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# Dairy and Food Sanitation

*A Publication for Sanitarians and Fieldmen*

- Training Programs: They Need Not Be Boring
- Quality of Milk and Patterns of Consumption
- Teat Dip as A Component of Coliform Mastitis Control
- Fundamentals of Cleaning and Sanitizing Multiuse Utensils and Food Equipment Surfaces

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

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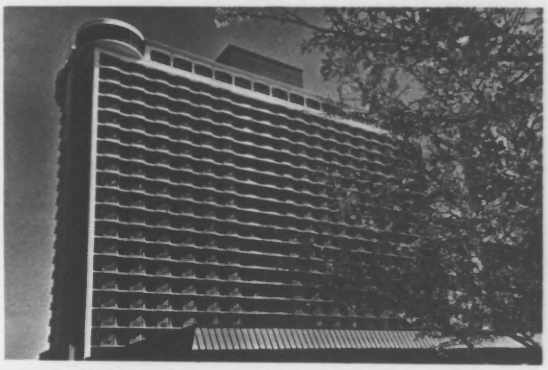

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# Dairy and Food Sanitation

Vol. 2 March, 1982 No. 3

*Dairy and Food Sanitation, Vol. 2, No. 3, Pages 92-94 (March 1982)*


# *Fundamentals of Cleaning and Sanitizing Multiuse Utensils and Food Equipment Surfaces*

**JAMES L. BROWN**

*National Sanitation Foundation Testing Laboratory*
*Ann Arbor, Michigan*

*Back at the turn of the century, infectious influenza swept across the U.S. leaving many persons dead in its path. Today, this dreaded killer has been all but been eliminated as a result of increased medical know-how, and better sanitation of food utensils. One pioneer in the field of sanitation was J. A. Cummings, who published a paper in 1919 making recommendations for the proper washing of utensils to make them safe to use. This article expands on those recommendations, covering the fundamentals of cleaning by the use of detergents, water and heat, and how the utensil is sanitized by the chemical action of chlorine, iodine or quaternary ammonium compounds.*

Although some may think food sanitation theories are relatively recent developments, understanding that eating utensils must be clean to prevent the spread of infections is not new. Over sixty years ago, a scientist named J. A. Cummings recommended specific methods for proper sanitation of multiuse utensils to make them safe.

Since then, health agencies have set many regulations in order to insure a bacteriologically safe eating utensil. Of primary importance is the removal of physical soil. This is essential to the sanitization of the utensil.

First, some terms must be defined for a clear understanding of the subject:

Sanitizing Agent - An agent that reduces the number of bacterial contaminants to safe levels, as determined by public health requirements.

Disinfectant - Usually a chemical agent which destroys germs or other harmful organisms or which inactivates viruses. Most commonly used to designate chemicals that kill growing forms but not necessarily resistant spore forms of bacteria.

Sterilization - The complete destruction of all microorganisms.

Detergent - A "cleaning agent," or, in popular usage the term generally refers to packaged cleaners used for laundering and dishwashing. Detergents have soapy characteristics without having the disadvantages commonly found with a true soap in hard water.

Soap - A sodium or potassium salt with a long chain organic acid.

Saponification - The chemical reaction between an alkali and a fat in which soap is produced.

Emulsification - The physical action in which fats are mechanically broken up into very small particles which are uniformly suspended in a solution.

Sequestering Agents - Compounds which will react with certain ions to form relatively stable, water soluble complexes. Polyphosphates are often used in detergent formulations to prevent precipitation.

Peptize - To dispense in colloidal form, usually in a solution.

Detergents are formulated from a number of different compounds. One is alkalis, which soften the water by precipitating the hardness ions. Alkalis also saponify fats, or create a chemical reaction through which soap is produced.

Complex phosphates are a second ingredient of detergents. These emulsify fats and oils, disperse and suspend oils, peptize proteins, soften water by sequestering, and provide rinsability characteristics without being corrosive.

A third component of detergents are organic compounds used to soften the water by sequestering, prevent mineral deposits and peptize proteins.

A fourth compound of detergents is wetting agents. These emulsify and disperse fats, provide wetting properties, form suds and provide rinsability characteristics.

Organic acids are a fifth ingredient. These acids prevent mineral deposits by sequestering, and also soften water.

Another compound found in some detergents are mineral acids. These prevent mineral deposits and soften water.

Detergents are classified as anionic, cationic, non-ionic or amphoteric according to the way they ionize in solution. The anionic are by far the most widely used.

Very basically, an anionic surfactant molecule, the active portion of the formulated detergent can be visualized as consisting of two parts: the "head" and "tail." See Figure 1.

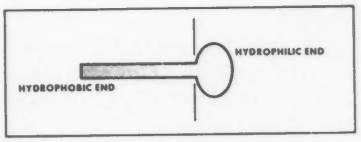


Figure 1. *Surfactant Molecule.*

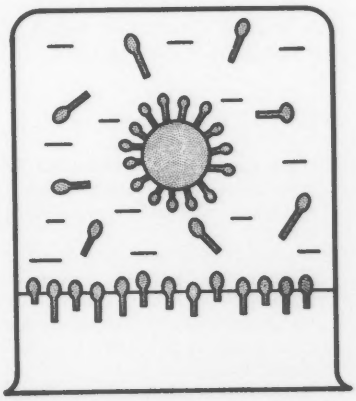

Figure 2. *Schematic Illustration of Soil Suspension by Micelle Formation.*

Chemically, the tail is the active part of the molecule. It consists of the long chain hydrocarbon which is hydrophobic or "water-hating." The "head" is the sodium portion. It is hydrophilic or "water-loving."

These molecules gather together in rather well-defined aggregates called micelles. See Figure 2. When foreign matter, soil, for example, is present it is taken into the micelle and suspended in the solution. Excess surfactant molecules migrate to the air-water interface where they form suds.

In general, detergents should possess the following properties:

- Wetting (the ability to wet readily the utensil being cleaned)
- Emulsification (the ability to emulsify fats from the food soil on utensils)
- Dissolving (the ability to dissolve food particles, particularly proteins)
- Deflocculation (ability to break up dirt particles)
- Dispersion (the detergent should function properly in hard and soft waters, and preferably should be of a type which will minimize the formation of a film, or deposit of mineral salts, or similar substances on utensils and equipment).
- Rinsing (property of being easily rinsed from the utensil by clean water)
- Sequestering
- Buffering

Water is another element basic to utensil cleaning. It has a number of different functions, such as acting as a solvent for water soluble soil or as a wetting agent. Water can be a vehicle for carrying detergent where needed or for carrying away the separated soil. Water also distributes mechanical action imparted by machine agitation. This cleans the utensils by creating the mechanical force necessary for complete soil removal. In addition, when water, is applied with force it reduces soil particle and globule size for stable dispersion.

Heat is the final fundamental element of cleaning. It enhances the spontaneous separation of soil from the surface by:

- decreasing strength of absorptive bonds between soil and surface;
- decreasing the viscosity of liquid soil and thus the resistance of the soil to shear during dispersion;
- increasing pedesis (brownian movement) of solid soil particles;
- increasing the solubility of soluble soils; and
- increasing the rate of reaction and thus the extension reaction in a given time between alkali and acid soil or saponsifiable fatty soil.

But heat may be detrimental to the efficiency of a detergent system. It can lower surface activity of detergent solutions which are optimally soluble in cold water. Heat increases the extent of hydrolysis of hydrolyzable detergents. It decreases emulsified liquid soil stability and the solvation of dispersed soil particles. Finally, heat increases settling tendency of suspended soild particles.

