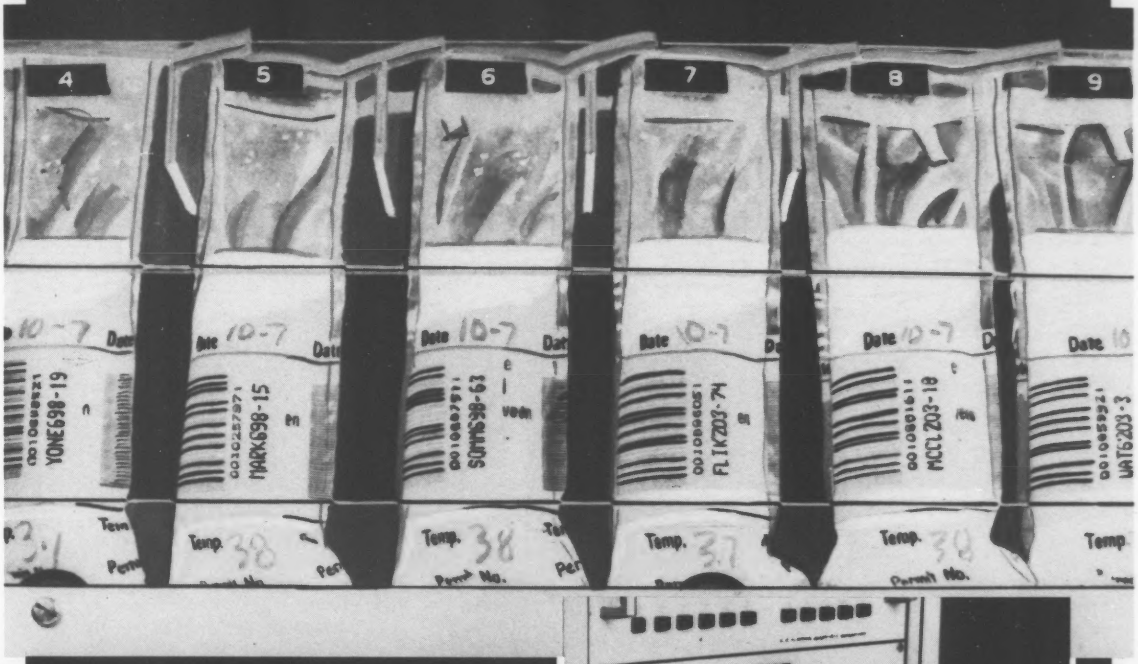


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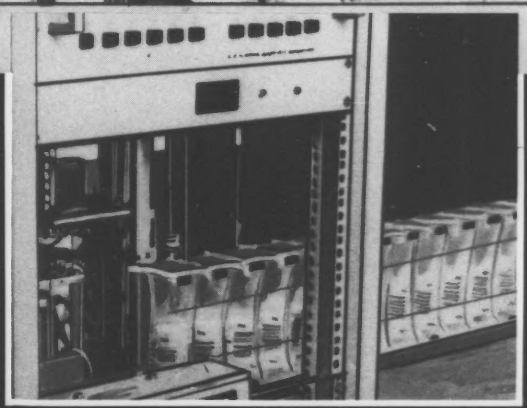

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# Dairy and Food Sanitation

CONTENTS Vol. 6 No. 7 July, 1986

ARTICLES:

*Dairy and Food Sanitation, Vol. 6, No. 7, Pages 280-284 (July 1986)*


# Plumbing Cross Connections In Food Service Facilities

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## INTRODUCTION

There would be little debate about injecting toxic chemicals into a community water distribution system or allowing sewage to flow through potable water lines. The health hazards of these situations are well recognized and resulting illness outbreaks would be devastating. However, plumbing cross connections do exist in every community that create the potential for these very things to occur.

Case histories of illness outbreaks due to plumbing cross connections are well documented. During the summer of 1985 a rural water district in SE Oklahoma was contaminated with a highly toxic pesticide. The entire water distribution system in Woodsboro, Maryland, was heavily contaminated in 1983 with a herbicide resulting in the State Health Department placing a ban on the community water system. Other recent case histories include water system contamination by: chlordane, antifreeze, chromates, and biological agents. All these cases have one thing in common, they could have been prevented if an active cross connection control program had been in effect.

As a public health official, the Sanitarian should be a key individual in cross connection control programs, especially in food processing and food service facilities. Since the revision of the USPHS Food Service Sanitation Code in 1976, sanitarians have placed increased emphasis on monitoring potentially hazardous foods during sanitary inspections. While this emphasis has probably reduced the occurrence of foodborne disease, it may have resulted in the increased potential for waterborne illness to occur. Failure to thoroughly evaluate a food service facility's plumbing system may allow cross connection and back flow hazards to exist.

The purpose of this article is to describe common cross connection hazards that can be found in food service facilities. A brief review of cross connection terms and definitions is provided on page 283. Pages 283 and 284 show the five basic devices and a device selection chart. This guide should be reviewed if you have not been involved in an active cross connection control program.

## FOOD SERVICE CROSS CONNECTION HAZARDS

Backflow and cross connection hazards may be found in the following general situations:

1. Hazards where sewage and waste water may enter the potable water system.
2. Hazards where chemicals may enter the potable water system.
3. Hazards where foods may become contaminated with sewage or waste water.

The first situation will normally involve a submerged water inlet that has not been provided back flow protection. An example is a garbage disposal with a water inlet below the flood rim of the appliance. When the grinding bowl is filled with food waste or backed up sewage, contaminants may backflow into the water inlet if conditions for back siphonage occur. Back siphonage may result from the filling of a nearby dishwasher or sink, a broken water pipe, or other heavy water usage elsewhere in the facility. If a back flow preventor has not been properly installed, contaminated waste may be distributed to other parts of the plumbing system.

An atmospheric vacuum breaker (Figure 1) will provide adequate back flow protection for the submerged water inlet on garbage disposal units. The inspector should not only check for the presence of the vacuum

Figure 1. *Atmospheric Vacuum Breaker. Cannot be placed under continuous line pressure. Not suitable where backpressure may occur.*

breaker but also check to insure that it has been installed correctly. Atmospheric vacuum breakers must be installed at least 6" above the flood rim of the appliance and downstream from the water control valve. If the atmospheric vacuum breaker is placed upstream from the water control valve it will be under continuous pressure and quickly fail.

When the atmospheric vacuum breaker cannot be placed downstream from the water control valve a pressure vacuum breaker (PVB) (Figure 2) can be installed. This device can be placed under continuous pressure and placed downstream from the water control valve. It must be located 12" above the water inlet that it protects. The PVB is provided with two test cocks and should be tested by a certified tester on a scheduled basis. Where PVBs are installed the sanitarian should review test records as part of the inspection.

Figure 2. *Pressure Vacuum Breaker. May be placed under continuous line pressure. Not suitable where backpressure may occur. Requires annual testing.*

A major limitation of both types of vacuum breakers is that they cannot be used where there is a potential for backpressure to occur. Table one lists other examples where vacuum breakers can be used to prevent back siphonage from submerged water inlets. In all cases the inspector should check for the presence of a vacuum breaker and correct installation.

Perhaps the most common cross connection that can be found in a food service operation is the water faucet with a garden hose attached. Without backflow protection the garden hose provides a direct link between the facility's plumbing system and numerous sources of contamination. During food service inspections garden hoses have been found being used to clean out grease traps and even used trying to unstop clogged sewer lines. A simple hose bibb vacuum breaker will provide adequate protection against contamination.

Several situations may exist where chemicals may be able to contaminate the water system. The most troublesome for the sanitarian will be those involving air conditioning systems, hot water systems and fire sprinkler systems. A variety of toxic and nontoxic chemicals may be used in these systems for scale control and water conditioning. In most cases these systems will be subject to back pressure and will require the installation of a double check valve assembly (DCVA) (Figure 3) or a reduced pressure principle backflow preventor.

Table 1. Vacuum Breaker Installation.

| |
|---|
| Dishwashers |
| Cooking Kettles |
| Coffee Urns |
| Garbage Can Wash Stations |
| Water Softeners |
| Steam Tables |
| Degreasing Equipment |
| Flushing Floor Drains |
| Potato Peelers |

The double check valve assembly is designed for use with only nontoxic chemicals. These protection devices are also used in food processing plants to prevent processed liquids from backflowing into potable water lines. When used in boiler systems the inspector must insure that only nontoxic chemicals are being used for water conditioning. The DCVA is designed for routine testing by a certified tester. Installation must permit easy access for testing and repair.

Systems involving toxic chemicals will require the installation of a reduced pressure (RP) (Figure 4) device. At first glance the RP device may appear complicated. However, it is a simple device consisting of two check valves with an additional relief valve located in a reduced pressure zone. When normal line pressure is maintained water flows through the first check valve, through the reduced pressure zone, and then

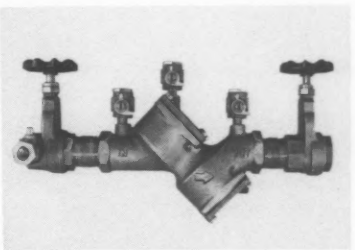

Figure 3. *Double Check Valve Assembly. For use with low hazards. Provides protection against backpressure. Requires annual testing.*

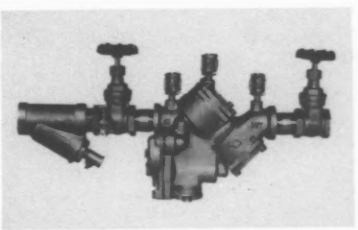

Figure 4. *Reduced Pressure Principle Backflow Preventor. For use with high hazards. Provides protection against backpressure. Requires annual testing.*

through the second check valve. When backflow conditions occur the relief valve opens creating an air gap between the two check valves.

Installation of the RP requires a drain for liquid discharged through the relief valve and adequate space for testing and repair. RP devices should never be placed over food processing areas. Water discharged through the relief valve can contaminate food and also create a safety problem. The RP device is designed to be tested. During inspections the sanitarian should review test records. Table 1 provides examples of other situations where DCVA and RP devices should be installed.

The third situation where cross connections can be a problem involves food contact surfaces with water drains that could be directly connected to sewer lines. The most common example of this situation is the ice machine bin. The only approved method of backflow protection in this situation is an air gap between the drain line and the sewer. An air gap must be at least one inch or twice the diameter of the drain, whichever is greater. The hazards of a direct connection to a sewer line are obvious, however, the hazard involved in a drain line extending a few inches into an open floor drain may not be obvious. It is easy to assume that sewage would first overflow through the open floor drain before backflowing up through the drain line into the ice

Table 2. Recommended Backflow Prevention Training Programs.

California:
Foundation for Cross-Connection Control & Hydraulic Research
B.H.E. University Park, MC-0231
Los Angeles, CA 90089-0231
(213) 743-2032

Colorado:
Larimer County Voc-Tech Center
Water/Wastewater Program
4616 South Shields
P.O. Box 2397
Fort Collins, CO 80522
(303) 226-2500 or (303) 667-2808

Red Rocks Community College
12600 W. 6th Avenue
Golden, CO 80228
(303) 988-6160

Connecticut:
Connecticut Department of Health Services
150 Washington Street
Hartford, CT 06106
(203) 566-1253

Florida:
TREEO Center
3900 SW 63rd Blvd
Gainesville, FL 32608
(904) 375-6398

Michigan:
Michigan Plumbing & Mechanical Contractor's Assn.
6810 S. Cedar, Suite 14
Lansing, MI 48910
(517) 694-8171

New England:
New England Water Works Association
850 Rear Providence Highway
Dedham, MA 02026
(617) 329-9650

New York:
Cross Connection Control Foundation
475 Norris Drive
Rochester, NY 14610
(716) 442-2000 ext. 13

Cross Connection Control Foundation of Long Island, Inc.
%Eastern Water Works Supply, Corp.
348 East Meadow Avenue
East Meadow, NY 11554
(516) 794-5803

Ohio:
Ohio Department of Health
Plumbing Unit
266 N. Fourth St.
Columbus, Ohio 43215
(614) 466-4746

Oregon:
Clackamus Community College
19600 Molalla Avenue
Oregon City, OR 97045
(503) 657-8400

Rocky Mountain Region:
Stuart F. Asay & Associates
1333 W. 120th Ave.-Suite 203
Westminster, CO 80234
(800) 621-8385 ext. 429

South Carolina:
South Carolina Water Quality Institute
Sumter Area Technical College
506 Guignard Drive
Sumter, SC 29150
(803) 778-1961 ext. 238

Southeast Region:
National Environmental Technology Training Institute
University Station Box 13264
Gainesville, FL 32604-1264
(904) 372-8037

Tennessee:
Operator Training Center
Route 11, Blanton Drive, Box 388
Murfreesboro, TN 37130
(615) 890-7008

Texas:
Texas A&M University
Engineering Extension Service
Water and Wastewater Training Division
P.O. Box 40
San Antonio, TX 78291
(512) 227-8217

Utah:
Utah Technical College at Provo
P.O. Box 1609
Provo, UT 84601
(801) 226-5000

Washington:
Washington Environmental Training Resource Center-Green River
12401 SE 320th St.
Auburn, WA 98002
(206) 833-9111

Wisconsin:
University of Wisconsin-Extension
Dept. of Engineering and Applied Science
432 N. Lake Street
Madison, WI 53706
(608) 262-2061

Wyoming:
Casper College
Water Quality Technology Programs
125 College Drive
Casper, WY 82601
(307) 268-2670

bin. If a pressure cleaning device were used to unplug a sewer line, sewage could easily be forced through the floor drain into the ice bin.

The situations that have been described are not the only potential cross connection problems. Decorative fountains, fish tanks, lawn irrigation systems, and solar heating systems, to name a few, are other areas that should be checked for cross connections. Unless the Sanitarian has evaluated these situations, the dining public will not be fully protected from the threat of an illness outbreak.

While Sanitarians may not be responsible for the management of a community cross connection control program, they are responsible for eliminating cross connections from food service facilities. This can only be accomplished with a thorough technical knowledge of backflow prevention theory and backflow prevention devices. Most states have some type of backflow prevention training courses. A newly formed American Backflow Prevention Association (Box 835, Broomfield, Colorado 80020) not only provides training and technical seminars, but, also publishes a monthly backflow prevention newsletter. A listing of other recommended backflow training programs is listed in Table 2.

Toxic chemicals and raw sewage will continue to contaminate our water distribution systems as long as cross connections exist without backflow preventors. The existence of a plumbing cross connection is an excellent example where an ounce of prevention can go a long way.


## ACKNOWLEDGMENTS

The authors would like to thank the Watts Regulator Company for permission to reprint parts of their backflow prevention training literature.


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3. Texas State Board of Plumbing Examiners. 1984. TYPICAL FACILITIES, CROSS CONNECTIONS OR WATER USES WHICH MAY ENDANGER THE PUBLIC WATER SYSTEM. Austin, Texas.
4. U.S. Public Health Service. 1963. WATER SUPPLY AND PLUMBING CROSS CONNECTIONS. PHS #957.
5. Watts Regulator Company. 1983. ANOTHER CASE FOR BACKFLOW PREVENTION. Lawrence, MA.

