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Dairy and Food Sanitation®

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

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Control of Chemical Residues in Food Animals

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Control and Prevention of Chemical and Drug Residues In Food Animals

A. B. CHILDERS, DVM, MS and DANIEL H. JONES, DVM, MS

From the Departments of Veterinary Public Health (Childers) and Veterinary Physiology and Pharmacology (Jones), Texas A&M University, College Station, TX 77843.

Presented before the Scientific Programme Section on Hygiene of Animal Products and Veterinary Public Health, XXII World Veterinary Congress, August 22-25, 1983, Perth, Western Australia.

The potential problem of chemical and drug residues in food-producing animals has become of major concern to public health and regulatory officials and consumers. In 1978, the U.S. Department of Agriculture's Food Safety and Inspection Service began surveying for residues in food animals at the time of slaughter, using the Swab Test on Premises (STOP). Cull dairy cows, feedlot animals with evidence of recent injections, and veal calves are being closely scrutinized for the possibility of illegal residues. Swine containing levels of sulfa drugs above the permitted 0.1 ppm tolerance are also of concern to both the FDA and USDA. Correct dosages, proper administration, observance of withdrawal times by livestock producers and a concerted effort by the veterinary profession to inform their clients of the seriousness of the problem are necessary to insure that our food supply remains free of illegal and occasional harmful drug residues. Pesticides, PCB's and other chemicals have also caused problems in food animals. Similar types of surveillance and producer-information programs used for drug residues should also be successful in preventing chemical residues.

Chemical and drug residues in our food supply are becoming an increasing problem. Continued awareness of this problem by consumers, regulatory and public health officials, and the United States Congress has resulted in adverse publicity and often expensive sanctions against the food producer and processor. These incidences generally result in a reaction to solve the immediate problem without subsequent action to prevent a future occurrence.

Fortunately, the situation is changing. The U.S. Department of Agriculture (USDA), the Food and Drug Administration (FDA), and various state agencies are closely examining their residue control programs and are beginning programs designed to *prevent* residues before they occur--an excellent example of the oft-heralded, but less often-practiced, concept of preventive veterinary medicine. The USDA has compared the problem to a river and its watershed. Each tributary adds pollutants to the waterflow, just as each phase of animal production may add contaminants to the food produced by those animals. To prevent residues, all production systems must be residue-free (9).

In 1967 the USDA began its National Residue Program which consists of monitoring and surveillance for chemical and drug residues in food animals. Originally, the program was concerned with detecting environmental contaminants, primarily pesticides, but its emphasis on drug residues has been increasing in the past 6-7 years. In the monitoring phase, samples are taken from randomly selected carcasses at slaughtering plants throughout the country. In the surveillance phase, carcasses are sampled from specific producers with a history of having previously marketed animals containing residues above the tolerance levels. The major attention of the program has been focused on reducing the level of sulfonamide residues in swine for the past five years from approximately 13% to 5% (5).

In 1979, the USDA's Food Safety and Inspection Service (FSIS) began using the STOP (Swab Test on Premises) test to detect illegal drug residues in dairy cattle (5). In less than a year, one dairyman had 26 occurrences of illegal residues in cull cows he had sold for slaughter which resulted in permanent injunction against him by the FDA. Using the STOP test, veterinary meat inspectors can determine within 18 hours whether carcasses have

antibiotic residues and can allow those which are free of antibiotics to move immediately into the food chain. This has permitted the screening of ten times as many cattle at a reduced cost than was previously possible with conventional testing methods. If the swab test is positive, additional samples are sent to the laboratory for confirmation. If antibiotics are confirmed above the tolerance levels, the carcasses cannot be used for food. After condemnation of the carcasses, the FDA is notified and takes appropriate action against the producer either with a warning letter or other legal action when necessary.

In early 1982 the FSIS began using two highly sensitive tests to analyze meat and poultry for sulfa residues at levels as low as 0.1 ppm (2). FSIS scientists have also recently developed tests to detect residues of chloramphenicol--an antibiotic that has been banned for use in food animals and has been incriminated in causing aplastic anemia in humans. This is a particularly significant development, since it has shown that chloramphenicol is being illegally used in the production of veal calves. The FSIS has also proposed to extend STOP testing to all species of livestock and poultry that are raised for food.

These and other developments indicate the USDA's commitment to and success in detecting chemical and drug residues in meat and poultry. But, if an ounce of prevention is worth a pound of cure, could not a lot of time and money be saved by preventing those residues in the first place? The loss of a number of feeder cattle in a midwestern feedlot several years ago as a result of polychlorinated biphenyl contamination emphasizes this fact. To accomplish this goal, the USDA has announced the beginning of the Residue Avoidance Program (RAP in governmental jargon) (3).

RAP's objective is clearly identified by its name - residue avoidance - and it aims to reduce the levels of chemical and drug residues by making prevention a part of all stages of animal production. Producers work to enhance production but seldom understand the precautions necessary for chemical and drug use. Therefore, they need to know as much about residue prevention as they do about other parts of their production system.

The success of such an approach has already been demonstrated in several areas. After information was made available to swine producers, they were able to significantly reduce the rate of sulfonamide residue violations. A joint effort with the dairy industry, Extension Service and other governmental agencies has led to a steady decline in the number of antibiotic residue violations in dairy cows. The success of a well-developed residue avoidance program has been demonstrated by the poultry industry. Residue control programs are now used in production of nearly all of the nation's broilers and in a large percentage of the turkeys. The National Broiler Council recently announced adoption of a cooperative agreement between the broiler industry and the USDA which would use the RAP for controlling residues.

An effective residue prevention program should also provide a mechanism whereby residues in live animals can be detected before marketing and thus lower the chances of their reaching the food-chain. FSIS has modified the STOP test so that it can be used to test animals on the farm before they are sent to slaughter. This modification - the Live Animal Swab Test (LAST) - is ready for use in testing the urine of dairy cows (4). It can also be used to test blood and will be more useful when blood levels can be correlated with tissue levels. Before using the test as a nondestructive clearance procedure, data must be available which will correlate blood levels (or their absence) with tissue levels. FSIS believes from knowledge and experience gained through the years that total residue avoidance is workable. However, several things are essential. First, field tested information must be readily available to the producer. Second, producers must be able to identify critical checkpoints and use this information to make corrections. Third, producers must desire to control residues.

The FDA believes that the practicing veterinarian can play an important role in preventing chemical and drug residues and has emphasized this in its prevention programs. Since veterinarians are often among the first to come in contact with sick or treated animals, the agency has urged the veterinarian to alert producers of potential residue problems from improper chemical or drug use and failure to observe withdrawal times. The FDA's Bureau of Veterinary Medicine publishes *Drug Use Guides* for all food-animal species (1). These guides are available to veterinarians and producers, and contain information on drug withdrawal times and their calculations and other drug use topics.

These monitoring, surveillance and educational programs should be helpful in controlling and preventing residues in meat, milk, poultry and eggs (as a spin-off from broiler production).

Of the previously mentioned *Drug Use Guides,* the one for "Dairy Cattle and Calves" contains important information for use by the dairyman, including an illustration for calculating milk discard times. Since the *Grade A Pasteurized Milk Ordinance* requires that the milk from all producers be tested for antibiotics at least four times during any consecutive six month period, most of the time the producer is usually aware of any problems he may have with drug residues in his milk (8). State dairy herd improvement associations, milk cooperatives, trade journals and dairy extension specialists continually emphasize the importance of milk-residue avoidance and up-date the dairyman on current residue problems.

Examination of suspect milk samples at the request of the farmer can prevent economic sanctions and unnecessary waste of milk. The dairy industry has demonstrated in a collaborative study that, when locally-performed test results are available to the farmer before delivery is made, legal sanctions against suppliers of contaminated milk are usually avoided. Experience has also shown that the initiation of direct "check-sample" control procedures leads to a dramatic decrease in both the incidence and levels of antibiotic residues in milk (6).

The National Mastitis Council has published a number of educational materials for dairymen including: *Money*

Returns from an Effective Mastitis Control Program, Mastitis Treatment Guidelines for Dairymen, and *Procedures for Handling the Mastitis Problem Herd* (7). Even though these materials provide information on mastitis treatment and control, they all emphasize the importance of avoiding drug residues in milk through proper management.

REFERENCES

1. Bureau of Veterinary Medicine Memo: Drug Use Guides. Food and Drug Admin., June, 1978.
2. Food Safety and Inspection Service, U.S. Dept. Agri.: Personal Communication, July, 1982.
3. FSIS: Residue Avoidance Program. U.S. Dept. Agri., FSIS-20, December, 1982.
4. FSIS: How to Perform the Live Animal Swab Test for Antibiotic Residues. U.S. Dept. Agri., Agri. Handbook No. 601, January, 1983.
5. FSQS Facts: The National Residue Program. U.S. Dept. Agri., FSQS-26, July, 1980.
6. Joint Mastitis Committee of AVMA: Milk Production Guidelines. JAVMA 182:870, 1983.
7. National Mastitis Council, Washington, DC.
8. Public Health Service: Grade A Pasteurized Milk Ordinance. U.S. Dept. Hlth., Educ., and Welfare, PHS/FDA Pub. 229, 1978.
9. Spaulding, J. E.: A Residue Approach for the '80's. American Bacteriological and Chemical Research Corp. Symposium, Gainesville, FL, March, 1982.

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AT THE PODIUM

HARRY HAVERLAND, Director

State Training Branch, FDA
Cincinnati, OH 45202
15 July, 1984

It has been quoted that one of man's greatest fears is making a speech. In most instances, this is an exaggeration. There are certain steps that can be taken that will alleviate the anxietics of making a presentation.

Initial Response

You have been approached to present a topic because someone believes that you have the expertise to handle the subject. The compliment should be received graciously. However, before making a decision, additional information should be obtained, including: title of presentation, date, time, location, sponsoring organization, audience composition, and can you expect your expenses to be paid by the organization? Additionally, it is good protocol to briefly discuss the subject to obtain a better understanding of the materials to be covered. If the responses and discussion leave you with a confident feeling, ask the individual to send a written invitation confirming many of the details. This is a good procedure because it may be necessary to discuss the invitation with upper level management. If you do not feel comfortable with the invitation, now is the time to say - no.

During the interim period, check your calendar in reference to availability and, if necessary, obtain approval to make the presentation. Upon receipt of the written invitation, answer promptly indicating you are pleased to accept the speaking engagement. In your response, specifically identify the title, date, location and any financial arrangements. With this action, the initial step to the podium has occurred. A commitment has been made and it must be honored. An important part of the over-all program has been finalized.

Preliminary Preparation

Make a rough outline of the points that should be covered in the presentation. Review these points with someone else who has knowledge concerning the subject. It is an advantage to select an individual who is candid and is an "idea" person. Following the discussion(s), rewrite the outline.

A decision needs to be made on whether visual aids will be utilized to supplement the materials being presented. Well-prepared visual aids will substantially enhance the presentation of technical materials. This approach also has a stabilizing effect by relieving nervousness through the physical action of pointing and speaking simultaneously. Initial nervousness should not be a major problem, since most speakers experience varying degrees because of their concern for acceptance of the materials by the audience. Preview available training aids such as slides and overheads to determine if materials already exist which can be incorporated into the presentation. If appropriate visual materials are not available, overhead transparencies are one of the easiest and least costly to prepare. Some points to remember in developing visual aids are: (a) use large print that can be readily viewed on the screen from approximately 100 feet; (b) although script makes a good appearance, it is difficult to read; (c) do not crowd too much on the visual -- a rule of thumb is to use about a 10 second reading span as a guide; (d) mark each slide with a 'thumb-dot' on the lower left-hand corner as the slide is held so as to properly read the copy material in the slide -- slides conventionally are stored and given to a projectionist with the thumb-dot in the upper right-hand corner, so the slides will be ready to place in the projector; (e) it is a good idea to number the slides sequentially. A multitude of colors exist in the line of transparency materials. Thirty-five (35) millimeter slides make excellent visual aids. A slide should be developed to deliver a central message. Pinpoint and center materials. An alternative to individual development of training aids is to utilize a professional illustrator. However, this can be expensive.

Final Preparation

It is not a good policy to memorize a presentation. Organize and review the materials, including visual aids, several times. There is nothing wrong with preparing notes as reminders of major points. Do not read the presentation unless it is a technical paper at a symposium and all presenters are following this format. Advise the appropriate individual of the need for visual aid equipment including type of projector, screen, etc. Make sure some

type of a pointer is available. Also, provide biographical data for introduction purposes and to "set" your credentials.