The decision of whether or not to use heat in cleaning depends on the balance between the beneficial and nondetromental effects in a particular application.

Generally, there are two accepted methods of providing for the final sanitization of a utensil once soil has been removed. The first method, is a function of several variables. Included in these are the volume of water used, the water temperature, and the total contact time.

To demonstrate, note Figure 3. This chart graphically describes the build-up of heat on a utensil surface during dishwashing.

It is possible to calculate the amount of heat applied at the utensil

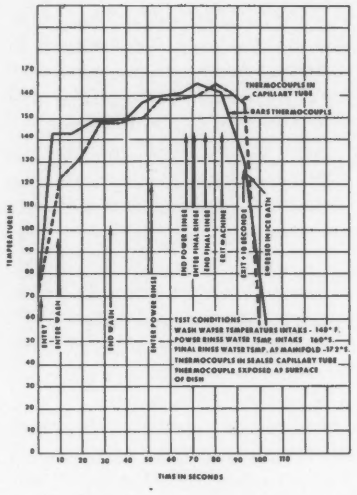


Figure 3. *Response Comparison of Thermocouples.*

surface. This can be correlated with the thermal death curves of microorganisms of the heat resistant variety--such as *Microbacterium tuberculosis* and other organisms.

Another method to provide for final sanitization of a utensil is chemical action. Several chemicals are in popular usage for utensil sanitization, including chlorine, iodine and quaternary ammonium compounds.

The chemistry of chlorine, is shown briefly in the following reactions:

When chlorine is dissolved in water it hydrolizes rapidly to form hypochlorous acid and hypochloric acid.

$$Cl_2 + H_2O \quad HOCl + H^+ + Cl^-$$

Hypochlorous acid further disassociates to give hydrogen ions and hypochlorite ions.

$$HOCl \quad H^+ + OCl^-$$

The relative proportions of molecular dissolved chlorine, undisassociated hypochlorous acid, and hypochlorite ions which exist in equilibrium vary with the pH, as shown in the following detail. See Figure 4.

At pH values less than pH3, molecular dissolved chlorine is found.

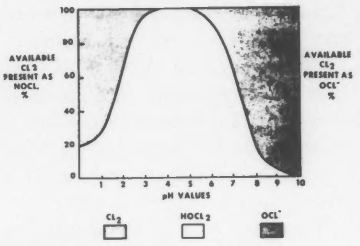


Figure 4.

Between pH4 and 5 chlorine exists almost entirely as unionized hypochlorous acid. Above pH7 hypochlorite ion becomes significant. Unionized hypochlorous acid and hypochlorite ions are present in equal proportions only at pH 7.4.

Factors which affect the sanitizing effect of chlorine include: pH: hypochlorous acid is the form which has the greatest capacity to disinfect; temperature-the rate of disinfection increases with increased temperature; concentration; and the form in which chlorine is used. Free chlorine applied either as chlorine gas or as a hypochlorite is a much more rapid disinfecting agent than chloramine.

The second most common chemicals used for utensil sanitizing are iodophors. They have many advantages:

- They permit the application of iodine, a powerful germicide, in a safe and convenient way.
- They are virtually odorless, if properly used.
- They are a relative non-irritant and do not sensitize humans.
- Their toxicity is low.
- Being surface active, they possess strong wetting powers and penetrate "soil."
- They act as their own indicator-when all of the iodine has been absorbed by organic matter the yellow-brown color disappears.
- Iodophor preparations are stable in storage.

The relatively few disadvantages of iodophors are:

- If used at higher concentrations than necessary, they may be more expensive than ordinary hypochlorites and other chlorine compounds.
- If used negligently, for example at excessive concentrations or at high temperatures, iodophors may be corrosive.
- Complaints of odor and staining have been received on isolated occasions. Investigation indicated that these arose from incorrect use.

The third chemical used in utensil sanitization are quaternary ammonium compounds. The efficiency of numerous quaternary ammonium compounds varies widely, and is affected by the mineral content and other substances in the water in which they are used. It is not possible to establish specific standards for minimum concentrations which will be effective under all conditions.

There are many diverse factors which affect the cleaning and sanitization process of multiple-use utensils. In problem areas, all of these diverse factors must be investigated and evaluated in their proper perspective.

The inroads made in the cleaning and sanitizing of multi-use utensils have prevented the spread of many infectious diseases. Influenza, for example, killed many persons at the beginning of the century and now has all but disappeared as a dreaded illness. Early sanitation scientists such as A. J. Cummings, would be proud of where their work has led.

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See page 89 and
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*Dairy and Food Sanitation, Vol. 2, No. 3, Pages 96-99 (March 1982)*


**ROBERT B. GRAVANI**

*Institute of Food Science*
*Stocking Hall*
*Cornell University*
*Ithaca, NY 14853*

# Training Programs: They Need Not Be Boring

*Training and continuing education programs, seminars and lectures are all part of our daily quest for knowledge. With the increase in the number of these types of programs it is important that those individuals responsible for training be proficient in conducting practical, meaningful and worthwhile sessions. Basic principles on how to go about planning and organizing a training program, what important factors must be considered and some practical suggestions for program planners are discussed.*

You're familiar with the typical training programs that we've all attended. Does this scene sound familiar? A smoke filled room which is poorly ventilated and too small to accomodate the group, uncomfortable chairs, a boring speaker making an irrelevant presentation on a subject of marginal interest to you, poor or nonexistent visual aids and no audience involvement. Yes, and all this lasts anywhere from 1 hour to 12 weeks.

Unfortunately, the words "training program" can conjur up thoughts of these horrible memories that we've all experienced. But training programs need not be unpleasant; they can be inspiring, relevant, thought provoking and a very enjoyable experience. In the rest of this article, you'll find a few suggestions on how to make your training session or educational program more meaningful to the audience that you're trying to train, whether they're newly hired food service workers or Ph.D's in food science attending an annual refresher course.

So, how do you do it? It's really simple if you follow some basic principles (1).

1) PLAN--the success of every program depends on adequate, proper and careful planning. Without proper planning and attention to DETAILS, your program will be a failure. Don't assume anything, follow-up on every detail.
2) ORGANIZE -- take time to carefully organize your thoughts about:
   a. The purpose of the training program (What are you trying to accomplish? Why? Establish training goals!)
   b. The audience needing training (Who are they? How many are there? What is their educational background and job experience?)
   c. The length of time you have to train (determine the best time of the day or week and then schedule a workable and practical training program).
   d. The availability of speakers and visual aids (choose people who are technically qualified and good speakers!) Look for good quality visual aids such as slides, movies and video tapes that will enhance the program.
   e. The availability of facilities (How big is the meeting room or auditorium? Will it handle your group? Does it have adequate ventilation? Can the room be easily darkened for audio visuals? Are the chairs comfortable? Are there enough electrical outlets? Is there a speakers podium with a light? a screen? a workable public address system?)
3) STAFF -- After planning a good program and thinking about the availability of qualified speakers, then contact interested and enthusiastic people

**"But training programs need not be unpleasant; they can be inspiring, relevant, thought provoking and a very enjoyable experience."**

to assist you in implementing the program. A small group of dedicated people can often get more done than a large committee.

4) CONTROL -- As the person in charge of the training program, take charge of the situation and keep the entire operation in control. Make sure you're aware of what is happening at all times. *Pay attention to details*! Don't leave anything to chance.

