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Human Relations in the Inspection Process

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Sanitarians are highly-skilled people, who exert major influences on the health of the public and on the businesses that they inspect. Because sanitarians are often present in establishments for relatively brief periods of time compared with the managers of the establishments, the establishment managers will always have the greatest potential to affect the health and safety of the public. Sanitarians, therefore, may exert their greatest favorable influence on the community when they employ good human relations skills to create a climate in which the establishment manager is a co-participant in the protection of public health. While human relations skills are critical to the inspection process, there is a relative scarcity of information on this subject. This paper provides some specific guidelines for sanitarians involved in inspections. Consideration is given to humanism, tact, appropriate dress, and an understanding of the complex human behaviors which impact on the inspection process.

Sanitarians are highly-skilled people who hold powerful positions. As official inspectors of restaurants, dairies, food processing plants, nursing homes, and many other diverse institutions subject to health inspections, they exert major influences on the health of the public and on the businesses that they inspect. Most sanitarians appreciate the fact that human relations are essential skills in the inspection process, and know that policing an establishment and checking off violations will not likely improve the sanitary environment within that establishment. In fact, it is the interaction between people, or human relations, that is the key to the inspection process.

Since sanitarians are often present in establishments for only brief periods of time compared with the managers of those establishments, the establishment managers will always have the greatest potential to affect the health of the public. Therefore, in order to exert the greatest favorable influences on the community, the sanitarian should endeavor to create a climate in which the establishment manager is a co-participant in the protection of public health and safety. K. G. Weckel summed up this philosophy when he wrote: "teaching is successful with the majority; policing is necessary for the few...we must communicate and educate rather than police."

Good human relations skills are key to the destruction of barriers to communication and education; however, these skills sometimes tend to be neglected by sanitarians. Sanitarians, who may on one hand strive to be highly-proficient in technological skills, may also feel that a similar proficiency in human relations skills is somehow less important. At best, the subject of human relations is often viewed as only a kind of "quasi" skill, which is believed to be either intuitive or is capable of being learned entirely through experience. A lack of information on the specific subject of human relations skills for sanitarians compounds the problem. Much has been written about how to get along successfully with people in general, and how to deal with the public, but sanitarians searching for specific ideas to help them get along more smoothly with people in businesses that they inspect usually find considerably less advice of direct practical value.

The subject of this paper was introduced to St. Louis County, Missouri sanitarians through an in-service training class which was designed to take up about ninety minutes of discussion. However, due to the enthusiastic discussion it provoked, it became apparent to supervisors and line sanitarians alike that a more extensive review of the subject would be beneficial. This paper is a joint effort of a sanitarian and a food service establishment manager, and is an attempt to fill the gap in the field of human relations skills training for sanitarians. Of course, one cannot write a human relations paper giving

all the answers, because to a large extent the answers will depend on the given situation; however, the following suggestions are offered with the hope that sanitarians will use them as a nucleus for further study of the subject.

ESTABLISHING RAPPORT

Sanitarians can represent an unstated threat to the managers of establishments that they inspect. This is because sanitarians are often regulatory people, and the managers of various establishments subject to health inspections are usually businesspersons, and their different points of view tend to cause them to regard each other with suspicion. The reduction of this mutual suspicion is a critical first step in the inspection process, and may be achieved by the establishment of a modest rapport. Such a rapport can be initiated by simply trying to understand what the other person is trying to accomplish. As the noted psychologist, Dr. Harry Stack Sullivan, observed: "dealing with . . . any group . . . the first step is to see the world through their eyes, to enter into what they are trying to do . . . genuine communication is impossible on any other basis."

Try to put yourself into the establishment manager's situation. Although your point of view may differ somewhat from his or hers, you can achieve the common ground of rapport by convincing the establishment manager that you respect the general objectives of businesses. For example, communicate your appreciation for the facts that businesses continue to exist only when they are profitable, and that good sanitation and business profits are consistent objectives. Promote the idea that your advice could save the business money by reducing product spoilage and energy costs and could increase client acceptance of the establishment. By projecting an attitude of understanding and helpfulness to the establishment manager, he or she will be more likely to attempt to understand your objectives and to be more helpful to you in attaining them.

Once you have successfully made the point that you are not an adversary, be careful to avoid ruining your burgeoning rapport by forcing the establishment manager into anything resembling a subordinate role. Be aware of the stress under which the establishment manager operates, and of the fact that your regulatory presence in his or her place of business is surely adding to that stress. Through a general fear of the inspection process and dependence on factors beyond his or her control, coupled with being under close scrutiny, a feeling of subordination may easily develop. Be aware of this and avoid any unnecessary forcefulness.

Look for something in the establishment manager's environment that you like, such as an object in the manager's office or your observation of a particularly good sanitation practice. Once identified, a simple and sincere compliment should be well received. This may in turn be reciprocated with a compliment to you. If such a reciprocal compliment occurs, you and the establishment manager will be talking to and learning about each other, and the stage will be set for a good inspection.

PROJECTING PROFESSIONALISM

Doctors often wear white coats while counseling their patients, but hygiene may be only a secondary reason. Perhaps the main advantage in wearing a white coat is in the fact that it increases the confidence of patients in their doctors. The white coat is psychologically important because it helps the doctor project an aura of authority. Similarly, you may be an extremely competent and skilled sanitarian, but that look must be projected in order for you to be taken seriously.

While one's good grooming should obviously include such items as well-polished shoes, pressed clothing, combed hair, etc., a somewhat formal, professional look should also be considered necesssary in the inspection process. Unless some extraordinary situation merits less formal attire, it is always correct to wear a coat and tie if you are a man, or a business suit if you are a woman. In virtually all urban situations, this businesslike attire should be considered appropriate and mandatory for the sanitarian in the inspection process. Do not rely on a clipboard to make yourself look official. This also applies if the manager of an establishment is in the habit of dressing casually. You are the official, and the establishment manager will expect you to project that professional look of authority, so do not be a disappointment. By looking the part, the manager will be more confident in you and will listen more closely to your advice.

COMMUNICATING EFFECTIVELY

Human communications are extremely complex and are, therefore, not always well understood. One result of this lack of understanding is that people frequently send the wrong messages to other people. Our so-called "simple" speech is really an intricate process, composed of many verbal and non-verbal components, all of which must properly combine in order for us to communicate effectively. Human communications underlie every facet of the inspection process, and sanitarians can benefit from a closer look at the subject.

That often-heard expression "it's not what he said, but how he said it," refers to the fact that there is an emotional overlay to our words. This overlay, known as "metacommunication," is as important as our actual words in determining how our messages are understood. In fact, inappropriate metacommunication may result in our understood messages being quite the opposite of our meaning.

Voice volume is one form of verbal metacommunication. In many animal species, including our own, by raising the voice to a high volume, organisms display their dominance to others. In our species, such a display is an obviously boorish gesture, but the real damage of raising the voice during an inspection is that it tends to force the establishment manager into a defensive posture. In a defensive posture, the manager may be cooperative, but you can be sure that the cooperation will be minimal at best, and will probably be accompanied by resentment. Sanitarians should avoid all aggressive behavior, as this will be counterproductive to the goal of inducing a participatory attitude in the establishment manager.

Body language or "kinesics" is the non-verbal aspect of metacommunication. Because kinesic cues are more subtle than verbal ones, they tend to be even less well understood. Consequently, inappropriate kinesics have the potential for causing great damage. Some non-verbal signals are particular to certain cultures, while others are common to all. One anthropological theory holds that the more common non-verbal signals are actually remnants of a time in human evolution which preceded spoken language. In any event, through the use of these non-verbal signals, people continually, and often unconsciously, send signals to others while they speak. Since inappropriate body language may also cause the inadvertent display of aggression, it can greatly inhibit positive communication, and the sanitarian should strive to understand and control these behaviors.

Certain non-verbal gestures have generally well-known meanings, while others do not. For example, most people know that when someone folds his arms over his chest, that person is probably not very receptive to the speaker. Another concept, the "personal bubble," is far less understood, but is critical in the close quarters that exist during the inspection process. The term "personal bubble" refers to an invisible space around each person which that person carries with him and which is held to be inviolate. The space can vary in size between different individuals and with certain environmental factors, but regardless of size, it always represents the "territory" of that individual. You have observed this "personal bubble" effect if you have ever felt uncomfortable when someone you knew only casually insisted on standing extremely close to you. Care should be taken to avoid invading any person's bubble, for this is a territorial invasion, which will tend to cause anxiety.

While there is no need to become so analytical that you become self-conscious, when you talk with an establishment manager, simply be aware of where you are standing and observe the manager's reaction to your position in his space. Then, if you notice the manager becoming uncomfortable, try moving back a bit and see what happens. Above all, do not touch people! With the

exception of a firm handshake, which is an accepted, formal greeting, touching people is a definite "no no," as it is the most extreme violation of the personal bubble principle. Remember, any invasion of territory could trigger a defensive reaction, and if a person adopts a defensive posture, that person will not be receptive to your ideas.

EDUCATING

Assume that most establishment managers will be interested in sanitation to some degree. As with successful businesspeople everywhere, successful establishment managers have become that way because of their interest in their profession, and if you can add to some facet of their interest, that information will be welcome. Of course, an establishment manager whose education is in the sciences may have the greatest appreciation for your craft, but do not be afraid to talk about technical subjects. A good educator is one who can discuss the most technical subjects in a manner which renders them fit for "human consumption." Additionally, in many jurisdictions food service establishment managers study Applied Food Service Sanitation, which gives them a very good basis for an exchange of ideas with the sanitarian.

Sanitarians must know the logic behind each sanitary requirement, but this should be considered only minimum required knowledge. The professional sanitarian considers continuing education to be mandatory. Reading professional journals, and attending professional meetings and presentations, will provide the sanitarian with a broad data base from which to draw upon and share with the establishment manager at some appropriate moment during the inspection.

For example, one suitable subject for discussion which is on the cutting edge of food protection is a concept known as "Hazard Analysis Critical Control Point Approach." The establishment manager may or may not wish to explore the subject further, but will probably appreciate an introduction to a subject which is likely to one day impact on his or her business, and will be gratified that you respect his or her intelligence enough to discuss the subject.

Sharing your knowledge of new procedures with establishment managers has another advantage. In doing so you will demonstrate that you are a member of a dynamic profession, whose goals are not unlike those of businesspersons and one which welcomes innovation and progress. For example, Dr. Frank Bryan, a professional sanitarian and distinguished microbiologist, has observed that: "(new) inspectional procedures . . . may conflict with a desire to achieve uniformity, but new ideas and

approaches are essential and must be continually introduced and evaluated so that progress can occur and so that program stagnation will not occur."

The sanitarian can pique interest in learning by referring to a number of excellent articles which explode myths or otherwise question long standing concepts in sanitation. For example, there is an article that points out the fact that money is really a lot cleaner than most people realize, and for a number of reasons is not a very good medium for bacterial growth. Other interesting studies dispel the inaccurate notion that mayonnaise is a potent and frequent cause of foodborne illness and show that it can actually inhibit bacterial growth. A provocative subject for discussion might be the relative importance of insects as vectors of foodborne illness. Curiously, although those common household pests do in fact carry a great variety of pathogenic bacteria, insects are not high on the list of factors which have actually caused reported foodborne disease. Is it really good hygiene to wash with that bar of soap on the establishment's sink? If not, what is the alternative?

By sharing information with the establishment manager, you will provide interesting discussion which will tend to reinforce the idea that you consider the manager to be a co-participant in the common objective of protecting the health of the public. By all means be sure to listen also, as the process of learning is a two way street, and you will please the establishment manager by allowing him to share information with you.

BEING FAIR AND THOROUGH

With the exception of establishments which have recently opened, the authors have observed very few which merit a score of one hundred percent. Many sanitarians, however, feel that they have some sort of obligation to bestow these perfect scores on decidedly imperfect establishments. Of course, sometimes this is done because perfunctory inspections are just easier to perform. But in other cases, high scores may be given in the mistaken belief that in doing so the sanitarian will become better liked by the manager, which will lead to greater cooperation and ultimately improved public health. In truth, the sanitarian may have the feeling of being liked and respected, but the cordiality will probably be only superficial and the respect for the sanitarian as a professional person will simply not be there. Professional people earn respect through integrity, fairness and dedication to their craft. By conducting thorough and fair inspections of establishments, concentrating on the critical items, while working with management to correct those of less significance, your efforts will seem valid, and better cooperation will result.

Be certain to be as thorough yourself as you are with the managers in the establishments that you inspect. A frequent and general criticism of governmental employees is that they require higher standards for others than they do for themselves. For example, if you require an establishment manager to possess and utilize certain equipment, such as a stemmed thermometer in the case of a food service establishment manager, you will demonstrate arrogance if you refuse to use one yourself. The authors have known sanitarians who claimed they did not need a thermometer to test the temperatures of foods, dishwater temperatures, etc., presumably because their hands were calibrated to detect a thermal differential of plus or minus two degrees. Avoid any such inferences of your superiority, as they will be perceived as unnecessary demonstrations of power, and will form a barrier to a good relationship with the establishment manager.

Aside from the general obligation of all workers to do a good job, and the sanitarian's ethical responsibility to protect the public health, there is also a human relations aspect involved in the inspection process worth considering. Managers of establishments subject to health inspections are also taxpayers, and have an additional right to expect a thorough inspection from the sanitarian. Most sanitarians are government employees, thus are in a real sense the employees of the citizens who pay taxes and public fees. Accordingly, in most jurisdictions where establishments pay fees for their licenses, the managers of those establishments have a psychological expectation for you to perform well for their expenditure. The manager may never tell you so, but a perfunctory inspection will cause bad feelings.

FLEXIBILITY

Keep a proper perspective in the inspection process. By doing so you will have the flexibility to practice the "spirit" rather than the "letter" of the sanitary laws. In a restaurant situation, for example, where the protection of the public health is achieved primarily through the control of contamination and the prevention of time-temperature abuse of foods, if a sanitarian continually emphasizes items such as "floors, walls and ceilings," which are relatively insignificant in terms of public health protection, that sanitarian may eventually acquire the reputation of being a "nit picker." Of course, you have the power to enforce correction of minor violations, but you will be far more effective in promoting the public health if you can distinguish between what is important and what is not. Be able to distinguish between codes, rules and common sense.

DIPLOMACY

Hopefully, if the sanitarian follows the preceding points, there will be no occasion for argument. Unfortunately, everybody has an occasional bad day. For example, through a chain of events which is no fault of his own, the sanitarian may walk into an establishment and

be the proverbial "last straw of the day." For this reason, it is helpful to begin "reading" the manager as soon as you arrive at an establishment. This "reading" of the establishment manager can be facilitated by simply asking questions and listening closely to the answers. For example, when you arrive in an establishment, simply ask the question "how are things going today?" The manager's answer should give you a clue about how to proceed with the discussion of any violations which may be later observed. More pragmatically, the simple social amenities cost nothing, and they may pay off with big dividends in terms of your enhanced communication with the establishment manager.