Specific information is provided on education, experience, publications/awards, and membership in professional organizations. Obtain a copy of the printed program and affirm time and site location of the presentation. Plan to meet the allotted time frame. If you have slides, make sure that they are in proper order and the owner of the slides is clearly indicated. Make prior arrangements regarding on-off of lights and visual aid equipment. Avoid too many light-dark cycles during your talk, because having the lights turned on and off repeatedly can be distracting. If possible, do not completely darken the room which may interfere with eye contact and note taking. Be well groomed and neatly attired.

Finally, look the facilities over and check out the podium in reference to the microphone, reading lights, and having a good perspective on how things will look from the podium.

At the Podium

Following the introduction, approach the podium in a brisk manner with a smile on your face. Take a brief moment for composure. Thank the Chairman for the introduction and express your pleasure for the opportunity to address the group. At this time, lay the ground rule regarding questions, if it has not already been established, by saying that questions will be welcome during the presentation, or it will be appreciated if questions are held until the discussion period. Be confident. Speak clearly and maintain eye contact with the audience. Use your notes. When using visual aids, do not talk to the screen. The use of a pointer will assist in minimizing the tendency to lose contact with the audience. Watch the audience's reactions. Learn to read reactions and to make changes in delivery style to overcome negative responses.

Throughout, always remember why you are at the podium -- you were asked.

Annual Cheese Research And Technology Conference Announced

The Second Annual Cheese Research and Technology Conference sponsored by the Walter V. Price Cheese Research Institute will be held on March 6 and 7, 1985 at the Sheraton Inn and Conference Center, Madison, Wisconsin. Two half-day discussion sessions starting at noon on March 6 will be followed by demonstrations of cheesemaking using ultrafiltration, state-of-the-art CIP, and use of computers for milk standardization during the afternoon of March 7.

Topics to be discussed include an update on milk component testing, impact of ultrafiltration on cheesemaking technologies, descriptions of ultrafiltration cheesemaking systems, new applications of genetic engineering for starters and enzymes, factors affecting cheese yield, specialty cheeses, national milk composition survey, optimizing milk standardization with computers, controlling cheese flavor quality, whey protein purification and functionality, and various options for using ultrafiltration permeate. The last topic will focus on new processes and products, including adhesive resins, and on energy generation.

For enrollment information call 608-263-1672, or write to Agricultural Conference Office, UW-Extension, Jorns Hall, 650 Babcock Drive, Madison, WI 53706. For program information call 608-263-2001, or write to Norman F. Olson, Professor, Department of Food Science, University of Wisconsin-Madison, 107 Babcock Hall, 1605 Drive, Madison, WI 53706.

Food & Dairy Expo '85 Breaks All Records For Space Requests

Food & Dairy Expo '85 is 8 months away from opening day and has already broken all previous records for space reservations. Three hundred sixty-seven members of Dairy and Food Industries Supply Association (DFISA) have reserved more than 257,000 square feet of exhibit space at the Georgia World Congress Center, Atlanta, Georgia, October 5-9, 1985.

Food & Dairy Expo is one of the fastest growing international trade shows and is holding its position as the number one exposition of its kind in North America. Because of its size and scope, Food & Dairy Expo is a unique opportunity to join top food industry people from all over the world.

Robert Nissen of Ladish Co., Tri-Clover Division and president of DFISA says surpassing Food & Dairy Expo '83's record breaking attendance of 17,305 and attracting a high-quality audience are goals Expo organizers are striving to achieve.

"The exhibition," Nissen said, "will feature the newest technologies from food industry leaders." Products and services displayed will cover every aspect of food processing systems, ingredients, packaging, refrigeration, sanitation, transportation, and computer technology.

The five-day show will provide practical information to a broad spectrum of individuals from the food, dairy and beverage industries. Top industry executives, including manufacturing managers, engineers, researchers and marketing/sales personnel are expected to attend.

For more information on attending or exhibiting at Food & Dairy Expo '85, contact Dairy and Food Industries Supply Association, 6245 Executive Boulevard, Rockville, MD 20852. 301-984-1444, telex 908706.

Freezing Technology Course For The Frozen Food Industry

A new three day short course in "Freezing Technology" for operating personnel from frozen food companies will be offered April 2-4, 1985 at the University of California, Davis. The course is designed to train operating personnel to make better on-the-job decisions by giving them a better comprehension of the "whys" of what they do.

The course will cover:

* Food freezing systems
* Principles of refrigeration
* Raw material selection and handling for vegetables, fruit, meat, fish, shellfish and egg products
* Technology of freezing particular products
* Blanching and enzymes
* Packaging of frozen foods
* Storage of frozen foods
* Handling in marketing channels
* Microbiology of frozen foods
* Frozen food plant sanitation
* Laws and regulations
* Water - waste management and disposal
* Quality compliance and assurance, and
* Factors affecting quality.

The target audience is management or supervisory personnel, quality control personnel, line supervisors, potential supervisors and other frozen food industry personnel who feel they would benefit from the

course. Instruction will be at a level that is easily understood by this broad audience. There are no prerequisites for the course.

The registration fee for the "Freezing Technology" short course is $180.00. Reference materials, lunches, beverage breaks, and a banquet are included in the registration fee. Registrants will receive a certificate of course attendance. Course attendance will be limited to 50 people.

For further information about the short course, contact Robert C. Pearl or Rebecca Woolf, Food Science and Technology Department, University of California, Davis, CA 95616. 916-752-0980.

NDC Reaches Health Professionals With Good News About Calcium

Health professionals will learn that dairy foods are the best "prescription" for a calcium-rich diet when they read National Dairy Council's new publication, *Calcium: A Summary of Current Research for the Health Professional.*

The 36-page book briefs doctors, dentists, dieticians and others on the benefits of calcium. The extensively researched text includes more than 120 references. Beginning with an overview on how the body uses calcium, the summary goes on to discuss the calcium requirements of all age groups. A review of the latest research explores calcium's role in maintaining healthy teeth, bones, and normal blood pressure.

"Dairy foods as a group are the best source of calcium in the American diet," explained NDC President M. F. Brink, PhD. He noted that the new publication includes a chart listing the calcium content of dairy products as well as other foods.

"Health professionals who read this calcium summary will be able to impress upon their patients the importance of a calcium-rich diet," Brink added.

Many Americans--especially women--don't consume the recommended amount of calcium. The text points out that this calcium shortfall may lead to serious health problems. The bone-thinning disease known as osteoporosis, for example, is related to inadequate calcium intake throughout life. The calcium summary examines the clinical aspects of osteoporosis and describes the type of women most likely to develop this "brittle bone" malady.

Calcium, health professionals learn, also helps regulate blood pressure. The text highlights research on how calcium may guard against high blood pressure, which affects 60 million Americans to some degree.

Can dietary calcium cause kidney stones? This is one of several consumer concerns addressed in the text. There is no scientific evidence to blame a calcium-rich diet for kidney stones, notes NDC.

Health professionals are assisted by National Dairy Council in explaining to consumers calcium's role in good nutrition. A pocket at the back of the calcium summary holds four sample consumer pamphlets which can be ordered in quantity from local Dairy Council offices.

Selected health professional organizations have received promotional copies of *Calcium: A Summary of Current Research for the Health Professional.* NDC has also developed a full-page advertisement to promote the publication through selected journals.

The calcium summary is available from local Dairy Council offices, or it can be purchased for $10 from National Dairy Council, 6300 N. River Road, Rosemont, IL 60018-4233.

National Dairy Council is the nutrition education and research arm of the dairy industry. The combined efforts of Dairy Council, American Dairy Association and Dairy Research, Inc., provide a total promotion program for domestically-produced dairy foods.

Food Packaging Costs Consumers

After labor costs and farm costs, the third largest portion of our food dollar -- eight percent -- goes to packaging, says a Texas A&M University Agricultural Extension Service food and nutrition specialist.

That includes not only the package on the shelf, but the shipping carton, other distribution materials and the packaging equipment, explains Mary K. Sweeten.

While the cost of packaging as part of our food dollar is small, some foods cost more to package than others, says Sweeten.

According to the USDA, food packaging and container costs average nearly one-third of the cost of ingredients. But in about a fourth of the foods and beverages sold, packaging costs are greater than the cost of ingredients, reports the specialist. In general, the more processed or complicated a food product is, the higher the packaging costs, Sweeten says.

For example, foods such as beer, soft drinks, cereals, baby food, frozen dinners and canned fruits

and vegetables all have packaging costs greater than 100 percent of the cost of the ingredients.

Packaging costs for cake mixes, bread and cookies are between 50 percent and 100 percent of the ingredient costs, she reports. Packaging costs for frozen fruits and vegetables are only 42 percent of the cost of ingredients; and packaging costs for dried fruits and vegetables are 39 percent of the cost of the ingredients.

On the low end of the scale, frozen seafood, flour products and coffee have packaging costs that are less than 15 percent of the cost of ingredients. And "basic" foods like poultry, cheese, butter, sugar and red meats have packaging costs of less than 10 percent of the value of the food.

New methods and material for processing and packaging food have developed to meet consumer demands growing out of changing family patterns and lifestyles, notes Sweeten. But consumers can expect to pay for these changes at the grocery check-out counter.

1985 Food Protection Award Open To Local Agencies

Applications are now being accepted for the Samuel J. Crumbine Consumer Protection Award for 1985. The Crumbine Award is given annually to a deserving local environmental health department for proven excellence in a program of food and beverage sanitation.

The competition is open to all U.S. local government agencies which can demonstrate outstanding achievement in the design and implementation of the program they have instituted to prevent the outbreak of foodborne disease in the community.

Deadline for the 1985 Award entries is May 31, 1985.

Presentation of the Award will be made at the annual meeting of the International Association of Milk, Food & Environmental Sanitarians in Nashville, Tennessee, August 14, 1985.

Applications may be obtained by writing to the Award sponsor, the Single Service Institute, Inc., 1025 Connecticut Avenue, NW, Suite #513, Washington, DC 20036.

Litsky Receives Kimble Award

Warren Litsky, Chairman of the Department of Environmental Sciences at the University of Massachusetts at Amherst, has been chosen to receive the 33rd Kimble Methodology Award of the Conference of Public Health Laboratory Directors.

The award recognizes significant contributions in the application of scientific knowledge to public health laboratory practice, and was based primarily on Litsky's work on the identification and enumeration/ quantitation of bacteria and chemicals that can be used as indicators of fecal pollution of water, soil, and food. He received a plaque, a glass sculpture, and $1,000.

The award was one of six major honors bestowed on Litsky in the past five years. In 1979 he received a Distinguished Teacher Award from UMass; in 1980 he received the Carski Distinguished Teaching Award from the American Society for Microbiology; in 1982 he received an honorary Doctor of Science degree from Clark Univ., Worcester, Mass.; in 1983 he received (with Dr. Chun-Kwun Wun) the Difco Award from the Laboratory Section of the American Public Health Assn.; and in 1983 he was awarded a Chancellor's Medal from UMass for exemplary and extraordinary service to the university.

Bulk Food Guidelines Protect Consumers

Scooping your own corn meal or rice from barrels at the supermarket may be a nostalgic reminder of the old country store. But like most things, even buying bulk food is more complicated than it was in grandma's day.

Today you may have to struggle with a long-handled scooping device or plastic dispensing mechanism to get at your favorite bulk food. The apparatus is there for good reason -- to protect your health and safety.

The growing popularity of selling everything from trail mix to dried fruit, coffee beans and popcorn in bulk led food retailers to seek guidance from the Food and Drug Administration for applying sanitation law in their operations, says Texas A&M University Agricultural Extension Service food and nutrition specialist Marilyn Haggard.

"The objective in providing guidelines for bulk food sales is to control potential health problems such as the spread of communicable disease, outbreaks of food-borne illness and unintentional contamination of food," she says.

The FDA completed guidelines for handling bulk food in supermarkets earlier this year, and the effects are being seen in the grocery stores now, adds Haggard.

The rules require bulk food to be dispensed from containers with close-fitting individual covers. Containers must be easily removable from the display

unit for servicing, unless they can be cleaned in place without contaminating the food, explains the specialist.

The FDA ordinance also states that manual contact with the food by customers must be avoided either by mechanical dispensing devices such as gravity fed units, manual dispensers like tongs and scoops, or wrapping and sacking products, advises Haggard.