## SYSTEM PROTECTION BY DEVICE SELECTION

● = Type To Be Used
■ = Better Selection

| TYPE OF CONNECTION | TYPE OF DEVICE TO BE USED | | | | |
|---|---|---|---|---|---|
| | Air Gap | Atmospheric Vacuum Breaker | Pressure Vacuum Breaker | Double Check Valve | Reduced Pressure Zone |
| **DIRECT WATER CONNECTIONS SUBJECT TO BACK-PRESSURE FROM:** | | | | | |
| 1. Pumps, tanks and lines handling: | | | | | |
| (a) Sewage substances | ● | | | | ● |
| (b) Toxic substances | ● | | | | ● |
| (c) Non-Toxic substances | ● | | (1) ● | ■ | ● |
| 2. Steam lines & steam boilers | | | | | |
| (a) Boiler or steam connection to toxic substances | ● | | | | ■ |
| (b) Boiler or steam connection to non-toxic substances *(boiler blow-off not connected directly to sewer)* | ● | | (1) ● | ■ | ■ |
| 3. Car Wash Installation | | | | | ■ |
| **INLET TYPE WATER CONNECTIONS NOT SUBJECT TO BACK-PRESSURE:** | | | | | |
| 1. Waste line *(not subject to back-pressure due to waste line stoppages)* | ● | ● | ● | | ● |
| 2. L. I. to receptacles containing toxic substances | ● | ● | ● | | ■ |
| 3. L. I. to receptacles containing non-toxic substances | ● | ■ | (1) ● | ● | ● |
| 4. Lawn Sprinkler Systems | ● | ■ | ● | ● | ● |
| 5. Lawn Sprinkler Systems with fertilizer injection | | | | | ■ |
| 6. Coils or jackets used as heat exchangers in compressors, degreasers or other equipment: | | | | | |
| (a) In toxic substances | ● | ● | ● | | ■ |
| 7. Flush valve toilets | | ● | | | |
| 8. Toilet and urinal tanks | ● | ● | | | |
| 9. Valve outlets or fixtures with hose attachments which may constitute a cross connection: | | | | | |
| (a) Toxic substances | ● | (2) ■ | ● | | ● |
| (b) Non-toxic substances | ● | ■ | ● | ● | ● |
| 10. Plating Tanks | ● | | | | ■ |
| 11. Vats and vessels used for degreasing, descaling, stripping, pickling, dipping | ● | | | | ■ |
| 12. Water cooled equipment which is sewer connected | ● | | | | ■ |
| 13. Fire fighting systems which are treated for scale or algae formation or contain anti-freeze, Fomita or other chemical | ● | | | | ■ |
| 14. Fire fighting system untreated | ● | | | ■ | ● |
| 15. Greenhouse | | | | | ■ |

Note: L.I. = Low Inlet
(1) = Backflow Preventer with Intermediate Atmospheric Vent. Sizes ½" and ¾". (See Item 3 on Page 2.)
(2) = Hose Connection Vacuum Breaker.

**A.S.S.E. AND ANS. STANDARDS APPLICABLE TO THE FIVE BASIC DEVICES THAT CAN BE USED TO CONTROL CROSS CONNECTIONS**

1. **Air Gap** – Ans. Standard A40.4
2. **Atmospheric Vacuum Breakers** – A.S.S.E. Standard 1001 (Ans. A112.1.1)
   **Hose Connection Vacuum Breakers** – A.S.S.E. Standard 1011
3. **Pressure Type Vacuum Breakers** – A.S.S.E. Standard X1020 (Proposed)
   **Backflow Preventers with Intermediate Atmospheric Vent** – A.S.S.E. Standard 1012
4. **Double Check Valve Type Back Pressure Backflow Preventers** – A.S.S.E. Standard 1015, A.S.S.E. 1024 Dual Check
5. **Reduced Pressure Principle Back Pressure Backflow Preventers** – A.S.S.E. Standard 1013

*Dairy and Food Sanitation, Vol. 6, No. 7, Pages 285-290 (July 1986)*


# Evaluation of Automated Time Temperature Monitoring System In Measuring Freshness of UHT Milk

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*Morristown, New Jersey*

Demand for aseptically packaged food and beverages is increasing in the United States. Schotland Business Research projects 4 billion aseptic packages per year in the U.S. market by 1987. The three major categories of aseptically packaged products that have demonstrated acceptance are ready to serve juices, milk and juice drinks. By 1987, ready to serve juices are estimated to total 1.4 billion units, milk 800 million units, and juice drinks 550 million units (Packaging Digest 1983).

The Ultra High Temperature (UHT) processing of fluid milk has the potential of providing a longer shelf life product which is superior in taste to many reconstituted milks. Smith, University of Maryland, in a literature search on UHT milk (Unpublished 1984) reported that method of processing, packaging and temperature of storage will influence the quality and shelf life of UHT fluid milk. This review shows that shelf life is not indefinite and that a good quality raw material with proper processing and packaging conditions can be expected to yield a product with three to four months of shelf life under ambient storage conditions. A large U.S. processor of UHT milk reports a shelf life of eight months is attained by optimizing both processing conditions and distribution environment (Food Engineering 1983).

The bulk of reported research on UHT milk has investigated the effect of different processing and packaging techniques on product quality and flavor. It is generally known that temperature of storage is very important to product shelf life but there are no reports available on the effect of various temperatures that would be experienced in commercial distribution on product quality and shelf life. With increasing U.S. and international shipments of UHT milk, such information is required in order to optimize quality. Also, an objective device for monitoring and controlling product quality during distribution could provide benefits to processors and consumers.

Allied Corporation of Morristown, New Jersey, has developed the Lifelines™ Inventory Management System, a computerized time temperature monitoring system for measuring the freshness of semi-perishable and perishable foods during distribution. Studies were conducted at Cornell University, Ithaca, New York, to evaluate the Lifelines System in measuring the freshness of UHT milk stored at constant refrigerated and non-refrigerated temperatures and during shipments between the East Coast and West Coast of the United States. This paper describes the experimental techniques used and reports the results of laboratory and shipping tests using the Lifelines Systems.

## OBJECTIVE

1. To determine the shelf life of UHT milk stored at refrigerated and non-refrigerated temperatures.
2. To determine the effects of shipments in commercial carriers on the quality of UHT milk.
3. To evaluate the effectiveness of the Lifelines Inventory Management System in measuring the freshness and shelf life of UHT milk.

The time temperature monitoring system is composed of three principal parts:

(a) A printed label incorporating a color changing chemical integrator
(b) A microcomputer with optical wand for reading the indicator label and
(c) Software data analysis and tele-communications.

The Lifelines System incorporates proprietary color-changing polymers printed on labels in a bar code format. The indicator element is lightly colored at the start, but through the combined effects of time and temperature,

*Paper presented at the Ninth Annual Eastern Research Highlights Conference, November 7-8, 1984, Washington, D.C.*

its color intensity increases irreversibly. The rate of color development increases as the temperature rises.

The indicator labels (Figure 1) are comprised of two distinct types of bar codes. One is a standard bar code, either code 3 of 9 or interleaved 2 of 5, which provides information about the product's identity, date of manufacture, lot numbers or any other relevant inventory information. The other is an indicator code which contains a polymer that develops color predictably under different time-temperature conditions. These changes identify cumulative temperature exposure that affects the product's shelf life. Allied has developed a number of polymers capable of monitoring a wide range of products.


A B C

A USER SPECIFIC INFORMATION

B FRESHNESS IDENTIFICATION CODE

C FRESHNESS BAR CODE

Figure 1. *Freshness label.*

The portable microcomputer (Figure 2) can read conventional bar codes as well as measure the reflectance of the polymer coating on the label. It has a total memory capacity of up to 80 kilobytes and can be downloaded to a remote host computer for analysis and permanent storage of the information.

Figure 3 shows a schematic of the Lifelines System with labels on a shipping carton, portable microcomputer connected to a remote host computer via the commercial telephone network.

Two series of laboratory tests were carried out to determine the shelf life of whole white UHT milk stored at different temperatures and the effectiveness of the Lifelines System in measuring the freshness and shelf life of milk stored at these temperatures.

*Test Series No. 1*

In Test Series Number 1, which began in February 1984, 140 eight-ounce cartons of UHT milk were obtained from a cooperating processing company and stored at temperatures of 2°C (Control), 21°C, 32°C and 45°C at Cornell University. For each data point at least one eight-ounce carton was sampled. At periodic intervals of storage, samples were analyzed by an expert taste panel


Figure 2. *Hand-held computer.*

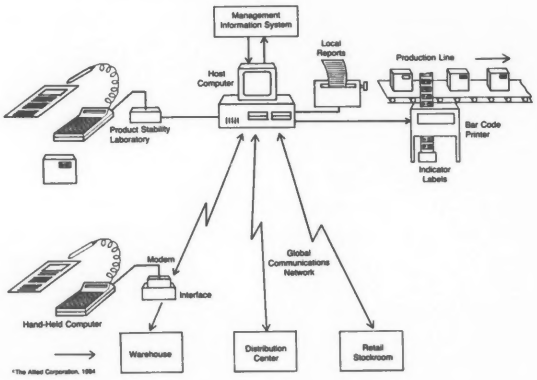



Figure 3. *Lifelines inventory management system.*

of 3 to 7 people using a 9 point hedonic scale. The freshness of the product was calculated as a function of the percentage change from the control. Product freshness in percent = (100) x (taste panel score for test product) ÷ (taste panel score for control).

Chemical tests were also carried out for 2% TCA (trichloracetic acid), Soluble Nitrogen and Acid Degree Value (ADV).

For evaluation of the Lifelines System, Code Number 24 indicator labels containing a polymer coating designed for a semi-perishable product were placed with each individual test carton and on the master cartons. Each label was scanned five times with the portable microcomputer at each product sampling, reflectance read and the read-

ings periodically downloaded to the laboratory computer for analysis.

*Test Series No. 2*

Test Series Number 2 began in July 1984 and was carried out to confirm results of earlier Test Series Number 1. Approximately 500 eight-ounce cartons of UHT milk were obtained from the same cooperating processing company as in Test Series No. 1 and stored at temperatures of 2°C (Control), 21°C, 32°C, 37°C and 45°C at Cornell University. Storage samples were analyzed using the same taste panel procedures described for Test Series Number 1. Chemical tests were not repeated because it was found that these tests were not as sensitive to quality changes as taste panel findings. For evaluation of the Lifelines System, code number 24 and 21 indicator labels were used as described for Test Series No. 1.

*Shipping Tests*

The shipping tests were started in August 1984, using UHT processed milk from the same lot as in Test Series Number 2. The indicator labels were placed with individual units and master cartons as in the laboratory tests and were scanned in the same manner as described previously.

Samples were shipped on a continuing basis for three round trips in a non-refrigerated commercial carrier between Cornell University and the University of California at Davis. Two separate trucks were used as carriers for each trip and recorders were used to measure the temperatures of each truck. At each distribution point (Cornell and University of California) samples of products were removed from each truck and scanned for label reflectance. After each round trip, samples from each truck were subjected to organoleptic tests using the same procedures described for the laboratory tests. To determine the effect of additional storage on product quality, duplicate samples were removed periodically from shipments and were stored at temperatures of 2°C, 21°C and 32°C for taste panel evaluation.

## RESULTS

Tables 1 and 2 show 2% TCA soluble nitrogen and ADV values obtained as a function of storage temperature.

It can be seen that 2% TCA soluble nitrogen increases as a function of increased storage temperatures. ADV values increased significantly at 32°C and 45°C indicating the possibility of their use to indicate product exposure to high temperatures. Data for 2% TCA soluble nitrogen and ADV are plotted in Figures 4 and 5 respectively.

The percent freshness of UHT milk as indicated by taste scores is shown in Tables 3 and 4.

It can be seen that UHT milk loses quality as a function of increased time and temperature of storage. The data indicate that the samples lost about 50 percent of their initial freshness after storage for 164 days at 21°C, 95 days at 32°C, 42 days at 37°C, and as early as 20 days at 45°C. Findings from Test Series No. 2 are in general agreement with those from Test Series No. 1.

TABLE 1. *Increase of 2% TCA soluble nitrogen in the UHT milk over the time of storage.*

| Days In Storage | Storage Temperature | | | |
|---|---|---|---|---|
| | 2°C | 21°C | 32°C | 45°C |
| | Percent | | | |
| 10 | 0 | - | 0.8 | 3.2 |
| 28 | 0 | - | 1.1 | 9.6 |
| 42 | 0 | - | - | 11.8 |
| 56 | 0 | - | - | 29.9 |
| 83 | 0 | 4.0 | 16.0 | 40.0 |
| 95 | 0 | 10.5 | 19.0 | 46.7 |
| 125 | 0 | 12.6 | 21.9 | 58.0 |
| 164 | 0 | 17.3 | 34.6 | 77.5 |

TABLE 2. *Increase of acid degree value of the UHT milk.*

| Days In Storage | Storage Temperature | | | |
|---|---|---|---|---|
| | 2°C | 21°C | 32°C | 45°C |
| | Percent | | | |
| 10 | 0 | - | - | 6.2 |
| 42 | 0 | 2.7 | 8.0 | 29.2 |
| 56 | 0 | 2.7 | 12.4 | 45.1 |
| 67 | 0 | - | 16.6 | 62.8 |
| 95 | 0 | - | - | 68.9 |
| 125 | 0 | - | 26.0 | 79.8 |

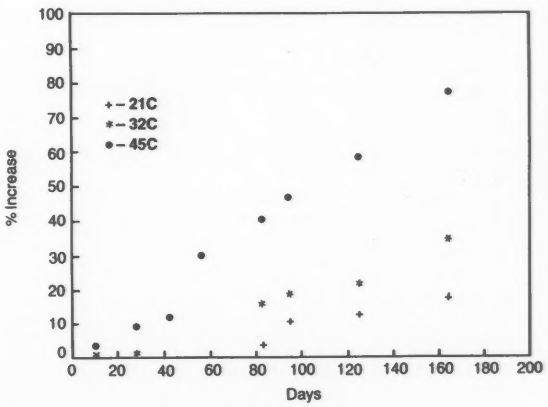



Figure 4. *Increase of 2% TCA soluble nitrogen.*

Tables 5, 6 and 7.