Demonstrate that you really want to lighten the load of the manager by being friendly and helpful, and this will probably be responded to with good cooperation. However, if a manager insists on arguing with you, be patient and remember that you are a professional person who is expected to be in control at all times. Also, by not contributing to an argument, you will be decreasing enmity and the argumentative person will usually dissipate his anger in time. Be being calm and allowing him or her to run out of breath, you will eventually have a more rational person to talk with. Never involve your ego. Remember that your objective is to protect the public health from disease and hazards, and not to win insignificant arguments. An old saying goes that "if you argue with an idiot, he is doing the same thing."

When a climate finally exists when your ideas can be discussed rationally with each other, remember that you are likely to have a greater effect on attitudes if you can point out how the establishment manager can be personally and positively affected by the proposed change. For example, if you must require that a back door be rodent-proofed, try to actually "sell" the idea to the manager by pointing out that the eventual energy savings realized by a close-fitting door will probably more than pay for the necessary corrections.

If serious violations are observed, be sure to discuss them in a non-aggressive manner. Even the most serious and costly violations can be and should be discussed tactfully. "Tact," in the words of Howard Newton, is simply "the art of making a point without making an enemy."

While there are no magic rules for handling all situations encountered in the inspection process, there are basic rules which do prevail for the professional sanitarian, and the most basic of these is "golden." Above all, treat the managers of establishments that you inspect in a manner in which you would like to be treated, and you probably will not go wrong.

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Major Concepts In Institutional Feeding

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Food is essential in promoting and maintaining the health and morale of the aged, the infirmed, and the very young. However, if proper precautions are not taken, it can also serve as a vehicle for conveying pathogenic organisms, bacterial toxins or poisonous chemicals to those in institutions, hospitals, nursing homes, schools, day care centers, homes for aged and correctional facilities.

I THE PROBLEM

A. FOODBORNE DISEASE IN INSTITUTIONS

In 1979 there were more cases of foodborne diseases reported as having occurred in hospitals and institutions than in any other kind of food serving establishment. Large numbers of people are usually affected in institutional outbreaks of foodborne disease. For example, an average of ninety-nine (99) persons were affected in each of the 1979 institutional outbreaks. Forty-five percent of the cases of foodborne disease reported occurred in institutions.

In the institution we would expect a higher attack rate of foodborne illness because of the large number of people concentrated in a building who are highly susceptible, i.e.; very old, very young, and those already ill.

Breakdown on Type of Institutions

(Where Reported)

13 - Schools
3 - Camps
3 - Prisons
3 - Hospitals
4 - Nursing Homes
1 - Child Care Day Center
33 - Unknown

B. EFFECT AND RAMIFICATIONS OF FOODBORNE DISEASE OUTBREAKS

1. *Health*

The majority of foodborne diseases are non-fatal, although there are records of deaths from heart attacks or the rupturing of vital organs, both after-effects to foodborne diseases. Botulism kills approximately 17 percent of the people that it afflicts.

Outbreaks of foodborne diseases can be disasterous among a debilitated populace, such as a group of nursing home patients, or the very young.

a) In a state hospital, 17 pounds of sodium flouride roach powder, mistaken for powdered milk were added to a 10-gallon mix of scrambled eggs. Two hundred and sixty-three cases of food poisoning resulted; forty-seven of those died. Rosenau, *Prev. Medicine and Public Health,* 8th Edition.

b) School party in Georgia ends with Salmonellosis for 25 from eating homemade ice cream. *MMWR* Sept. 1981, 30 (37):467-8.

c) In Children's Hospital in Pennsylvania 280 ill with Shigellosis from eating food in the cafeteria. *MMWR* 1979, 28 (41):498-9.

d) Five die and forty-eight ill from foodborne Salmonella in nursing home in Minnesota. *Minnesota Dept. Health, Memo,* August 21, 1981.

e) Ten patients fed oven cleaner in a nursing home in Colorado. *Rocky Mountain News,* June 7, 1980.

f) Salmonella in eggnog killed four and seventy-seven were made ill at a nursing in South Jersey. Those who died were between 80-88 years of age. *New York Times,* January 7, 1982.

These are but a few examples of what is reported each year in the U.S. In the institution there is a population more susceptible to foodborne disease, therefore emphasis is placed on the importance of good, safe food handling in institutions for the workers and those who are responsible

for sanitary inspection. The U.S. Food and Drug Administration State Training Branch, has been presenting a special course on Institutional Sanitary Food Service for years. They recognize that in many institutions you have the very old or young, sick, etc. which are susceptible to foodborne illness.

2. *Economic*

Economic loss from foodborne disease -- costs of medical and nursing care, lost work and school time, medications, and payment of judgments that arise from legal actions -- is not a negligible factor when it is considered on a community basis. Except for one study in Medical Intelligence, (Ref. 5) most data on costs of human salmonellosis are projections. In July and August 1976, thousands contracted salmonellosis from eating contaminated cheddar cheese served primarily in Mexican style restaurants in Denver and Colorado. It was estimated that 32,000 persons were involved in this outbreak involving cheese. The mean cost per person was $125 for those who did not require hospitalization or medical care. 32,000 cases × $125 = $4 million; the mean cost for those requiring medical care/hospitalization was $645 × 32,000 cases = $21 million.

II. PRINCIPLES OF FOODBORNE DISEASE CONTROL

The knowledge essential to the control of foodborne diseases is available. Control can be obtained by the effective application of the following principles:

A. APPROVED FOOD

Food that is in sound condition, free from spoilage, filth and obtained from sources complying with all laws relating to food and food labeling. All foods should come from commercial food processing establishments. Approved foods is a critical item in all food service operations but even more with institutions; yet it is often one of the most overlooked items by regulatory personnel.

1. *Milk and Milk Products*

These foods should be pasteurized, otherwise when consumed raw, they can transmit brucellosis, bovine tuberculosis, streptococcal infections, and similar illnesses, i.e.: Yersiniosis.

2. *Canned Foods*

Improperly processed hermetically-sealed foods can cause botulism food poisoning. The only reliable sources of canned foods are from those plants in which the environment, methods of preparation, and retorting practices are subject to official surveillance.

Institutions are sometimes offered gratuitous home-canned foods. Home-canned foods with a pH of 4.6 or above should never be accepted - these foods have a history of incrimination in botulism outbreaks. Since each home-canned product is processed differently, the only safe way is to prohibit their use in institutions.

3. *Poultry*

Poultry and poultry products have been incriminated as a source of salmonella in a great many foodborne disease outbreaks. Salmonellae organisms are frequently found on raw poultry and when brought into the kitchen can be a source of contaminating food contact surfaces.

Chicken eggs, likewise may contain salmonellae organisms. External contamination and internal from the oviduct of the hen.

4. *Shellfish*

Oysters, clams, and mussels have been incriminated in outbreaks of typhoid fever, infectious hepatitis and shellfish poisoning. Particular problems may be encountered in coastal areas where operators or donators may harvest shellfish from unsafe sources. All shellfish should be obtained from sources that appear on the current Public Health Service FDA list of Certified Shellfish Shippers or sources which are State approved.

5. *Inspect Foods for Signs of Spoilage Which are Evidenced by:*

a) Swollen cans
b) Slime on meat, fish, or poultry
c) Off color or odor
d) Rotten or decomposed fruits and vegetables
e) Thawed frozen foods or crystallization of frozen foods indicating some thawing.

Whether food comes from an approved source and it is in good condition can be a judgemental decision that could require further investigation. In some cases, embargoing the food product may be necessary to protect the public's health until proper determination can be made.

B. PROPER STORAGE AND LABELING OF POISONOUS MATERIALS

There shall be present in food service establishments only those poisonous or toxic materials necessary for maintaining the establishment, cleaning and sanitizing equipment and utensils, and controlling insects and rodents. *Food Service Sanitation Manual. Pub.* #78-2081, 1976, FDA.

Containers of poisonous or toxic materials shall be prominently and distinctly labeled according to law for easy identification of contents, and stored separately from food. Each of these two categories should be stored separately and away from food.

1. Insecticides and rodenticides.
2. Detergents, sanitizers, and related cleaning or drying agents. Caustics, acids, polishes, and other chemicals.

C. PROMPT COOLING

Prompt cooling of cooked leftover foods is essential in foodborne disease control. Foods should be refrigerated while hot. Never allow foods to

cool to room temperature before chilling in a refrigerator. This practice allows for food to be in an optimum growing temperature range for microorganisms for several hours.

Techniques for rapid cooling--rapid chill units, placing containers in freezer compartments, packing containers in ice, immersion of containers in running water or mechanical stirring--should be considered and are of particular importance when chilling facilities are limited. Provisions should be made to allow for proper air circulation within chilling units; no shelves covered with aluminum foil or cloths. Four hours is the maximum length of time that potentially hazardous foods should be kept between 140°F and 45°F, including the time required for chilling. Rapid cooling in shallow containers is necessary to accomplish this goal.

The composition and viscosity of the food being chilled also influences the rate of cooling. The composition (ingredients) and viscosity (solid/liquid) of the food being chilled as well as the size (distance heat or cold has to travel) influences the cooling rate. Heat moves through a relatively dry or somewhat firm or solid material at a slower rate than it moves through a fluid or liquid material. Foods such as sandwiches, potato salad, dressing, bread pudding, croquettes and meatloaf--all potentially hazardous foods--cool slowly.

FROZEN STORAGE

Freezer space may be used for storing some raw foods, or cooked foods prepared in advance for peak load periods, or for storing leftover foods until they can be served as well as for storing prepackaged frozen foods, but freezer storage is designed to receive product at or near 0 degrees F and hold it.

III. FOOD SERVICE

A. EMPLOYEE HEALTH

1. Thoroughly wash hands and exposed portions of the arms with soap and water, before starting work, during work and after leaving the patient area.
2. Clean clothing and hair restraint.
3. Sick or infected employees should not be handling food.

B. FOOD PROTECTION

1. All foods should be covered between time of preparation and time of serving. Hot food should be held at temperature of 140°F or greater, and cold foods at 45°F or less.
2. Food should be served as soon as possible after its preparation. Facilities for late trays should be available on the floor.

C. TRAY ASSEMBLY AND DISTRIBUTION

1. Centralized - Assembled in kitchen and carried directly to the patient.
   a) Dumb-waiters or vertical conveyors may be utilized to transport prepared trays of food to the serving areas.
   b) Unheated tray trucks or
   c) Heated trucks or
   d) Combination of both such as airline "flight type" carts.
   e) In preheated dishes and sealed in an insulated container, cold foods added to tray and transported in closed unheated truck for delivery. Heated pellet systems are commonly used. A newer system is the temperature barrier/slotted tray. Hot and cold food items are separated but remain on the same tray. Hot food on the left and cold food on the right. The tray has a solid insulated divider in the duo-temperature cart, (heating elements on left and cooling elements on right), thereby maintaining hot foods hot, and cold foods cold. Re-thermalization units allow meals assembled to go immediately into a re-thermalization cart and under refrigeration. In refrigerator all food items are maintained at 40°F until only minutes before mealtime when heating elements built into each shelf gently heat by conduction, each food item to be served hot, no rise in temperature occurs within the refrigerated environment during the heating cycle. An audible signal indicates meals are ready to serve.
2. Decentralized - Food is prepared in the central kitchen and sent to serving pantries in bulk to each floor. Trays are assembled on the floors. Rapid or quick chill refrigerators are used to cool foods within two hours to a safe holding temperature (45°F).
3. In all cases facilities for "hold" or "late" trays should be available on the floor.

D. DINING ROOM SERVICE

1. Cafeteria for staff, employees and students.
2. Cafeteria for patients and visitors.

IV. INSTITUTIONAL FOODSERVICE SYSTEMS

A. CONVENTIONAL

1. Preparation from raw foods.
2. Separate meat processing, baking and vegetable areas.
3. Requires intensive labor.
4. Hot and cold storage from large batches.

B. READY PREPARED (COOK FREEZE AND COOK CHILL)

1. Response to critical shortage of skilled food personnel.
2. Food stored as needed for assembly and production.
3. Cook Freeze - batches of food prepared on a regular schedule (Monday-Friday) individually portioned, plated, blast-frozen; stored, thawed, and reheated at point of service (usually by microwave ovens).
4. Cook Chill - Batches of food prepared daily,

usually chilled in bulk, plated, stored in refrigerated carts. Food reheated at point of service (usually by microwave).

C. COMMISSARY FOODSERVICE SYSTEMS
   1. Centralized food procurement and production.
   2. Food is received which has had little or no processing.
   3. Savings by central facility justify expensive equipment needed.
   4. Food is received and stored frozen, chilled or dry.

D. ASSEMBLY - SERVE
   1. Completely processed frozen products predominate.
   2. Assembly from bulk, pre-portioned and preplated either before or after heating, depending on the tray assembly and distribution technique utilized.

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QUALITY OF ICE CREAM AND ICE MILK SOLD IN CONNECTICUT

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Ice cream is a delicious wholesome, and nutritious food made of cream, milk, skim milk, condensed milk, or other concentrated dairy products. It contains sugar or other sweeteners and flavoring, may contain stabilizer or color, and has air incorporated during freezing. Several additives also may be used; the maximum amounts are specified by regulation, and optional ingredients, flavoring, and additives must be listed on the label.

Records of frozen ices have been found in Europe back to the 16th century and a form of ice cream was recorded during the 18th century (*3*). In America, the introduction of ice cream is credited to Mrs. Alexander Hamilton who, it is said, in 1789 served ice cream at a dinner attended by George Washington. The upsurge in ice cream making began in 1851 when the first commercial ice cream plant was opened in Baltimore, Maryland. Four inventions were essential to the new industry: condensed milk by Gail Borden of Wolcottville, Connecticut; the cream separator; the Babcock test for fat; and mechanical refrigeration (*3*).

Ice cream is a popular dessert or snack for persons of all ages. In the United States the average per capita consumption is about 3.7 gallons (*1,7*). In New England, however, consumption is more: 5.3 gallons. Vanilla flavor accounts for over 45% of sales followed by chocolate at about 10%. About 74% of all ice cream is purchased in supermarkets, and over 83% is purchased in half-gallon containers (*1,7*). Consumption of ice milk is about 1.3 gallons per capita.