5) EVALUATE -- Evaluate the effectiveness of the program after it is completed by polling the audience. Anonymous evaluation usually results in the most honest appraisal of a program's effectiveness. A program evaluation is also an excellent way to generate future program ideas and it need not be complicated. Figure 1 illustrates a typical program evaluation form that can be completed in a short time and quickly compiled.

6) FOLLOW-UP -- Follow-up the training program by determining whether work performance, attitude or skills were positively affected by the materials that were presented. Also follow-up by expressing your appreciation to those who helped make the program successful -- fellow program planners, speakers and co-sponsors.

Another important area to consider when planning a training program is how people learn (2). When conditions are condusive to learning, a majority of the audience will go home with many useful ideas.

Figure 1. *A "Typical" Program Evaluation Form of a Warehouse Sanitation Seminar.*

Warehouse Sanitation Seminar
Date of Program
**PROGRAM EVALUATION**

We need your opinion -- please answer all questions frankly and offer suggestions and criticisms freely.

1) Overall, how would you rate the value and quality of this seminar?
   1 2 3 4 5 6 7 8 9 10 (10 is excellent)
2) Please comment on the content of the program. What topics were most important to you?
3) Was there any subject matter in your area of concern that was of little or no value to you?
4) Would you like to see sanitation seminars like this held on a yearly basis? If yes, what topics would you like to see discussed?
5) Please tell us anything else you think we should know about the seminar.

We hope that you enjoyed the program and obtained information that will be helpful. Thank you for your help and cooperation!

Learning is affected by many things including:

1) The audiences capability and attitude. The key items are the audiences ability and desire. The training must be flexible to accomodate difference in capabilities and attitudes.
2) The education background, previous training and experience of the audience. Keep the educational level of training at the level of the audience and don't talk down to the group.
3) The nature of the materials being taught. The simplicity or complexity of the materials or task is important in how the training is approached.

4) The instruction methods used:

| | |
|---|---|
| a. Lecture | d. Video tape |
| b. Discussion | e. Demonstrations |
| c. Slides | f. "Hands on training" |

The instruction method will depend on the nature of the materials being taught, but remember that successful training requires active audience participation. . .the old adage "Tell me, I'll forget, show me, I may remember, but involve me, and I'll understand!" definitely applies in training situations.

5) The capability and attitude of the trainer. The speaker or trainer must be familiar with the subject matter, motivated, enthusiastic and a good teacher. If the trainer is unprepared, uninvolved, and unconcerned, the audience will be too.

Several other items (3) must also be considered by a program planner; they are:

1) Motivation -- the people must be anxious to improve their abilities and opportunities. Too little motivation is undesirable while too much motivation results in a very tense situation, which inhibits learning. Judging the right amount of motivation depends on the audience and requires skill and practice.
2) Reinforcement and feedback -- participants in training programs need to feel that they are making progress and should receive encouragement where it is deserved.
3) Learning by doing -- the audience must be involved if training is to be effective.
4) Spaced repetition/learning by parts -- depending on the material or tasks being taught, learning periods should be spaced through time with frequent repetition. Break down complex materials and ideas so that small "digestible" segments can be taught.
5) Providing theory -- the material that is taught and the needs of the audience usually dictate how much theory should be provided. People need to know *why* some things are done in a specific way. Take time to explain *some* of the theories in an organized and understandable manner.

Whenever training programs are organized, Murphy's Law usually should be kept in mind. This law states that "if anything can go wrong, it will". Be prepared for crises and emergencies by planning ahead and making alternate arrangements. Prepare detailed checklists for items that need your attention. While some people laugh about checklists, many a trainer and meeting planner has been spared the embarrassment of forgetting an important detail by preparing and using a checklist.

Some suggestions for program checklists are listed below:

- Meeting room facilities
- Speakers and special guests
- Registration Materials (Registration table, name tags, list of participants, copies of up to date program, and handout materials.)
- Audio visual materials and props
- Refreshments, coffee breaks and meals; room accomodations if necessary
- Follow-up program evaluation forms and thank you notes

An example of a more detailed checklist is shown in Figure 2.

Figure 2. *Checklist for Meeting Room Facilities.*

- Room Size - (How many can the room hold? Any provisions for more people?)
- Room Acoustics
- Chairs and/or Tables (types and number)
- Arrangement of Furniture:
  - Conference Style
  - Board Room Style
  - Theater Style
  - Classroom Style
  - Informal
- Projection Table
- Table for Overhead Projector
- Head Table
- Registration Table & Materials
  - Name Tags
  - List of Participants
  - Copies of Up-to-Date Program
  - Handout Materials
- Speaker's Podium With a Light
- Drapes, Shades or Blinds To Darken Room
- Light Switch Control
  - Main
  - Individual lights (pre-test and become familiar with them)
- Screen (Is it large enough to be seen in the back of the room?)
- P.A. System
  - Master Control
  - Volume Control
  - Functioning microphones
- Room Ventilation/Heating - Main Control/Thermostat (Can it be adjusted?)
- Maintenance Person, Room Set-Up Person and/or Building Engineer -- Meet these people and know where to contact them in case of a last minute change, problem or emergency.
- Lobby Area or Foyer
- Coat Rack
- Direction Signs to Meeting Room
- Message Board
- Rest Room Facilities (Are they clean and close to the meeting room?)
- Refreshment/Meal Facilities
- Overall Impression of Meeting Room Facilities

One last suggestion -- stick to the program! Start on time and adjourn on time. Program participants will be impressed and will appreciate your preciseness.

Organizing a training program is not a simple task; it should be taken seriously and planned very thoroughly. If all the things mentioned in this article are considered, your next program may result in a practical and meaningful experience for all those who attend. Give it a try!

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# *Quality of Milk and Patterns of Consumption by Children in Connecticut Schools and Camps*

**LESTER HANKIN, GEORGE STEPHENS, DONALD SHIELDS and KATHLEEN CUSHMAN**

*Adapted from Bulletin 782 of the Connecticut Agriculture Experiment Station, New Haven, CT.*

*Milk is one of the most basic foods for children and adolescents. It provides the essential element, calcium, as well as vitamins, protein, and carbohydrate. The use of milk is stressed in school lunch programs by many groups and by the United States Department of Agriculture (USDA). The USDA participates both in the funding and in the distribution of some dairy products.*

*On days when school is in session about 10% of the milk sold in Connecticut (about 500,000 half-pints) is used in schools. However, the consumption patterns in public schools had not been examined. Although the freshness of milk samples collected from schools was investigated in 1975 (3), the relation of quality to consumption was not studied. In the present study the adequacy of refrigerated storage and the way in which the milk was dispensed were studied. At some schools consumption was also studied as distinct from preference. The same information was also obtained at day and residential camps for children.*

## EXPERIMENTAL

The study on student preferences and the quality of milk served in schools encompassed the period from September, 1978 through May, 1979, essentially one school year. A total of 271 public schools in 45 towns were studied. Milk usage was determined and samples were taken from children's camps during June through August, 1979. To determine the amount of milk taken but not consumed, twelve elementary, six middle schools and one high school were examined during the spring and fall of 1979.

The amount of milk taken was determined by dividing the number of servings or half-pint cartons by the school enrollment. The percentage of milk actually consumed was determined by dividing the amount of milk not consumed by the amount taken.

Samples were immediately placed in ice for transport to the laboratory. The temperature of milk at collection and the age of the sample (days from bottling) were recorded. Ninety-two samples were taken at high schools and 315 at middle and elementary schools. Milk for analysis was taken at 19 residential and 15 day camps.