Also, just because you buy food from bulk dispensers doesn't mean you give up your right to product information, she says. The container should show either a counter card or manufacturer's label stating the name of the product and its ingredients in order of predominance.

To reduce the possibility of contamination, the rules suggest that retailers limit the depth of a bulk-food container to 18 inches and locate any containers with the opening at the top at least 30 inches from the floor, Haggard says. But retailers are not required to use these measurement standards as long as they avoid contamination of the food.

The FDA guidelines call for voluntary compliance by retailers and exempt wrapped candies, nuts in their shells and other protected items, she adds. So consumers will need to judge for themselves whether a bulk food operation seems sanitary, she says.

"Music City" To Host 1985 ACDPI Conference

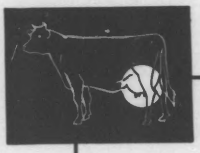
Over 300 delegates from throughout the U.S., Canada, Mexico, and select European countries are expected to attend the 1985 American Cultured Dairy Products Institute Annual Meeting/Kultures and Kurds Klinic/International Cultured Product Evaluation Sessions, according to Institute Vice President Dr. C. Bronson Lane. Site for the March 17-20 events will be the Opryland Hotel, Nashville, Tennessee.

Buttermilks, sour creams, cottage cheeses, and yogurts submitted by manufacturers will be analyzed by experts during the international product evaluation sessions and awards given for individual product excellence. Over-all products winner will receive the coveted Neil C. Angevine Superior Quality Award at the March 19 Recognition Banquet.

Additionally, the program includes a Chairman's Reception honoring Jeff Edwards and a March 18 luncheon where the recipient of the 1985 ACDPI Research Award (sponsored by Nordica Int.) will be recognized.

Tours of the Purity Dairies plant in Nashville and the Heritage Farms (Kroger Co.) processing facility in Murfreesboro are also on tap for the conferees.

For additional information, contact Dr. C. Bronson Lane, ACDPI, P.O. Box 7813, Orlando, Florida 32854. 305-628-1266.



N.M.C.

NATIONAL MASTITIS COUNCIL

By Steve Watrin
Rep Training Specialist
Land O'Lakes, Inc.

Rapid Penicillin Tests Comparison

The last two NMC columns reviewed the Bacillus Stearothermophiles disc assay, Delvo, and Penzyme tests, all of which check for penicillin in milk. This column will complete our rapid penicillin test comparisons by reviewing the Charm and Spot Tests.

Charm

There are three different tests being used today. The Charm Test and Charm Test II are the only rapid tests with official status. These tests take 8-12 minutes and are widely used by dairy organizations. The Charm Field test is a new screening test based on a competitive reaction between carbon 14 penicillin and penicillin itself. They compete for sites on the microbial cells. This test will detect all beta lactams and is based on AOAC, standard methods procedures. It is a portable system and can be adapted to laboratory, field, or farm use. It takes less than six minutes, and more than one test can be run at a time. (1 1/2 extra minutes per additional test.) Some sensitivity is lost from official test. It requires minimal involvement and gives a quantitative answer. In addition, the filter provides a permanent record. There are optional purchase plans available and the cost is under $2.00 per test.

Spot

This is a latex slide agglutination test. It is based upon antibody-antibiotic competitive reaction. Therefore, the test is specific in detection. Currently, it detects penicillin G and Cepharpirin. Plans are to add ampicillin and cloxacillin to the test. It is being used by some dairy operations as a screening test. Minimal capital investment is required. It takes six minutes per test and requires minimal technician involvement. Standardization of reagent is usually not necessary. However, reagents may have stability problems if not handled correctly. Temperature is important for proper performance and should be between 65-80°F. Cost is $2.00 per test.

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703-243-8268

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

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It is now possible to catch contaminated milk right where it gets contaminated.

As you may know, most of the milk in this country is going through the Charm Test® before it goes through the processing plant. Because the Charm Test catches 100% of the contaminated milk, 100% of the time. In just 12 minutes.

But you may not realize that you can now catch contaminated milk right where it gets contaminated. With the new Charm Field Test.™ You can take it anywhere. And get 100% accuracy, in under six minutes.

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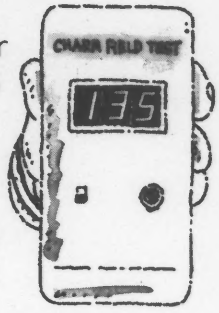

If you can read numbers, you can read our Field Test.

And the Charm Test doesn't just catch Penicillin G and Cephapirin. It catches the whole family of penicillin beta lactams, all 33 that can make for contaminated milk. All with a single test.

Add to all that the fact that our Field Test costs only $1.50 and has reagents that are incredibly stable (meaning you can use them until they're gone), and you'll see it not only makes sense to use a Charm. It's downright foolish to be caught without one.


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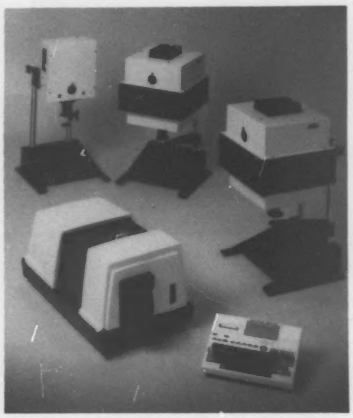

Colorimeter by Hunter Labs

Low Cost, Versatile Colorimeter Introduced By HunterLab

• Hunter Associates Laboratory, Inc., 11495 Sunset Hills Road, Reston, Virginia, has announced the introduction and availability of the new D25-PC2. In keeping with demands for cost effective, reliable, flexible, and fast color measurement instrumentation, the D25-PC2 allows users to select one or more of HunterLab's five specially designed optical sensors, and combine them with the lightweight, compact Epson HX-20 "Laptop" computer. The result is an affordable colorimeter that allows any user to design a system that fits the demands of their particular application.

The menu-driven, user-prompting D25-PC2 is designed for both ease of training and use. Standard features include one decimal place data, automatic standardization, transfer standardization, XYZ and one additional color scale, system diagnostics and a built-in printer, to name a few. Of equal importance is that options such as Hunter L,a,b; CIELAB, haze; contrast ratio; YI D1925-70; WI E313-73; component color difference and total color differences can be selected separately, not in packages. This means you purchase only what you need, at substantial savings.

Alternately, for those individuals who own personal computers, additional savings can be realized. The D25-PC2 may be ordered without the Epson computer and connected directly to the user's own computer via an RS-232 port found on most computers in the market today. In turn, since all measurement software is provided with each system, users are also able to program data display and measurement routines themselves, to fit their individual day-to-day requirements.

Application flexibility is another key feature of the D25-PC2. Users can choose from the field-proven, low-cost optical sensors that include the D25A and D25AA for flat opaque surfaces and materials of small particle size; the D25L for non-uniform surfaces and large particle size specimens and the D25M for textured surfaces, fibers, and chips. The D25P sensor is used for transmission and haze measurements of film and liquids and the measurement of opaque materials where the specular light can be included or excluded.

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New Milk Screening Test From SmithKline

• PENZYME Milk Test, a new screening test for detecting antibiotic residues in milk, is being introduced to dairymen by SmithKline Animal Health Products.

PENZYME is a quick, reliable and economical antibiotic residue screening test. In 25 minutes, a dairyman can accurately determine whether milk samples contain penicillin or other beta-lactam antibiotic residues. The average cost of a test is $2.50.

The PENZYME Milk Test is an enzymatic assay based on a known chemical reaction that occurs between beta-lactam antibiotics and the test chemicals. If beta-lactam antibiotics are present, they will bind to the test enzymes, preventing or interfering with the chemical reaction that generates a pink color. The pink color indicates that no beta-lactam antibiotics are present in the milk sample. Progressively lighter shades of pink or a yellow-white sample indicate increasing amounts of penicillin, ampicillin, cephalosporins or related compounds.

PENZYME Milk Test kits are available from local milk cooperatives, distributors of animal health products or directly from SmithKline Animal Health Products in West Chester, Pennsylvania. The company is a subsidiary of SmithKline Beckman Corporation, a world leader in human and animal health care.

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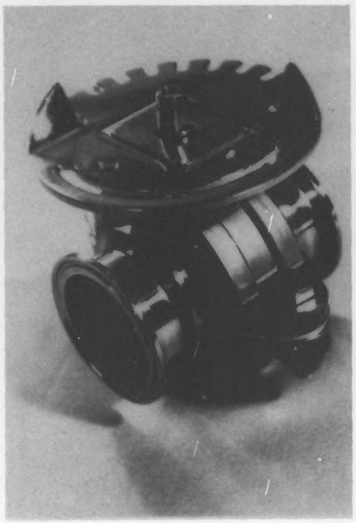
SmithKline Milk Screening Test



Bay State Controls Sanitary Butterfly Valves

Sanitary Butterfly Valves Feature In-Line Adjustable Seats

• A new line of sanitary butterfly valves that easily retrofit a wide range of existing ferrule-end sanitary valves is being introduced by Bay State Controls Corporation of Worcester, Massachusetts.

Bay State Controls Sani-Clamp Butterfly Valves feature crevice-free interiors that prevent contamination and patented seats that easily adjust without system shut-down. Meeting all FDA and USDA sanitary service requirements, they easily retrofit a wide range of ferrule-end sanitary valves.

Produced with sani-clamp, flanged, butt-weld or other mixed ends, Bay State Controls Sani-Clamp Butterfly Valves come in 1-1/2" to 6" OD. Offering seats in a wide range of elastomers for process media compatibility, they include one-piece disc shafts and nickel-plated or stainless steel bodies and handles.

Bay State Controls Sani-Clamp Butterfly Valves are priced from $167 depending on materials, size and quantity. Literature is available on request.

For more information contact: Bay State Controls Corporation, Robert Prescott, General Manager, 51 Union Street, Worcester, MA 01608. 617-799-0335.

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Food Science Facts
For The Sanitarian

Robert B. Gravani
Cornell University
Ithaca, NY

FOOD DETERIORATION AND SPOILAGE CAUSED BY MICROORGANISMS

The human diet consists largely of foods that may be deteriorated in quality or spoiled by bacteria, yeasts and/or molds. Foods are composed of a combination of proteins, carbohydrates and fats, and all of these compounds can support the growth of a variety of microorganisms. These organisms are found everywhere -- in air, soil, water, on the skin and in the intestinal tracts of man and animals, on the peels of fruits and vegetables, on food processing equipment, utensils, and on the clothing of people working with food.

Once microorganisms find their way into food, and given the appropriate conditions, they can act in two ways; they can:

1) Break down or degrade food constituents and use these breakdown products to grow.

2) Produce substances (metabolic by-products) in the food as a result of their growth.

The biochemical changes caused by microorganisms in foods may be beneficial, as in the case of fermented dairy products, beer and wine, or undesirable, as evidenced by mold growth on cheese, discoloration of fish or slime produced on lunch meat.

An example of the way bacteria spoil food can be seen when meat is stored at room temperature (70°F). After a day or so, the meat gets slimy, develops a putrid odor and often discolors. All of these quality defects are the result of microbial growth and degradation.

Since microorganisms can ferment sugars, break down (hydrolyze) proteins, fats and complex carbohydrates like starch and cellulose, the first sign of food spoilage is in the appearance, color, texture, odor or flavor of the product. These quality parameters along with the microbiological defects are summarized below.

The undesirable changes that occur in foods are determined by a variety of factors, including the:

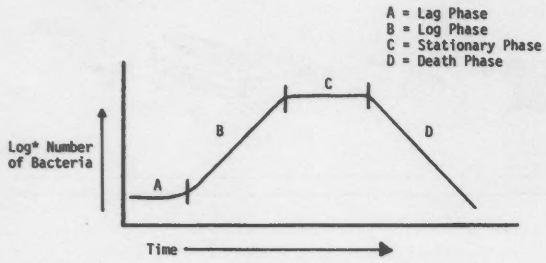
- Origin of the food
- Composition of the food
- Method of processing, packaging, handling, and storage
- Types and numbers of microorganisms present.

The microorganisms present in food will be influenced by those associated with the raw product, those "picked up" during harvesting, handling, transporting, and processing of the product, and those that survive the processing (preservation) method. Storage conditions of foods will also influence microbial spoilage. The microorganisms that are present in a food can act singly or in groups to break down the complex constituents of foods.