Connecticut Regulations for ice cream are administered by the Department of Consumer Protection (*4*) and define the ingredients that may be used and the types and amounts of additives and flavoring permitted. The salient points of the regulations are that ice cream shall contain not less than 10% butterfat and ice milk not less than 2 nor more than 7%. Dietery frozen dessert shall contain less than 2% butterfat. Vegetable fat is not permitted in ice cream, ice milk, or dietary frozen dessert.

For ice cream the weight of milk solids not fat shall be not less than 6%. For ice milk the total milk solids shall be not less than 11% and for ice cream 20%. The total number of aerobic bacteria per gram, called the Standard Plate Count, shall not exceed 100,000 and the number of coliform bacteria shall not exceed 10 per gram. The weight per gallon for ice cream and ice milk shall be not less than 4.5 pounds and the total solids per gallon shall be not less than 1.6 pounds. If the ice cream is labeled as "French vanilla," it must contain at least 1.4% eggs.

In this Bulletin we report analyses of vanilla ice cream and ice milk sold in Connecticut. We determined compliance with State Regulations and quality and nutrient factors such as flavor, fat, protein, calories, and content of bacteria.

Methods

Seventy-nine samples of vanilla ice cream, eight of ice milk, and one dietary frozen dessert were collected from May through August 1983 by inspectors of the Connecticut Department of Consumer Protection. The samples were taken at processing plants and distribution points in Connecticut or in retail stores if the product was produced in another state. Except for the three hand-packed samples, all were packaged by the manufacturer. Whenever possible half-gallons were collected, and 74 samples were in half-gallons, 12 in quarts, and 2 in pints.

Samples were delivered frozen to the laboratory and examined for toal number of aerobic bacteria per gram (Standard Plate Count), coliform bacteria, and yeasts and molds according to Standard Methods For the Examination of Dairy Products (*6*). Analyses for fat, protein, ash, total solids, and egg were by methods of the Association of Official Analytical Chemists (*5*).

The percentage of total carbohydrate and the caloric content were calculated values. Total carbohydrate is % total solids - (% fat + % protein + ash). Calories per 100 grams are % fat × 8.79 + [% total solids − (% fat + % ash)] × 4. One hundred grams of ice cream is about 3.5 ounces or about one slice. Percent sweetener is the % of total carbohydrate less the % lactose. Lactose was determined by high performance liquid chromatography (*8*). Analysis of duplicates showed for protein determination an average difference between duplicates of 0.35% with a standard deviation about the mean of 0.35%, for fat

an average difference of 0.20% with a standard deviation about the mean of 0.09%, and for lactose an average difference of 0.23% with a standard deviation about the mean of 0.19%.

Flavor or taste was judged according to the standard criteria of the American Dairy Science Association (*2*) by at least three persons. A scoring system of 1 to 10 was used, 10 being the best. In Table 1 the Roman numerals I, II, or III appear after the brand of the product. Numeral I designates that the product contains all natural flavoring (vanilla extract or vanilla powder), II designates that mostly natural flavoring was used but some artificial flavoring was added, and numeral III indicates that all or mostly all artificial flavoring was used.

Results and Discussion

Sixty-eight brands are represented by the 88 samples in Table 1. More than one type of ice cream may have been produced under the same brand. Examples are samples 8, 9, and 10, samples 35 and 36, and samples 52 and 53. We occasionally received duplicates, and results for each sample are shown in the Table. In the Table, the brand as well as the manufacturer is shown. Some samples with different brand names were made by the same processor, for example, samples 22, 30, 35, 41, 55, 56, 63, 65, 68, 69, 72, and 87.

The weight per gallon of ice cream and ice milk averaged 4.9 pounds but ranged from 4.2 to 7.5. Six samples (numbers 37, 43, 46, 61, 74, 86) failed to meet the State minimum requirement of 4.5 pounds per gallon (Table 1). We do not show in the Table the weight per gallon for hand-packed samples since considerably more ice cream or ice milk can be packed by hand into a container than by a machine. All samples met the Standards for total solids, solids not fat, total milk solids, and pounds solids per gallon.

All except sample 16 met the Standard (100,000 per gram) for total number of aerobic bacteria. Seven samples had more than 10 coliform bacteria per gram (Table 1), and this usually indicates post-pasteurization contamination. The number of yeasts and molds detected was generally less than 10 per gram.

Butter fat in the ice cream samples ranged from 9.1 to 17.3% with an average of 11.9% (Table 1). Only sample 46 was below the regulated minimum of 10% butterfat. Over 55% of the samples contained from 10 to 12% fat, about 27% contained from 12 to 14%, 11% contained from 14 to 16%, and about 5% contained over 16% butterfat. the fat content of the ice milks ranged from 2.2 to 6.6% with an average of 3.6%, all within the State requirement of 2 to 7%. No sample of ice cream or ice milk was adulterated with vegetable fat.

Protein content of ice creams averaged 3.3% with a range from 2.0 to 6.0% (Table 1). The amount of protein depends on the amount of casein in the milk or milk solids used. The average protein content of the ice milks was 3.5%.

The average carbohydrate content of the ice milks was 27.1% and of the ice creams 22.4%. The total carbohydrate in vanilla ice cream and ice milk includes the lactose from the dairy products as well as added sucrose, corn sweeteners (hydrolyzed corn starch containing glucose, fructose, maltose, and higher polysaccharides), as well as some stabilizers such as agar and vegetable gums.

The percentage of sweetener is the total carbohydrate less the lactose added in the solids of whole milk, skim milk, or whey. Sweeteners include sucrose and hydrolyzed corn starch usually noted on labels as corn sweeteners. Sweeteners in ice cream average 17.2% with a range from 13.2 to 21.9%. The range for ice milk was 19.2 to 26.7% with an average of 21.2%.

The average calories per 100 grams of ice cream exceeded that of ice milk by about 26%. Ice cream had an average of 207 calories (about the number in two large apples) per 100 grams and ice milk 154. The calories in ice cream and ice milk are primarily from fat. Fat provides about twice as many calories per gram as protein or carbohydrates.

Vanilla ice cream and ice milk are labeled according to the flavoring. The flavor category is shown in Table 1 as a Roman numeral following the brand. Vanilla ice cream or ice milk in category I would be labeled vanilla, indicating that all natural vanilla was used. In category II it would be labeled vanilla-flavored, with a subsidiary declaration such as "vanilla and artificial flavor" indicating that although mostly natural vanilla was used, some artificial flavor was added. In category III the product would be labeled artificially flavored vanilla, showing that all or mostly all flavor was artificial. Natural flavor is either vanilla extract or vanilla powder. Forty-one samples of ice cream were in category I, 27 in category II, and 11 in category III. For ice milk there were four each in categories I and II (Table 1).

Taste or flavor is largely personal preference. We found the average flavor score for ice cream and ice milk was 7.6 with a range from 4 to 9 (Table 1). Samples scoring between 7.5 to 9 usually were criticized as "lacking fine flavor" or "lacking flavor," not important criticisms. A score below 7.5 indicates defects such as "too sweet," "cooked flavor," or "unnatural flavor." Unnatural means the flavor does not suggest vanilla or there is a flavor not usually associated with vanilla ice cream. Scores below 6 reflected more serious flavor defects, such as "taste of old ingredients" or "very unnatural flavor." Consumers, of course, may disagree with this flavor analysis since standardized flavor criteria were used.

Conclusions

Seventy-nine ice cream, eight ice milks, and one dietary frozen dessert for sale in Connecticut were tested for nutrients, quality, flavor, and for compliance with State Regulations. All were vanilla or vanilla-flavored.

Table 1. Microbial, Chemical, Nutrient, and Flavor Analysis of Vanilla Ice Cream and Ice Milk.

Sample Number	Weight per gal., pounds[b]	Bacteria, no/g[b]	Coliform bacteria, no/g[b]	Protein %	Fat, %[b]	Total Carbohydrate, %	Sweeteners, %[e]	Calories, no/100 g	Flavor score[d]	Sample Number
ICE CREAM										
1	5.3	3,000	<1	2.9	12.8	21.4	18.0	209	8	1
2	—	—	—	3.9	14.9	21.9	21.9	234	8	2
3	—	—	—	2.7	14.6	21.0	17.2	225	8	3
4	4.9	600	2	3.0	12.4	21.4	15.5	207	8	4
5	5.1	1,600	<1	5.8	12.0	21.7	18.7	214	9	5
6	6.3	3,300	<1	3.7	13.1	21.5	18.6	218	7	6
7	5.0	40	<1	3.3	14.2	20.4	14.1	220	8	7
8	5.4	260	<1	3.0	10.0	22.3	16.6	189	8	8
9	5.4	80	<1	3.4	10.3	24.5	19.2	203	8	9
10	5.3	70	<1	3.8	12.4	23.3	18.0	217	8	10
11	4.7	9,900	<1	4.1	11.2	21.3	15.3	200	9	11
12	4.8	3,300	<1	4.2	11.2	22.4	17.5	205	9	12
13	6.1	260	<1	3.4	16.4	18.8	13.7	232	8.5	13
14	4.6	2,200	540	3.7	12.9	21.6	18.2	215	5	14
15	4.9	240	2	3.8	13.1	21.5	16.7	217	8.5	15
16	4.6	5,800,000	140	3.0	10.2	23.2	17.5	194	7	16
17	5.2	430	<1	4.2	11.0	20.2	13.2	194	8	17
18	7.5	680	<1	4.6	12.1	19.2	13.3	202	5	18
19	4.5	950	<1	2.7	12.7	20.0	14.0	203	5	19
20	4.7	120	<1	3.9	12.7	21.3	18.5	212	8.5	20
21	4.8	3,300	5	3.8	12.3	22.1	18.5	212	9	21
22	4.8	170	1	2.9	10.3	23.8	19.7	198	9	22
23	4.8	80	<1	2.8	13.1	18.9	14.9	202	7	23
24	4.7	610	<1	4.0	10.0	25.9	20.8	208	8	24
25	5.4	190	<1	3.2	10.2	22.5	18.7	192	8	25
26	4.5	60	<1	2.9	10.3	21.7	16.8	188	6	26
27	4.6	340	<1	3.5	11.4	22.1	18.3	203	8	27
28	7.2	140	<1	3.9	10.4	20.5	17.8	189	8	28
29	4.8	25	<1	2.8	10.5	22.1	17.8	191	6.5	29
30	4.7	110	<1	3.7	10.1	23.9	17.2	199	8.5	30
31	7.7	580	<1	4.8	16.3	19.3	14.8	239	8	31
32	4.6	270	<1	3.4	10.4	24.3	18.8	202	8	32
33	4.7	15	<1	2.7	12.4	20.7	18.2	203	8	33
34	4.7	120	<1	3.3	10.0	23.8	18.1	196	7	34
35	4.7	100	<1	3.3	10.0	23.6	18.3	196	8	35
36	4.9	200	3	3.7	10.3	23.1	18.1	198	8	36
37	4.4	160	<1	2.2	12.8	20.8	16.3	202	7.5	37
38	4.5	60	<1	2.6	10.3	24.1	18.2	198	8	38
39	5.6	470	<1	3.3	18.5	20.3	14.5	239	7.5	39
40	4.8	180	<1	3.8	14.5	20.3	15.5	223	7	40
41	4.8	280	7	3.7	10.1	24.4	18.1	201	8	41
42	5.1	49,000	1	4.0	13.1	24.6	18.0	231	8	42
43	4.2	60	<1	4.4	14.2	21.0	17.1	227	7	43
44	4.8	170	10	2.9	10.4	22.9	16.1	195	7	44
45	5.0	860	5	2.8	13.3	22.7	18.1	218	8.5	45
46	4.2	39,000	880	3.4	9.1	22.7	17.3	184	4	46
47	5.6	40	<1	2.8	17.3	21.6	17.1	250	7	47
48	4.6	280	<1	3.1	10.0	22.0	16.1	189	6	48
49	4.5	770	4	3.4	12.4	24.3	17.9	199	8	49
50	4.6	260	<1	2.7	14.9	19.7	15.2	221	7	50
51	5.2	1,200	1	2.7	10.2	25.3	17.1	194	8	51
52	5.5	120	<1	3.1	10.5	20.8	15.2	188	7.5	52
53	5.2	500	<1	3.2	10.7	22.8	18.8	198	6.5	53
54	4.9	360	<1	3.0	11.1	27.2	21.3	219	9	54
55	4.7	35	<1	3.2	10.5	23.9	18.6	194	8	55
56	4.7	190	<1	2.8	10.5	23.4	17.5	198	8.5	56
57	4.8	460	3	3.8	12.8	21.9	18.1	215	8	57
58	8.0	450	3	3.6	15.0	20.4	15.2	229	6	58
59	5.8	100	<1	3.6	15.9	19.0	14.5	235	8.5	59
60	4.6	1,200	<1	3.3	10.9	24.0	17.6	205	9	60
61	4.4	300	<1	3.2	10.9	23.9	18.3	204	8	61
62	5.1	3,900	17	3.0	12.8	23.2	17.8	217	8	62
63	4.7	1,400	3	2.9	10.2	24.5	19.9	199	8.5	63
64	5.0	190	<1	3.0	10.2	24.4	19.0	199	8.5	64
65	4.7	80	<1	3.5	10.9	23.1	17.7	202	8.5	65
66	5.4	290	1	3.6	12.0	22.6	17.3	211	9	66
67	4.7	420	<1	3.1	10.4	24.9	19.2	203	6	67
68	4.9	1,400	10	4.1	12.8	21.8	18.3	213	7.5	68
69	4.8	55	<1	2.8	10.7	24.0	18.8	201	9	69
70	4.7	310	<1	2.9	10.8	22.8	17.1	195	8	70
71	—	—	—	3.4	15.4	20.6	18.1	232	6	71
72	4.7	1,600	4	2.7	10.6	23.1	17.5	196	8	72
73	5.9	40	<1	3.5	10.2	25.7	20.8	206	9	73
74	4.3	1,800	22	3.3	10.1	21.4	18.5	187	7	74
75	4.9	15,000	4,300	3.1	11.7	21.5	16.9	201	8	75
76	4.6	1,400	<1	2.9	10.8	23.4	17.9	198	8	76
77	4.5	350	<1	2.9	12.6	23.3	18.3	215	7	77
78	4.6	150	<1	2.9	12.4	24.2	18.3	217	8.5	78
79	5.0	680	1	2.9	11.8	23.3	17.8	209	9	79
ICE MILK										
80	5.0	290	<1	3.1	4.3	24.3	19.5	147	5	80
81	4.5	200	1	3.5	3.0	27.3	21.0	150	7.5	81
82	4.7	850	4	4.1	3.0	28.4	23.0	156	8	82
83	4.7	1,100	25	3.8	8.8	25.8	19.5	175	7.5	83
84	5.2	120	8	3.4	3.4	25.2	19.2	145	8.5	84
85	4.6	110	<1	3.8	3.1	28.3	20.3	147	7	85
86	4.4	380	1	2.0	3.4	26.2	20.2	142	8	86
87	4.4	800	1	4.1	2.2	33.2	26.7	189	7.5	87
DIETARY FROZEN DESSERT										
88	5.1	390	1	4.7	1.5	20.7	13.5	114	7	88

a) The Roman numeral designates whether the ice cream or ice milk contains only natural vanilla flavoring (I), mostly natural but some artificial flavoring (II), or all, or mostly all, artificial flavoring (III).

b) According to State Regulations weight per gallon must be at least 4.5 pounds, bacteria per gram must not exceed 100,000, coliform bacteria must not exceed 10 per gram, ice cream must contain at least 10% butterfat, ice milk requires from 2 to 7% fat, and dietary frozen dessert must contain less than 2% fat.

c) Weight per gallon, bacteria per gram, and coliform bacteria are not shown for hand-packed samples. Since considerably more ice cream can be packed into a container by hand than by filling machine, weights are not comparable. Bacterial counts for hand-packed samples reflect the sanitary conditions of the utensils and containers used for packaging as well as care during processing. All three hand-packed samples had satisfactory bacterial counts.

d) Flavor score indicates the overall taste of the ice cream and ice milk, based on standard criteria. A scoring system of 1 to 10 was used, 10 being the best.

e) Sweetener is the % total carbohydrate less the % of lactose.

f) Sample 2, which purports to be reduced in lactose, contained less than 0.3% lactose. Sample 3, the usual ice cream from the same manufacturer, contained 3.9% lactose.