It can be seen from these data that reflectance for both labels Number 21 and 24 decrease in value with an increase in time and temperature of storage. The data show close agreement in values for labels Number 24 in Test

The reflectance measurements expressed in percent obtained from scanning of indicator labels Number 21 and 24 are shown in

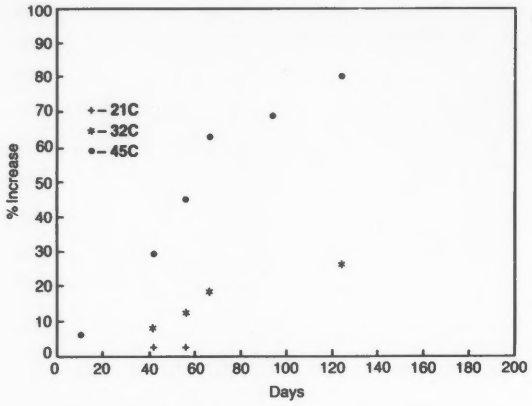



Figure 5. *Increase of acid degree value of UHT milk.*

TABLE 3. *Freshness of UHT milk indicated by taste scores (Test Series No. 1).*

| Days In Storage | Storage Temperature | | | |
|---|---|---|---|---|
| | 2°C | 21°C | 32°C | 45°C |
| | (Percent Freshness)[1] | | | |
| 28 | 100 | 93.33 | 73.33 | 56.67 |
| 42 | 100 | 89.00 | 63.19 | 31.60 |
| 56 | 100 | 87.00 | 67.74 | 29.03 |
| 67 | 100 | 100.00 | 79.31 | 13.79 |
| 83 | 100 | 71.00 | 42.86 | 14.29 |
| 95 | 100 | 82.86 | 57.14 | - |
| 125 | 100 | 67.57 | 35.14 | - |
| 164 | 100 | 55.02 | 34.93 | - |

[1]Percent Freshness =

$$\frac{\text{(Taste Panel Score for Test Product)} \times (100)}{\text{Taste Panel Score for Control}}$$

TABLE 4. *Freshness of UHT milk indicated by taste scores (Test Series No. 2).*

| Days In Storage | (Percent Freshness)[1] | | | | |
|---|---|---|---|---|---|
| | 2 | 21 | 32 | 37 | 45 |
| | Percent Freshness[a] | | | | |
| 0 | 100 | 100.00 | 100.00 | 100.00 | 100.00 |
| 12 | 100 | 96.78 | 91.40 | 80.65 | 72.58 |
| 20 | 100 | 100.00 | 85.71 | 71.43 | 50.00 |
| 42 | 100 | 95.65 | 72.46 | 47.83 | 20.29 |
| 52 | 100 | 85.96 | 70.02 | 40.03 | 17.50 |
| 67 | 100 | 85.97 | 64.91 | 24.56 | 5.26 |
| 90 | 100 | 75.86 | 55.17 | 32.76 | - |

[1]Percent Freshness =

$$\frac{\text{(Taste Panel Score for Test Product)} \times (100)}{\text{Taste Panel Score for Control}}$$

TABLE 5. *Actual indicator label reflectance measurement. Label number 24 (Test Series No. 1).*

| Days In Storage | Storage Temperature (°C) | | |
|---|---|---|---|
| | 21 | 32 | 45 |
| | (Reflectance in Percent) | | |
| 10 | 88.33 | 76.50 | 37.33 |
| 21 | 84.30 | 64.20 | 15.13 |
| 35 | 80.97 | 51.07 | 7.31 |
| 42 | 81.04 | 46.50 | 6.07 |
| 56 | 75.54 | 35.67 | 2.00 |
| 67 | 73.37 | - | - |
| 74 | 73.50 | 28.18 | - |
| 83 | 70.80 | 26.46 | - |
| 95 | 68.14 | 22.99 | - |
| 125 | 61.10 | 15.76 | - |
| 164 | 56.34 | 13.00 | - |

TABLE 6. *Actual indicator label reflectance measurement. Label number 21 (Test Series No. 2).*

| Days In Storage | Storage Temperature (°C) | | | |
|---|---|---|---|---|
| | 21 | 32 | 37 | 45 |
| | (Reflectance in Percent) | | | |
| 0 | 94.50 | 94.50 | 94.50 | 94.50 |
| 12 | 88.78 | 83.78 | 79.81 | 58.67 |
| 20 | 86.86 | 80.33 | 69.33 | 44.33 |
| 28 | 85.00 | 75.78 | 60.22 | 32.78 |
| 42 | 85.78 | 73.00 | 52.78 | 26.33 |
| 52 | 81.33 | 66.33 | 42.33 | 16.78 |
| 67 | 81.00 | 64.44 | 38.89 | 13.67 |
| 90 | 79.64 | 57.07 | 30.47 | 13.13 |

TABLE 7. *Actual indicator label reflectance measurement. Label number 24 (Test Series No. 2).*

| Days In Storage | Storage Temperature (°C) | | | |
|---|---|---|---|---|
| | 21 | 32 | 37 | 45 |
| | (Reflectance in Percent) | | | |
| 0 | 97.00 | 97.00 | 97.00 | 97.00 |
| 12 | 88.11 | 76.22 | 60.22 | 32.89 |
| 20 | 86.08 | 71.22 | 49.89 | 18.67 |
| 28 | 82.11 | 62.11 | 36.00 | 11.11 |
| 42 | 81.22 | 55.22 | 28.89 | 8.55 |
| 52 | 76.78 | 46.11 | 18.78 | 4.56 |
| 67 | 73.56 | 40.11 | 15.33 | 3.00 |
| 90 | 68.60 | 33.18 | 10.56 | 3.00 |

Series No. 1 and No. 2. The change in indicator reflectance values as a function of time and temperature of storage is shown more dramatically in Figure 6 on reproducibility of reflectance measurements.

Figures 7 and 8 show the comparison of taste panel findings with indicator reflectance measurements determined with the Lifelines System. From Figure 7 it can be seen that the correlation for label Number 24 in Test Series No. 2 confirms that found in Test Series No. 1. A regression analysis shows that correlation of label Number 24 is 0.971 whereas that of label Number 21 is 0.975.

A program has been developed by Friedmann (Allied unpublished) for estimating product freshness. From indicator reflectance values and elapsed time, the kinetic average temperature can be estimated and used with the product degradation rate equation to estimate the product freshness. Figure 9 shows the estimated product freshness readings based on reflectance values obtained from label Number 24 and the correlation of these values with taste panel findings. The program utilized for estimating the

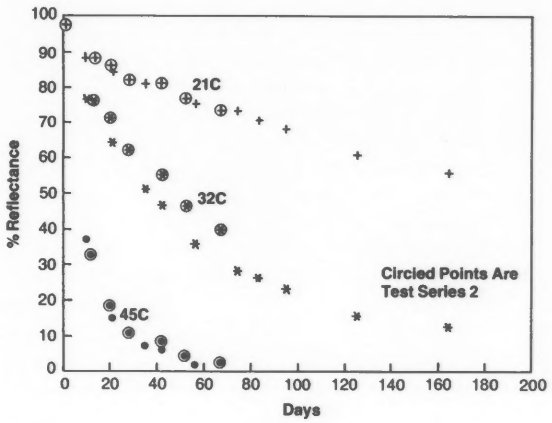



Figure 6. *Reproducibility of reflectance measurements.*

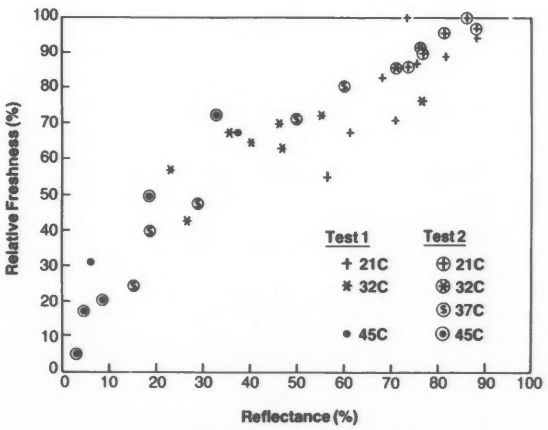



Figure 7. *Correlation of indicator response (MC24) with taste scores.*

product freshness can be incorporated into the microcomputer to provide a direct reading of product freshness as influenced by the time and temperature of product storage.

At the time of this report, temperature analysis, taste panel scores and reflectance measurements had been carried out for three round trips of shipments between the East and West coast, which covered 60 days.

The temperature of the UHT milk containers as measured by a recording thermometer in the product master carton is shown in Figure 10. It can be seen that the

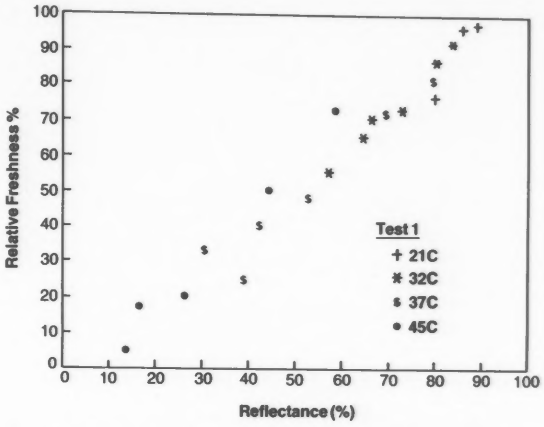



Figure 8. *Correlation of indicator response (MC21) with taste scores.*

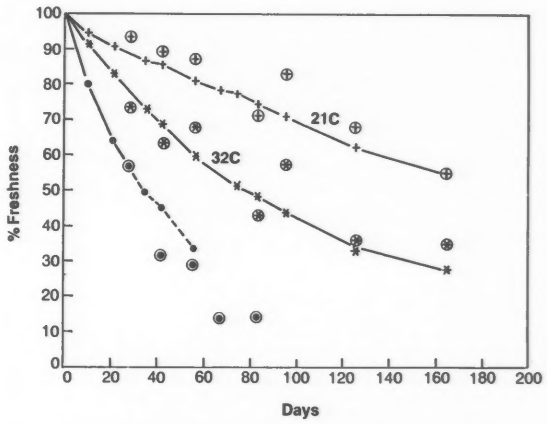



Figure 9. *Actual freshness (taste scores) and computer estimated freshness. Note, Circle points are taste panel scores.*

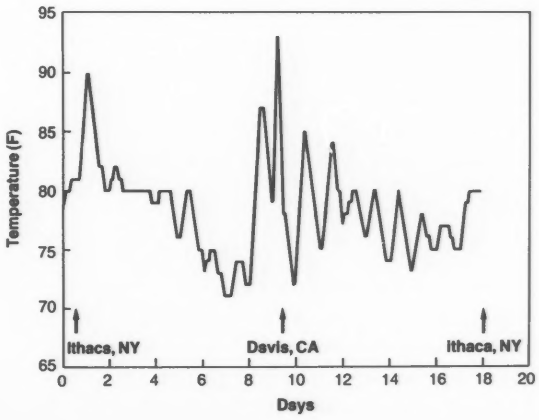



Figure 10. *Shipping test temperature profile.*

TABLE 8. *Freshness of UHT milk after the extended time of shipment.*

| At End of Trip No. | Shipment Days | Temperature[1] 0°C | Taste Panel Freshness (Percent) | Reflectance of Indicator Labels (Percent) Label No. 24 | Label No. 21 |
|---|---|---|---|---|---|
| Control | 0 | 2 | 100.00 | 97.00 | 94.50 |
| 1 | 24 | 26.17 | 95.24 | 74.86 | 81.83 |
| 2 | 44 | 25.30 | 85.46 | 68.70 | 79.01 |
| 3 | 66 | 25.10 | 72.92 | 62.78 | 77.58 |

[1]Average temperature during shipment.

TABLE 9. *Freshness of UHT milk indicated by taste scores and by polymer labels.*

| Days in Storage | Taste Panel Freshness (Percent) | Reflectance of Indicator Label (Percent) Label No. 24 | Label No. 21 |
|---|---|---|---|
| 0 | 100.00 | 97.00 | 94.50 |
| 23 | 91.54 | 74.42 | 81.81 |
| [a]43 | 85.49 | 69.13 | 79.86 |
| [b]43 | 85.49 | 66.55 | 80.05 |
| [a]54 | 77.18 | 70.38 | 80.38 |
| [b]54 | 72.91 | 57.48 | 76.07 |
| [c]69 | 81.60 | 76.95 | 81.17 |
| [a]69 | 73.33 | 65.40 | 79.05 |
| [b]69 | 63.64 | 49.11 | 71.97 |

[a]Storage at 21°C after 23 days of shipment at average temperature 25°C.

[b]Storage at 32°C after 43 days of shipment at average temperature 25°C.

[c]Stored at 2°C after 23 days of shipment at average temperature 25°C.

product temperature during August varied from a low of about 21°C (70°F) to a high of about 34°C (93°F).

The freshness and indicator reflectance values for UHT milk after extended shipments are shown in Table 8. It can be seen that the actual reflectance readings obtained from label Number 21 correlates quite well with freshness values obtained from taste panel findings.

The freshness of UHT milk stored at 20°C, 21°C, and 32°C after shipment for 23 days (one round trip) is shown in Table 9. It can be seen that trends for actual reflectance values for label Number 21 are in close agreement with those for taste panel findings.

## CONCLUSIONS

Results of these studies show that:

- UHT milk loses quality as a function of time and temperature of storage. The sample lost about 50 percent of its initial freshness after storage for 164 days at 21 degrees centigrade, 95 days at 32 degrees centigrade, 42 days at 37 degrees centigrade, and as early as 20 days at 45 degrees centigrade.
- Chemical analysis for 2% TCA soluble nitrogen and ADV while not providing direct correlation with taste panel findings do indicate severe abuse due to exposure of product to high temperature.
- Product freshness evaluation using the Lifelines Indicator label were reproducible and predictable in measuring the quality of over 390 individual samples of UHT milk stored under various temperatures in laboratory and commercial shipping tests.
- The correlation between the Lifelines Indicator label and the taste panel findings was better than $r = 0.97$.

## REFERENCES


1. Allied Corporation, November 1984, A Mathematical Program for Estimating Product Freshness from Indicator Reflectance (Unpublished).
2. Food Engineering, July 1983, The Aseptic Report, pp. 70-72.
3. Packaging Digest, December 1983, Dairies Continue Aseptic March, Delta Communications, Inc., Chicago, Illinois, p. 46.
4. Smith, M., October 1984, Literature Search on UHT Milk (Unpublished), University of Maryland, College Park, Maryland.

## Ron Case New IAMFES Secretary

Ron Case through vote of the IAMFES membership will begin his term on the IAMFES Executive Board in August, 1986.

Ron Case is presently Corporate Quality Assurance Manager for Kraft Inc. in Glenview, Illinois. During his 12 years with Kraft Inc., he has had a variety of Quality Control positions, including Food Technologist and Corporate Laboratory Control Manager. Prior to coming to work in the food industry, he was a secondary school Science teacher in Kentucky.

Ron received his Bachelor's Degree from the University of Kentucky in Science Education and his Master's Degree from the University of Notre Dame in Chemistry. He has done additional graduate work at the University of Wisconsin in Food Safety.

An active member of IAMFES and the Illinois affiliate for 8 years, Ron has served on the laboratory committee and has been a speaker at both the state and international meetings.

As part of the APHA Technical Committee on "Standard Methods for the Examination of Dairy Products", he helped prepare the 15th edition and authored one chapter. He has been active in the Association of Official Analytical Chemists (AOAC) and has published papers on detection of antibiotics in milk.

He is currently serving on the joint committee of experts for the International Dairy Federation/International Standards Organization/AOAC on topics dealing with dairy analyses. He has been actively involved with the National Conference on Interstate Milk Shipments and has served on its Laboratory Committee since 1979.

Ron will serve on the IAMFES Executive Board for five years. Welcome aboard, Ron.

## Seventh Annual Joint Educational Conference to be Held September 24-25, 1986

The Seventh Annual Joint Educational Conference of the Wisconsin Association of Milk and Food Sanitarians, the Wisconsin Environmental Health Association, the Wisconsin Dairy Technology Society and the Wisconsin Association of Dairy Plant Field Representatives will be held on Wednesday, September 24 and Thursday, September 25, 1986.

The site of the conference will be the Valley Inn, Wisconsin Avenue and Walnut Street, Neenah, Wisconsin 54956.

For additional information about the conference contact: Ron Buege, West Allis Health Department, 7120 West National Avenue, West Allis, Wisconsin 53214. 414-476-3770.

## Environmental Management Assn. Conference & Exposition to be Held November 2-6

A combined national conference and exposition covering environmental sanitation, maintenance, quality control and assurance will be held November 2-6, 1986 at the Safari Conference Center Resort, in Scottsdale, Arizona.

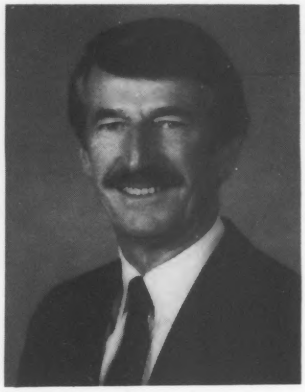
This annual national educational gathering is being presented by the Environmental Management Association, and its subsidiaries, the Food Sanitation Institute, the Health Care Facilities, the Buildings-Grounds Subsidiary, and the Sanitation Suppliers & Contractors Institute. The four and one-half day program is designed for a visiting audience of sanitation, quality assurance and control executives, engineers, consultants, scientists, educators and first responders working in the field of environmental sanitation maintenance management.