The competition between different kinds of bacteria, yeasts and molds in food usually determines which one(s) will outgrow the others and cause its characteristic type of spoilage. If the conditions favor the growth of all microorganisms, bacteria usually grow faster than yeasts and yeasts faster than molds. Yeasts can outgrow bacteria only when they predominate or when conditions slow down bacterial growth. Molds predominate only when conditions are better for them than yeasts or bacteria.

QUALITY PARAMETERS	DEFECTS
General Appearance of Food	Mold growth Slime or film formation on food Formation of gas; pockets of gas; bubbles, swelled containers
Color	Color changes; discoloration of food (unusual pink, gray, red and/or green colors)
Texture	Soft; mushy; lack of freshness
Odor	Putrid/decomposition smell; sulfur odor; sweet odors; or "alcoholic" odor
Flavor	"Off" flavors including bitter, sour, "yeasty", or rancid tastes

When introduced into a food, organisms grow in a characteristic manner. The graph below shows a typical bacterial growth curve.



As the bacteria get "acquainted" with their new environment, it takes some time to "gear up" their cellular machinery to break down food constituents, absorb the nutrients present and grow. This portion of the growth curve is known as the lag phase. Bacterial growth does not begin immediately and the length of this phase depends on the environmental conditions (time, temperature, etc.).

**The word log refers to logarithm which is a mathematical way of easily expressing large numbers.*

As the bacteria begin to take in nutrients, they grow and rapidly increase in numbers. This phase of maximum growth is known as the log phase. It is governed by the generation time of the organism or how long it takes the bacteria to double in numbers.

The stationary phase occurs when growth slows down and tapers off. This phase is due to the exhaustion of nutrients in the food and/or the production of inhibitory substances (acids) by the bacteria. The death phase results when nutrients are exhausted and/or metabolic by-products build up and cause cell death.

Growth of bacteria is influenced by several factors including:

- Water
- Nutrients
- Oxygen
- Temperature
- pH
- Inhibitory substances.

In most foods, it is desirable to keep the bacterial numbers low and to prevent rapid growth which will result in product deterioration and spoilage.

Dairy Quality

by **Darrell Bigalke,** *Food & Dairy Quality Mgmt., Inc., St. Paul, MN*

PRODUCTION OF QUALITY COTTAGE CHEESE, FINISHED PRODUCT STANDARDS, AND DISTRIBUTION CONTROL

Earlier DAIRY QUALITY UPDATE newsletters discussed the importance of establishing standards in managing a quality control/quality assurance program. Both sensory and biological standards need to be considered when establishing product standards. Development of standards for shelf life, appearance, flavor, texture, and safety for products should be considered to assure a high degree of consumer acceptance.

Finished product inspection should include observations and development of standards for texture, appearance, and flavor. These standards should consider defects such as shattered curd, curd texture, proper ratio of cream dressing to cottage cheese, free whey, and other defects affecting appearance and flavor. Standards should also be established for packaging, including appearance, net weight, and other parameters. As discussed in previous DAIRY QUALITY UPDATES, controlling these potential defects is primarily a function of process control. However, finished product inspection is needed as part of the process control system.

To assure a high degree of consumer acceptance, cottage cheese processors must focus on production of a product with extended shelf life. One of the leading causes of short shelf life is post-process contamination and spoilage by psychrotrophic microorganisms. Therefore, testing procedures and establishment of standards for psychrotrophic bacteria present in cottage cheese products should be of primary concern for a dairy's quality assurance program. Post process contamination of cottage cheese by *pseudomonas, aerobacter, achromobacter, alcaligenes,* and other psychrotrophic organisms can lead to slimy defects, bitter flavors, fruity flavors, and discoloration (2). These organisms are normally heat sensitive and are usually post heating contaminants. Therefore, the process control systems discussed in last month's DAIRY QUALITY UPDATE should be implemented to control these organisms. Establishing standards and finished product inspections will enable the processor to determine and control the shelf life and quality of cottage cheese products.

Psychrotrophic organisms can be present in cottage cheese products initially at very low numbers. However, due to their psychrotrophic nature, they are capable of growth during storage and subsequent spoilage of product. Therefore, a product stress testing system (shelf life testing) is needed to determine the presence of these organisms. Table I suggests some standards for shelf life testing for the presence of psychrotrophic bacteria.

Yeast and mold contamination of cottage cheese can also lead to product defects. Standards must be established for initial yeast and mold counts for shelf life samples, and for samples held to the end of code.

Most regulatory agencies will not allow coliform populations to exceed 10/ml in cottage cheese products. Therefore, the company standards should also be established for coliforms in cottage cheese. Certainly these standards should not exceed the legal standards.

A key element in maintaining and controlling both physical and biological product defects is temperature control. From a microbiological standpoint, the growth rate of psychrotrophic contaminants is the key factor reducing shelf life. To reduce the growth rate of these organisms, temperature control must be maintained through production and distribution of products. Establishment of standards or limits is necessary to assure proper temperature during production and distribution. Bodyfelt (1) suggests temperature surveys for production and storage including temperature checks of rinse water, the curd banked, the curd drained, dressing, creamed curd, product at the filler, and production in cold storage. Distribution temperature control as well as retail control will help extend shelf life and maintain consumer acceptance.

Table I points out some physical and biological parameters that should be considered when determining finished product standards. Standards are also suggested that are achievable that should reflect good quality cottage cheese. This list is not an exhaustive list nor do the standards suggested apply to all situations. However, the table is meant to be a guideline for establishing finished product standards for cottage cheese.

TABLE I: Finished product - cottage cheese quality - standards.

Initial		
microbial		
	yeast and mold	<1/ml
	coliforms	<1/ml
pH		4.5
flavor		no defects
texture		no defects
appearance		no defects
temperature		<45F
packaging		no defects
Shelf life		
1/2 of Code		
microbial		
	psychrotrophic	<100/ml
	yeast and mold	< 1/ml
flavor		no defects
texture		no defects
appearance		no defects
End of Code		
microbial		<10,000/ml
flavor		no defects
texture		no defects
appearance		no defects
Distribution temp.		<45F

Next month's DAIRY QUALITY UPDATE will discuss post-pasteurization and contamination of fluid milk case history.

REFERENCES

1. Bodyfelt, F. W. 1981 Temperature Control Monitoring for Cottage Cheese Plants. Dairy Record, January, p. 65-67.
2. Schultz, W. D. and J. C. Olson, Jr., 1960. Studies on Psychrotrophic Bacteria. I. Distribution in Stored Commercial Dairy Products. J. Dairy Sci. 43: 436-450.

IA.AMFES, Inc. Holds Annual Meeting

The IA.AMFES, Inc. held its annual meeting on October 17, 1984, at the Holiday Inn in Little Amana, IA. The morning session opened with welcoming remarks from President Derward Hansen. The first speaker, Dr. Russell Currier of the IA Department of Health - Disease Prevention Division updated Contemporary Foodborne Disease Problems, and Al Bierbaum of the IA Association of Rural Electric Cooperatives spoke on Stray Voltage, concluding the morning session.

Short Time Antibiotic Testing from Angenics, Penzyme and Charm started off the afternoon session. The program followed with a public relations message: "How to Work With People Under Stress," by John Tait, ISU Professor of Sociology and Extension Sociologist. The meeting concluded with a film, "Put It All Together."

No business meeting was held. The Association members voted by private ballot to have a two day meeting once per year and to use treasury funds to procure speakers for our meeting.

Nominations Sought For Shogren Award

The Shogren Award is presented each year at the IAMFES Annual Meeting.

This award is presented to an affiliate group for their effort and advancement throughout the year.

Nominate your well deserving group simply by requesting an award form from the IAMFES Office in Ames at P.O. Box 701, Ames, IA 50010.

Scholarship Recipients Announced

The Scholarship Committee of the Food Science Department, The Pennsylvania State University, has met and selected additional recipients for the 1984-85 academic year. Those selected are as follows:

Diana L. Kerestan has received the Walter S. Anderson Memorial Scholarship, in the amount of $500.

Ronald C. Eckel and Craig A. Sowers are each recipients of a $250 Dairy Sanitarians' Scholarship.

Barbara J. Rybar is the winner of the Michael J. Daly Memorial Scholarship, in the amount of $250.

The September 28, 1984 Supplement to the *Morbidity and Mortality Weekly Report* gave a comprehensive review of adult immunization, based on recommendations of the Immunization Practices Advisory Committee. The following commentary on immunization recommendations for persons in special occupations is taken from the introduction to the Committee statement. Copies of this special edition of MMWR are available at $3.00 each from the Massachusetts Medical Society, C.S.P.O. Box 9120, Waltham, MA 02254-9120.

SPECIAL OCCUPATIONS

Persons in specific occupations may be at increased risk of exposure to certain vaccine-preventable illnesses. Such persons may need selected vaccines and toxoids in addition to those routinely recommended for their age group.

Health-Related Occupations

Medical, dental, laboratory, and other support personnel who may have contact with blood or blood products should be immune to hepatitis B virus (HBV) infection. The groups at highest risk for acquiring HBV infection and for whom HB vaccine is recommended include medical technicians, operating room staff, phlebotomists, physicians (particularly surgeons and pathologists), nurses (particularly intravenous-therapy nurses and nurses on oncology and dialysis units), dentists and oral surgeons, laboratory and blood-bank technicians, and emergency-room staff. Morticians and their assistants who have routine contact with blood and secretions are also at high risk of HBV infection. Selected staff of institutions for the mentally retarded may be at increased risk of HBV infection because of exposure to bites and contact with skin lesions, saliva, and other potentially infected secretions in addition to blood.

Among health-care personnel with frequent exposure to blood, the prevalence of serologic evidence of HBV infection is estimated to range between 10% and 30%. Since the cost effectiveness of serologic screening to detect susceptible individuals among health-care personnel depends on the prevalence of infection, each institution must decide whether serologic screening is cost effective. Vaccination of individuals who already have antibodies to HBV has not been shown to cause adverse effects.

The duration of protection from a three-dose series of HB vaccine or the need for booster doses has not yet been determined.

Transmission of rubella in health facilities (hospitals, physician or dentist offices, clinics, etc.) can disrupt hospital or office routines and cause considerable expense. Although no cases of congenital rubella syndrome (CRS) have been reported in association with rubella transmission in health facilities, therapeutic abortions have been sought by pregnant staff members following rubella infection. To prevent such situations, all medical, dental, laboratory, and other support health personnel, both male and female, who might be at risk of exposure to patients infected with rubella, or who might have contact with pregnant patients, should be immune. Rubella vaccine is recommended for all such personnel unless they have either proof of vaccination with rubella vaccine on or after their first birthday or laboratory evidence of immunity. Combined MMR vaccine is the vaccine of choice if recipients are likely to be susceptible to measles and/or mumps as well as to rubella.

Measles transmission in health facilities can also be disruptive and costly. To prevent such situations, all health personnel born in 1957 or later who may have contact with patients infected with measles should be immune. Such persons can be considered immune only if they have documentation of having received live-measles vaccine on or after their first birthday, a record of physician-diagnosed measles, or laboratory evidence of immunity. Measles vaccine is recommended for all persons lacking such documentation. Combined MMR vaccine is the vaccine of choice if recipients are likely to be susceptible to rubella and/or mumps as well as to measles. Adults born before 1957 can be considered immune to measles since measles was a universal infection before the availability of measles vaccine.

Poliovirus vaccine is not routinely recommended for persons older than high school age (18-19 years old). However, hospital personnel having close contact with patients who may be excreting wild polioviruses, and laboratory personnel handling specimens that may contain wild polioviruses, should have completed a primary series of poliovirus vaccine. For personnel who do not have proof of having completed a primary series, completion is recommended with inactivated poliovirus vaccine (IPV). IPV is preferred because there is a slightly increased risk in adults of vaccine-associated paralysis following receipt of OPV. In addition, since vaccine poliovirus may be excreted by OPV recipients for 30 or more days, the use of OPV increases the risk of acquiring vaccine-associated paralytic poliomyelitis among susceptible immunocomprised contacts and susceptible close contacts of OPV recipients.

Smallpox vaccination is indicated only for laboratory workers involved with orthopox viruses or in producing and testing smallpox vaccine. When indicated, smallpox vaccination should be given at least every 3 years.

Plague vaccine is indicated for laboratory personnel working with *Yersinia pestis* possibly resistant to antimicrobial agents and for persons performing *Y. pestis* aerosol experiments.