One sample of ice cream exceeded the total number of bacteria allowed by regulation. Six ice creams and one ice milk exceeded the standard for number of coliform bacteria, and six samples were below the required minimum of 4.5 pounds per gallon. Only one sample of ice cream did not meet the regulated minimum of 10% butterfat. All ice milks were within the regulated 2 to 7% butterfat. The average sweetener in ice cream was 18.2% and in ice milk 21.2%. Calories per 100 grams of ice cream averaged 207 and of ice milk 154. The average flavor score, on a 1 to 10 basis, was 7.6, indicating most samples had a good flavor.

These results show ice cream and ice milk sold in Connecticut generally are of good quality.

ACKNOWLEDGMENTS

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Scientific Organization Opposes EDB Ban: Says Alternatives More Dangerous

The ban on grain-related uses of the pesticide ethylene dibromide (EDB) should be lifted, and the proposed ban on its use in the fumigation of fruit should be postponed, until and unless a suitable replacement is found, states a report released recently by the American Council on Science and Health (ACSH).

"The ban on EDB was a serious mistake," said ACSH Executive Director Dr. Elizabeth M. Whelan. "The health risk from the traces of EDB in foods is purely hypothetical. However, EDB's benefits in protecting our supplies of grain and fruit from insect contamination and destruction were real and important.

"We cannot simply do without EDB. Something else must be substituted," she continued. "Unfortunately, none of the alternatives currently available has been shown to be safer than EDB in terms of cancer-causing potential, and all are more dangerous to the workers who must handle them than EDB was."

The tolerance levels for EDB in foods which were recently set by the Environmental Protection Agency (EPA) "have given the public the protection we need," said Dr. William R. Havender, author of the ACSH report. "They provide a very adequate margin of safety, and they can be achieved readily. In fact, most foods on supermarket shelves today are already in compliance.

"It would make more sense for EPA to devote its efforts to monitoring EDB use to prevent the rare cases of excessive contamination, instead of banning a needed substance for which no safer substitute is currently known," he added.

Several lines of evidence indicate that EDB poses a negligible health risk to consumers, according to the ACSH report *Ethylene Dibromide (EDB)*.

A person would have to eat "at least 250,000 times as much food as he or she normally does every day" to equal the cancer-causing dose of EDB given to laboratory animals, the report states.

Studies have shown that workers heavily exposed to EDB do not have higher cancer rates than the general public does. "Since these studies were relatively small, it would be incorrect to say that they show that EDB is completely safe," Dr. Havender said. "But they do indicate that the risk to consumers, who are exposed to much lower doses, is at most extremely small."

The ban on EDB has "guaranteed" greater dangers for workers, the ACSH report states. Two of the three alternative fumigants (methyl bromide and a carbon tetrachloride/carbon disulfide mixture) are proven carcinogens. The third (phosphine) is highly flammable. Methyl bromide and phosphine are both very poisonous, much more so than EDB.

Other alternatives which are safer for workers, such as cold treatment (of fruit) and gamma-irradiation, cannot be used now because facilities on the requisite scale have not been constructed. Irradiation is also awaiting government approval, which is expected later this year, ACSH said.

ACSH is an independent, nonprofit organization promoting scientifically balanced evaluations of food, chemicals, the environment and health.

To obtain a single, complimentary copy of the ACSH report on EDB, send a self-addressed, stamped (37 cents postage), business-size (#10) envelope to Ethylene Dibromide Report, ACSH, 47 Maple St., Summit, NJ 07901.

Don't Take Food Poisoning On A Picnic

Summer begins the peak picnic--and food poisoning--season. But with a few simple precautions, this unpleasant and sometimes serious illness can be avoided, says a Texas A&M University Agricultural Extension Service food and nutrition specialist.

The "poison" is actually produced by a certain bacteria, a type of staphylococcus, which contaminates the food, says Mary K. Sweeten. The poison is eaten with the food and produces symptoms such as nausea and vomiting.

For most people, food poisoning is just a miserable experience, but it can be serious for babies, elderly people and those with other illnesses, she notes.

The bacteria often reach food from the hands of the person preparing it. But even when you're careful to wash your hands, bacteria from the skin, hair or throat can be spread to food, she explains.

Since these bacteria are especially fond of protein, Sweeten recommends precautions when taking high protein foods--such as meat, poultry, salads containing egg, custards and some baked foods--on picnics.

The most likely sources of food poisoning are those dishes that you don't normally heat or reheat before serving on a picnic.

"It's never wise to assume that high-protein foods are safe after being kept at room temperature," she says. "Since refrigeration prevents the bacteria from making their poison, the most effective way to avoid

food poisoning is to eat them right away or else keep them cold until they are served."

Refrigeration temperatures should be below 45 degrees Fahrenheit, which may be difficult to maintain in an ice chest or other type of cooler, she cautions.

"Contrary to myth, mayonnaise isn't commonly the main culprit in food poisoning," says the specialist. So it's important to keep all hot foods hot and cold foods cold to reduce the chances of taking food poisoning along on your picnic.

UC Davis Schedules Process Control School

University Extension at the University of California, Davis, has scheduled a Better Process Control School on November 26-29, 1984. The School is intended for supervisors of thermal processing systems, acidified processing systems and/or container closure evaluation operations. To enroll or obtain further information, contact: Robert C. Pearl, Department of Food Science & Technology, Cruess Hall, UC Davis, Davis, CA 95616. 916-752-0980.

American Sanitation Institute Offers Workshop

The American Sanitation Institute, a division of The Huge' Company, Inc., will conduct a "Preventive Sanitation and Food and Drug Compliance Workshop," including EPA/FIFRA and Pesticide Updates, on October 8, 9, 10, 1984.

The seminar will be held in Atlanta, Georgia, at the Atlanta Marriott Downtown. It is open to all food industry Plant Management, QA and QC Managers, Directors of Sanitation, Sanitarians and PCO's.

Prominent speakers from the Federal Food and Drug Administration, Federal EPA, state agencies, state colleges and universities, as well as members of the American Sanitation Institute staff and directors of well known food processors will be in attendance.

Topics discussed will include the FDA Act, pesticide labels, corporate responsibility, employee practices, the new Retail Store Standards, development of a preventive sanitation program, sanitation hazards, and insect, rodent and bird control.

Information regarding the seminar program and registration may be obtained by contacting The Huge' Company/American Sanitation Institute, Karen Falk, Advertising Manager, 800-325-3371. In Missouri, call 314-725-2555 or 800-392-0855.

The American Sanitation Institute has presented Preventive Sanitation Seminars throughout the country since 1979. The Huge' Company, Inc. is a manufacturer of pesticides to the food industry. Both firms are headquartered in St. Louis, MO.

NEM Announces New Foodservice Safety Course

National Educational Media, Inc. (NEM), the world's leading producer/distributor of motion picture/videocassette-based training programs for the foodservice industry, has released Foodservice Safety, the newest in a series of training courses for foodservice personnel. Built around nine NEM audiovisual programs, the course provides a concise curriculum for thorough personnel training to prevent accidents and losses, reduce insurance premiums and avoid lawsuits. NEM is making available a free brochure describing the package, which contains motion pictures or videocassettes, course notebook and correlated, printed student guides with tests. All items are available separately or in a specially-priced package.

A 100-page NEM System Course Notebook integrates the course's nine film/video modules. This notebook's detailed, step-by-step instructions ensure easy and effective administration of the course by novices and experienced training professionals alike. Samples of instructor's guides and printed tests for trainees are also included.

The instruction in the first eight modules provides a safe and sound foundation for reduced insurance costs and compliance with government safety regulations. Preventing personal injuries such as slips, falls, cuts, strains and burns, and avoiding property losses caused by fires, for example, are key elements of NEM's Foodservice Safety course. A ninth, optional module deals with hotel fire safety.

According to Jack Copeland, president of NEM, "This training will help employees achieve the competence and motivation to do their jobs safely. Foodservice operators will happily recognize that the course can help their employees create safe kitchen and dining room environments that benefit the workers, the guests and the whole operation." Copeland adds that NEM clients using the course include restaurants, hotels, schools, hospitals and government agencies around the world.

For nearly 20 years, NEM has provided motion picture/videocassette training programs for the

foodservice industry, serving the needs of 20,000 clients in 110 countries. Its programs are available not only in English, but also in Spanish and 14 other languages, in motion picture, videocassette, filmstrip and slide formats. Many have won major film festival awards for training excellence.

This course stresses universal, fundamental principles and skills that apply to all foodservice operations. Additional information on Foodservice Safety and other NEM System Professional Courses and training programs may be obtained by contacting National Educational Media, 21601 Devonshire Street, Chatsworth, CA 91311. 818-709-6009. Telex: 910-493-2081. In Canada, contact Mr. John McAlister, Omega Films, Ltd., 133 Manville Road, Unit 19, Scarborough, Ontario, M1L 4J7 Canada.

New Name Reflects Increased Use of Plastics in Packaging

Du Pont's Flexible Packaging Division is now the Packaging Products Division, to reflect the increased use of plastics in rigid, semi-rigid and flexible packaging.

The new name signals Du Pont's awareness of the rapidly growing use of plastics in packaging that goes beyond the field of flexible packaging, according to Wilmer A. Jenkins, Director.

"There is a raidly growing movement to replace rigid metal and glass packages with plastics," Jenkins said. "We intend to participate by developing specialty materials such as high barrier polymers and co-extrudable adhesive resins which will be essential for this revolution to succeed."

Jenkins said a recently introduced product, "Selar" barrier resin, is the most visible example of many years of Du Pont barrier research. "'Selar' is just the first of the barrier technologies that we intend to develop. We also will continue to modify and improve our current line of films and resins for packaging."

Milk Intolerance?--Try Yogurt!

People who suffer from milk intolerance can reap the nutritional benefits of milk--without side effects--by eating yogurt, says a Texas A&M University Agricultural Extension Service nutritionist.

Lactase deficiency is a fairly common problem, especially among non-Caucasians, says Dr. Dymple Cooksey. It's estimated that three in ten non-Caucasians and one in ten Caucasians experience the problem, she adds.

Lactase is an enzyme which breaks down lactose, or milk sugar. For people with a lactase-deficiency, the lactose from milk remains undigested in the intestine and can cause discomfort, explains the nutritionist.

This milk intolerance is usually recognized between the ages of ten and twenty, the years when active teenagers need four servings of dairy products daily, she notes. Yogurt can provide a solution to this problem.

One cup of plain yogurt provides about the same amount of protein, calcium and riboflavin as one cup of milk, she says.

However, low-fat yogurt may not be fortified with vitamins A and D, so other sources will be needed, advises Cooksey. Dark-green and orange vegetables, egg yolk, butter, fortified margarine and whole-milk cheeses all provide vitamin A.

The fruit-flavored yogurts are as nutritious as milk, but have two or three times more calories than skim or low-fat milk, the nutritionist says.

Understanding Food Package Dating

Coded dating on packaged foods is a mystery that most consumers can solve with a little information, says a Texas Agricultural Extension Service home economist.

Perishable foods with less than 30 days of shelf life, such as milk or baked goods, frequently carry a "sell-by" date, says Bonnie L. Piernot, an Extension specialist with Texas A&M University.

"Some consumers believe the food is no good if it's still in the store on the sell-by date," she says. "Actually, the food will be wholesome if used right away, but consumers should buy before the package date if they want to allow for home storage--even in the refrigerator."

The open sell-by dates on perishable foods are easy for consumers to understand, but are not required on all foods, she notes.

Semi-perishable food with a shelf life of 30 days to 6 months, such as cereals and crackers, and foods with a shelf life of over six months, such as canned and frozen goods, also have sell-by dates. But these present a challenge to consumers, says Piernot, since they are usually expressed in a code.

The codes can be figured out if you know something of how the system works, says the home economist. Sometimes letters are used to represent the month, or in baked goods, the day of the week, she explains. So "A" in a code may mean either January or Monday.

Numbers represent the day of the month and year.

For example, "B24" could stand for February 2, 1984. In other cases numbers can represent the day and year. So 2804 can mean the 280th day of this year, October 6, 1984.

Checking dates on packaged food can help consumers get the most nutrition for their food dollar. According to Piernot, the fastest loss in food value occurs during and immediately after the processing for packaging. But the loss of nutrient quality continues at a slower pace all during the life of canned and frozen foods.

Dating codes can also remind consumers to rotate their food stock at home, and to use foods roughly in the order in which they were purchased. Storing foods for too long--even canned goods--can mean a loss of nutrients and wasted dollars, cautions the home economist.

Marketing Issues Topic For DFISA Seminar

"Answers for Today's Marketing Issues" will be discussed at Dairy & Food Industries Supply Association's fall marketing seminar to be held at Chicago's Westin O'Hare Hotel on September 18, 1984.

Seminar topics will cover: Marketing Imperatives for the 1980's & 90's; Industrial vs. Consumer Marketing; Federal Regulations and Their Effect on Marketing; How the Food Industry Can Best Serve the Pharmaceutical Industry; and An Update on Aseptics in North America.