Visiting specialists will be able to evaluate and compare exhibitor products and services in such areas as: sanitation, maintenance, grounds, process and product control and assurance, all within the complete economic spectrum of the business community.

Complete educational technical programs, via food, health care, buildings and grounds classifications, emphasizing new developments and techniques in sanitation maintenance management are expected to draw an unusually influential audience. Conducted by leading experts, the programs will cover a range of subjects, all of timely interest.

For full conference and exposition programs, registration form, and complete details, contact the Environmental Management Association's national

executive office at 1019 Highland Ave., Largo, FL 33540. 813-586-5710.



## Dr. Norman F. Olson Named 1986 Macy Award Recipient

Dr. Norman F. Olson, Professor of Food Science and Director of the Walter V. Price Cheese Research Institute at the University of Wisconsin - Madison has been selected as the 1986 recipient of the Harold Macy Food Science and Technology Award. The Macy Award has been presented annually since 1981 by the Minnesota Section of the Institute of Food Technologists in recognition of an outstanding example of Food Technology transfer or cooperation between scientists in areas of service represented by Universities, government, or private industry.

Dr. Olson was nominated for the Macy Award as a result of his association with the Walter V. Price Cheese Research Institute which he organized in 1976. The Institute, which became firmly established through appropriations from the State of Wisconsin and private industry in 1979, continues to thrive under Olson's leadership, and has been effective in providing technical assistance to the nation's cheese industry. An example of institute sponsored technology transfer is the annual Cheese Research and Technology Conference which was initiated by Olson. The third Conference, held in 1985, drew over 300 participants. Dr. Olson has also been instrumental in adopting the University's instructional program to technology transfer. He has developed a unique one-week college level course in cheese technology which can be taken by off-campus students and employees of the food industry. Olson also participates regularly in teaching the two-week cheesemaking course held on the Madison campus. Olson estimates that as much as one-third of his time in the office is devoted to answering telephone or written inquiries from the cheese industry.

Dr. Olson's principal research activities include the chemistry, microbiology and technology of cheese products; acceleration of cheese ripening, rheology of milk during clotting; and the applications of ultrafiltration in cheese manufacturing.

Dr. Olson's contribution's to the industry have been recently rewarded by his appointment as Director of the newly organized Center for Dairy Research at the University of Wisconsin - Madison.

## Microwave Oven Safety Brochure Available from ACSH

Radiation leakage from microwave ovens is *not* a significant problem; the hazards are electrical shock, fires, and burns, and most mishaps of these types can be prevented if proper safety precautions are taken, says the American Council on Science and Health (ACSH), an independent scientific organization.

"The principal danger from microwave ovens is the risk of electrical shock that any electrical appliance carries," said ACSH Research Associate Sharon Lynn Campbell, author of the ACSH report *Safety and Health Aspects of Microwave Ovens*. "To prevent electrical shock, it is crucial to install the oven

correctly, using a circuit that is rated for at least 15 amperes of current and a properly polarized and grounded outlet. You should also check frequently to make sure that the electrical plug and cord are not damaged."

To reduce the risk of fire, don't overcook foods, monitor cooking if paper, plastic, or other combustible materials are used, and make sure that exhaust outlets (found in different locations on different oven models) are never blocked, ACSH advises.

"It's important to be aware of the risk of burns from microwave cooking, particularly when you first start using a microwave oven and are unfamiliar with the unique way that it heats food and utensils," said Dr. Edward G. Remmers, Associate Director of ACSH.

"Cooking dishes tend to stay cool in a microwave oven; the problem with this is that you may forget that the food within them can be very hot," he said. "Also, microwave ovens do not heat food evenly; be sure to stir and mix the food well before eating. Because of the potential problem with "hot spots," it is recommended that microwave ovens *not* be used to heat infant formula or other baby foods."

All microwave ovens manufactured after October, 1971 are covered by a strict radiation safety standard established by the Food and Drug Administration. "There is very little cause for concern about radiation leakage from a microwave oven," said ACSH Executive Director Dr. Elizabeth M. Whelan, "as long as the door, hinges, and seal are intact and the door is properly closed.

"If your microwave oven is ever damaged or you suspect that it might be damaged, have it checked and repaired by a licensed, qualified repair person before using it again," she continued. "Repairing microwave ovens and checking them for leakage are not do-it-yourself projects. We do *not* recommend that consumers buy devices to check for radiation leakage. They are unnecessary, and the inexpensive models are unreliable. A really accurate device would probably cost at least as much as your oven! In the unlikely event that your oven ever needs to be tested for radiation leakage, contact your county extension officer, power company, or city health department. They may have adequate testing equipment and be able to provide testing service."

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

To obtain a copy of *Safety and Health Aspects of Microwave Ovens,* send a self-addressd, stamped (39¢ postage), business-size (#10) envelope to Microwave Oven Report, ACSH, 47 Maple St., Summit, NJ 07901.

## *Food Pacific '86 to be Held Aug. 29 - Sept. 2*

FOOD PACIFIC '86, Canada's International Trade Show on Food, being held August 29th to September 2nd, 1986, is expected to attract 800 exhibitors and 25,000 buyers to B.C. Place Stadium for the most comprehensive, trade only, food and beverage show ever held in Canada. Advance registration for visitors is complimentary but there will be a nominal charge for domestic visitors who register on site.

For more information contact: FOOD PACIFIC '86, 165-10651 Shellbridge Way, Richmond, B.C. V6X 2W9. 604-276-2277.

## *New Remanufacturing & Repair Facility Open*

In a move to better serve its sanitary and industrial pump customers throughout the world, Waukesha Pumps of Waukesha, Wisconsin, announces the opening of a new pump remanufacturing and repair facility in Modesto, California. Its primary purpose is to facilitate Waukesha's long-standing policy of providing the capability to completely remanufacture its stainless steel pumps two times in order to extend service life.

According to James S. Dahlke, director of sales, the Modesto Center will be an extension of the firm's main manufacturing facility in Waukesha.

All inquires relative to the facility should be directed through Waukesha Pumps, 1300 Lincoln Ave., Waukesha, WI 53186.

## *Growth Hormone May Increase Milk Production*

Growth hormone has been shown to increase milk production in dairy cows 15 to 40 percent, according to Donald Otterby, animal science researcher with the University of Minnesota's Agricultural Experiment Station. However, many questions still have to be answered before use of the hormone can become practical, he says.

Dairy cattle vary in their production of growth hormone. Concentrations are higher in cows of high

production potential than in lower producers. Also, concentrations of growth hormone are higher during peak lactation than during mid- or late lactation, Otterby says.

"We've found that growth hormone does increase milk production; we are looking at what happens to the cow while you are giving her growth hormone. One of the things we are studying is what happens to the cow's body composition. We are interested also in management factors that affect these animals that are getting growth hormone. One thing we know is we have to feed them more," he says.

Questions still to be answered by research are: When is the best time to begin the growth hormone injections, and how long can the hormone be administered? Can it be used for repeated lactations?

The cost benefits have not been determined, because the cost of the growth hormone has not yet been established. It is also not yet clear when the hormone will be available. Some predict the technology will be available as early as 1988, says Otterby, but he thinks 1990 is a more reasonable estimated date.

To date, most investigators have administered growth hormone by single, daily injections. Injections more than once daily or continuous infusion of the hormone appear to be no better than single, daily injections of an identical dosage. The hormone cannot be given orally because digestive processes would destroy it before absorption. Slow-release implants would eliminate the need for daily injections, but are not yet available.

"At this time, no one really knows what the impact of growth hormone will be," Otterby says. "First, it must be approved for use by FDA. We do know that use of growth hormone will require management that is extremely skilled and pays careful attention to detail."

## *Vacuum-Packaged Beef New at the Meat Counter*

Vacuum-packed beef is an innovation in packaging that can help consumers save money while they enjoy their favorite meat cuts.

Nutritionist Mary K. Sweeten explains that vacuum-packaged beef is a boneless section of beef that is trimmed of excess fat. It is packaged in a plastic "shrink-wrap" bag at the processing plant under strict sanitation controls.

Vacuum-packaged beef may also be referred to as bulk beef, beef-in-a-bag, cryovac beef, beef subprimals or mini-subprimals, says the Texas A&M University Agricultural Extension Service (TAEX) specialist.

She explains that from the processing plant, the vacuum-packed beef is shipped to the supermarket in boxes. The retailer can open the vacuum-packed beef, cut it into smaller portions, put the pieces in trays and wrap and price them for the meat case.

Or a retailer may simply remove the vacuum packed beef from the box, price and display it alongside the individual retail packages in the meat case.

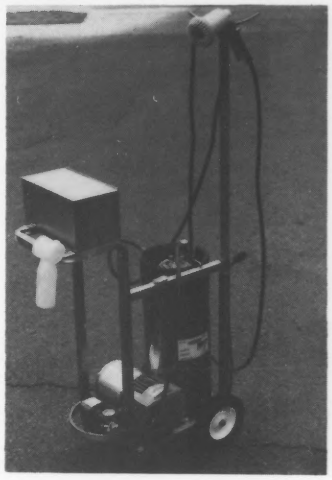
By buying bulk vacuum-packaged beef, consumers can save from 20 to 50 cents per pound, Sweeten says.

According to the specialist, vacuum-packaged beef is slightly darker in color than traditional beef cuts. But once the bag is open and the beef is exposed to air, the meat will take on a bright red beef color.

Meat that is vacuum-packaged can be stored two to three times as long as conventionally-packaged cuts, she says. But as with other meat, it should be kept refrigerated and used soon after the "sell-by" date on the label.

# New Product News

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



*Sani-Sure Teat & Udder Washer*

## Unique Washer Available for Dairy Industry

• Sani-Sure Company offers a unique, patented washer for the dairy industry.

According to the company, the secret of the efficiency of this washer is that the air is injected (aerated) into the solution through an orifice inside the tank, which will create a pulsating action on the nozzle. This action induces good, quick milk-let-down and cleans the cows teats at the same time, the company claims. You have a clean solution for every teat; no sponges or rags are used. Therefore, spreading of bacteria from one teat to another and from one cow to another is minimized.

Official records state that mastitis costs the American dairy industry about $2.8 billion a year, or $225 per cow annually. Dairy producers can reduce these losses by adopting a preventive mastitis program. Lack of sanitation is the number one cause of mastitis, according to the company.

The Wisconsin Society of Professional Engineers chose the Teat and Udder Washer from Sani-Sure to receive the 1985 Governor's New Product Award, judged on the basis of engineering, contribution to the economy of Wisconsin, ingenuity of concept, function, safety, appearance and packaging.

There are now about 500 washer units in operation on dairy farms in the U.S. and Canada.

The Sani-Sure Company also manufactures and distributes a Teat Dipper or Dip Cup to disinfect cows teats after milking. These products are currently being used worldwide.

For more information contact: Anders V. Sparr, Sani-Sure Co., P.O. Box 48, Waupun, WI 53963 or call 414-324-5395. Inquiries about manufacturing and distributing rights are also welcome.

*Please circle No. 263*
*on your Reader Service Page*

*Compressors from Foxx Equipment*

## New Compressor Now Available From Foxx Equipment

• Foxx Equipment Company has announced the availability of the complete line of new Danfoss Universal Refrigeration compressors. This new line, backed by the world's largest manufacturer of fractional horse power compressors, can be used to replace virtually any brand of original equipment. They operate quietly, and because of their compact size, are easy to install. Foxx Equipment backs each Universal compressor with an unconditional 5-year limited written warranty and also provides one day order processing. Fully illustrated 130 page catalog available.

For more information contact: Foxx Equipment, 421 Southwest Boulevard, Kansas City, MO 64108. 816-421-3600.

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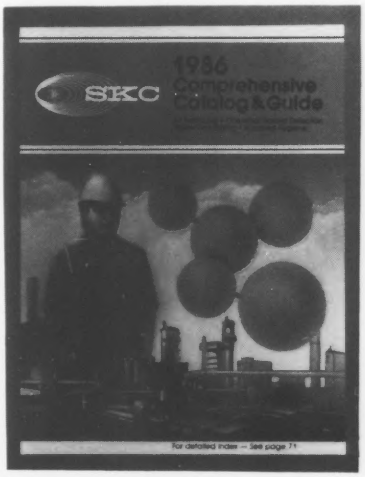


*SKC Catalog*

## "Teflon"-P Powder Coating Meets FDA Requirements

• The Du Pont Company has introduced a "Teflon"-P PFA powder coating with excellent high temperature and nonstick properties for use in the food processing industry. The sprayable powder, designated "Teflon"-P 532-7000, conforms to Food and Drug Administration regulations governing direct food contact.

The powder coating material is melt-flowable and forms tough, durable, low-porosity coatings. It can coat complex shapes uniformly with thin films specified by current FDA regulations. Commercial food preparation and handling equipment are potential applications for "Teflon"-P 532-7000.

For more information contact: Stephanie M. Mogavero, Du Pont Company, Marketing Communications Department, Wilmington, Delaware 19898. 302-774-6602, or contact: Stanley Elias, Gilbert, Whitney & Johns, Inc. 201-386-1776.

*Please circle No. 265*
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## 1986 Air Sampling Catalog Includes Expanded Standards Guide

• SKC Inc. announces its 1986 Comprehensive Catalog and Guide for air sampling, worker monitoring, chemical hazard detection, and industrial hygiene.

The enlarged 72 page publication gives the complete SKC line of equipment for air sampling and analysis. Included are sorbent tubes and accessories, long-duration color detector tubes, sample bags, and constant flow pumps - low, high and universal. Also pump calibrators, filters and impingers, and gas monitoring badges.

The catalog contains an expanded and updated guide to NIOSH, OSHA, and EPA air sampling standards. The guide lists over 1700 established NIOSH/OSHA procedures for sampling and analysis of gaseos and particulate hazards. It also itemizes 60 toxic organic compounds covered by EPA air sampling standards. For each chemical hazard the recommended SKC collecting equipment is identified and indexed.

For a copy of the 1986 Comprehensive Catalog and Guide, contact SKC Inc., R.D.1, 395 Valley View Road, Eighty Four, PA 15330. 412-941-9701.

*Please circle No. 266*
*on your Reader Service Page*

*PCI Sentry Monitor*

## "Wireless" Monitor System

• A new "wireless" monitor system consisting of one Central Receiver unit and up to 99 Remote Transmitter units, can monitor all types of refrigeration, air conditioning, heating, and processing equipment, as well as doors, windows and safety devices by transmitting coded signals through a building's existing power wiring, according to Phil Alward, President of Precision Controls Inc.

Called the PCI Sentry Monitor, the system enables the user to plug one Central Receiver unit into any standard 110 volt AC wall receptacle and from that location, monitor up to 99 items throughout the building including cold rooms, roof compressors, boilers, conveyor lines, and liquid levels.

The system operates by detecting the closure of virtually any type of switch (such as a pressure sensor, temperature sensor, or level sensor) which is either existing or installed on the item to be monitored. Small Remote Transmitters are wired to these switches with two leads, then number coded with small dip switches and plugged into any standard wall outlet. The Remote Transmitter sends a coded signal to the Central Receiver which flashes a number identifying the item, enabling the user to correct a potentially critical problem.

The rear of the Central Receiver has a standard 110 volt AC receptacle which will energize a warning device such as a chime, alarm, flashing light, automatic telephone dialer, etc. A reset button on the Central Receiver clears the system.

There are 2 basic models. Central Receiver Model 100 supports up to 99 Remote Transmitters; Model 10 up to 9.