Preexposure rabies vaccination is indicated for laboratory workers directly involved with testing or isolating rabies virus.

Veterinarians and Animal Handlers

Veterinarians and animal handlers are at risk of rabies exposure because of occupational contact with both domestic and wild animals. They should receive preexposure rabies vaccine prophylaxis with human diploid cell rabies vaccine (HDCV). Preexposure vaccination against rabies does not eliminate the need for additional therapy after exposure to rabies; it does, however, simplify postexposure therapy by eliminating the need for human rabies immune globulin (HRIG) and by decreasing the number of postexposure doses of vaccine needed. Persons at continued risk of frequent exposure should receive a booster dose of HDCV every 2 years or have their serum tested for rabies antibody every 2 years and, if the titer is inadequate ($<$ 5 by the rapid fluorescent-focus inhibition test), receive a booster dose.

Selected Field Personnel

Plague vaccine is indicated for field personnel who cannot avoid regular exposure to potentially plague-infected wild rodents and rabbits and their fleas.

Preexposure rabies vaccine prophylaxis should be considered for field personnel who are likely to have contact with potentially rabid dogs, cats, skunks, raccoons, bats, or other wild-life species.

Sewage Workers

Sewage workers, as all other adults, should be adequately vaccinated against diphtheria and tetanus.

Poliovirus and typhoid vaccines and immune globulin are not routinely recommended for sewage workers. (*Morbidity and Mortality Weekly Report*, 33: No.1S, 9/28/84).

MICROWAVE DANGER DISCOUNTED

Cooks who use microwave ovens are not in danger of getting cancer from the oven's radiation, FDA says. News reports of a recent study indicating possible carcinogenic effects in rats from exposure to microwave radiation have led to some consumer concern about the safety of microwave ovens.

In the study, conducted at the University of Washington and sponsored by the Air Force, 100 rats were exposed over their whole bodies to microwave radiation for 21 hours a day for their entire lives (up to 25 months), at a level equivalent to approximately 5 milliwatts per square centimeter in humans.

Even a person making extensive use of a microwave oven would be exposed to levels far below this, according to FDA. Most ovens tested by the agency leak no microwaves at all. The maximum leakage allowed by FDA's standards is 5 milliwatts per square centimeter at a distance of two inches from the oven. Even if an oven leaked to the maximum allowed, the portions of the user's body at a normal arm's length from the oven would receive no more than 2 percent of the level used in the study. Farther away from the oven the exposure would be dramatically lower.

In addition, the experimental animals were exposed over their entire lifetimes, whereas even frequent oven users are close to an operating oven only a small part of the time. To approximate the conditions of the study, a human's entire body would have to be exposed continuously at a distance of two inches from an oven leaking at the maximum permitted level.

Since FDA standards are being met or bettered by oven manufacturers, concern about microwave radiation from these products appears to be unwarranted, the agency says. (*FDA Consumer*, 9/84).

SALMONELLOSIS FROM INADEQUATELY PASTEURIZED MILK - KENTUCKY

In late April 1984, three isolates of *Salmonella typhimurium*, all from persons associated with a convent in western Kentucky, were reported by the Kentucky Division for Laboratory Services to the Division of Epidemiology. Subsequent investigation revealed that at least 16 cases of gastroenteritis (predominantly diarrhea) were associated with the convent between March 28 and May 2. The likely vehicle was inadequately pasteurized milk.

One hundred forty nuns reside at the convent; additional persons are employed such as caretakers, foodhandlers, and farm workers. All meals are prepared in the convent kitchen and are available to residents and employees.

Of persons filling out questionnaires, 14 (15%) of 91 persons who admitted drinking pasteurized milk became ill, but only two (3%) of 75 who claimed not to have drunk milk became ill. Persons drinking pasteurized milk were approximately six times more likely to develop illness ($p = 0.01$). No other risk factors were identified.

Before early March 1984, the convent had its own herd of dairy cattle and pasteurized its own milk. At that time, the convent began purchasing raw milk from a Grade-A dairy farm in the area. Since the fall of 1983, this latter dairy herd reportedly has had a recurrent problem with gastroenteritis, although no fecal sampling has been performed.

The purchased milk was pasteurized at the convent in 50-gallon lots in a 60-gallon steam pasteurizer. No time-temperature gauge/record or air space heater was available. Pasteurization temperatures and holding times during the epidemic period are not known but may have been as low as 54.5C (130F) for only 30 minutes.

A milk sample collected May 4, reportedly pasteurized to 62.8C (145F) for 30 minutes, was weakly phosphatase-positive, indicating inadequate pasteurization. A butter sample collected the same day was strongly phosphatase-positive.

Based on the identical plasmid profiles of *S. typhimurium* isolated from milk and humans, the evidence of inadequate pasteurization, and the association between milk consumption and illness, it was concluded that inadequate milk pasteurization accounted for this outbreak. Preventive recommendations centered around the pasteurization process: use of a recording thermometer and air space heater, pasteurization at 65.6C (150F) for 35-40 minutes, and routine phosphatase and bacteriologic testing.

No further cases have been reported.

Editorial Note: Salmonellosis caused by *S. typhimurium* transmitted in raw milk has been previously identified in Kentucky. The outbreak described here differs from the earlier one in that inadequate milk pasteurization, rather than raw milk consumption, accounted for the outbreak. Unpasteurized milk is a common cause of outbreaks and sporadic cases of disease in the United States. The list of bacteria responsible for illnesses caused by consumption of raw and inadequately pasteurized milk includes various *Salmonella* species, *Campylobacter, Brucella, Escherichia coli, Yersinia enterocolitica,* and *Listeria*. Recently, a large outbreak of illness occurring in older age groups characterized by profuse diarrhea lasting more than 4 weeks has been under investigation in Minnesota; the causative agent is not yet known but there is a clear epidemiologic association with drinking raw milk. Health professionals and persons responsible for milk regulations should be aware of the many health hazards associated with drinking unpasteurized or inadequately pasteurized milk. (*Morbidity and Mortality Weekly Report* 1984, 33: 505-506).

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100 South CP Ave.
Lake Mills, Wisconsin 53551

115 Alfa-Laval, Ltd. (9/28/58)
(not available in USA)
113 Park Street South
Peterborough, Ontario, Canada K9J 3R8

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

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

117 DCI, Inc. (10/28/59)
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St. Cloud, Minnesota 56301

76 Damrow Company (10/31/57)
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196 Western Ave., P.O. Box 750
Fond du Lac, Wisconsin 54935-0750

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

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

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

02-08 Pumps for Milk and Milk Products

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325 Albin Pump, Inc. (12/19/79)
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65R Alfa-Laval, Inc. (5/22/57)
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Kenosha, Wisconsin 53141

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212R Babson Brothers Co. (2/20/70)
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Hills, MN 56138

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

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

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

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

121 Technova, Inc. (12/9/59)
(not available in USA)
1450 Hebert St. CP758
Drummondville, Quebec
Canada J2C 2A1

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

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

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

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

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

260 APV Crepaco, INC. (5/22/74)
100 South CP Ave.
Lake Mills, Wisconsin 53551

403 APV Crepaco, INC. (8/22/82)
395 Fillmore Ave.
Tonawanda, NY 14150

291 Accurate Metering Systems, Inc. (6/22/77)
1731-33 Carmen Dr.
Elk Grove Village, Illinois 60007

67R Alfa-Laval, Inc. (6/10/57)
Flow Equipment Div.
5718-52nd St.
Kenosha, Wisconsin 53141

322 Alfa-Laval, Ltd. (7/16/79)
(not available in USA)
113 Park Street South
Peterborough, Ontario
Canada K9J 3R8

380 Allegheny Bradford Corp. (3/21/83)
P.O. Box 264
Bradford, Pennsylvania 16701

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

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

245 Babson Bros. Company (2/12/73)
2100 So. York Rd.
Oak Brook, Illinois 60521

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

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

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

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

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

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

350 H&K, Inc. -Rosista Div. (1/7/82)
2365 S. 170th Street
P.O. Box 54
New Berlin, WI 53151

369 IMEX, Inc. (11/3/82)
6733 So. Sepulveda Blvd.
Suite E
Los Angeles, California 90045

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

34R Ladish Co., Tri-Clover Div. (10/15/56)
9201 Wilmot Rd.
Kenosha, Wisconsin 53141

398 Ladish Co., Tri-Clover Div. (7/29/83)
9201 Wilmot Road
Kenosha, WI 53141

389 Lee Industries, Inc. (5/31/83)
P.O. Box 537
Port Matilda, Pennsylvania 16870

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

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

374 Pasilac, Inc. (1/25/83)
660 Taft St., NE
Minneapolis, Minnesota 55413

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

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

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

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

287 Sanitary Processing Equipment Corp. (1/14/77)
P.O. Box 178, Salino Station
Syracuse, New York 13201

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

391 Stork Food Machinery, Inc. (6/9/83)
7 Finderne Ave., P.O. Box 816
Somerville, New Jersey 08876

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

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

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

191R Tri-Canada, Inc. (11/23/66)
6500 Northwest Dr.
Mississauga, Ontario
Canada L4V 1K4

250 Universal Dairy Equipment (6/11/73)
408 First Avenue, So.
Albert Lea, Minnesota 56007

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

278 Valex Products Corp. (8/30/76)
20447 Nordhoff St.
Chatsworth, California 91311

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

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

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

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

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

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

418 Pasilac, Inc. (4/2/84)
660 Taft St., NE

Minneapolis, MN 55413

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

420 Stork Food Machinery, Inc. (4/17/84)
7 Finderne Ave., P.O. Box 816
Somerville, NJ 08876

32 Taylor Instrument Co. (10/4/56)
Div. of Combusion Eng.
95 Ames St.
Rochester, New York 14601

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

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

35 Ladish Co., Tri-Clover Div. (10/15/56)
9201 Wilmot Rd.
Kenosha, Wisconsin 53141

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

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

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

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

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

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

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

326 American Vicarb Corp. (2/4/80)
77 Oriskany Dr.
Tonawanda, New York 14150

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

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

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

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

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

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

365 Pasilac Therm, Inc. (9/8/82)
660 Taft St., N.E.
Minneapolis, Minnesota 55413

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

426 Tri-Canada, Inc. (8/31/84)
6500 Northwest Drive
Mississauga, Ontario, Canada L4V 1K4

12-04 Tubular Heat Exchangers for Milk and Milk Products

438 APV Equipment, Inc. (12/10/84)
395 Fillmore Ave.
Tonawanda, NY 14150

307 Alfa-Laval, Inc. (5/2/78)
Flow Equipment Div.
5718-52nd St.
Kenosha, Wisconsin 53141

248 Allegheny Bradford Corp. (4/16/73)
P.O. Box 264
Bradford, Pennsylvania 16701

243 Babson Bros. Company (10/31/72)
2100 So. York Rd.
Oak Brook, Illinois 60521

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

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

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

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

392 Stork Food Machinery, Inc. (6/9/83)
7 Finderne Ave., P.O. Box 816
Somerville, New Jersey 08876

393 Stork Food Machinery, Inc. (6/9/83)
7 Finderne Ave., P.O. Box 816
Somerville, New Jersey 08876

394 Stork Food Machinery, Inc. (6/9/83)
7 Finderne Ave., P.O. Box 816
Somerville, New Jersey 08876

395 Stork Food Machinery, Inc. (6/9/83)
7 Finderne Ave., P.O. Box 816
Somerville, New Jersey 08876

13-06 Farm Milk Cooling and Holding Tanks

49R Alfa-Laval, Ltd. (12/5/56)
113 Park St., South
Peterborough, Ontario, Canada K9J 3R8