The Seminar is conducted and sponsored by DFISA's Marketing Seminar Subcommittee -- James Dahlke, Waukesha Foundry Division, Abex Corp., is chairman.

For more information contact: Dairy and Food Industries Supply Association, 6245 Executive Boulevard, Rockville, MD 20852. 301-984-1444.

Polysulfone Plays A Key Role in Milk Production

Polysulfone plays an important role in milking machines and related equipment. Babson Bros. Co. has replaced many glass and stainless steel components in its milking machines with Union Carbide's Udel polysulfone. It eliminates the breakage of glass, and provides weight and cost reductions over stainless steel, they report. It is also transparent.

Babson considers any materials which have FDA approval. Those they select must withstand the attack of acids and caustic cleaning solutions, as well as iodines. They use some nylons and also modified PVC for hoses. However, nylon lacks clarity and PVC has thermal limitations. Among other materials, polycarbonate presents problems with chemical resistance to aggressive cleaners, and TPX has thermal limitations.

Polysulfone has both FDA recognition and 3A sanction for dairy applications. It has high-temperature resistance, and is hydrolytically stable, with exceptional resistance to boiling water and steam over long periods of time. It also resists pitting and corrosion, and build-up of lime deposits.

Polysulfone is available in transparent grades for use where visual inspection is desired. If this is not necessary, it is available in a wide range of opaque colors.

Further information on Udel polysulfone is available from Union Carbide Corporation, Dept. M1555, Old Ridgebury Road, Danbury, CT 06817.

Toronto Site for ACDPI Mini-Klinic

The American Cultured Dairy Products Institute has scheduled its third mini-Klinic for September 11-13 in Toronto, Ontario, Canada, according to Institute Board Chairman Jeff Edwards of the Kroger Co. This two and one-half day session dealing with the "basics" of cultured dairy food manufacture is especially geared for processing plant quality control personnel, supervisors, foremen, and on-line production staff.

Klinic delegates will receive instruction in basic microbiology, sanitation principles, product formulations, culture programs, and be given "hands on" experience in recognizing defects in buttermilk, sour cream, yogurt and cottage cheese - plus much more! Additionally, those in attendance will observe cultured food processing operations at the Gay Lea Foods facility near Toronto.

Featured Klinic instructors, relates Edwards, will include: Dr. Ron Richter, Texas A&M University; Dr. Ed Custer, Mississippi State University; Dr. Charles White, Louisiana State University; Earl Connolly, Fantasy Flavors, Inc.; Fran Lavicky, Nordica International; Dr. C. Bronson Lane, Dairy and Food Nutrition Council of Florida. Commencing comments will be given by Dr. Vic Amer, Dairy Bureau of Canada.

Further information pertaining to the "nuts and bolts" workshop may be obtained from Dr. C. Bronson Lane, ACDPI Vice President, PO Box 7813, Orlando, FL 32854. 305-628-1266.

New Product News

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

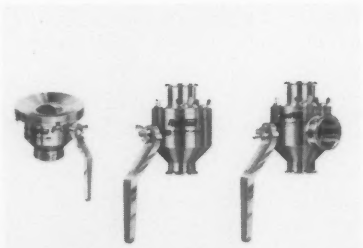
USDA-MID Approved Sanitary Ball Valves

• Fluid Transfer, Division of Lee Industries, Inc., currently offers the only complete line of USDA-MID approved sanitary ball valves. Fluid Flow Ball Valves were specifically designed for the sanitary market. Other sanitary ball valves are basically industrial valves modified for the sanitary market through the use of body cavity fillers and sanitary end connections.

The Fluid Flow line consists of 1-1/2" through 4" flush bottom, two-way, and three-way valves. They feature Type 316 or 316L stainless steel and Mica-filled Teflon construction. The simple yet durable design of the valve allows fast breakdown for easy cleanup and maintenance. Standard fully encapsulated seals provide minimum product entrapment, while full-flow ports eliminate product flow restrictions. A sanitary 4 I.D. finish is standard, while a 4 O.D. finish is offered as an option. Pre-tested at low (4 PSIG) and high (600 PSIG) pressures, the valves are rated for 300 PSIG and full vacuum at a maximum operating temperature of 550°F.

Lee Industries designs and manufactures an extensive line of sanitary processing equipment and systems for the food, pharmaceutical, and cosmetic industries.

For more information, contact: Lee Industries, Inc., Fluid Transfer Division, P.O. Box 519, Port Matilda, PA 16870. 814-692-5537.



"Fluid Transfer's complete line of USDA approved sanitary ball valves"

Fluid Transfer Sanitary Ball Valves

Specialized Tubing For Food and Beverage Industry

• Norton Industrial Plastics has developed a specialized tubing formulation for use in the food processing and beverage industry. The Tygon formulation, Tygon^{R} B-44-3, is NFS listed under Standard 51 and fully complies with all applicable FDA regulations.

Tygon B-44-3 tubing will not affect the taste or odor of products conveyed through it. It is clear for visual product monitoring and control. Tygon B-44-3 tubing has been thoroughly proven in countless installations as permanent lines, as "quick and easy" temporary lines and as lines used in conjunction with rigid piping systems to give them a new measure of versatility.

The complete Tygon product line consists of 8 standard formulations. In addition to Tygon B-44-3, there are a variety of Tygon tubings specially formulated for dairy, general laboratory, surgical and hospital, heavy-duty chemical and fuel and lubricant use.

For more information, contact: Norton Industrial Plastics, P.O. Box 350, Akron, OH 44309. 216-798-9240.

New, Safe Odor Control Agent Surrounds the Culprit

• A new line of odor control agents works like no other deodorizer in the past. And the difference can dramatically cut odor control costs in a very wide variety of industrial, institutional and agricultural applications.

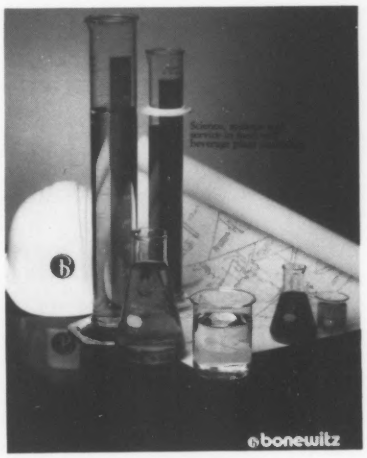
Rather than simply mask odors or oxidize them, the new deodorizer permanently entraps or encapsulates odorant molecules. Thus, it provides a broad-spectrum or non-specific odor neutralizer. It even works on SO_x and NO_x odorants that defeat conventional oxidants or "masking" deodorizers.

So far the new line, called Verdict™, has proven successful in a variety of industrial, municipal and institutional applications in the South Jersey, Philadelphia area. Applications include: sewage and waste treatment, oil refining and re-refining, food processing, animal rendering, and landfills. Users report more effective odor control at 1/2 to 1/3 the cost.

Unlike most deodorizers, the low-cost Verdict is free of phenols, phosphates, heavy metals and formaldehyde compounds. The new deodorizers are non-toxic, non-irritating, biodegradable and meet all FDA regulations. Verdict itself has a very faint antiseptic smell.

Verdict odor control agents work readily in existing systems without any need for restructure or change. The agents are available in three concentrations: 9-11, Industrial Strength; 7-21, Industrial Concentrate; and 7-73, Scrubber Concentrate.

Write Sonic Development Corporation, 305 Island Road, Mahwah, NJ 07430.



Bonewitz Chemical Services, Inc.

New Bonewitz Brochure

• A new brochure from Bonewitz Chemical Services, Inc., Burlington, Iowa, explains the resources that are utilized in developing total sanitation programs for food and beverage processors. These resources are detailed in specific sections on research and development, engineering, manufacturing and service personnel. Each section includes photographs that illustrate how Bonewitz works toward developing an effective and efficient sanitation program.

Bonewitz, a Henkel subsidiary, specializes in providing sanitation equipment and systems, chemicals and in-depth service. Henkel resources are also detailed in this brochure to develop a better understanding of the excellent research capabilities that are available through the firm.

For copies of the new brochure, contact: Bonewitz Chemical Services, Inc., P.O. Box 927, Burlington, IA 52601. 319-753-2881.

New Photoelectric Sensing System

• A photoelectric sensing system currently available from Blen-Cal Electronic Industries, Inc., provides in-line validation of the presence of tamper-evident packaging components, including interior seals, closures and shrink sleeves.

The Missing Components Detector (MCD) system is also used to check for the presence or absence of accessory packaging items such as applicator brushes and medicine droppers, in addition to verifying the presence of the actual product.

Simultaneous trigger and scanner beams monitor designated components as containers pass on the packaging line. Any signal from a trigger beam not followed by a correct scanner indication will activate an alarm or ejection device, or initiate shutdown of the line.

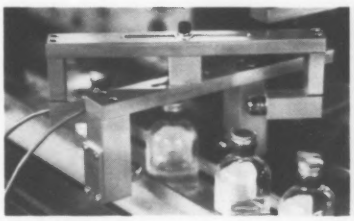
Multiple trigger-scanner combinations can be arranged in series along the line to track and verify the progressive assembly of packaging components. A virtually limitless range of scanner configurations allows for monitoring tamper-evident features in a wide variety of package shapes and sizes.

Standard features of the MCD system include a built-in counter to keep track of rejects and/or total output; an electronic power monitor which sounds an alarm in the event of AC/DC or scanner lamp failures; and a rated speed of up to 1500 repeat cycles per minute. The photoelectric sensors are unaffected by line speed changes.

All electronic components are solid-state and modular for easy replacement.

Blen-Cal produces a full line of systems for the inspection and verification of packaging materials at the point of manufacture, upon receipt of shipment and on the assembly line.

For more information, contact Rod Staehlin, Blen-Cal Electronic Industries, Inc., 700 Summa Avenue, Westbury, NY 11590. 516-334-3601.



Blen-Cal photoelectric sensors

Fast Vision System Works With 24 Cameras

• A vision system from Britain can operate with inputs from 24 television cameras in real time so that it can be used on-line with production and process lines. VIDISCAN can improve quality control by inspecting 100% of the products, and can reduce manufacturing costs by making automation equipment more accurate and flexible. Reportedly, the system costs one-third less than vision systems based on frame storage techniques, because large quantities of computer memory are not required.

The system is simple to use and, because it is housed in a sealed cabinet with filtered air supply, it is suitable for operation in industrial environments. It will analyze optical images, according to a stored program for measurement, positioning, counting, sorting and inspection. It can also scan powders and granular materials for unacceptable foreign body content.

High speed operation results because the system can reject any visual information received from the cameras which is not relevant to the task in hand; the time required to process the numerical data produced is reduced to 20 milliseconds. Data can be displayed simultaneously in picture and alphanumeric form on the system's twin screens, printed out or transmitted as control signals to production machinery.

The system can lock onto the track of a moving subject, because compensation for movement relative to the camera's field of view is automatic.

The operator's terminal with screens, keyboard, floppy disk unit and printer can be located away from the main information processing equipment. Cameras can be moved and altered to suit changes in factory layout. Eight color cameras can be connected (each one feeds three input channels). UV and IR cameras as well as those which operate over visible wavelengths can be used. The ability to make changes quickly enables the benefits offered by the system to be realized in small batch production and in volume manufacturing.

The basic system is flexible enough to undertake most tasks which need vision systems, so additional software costs are low. Its modular concept, in software and hardware terms, means that users can start with a small system and expand it or upgrade it when additional features are developed.

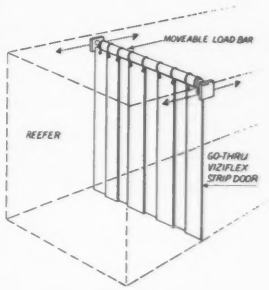
For more information contact: Erlebach Engineering Ltd., ATTN: Michael Erlebach, Managing Director, Cheyneys Lodge, Ashwell, Hertfordshire SG7 5RP England. Telephone: Ashwell (46274) 2881.

Adjustable Strip Door Preserves Refrigeration In Specific Areas

• A new vinyl strip door featuring flexible installation that reduces compressor use, has been introduced by GO-THRU DOORS, Inc. Mounted on a portable load bar by their Penta-Klips, the Viziflex strips can be positioned to conserve refrigerated air in the loaded portion of a reefer truck.

The load bar is adjustable with tension release. GO-THRU DOORS also makes strip doors for refrigerators and freezers, of Viziflex II material, which is USDA approved for use near food. Installed in a refrigerated warehouse or reefer, GO-THRU DOORS reduce cold air loss when outer doors are opened.

Complete details and prices are available on request to GO-THRU DOORS, INC., 20d Robert Pitt Drive, Monsey, NY 10952. 914-425-4522.



Viziflex Strip Door

New Batch Power Washer

• A new one page flyer is now available from Metalwash Machinery Corporation, Elizabeth, New Jersey, on their compact, pot, pan and utensil batch power washer, the RS-28FL. This machine is ideal for restaurants, cafeterias, hotels and institutions serving up to 5,000 meals a day.

This flyer is equipped with a clear photo and line diagrams of the plan view, side elevation view and load end elevation view of the RS-28FL.

Each feature, such as piping, pump and electrical control panel (to name a few), is described along with the service requirements and optional equipment available. This machine is NSF approved.

Free copies are available upon request. For more information contact: Metalwash Machinery Corporation, Bob Rath, President, 901 North Avenue, Elizabeth, NJ 07201. 201-352-6876.

Food Science Facts
For The Sanitarian

Robert B. Gravani
Cornell University
Ithaca, NY

MORE ON BACTERIAL FOODBORNE DISEASE: OTHER IMPORTANT BACTERIA

Although *Staphylococcus, Salmonella* and *Clostridium botulinum* are of great importance and considerable concern to the food industry, there are other bacteria that can also cause food poisoning. These "other" bacteria are not as well known as the ones already discussed, but you should be aware of them and the problems they cause. In this issue of Food Science Facts, food poisoning caused by several bacteria will be highlighted.

CLOSTRIDIUM PERFRINGENS

Clostridium perfringens is found in soil, dust, air, sewage, human and animal feces and on many raw foods. This organism is a problem in food service operations where foods are cooked and allowed to cool slowly and then held for long periods before consumption.

Clostridium perfringens produces spores; the cooking of foods destroys growing bacterial cells and some spores, but heat resistant spores can survive. When these cooked foods are inadequately refrigerated, spores germinate and grow and the number of bacteria increase.

Foods involved in *Clostridium perfringens* food poisoning usually include protein foods such as meat and poultry, stews, gravies, sauces, meat pies and casseroles.

This type of food poisoning is classified as both an intoxication and an infection since large numbers of *Clostridium perfringens* are necessary for an outbreak to occur; but after ingestion these bacteria produce a toxin in the intestinal tract.