For monitoring any equipment or activity where there is no existing sensor switch, the company offers a comprehensive range of 400 switches which can be installed by the user. These include temperature sensors for refrigeration units, photoelectric sensors for motion detection, level sensors for bulk storage vessels, and immersion aquastats for hot water heaters. The company also supplies Call Buttons which can be plugged into any wall outlet for paging the Central Receiver.

Signal transmission through power lines does not affect computers, printers, or any other electrical devices in the building, according to the manufacturer. The system costs considerably less than standard wired systems and can be reused at other locations.

For more information contact: Walter Basedow, Product Manager, Precision Controls Inc., 14 Doty Road, Haskell, NJ 07420. 201-835-5000.

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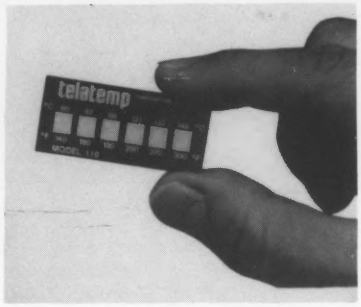


*Telatemp Model 110*

## Free Sample: Telatemp Miniature Temperature Recorder

• New ±1% accuracy Telatemp Model 110 miniature self-adhesive temperature recorder features six indicator windows which turn irreversibly black when exposed to the calibrated temperature. Rated temperatures are printed at the sensor window in both C and F. Ranges in 10° increments from 100°F to 500°F (38°C to 260°C). Ideal for use in all processing and manufacturing industries to record overheat for preventive maintenance, test, quality control, laboratory research, production, and energy conservation.

Miniature 0.75" x 1.75" size permits installation on parts and in areas where other recording instruments prove impractical. Nominal thickness 0.01". Price $1.25 each in 100 quantity. Delivery from stock.

For FREE SAMPLE and literature write Telatemp Corp., P. O. Box 5160, Fullerton, CA 92635. Telephone toll free 1-800-321-5160, except CA: 714-879-2901.

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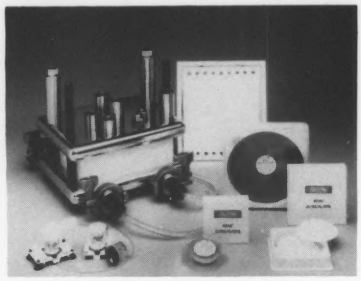

*Filtron Corp. Ultrafiltration Products*

## New Ultrafiltration Line Exclusively at Fisher

• Biological research, medical research, analytical studies, quality control, food processing, waste disposal - all share such basic *ultrafiltration procedures* as concentrating, separating, de-salting or purifying solutions and suspensions.

Now, exclusively at Fisher Scientific, are new *Filtron Corporation products* for ultrafiltration, including Nova™ membranes, Novacell™ stirred-cell systems for small volumes, and Novasette™ cassette systems for high-volume continuous-flow work with biochemical solutions. *The highlights:*

*Nova membranes:* triple-layer structures of ultra-thin polyethersulfone skin (0.1-0.5 μm) supported by highly porous polymer laminated to tough polyolefin. Offer widest molecular-weight range available in polyethersulfone membranes: *3,000 to 100,000*. Can be used to +100°C and pH 1 to 14. Long service life (can be cleaned and re-used up to ten times).

*Novacell:* introduces concept of *disposable* 10 mL polyvinyl-chloride cell with reusable components. Result: new convenience, economy. Prep, assembly, clean-up are simple, fast. Novacell offers largest filtration area to date: *5.6 cm²* (55% more than other 25mm stirred cells). Color-coded support base identifies membrane. Suction cups securely attach cell to stirrer plate, eliminating use of tape and other improvised means.

*Novasette* systems process from one to several hundred liters in minutes. Unique design permits change or addition of filter-cassettes *without* disconnecting tubing. Each cassette provides *5 sq ft* filtration area; up to ten cassettes can be combined, as required. Available in range of 3,000-100,000 MW, with narrow pore-size distribution for sharp cut-off, high sensitivity.

For more information contact: Fisher Scientific, 711 Forbes Avenue, Pittsburgh, PA 15219.

*Please circle No. 269*
*on your Reader Service Page*

*Soiltest pH Meter*

## pH Meters Introduced by Soiltest

• SOILTEST Environmental introduces three pH Meters for general purpose use in the lab, field or plant. Solid state circuitry allows accurate pH measurement over the whole range. All units are enclosed in a sturdy case, and faceplate markings are both acid and alkali resistant. All models operate on safe, 9 volt internal power.

Model 425-200 is our lowest priced model and offers extraordinary value. It has manual temperature compensation capability and an analog readout. Range 2-12 pH direct (0-14 pH with offset ranging), resolution 0.1 pH, 9 volt operation, BNC connectors.

Model 425-300 has all the features of the 425-200 plus easy to read 0.5 inch high digital readout. Range 0-14 pH, resolution 0.1 pH, 9 volt, BNC connector.

Model 425-500 is the bench unit. This pH/MV analog meter has many features found in more expensive models. Rugged, portable and with a mirrored face, tilted for easy reading, the unit features standardize, slope and temperature (or optional ATC) controls. Range 0-14 pH/±700 MV, resolution 0.05 pH/±10 MV. Bench unit includes AC adapter (no 110V inside unit).

Hand units come with carrying/storage case and buffer solutions. Electrode, instructions and battery included with all units.

For more information contact: Bob Wilson, SOILTEST, Inc., Environmental Division, P.O. Box 931, Evanston, IL 60204. 1-800-323-1242.

*Please circle No. 270*
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## Three New Training Videotapes Introduced

• Video Instructional Programs, Inc., introduces three new training videotapes for the pest-control industry. "Initial Training and Certification," by Dr. Bobby C. Pass, Chairman of the University of Kentucky, Department of Entomology and research team member for the EPA and USDA, prepares employees for certification testing. "Fleas and Their Control" was developed by Dr. Christian M. Christensen, Extension Entomologist, contributing editor to *Pest Control Technology Magazine*, and University of Kentucky professor. "The German Cockroach" was developed by Dr. Austin M. Frishman, consultant for over one thousand companies and government agencies and former professor of biology at the State University of New York.

Each video program is accompanied by a thorough work manual which includes comprehension drill, discussion questions, and supplementary material. Employing the most modern educational techniques, the technically accurate tapes offer thorough and consistent teaching, comprehensive subject-matter coverage, and repeated emphasis on safety. The programs result in better trained service men, increased efficiency, increased sales and profitability, and, ultimately, improved liability protection.

For more information call 1-800-826-7474 or, in Kentucky, call collect 502-826-9400. Or write to 600 S. Main St., Henderson, KY 42420.

*Please circle No. 271*
*on your Reader Service Page*

## Brochure Offers Look At Laboratory Resources

• *"The Fisher Story,"* a large-format full-color brochure from Fisher Scientific, offers a look at the *resources* of one of the laboratory world's major suppliers, now into its ninth decade of continuous operation.

The booklet covers such *industry firsts* as the first use of pre-packaging for speedier delivery. The first total conversion to metric reagents. The first real-time computer system for product information, remote order-entry and inventory control by laboratory customers.

*"The Fisher Story,"* a useful glimpse at what state-of-the-art distribution can mean to clinical, industrial, educational, governmental and research laboratories.

For more information contact: Fisher Scientific, 711 Forbes Avenue, Pittsburgh, PA 15219.

*Please circle No. 272*
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## New Brochure Available on Groen Laboratory Equipment

• Groen, a Dover Industries company, has produced a comprehensive brochure on the firm's complete line of steam jacketed laboratory kettles and continuous processing pilot plant heat exchange equipment.

This four page brochure covers a broad range of agitator and non-agitator model kettles designed for testing product formulations in a laboratory or pilot plant facility. Both direct steam and self generating models, designed for atmospheric, pressure or vacuum processing of food products, pharmaceuticals, cosmetics and chemicals are described. Performance data and an ordering guide are included to assist in determining the best model for individual product applications.

This handy reference guide also describes the Pilot Plant versions of the DR Series Scraped Surface Heat Exchanger and 372/696 Series Thin Film Evaporator. These smaller scale units are used to test product formulations and applications for the continuous processing of food products, confections, creams, lotions and more.

A free copy of this brochure is available by calling Groen's Process Equipment Group at 312-439-2400 or contacting Groen, 1900 Pratt Blvd., Elk Grove Village, IL 60007.

*Please circle No. 273*
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## Thor Chemicals, Inc. Receives EPA Approval

• Phenylmercuric Acetate, 100% manufactured by Thor Chemicals has just received EPA approval for use in water-based paints, manufacturing and as a mildewcide for in-can protection. Thor Chemicals' plant that manufactures Phenylmercuric Acetate, 100% is located in Margate, England and is Europe's largest PMA producer.

Thor Chemicals has begun stocking this compound in Connecticut for sale and distribution throughout the United States. Both soluble packs (2 oz, 4 oz, 8 oz and 16 oz) and drums of this PMA 100 product are produced regularly and are available promptly.

For more information contact: Mr. Kelvin J. Dally, Commercial Manager, THOR CHEMICALS, INC., Brook House, 37 North Avenue, Norwalk, CT 06851. 203-846-8613.

*Please circle No. 274*
*on your Reader Service Page*

# Food Science Facts
## For The Sanitarian

**Dr. Robert B. Gravani**
*Cornell University*
*Ithaca, NY*

### COCKROACHES

Cockroaches are troublesome, unpleasant insects that are found in almost every habitable land throughout the world. They are among the oldest insects and have lived on the earth for about 350-400 million years. Fossils show that the roaches we are familiar with have survived and remained virtually unchanged from their ancient ancestors. Today, cockroaches make up less than 1% of the insects in the world.

It is believed that the four major species of cockroaches which cause problems for the US food industry came from Africa. Cockroaches have spread throughout most of the world as a result of commerce, being transported across oceans and continents in ships, airplanes and trucks.

Research studies have shown that cockroaches can transport many types of bacteria including species of *Staphylococcus, Streptococcus, Salmonella, Clostridium* and coliforms.

In addition to carrying these bacteria, cockroaches are also objectionable because of their offensive odor. This odor is very unpleasant and is noticeable when cockroach populations reach high levels. The odor results from a combination of their excrement, fluid from their scent glands and the fluid regurgitated from their mouths while feeding.

A cockroach infestation is not only unpleasant from an aesthetic point of view, but regulatory agencies score down establishments that have them. Each year, millions of dollars are spent to control cockroaches in food processing plants, warehouses, retail food stores and food service establishments.

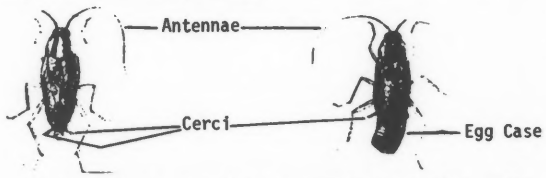
### DESCRIPTION

The word cockroach is a corruption of the Spanish word cucaracha (for cockroach). There are over 3,500 species of cockroaches that range in size from ones that are hardly visible, to ones that are more than three inches in length. They also come in a variety of colors. The cockroaches found in the US range in color from yellowish tan to brownish black and are from about 1/2" to 2" long.

### COCKROACH BIOLOGY

The cockroach has a broad, flattened, oval body covered with a shiny brown or black hard, waxy coating. This flattened body enables them to easily hide in small cracks and crevices. Cockroaches have long thread-like antennae that they use for smell and to sense vibrations in the air. They also have a pair of short feelers or cerci on their hind end that can also detect vibrations and movements. Cockroaches have six long slender legs that are covered with bristles. These powerful legs allow the roach to move very quickly. As a matter of fact, the cockroach is one of the fastest runners among insects. The cerci are directly connected to the legs, so when the cockroach senses danger, nerve impulses move very rapidly to the legs and the insect immediately starts running for cover.

The male cockroach has two pair of wings that cover its entire back, while females are often wingless or have imperfectly developed wings.




Cockroaches are capable of reproducing rapidly. They need to mate only once in their lives to produce many offspring, but they can and often do mate again anyway. Some roaches can even reproduce without males being present. Eggs laid by these females give rise to only females.

Cockroaches' eggs are enclosed in a purselike capsule called an egg case. In some cockroaches, the female carries this egg case, which extends from her body, until the young roaches (nymphs) are ready to hatch. In other species, the female deposits the egg case as soon as it is formed. Egg cases vary in size and in the number of eggs they contain. Usually there are 16 to about 40 eggs arranged side by side in a double row inside the case.

After the egg case is deposited, soft white young cockroaches (nymphs) emerge. These nymphs become hard and turn brown in color after being exposed to air. The newly hatched nymphs resemble adults except that they lack wings and do not have the distinct markings of an adult. Nymphs go through several molts where they shed their old skin and acquire a new one. After each molt, the cockroach gets a little larger. Nymphs will molt from six to twelve times before they become adults. Cockroaches vary in the time they require to go from nymph to adult - some species require a few weeks, while others require several years.

### HABITS AND DIET

The cockroach prefers a warm, highly humid and dark environment and will actively seek out this type of area. It tries to avoid light and prefers to hide in cracks and crevices. Cockroaches hide in these areas during the day and then come out to seek food at night. If disturbed, they run rapidly for shelter and disappear through openings to their hiding places.

Cockroaches need a little moisture and very small amounts of food to survive. They are not capable of biting, but rather scrape and chew a variety of products. They are natural scavengers and will eat almost anything. Although roaches prefer starchy foods like bread, potatoes and beer, they will eat anything including sweet beverages, vegetables, pet foods, cereals, even tobacco, grease, soiled clothing, paper, glue and book bindings. Cockroaches damage much more food and materials than they consume. They contaminate products through body contact, chewing and with their waste products. It is virtually impossible to starve a cockroach in areas where food is processed, stored or prepared; even the smallest crumb can provide a meal for a roach.

### ADAPTABILITY

Cockroaches are very hardy insects, and that is one reason why they've been around for over 350 million years. They can:

- Survive the loss of legs or antennae,
- Withstand temperatures from 10°F to 148°F for short periods,
- Endure depressurization,
- Go for long periods without food and water.

The cockroach lives and breeds in areas close to its food supply, but it will wander great distances and even migrate to new areas in search of food.

The reason that cockroaches have been living on earth so long is because of their:

- tremendous reproductive capabilities,
- ability to adapt to changing environments,
- protective mechanisms,
- adaptable feeding behavior,
- lack of natural enemies.

Food industry employees need to know more about these pests and their habits in order to control them. Next month's Food Science Facts will describe the most common types of cockroaches and discuss their habits.

## BUGS IN THE BANKRUPT BAKERY

Filing for bankruptcy may help unsuccessful entrepreneurs deal with their creditors, but if their problems include adulterated food, the tactic won't help elude FDA. Take the case of Philadelphia bakers Willard Graham, Jr. and Edward Torr.

The two had been, respectively, president and vice president of Hanscom Retail Foods Inc. The company made sweet baked goods, salads and candies, distributing them through department stores and the company's own retail outlets in the Delaware River valley area.

Investigating from FDA's Philadelphia district office first found extensive rodent infestation during a routine inspection in October, 1981. The district laboratory confirmed that there were mouse pellets and urine stains on bags of flour, collected as samples, and the Pennsylvania Department of Agriculture embargoed about 16,000 pounds of various food items. These were subsequently destroyed under state supervision.

Two years later, FDA investigators inspected the plant again and experienced a strange sense of deja vu. Conditions were almost identical: rodent filth in the plant, live insects in raw materials and on manufacturing equipment, and structural defects that would let rodents come and go freely. Laboratory analysis again confirmed that some raw materials contained rodent and insect filth.

The district requested that criminal charges be brought against the firm and its two principal officers, Graham and Torr. But, while the legal wheels were being set in motion, the firm filed for bankruptcy and went out of business. In addition a fire ravaged the manufacturing plant.