240 Babson Bros. Company (9/6/72)
2100 So. York Rd.
Oak Brook, Illinois 60521

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

336 Merle D. Haberer (2/3/81)
P.O. Box 220
Bowdle, South Dakota 57428

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

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

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

16-04 Evaporators and Vacuum Pans for Milk and Milk Products

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

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

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

356 Damrow Co. (3/10/82)
(Div. of DEC Int'l. Inc.)
196 Western Ave., P.O. Box 750
Fond du Lac, Wisconsin 54935-0750

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

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

299 Stork Food Machinery, Inc. (11/17/77)
7 Finderne Ave., P.O. Box 816
Somerville, New Jersey 08876

427 Tri-Canada, Inc. (8/31/84)
6500 Northwest Drive
Mississauga, Ontario, Canada L4V 1K4

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

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

311 Wiegand Evaporators, Inc. (8/28/78)
8940 Rt. 108
Columbia, Maryland 21045

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

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

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

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

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

324 Conoffast (11/29/79)
711 Jorie Blvd.
Oak Brook, Illinois 60521

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

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

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

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

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

351 Tetra Pak (1/7/82)
4885 Alpha Rd.
Suite 100
Dallas, Texas 75234

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

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

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

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

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

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

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

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

412 Sani Mark, Inc. (11/28/83)
5767 Dividend Road
Indianapolis, IN 46241

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

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

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

262 Alfa-Lava, Ltd. (11/11/74)
113 Park St., South
Peterborough, Ontario, Canada K9J 3R8

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

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

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

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

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

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

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

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

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

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

302 Eskimo Pie Corp. (1/26/78)
530 E. Main St.
Richmond, Virginia 23219

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

222 Maryland Cup Corp. (11/15/71)
Owings Mills, Maryland 21117

24-01 Non-coil Type Batch Pasteurizers

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

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

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

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

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

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

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

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

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

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

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

26-02 Sifters for Dry Milk and Dry Milk Products

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

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

363 Kason Corp. (7/28/82)
231 Johnson Ave.
Newark, New Jersey 07108

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

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

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

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

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

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

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

313 St. Regis Paper Co. (10/10/78)
Pkg. Mach. Group
1881 W. North Temple
Salt Lake City, Utah 84116

347 Systems (10/28/81)
1731-33 Carmen Dr.
Elk Grove Village, IL 60007

28-00 Flow Meters for Milk and Liquid Milk Products

272 Accurate Metering Systems (4/2/76)
1731-33 Carmen Dr.
Elk Grove Village, Illinois 60007

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

223 C-E Invalco (11/15/71)
Combustion Engineering, Inc.
P.O. Box 556
Tulsa, Oklahoma 74101

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

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

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

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

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

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

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

431 Pasilac, Inc. (10/11/84)
660 Taft St., N.E.
Minneapolis, MN 55413

270 Taylor Instrument Co. (2/9/76)
Div. of Combustion Eng.
95 Ames St.
Rochester, New York 14601

386 Turbo Instruments (5/11/83)
2133 Fourth St.
Berkeley, California 94710

29-00 Air Eliminators for Milk and Fluid Milk Products

340 Accurate Metering Systems, Inc. (6/2/81)
1731-33 Carmen Dr.
Elk Grove Village, Illinois 60007

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

30-01 Farm Milk Storage Tanks

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

31-01 Scraped Surface Heat Exchangers, as Amended

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

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

323 Anco-Votator Div. (7/26/79)
Cherry-Burrell Corp.
P.O. Box 35600
Louisville, KY 40232

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

361 Damrow Co. (7/12/82)
(A Div. of DEC Int'l., Inc.)
196 Western Ave., P.O. Box 750
Fond du Lac, Wisconsin 54935-0750

32-00 Uninsulated Tanks for Milk and Milk Products

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

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

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

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

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

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

33-00 Polished Metal Tubing for Dairy Products

310 Allegheny Bradford Corp. (7/19/78)
P.O. Box 264
Bradford, Pennsylvania 16701

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

289 Ladish Co., Tri-Clover Div. (1/21/77)
9201 Wilmot Rd.
Kenosha, Wisconsin 53141

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

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

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

345 Trent Tube Div., Crucible, Inc. (9/16/81)
2188 Church St.
East Troy, Wisconsin 53120

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

35-00 Continuous Blenders

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

415 Luwa Corporation (1/5/84)
4404 Chesapeake Dr.
Charlotte, NC 28216

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

36-00 Colloid Mills

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

37-00 Presure and Level Sensing Devices

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

317 C-E Invalco (2/26/79)
Combustion Engineering, Inc.
P.O. Box 556
Tulsa, Oklahoma 74101

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

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

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

419 Pasilac, Inc. (4/2/84)
660 Taft St., NE
Minneapolis, MN 55413

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

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

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

38-00 Cottage Cheese Vats (In Press)

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

40-00 Bag Collectors for Dry Milk and Dry Milk Products

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

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Abstracts of papers in the February Journal of Food Protection

To receive the* Journal of Food Protection *in its entirety each month call 515-232-6699, ext. A.

Beef Jerky: Viability of Food-Poisoning Microorganisms on Jerky during its Manufacture and Storage, Richard A. Holley, Food Research Institute, Research Branch, Agriculture Canada, Ottawa, Ontario K1A 0C6, Canada

J. Food Prot. 48:100-106

Beef jerky was made from slices of flank steak inoculated with *Staphylococcus aureus*, vegetative cells of *Clostridium perfringens* as well as *Bacillus subtilis* and a two species-composite of *Salmonella*. Slices were placed in a domestic food dehydrator for 4 h at 52.9±0.8°C (127.2°F) followed by 4 h at 48.2±0.4°C (118.8°F). Meat slices dried rapidly, reaching an a_w of 0.86 and a shelf-stable moisture-protein ratio of ≤1.6 within the first 2.5-3 h of drying. Samples originally contained about 68% moisture, but this dropped to about 30% by 4 h and 20% by 8 h. Some growth of inoculated *S. aureus* occurred initially but total numbers of all other added microorganisms decreased rapidly from the start of drying and although significantly reduced in numbers at the end of 8 h treatment, they survived processing. *C. perfringens* cells were not detected at the end of the heated-drying regimen but were recovered later in an inoculated sample stored at 2.5°C for a month. Contaminated jerky stored at 20°C and high relative humidity (RH) for 26-28 d did not contain detectable added bacteria, whereas identical samples stored at 2.5°C and low RH contained viable *S. aureus* and *B. subtilis* as well as *C. perfringens*. Domestic preparation of jerky from beef of normal retail quality would involve little risk provided initial drying is done rapidly at temperatures equal to or greater than those used in the present study.

Beef Jerky: Fate of *Staphylococcus aureus* in Marinated and Corned Beef during Jerky Manufacture and 2.5°C Storage, Richard A. Holley, Food Research Institute, Research Branch, Agriculture Canada, Ottawa, Ontario K1A 0C6, Canada

J. Food Prot. 48:107-111

A domestic food dehydrator was used to prepare beef jerky from inside round steak and corned beef brisket slices contaminated with *Staphylococcus aureus*. The number of added staphylococci doubled within 2 h after the start of drying corned beef slices. About 3-3.5 h were required for corned beef and between 1-2.5 h for inside round slices to reach an a_w of 0.86. Only 15% of all staphylococci initially present survived 8 h of heated-drying, and this was reduced to 5% after a week of refrigerated storage of slices. The safety of beef jerky produced in the home is assured when wholesome meats used in its preparation are rapidly dried.

Protection of Milk Packaged in High Density Polyethylene Against Photodegradation by Fluorescent Light, Anthony J.Fanelli, Joan V. Burlew and Mina K. Gabriel, Allied Corporation, Corporation Research and Development, P.O. Box 1021R, Morristown, New Jerseyy 07960

J. Food Prot. 48:112-117

The effectiveness of visible and UV light screens, compounded in polyethylene dairy resin to protect vitamins in milk from photodegradation, was investigated. Three pigments and three UV absorbers were chosen for testing on the basis of their commercial availability, FDA approval for contact with food, and advertised compatibility with polyolefins. In this study, vitamin decomposition was accelerated over what would be experienced in a commercial milk container in order to expedite the testing program and exaggerate differences in effectiveness of the various light screens. Good protection of vitamin A and riboflavin was provided by 0.3 wt % FD&C yellow #5. Protection of ascorbic acid was marginal. Two of the UV absorbers, Cyasorb 531 and Tinuvin 326, afforded protection of vitamin A, but not riboflavin or ascorbic acid. Visible and UV spectra are presented for the vitamins and light screens used in this work.

Production of PR Toxin and Roquefortine by *Penicillium roqueforti* Isolates from Cabrales Blue Cheese, Margarita Medina, Pilar Gaya and M. Nuñez, Departamento de Bioquímica y Microbiología, Instituto Nacional de Investigaciones Agrarias Apartado 8111, Madrid 28040, Spain

J. Food Prot. 48:118-121

PR toxin production in yeast extract-sucrose broth by 33 *Penicillium roqueforti* isolates from Cabrales blue cheese was quantified by a disc assay technique with *Bacillus megaterium* NRRL B-1368 as the test organism. Isolates from the interior of the cheese reached an average production of 1.89 mg PR toxin/100 ml, whereas the mean level of isolates from the surface was 1.64 mg/100 ml. Roquefortine production in the same broth by these isolates was quantified by a similar technique, with *Bacillus stearothermophilus* DSM 22 as the test organism. Mean production of roquefortine was 0.18 mg/100 ml for *P. roqueforti* isolates from the interior and 0.09 mg/100 ml for isolates from the surface of the cheese. If lactose or sodium lactate replaced sucrose in the growth medium, levels of both toxins decreased considerably. The identity of PR toxin and roquefortine in crude extracts was confirmed by thin-layer chromatography.

Effect of Storage of Raw and Pasteurized Goats' Milk on Flavor Acceptability, Psychrotrophic Bacterial Count, and Content of Organic Acids, E. J. Guy, K. B. Hicks, J. F. Flanagan, T. A. Foglia and V. H. Holsinger, Eastern Regional Research Center[1], Philadelphia, Pennsylvania 19118

J. Food Prot. 48:122-129

Pasteurization of raw goats' milk either at 63°C for 30 min or 72°C for 15 s within 1 d of milking ensures a better tasting product both initially and during storage at 4.5°C for 6 weeks than if the raw milk is aged for several days at 4.5°C before being pasteurized. Pasteurized milks processed from high-count raw milks aged 1 to 2 weeks had lower acceptability ratings (on a 9-point hedonic scale), which decreased further in cold storage and were independent of bacterial increases in the log phase of growth. Pasteurized milks processed from raw milk 7 or more days old were subject to rapid increases in bacterial numbers in storage if they were trace-contaminated during pasteurization even though initial counts were <100 psychrotrophs/ml. For all raw and pasteurized milks, three peaks were consistently observed from an HPLC analysis designed to monitor some organic acids. Two of the components decreased and the third appeared and increased during storage. Disappearance of one component coincided with appearance of another. These compounds may be associated with loss of flavor quality of the milk since in some instances these changes significantly correlated with the decrease in hedonic ratings of the stored milks.

Differentiation of *Clostridium perfringens* from Related Clostridia in Iron Milk Medium, Carlos Abeyta, Jr., Anita Michalovskis and Marleen M. Wekell, U.S. Health and Human Services, Public Health Service, Food and Drug Administration, Seafood Products Research Center, Seattle, Washington 98174 and Institute for Food Science and Technology, College of Ocean and Fishery Sciences, University of Washington, Seattle, Washington 98195

J. Food Prot. 48:130-134

The stormy fermentation reaction of *Clostridium perfringens* in iron milk medium was compared to that of several *C. perfringens*-like strains. These clostridia, *C. barati, C. perenne, C. absonum,* and *C. paraperfringens* are very similar to *C. perfringens* on the basis of certain biochemical reactions and, consequently, are often difficult to distinguish from *C. perfringens*. Furthermore, these related clostridia may also be present in foods. Results of this study demonstrate that after 18 h of incubation at 45°C, only *C. perfringens* gave a positive reaction in iron milk with inocula as low as 22 cells/g. Some of the other strains began to show only gas production at 18 h. After 24 to 42 h some strains gave positive results and after 72 h all were positive. Enumeration of *C. perfringens* from food samples in iron milk medium by a 3-tube most probable number (MPN) technique gave similar results to enumeration by plate count using Shahidi-Ferguson Perfringens (SFP) agar. Furthermore, a rapid positive response occurred after only 2 and 3 h incubation of iron milk inoculated with 10^8 and 10^7 cells/ml, respectively. The high selectivity, ease of identification and rapid growth of *C. perfringens* in iron milk make the iron milk MPN procedure a valuable assay for accurate enumeration and differentiation of *C. perfringens* from related clostridia in food products.