Symptoms occur 8 to 24 hours after eating the contaminated food and usually include acute abdominal pain and diarrhea. *Clostridium perfringens* food poisoning is relatively mild, and the symptoms commonly last from 12 to 24 hours. Due to the rather mild symptoms and short duration of the illness, most cases are probably not reported to health authorities.

Clostridium perfringens food poisoning can be prevented by:

- Adequate and rapid cooling of cooked meats, stews and gravies;
- Holding hot foods above 140°F;
- Reheating leftover foods to 165°F; and
- Good personal hygiene.

BACILLUS CEREUS

Bacillus cereus is common in soil, dust, and is widely distributed in nature. Foods from the soil and ones produced and prepared in dusty environments will contain the organism. Although outbreaks are uncommon, several involving tapioca pudding and fried rice have recently occurred in New York State.

Plant products like cereals, flour, starch, rice, baking products, animal products and mixtures of ingredients such as puddings and custards have been involved in outbreaks. *Bacillus cereus* can be a problem in food establishments where large batches of food are prepared ahead of time and not properly cooled prior to reheating and serving. Symptoms are mild and of short duration, so people usually don't seek medical attention. Control of *Bacillus cereus* is virtually the same as for *Clostridium perfringens*. Foods should be:

- Kept at proper holding temperature (below 45°F or above 140°F);
- Chilled rapidly in small quantities; and
- Reheated to 165°F.

VIBRIO PARAHAEMOLYTICUS

Vibrio parahaemolyticus is traditionally associated with seafoods, particularly crabs, oysters, shrimp, and lobsters. Most outbreaks occur because the seafoods have not been properly cooked, and then they are inadequately refrigerated, allowing bacteria to grow rapidly. Several outbreaks have also occurred when raw or undercooked seafood was allowed to contaminate cooked seafood products. Since *Vibrio parahaemolyticus* is easily killed by normal cooking temperatures, care should be taken to cook seafood products thoroughly, to eliminate cross contamination and to properly refrigerate cooked seafoods.

SHIGELLA

This type of foodborne disease is associated with poor personal hygiene and sanitation. It is spread from person-

to-person and through contaminated water. Infected food-service workers who do not practice good personal hygiene can spread the organism to much handled food like salads such as potato, tuna, macaroni, chicken and shrimp. *Shigella* can be easily controlled with a high standard of personal hygiene --

- Washing the hands after using the toilet;
- Not [illegible] with food when ill;
- By practicing good sanitation in the establishment.

ESCHERICHIA COLI

Pathogenic types of *Escherichia coli* cause the uncomfortable symptoms of "traveler's diarrhea," commonly known as "turista." They are spread from person-to-person and through contaminated water. Control of this illness can be achieved through good personal hygiene, by preparing foods in a sanitary manner and by proper sewage disposal.

"NEW PATHOGENS"

In the past several years, two bacteria have surfaced as "new pathogens." They are *Yersinia enterocolitica,* and *Campylobacter jejuni*. Although the names are difficult to pronounce, these two organisms are currently receiving a great deal of attention in laboratories around the world. They are a common contaminant of raw foods of animal origin and are easily destroyed by heat. Improper cooking and cross contamination are often responsible for outbreaks caused by these two organisms.

One can become overly concerned about foodborne illness or ignore it completely. Perhaps the best we can achieve is somewhere between these two extremes. People working with food--and that includes EVERYONE: food processing personnel, food service workers, supermarket deli people, homemakers and others--should respect the foods that they work with. Everyone should realize that food can not only spoil, but it can cause illness and sometimes death if it is improperly handled.

Remember, the safeness of food depends on all of us--won't you do your part to help?

Dairy Quality

by Darrell Bigalke and Dr. Rulon Chappel, *Food & Dairy Quality Mgmt., Inc., St. Paul, MN*

ICE CREAM MICROBIOLOGICAL QUALITY

Part I. Controlling Coliform and other Microbial Contamination in Ice Cream

Many regulatory agencies have developed standards for the Coliform Count and/or Total Bacteria Count of ice cream. Therefore, there is a necessity for ice cream manufacturers to control the number of bacteria, especially coliforms, in ice cream. Unfortunately, there are many sources and mechanisms of bacteria and/or coliform contamination. The objective of this Newsletter is to discuss some of these sources and mechanisms. Next month's Dairy Quality Update will discuss procedures for monitoring bacterial and/or coliform contamination of ice cream.

While the Total Bacteria Count is of concern to ice cream manufacturers, the Coliform Count is certainly more significant. Since the Coliform Count is frequently monitored by regulatory agencies, controlling coliform contamination of ice cream mix is essential. Coliform bacteria are normally heat sensitive and will not survive commercial pasteurization temperatures. Therefore, these organisms are thought of as post-pasteurization contaminants and used by regulatory agencies to monitor the level of plant sanitation. However, in addition to plant sanitation, other factors will influence the coliform count of ice cream. These factors include:

1) Time and temperature of holding ice cream mix.
2) Ingredients added after pasteurization.
3) Environmental factors such as contaminants from compressed air, and contaminants from chill water or glycol.
4) Laboratory procedures used to monitor coliform contamination.

Effective plant sanitation and good employee personal hygiene are necessary ingredients in a program that will control coliform contamination of ice cream mix. Product contact surfaces need to be effectively cleaned and sanitized. In this regard, rubber parts such as door gaskets, plug valves, etc., need to be in good repair and cleaned and sanitized properly. Manually cleaned product contact surfaces such as fruit feeders, fillers, etc., can be a significant source of contamination. Therefore, special efforts are needed to assure that these contact surfaces are effectively cleaned and sanitized.

Standard Methods for the Examination of Dairy Products (1) points out that ice cream ingredients can be a significant source of bacteria and/or coliform contamination. Ingredients added to ice cream mixes before pasteurization normally do not contribute to microbial contamination unless the ingredients contain large numbers of thermoduric bacteria. The ingredients of main concern are those added after pasteurization. Ingredients such as fruit, nuts, extracts or color may contain enough organisms that will contribute significantly to the Standard Plate Count and/or Coliform Count. Hammer and Babel (2) point out that from 6 - 66 percent of nut samples examined showed various levels of coliforms. Control of coliform contamination in nuts must be done through effective heat processing or treatment with gas (ethylene oxide). Also, fruits such as strawberries, raspberries, etc., may contribute significantly to the Standard Plate Count and the Coliform Count of ice cream.

Environmental factors (as in fluid milk) can be a tremendous source of bacterial and/or coliform contamination of ice cream. Condensation from compressed air, cracks and nicks in storage tanks, glycol and/or chill water contamination from cracks and HTST plates, contaminants from packaging material, and airborne contaminants can all be significant sources of bacterial and/or coliform contamination. Air dryers must be used on air compressors for compressed air used for air blows. HTST plates should be in good repair and have no cracks or pin holes allowing glycol or chill water contamination. In addition, in the HTST the ice cream mix should be at a higher pressure than the glycol or chill water pressure. Packaging material must be stored properly, and the packaging environment must be clean to reduce airborne contaminants. Pasteurized surge tanks used for holding ice cream mix must be monitored for cracks that would allow post-pasteurization contamination.

Since complete elimination of post-pasteurization contamination of bacteria and/or coliforms in a dairy envi-

ronment is virtually impossible, it is essential to control the times and temperatures of storage of ice cream mix prior to freezing. As a general rule of thumb, ice cream mix should not be stored for more than 48 hours at temperatures less than 40°F prior to freezing. If these times and temperatures are abused, there is potential for tremendous microbiological growth in the ice cream mix. Consider the example in the table below.

	Product A	Product B
Storage Time	48 Hours	48 Hours
Storage Temperature	48 F	38 F
Initial Contamination Rate	1 coliform organism/ 100 of mix	1 coliform organism/ 100 of mix
Coliform Count After 48 Hours	15 coliforms/ml	1 coliform/25 ml

For Product A stored at 48°F, one might anticipate the coliform contaminate to have a generation time of 4 hours. At this growth rate, one would expect the coliform population of 15/ml at the end of 48 hours. However, in Product B stored at 38°F, the coliform contaminate would have a growth rate or generation time of 24 hours. At this growth rate, the coliform population at the end of 48 hours would be one organism/25 ml. In other words, one could expect a population of 15 coliforms/ml for product stored at 48°F and 1 organism/25 ml for product stored at 38°F. Therefore, in order to meet the regulatory standards of less than 10 coliforms/ml, it is essential to store ice cream mix at low temperatures prior to freezing.

In summary, controlling bacteriological and/or coliform contamination of ice cream requires four considerations:

1) Effective plant sanitation.
2) Controlling environmental contaminants.
3) Selecting ingredients with low microbial counts that are coliform-free.
4) Controlling the times and temperatures of storage of ice cream mix.

Next month's Dairy Quality Update will continue with Part II, "Recommended Laboratory Procedures for Monitoring and Controlling the Microbiological Quality of Ice Cream."

1. Marth, Elmer H. 1978. *Standard Methods for the Examination of Dairy Products*. Washington, DC: American Public Health Association.
2. Hammer, Bernard W. and Frederick J. Babel. 1957. *Dairy Bacteriology*, 4th Ed. New York: John Wiley & Sons, Inc.

Educational Conference Held In South Dakota

The South Dakota Environmental Health Association and the South Dakota Public Health Association held their third Joint Annual Educational Conference in Brookings, South Dakota, May 2-4, 1984. The conference, held at the Student Union Building on the campus of South Dakota State University, had the largest attendance ever of approximately 125-150 daily.

Awards presented at the conference included: Sanitarian of the Year Award, Robert McGrath, Health Director, Brookings City Dept.; and Honorary Membership, Retiring 1984, Harold Schultz, Program Director, State Dept. of Agriculture.

Presentations included: Lab Improvement Through Training & Quality Control, John Ikeda, Chief, Lab Improvement Program, MN State Dept. of Health; Big Xious Aquifer Study, Dennis Nelson, Technical Assistant, East Dakota Conservancy Sub-District; and the Joint Luncheon address given by Dr. John Todd, Assistant Surgeon General, Deputy Director of Indian Health Service, U.S. Public Health.

Officers for 1984-85 include: President, Cathy Meyer, SD State Dept. of Health, Mitchell; President Elect, Robert McGrath, Brookings City Health Dept., Brookings; and Morris V. Forsting, Secretary-Treasurer, SD State Dept. of Health, Sioux Falls.

Left to right, Jim Lawler, 83-84 President SDEHA; Kathy R. Hathaway, Executive Secretary IAMFES; May Coleman, Region IV Vice President NEHA; Linda Kropenske, President SDPHA; and Dr. John Todd, Assistant Surgeon General Deputy Director, IHS, USPHS, Dept. of Health and Human Services.

Jim Lawler, (right), presents Robert McGrath (left) with Sanitarian of the Year Award.

PA Dairy Sanitarians - Laboratory Directors Conference

The joint program was held at the Keller Conference Center at the Pennsylvania State University with almost 250 people in attendance. There were four panel discussions with 11 participants and presentations on other topics by 34 speakers. Panels included computerized milking and feeding, automated composition testing, farm quality problems, and testing cheese and frozen desserts for composition. Two half days were joint sessions, while the other two half days featured separate sessions for laboratory directors and industry or regulatory sanitarians.

Seventy-six respondents rated the program good to excellent. The most interesting and worthwhile presentations in the joint sessions were rated as communicating with farmers, changes in milk composition and dairy regulations. Automated component testing was rated high by laboratory directors, and bottom filling of bulk tanks and stray voltage received high ratings by sanitarians. The 1985 program is scheduled for May 13-15.

Donald Lerch, PA Department of Agriculture sanitarian, was elected as Vice President, to join James Barnett, Interstate Milk Producers Cooperative, as the new President. Arthur Freehling is President Elect, and Audrey Hostetter and Patricia McKenty continue to serve as Secretary-Treasurer and Assistant.

George Deer, a regional sanitarian and farm supply rating officer, was awarded the Distinguished Service Plaque. William Baumgart, fieldman with Interstate Milk Producers Cooperative, received the plaque as the outstanding fieldman for 1984.

PA Dairy Sanitarians Associations Officers for 1984 are Arthur Freehling, President Elect; James Barnett, President; Audrey Hostetter, Secretary-Treasurer; Patricia McKenty, Assistant Secretary-Treasurer; Donald Lerch, Vice President; and Ivan Redcay, Past President.

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Effective Enrichment-Plating Conditions for Detection of *Salmonella* in Foods, Jean-Yves D-Aoust, Health Protection Branch, Health and Welfare Canada, Sir Frederick Banting Research Centre, Tunney's Pasture, Ottawa, Ontario, Canada K1A 0L2

J. Food Prot. 47:588-590

The performance of tetrathionate brilliant green (TBG) and selenite cystine (SC) enrichments, and bismuth sulfite (BSA) and brilliant green sulfa (BGS) plating media was assessed on the basis of data on 2085 *Salmonella*-contaminated low and high moisture foods that were collected during a 6-year (1977 to 1983) study involving 22 laboratories. None of the eight enrichment-plating combinations considered identified all positive samples. TBG was markedly more sensitive than SC for detection of salmonellae in high moisture foods, where enrichment in TBG and plating on both BSA and BGS identified 92% of contaminated samples. Plating of SC enrichment cultures on the two agar media was substantially less productive (63%). With low moisture foods, TBG and SC rates of isolation varied by less than 10% under homologous conditions. Plating media did not affect method sensitivity. Identification of numerous contaminated samples by TBG or SC enrichment alone underlines the value of using multiple enrichment and plating media in standard methods.

Combined Effect of Monotertiary Butylhydroquinone and Sodium Chloride on Lactic Acid Bacteria, M. Raccach, M. E. Schilz and S. L. Kovac, Division of Agriculture, Food Quality Program, Arizona State University, Tempe, Arizona 85287

J. Food Prot. 47:591-597

The combined effect of monotertiary butylhydroquinone (TBHQ; 0 to 2000 μg/g), meat and NaCl (3.0 and 3.6%) was examined on the fermentation of dextrose and sucrose by *Pediococcus pentosaceus* and *Lactobacillus plantarum* at 27 and 35°C. With both bacteria, the rate of fermentation of each carbohydrate was reduced to different extents with increases in the concentration of TBHQ. In most instances, increasing the concentration of NaCl from 3.0 to 3.6% enhanced the antimicrobial activity of TBHQ. The same phenomenon was observed when the temperature of fermentation was reduced from 35 to 27°C. The effect of increasing the concentration of NaCl (3.0 to 3.6%) on the rate of fermentation of dextrose was larger than that brought about by decreasing the temperature of fermentation. The reverse was found with sucrose. *P. pentosaceus* was more sensitive to the combined action of TBHQ and NaCl at both 27 and 35°C than *L. plantarum*. TBHQ, 1000 and 2000 μg/g (35°C) and 30 μg/g (27°C) in combination with 3.0 and 3.6% NaCl, respectively, stopped the fermentation of dextrose by *P. pentosaceus*. TBHQ, up to 2000 μg/g (35°C) and up to 30 μg/g (27°C) with 3.6% NaCl, reduced (up to 80%) but did not stop the fermentation of sucrose by *P. pentosaceus* in meat. The fermentation of dextrose and sucrose by *L. plantarum* in meat (27 and 35°C) was reduced (up to 73%), but was not stopped, by up to 2000 μg/g TBHQ.