Bacterial analyses for total aerobic count and for coliform bacteria were made according to Standard Methods for the Examination of Dairy Products (8). Flavor was judged organoleptically by methods recommended by the American Dairy Science Association, as modified for the Connecticut Milk Flavor Improvement Program (2,4). Fat was determined by methods of the Association of Official Analytical Chemists (7). Data were analyzed using SPSS computer programs (6).

## SCHOOLS

Size of sample: Information was obtained in 45 of the 169 towns in Connecticut. Included were 195 elementary schools, 36 middle schools, and 40 high schools. These schools had an enrollment of 152,248 students and represented 26% of the students in Connecticut public schools. The smallest enrollment was

76 students and the largest was 2,804 students. About 78% of the elementary schools examined had enrollment of less then 500. For middle schools 47% had enrollments greater than 700, and for high schools 64% had enrollments greater than 1,000.

Total milk usage based on enrollment: The percentage of students taking milk according to population of the town and by type of school is shown in Table 1. Combining all the data for 152, 248 students in 45 towns, 124, 123 portions of milk were dispensed daily. Thus, 82% of all students took milk daily. Calculations based on total enrollment, however, do not take into account the 94% average daily attendance (personal communication from Connecticut Department of Education). The percentage of students in schools taking milk could therefore average as high as 85%. Town population did not greatly affect the percentage of students taking milk. The range was 79 to 84% (Table 1).

More students in middle schools (90%) took milk than did students in elementary (82%) or high schools (75%, Table 2).

*Preference for type of milk:* Some schools (26%) offered only whole milk (minimum of 3.25% fat) while others (74%) offered both whole and chocolate-flavored milk (0.5 to 2.0% fat). A few schools also offered lowfat (0.5 to 2.0% fat) and nonfat milk (not more than 0.5% fat). What is offered appears to be at the discretion of the school dietitian or person in charge of the cafeteria. Starting with the 1979-1980 school year, schools partipating in the USDA school lunch program were required to offer nonfat or lowfat unflavored milk in addition to chocolate-flavored and whole milk.

Elementary and middle school students prefer chocolate-flavored milk over whole milk in a ratio of only 1.5 to 1.0 (Table 2). The data for students taking lowfat and nonfat milk are limited because few schools offered these products during the period of the study.

In some schools the ratio of students taking chocolate-flavored milk to whole milk was greater than 10 to 1. Examples were three elementary schools in East Hartford, one elementary school in Waterbury, a middle school in New Haven, and a high school in Wolcott. Conversely, in seven schools more whole milk than chocolate-flavored milk was taken. The reasons for these marked differences in preference are not apparent.

*Age and temperature of milk:* The average age (number of days between bottling and collection) of milk offered for sale at schools was 3.5 days (Table 3) with a range of 0 to 13. The average code period (number of days between bottling and last day product may be offered for sale) for all dairies was 10.7 days with a range of 7 to 13. The mean temperature of all samples collected at school cafeterias at serving was 3.8°C (38.8°F), well within acceptability.

An attempt was made to determine if age of the milk being served varied with the population of the town in which the school resided (Table 3). For 11 towns with populations under 5,000 the averge age of milk exceeded by about one day the average age of milk in larger towns. Examination of individual towns showed that older milk was found in both small and large towns.

It is not known whether the milk was kept long in the cafeteria before sale or whether there was a delay between bottling and delivery. An attempt to determine if certain dairies accounted for most of the older milk found fairly even distribution among dairies.

TABLE 1. *Percentage of students in schools taking milk in relation to population of town.*

| Population of town | Number of towns | Number of students | % Taking milk |
|---|---|---|---|
| Under 5,000 | 11 | 3,985 | 82 |
| 5,000 to 9,999 | 10 | 14,827 | 82 |
| 10,000 to 24,999 | 10 | 26,182 | 83 |
| 25,000 to 49,999 | 6 | 22,395 | 84 |
| 50,000 to 99,999 | 5 | 39,865 | 79 |
| Over 100,000 | 3 | 44,994 | 82 |
| Totals | 45 | 152,248 | |

In all 45 towns milk was adequately refrigerated during storage. For 271 schools, 82.7% had separate storage facilities for milk. The remainder (17.3%) used the milk serving facilities for storage. However, 45.6% of the schools served milk from unrefrigerated areas. Of 39 samples unrefrigerated at serving, only six (15.4%) were found to be above 7.2°C (45.0°F).

*Flavor and flavor score:* Although flavor scores appear to be satisfactory, 13.8% of the samples had an

TABLE 2. *Percentage of students taking milk by type and according to category of school and population of town.*[1]

| Population of town | Number of schools | Enrollment | % of enrollment taking milk | Percentage taking | | | |
|---|---|---|---|---|---|---|---|
| | | | | whole milk | chocolate milk | nonfat milk | lowfat milk |
| ***High Schools*** | | | | | | | |
| under 5,000 | 0 | — | — | — | — | — | — |
| 5,000 to 9,999 | 7 | 5,227 | 93.2 | 48 | 54 | — | — |
| 10,000 to 24,999 | 3 | 3,554 | 82.2 | 36 | 58 | <1 | 6 |
| 25,000 to 49,999 | 3 | 3,680 | 89.0 | 47 | 47 | 5 | — |
| 50,000 to 99,999 | 7 | 11,345 | 68.5 | 38 | 60 | 2 | — |
| over 100,000 | 7 | 12,663 | 75.2 | 27 | 70 | 3 | — |
| TOTAL | 27 | 36,469 | | | | | |
| ***Middle Schools*** | | | | | | | |
| under 5,000 | 0 | — | — | — | — | — | — |
| 5,000 to 9,999 | 3 | 1,350 | 102.3 | 30 | 70 | — | — |
| 10,000 to 24,999 | 3 | 1,550 | 88.3 | 37 | 63 | — | — |
| 25,000 to 49,999 | 5 | 3,539 | 100.2 | 29 | 70 | <1 | <1 |
| 50,000 to 99,999 | 8 | 5,592 | 88.4 | 26 | 74 | — | — |
| over 100,000 | 6 | 5,935 | 90.6 | 19 | 81 | — | — |
| TOTAL | 25 | 17,966 | | | | | |
| ***Elementary Schools*** | | | | | | | |
| under 5,000 | 2 | 453 | 97.4 | 25 | 75 | — | — |
| 5,000 to 9,999 | 8 | 2,695 | 75.6 | 26 | 74 | <1 | — |
| 10,000 to 24,999 | 13 | 6,424 | 77.7 | 28 | 72 | — | — |
| 25,000 to 49,999 | 9 | 3,844 | 74.5 | 36 | 64 | — | — |
| 50,000 to 99,999 | 47 | 17,047 | 81.9 | 25 | 75 | — | — |
| over 100,000 | 48 | 19,973 | 84.5 | 21 | 78 | <1 | — |
| TOTAL | 127 | 50,436 | | | | | |

[1] Data only for schools offering both whole and chocolate-flavored milk and nonfat and lowfat milk.

TABLE 3. *Analysis of milk samples collected at schools according to population of towns.*

| Population of town | Avg. age of milk (days) | Avg. temperature at collection (°C/°F) | Avg. flavor score | Avg. aerobic count (per ml) |
|---|---|---|---|---|
| Avg. — all towns | 3.5 | 3.8/38.8 | 36.8 | 1,706 |
| under 5,000 (11)[1] | 4.4 | 3.6/38.5 | 36.7 | 3,347 |
| 5,000 to 9,999 (10) | 3.5 | 4.2/39.6 | 36.6 | 1,191 |
| 10,000 to 24,999 (11) | 3.2 | 4.6/40.2 | 37.3(10) | 3,328(10) |
| 25,000 to 49,999 (6) | 3.7 | 4.0/39.2 | 37.2 | 2,587 |
| 50,000 to 99,999 (5) | 3.3 | 3.8/38.8 | 38.2 | 786 |
| over 100,000 (3) | 3.7 | 3.4/38.2 | 36.7 | 1,261 |

[1] The number in parenthesis after population of town indicates total number of towns from which samples were taken. In other columns the number in parenthesis indicates number of towns from which samples were taken if different from total.

unsatisfactory flavor. Age of milk varied between school type within the same town, but age of milk did not correlate well with unacceptable flavor. Both fresh and older milk sometimes had unsatisfactory flavor.