Diluents and Enumeration of Stressed *Campylobacter jejuni*, Debra D. Abram and Norman N. Potter, Department of Food Science, Cornell University, Ithaca, New York 14853

J. Food Prot. 48:135-137

Significant discrepancies in calculated counts of *Campylobacter jejuni* strains ATCC 33250 and 29428 were observed between undiluted samples and samples diluted in 0.1% peptone water when cultures had been incubated at 42°C under microaerobic conditions in brucella broth containing 2% NaCl. The influence of 0.1% peptone water, brucella broth and phosphate buffer as diluents for enumeration of *C. jejuni* stored at 6 and -18°C in brucella broth with 0.5 and 2% NaCl was studied. The three diluents were equally effective for the recovery of *C. jejuni* from refrigerated broth containing 0.5% NaCl. However, when the organism had been refrigerated in the broth with 2% NaCl or frozen in the broth with either level of salt, dilution with brucella broth produced significantly higher counts than dilution with 0.1% peptone water or phosphate buffer.

Growth Inhibition of Microorganisms in Refrigerated Milk by added Maillard Reaction Products, Rosa C. De Lara and S.E. Gilliland, Animal Science Department, Oklahoma State University, Stillwater, Oklahoma 74078

J. Food Prot. 48:138-141

Maillard Reaction Product (MRP) prepared by heating (2 h at 121°C) a solution of 0.2 *M* glucose and 0.2 *M* histidine was added at different concentrations (0.23, 0.47 and 0.70%) to cold milk (either autoclaved reconstituted 10% nonfat milk solids inoculated with *Pseudomonas fragi* or raw milk) and stored at 5°C to evaluate its effect on growth of psychrotrophic microorganisms during refrigerated storage. Growth of microorganisms decreased as the percentage MRP increased. *P. fragi* in autoclaved nonfat milk was inhibited more than was the natural flora in raw milk. An apparent bactericidal effect was observed at higher MRP concentration in autoclaved milk; however, this was not evident for raw milk.

Effects of Rigor State, Salt Level and Storage Time on Chemical and Sensory Traits of Frozen and Freeze-Dried Ground Beef, J. C. Kuo and H. W. Ockerman, Department of Animal Science, The Ohio State University, Columbus, Ohio 43210 and Ohio Agricultural Research and Development Center, Wooster, Ohio 44691

J. Food Prot. 48:142-146

Both pre- and post-rigor beef *semimembranosus* muscles were ground with salt (0, 2 and 4%) and then subdivided into two treatment groups (freezing and freeze drying) and evaluated during storage of 0, 5, 10 and 15 wk for chemical and sensory traits. Rehydration ratios of pre-rigor freeze-dried beef (salted or unsalted) were not significantly changed during a 15-wk storage period at 25°C. With the addition of 2 and 4% salt, pre-rigor freeze-dried beef was less susceptible ($P<0.05$) to lipid oxidation (lower TBA values) than post-rigor, freeze-dried beef. Pre-rigor, freeze-dried beef was superior to post-rigor, freeze-dried meat in all sensory traits studied. Differences in TBA

values were not significant between pre-rigor and post-rigor, frozen beef treatments at any salt level (0, 2 and 4%). Pre-rigor, frozen beef samples were superior ($P<0.05$) to conventional post-rigor, frozen meat in panel tenderness and acceptability scores. The TBA values of pre- and post-rigor beef (frozen or freeze dried), in general, increased with increased salt level (0, 2 and 4%). Freeze-dried beef samples (pre- or post-rigor) were less ($P<0.05$) tender, cohesive, acceptable and more rancid and/or off-flavor than frozen meat (pre- or post-rigor).

Identification of *Enterobacteriaceae* in Foods with the AutoMicrobic System, J. S. Bailey, N. A. Cox, J. E. Thomson and D. Y. C. Fung, United States Department of Agriculture, Agricultural Research Service, Richard B. Russell Agricultural Research Center, P.O. Box 5677, Athens, Georgia 30613 and Kansas State University, Department of Animal Science and Industry, Manhattan, Kansas 66506

J. Food Prot. 48:147-149

Stock cultures (136) and fresh isolates (163) of *Enterobacteriaceae* from ground beef, processed chickens, frozen pot pies and commercial poultry feeds were identified to species with the AutoMicrobic System (AMS). All stock cultures and fresh isolates were also concurrently tested with two other identification systems (Micro-ID and API), previously evaluated and proven accurate for identification of *Enterobacteriaceae*. The AMS correctly identified to species 135/136 (99.3%) of the stock cultures and 160/163 (98.2%) of the fresh isolates. All *Salmonella* cultures tested (74) were correctly identified by AMS.

Sodium Chloride and Pathogenic Bacteria in a Vacuum-Packed Minced-Meat Product, H.-J. S. Nielsen and P. Zeuthen, Food Technology Laboratory, The Technical University of Denmark, DK-2800 Lyngby, Denmark

J. Food Prot. 48:150-155

Development of *Bacillus cereus*, *Salmonella enteritidis*, *Salmonella typhimurium* and *Yersinia enterocolitica* in vacuum-packed Bologna-type sausage was highly influenced by sodium chloride level (brine concentrations 3.4, 4.5 and 6.0; 2.8 for salmonellae) with none of the bacteria growing at 6.0%. Growth of *Staphylococcus aureus* was unaffected even by the highest sodium chloride concentration used. Decreasing the storage temperature accentuated the inhibitory effect of sodium chloride on *Y. enterocolitica* and *B. cereus*. Initial numbers decreased slowly or remained static in sausage with a high sodium chloride content, when growth did not occur. At the low salt level, at 2-5°C, only *Y. enterocolitica* was not inhibited until the sodium chloride content was 4.5% and the storage temperature 2°C. At increased, but not unusual temperature, *B. cereus* could develop at 4.5% (12°C) and *S. aureus* at all salt levels (8-15°C).

Production of Mycotoxins by Sorbate-Resistant Molds, Michael B. Liewen and Elmer H. Marth, Department of Food Science and The Food Research Institute, University of Wisconsin-Madison, Madison, Wisconsin 53706

J. Food Prot. 48:156-157

Nine strains of sorbate-resistant molds were grown in YES broth for 10 d at 21°C in the presence and absence of 3000 ppm sorbate. Following the incubation period, the cultures were extracted with chloroform and the extracts were tested for the presence of mycotoxins. Two of the extracts contained ochratoxin A and another extract contained an unidentified substance similar to cyclopiazoic acid. None of the strains produced mycotoxins in the presence of 3000 ppm sorbate.

Sterol Oxidation Products in French Fries and in Stored Potato Chips, Ken Lee, Anne M. Herian and Nancy A. Higley, Department of Food Science, 1605 Linden Drive, University of Wisconsin-Madison, Madison, Wisconsin 53706

J. Food Prot. 48:158-161

Potato chips and french fries were analyzed by high performance liquid chromatography and thin layer chromatography for cholesterol and β-sitosterol oxidation products. Chips stored for 150 d at 23°C in unopened foil bags contained no detectable sitosterol oxidation products, but those held at 40°C contained 7α-hydroxysitosterol, 7β-hydroxysitosterol, and sitosterol β-epoxide only after an extended storage of 95 d. French fries as purchased contained sterol α- and β-epoxides, and 7α- and 7β-hydroxysterols. These sterol oxidation products were present in repeat samples from five different fast food restaurants. Ingestion of sterol oxides from potato chips is unlikely, whereas ingestion of sterol oxides from french fries is possible.

Effects of Potassium Sorbate on Growth and Ochratoxin Production by *Aspergillus ochraceus* and *Penicillium* Species, Lloyd B. Bullerman, Department of Food Science and Technology, University of Nebraska, Lincoln, Nebraska 68583

J. Food Prot. 48:162-165

Effects of potassium sorbate on growth and ochratoxin production by *Aspergillus ochraceus* NRRL 3174 and *Penicillium* sp. isolated from cheese were studied. Potassium sorbate at 0.05, 0.10 and 0.15% delayed or prevented spore germination and initiation of growth, and decreased the rate of growth of

both organisms in yeast-extract sucrose (YES) broth at 12°C. However, at 25°C germination and growth of *A. ochraceus* was more rapid. Increasing concentrations of sorbate caused more variation in the amount of total mycelial growth of *Penicillium* sp. and generally resulted in a decrease in total mycelial mass. Potassium sorbate also greatly reduced or prevented production of ochratoxin by *Penicillium* sp. for up to 70 d at 12°C. At 0.05 and 0.10% sorbate, ochratoxin production was greatly reduced over the control, and was eliminated at 0.15%. Overall, ochratoxin production by *Penicillium* sp. in the presence of sorbate was very low or eliminated. On the other hand, *A. ochraceus* responded somewhat differently to sorbate. At 12°C, *A. ochraceus* was similarly inhibited by all three levels of sorbate, and did not produce ochratoxin. When incubated at 25°C, *A. ochraceus* grew quite readily and appeared to produce greater amounts of ochratoxin in the presence of sorbate, especially at the 0.05% level. Considerably higher levels of ochratoxin were produced at 0.05% sorbate than the control, and somewhat higher levels were obtained at 0.10 and 0.15% sorbate.

Presence of Histamine in the Bluefish, *Pomatomus saltatrix*, John J. Karolus, Donald H. Leblanc, A. J. Marsh, Roger Mshar and Tom A. Furgalack, Connecticut State Department of Health Services, Laboratory and Environmental Health Services Division, 150 Washington Street, Hartford, Connecticut 06106

J. Food Prot. 48:166-168

Consumption of bluefish (*Pomatomus saltatrix*) has been epidemiologically implicated and confirmed by laboratory analyses as a cause of scombroid food poisoning. An examination of marketable bluefish filets in the State of Connecticut found over 6.5% of the filets had histamine levels indicative of decomposition. No direct correlation of the presence of histidine decarboxylating bacteria and levels of histamine was found. The bluefish should be recognized as a food capable of causing scombroid poisoning.

Economic Loss from Foodborne Disease Outbreaks Associated with Foodservice Establishments, Ewen C. D. Todd, Bureau of Microbial Hazards, Health Protection Branch, Health and Welfare Canada, Sir Frederick G. Banting Research Centre, Tunney's Pasture, Ottawa, Ontario, Canada K1A 0L2

J. Food Prot. 48:169-180

The economic losses associated with 17 incidents of foodborne disease, mainly from Canada and the United States, were compared and evaluated. The incidents arose because of mishandling in restaurants, hotels, catering establishments, hospitals, homes for the aged and a college. Costs ranged from $16,690 to over $1 million, with the median of the average costs per case for the 17 incidents of $788. The economic impact of foodborne illness was generally greater for restaurants, hotels and institutions than for catering establishments. Loss of business and law suits were the major factors in the costs, but loss of income for victims and infected food handlers was also considerable.

Incidence of Foodborne Disease in the Netherlands: Annual Summary - 1980, H. J. Beckers, Laboratory for Water and Food Microbiology, National Institute of Public Health and Environmental Hygiene, P.O. Box 1, 3720 BA Bilthoven, The Netherlands

J. Food Prot. 48:181-187

Data on the incidence of foodborne disease in 1980 are presented. A total of 272 incidents affecting 1298 ill persons were analysed. In 64 incidents (337 cases), the etiology was established; micro-organisms appeared to be the main causative agents. *Salmonella* was responsible for 15 of these incidents (55 cases), *Staphylococcus aureus* for 6 (106), *Clostridium perfringens* for 8 (57), *Bacillus cereus* for 17 (88) and *Campylobacter jejuni* for 4 (9). Three episodes (4 cases) were caused by *Yersinia enterocolitica, Escherichia coli* and *Vibrio* sp. In 11 episodes (18 cases) illness resulted from ingestion of food contaminated with chemical substances. Cases of foodborne disease recorded by the Chief Medical Inspectorate included infections from *Salmonella* (6347) *C. jejuni* (531) and *Y. enterocolitica* (264). However, these could not be analysed further due to a lack of epidemiological information. About 60% of the outbreaks were associated with only two food items: meat and meat products (15%) and Chinese foods (44%). Mishandling of food in foodservice establishments resulted in about two-thirds of the incidents. It is supposed that there is an "over-reporting" of incidents involving Chinese foods from take-away restaurants, compared to episodes involving other foods from other locations, especially from private households. The role of viruses in outbreaks of foodborne gastroenteritis with an incubation period of more than 24 h is discussed.

Calendar

1985

March, ANNUAL MEETING OF THE MICHIGAN ENVIRONMENTAL HEALTH ASSOCIATION, to be held at the Lansing Hilton - Playboy Club, Lansing, MI. For more information contact: J. Douglas Park, 3500 N. Logan, Lansing, MI 48909. 517-373-2936.