Effect of Processing and Storing Oyster Meats on Concentrations of Indicator Bacteria, Vibrios and *Aeromonas hydrophila,* M. A. Hood, R. M. Baker and F. L. Singleton, Department of Biology, The University of West Florida, Pensacola, Florida 32514

J. Food Prot. 47:598-601

Oyster meats were examined from three commercial processing plants at different stages of processing and storage for four standard indicator bacterial groups, five species of vibrios reported to be associated with shellfish associated gastroenteritis, and *Aeromonas hydrophila*. Processing reduced the overall microbial load, but the individual bacterial groups examined remained statistically the same throughout processing. Upon storage, the concentration of *Vibrio parahaemolyticus* significantly declined with a concomitant increase in levels of *A. hydrophila,* and the levels of all other *Vibrio* spp. remained statistically the same. The findings suggest that, while processing results in a cleaner appearing product, processing does not eliminate potentially pathogenic vibrios. However, processing and subsequent storage of oyster meats do not appear to increase the levels of vibrios.

Quantitative Estimation of Fecal Coliforms in Fresh and Frozen Fishery Products by APHA and Modified A-1 Procedures, S. Varga and A. Doucet, Department of Fisheries and Oceans, Fisheries Operations Branch, 1721 Lower Water Street, Halifax, Nova Scotia, Canada B3J 2S7

J. Food Prot. 47:602-603

Fresh, frozen and breaded fish were analyzed for fecal coliforms by the modified A-1 (A-1 M) and APHA procedures. The A-1 M method produced significantly lower numbers of fecal coliforms. The lower values derived by the A-1 M procedure were attributed to the inhibiting effect of sample sediment on gas formation in fermentation tubes. By altering the A-1 M technique, estimates comparable to those produced by the presently used APHA method were obtained. Changes consisted of an increase in incubation time at 44.5°C and/or elevating gas vials in the culture tubes.

Comparison of Microbiological Methods for Detecting Penicillin and Penicillin-Like Antibiotic Residues in Milk, J. N. Geleta, H. H. Bryant, J. E. Heavner, J. J. Colaianne, G. G. Carter and M. A. Norcross, Division of Veterinary Medical Research, Bureau of Veterinary Medicine, Food and Drug Administration, Beltsville, Maryland 20705

J. Food Prot. 47:604-610

Five microbiological methods for detecting residues of penicillin and penicillin-like antibiotics were compared, and the relative incidence of residues in whole milk samples was determined. Five groups of 10 lactating cows each and five commercial antibiotic products (penicillin G in oil, penicillin G in a water-dispersible oil base, cloxacillin, cephapirin and ampicillin) used for the treatment of mastitis were studied. Milk samples collected from the cows were tested for antibiotic content by the *Sarcina lutea* or *Bacillus subtilis* cylinder plate, International Dairy Federation-Associationof Official Analytical Chemists (IDF-AOAC) *Bacillus stearothermophilus* ATCC 10149 disc plate, Delvotest-P, Antibiotic Residue Branch (ARB) *B. stearothermophilus* C 953 quantitative disc plate and ARB *B. stearothermophilus* C 953 quantitative cylinder plate methods. All samples tested by the original *S. lutea* or *B. subtilis* cylinder plate methods, with the exception of the penicillin G in oil product (Uni-Biotic), were free of antibiotic residues and showed no inhibitors beyond the labeled milk withdrawal time. The newer, more sensitive official IDF-AOAC method, Delvotest-P and both ARB *B. stearothermophilus* quantitative disc and cylinder plate methods detected measurable amounts of cephapirin and penicillin G in the post-treatment milk for one to three additional milkings beyond the labeled milk discard time. Cloxacillin, as determined by the ARB *B. stearothermophilus* cylinder plate method, was generally depleted by 48 h. The excretion rate of ampicillin product coincided with the labeled milk discard time. The level of detection of both disc plate methods and Delvotest-P for cephapirin and ampicillin was comparable. Variations in the concentration in milk and the persistence of two penicillin G products were probably due to differences in the formulation and the dosing regimen. Inhibitory substances and non-specific reactions were observed with the IDF-AOAC disc method, the Delvotest-P and both ARB *B. stearothermophilus* methods in some control and post-treatment milk samples. These results are consistent with reports of other investigators and suggest that the use of more sensitive procedures for monitoring antibiotic residues in milk may result, for some infusion preparations, in an increased incidence of violative residues of penicillin G and cephapirin.

Comparison of Infra-Dry and AOAC Methods for Moisture in Food Products, B. A. Minor, K. A. Sims, R. Bassette and D. Y. C. Fung, Department of Animal Sciences and Industry, Kansas Agricultural Experiment Station, Kansas State University, Manhattan, Kansas 66506

J. Food Prot. 47:611-614

The Infra-Dry (IR) method was accurate, precise and faster than conventional (AOAC) procedures for moisture determinations in ten selected food products. The average percentage moisture by the IR method for 10 common food products and those by AOAC in parentheses are as follows: oatmeal 9.88 (9.87), cornmeal 10.86 (10.91), wheat flour 10.80 (10.80), grape nuts 4.73 (4.78), rice 12.39 (12.41), potato flakes 8.40 (8.36), bread crumbs 9.93 (9.99), noodles 9.58 (9.54), NFD milk 4.23 (4.24), and fresh milk 88.60 (88.71). The temperatures used for the IR method (135 to 155°C) were higher than those for the AOAC procedures (130°C for all products except NFD and fresh milk [100°C]); however, the times were considerably less (10 to 30 min) than for AOAC procedures (1 to 5 h). Standard deviations were generally <0.06%, except for cornmeal and noodles which were approximately 0.1%. Precisions were generally >97%. Upon removing the samples from the IR oven, results of good precision and accuracy were obtained by cooling the samples in a desiccator for 5 min or the built-in IR cooling chamber for 45 s. The recommended IR method uses a cooling chamber, is faster, and does not require a desiccator. Slightly lower precision and accuracy resulted when the entire IR oven was used. The best results were obtained using the black third of the oven. However, the slight difference in precision and accuracy is of little practical significance.

Comparison of Aerobic and Anaerobic Incubation Conditions for Optimal Recovery of *Salmonella*, J. S. Bailey, J. O. Reagan, N. A. Cox and J. E. Thomson, U.S. Department of Agriculture, Agricultural Research Service, Richard B. Russell Agricultural Research Center, P.O. Box 5677, Athens, Georgia 30613 and Department of Food Science, University of Georgia, Athens, Georgia 30602

J. Food Prot. 47:615-617

Effects of aerobic and anaerobic incubation of selenite-cystine and TT enrichment broth incubated at 37 and 34°C on the growth of *Salmonella* were determined. Pure cultures of four serotypes of *Salmonella* were enumerated at 0, 4, 8 and 24 h of incubation and no significant differences related to incubation conditions were found. The effect of microflora other than *Salmonella*, in pure and mixed cultures and from chicken and feed samples, on the recovery rate of *Salmonella* after incubation in enrichment media was evaluated and no significant effects were found; however, aerobic incubation usually gave higher *Salmonella* counts. Greater recovery of *Salmonella* was obtained by incubating selective plating media aerobically rather than anaerobically. Aerobic incubation of liquid enrichment media and differential plating media is therefore recommended for optimal recovery of *Salmonella*.

Evaluation of the Microbiological Safety of Tofu, Susan K. Kovats, Michael P. Doyle and Nobumasa Tanaka, The Food Research Institute, University of Wisconsin-Madison, Madison, Wisconsin 53706

J. Food Prot. 47:618-622

Studies were done to evaluate the safety of tofu inoculated with different bacterial pathogens and held at different temperatures. *Clostridium botulinum* (type A and/or B) toxin was produced in tofu after 1 and 3 wk of storage at 25 and 15°C, respectively, but not within 6 wk at 5 or 10°C. Compared with water-packed tofu, vacuum-packaged tofu did not increase the risk of botulinal toxin production at 15°C. *Staphylococcus aureus* and *Salmonella typhimurium* grew at similar rates at 10, 15 and 25°C, but decreased in number at 5°C. Staphylococcal enterotoxin was not produced within 4 wk at 10°C, 8 d at 15°C, or 2 d at 25°C, even though an *S. aureus* population of $>10^7$ CFU/g was present in most samples and analyzed. Staphylococcal enterotoxin was detected in a 5-d sample held at 25°C. Toxin production may have been delayed because of the low amount of oxygen in water-packed tofu. *Yersinia enterocolitica* grew at all temperatures evaluated (5, 10, 15 and 25°C), including a 4- to 6-$\log_{10}$ increase within 14 d at 5°C. Results of these studies substantiate the need for: (a) implementing a high level of sanitary practices during tofu production, (b) pasteurizing tofu after packaging, and (c) properly refrigerating tofu during storage and display.

Recovery of Coliphages from Chicken, Pork Sausage and Delicatessen Meats, J. E. Kennedy, Jr., J. L. Oblinger and G. Bitton, Food Science and Human Nutrition Department and Environmental Engineering Sciences Department, University of Florida, Gainesville, Florida 32611

J. Food Prot. 47:623-626

Coliphages were recovered from 18 of 18 fresh chicken and pork sausage samples as well as from 2 of 6 processed delicatessen meat samples employing a rapid technique using EC medium as both an eluent and as a modified phage assay plating medium. Coliphage recoveries ranged from approximately 3.3 to 4.4 $\log_{10}$, 1.2 to 3.5 $\log_{10}$ and zero to 2.7 $\log_{10}$ plaque forming units per 100 g in fresh chicken, fresh pork sausage and roast turkey breast, respectively. High coliphage levels generally reflected high fecal coliform counts, particularly for fresh meat samples. These data indicate that coliphages can be readily enumerated in foods within 16 h.

Determination of Aflatoxins in Bread and Bakery Products, M. T. Cutuli de Simón and G. Suárez Fernández, Departamento de Microbiologia, Facultad de Veterinaria, Universidad Complutense, Madrid-3, Spain

J. Food Prot. 47:627-628

The possible presence of aflatoxins B_1, B_2, G_1 and G_2 was studied on 50 samples of bread and 50 samples of bakery products. The methods used in sample analysis were the following: (*a*) aflatoxin determination by thin layer chromatography (TLC) with chloroform/acetone solvent system (88/12); and (*b*) by high pressure liquid chromatography, with the toluene/ethyl acetate/methanol solvent system (68/29/3). With both methods, separations obtained of the different aflatoxins were optimal for accurate identification. Presence of aflatoxins B_1 and G_1 was detected in the extract from a sample of the bakery products group, using both methods mentioned.

Contaminating Mycoflora in Yogurt: General Aspects and Special Reference to the Genus *Penicillium* A. Mateos García and G. Suárez Fernández, Departamento de Microbiologia, Facultad de Veterinaria, Universidad Complutense de Madrid, Madrid-3, Spain

J. Food Prot. 47:629-636

A microbiological study was carried out on three commercial brands of yogurt with three different flavors. Each sample was divided into two lots, one for initial analysis and the other was stored at 4°C for 20 d before analysis. The lots were denominated initially and at the end of storage. Frequency of appearance in integrating the genera of the mycoflora of yogurt was observed to be very different, which enabled us to establish two types of flora: normal and sporadic/infrequent. We considered the mycoflora belonging to the genera *Penicillium, Monilia, Cladosporium, Micelia sterilia, Alternaria, Rhizopus, Aspergillus* and yeasts in general to be normal. The genera considered to be sporadic totaled seventeen. From the count of toal colonies of molds per ml, it was deduced that the quantitative method is not valid for this type of microorganism in yogurt. Culture media used showed similar levels of effectiveness for growth of the various genera. The comparative study conducted on the two lots, initial and final, showed a certain evolution of mycoflora present in the product. With regard to the *Penicillium* genus, the highest frequencies of appearance occurred in the same brand and in both lots. Comparing the results according to flavor, differences were found between initial and final lots. Malt extract agar was the most favorable culture medium for development of the *Penicillium* strains isolated for yogurt. As to species, the presence of *Penicillium frequentans* is to be noted because of its possibly toxigenic nature.

Formation and Control of Mycotoxins in Foods, Lloyd B. Bullerman, Lisa L. Schroeder and Kun-Young Park, Department of Food Science and Technology, University of Nebraska, Lincoln, Nebraska 68583

J. Food Prot. 47:637-646

Mycotoxin production is favored by high humidity and high water activity (a_w). To control mycotoxin formation on the basis of moisture, the moisture content must be maintained below a

certain critical level for each commodity. Aflatoxin production is favored by temperatures of 25 to 30°C, whereas below 8 to 10°C, aflatoxin production can occur, but the amounts produced are less and the time required for production is longer. Cycling or changing temperature may or may not increase aflatoxin production, depending on the temperatures, mold species and substrates involved. Other mycotoxic molds respond to temperature differently than the aspergilli. Species of *Penicillium*, *Fusarium* and *Cladosporium* are capable of growing at temperatures below 5°C, and some even just below freezing. *Penicillium* spp. can produce patulin, penicillic acid and ochratoxin at temperatures from 0 to 31°C, whereas *Aspergillus ochraceus* does not produce ochratoxin or penicillic acid below 12°C. Penitrem production by *Penicillium crustosum* can occur at refrigeration temperature. *Fusarium* spp. can produce zearalenone and the trichothecenes at temperatures below 10°C and even below freezing. Maintaining storage temperatures of stored commodities at 5°C or lower will prevent the production of aflatoxins and ochratoxin by aspergilli but will not prevent the production of mycotoxins by *Penicillium* spp. and *Fusarium* spp. Mycotoxic molds may grow on a vast array of substrates, but some substrates support little or no mycotoxin production while supporting extensive mold growth. Most substrates that support aflatoxin production are plant products, such as peanuts, Brazil nuts, pecans, walnuts, almonds, filberts, pistachio nuts, cottonseed, copra, corn sorghum, millet and figs. Animal products are less likely substrates for aflatoxin production. The main source of aflatoxins in animal products are residues in milk and animal tissues as a result of consumption of toxic feed by the animal. Some herbs and spices have antifungal properties and do not support mycotoxin production. However, aside from this, most food substrates are susceptible to mold growth and mycotoxin production. Some substrates, such as cheese, cured meats and soybeans, might be less favorable for mycotoxin production, but may still support mycotoxin formation. Drought stress, insect damage and mechanical damage may increase the ability of *Aspergillus flavus* and other fungi to invade peanuts, cottonseed and grain. Some measure of control can be gained by minimizing drought stress through irrigation and minimizing insect and mechanical damage. Development of peanut varieties and corn hybrids that are resistant to preharvest invasion by *A. flavus* may also offer some measure control. Competing microorganisms tend to restrict fungal growth and mycotoxin production. Low oxygen concentration (<1%) and/or increased concentrations of other gases (i.e., >90% CO_2) may depress mold growth and mycotoxin formation. Antimycotic agents can be used to control mold growth and mycotoxin production. Sorbic acid, potassium sorbate, propionic acid and propionates appear to be more effective antimycotics over a greater range of conditions than benzoates. Other substances, such as sodium diacetate and BHA, also have antifungal activity. Certain herbs and spices, particularly cinnamon, cloves and mustard, may contain enough antifungal activity to exert a protective effect at normal usage levels.