No charges could be brought against a defunct firm. But the evidence of insanitary operations accumulated during the inspections were so overwhelming that the U.S. Justice Department proceeded with the case against the two responsible officials. Graham and Torr were charged with holding food under insanitary conditions and letting it become contaminated with insect and rodent filth. Both pleaded guilty to two counts of the indictment; each was sentenced to two years' probation. The court reported that Torr's probation was being transferred to the Western District of Pennsylvania, where he had found new employment at a bakery in Pittsburgh.

*March 1986/FDA Consumer*

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## SOMETIN UNWANTED

If you've wondered "who put the overalls in Mrs. Murphy's chowder," you might also ask who put the extra tin in Campbell's juice.

The answer, at this point, is that nobody knows for certain. But excessive tin was the reason behind a recent voluntary recall of more than 1.5 million cans of orange and grapefruit juice by a branch of the Campbell Soup Co., in Napolean, Ohio. Nineteen people in Michigan reported suffering nausea, vomiting, stomach cramps and headache after drinking the juice products, according to the Ohio Department of Agriculture. Such symptoms are commonly experienced by people who are sensitive to tin.

Their illness is understandable. Campbell's laboratory analysis found 330 to 400 parts per million in the affected lots, a range of 50 to 100 parts per million is normal for the product.

FDA's Cincinnati office learned of the problem when Campbell's home office in Camden, NJ, notified the agency of the Michigan illness reports.

No manufacturing problems were found by FDA inspectors who visited the Campbell plant. The excess tin apparently was in the concentrate used to make the juice although this has not been confirmed.

The recall included 6-, 12-, 46- and 50-ounce containers produced under seven brand names. The product had been distributed in 12 states. No other illnesses were reported to FDA.

*March 1986/FDA Consumer*

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## *SALMONELLA HEIDELBERG* OUTBREAK AT A CONVENTION - NEW MEXICO

Of approximately 1,000 persons attending a convention October 6-8, 1985, in Santa Fe, New Mexico, 91 reported a diarrheal illness with onset of symptoms between 10 a.m., October 7, and 11 p.m., October 12. *Salmonella heidelberg,* sensitive to all antibiotics tested, was isolated from the stools of five attendees. Three persons were hospitalized. The ill attendees reported spending over $11,000 on medical costs and lost 117 days of work.

A telephone survey of 76 convention attendees living in New Mexico showed that, of four meals consumed at the convention, only the breakfast of October 7 was significantly associated with illness ($p < 0.002$).

In a subsequent mail survey of the approximately 550 convention attendees who ate the breakfast, the only food significantly associated with illness among the 60% who responded was eggs. All of 91 ill attendees ate the eggs, compared with 189 (92%) of 206 well attendees ($p = 0.01$). Eggs served at the meal were not available for culture; other eggs from the same distributor were culture-negative for *Salmonella*. The eggs had been cracked and stored in tall 2-gallon containers in a walk-in refrigerator the evening before the breakfast. They were then cooked in batches in a steamer in the morning. Several attendees commented that the eggs seemed "runny."

Of the staff who worked at the breakfast, three reported illness compatible with salmonellosis with onset during the same period as the conventioneers, and all three had eaten the eggs. *S. heidelberg* was isolated from the stools of two staff members who did not handle food but had eaten the eggs.

**Editorial Note:** In the 1960s, eggs were responsible for a large proportion of salmonellosis outbreaks. With improvements in egg processing and quality control, egg-related outbreaks decreased dramatically in the 1970s. However, as this outbreak illustrates, egg-related illness remains an important public health concern. Pathogens may proliferate in eggs or in other food refrigerated in large containers, since the center of the container may be inadequately cooled. In this outbreak, the fact that many well attendees also ate eggs suggests that only some egg containers were contaminated, that only some eggs were cooked sufficiently to kill the bacteria, or that susceptibility to infection may have varied among the attendees.

For the 10-year period 1973-1982, 11 outbreaks of salmonellosis due to eggs were reported to CDC's Foodborne Disease Surveillance System. Of the 307 ill people in these outbreaks, 45 (15%) were hospitalized, and nine (3%) died. *S. heidelberg* has been frequently associated with poultry, accounting for 29% of *Salmonella* isolates from poultry submitted to the U.S. De-

partment of Agriculture in 1982.
*MMWR 2-14-86*

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## IN-TRANSIT CHEMICAL SPILL -WEST VIRGINIA

On October 14, 1985, a truck was transporting a 1-ton-cylinder containing 2,000 pounds of antimony pentachloride from a production plant in Kentucky to a disposal site in New Jersey. At approximately 9 p.m., while the truck was parked at a company truck terminal in Wood County, West Virginia, a member of the county rescue squad noticed a liquid chemical leaking from the front of the trailer. The spill consisted of approximately 1,000 pounds of antimony pentachloride, which came from the tank's defective relief valve and valve seat. Antimony pentachloride reacts with atmosphere moisture to form hydrochloric acid.

Emergency-response efforts included simultaneous containment and evacuation. Soda ash, bicarbonate of soda, sand, and a trench were used to limit the ground spread of the liquid spill. Access to the leaking tank was obtained by using a backhoe to tear one side out of the trailer. The leak was plugged at 2:16 a.m., October 15, when a piece of wood dowel was put in the 1/8-inch-diameter hole. Police used public address systems to notify the residents and roadblocks to control traffic. Approximately 500-600 residents were evacuated from their homes.

Area hospitals reported 12 people in the area were treated for a variety of ailments, including one chemical burn, dizziness, throat and stomach pains, and burning sensations. The chemical-burn victim was a member of the emergency-response team. None of the cases were reported to be serious.

This event provided an opportunity to identify communication weaknesses in the Wood County Emergency Plan. Because of the diversity of organized involvement in the community and the newness of the system, many officials were never contacted. The Mid-Ohio Valley Health Department (MOVHD) is assisting in strengthening these organizational links. MOVHD is currently gathering and summarizing all available data relating to this event. This information will help MOVHD assist in establishing criteria for an effective emergency plan for the six counties it serves.

**Editorial Note:** Unintentional releases of hazardous materials occur throughout the United States and have potentially serious public health impacts. Approximately 25% of all releases occur when materials are being transported; 75% occur during their production, storage, or usage within plants. From 1971 to 1981, over 108,000 hazardous-material events occurred on public roads in the United States. Of these, 860 (0.8%) occurred in West Virginia. In-transit releases of hazardous materials occurred most frequently in Pennsylvania (11,961), Ohio (8,198), and Illinois (5,318).

The public health effects can be minimized with efficient emergency preparation and response. Hazardous-material events demonstrate the importance of ensuring that contingency plans are in place and the component activities are coordinated throughout the response. The U.S. Environmental Protection Agency (EPA), the U.S. Coast Guard (USCG), and the Federal Emergency Management Agency (FEMA) are responsible for providing consultation on the development and implementation of contingency plans and for providing, as needed, on-scene coordination in emergency situations. The Agency for Toxic Substances and Disease Registry (ATSDR) or CDC can assist in the development of the health components of these plans. EPA and USCG, as well as designated state and local emergency-response officials, depend on the emergency-response capabilities of ATSDR or CDC to help assess the potential health risks resulting from emergency events. The Emergency Response Coordinators of ATSDR are available to provide immediate health consultation 24 hours a day; telephone: FTS 236-4100 or commercial (404) 452-4100 (days), and FTS 236-2888 or commercial (404) 329-2888 (nights and weekends).
*MMWR 2/14/86*

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## DISEASES MICE CARRY

*Salmonellosis,* which causes diarrhea, fever & vomiting, can spread from bacteria in mouse droppings to human food.

*Toxoplasmosis* is a parasitic disease that can cause severe birth defects. Often spread by cats, it is also carried in mouse droppings.

*Trichinosis,* a parasitic muscle disease, is carried in the droppings of mice who eat raw or poorly cooked, infested pork scraps.

*Leptospirosis,* a mild to severe infection causing fever, headache, muscle and joint pains, is spread in the urine of infected mice. Severe cases are complicated by kidney damage, jaundice and anemia.

*Listeriosis* is a flu-like bacterial food poisoning that can lead to coma and death.

Other diseases spread by mice are:

*Murine typhus fever* (carried by mouse fleas); *Plague* (flea-borne) - the "Black Death"; *Rickettsialpox* (mite-born) - mild, resembles chickenpox; and *Lymphocytic Choriomeningitis* (caused by the LCM virus) - may resemble flu, but severe cases can cause brain inflammation.

*Food News for Consumers* Vol 2, No. 4. 1985 USDA "Mouse Control"

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The National Oceanic and Atmospheric Admn. (Commerce Department) Northeast, Regional Climate Program provided the following information. Recent disasters emphasize this is a continuing problem and sanitarians everywhere should understand how to handle these emergency situations. The NOAA guidelines for flood safety follow:

COMMUNITY ACTION: It is essential that communities establish an appropriate local organization which can receive flood warnings and disseminate them swiftly to the public. Such organizations should be headquartered where 24-hour operation can be assured, as in the sheriff's office, police department, or other emergency office. The nearest Weather Service Office should be kept informed of the key staff and organization to which flood warnings should be transmitted.

Every resident of a community should know what a forecast river height means in terms of his own situation. He should know, for example, how far his property is above or below anticipated flood levels, and how this elevation relates to the river gages for which forecasts are prepared. He should know the location of safe areas. Many communities have supported flood mapping programs, which make such information readily available to individual citizens.

Community preparedness means that everyone can take positive emergency steps in the face of imminent disaster. Evacuation routes can be established, the emergency operation center

can be manned, Red Cross shelters can be designated, and municipal and enforcement officials can be fully mobilized in advance of a destructive flood.

FLOOD SAFETY RULES:

Before the flood:

1. Keep on hand materials like sandbags, plywood, plastic sheeting, and lumber.
2. Install check valves in building sewer traps, to prevent flood water from backing up in sewer drains.
3. Arrange for auxiliary electrical supplies for hospitals and other operations which are critically affected by power failure.
4. Keep first aid supplies at hand.
5. Keep your automobile fueled; if electric power is cut off, filling stations may not be able to operate pumps for several days.
6. Keep a stock of food which requires little cooking and no refrigeration; electric power may be interrupted.
7. Keep a portable radio, emergency cooking equipment, lights, and flashlights in working order.

When you receive a flood warning:

8. Store drinking water in clean bathtubs, and in various containers. Water service may be interrupted.
9. If forced to leave your home and time permits, move essential items to safe ground; fill tanks to keep them from floating away; grease immovable machinery.
10. Move to a safe area before access is cut off by flood water.

During the flood:

11. Avoid areas subject to sudden flooding.
12. Do not attempt to cross a flowing stream where water is above your knees.
13. Do not attempt to drive over a flooded road - you can be stranded or swept away.

After the flood:

14. Do not use fresh food that has come in contact with flood waters.
15. Test drinking water for potability: wells should be pumped out and the water tested before drinking.
16. Seek necessary medical care at nearest hospital. Food, clothing, shelter, and first aid are available at Red Cross shelters.
17. Do not visit disaster areas; your presence might hamper rescue and other emergency operations.
18. Do not handle live electrical equipment in wet areas; electrical equipment should be checked and dried before returning to service.
19. Use flashlights, not lanterns or torches, to examine buildings, flammables may be inside.
20. Report broken utility lines to appropriate authorities.

*National Oceanic and Atmospheric Admn. (Commerce Dept.) NE Regional Climate Program. May, 1983.*

*Please circle No. 192 on your Reader Service Page*

# New Members

### *Arizona*

**Thomas M. Berry**
University of Arizona
Tucson

### *California*

**Joaquin Cancino**
Jessie Lord Inc.
Torrance

### *Florida*

**Chun-ming Chen**
University of Florida
Gainesville

**Linda B. Lubin**
Burger King Corp.
Miami

### *Georgia*

**Jim Camp**
Foss Food Technology
Douglasville

**Markus Nymark**
Hackman Flow Inc.
Brunswick

### *Illinois*

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Dr. Ellinger & Associates
Northbrook

**Robert K. Lagerlöff**
Illinois Dept. Public Health
St. Joseph

**James F. Nairn**
Phoenix Closures
Naperville

**Michael Sadowski**
Nutra-Sweet
University Park

### *Iowa*

**Kate Ehlts**
Swiss Valley Farms
Hopkinton

**Dean Tjornehoj**
Swiss Valley Farms
Davenport

### *Maine*

**Robert Peterson**
Div. of Health Engineering
Augusta

### *Massachusetts*

**Jan Hatch**
Sine Pump
Orange

### *Michigan*

**Mark J. Banner**
Diversey Corp.
Wyandotte

### *Minnesota*

**Douglas Belanger**
Minneapolis Health Dept.
Minneapolis

**Andy Cibert**
Minnesota Valley
Testing Lab
St. Paul

### *Missouri*

**Casole S. Love**
Chilhowee

**Carl W. Sparks**
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St. Joseph

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**Allan Helgeson**
Delicious Foods Inc.
Grand Island

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**Robert Redfern**
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### *Ohio*

**Charles Hammer**
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Marietta

### *Pennsylvania*

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Miller Brewing Co.
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*Wyoming*

**Mike Woodland**
Wyoming State Health Dept.
Worland

*Canada*

**Dr. D. M. Irvine**
Guelph, Ontario

# Synopsis of Papers for the IAMFES Annual Meeting

**The Microbiological Evaluation of Handwashing Practices for Food Service Personnel,** *Donald Vesley, J. L. Lauer and R. Lillquist,* University of Minnesota, Boynton Health Service, 410 Church Street Southeast, Minneapolis, MN 55455

Despite the universal acceptance of handwashing as a major component of infection control programs in clinical, laboratory or food service settings, there is little agreement or standardization relative to methods for evaluating the effectiveness of handwashing regimens. The availability of a mechanical handwashing device (VIVO II, Scientific Growth, Inc., Phoenix, AZ) has enabled us to develop protocols for standardized comparisons of different methods and products. For non-germicidal regimens the effluent from the wash itself is collected and high numbers of microbes recovered reflect successful handwashing. A follow-up standardized machine wash provides a comparison based on percentage removed by the original wash. For germicidal regimens, percentage reduction based on a control hand (standardized preliminary wash) vs. a test hand (standardized follow-up wash) must be used because the germicidal action changes the significance of high counts in the effluent from the actual wash. Studies on student volunteers are described which imply the ability of an 8 sec. machine wash to yield results equivalent to a manual wash (15 sec. Ivory Soap) provided that a relatively high machine pressure (42 lb./in.$^2$) is maintained. However, a germicidal product in manual washing (15 sec. Betadyne) provided a greater percent reduction that an 8 sec. non-germicidal machine wash.

**Groundwater Contamination: The Rosemount Story,** *Fay M. Thompson, Ph.D.,* University of Minnesota, 410 Church St., S.E., Minneapolis, MN 55455

Between 1960 and 1974 the University of Minnesota disposed of waste chemicals from its laboratories in a pit on a remote piece of land near Rosemount, MN, 20 miles south of the Twin Cities. The wastes were burned each time a load was brought for disposal. In 1971, the potential of groundwater contamination was investigated by installing seven groundwater monitoring wells around the burning pit. No contaminants were detected in any of the wells. In 1984 an investigation into a groundwater pollution problem near a refinery some distance from the burning pit led to the discovery of low levels of chloroform contamination, which was most likely attributable to the burning pit even though it was 2 1/2 miles distant. Considerable further investigation led to the discovery of a large (several square miles) area of contamination, encompassing about 30 families using groundwater for their water supply. The levels of chloroform contamination found ranged from 0.1 to 15 ppb. Since the EPA recommended criterion for chloroform in private wells is 1.9 ppb, the University was asked to provide bottled water to the affected residents. (The municipal drinking water standard for chloroform is 100 ppb. This anomaly will be discussed.) Several options for providing an alternate water supply to the affected parties are being considered. Three that will be described and evaluated here are activated carbon filtration, new wells in a deeper aquifer, and a central community water supply. Cost and effectiveness comparisons will be presented.