March 4-6, PRINCIPLES OF SENSORY EVALUATION WORKSHOP, to be held in Palo Alto, CA. For more information contact: Tragon Corporation, 365 Convention Way, Redwood City, CA 94063. 415-365-1833.

March 5-6, VIRGINIA ASSOCIATION OF SANITARIANS & DAIRY FIELDMEN DAIRY INDUSTRY WORKSHOP, to be held at Donaldson-Brown Continuing Education Center, VA Polytechnic Center & State University, Blacksburg, VA. For more information contact: W. J. Farley, Rt. 1, Box 247, Staunton, VA 24401. 703-434-3897.

March 6-7, SECOND ANNUAL CHEESE RESEARCH AND TECHNOLOGY CONFERENCE, to be held at the Sheraton Inn and Conference Center, Madison, WI. For more information contact: Norman F. Olson, Walter V. Price Cheese Research Institute, Department of Food Science, University of Wisconsin-Madison, Madison, WI 53706. 608-263-2001.

March 11-12, NEW YORK STATE CHEESE MANUFACTURERS' ASSOCIATION ANNUAL MEETING, to be held at the Syracuse Marriott Inn, East Syracuse, NY. For more information contact: D. K. Bandler, 11 Stocking Hall, Cornell University, Ithaca, NY 14853. 607-256-3027.

March 11-12, PRINCIPLES OF SANITATION FOR WAREHOUSEMEN, to be held in Manhattan, KS. For more information contact: Shirley Grunder, American Institute of Baking, 1213 Bakers Way, Manhattan, KS 66502. 913-537-4750.

March 13-15, FOOD IRRADIATION UPDATE, to be held at the UC Davis Faculty Club, Old Davis Road, UC Davis, CA. For more information, or to enroll, contact: Jim Lapsley at 916-752-6021.

March 17-20, AMERICAN CULTURED DAIRY PRODUCTS INSTITUTE ANNUAL MEETING AND CONFERENCE/KULTURES AND KURDS KLINIC/NATIONAL CULTURED PRODUCT EVALUATION SESSIONS, to be held at the Opryland Hotel, Nashville, TN. For more information contact: C. Bronson Lane, ACDPI, P.O. Box 7813, Orlando, FL 32854.

March 20, INDIANA DAIRY INDUSTRY CONFERENCE, to be held at Stewart Center, Purdue University, West Lafayette, IN. For more information contact: James V. Chambers, Food Science Department, Smith Hall, Purdue University, West Lafayette, IN 47907. 317-494-8279.

March 25-27, PRINCIPLES OF QUALITY ASSURANCE, to be held in Manhattan, KS. For more information contact: Shirley Grunder, American Institute of Baking, 1213 Bakers Way, Manhattan, KS 66502. 913-537-4750.

March 25-29, MID-WEST WORKSHOP IN MILK AND FOOD SANITATION, The Ohio State University. For more information contact: John Lindamood, Department of Food Science and Nutrition, 2121 Fyffe Road, The Ohio State University, Columbus, OH 43210-1009.

March 26-27, WESTERN FOOD INDUSTRY CONFERENCE, to be held at Freeborn Hall, University of California, Davis, CA. For more information contact: Shirley Rexroat, 916-752-2191, or Bob Pearl, 916-752-0980.

April 2-4, FREEZING TECHNOLOGY COURSE FOR THE FROZEN FOOD INDUSTRY, to be held at the University of California, Davis. For more information contact: Robert C. Pearl, Food Science & Technology Dept., University of California, Davis, CA 95616. 916-752-0980.

April 3-4, SYMPOSIUM ON "TECHNOLOGICAL DEVELOPMENTS FOR TODAY AND TOMORROW," to be held at the Giant's Stadium Club, East Rutherford, NJ. For more information contact: Ms. Connie Sibona, 201-361-0900.

April 14-17, 66TH DFISA ANNUAL CONFERENCE, Marriott's Marco Beach Resort, Marco Island, FL. For more information contact: Bruce L. D'Agostino, Director, Public Relations, Dairy and Food Industries Supply Assoc., Inc., 6245 Executive Boulevard, Rockville, MD 20852-3938. 301-984-1444, Telex: 908706.

April 14-18, INTERNATIONAL FOOD FAIR OF SCANDINAVIA - TEMA 85, the 8th international fair for food and beverages, held together with the 5th international hotel, restaurant and catering fair. For more information contact: Leslie Christensen, General Manager, Bella Center A/S, Center Boulevard, DK-2300 Kobenhavn, Denmark.

April 15-16, ADVANCED PEST CONTROL, to be held in Manhattan, KS. For more information contact: Shirley Grunder, American Institute of Baking, 1213 Bakers Way, Manhattan, KS 66502. 913-537-4750.

April 15-19, STATISTICAL QUALITY CONTROL SHORT COURSES - STATISTICAL METHODS APPLIED TO PRODUCTIVITY IMPROVEMENT AND QUALITY CONTROL - FOR THE FOOD PROCESSING INDUSTRY, to be held at the University of California, Davis. For more information contact: Robert C. Pearl, Food Science & Technology Dept., University of California, Davis, CA 95616. 916-752-0980.

April 17-19, MEETING OF THE FLORIDA ASSOCIATION OF MILK, FOOD & ENVIRONMENTAL SANITARIANS, to be held at the Quality Inn - Cypress Gardens, FL. For more information contact: Dr. Franklin W. Barber, 1584 Cumberland Ct., Ft. Myers, FL 33907. 813-936-4769.

May 6-7, MOLD MONITORING AND CONTROLS SPECIAL COURSE, to be held in Manhattan, KS. For more information contact: Shirley Grunder, American Institute of Baking, 1213 Bakers Way, Manhattan, KS 66502. 913-537-4750.

May 8-10, SOUTH DAKOTA ENVIRONMENTAL HEALTH ASSOCIATION meeting. To be held in Spearfish, SD. For more information contact: Cathy Meyer, President S.D.E.H.A., PO Box 903, Mitchell, SD 57301. 605-996-6452.

May 13-16, ASEPTIC PROCESSING AND PACKAGING WORKSHOP, to be held at Purdue University, West Lafayette, IN. For more information contact: James V. Chambers, Food Science Department, Smith Hall, Purdue University, West Lafayette, IN 47907. 317-494-8279.

May 14-16, CONFERENCE ON INFANT FORMULA, to be held at the Sheraton Beach Inn & Conference Center, Virginia Beach, VA. For more information contact: Dr. James T. Tanner, Food & Drug Administration, HFF-266, 200 C Street S.W., Washington, DC 20204. 202-472-5364.

May 20-23, FOODANZA '85, joint convention of the Australian and New Zealand Institutes of Food Science and Technology. To be held at the University of Canterbury, Christchurch, New Zealand. For more information contact: D. R. Hayes, Convention Secretary, 394-410 Blenheim Road, PO Box 6010, Christchurch, New Zealand.

May 21-23, INTERNATIONAL DAIRY FEDERATION SEMINAR, Progress in the Control of Bovine Mastitis, to be held at Bundesanstalt fur Milchforschung, D-2300 Kiel, FRG. For more information contact: Prof. Dr. W. Heeschen, Bundesanstalt fur Milchforschung, Institut fur Hygiene, Hermann-Weigmann-Strabe 1, P.O. Box 1649, D-2300 Kiel / FRG. Telephone: (0431) 609-392 or 609-1. Telex: 292966.

May 21-23, DESCRIPTIVE ANALYSIS WORKSHOP, to be held in London, England. For more information contact: Tragon Corporation, 365 Convention Way, Redwood City, CA 94063. 415-365-1833.

May 24, DFISA INTERNATIONAL TRADE SEMINAR, to be held at the Key Bridge Marriott, Washington, D.C. For more information contact: Bruce L. D'Agostino, Director, Public Relations, Dairy and Food Industries Supply Assoc., Inc., 6245 Executive Boulevard, Rockville, MD 20852-3938. 301-984-1444, Telex: 908706.

June 3-5, NATIONAL COUNCIL FOR INTERNATIONAL HEALTH 1985 ANNUAL INTERNATIONAL HEALTH CONFERENCE, to be held in Washington, D.C. For more information contact: Dr. Curtiss Swezy, Program Manager, National Council for International Health, 2100 Pennsylvania Avenue, N.W., Suite 740, Washington, D.C. 20037.

June 17-20, BASIC FOOD PLANT MICROBIOLOGY, to be held in Manhattan, KS. For more information contact: Shirley Grunder, American Institute of Baking, 1213 Bakers Way, Manhattan, KS 66502. 913-537-4750.

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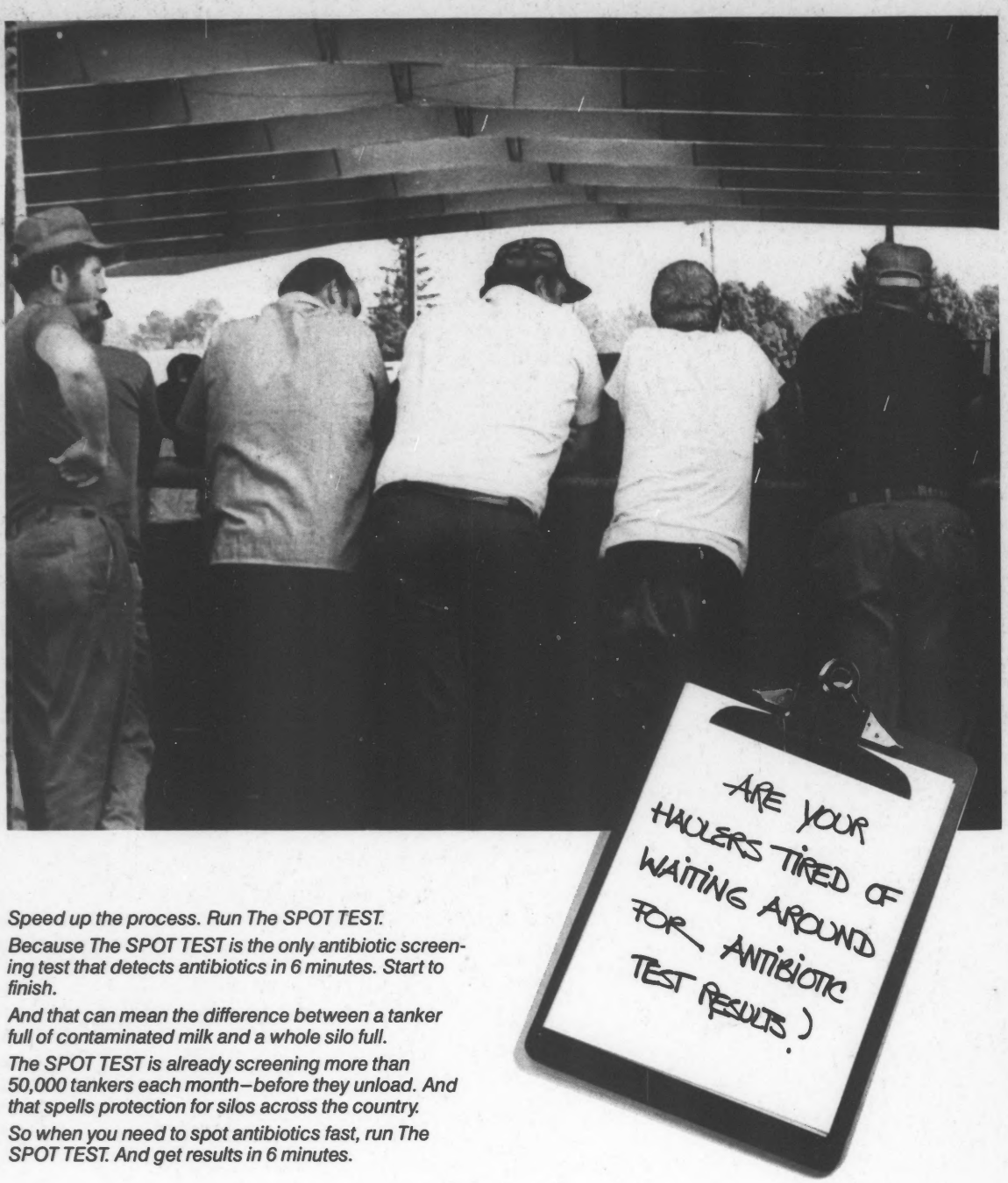

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