Antibiotic Residue Detection in Milk - A Review, J. R. Bishop and C. H. White, Louisiana Agricultural Experiment Station and LSU Agricultural Center, Department of Dairy Science, Louisiana State University, Baton Rouge, Louisiana 70803

J. Food Prot. 47:647-652

Methods for antibiotic residue detection in dairy products, especially raw milk, have greatly improved as to their rapidity, accuracy and sensitivity over the past 30 years. An assay requiring overnight coagulation was available in the mid-1950's, whereas now there is an immunologically-based test using monoclonal antibody technology requiring only 6 min. These advances have not come about without extensive research efforts. The following is an overview of the developments and their significance to the dairy industry.

Calendar

1984

August 6-10, BIOTECHNOLOGY: MICROBIAL PRINCIPLES AND PROCESSES FOR FUELS, CHEMICALS AND INGREDIENTS, a Massachusetts Institute of Technology one week course. For more information contact: Director of Summer Session, MIT, Room E19-356, Cambridge, MA 02139.

September 10-14, INTRODUCTION TO FOOD MICROBIOLOGY: A SHORT COURSE, to be held at the University of California, Davis. For more information contact: John C. Bruhn, Dept. of Food Science & Technology, University of California, Davis, Davis, CA 95616. 916-752-2192. Reg. fee is $395, due by September 5th.

September 11, WASHINGTON MILK AND FOOD SANITARIANS ASSOCIATION ANNUAL MEETING to be held at the Holiday Inn, 128th, Everett, Washington. For more information contact: Lloyd Luedecke, Dept. of Food Science & Tech., Washington State Univ., NW 312 True Street, Pullman, WA 99163. 509-335-4016.

September 11-13, AMERICAN CULTURED DAIRY PRODUCTS INSTITUTE THIRD MINI-KLINIC, to be held in Toronto, Ontario, Canada. For more information contact: Dr. C. Bronson Lane, ACDPI Vice President, P.O. Box 7813, Orlando, FL 32854. 305-628-1266.

September 12-13, The FIFTH ANNUAL JOINT EDUCATIONAL CONFERENCE of the Wisconsin Association of Milk and Food Sanitarians, the Wisconsin Environmental Health Association, The Wisconsin Dairy Technology Society and the Wisconsin Association of Dairy Plant Field Representatives will be held at the Elisabeth Inn at Plover (Stevens Point), Wisconsin. *Please note that this is a change of location.* For more information contact: Ron Buege, West Allis Health Department, 7120 West National Ave., West Allis, WI 53214. 414-476-3770.

September 15-21, 68th ANNUAL SESSIONS OF THE INTERNATIONAL DAIRY FEDERATION, Prague, Czechoslovakia. For more information contact: Harold Wainess, Secretary U. S. National Committee of the IDF (USNAC), 464 Central Avenue, Northfield, IL 60093. 312-446-2402.

September 18-20, NYS ASSOCIATION OF MILK AND FOOD SANITARIANS ANNUAL MEETING, to be held at the Albany Hilton, Albany, NY. For more information contact: John R. Bartell, President, Alfred State College, Alfred, NY 14802. 607-871-6145 (office) or 607-324-7556 (home).

September 20-21, MINNESOTA SANITARIANS ASSOCIATION, INC. ANNUAL MEETING to be held at the Earl Brown Center for Continuing Education on the St. Paul Campus of the University of Minnesota. For more information contact: C. B. Schneider, President, Minnesota Sanitarians Association, Inc. 612-623-5335.

September 30-October 4, 69TH ANNUAL MEETING OF THE AMERICAN ASSOCIATION OF CEREAL CHEMISTS to be held at the Hyatt Regency and Amfac Hotels in Minneapolis, MN. For more information contact: Raymond J. Tarleton, AACC Headquarters, 3340 Pilot Knob Road, St. Paul, MN 55121. 612-454-7250.

October 3, OHIO ASSOCIATION OF MILK, FOOD & ENVIRONMENTAL SANITARIANS ANNUAL MEETING to be held at Duff's Restaurant, Columbus, OH. For more information contact: CDR Ronald H. Smith, USPHS, % State Training Branch, FDA, Room 8002, FOB, 550 Main Street, Cincinnati, OH 45202. 513-684-3771.

October 3-5, KANSAS ASSOCIATION OF SANITARIANS ANNUAL MEETING to be held at the Red Coach Inn, McPherson, KS. For more information contact: Dale Wing, 1014 Cody, Hays, KS 67601. 913-625-5663.

October 9-10, DAIRY INDUSTRY CONFERENCE, Hyatt/Long Beach, Long Beach, CA. For more information contact: John C. Bruhn or Shirley Rexroat, Dept. of Food Science & Technology, University of California, Davis, CA 95616. 916-752-2191.

October 14-17, LONDON INTERNATIONAL FROZEN FOOD TRADE FAIR. For more inforamtion contact: Sandra Paul, 212-752-8400.

October 15-17, ISSUES IN SENSORY EVALUATION - STABILITY AND QUALITY CONTROL - Palo Alto, California. Attendence is limited and there is a fee. For more information and registration contact: Tragon Corporation, 750 Welch Road, Suite 210, Palo Alto, CA 94304.

October 19-25, FOOD SANITATION INSTITUTE 27TH ANNUAL NATIONAL EDUCATIONAL CONFERENCE & EXPOSITION, Holiday Inn Surfside, Clearwater Beach, FL. For more information contact: Jean M. Day, Executive Director, Food Sanitation Institute, 1019 Highland Ave., Largo, FL 33540. 813-586-5710.

October 23, ILLINOIS MILK, FOOD & ENVIRONMENTAL SANITARIANS ANNUAL MEETING, to be held at the Blue Moon Restaurant, Elgin, IL. For more information contact: Clem Honer, 1 South 760 Kenilworth Avenue, Glen Ellyn, IL 60137. 312-693-3200 (business). 312-858-9314 (home).

October 23-26, VETERINARY TOXICOLOGY WORKSHOP: ANIMAL TOXICOLOGY RELATED TO ENERGY INDUSTRIES, to be held at the Knoxville Hilton Hotel, Knoxville, TN. For more information contact: Dr. Charles F. Reed, College of Veterinary Medicine, P.O. Box 1071, Knoxville, TN 37901-1071. 615-974-7264.

November 22-24, 14TH ANNUAL SYMPOSIUM ON THE ANALYTICAL CHEMISTRY OF POLLUTANTS, 3rd International Congress on Analytical Techniques on Environmental Chemistry-Expoquimia, Barcelona, Spain. For more information contact: Av. Reina Ma. Christina Palacio No. 1, Barcelona-4 Spain.

November 26-29, UCD/FDA BETTER PROCESS CONTROL SCHOOL, to be held at the University of California. For more information contact: Robert C. Pearl, Dept. of Food Science & Technology, University of California, Davis, CA 95616. 916-752-0980.

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February 25-27, 11TH ANNUAL ABC RESEARCH CORPORATION TECHNICAL SEMINAR. For more information contact: Sara Jo Atwell, Administrative Assistant, ABC Research Corporation, P.O. Box 1557, Gainesville, FL 32607. 904-372-0436.

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.

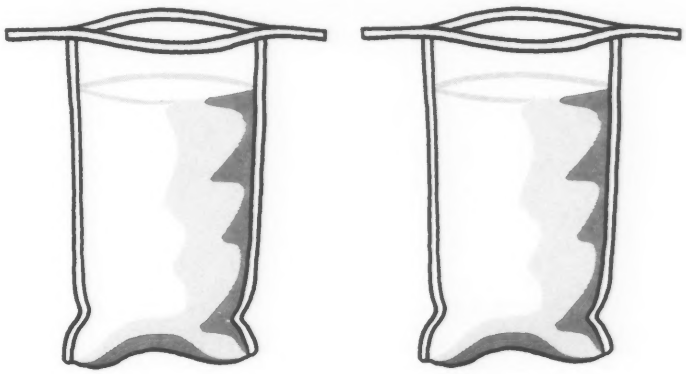
April 14-18, INTERNATIONAL FOOD FAIR OF SCANDINAVIA - TEMA 85, the 8th international fair for food and beverages, held together with the 5th international hotel, restaurant and catering fair. For more information contact: Leslie Christensen, General Manager, Bella Center A/S, Center Boulevard, DK-2300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

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

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.

August 5-9, IAMFES ANNUAL MEETING to be held at the Hyatt Regency, Nashville, TN. For more information contact: Kathy R. Hathaway, IAMFES, Inc., P.O. Box 701, Ames, IA 50010. 515-232-6699.



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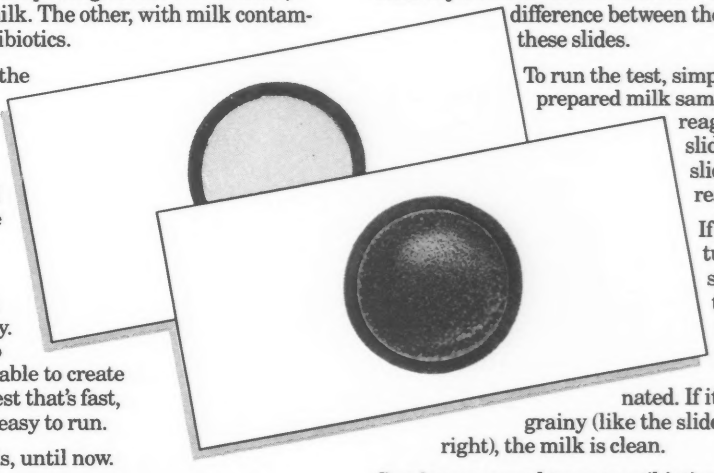

To run the test, simply mix a prepared milk sample and reagents on a slide. Rock the slide, then read.

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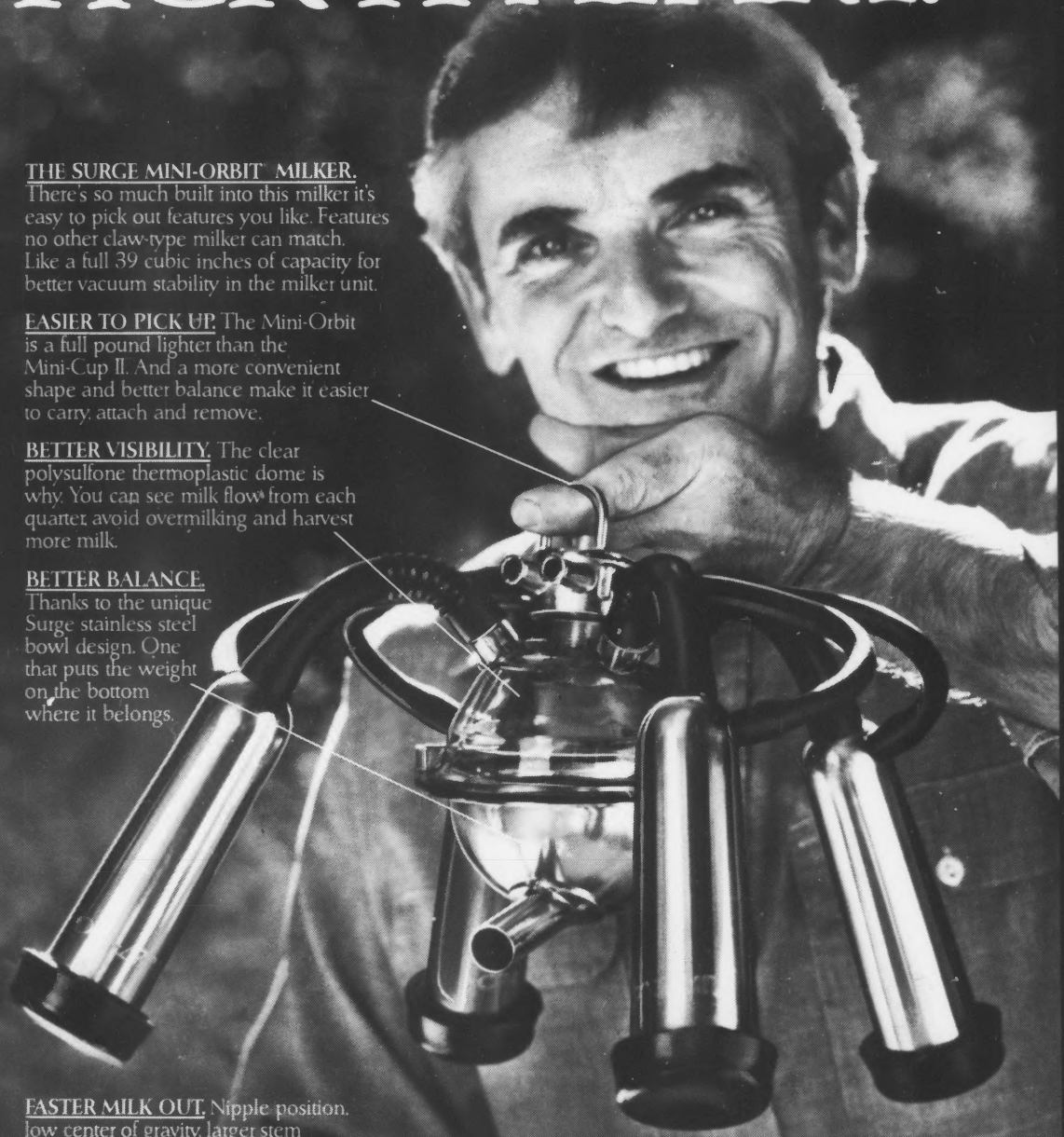

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