**Consumer Response to Food Irradiation,** *Christine M. Bruhn,* H. G. Schutz, R. Sommer,* Center for Consumer Research, University of California, Everson Hall, Davis, CA 95616

Food irradiation offers many advantages to the consumer including improved sanitary level of food. Critical to the realization of these advantages is consumer acceptance. Initial consumer response to irradiation has been uncertainty or fear. Based upon a series of studies, this paper examines the extent of attitude change when different types of consumers were presented with the scientific facts on irradiation by small group discussions with leaflet, leaflets obtained through the mail, and poster displays. Value structure and demographic characteristics of consumers accepting and resistant to irradiation were assessed. Subjects showed a higher concern for other areas of food safety and particularly the use of chemicals and sprays on food than toward food irradiation. After educational efforts, many consumers adopted a minor concern stance, but concern among ecologically sensitive consumers increased to a major level. Method of conveying information was not as significant a variable on concern as consumer type. In the samples surveyed, women, young people, and those who place a high value on an ecologically balanced world were the most concerned with the safety of irradiated foods. Willingness to buy irradiated foods was based on the safety of the process rather than the advantages of any specific food. Although educational efforts did not always lower concern, they usually increased stated willingness to try irradiated foods.

**Evaluating Microbial Quality of Raw Milk,** *R. B. Maxcy* and R. J. Paul,* Department of Food Science and Technology, University of Nebraska - Lincoln, Lincoln, NE 68583

Commercial evaluation of the microbial quality of raw milk presents a major challenge, and new methods are burdened by being compared to imprecise presently used standard methods. Extensive comparisons in commercial and research laboratory environments were made using a method that involved direct enumeration of single cells in comparison to colony forming units. The correlations were from 0.5 to .99 depending on treatment of the data. Repetition of all tests on milk from individual farms indicated that inherent variation in quality at the farm, sampling, testing, and evaluating the results showed the extreme inadequacy of the presently established methods of grading raw milk. More frequent tests with appropriate averaging would improve the likelihood of correct decisions on quality grade.

**Survival of *Listeria monocytogenes* in Ground Beef,** *J. L. Johnson*, M. P. Doyle, R. G. Cassens,* University of Wisconsin-Madison, 1805 Linden Drive, Madison, WI 53706

*Listeria monocytogenes,* due to its association with animals and animal products and its proven pathogenicity, is an or-

ganism of potential importance to the meat industry. The survival of *L. monocytogenes* in ground beef held at 4°C for 2 weeks was investigated. The ground beef was inoculated with Type 1 or Type 4 *L. monocytogenes* at a level of $10^5$ to $10^6$ organisms/gram and then packaged in either oxygen permeable or oxygen-impermeable bags. Bags were sampled randomly on days 0, 2, 3, 5, 7, 11, and 14 and *Listeria* counts were determined by duplicate spread plating on McBride's agar; pH of the meat samples was also determined. The number of *L. monocytogenes* in the ground beef remained constant throughout the sampling period and was not affected by oxygen permeability of the package. pH of the meat increased slightly during storage but was always in the range of 5.6 to 5.9. This work indicates that *L. monocytogenes* is capable of surviving 14 day refrigerated storage without any real decrease in cell numbers and could pose a health hazard if initially present at high levels. Work is currently underway to determine the survival of *L. monocytogenes* at the lower pH values characteristic of fermented sausages.

**Current Status of New Reproductive Biotechnologies that Affect the Dairy Industry,** *A. G. Hunter,* Department of Animal Science, University of Minnesota, St. Paul, MN 55108

A major goal of the dairy producer is to have a herd of high producing, efficient, long lived, prolific, disease resistant cows that make money. Today's high producing cow is mainly the result of intense genetic selection through artificial insemination (AI). This had been the only major genetic selection tool for improving cattle. However, powerful biotechnologies are emerging that when coupled with AI, promise significantly better cattle in the near future. The dairy industry will be highly influenced by the results of this current biotechnology revolution. The emerging biotechnologies include: (1) the use of growth hormone via daily injections or via permanent incorporation of its gene into the genome of cattle; (2) embryo generation (calves from calves; in vitro egg maturation & fertilization); (3) embryo micromanipulation (splitting, nuclear transplantation [cloning], parthenogenetic generation, mosaic or chimeric animals, foreign gene injection); (4) pre-selection of offspring via embryo or sperm sexing (monoclonal antibodies); and (5) methods for obtaining more offspring (superovulation, embryo freezing & transfer, synchronization & detection of estrus & pregnancy detection). Collectively, these emerging biotechnologies will have a significant impact on the amount, composition, and consumer acceptance of milk and its manufactured products.

**Surveillance of Soft and Semi-Soft Cheese for *Listeria,*** *M. A. Johnston*, A. Loit, U. Purvis and J. Farber,* Field Operations Directorate and Food Directorate, Health Protection Branch, Health and Welfare Canada, Ottawa, Ontario K1A 0L2

Recent outbreaks of listeriosis associated with dairy products prompted a survey to determine the incidence of *Listeria* in domestic and imported cheeses and to assess the manufacturing practices of the cheese industry. A total of 211 samples of soft and semi-soft cheeses from 38 Canadian and 60 foreign manufacturers were examined for *Listeria* and for phosphatase. Two samples contained *L. monocytogenes,* and one sample contained *L. innocua*. The three lots of cheese were all manufactured by one plant in France. Nineteen samples from 6 Canadian and 10 foreign manufacturers gave positive phosphatase tests. Additional information confirmed that some of these cheeses were made from unpasteurized milk and were not held 60 days prior to sale. Five of 25 manufacturers inspected at the time of sampling were not adhering to good manufacturing practices and used unpasteurized milk to make cheese. Although *Listeria* was found in Canadian cheese, the possibility of a *Listeria* outbreak occurring in Canada is real if conditions do not improve in a few plants. Continued surveillance by government and by industry is recommended in order to ensure the microbiological safety of such cheeses.

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Certificates of Attendance will be available this year. Contact Registration Desk, Wednesday August 6, 1986.

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**Wednesday, August 6** — 9:30 a.m. to 2:30 p.m.
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**Monday, August 4**
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**Tuesday, August 5** — 9:00 a.m. to 4:00 p.m.
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**Survival of *Escherichia coli* in Food at Hot-Holding Temperatures,** Caleb A. Makukutu and Rufus K. Guthrie, The University of Texas Health Science Center, School of Public Health, P.O. Box 20186, Houston, Texas 77225

*J. Food Prot.* 49:496-499

Foods usually served hot were held at various hot-holding temperatures [40°C (104°F) - 60°C (140°F] and were contaminated with fecal *Escherichia coli*. The contaminated hot foods were held for 1 h at each of the hot-holding temperatures during which the survival of the pathogen in each food type was evaluated. Results showed that *E. coli* survived hot-holding temperatures in each food type for the whole period of evaluation. A population increase occurred with time at temperatures below 50°C (122°F), while at and above this temperature there was a decrease in population with increasing time in each food type. A two-way analysis of variance using relative rates of increase or decrease ($\pm b$) showed food type to be unimportant for survival of the bacteria. A three-way analysis of variance of the same results using mean log CFU/g food showed holding temperature, food type, holding time, and the interactions of temperature and food type; and temperature and time to be significantly important for survival of the bacteria. The public health significance of these findings are discussed.

**Effect of Acetic Acid on the Death Rates at 52°C of *Salmonella newport, Salmonella typhimurium* and *Campylobacter jejuni* in Poultry Scald Water,** Anita J. Okrend, Ralph W. Johnston and Alice B. Moran, Food Microbiology Branch, Food Safety and Inspection Service, U.S.D.A., Bldg. 332, ARC-East, Beltsville, Maryland 20705

*J. Food Prot.* 49:500-503

The $D_{52}$ values [time necessary for a one log decrease in bacterial numbers at 52°C (125.6°F)] were determined for *Salmonella newport, Salmonella typhimurium* and *Campylobacter jejuni* in water that had been taken from the scald tank of a large-scale poultry slaughter operation, sterilized and then treated with various concentrations of acetic acid. The addition of 0.1% acetic acid to the scald water drastically reduced the $D_{52}$ values for all three bacteria; that of *S. newport* dropped from 22.18 ± 2.68 min to 2.88 ± 0.20 min; *S. typhimurium* from 29.05 ± 5.61 min to 3.56 ± 0.28 min; and *C. jejuni* from 5.97 ±0.93 min to 1.20 ± 0.45 min. When the acetic acid concentration was increased to 0.2%, the $D_{52}$ values of *S. newport* and *S. typhimurium* were 0.92 ± 0.16 and 1.30 ± 0.16 min, respectively. Addition of 1% acetic acid caused instantaneous bacterial death and $D_{52}$ values could not be calculated. This suggests that addition of the GRAS compound, acetic acid, to poultry scald water shows promise as a means of destroying *Salmonella* and *Campylobacter* in the scald tank and thereby reducing cross-contamination. Since the scald tank is the first step in poultry processing, a reduction at this critical control point might also reduce dissemination of *Salmonella* and *Campylobacter* during subsequent processing steps. Plant trials are being planned.

**Microbiological Quality of Tehineh Manufactured in Saudi Arabia,** M. Ayaz, W. N. Sawaya and A. Al-Sogair, Food Science and Nutrition Section, Regional Agricultural and Water Research Center, Ministry of Agriculture and Water, P.O. Box 17285, Riyadh, Saudi Arabia 11484

*J. Food Prot.* 49:504-506

Tehineh is a product obtained by the milling of dehulled and roasted white sesame seeds. A total of 50 tehineh samples was collected from ten processing plants in Saudi Arabia. These samples were examined by standard procedures for aerobic plate counts (APC) and counts of coliforms, *Staphylococcus aureus, Bacillus cereus, Clostridium perfringens,* molds and yeasts and detection of salmonellae. APC of tehineh ranged from 20 to 170,000 CFU/g. The counts for coliforms, *S. aureus, B. cereus, C. perfringens,* and molds and yeasts ranged from <10 to 300, <10 to 400, <10 to 250, <10 to 100, <10 to 120 and <10 to 50 CFU/g, respectively. Two out of ten tehineh plants (20%) were positive for four *Salmonella* serotypes. Four *Salmonella* serotypes recovered were *Salmonella hadar, Salmonella agona, Salmonella einsbuettel* and *Salmonella ubrecht,* with *S. hadar* being the most predominant. The results of this investigation indicate that foodborne pathogens present in tehineh may constitute a potential public health hazard.

**Survey of the Microbiological Quality of Adult Bovine Rennet Extracts,** E. B. Martínez, S. Tesone and F. Quevedo, Centro Panamericano de Zoonosis, OPS/OMS, Casilla 3092 Correo Central, (1000) Buenos Aires, Argentina

*J. Food Prot.* 49:507-509

Sixty-nine samples of liquid bovine rennet extract from several cheese-making plants were examined for microbiological quality. Wide differences were observed in the microbiological results, as well as in the pH, which ranged from 4.0 to 6.5, reflecting the manufacturing practices and sanitary conditions. The highest level of contamination was always caused by sporulated bacteria, both aerobic and anaerobic. Coliforms, considered to be enteric indicator bacteria were not detected, although halotolerant bacteria were found.

**Rapid *Salmonella* Detection in Foods by Motility Enrichment on a Modified Semi-Solid Rappaport-Vassiliadis Medium,** Jozef M. De Smedt, Robert F. Bolderdijk, Helmut Rappold and Dieter Lautenschlaeger, Laboratories of Van Houten International % General Chocolate, Montezumallan, 1, B 2410 Herentals, Belgium

*J. Food Prot.* 49:510-514

Modification of Rappaport-Vassiliadis enrichment broth into a semisolid motility medium (MSRV) provided a sensitive means for detecting *Salmonella* in contaminated foods. The type of peptone, the concentration of magnesium chloride, the presence of novobiocin and the temperature of incubation were determinants in medium performance. The analytical procedure consists of preenrichment for 20 h, followed by motility enrichment on MSRV for 24 h and, if there is migration, serological tests with the motile culture. The test result is obtained within 48 h from the start of preenrichment. This approach gave 39% more *Salmonella*-positive samples than enrichment in tetrathionate brilliant green broth with subsequent plating.

**Inhibitory Effect of Beta-Ionone on Growth and Aflatoxin Production by *Aspergillus parasiticus* on Peanuts,** Cheng-I Wei, Hsioukun Tan, Samuel Y. Fernando, and Nan-Jing Ko, Food Science and Human Nutrition Department, University of Florida, Gainesville, Florida 32611 and Department of Plant Pathology, National Chung Hsing University, Taichung, Taiwan, Republic of China

*J. Food Prot.* 49:515-518

The volatile ketone β-ionone showed a dose-related inhibition of fungal growth and aflatoxin production on peanuts after they were soaked in distilled water for 25 or 50 min, inoculated with spores, and incubated at 28°C for up to 2 weeks. For example, aflatoxin $B_1$ ($AFB_1$) production after 1 week of incubation was reduced to less than 11.0 and 6.7% of the control when 2.5 or 5 ml of β-ionone/100 g of peanuts, respectively, was added to water-soaked (25 min) peanuts. For $AFG_1$, production was reduced to 4.7 (2.5 ml) or 3.3% (5.0 ml) under the same treatment conditions. Unlike controls or those treated with less than 0.1 ml of β-ionone, peanuts treated with more than 0.25 ml of β-ionone had only sparse mycelial growth and supported only limited sporulation. The mycelia, after being transferred to fresh Mycological or Fluorescent Agar plates, still had the ability to form normal colonies and produce aflatoxins. This temporary limitation of fungal growth was also noticed for those *Aspergillus* cultures on Mycological Agar that had been treated with β-ionone either by direct contact or volatile bioassay procedures. The fungus was still able to grow of Fluorescent Agar even after the infected peanuts were treated with sodium hypochlorite for 15 or 30 min, indicating that mycelial penetration into peanut tissues occurs. This may confer protection from the action of various antifungal compounds. This observtion is further supported by microscopic detection of mycelial fragments in peanut tissues.

**Detection of Abnormal Milk with Impedance Microbiology Instrumentation,** F. A. Khayat and G. H. Richardson, Department of Nutrition and Food Sciences, Utah State University, Logan, Utah 84322

*J. Food Prot.* 49:519-522

Mastitic milk was detected by obtaining conductance measurements using an impedance microbiology Bactomatic 120 SC instrument. Conductance readings separated normal and abnormal milks after 30 min at 25°C when readings differed by more than 2 to 3% and exceeded the variance among instrument module wells. Samples blended from four quarters of a cow indicated milk from one quarter was abnormal if the salt level in the abnormal quarter raised the blend conductivity above that of normal samples and variance among the wells. Either solid or liquid substrates that contained stimulants could be used to accelerate bacterial acid production or reduce impedance detection times and did not affect the ability to detect abnormal milk. However, measurements varied with the volume of sample in the well, suggesting that fixed 1-ml liquid volumes of milk be used. Such volumes would allow detection of abnormal milk and bacterial load on the same sample.