The types of flavors found in 401 samples are shown in Table 4. Fifty-nine percent of the 39 samples designated as "burnt" came from one dairy. A burnt flavor indicates unsatisfactory heating of paper cartons during sealing. Generally the "cooked" and "feed" flavors are acceptable since it is unlikely that students or consumers in general could detect any off-flavor in such samples. "Lacks freshness" indicates contamination by bacteria in the pseudomonad group (1,5) and suggests that the milk is old.

*Total aerobic bacterial count:* The average total aerobic plate count of milk samples (Standard Plate Count per ml) is shown in Table 3. Some plate counts exceeded the legal maximum of 25,000 per ml. In general the numbers are well within the limits prescribed by law. However, total numbers tell little of the types of bacteria present or whether the bacteria have the ability to produce off-flavors and aromas (4).

*Coliform bacteria:* The coliform test measures bacteria in the coli-aerogenes group, and if they are present in large numbers, post-pasteurization contamination is indicated. In this study of 263 samples, 22 (8.4%) were unsatisfactory, having a count of five or more per ml of milk.

*Fat content:* An average of 3.36% fat in 149 samples of whole milk. Whole milk must contain a minimum of 3.25% fat. The average percentage of fat in 63 samples of chocolate-flavored milk was 1.25% (legal standard of 0.5 to 2.0%). For 12 samples of lowfat milk the average was 0.81% fat (legal standard of 0.5 to 2.0) and in five samples of nonfat milk the average was 0.34% (legal standard not more than 0.5%).

*Statistical analysis:* The only significant correlation was between the number of aerobic bacteria and the age of the milk ($r=0.4751$, $p=<.001$). As the milk aged, the number increased. The total number did not correlate with flavor score or the temperature of the milk.

*Comments by cafeteria personnel:* The workers at each school cafeteria were asked for comments or complaints about the milk offered. The 395 comments are shown in Table 5. The most frequent complaint specified leaking cartons (27%). About 16% of the complaints were about off-flavored milk.

*Milk taken but not consumed:* It was determined how much of the milk that was taken was actually consumed. At 19 randomly selected schools students deposited milk cartons as they left the cafeteria. The amount of each type of milk remaining in the cartons was measured. A statistical correlation was not found between the amount of milk not consumed and the percentage of students taking milk.

Students in the middle schools consumed more of the milk they took than did students in elementary schools. The amount of milk not consumed in those cartons with milk remaining was about the same in both types of schools and for both types of milk, averaging about 95 ml in each half-pint (236 ml) carton.

From town-to-town the percentage of milk not consumed ranged from 5 to 25% for whole milk and from 2 to 20% for chocolate-flavored milk. At most school the percentage of whole milk not consumed was about twice that of chocolate-flavored milk. In

TABLE 4. *Flavor criticism of milk samples collected at schools.*

| Flavor criticism | No. of samples | % of samples |
|---|---|---|
| no criticism | 82 | 20.5 |
| feed | 171 | 42.6 |
| lacks freshness | 56 | 14.0 |
| burnt paper or plastic | 39 | 9.7 |
| cooked and feed | 28 | 7.0 |
| cooked | 12 | 3.0 |
| vitamin flavor | 5 | 1.3 |
| musty | 2 | 0.5 |
| watery | 1 | 0.2 |
| oxidized | 2 | 0.5 |
| unsatisfactory (no specific criticism) | 3 | 0.7 |
| Total | 401 | |

only one school was more whole milk than chocolate-flavored milk consumed. The data for nonfat milk are too limited to make a statement.

In general it appears that students are not overly wasteful. The type of meal can affect milk consumption. It was not possible to determine who left more milk, students who purchased milk to accompany lunch from home or those provided milk with a purchased lunch. This aspect merits further study.

## CAMPS

*Types:* In the 26 residential and 16 day camps examined, 7,036 campers were enrolled. Thirty-four of the 42 camps were operated as non-profit enterprises. Camps were generally divided into those for two age groups, four to 13 and 11 to 17, although there was considerable overlapping of ages. The camps were located in 38 towns in Connecticut (Table 7).

*Analysis of samples:* The samples collected from 34 camps in 25 different towns are described in Table 7. The average age of milk was 4.6 and 5.7 days in the residential and day camps. Thus, the milk in camps was older than that found in schools (3.5 days). Also, 63% of the samples at residential and 33% at day camps had unsatisfactory flavor. The predominant criticism was lacking freshness."

When collected, the average temperature of samples was 5.6°C (42°F) compared to 3.8°C (38.8°F) (Table 6) for school samples. Again it must be pointed out that there was no way of knowing whether the milk had been properly refrigerated during transport or storage at the camps.

The total aerobic bacteria count (Standard Plate Count per ml) of samples from camps averaged 13,130 (within legal standards) but was higher than in the samples from schools.

Sixty-two percent of the non-profit day camps participated in the USDA milk program. Interstingly 75% of the non-profit day camps participating in the USDA program limited the amount of milk taken by each camper while only half of the camps not participating (including for-profit enterprises) limited the quantity.

Since most camps provided no choice, preference for type of milk was not tested. The amount of milk consumed at residential camps was slightly higher than at day camps (Table 7), but 56% of the days camps limited the quantity of milk which could be taken.

The average age of milk collected in schools in 1975 was 2.6 days (3) as compared to 3.5 days now. Increased

TABLE 5. *Complaints or criticisms by cafeteria personnel concerning milk sold in school cafeterias.*

| Complaint or criticism | No. of citations | % of total citations |
|---|---|---|
| no complaints cited | 123 | 31.1 |
| leaking carton | 106 | 26.8 |
| off-flavor milk | 63 | 15.9 |
| frozen milk | 29 | 7.3 |
| burnt carton | 17 | 4.3 |
| illegible code date | 16 | 4.1 |
| dirty carton | 15 | 3.8 |
| difficult to open carton | 9 | 2.3 |
| carton not full | 9 | 2.3 |
| milk too warm | 7 | 1.8 |
| past code date | 1 | 0.3 |
| Total | 395 | |

TABLE 6. *Amount and percentage of milk taken but not consumed.*

| | Type of school | | |
|---|---|---|---|
| | Elementary | Middle | High |
| Schools examined | 12 | 6 | 1 |
| % milk not consumed | | | |
| whole | 15.8 | 6.5 | 4.2 |
| chocolate-flavored | 9.0 | 3.9[1] | 2.8 |
| nonfat | 19.8[2] | 10.8[2] | 3.1[2] |
| % of half-pint cartons with milk left | | | |
| whole | 38.2 | 17.1 | 10.8 |
| chocolate-flavored | 23.3 | 10.1[1] | 8.1 |
| nonfat | 33.3[2] | 28.6[2] | 12.8[2] |
| Av. ml milk left per half-pint carton | | | |
| whole | 97.6 | 90.3 | 110.5 |
| chocolate-flavored | 81.1 | 87.9[1] | 100.2 |
| nonfat | 140.0[2] | 89.4[2] | 57.0[2] |

[1] Two schools did not offer chocolate-flavored milk.
[2] One school represented.
[3] Four schools represented.

age of milk found in schools could be attributed to change from daily delivery to every-other-day delivery to schools. Perhaps not all milk destined for schools is delivered the same day it is processed.

Data show that temperatures of storage equipment and of milk found in storage and serving equipment was satisfactory. However, it could not be determined if the milk had been stored earlier at some higher temperature. Of concern is that about 50% of the school served unrefrigerated milk. However, only 15.5% of the unrefrigerated samples were found to be above 7.2°C (45°F), suggesting that the milk had not been left unrefrigerated for a long period.

Now that preference patterns have been delineated, behavior can be investigated. For example, do students take chocolate-flavored milk at school because they are denied it at home? Do parents suggest the taking of chocolate-flavored milk at school because it contains less fat than whole milk? At those schools where milk consumption is low, is the taking of milk not encouraged? Does less milk taken by students in some schools relate to lactose intolerance? Would it help in those schools to provide modified milk, milk that had been treated with lactase to lower the lactose content? Do students prefer chocolate-flavored milk because they do not like the taste (off-flavor) of whole or lower fat unflavored milk?

The Connecticut State Department of Agriculture is now examining schools with below average milk consumption to determine whether low consumption is due to low quality of products. Thus, this study may serve dairy processors by helping them to provide a wholesome product, the school nutritionists and cafeteria workers by examining problems concerned with keeping quality, and the students by assuring that they continue to receive milk of good quality.

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TABLE 7. *Analysis of milk samples collected at residential and day camps.*

| Analysis | Type of camp | |
|---|---|---|
| | Residential | Day |
| Camps visited | 26[1] | 16[2] |
| Enrollment | 4,493 | 2,543 |
| Ounces milk served per meal | 10.8 (320 ml)[4] | 9.4 (279 ml) |
| Ounces milk served per meal (range) | 3.3 to 18.0[5] (97 to 532 ml) | 7.1 to 16.0[6] (208 to 473 ml) |
| Times milk offered per day (avg.) | 2.5 (range 2 to 4) | 1 |
| Age of milk (days) | 4.65 (17)[3] | 5.86(14) |
| Flavor score | 35.1 (19) | 35.8 (15) |
| % with unsatisfactory flavor | 63 | 33 |
| Temp. of samples (°C/°F) | 5.7/42.2 (19) | 5.4/41.8 (15) |

[1] 16 camps were co-educational, 7 all male, 3 all female.

[2] 12 camps were co-educational, 2 all male, 2 all female.

[3] The number in parenthesis indicates number of samples examined.

[4] One-half pint = 8 fluid ounces or 236 ml.

[5] All residential camps provided unlimited amounts of milk if offered at a given meal. Unlimited amounts of juice drink were generally provided if milk was not offered.

[6] All day camps served milk only once per day. Nine of 16 day camps limited the amount of milk per camper.

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# Gumshoeing The FD&C Act At The Grass Roots Level

ROGER W. MILLER

*Foods and drugs are processed in every corner of the country, as are medical devices and radiation-producing products. Likewise, blood banks are to be found in countless communities. To keep up with the work in those many establishments, the Food and Drug Administration has 128 resident inspection posts located in all 50 States and Puerto Rico. This article tells how the investigator from one of those posts, the one at Salisbury, Md., does his job.*

It was quarter to seven in the morning. The sun was weak, the breeze unborn, clouds few. The sputter of a boat's motor, muffled by the harbor water, and the occasional lament of a gull were the scene's only sounds. The smells were of the sea—aromas of salt and the rot of things that lived in a different environment. Low-slung wooden buildings, their sides bearing testimony to the whims of climate, crowded the water's edge. A moored skipjack lay motionless, as if resting up for the next day.

Mike Ellison drove his frill-less, government-owned station wagon past a pile of oyster shells, the tires of the dark brown vehicle crunching the spillover. He stopped alongside one of the buildings where a simple sign read "office." A second, light-colored station wagon followed and lined up next to his.

Ellison emerged from the vehicle, taking a small black notebook—his "diary"—with him. He waited for the driver of the second car to join him. "It doesn't look like they're working here," he said to the other driver as he nodded toward the nearly empty parking lot. Together the two headed for the office and disappeared inside.

Thus did the day officially begin for Ellison, an FDA investigator who works out of the Agency's resident inspection post at Salisbury, Md. Resident inspection post is the official term used to designate the 128 local offices of the Food and Drug Administration. With one to eight employees, these offices are located in such places as Augusta, Maine; Tifton, Ga.; Lubbock, Tex.; Bellingham, Wash.; Mayaguez, P. R., and Anchorage, Alaska. Forty-three of the offices, including the one at Salisbury, are one-person operations.

The resident posts are in addition to FDA's 21 district offices, where other investigators as well as chemists, lab technicians, and support personnel work. The resident posts are, in effect, mini-districts with responsibility for specific geographic areas. Ellison's area of responsibility covers 10 counties, known collectively as the Eastern Shore of Maryland and Virginia because they lie east of the Chesapeake Bay.

Located between the Atlantic Ocean and the bountiful Chesapeake, the 10 counties live off the salt water and its legacy. The legacy includes a flat terrain and soil with sand from another geological period. The summers are long and hot on the Eastern Shore and the area's 40 inches of rain annually are well-spaced throughout the year. But the porous soil allows the rain easy escape, and the area's farmers use irrigation to assure that their fields will produce the intended tomatoes, asparagus, corn, peas, carrots, and cucumbers.

The salt water that surrounds the Eastern Shore is a farm of another kind, producing oysters, clams, bluefish, striped bass, and a delicacy that is favored by stomachs across the land. That delicacy is the Atlantic blue crab, a crustacean that may grow up to 8 inches across and that contains some of the tastiest seafood this side of heaven.

As an aquatic farm, Chesapeake Bay is extraordinary. From its waters come half of the Nation's clam catch and one-fourth of its oysters. The blue crab harvest from the

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bay accounts for about half the U.S. total, or about 200 million of the creatures each year.

It was crabs that Ellison and his companion were seeking that early morning, but the critters were to prove elusive. The quest was for a crab picking and packing plant so that Ellison could do a routine inspection while his companion, microbiologist Ammon Swartzentruber from FDA headquarters, could collect samples as part of a nationwide microbiological survey of crab plants.

For this day, they had selected a crab plant in Cambridge, Md., a town on a tributary of the Chesapeake Bay just 28 miles from Salisbury. (Actually, Ellison's day had begun at 5:50 in the morning when he met Swartzentruber at the Salisbury office.) The plant was one of 45 that Swartzentruber and his cohorts from the Bureau of Foods were to check in the survey. For Ellison, it would be just another routine inspection.

But after conferring with officials at the plant, the two learned that no crabs would be cooked, picked, or packed there that day. It seems that the price of the creatures had jumped over the weekend, as buyers for restaurants sought to meet public demand and purchased the blue fellows by the bushel when the fishermen's boats reached the docks.

After conferring with Swartzentruber, Ellison decided to switch the four big boxes he carried in his station wagon to Swartzentruber's vehicle, while the microbiologist went back to the Salisbury office to do paper work until Ellison would be free later in the day. The boxes were used to keep the 8 pounds of crab meat collected each day in the survey. Inside the boxes were various commercial cooling packs that keep the samples at temperatures under 4 degrees Celsius (40 degrees Fahrenheit). The samples are shipped via commercial courier to FDA's microbiology laboratory in Minneapolis (see "Microbe Sleuthing in Minneapolis," FDA CONSUMER, Dec. '79-Jan. '80). At Minneapolis, the samples undergo five microbiological determinations. Swartzentruber tries to work his surveys in with the routine inspections of investigators so as to minimize the disruption for a firm.