**Evaluation of a Reversed Passive Latex Agglutination Test Kit for *Clostridium perfringens* Enterotoxin,** Stanley M. Harmon and Donald A. Kautter, Division of Microbiology, Food and Drug Administration, Washington, DC 20204

*J. Food Prot.* 49:523-525

A reversed passive latex agglutination (RPLA) test kit for *Clostridium perfringens* enterotoxin (CPE) marketed by the Denka-Seiken Co., Tokyo, Japan, was evaluated by using culture supernatant fluids and extracts from feces of food poisoning patients. Nanograms of CPE were detectable with the assay and the reaction was specific, as shown by parallel activity in a double antibody enzyme-linked immunosorbent assay (ELISA). Although less sensitive, the RPLA method is easier to perform than the ELISA and counterimmunoelectrophoresis, both of which require special test reagents and equipment not generally available.

**Evaluation of Factors Involved in Antibotulinal Properties of Pasteurized Process Cheese Spreads,** N. Tanaka, E. Traisman, P. Plantinga, L. Finn, W. Flom, L. Meske and J. Guggisberg, Food Research Institute and Department of Statistics, University of Wisconsin, Madison, Wisconsin 53706

*J. Food Prot.* 49:526-531

Pasteurized process cheese spreads with various levels of sodium chloride, disodium phosphate, moisture and pH were challenged with spores of *Clostridium botulinum* types A and B. Response surface methodology was used to design experiments that would yield maximum results with the minimum number of trials. Supplemental experiments were added to further clarify the response and to examine combinations of special interest. A total of 304 treatment combinations (batches) was incubated at 30°C, and five samples from each batch were taken at predetermined intervals up to 42 wk of incubation and tested for botulinal toxin. Sodium chloride and disodium phosphate inhibited botulinal toxin production with similar effectiveness. The inhibitory effect of low pH (<5.7) and low moisture (<54%) levels on botulinal toxin production was as expected, i.e., as either pH or moisture went up, it was necessary to increase sodium chloride and/or phosphate concentrations to compensate. Differences in water activity between cheese spreads with different compositions were observed but they were too small to use for controlling the properties of the products, e.g., a range of 9% in moisture level (51 to 60%) produced only 0.022 variation in water activity. Combinations of the above factors were developed for safe pasteurized process cheese spreads containing up to 60% moisture.

**Comparison of Sampling Methods for Isolation of *Campylobacter jejuni coli* from Pork Skin,** A. J. Bracewell, J. O. Reagan, J. A. Carpenter and L. C. Blankenship, Food Science Department, University of Georgia, Athens, Georgia 30602 and Richard B. Russell Agricultural Research Center, United States Department of Agriculture, Science and Education Administration, Agricultural Research Service, P.O. Box 5677, Athens, Georgia 30604

*J. Food Prot.* 49:532-533

Samples of fresh pork skin were inoculated with known numbers of a nalidixic acid-resistant strain of *Campylobacter jejuni* and sampled by two methods, swabbing and scraping, 10 min after inoculation to compare sampling methods. The effect of frozen storage of samples on detection was also examined. *C. jejuni* was readily recovered with swab samples while recovery of the organism was greatly reduced by the scrape method. Frozen storage of samples decreased the numbers of viable cells as compared to the fresh samples.

**Microbial Changes of Precooked Beef Slices as Affected by Packaging Procedure,** T. P. Carr and J. A. Marchello, Department of Animal Sciences, Univeristy of Arizona, Tucson, Arizona 85721

*J. Food Prot.* 49:534-536

Precooked beef slices from top round roasts were used in replicate trials to determine the effects of packaging treatment upon microbial growth during retail storage. Roasts were dry roasted to an internal temperature of 60°C, cooled for 1 h, then sliced (3 to 4 mm) and packaged in vacuum or an atmosphere containing 15% $CO_2$/40% $O_2$/45% $N_2$. Slices were stored either at 2, 6 or 10°C for up to 21 d. Enumeration of psychrotrophs, mesophiles, thermophiles and molds was determined after 0, 7, 14 and 21 d of storage. At 6 and 10°C storage, psychrotrophic organisms did not increase ($P<0.05$) on vacuum packaged beef slices during the 21-d storage period, but did increase ($P<0.05$) on slices stored in the gas mixture. Conversely, at 2°C storage, psychrotrophs increased ($P<0.05$) in vacuum at day 21 but not under gas atmosphere storage. Mesophiles did not increase significantly at 2 or 6°C storage within either packaging treatment during 21 d of storage. Mold growth did not occur on slices stored at 2°C.

**Action of Halogenated Compounds on *Aspergillus* Conidiospores,** Miguel D'Aquino, Pilar Santini and Humberto Muzio, Department of Toxicology (Hygiene and Public Health), Faculty of Pharmacy and Biochemistry, Buenos Aires University, Junin 954, 1113 Buenos Aires, Argentina

*J. Food Prot.* 49:537-540

The fungicidal activity of two halogenated compounds against conidiospores of four *Aspergillus* strains (*A. flavus* and *A. sydowi* isolated from a poultry farm, *A. parasiticus* NRRL 2999 and *A. niger* 29-CCM-A 41) was studied. Accordingly, the

sodium salt of a synthetic organic compound derived from trichloroisocyanuric acid and an organic complex of iodine (iodophor) were used at 20°C at their recommended dilution (0.1%). More than 99.9% of the exposed spore population of all strains was inactivated within 30 min of contact with either product. During the first minute of contact, the iodophor solution was more effective than the chlorinated one. Among parameters tested on *A. niger* conidiospores, a 10°C temperature rise slightly increased antimicrobial activity, which was substantially affected by dilution, the active principle being exhausted when using 0.05% concentration. In addition, organic matter (1% human serum) practically neutralized the fungicidal effect of both compounds, whereas acid pH (5.33) notably increased the antimicrobial capacity of the chlorinated derivative.

**Heat-Inactivation of *Streptococcus faecium* var. *casseliflavus* in Skim Milk Cultures with *Pseudomonas fluorescens*,** Jeffrey L. Kornacki and Elmer H. Marth, Department of Food Science and The Food Research Institute, University of Wisconsin-Madison, Madison, Wisconsin 53706

*J. Food Prot.* 49:541-543

Thermal destruction of *Streptococcus faecium* var. *casseliflavus* (SFC) at 57°C in autoclaved skim milk was determined at several pH values, and when skim milk was inoculated with *Pseudomonas fluorescens* and incubated 3 d at 10°C plus 4 d at room temperature before SFC was added. The pH values between 6.4 and 6.6 had little effect on heat resistance of SFC. At pH 5.6, however, accelerated thermal destruction occurred in sterile skim milk as compared to skim milk at pH 6.5. (D-values were 4.8 min and 10.2 min, respectively). Presence of large populations ($\log_{10}$ bacterial count = 9.8 to 9.9/ml) of *P. fluorescens* had a protective effect on SFC (D = 7.6 ± .7 min in skim milk preincubated with *P. fluorescens* and 6.2 min in skim milk without *P. fluorescens*).

**Qualitative, Quantitative and Technological Aspects of the Trichothecene Mycotoxins,** A. Peter Snyder, AMCCOM, Chemical Research, Development and Engineering Center, SMCCR-RSL, Aberdeen Proving Ground, Maryland 51010-5423

*J. Food Prot.* 49:544-569

Trichothecene mycotoxins pose a natural threat to plants, foodstuffs, animals and humans. Recently, strong implications regarding artificially induced trichothecene threats to humans in various parts of the world have come to the attention of the general public. This has spawned renewed interest and scientific research into the various properties of the toxins. The trichothecenes display orders of magnitude differences in toxicity levels depending upon the test subject and mode of administration. Potentially more sensitive and specific analytical characterization techniques and convenient, milder and faster organic decontamination reaction schemes exist in comparison to established methods. This review attempts to supply a concise information source as an aid to investigators faced with problems of trichothecene detection, analysis, and decontamination.

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# Calendar

## 1986

July 12-19, SIXTH INTERNATIONAL WORKSHOP ON RAPID METHODS AND AUTOMATION IN MICROBIOLOGY, to be held at Kansas State University. For more information concerning Program contents contact: Daniel Y.C. Fung, Call Hall, Kansas State University, Manhattan, KS. 66506. 913-532-5654. For registration information contact: Joe Pittle, Conference Center, Wareham building, Anderson Avenue, Manhattan, KS 66502. 913-532-5575.

July 14-18, TECHNOLOGIA DE PRODUCTION DE PAN (BREAD PRODUCTION FOR SPANISH SPEAKING BAKERS). For more information contact: Donna Mosburg, Registrar, American Institute of Baking, 1213 Bakers Way, Manhattan, KS 66502.

July 14-18, IN-STORE BAKERY TRAINING-FROZEN DOUGH OPERATIONS. For more information contact: Donna Mosburg, Registrar, American Institute of Baking, 1213 Bakers Way, Manhattan, KS 66502.

July 15-19, PURDUE CANNERS TECHNICIANS MOLD COUNT SCHOOL. For more information contact: Dr. James V. Chambers, Food Science Department, Smith Hall, Purdue University, West Lafayette, IN 47907. 317-494-8279.

July 21-25, PRINCIPLES OF BAKERY PRODUCTION-BREAD OR CAKE. For more information contact: Donna Mosburg, Registrar, American Institute of Baking, 1213 Bakers Way, Manhattan, KS 66502.

July 22-25, FOOD SAFETY TRAINING COURSE to be held at the Holiday Inn-University Center, Gainesville, Florida. For more information contact: Sara Jo Atwell, ABC Research Corporation, 3437 SW 24th Avenue, Gainesville, FL 32607. 904-372-0436.

**AUGUST 3-7, IAMFES ANNUAL MEETING to be held at the Radisson South, Minneapolis, MN. For more information contact: Kathy R. Hathaway, IAMFES, Inc., P.O. Box 701, Ames, IA 50010. 515-232-6699.**

August 4-8, CANNING TECHNOLOGY COURSE, to be held at Cornell University - NYSAES, Geneva, NY. For more information contact: D. L. Downing. 315-787-2273.

August 10-15, 1986 ANNUAL MEETING OF THE SOCIETY FOR INDUSTRIAL MICROBIOLOGY to be held at the Sheraton-Palace Hotel, San Francisco, CA. For more information contact: Mrs. Ann Kulback - SIM Business Secretary, SIM Headquarters, P.O. Box 12534, Arlington, VA 22209. 703-941-5373.

August 29 - September 2, FOOD PACIFIC '86, CANADA's INTERNATIONAL TRADE SHOW ON FOOD, to be held at B.C. Place Stadium. For more information contact: FOOD PACIFIC '86, 165-10651 Shellbridge Way, Richmond, B.C. V6X 2W9. 604-276-2277

September 15-17, IFDA ADVANCED FOODSERVICE BUYERS SEMINAR to be held at Tysons Corner Marriott Hotel. For more information contact: Chuck Brimmer. 703-532-9400.

September 20 - October 3, 1986 XXII INTERNATIONAL DAIRY CONGRESS, The Hague, The Netherlands. For more information contact: H. Wainess, Secretary U.S. National Committee of the IDF (USNAC), 464 Central Avenue, Northfield, IL. 312-446-2402.

September 22-26, 70TH ANNUAL SESSIONS OF THE INTERNATIONAL DAIRY FEDERATION. For more information contact: Congress Organizing Department, c/o Netherlands Congress Centre, P.O. Box 82000, 2508 EA The Hague, The Netherlands. You may also contact: H. Wainess, Secretary U.S. National Committee of the IDF, 464 Central Avenue, Northfield, IL. 312-446-2402.

September 23-25, WYOMING PUBLIC HEALTH SANITARIANS ASSOCIATION ANNUAL MEETING, to be held at the Holiday Inn, Thermopolis, WY 82443. For more information contact: William George, 118 1/2 N. 11th, Worland, WY 982401. 307-347-2617.

September 23-26, FOOD SAFETY TRAINING COURSE to be held at the Holiday Inn-University Center, Gainesville, Florida. For more information contact: Sara Jo Atwell, ABC Research Corporation, 3437 SW 24th Avenue, Gainesville, FL 32607. 904-372-0436.

September 24-25, SEVENTH ANNUAL JOINT EDUCATIONAL CONFERENCE, to be held at the Valley Inn, West Allis, Wisconsin. For more information contact: Ron Buege, West Allis Health Department, 7120 West National Avenue, West Allis, Wisconsin 53214. 414-476-3770.

October 21-22, CALIFORNIA ASSOCIATION OF DAIRY AND MILK SANITARIANS ANNUAL MEETING, to be held at Holiday Inn Downtown, Fresno, CA. For more information contact: Richard C. Harrell, 1554 West 120th St., Los Angeles, CA 90047. 213-757-9719.

October 27-29, 1986 INTERNATIONAL WHEY CONFERENCE, sponsored jointly by the Whey Institute and the International Dairy Federation, O'Hare Marriott Hotel, Chicago, IL. For more information contact: Conference Secretariat, Whey Products Institute, 130 North Franklin Street, Chicago, IL 312-782-5455.

November 1-6, FOOD SANITATION 29TH ANNUAL NATIONAL EDUCATIONAL CONFERENCE & EXPOSITION, Scottsdale, Arizona. For more information contact: Harold Rowe at 813-586-5710 or write: Jean Day, Registrar, Food Sanitation Institute, 1019 Highland Ave., Largo, FL 33540.

November 2-6, SANITATION MANAGEMENT CONFERENCE AND EXPOSITION, to be held at the Safari Conference Center Resort, Scottsdale, Arizona. For more information contact: Environmental Management Association's national executive office at 1019 Highland Ave., Largo, FL 33540. 813-586-5710.

## 1987

February 5-7, FOOD ADDITIVES, THE CHANGING CLIMATE? 1ST INTERNATIONAL CONGRESS, to be held at the Hilton Hotel, Vienna, Austria. For more information contact: Secretariat of the Food Additives, The Changing Climate, 1st International Congress, 30 Deane Way, Ruislip, Middlesex HA4 8SX, England.

March 31 - April 1, WESTERN FOOD INDUSTRY CONFERENCE, to be held at the University of California, Davis, CA. For more information contact: Robert Pearl, Conference Chairman, 916-752-0980 or Shirley Rexroat, Conference Coordinator, Department of Food Science and Technology, University of California, Davis, CA 95616.

**AUGUST 2-6, IAMFES ANNUAL MEETING to be held at the Disneyland Hotel, Anaheim, CA. For more information contact: Kathy R. Hathaway, IAMFES, Inc., P.O. Box 701, Ames, IA 50010. 515-232-6699**

September 26-30, DFISA's FOOD & DAIRY EXPO '87, to be held at McCormick Place, Chicago, IL. For more information contact: DFISA, 6245 Executive Boulevard, Rockville, MA 20852. 301-984-1444.

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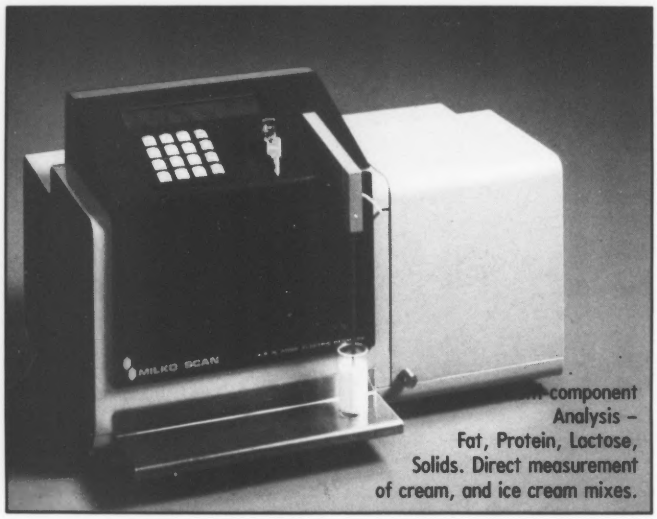


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