In his inspection, Ellison would look for the presence or evidence of flies, rodents, or birds in the plant; the handling of ice; the strength of hand-sanitizing solutions; and evidence of sores, tape, or other such abnormalities on the hands of employees. Inspecting a crab plant is different than inspecting most food plants because the meat is handled directly by workers and because the product must be kept cool. Crabs are bottom dwellers and are usually cooked while still alive. Eating bad crab meat may not result in a one-way trip in a long limousine, but it may make one wish he or she were on that trip.

Not being able to inspect the crab plant hardly caused Ellison to miss a stride. In no time at all, he had decided to drive to the other side of town and inspect another seafood plant. "We spent half our time on seafood and half on vegetables," Ellison explained. He uses "we" frequently, although he works alone virtually all of the time. Asked about that first person plural, he explained that he means "FDA and me."

While food takes up most of his time, Ellison has other, typical FDA investigator duties. The 10 counties he covers also contain one major medical device plant that makes emergency oxygen units, a small drug plant that produces a bulking agent for laxatives, a couple of research farms, a couple of experimental laboratories, and medicated feed manufacturers who produce chicken fodder for the Eastern Shore's sizeable broiler and fryer industry. In addition, Ellison "and FDA" inspect blood banks and audit State contract inspection programs of food warehouses and feedmills.

In a typical week, Ellison likes to start off with a major inspection of vegetable processing or a seafood firm and work in other projects along the way. For example, the week that started out with elusive crabs was rounded out with more thrusts at crab packing plants and inspections of an oxygen repacker and a commercial ice firm in the resort town of Ocean City, Md.

Guidance for the resident post inspectors comes from the monthly work plan sent down by the district office. In Ellison's case, the plan comes 103 miles from Baltimore. However, the work plans aren't always that easy to follow, what with interruptions by shortages of crabs, recalls, and other emergencies.

Ellison's resident post and his duties are typical of resident posts around the country, and yet his work is different. It's typical in that he has the responsibility for seeing that the Food, Drug and Cosmetic Act and other laws entrusted to the Agency are enforced among the 252,700 people in his area. It's different in that most investigators spend much more of their time on drug matters and other concerns.

Ellison's new concern that day was a seafood plant, and it was not yet eight in the morning when he drove into the parking lot of the plant. Donning his white coveralls and a white hard hat, he armed himself with a flashlight, a thermometer, and a notebook. The notebook is his diary, in which he would record his observations as he tours the plant. The diary also keeps track of the day's other activities.

Inside he waited briefly for a plant official to greet him, and then moved to a conference room off the plant cafeteria where he made out a "standard notice of inspection" that he signed and gave to the official. The notice spells out the purpose of the inspection and the laws that are involved.

The plant manager joined Ellison in the conference

room and together the two of them started out to tour the plant. Two assembly lines were working that day. The fish had come from Iceland in frozen blocks, the blocks were sawed up to the desired shape and size and moved along conveyor belts, the pieces were breaded or dipped in batter, baked and refrozen, or simply refrozen, and then packed in individual containers. The frozen-baked-frozen cycle keeps germ contamination possibilities to a minimum. Likewise, water used in batter is kept near freezing so that the batter stays close to 50 degrees to avoid the threat of toxicity.

Ellison first did a quick run through the plant so he would know where to concentrate on return. The run-through included storage areas, loading docks, the freezer room (where it's five below zero), the powerhouse (where electric capacitors are clearly labeled as containing PCB's), and the carton storage area.

Ellison was constantly on the lookout for signs of dirt and insects. In this plant, the search was made easier in the storage areas by white painted stripes about 18 inches wide along the edges of the rooms. The white stripe enabled Ellison, flashlight in hand, to detect evidence of rodents and insects. The stripe also serves as a border for the storage areas, telling employees to keep products away from the walls so that they can be inspected and turned over easier.

Rodents like to run along walls and insects gather in corners or seek dust to settle in. Ellison looked for rodent droppings or insect carcasses. Should he find signs of rodent infestation, he would go back to his vehicle for his black light that enables him to spot urine stains. But in this case, he found none. The plant manager explained that the firm has a pest control contractor who comes in every weekend.

In the production area, Ellison periodically tested the handwashing solution used by the workers. For this, he took a strip of paper out of a plastic vial. The strip was dipped into the solution. Ellison watched the dipped portion of the strip change color and than compared the color with coded colors on the label of the vial. On the first such experiment, the dipped color turned out to be a dark purple, indicating between 100 and 200 parts per million chlorine, an acceptable solution.

As the workers went off for a 10 a.m. break, the FDA man watched while tables where fish were handled were sanitized. He waited for the workers to come back on the job to see if they made use of the hand sanitation solution before resuming their tasks.

Ellison used his thermometer to test the temperature of the batter at several points along the assembly lines. His observations also included checking around equipment to see if any past accumulations indicated that the night cleanup crew at the plant was doing less than its job.

He watched as workers "stripped down" bags of batter mix, bread crumbs, and the like. Stripping down means taking off the outer layer of the bag so that no shipping dust gets in the product when it is dumped. The stripping might also reveal hidden insects.

Ellison's inspection also included a visit to the plant's records room where computers provide a processing and shipping history of each item turned out by the plant. This would be helpful should a product have to be tracked down in a recall.

The investigator declined an offer for lunch in the plant cafeteria and chose instead a nearby highway restaurant that he had learned about in his travels about the area.

After lunch, Ellison made a final run through the plant and then met with the plant manager to go over his findings.

"We didn't find anything out of line and so we don't want to spend any more time here than we have to," he told the plant official. However, he did collect information from the plant manager about his standing in the company, whom he reports to, etc. It was information that could come in handy for the Agency some day should an emergency involving the plant arise. Had Ellison found probelms at the plant, he would have written up an FD—483 "observations of insanitary practices," which he would give to and discuss with management.

The inspection over, Ellison drove to a nearby pay phone to contact Swartzentruber back at the Salisbury office. The two arranged to rendezvous later to make a try at another crab packing plant.

By this time the day had darkened, the sun having lost a battle to the clouds. A breeze blew off the bay and a mist began to develop. Somewhere in the Chesapeake Bay a blue crab was about to make a fatal mistake by grabbing for the piece of eel on a waterman's trotline or making the no-return trip down the funnel of a crab pot. That crab would end up with its shell pried open by the deft actions of a picker, its meat plucked by swift fingers. Mike Ellison might be there observing as the crab met its fate. And Ammon Swartzentruber might select a bit of the victim's meat for a plane ride to Minneapolis. There, a microbiologist would examine it under a microscope, looking for taint.

But most likely the treasured meat from the blue fellow would go the commercial route, selling for as much as twice the value of porterhouse steak. And well worth it, the ultimate consumer might tell you.

Such is the stuff that resident inspection posts deal with.

*Roger W. Miller is editor of* FDA Consumer.

# Classified Ad

## SANITARIAN

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*Dairy and Food Sanitation, Vol. 2, No. 3, Pages 110-114 (March 1982)*


# Teat Dip As A Component Of Coliform Mastitis Control

**RICHARD H. BENNETT, PH.D.**
*Extension Dairy Advisor*
*University of California*

*The development and implementation of strategies to control mastitis in California dairies have in general been quite successful. Specific dairies have utilized this information and technology (7) to full advantage and are consequently realizing substantial economic return over the investment in mastitis control. Furthermore these dairy farms typically produce milk of high quality, as evidenced by bulk tank milk with very low standard plate bacteria counts. Many California dairy farms have been successful in virtually eliminating mastitis due to the Staphylococci and the Streptococci.*

Staphylococci and the streptococci continue to be the principal cause for mastitis in dairy cows throughout the nation. Consequently they are the most economically significant mastitis producing bacteria effecting the milk production of most dairies. Dairy operators that have been successful in eliminating these common forms of mastitis with superior sanitation, the discerning use of antibiotics, and the elimination of animals that harbor chronic udder disease, are dismayed when a new and particularly severe form of mastitis begins affecting the herd.

As the level of infection in a mammary quarter is reduced or eliminated the defensive mechanisms of the udder retreat, and as a result the number of somatic cells or luekocytes decrease (12). The California Mastitis Test (CMT) performed on milk from bacteria free quarters will usually read negative to trace, reflecting a Somatic Cell Count (SCC) of approximately 300,000 or less cells per milliliter of milk.

A herd of cows with low milk SCC is more susceptible to mastitis in general, and particularly susceptible to mastitis caused by bacteria of the coliform group and other gram negative bacteria (4). Mastitis caused by coliform bacteria, most commonly Escherichia coli, (10) can cause a very severe mastitis, that can reduce a productive healthy cow to a critically ill animal in less than 24 hours. Coliform mastitis usually will cause a very high fever and may induce a lethal septic reaction.

Coliform mastitis can achieve epidemic proportions in certain herds (10). Dairy managers may feel the mastitis problems were less severe when the herd was infected with the more subtle staphylocci and streptococci. Thus the dismay of the management often associated with the dramatic coliform mastitis problem is understandable.

Coliform and the other gram negative bacteria are common and abundant in feces and the general dairy environment (5,6). Elimination of the bacteria from the dairy environment is essentially impossible. However, control of the numbers of coliform bacteria in the bedding is possible and a necessary component of coliform mastitis control (6).

Economic analysis of the impact of the typical forms of mastitis on milk production clearly establishes the justification for the elimination of the common mastitis pathogens. The increased risk of coliform mastitis that results from the control of the staphylococci and the streptococci can pose significant threat to the herds udder health and the profit making ability associated with disease free udders.

Interest in the control and elimination of coliform mastitis in California and elsewhere is increasing as more dairies become successful in exterminating the more common mastitis problems (11). Research conducted on California dairies has identified numerous practices that can significantly reduce the risk of coliform mastitis to producing dairy cows (1,2). The control of coliform mastitis can be achieved by reducing the numbers of coliform organisms that come into contact with the udder during the milking process as well as between milkings (5). The discriminant use of udder wash water, pre-milking sanitation of the udder and thorough drying of the udder and teats prior to priming and attachment of properly functioning milking machines will usually reduce the potential for coliform mastitis (3,4). The use of free-stall housing, that orients the cow so as to minimize fecal contamination of the cow bedding and the use of bedding that will not support the growth of coliform bacteria has been effective in the prevention and control of coliform mastitis (5).

While the use of effective teat dips has virtual unanimous endorsement for the control of mastitis due to the streptococci and staphylococci, mastitis researchers generally agree that the commercially available teat dips will not have significant effect on prevention of coliform and other forms of udder disease caused by gram negative bacteria (4,11).

Recent experience with efforts to mitagate a coliform mastitis herd problem provided an opportunity to evaluate the efficacy of a new teat dip product on a dairy herd's udder health. Particular attention was focused on the potential impact of the product on the incidence of coliform mastitis.

The opportunity to evaluate the potential for a teat dip to be a component in the overall strategy of coliform mastitis control, is fortunate and timely and may provide for new avenues of research in the control of coliform mastitis.

This research report describes the current findings of an ongoing field research project. The purpose of the trial is to evaluate the effect on a teat dip containing linear dodecylbenzene-sulfonate as the active ingredient as compared to a teat dip with iodophor as the bacteriocidal agent, on the overall incidence of clinical mastitis and coliform mastitis; to evaluate the general udder health as relfected by the somatic cell content of individual milk samples; and to evaluate the possible effect of the teat dip product on teat end condition and the potential interrelationships with the udder health.

## METHODOLOGY

A California dairy of approximately 320 cows in milk with a production average of 19,066 pounds of milk and 718 pounds of butter fat, was experiencing a moderate clinical mastitis problem largely due to coliform bacteria. The herd has an ongoing total dry cow therapy program and cows with chronic mastitis are routinely culled. Bacterial culture of the milk from all lactating cows, revealed that 90% of the cows were free of infection due to the staphylococci and the streptococci.

Procedures to control the risk of coliform mastitis were instituted. The use of udder pre-washers was eliminated. Udder wash water was treated with an iodopher sanitizer (a) at a level of 50 parts per million and single service paper towels were used to completely dry the udder prior to priming and placement of the milking machine. Free stall bedding was changed to ocean sand. The free stalls were designed and maintained to minimize defecation into the bedding. Any fecal droppings in the free stall bedding were removed daily.

In December of 1979 one half of the herd was switched to a teat dip (b) that contains linear dodecylbenzene sulfonate as the active antimicrobic agent (group II). The remaining animals were maintaned on the iodophor teat dip (c) (group I). The entire here had been dipped with the iodophor dip for at least five years. Both group of cows were dipped with the respective product within one minute after the milking machine was removed.

The herd is closed and therefor does not purchase animals that are or have been lactating. The vast majority of the herd replacements are heifers that are born and raised on site.

As first lactation animals enter the herd they are assigned to either group I or group II. Animals were not transfered for one group to the other.

Records of clinical mastitis cases were maintained and individual animal udder health was monitored by the CMT conducted by the Dairy Herd Improvement Association supervisor. Samples of milk from clinically mastitic udders were aseptically collected for bacterial culture. This level of observation has been maintained to date for 24 months.

Beginning on month 18 of the trial, intensive observation of the herd was initiated. The enumeration of individual milk somatic cells was initiated on a monthly basis. Individual mammary quarter samples were collected for bacterial culture. The relative populations of bacteria on the teat ends immediately prior to milking was determined by aseptic swabbing (9). The teat end condition was scored using a subjective numerical system (13).

All isolations of Coliform and other gram negative bacteria were identified using the The API 20E system (d). Identification of the gram positive organisms was achieved by differential hemolysis of Bovine Blood Agar and other biochemical reactions.

## PRELIMINARY RESULTS

As of January 1982 the test herd has been under close observation for 24 months. During that interval no significant management changes were introduced in the herd. The management of group I is essentially identical to that of group II.

Retrospective analysis of clinical mastitis records of group I and II for a period of 24 months prior to the initiation of the trial revealed no significant difference in the incidence of clinical mastitis. Comparison of CMT data colaborated this finding. The incidence of clinical mastitis in pre-trial months 1-24 was decreasing in both herds, suggesting the effect of an ongoing mastitis control program (table 1). During the first six months of the trial the comparative rate of clinical mastitis was not significantly different. However, by trial month 12 the incidence of clinical mastitis in group II had dropped very significantly to 1.65% ($P<.01$) of the group. This trend continued through trial month 24 at which time the over all rate of clinical mastitis in group II was 16.30%. This rate was less than half of the rate in group I (34.92%) and is statistically significant (table 1).

The decrease of clinical mastitis within group over the test interval was significantly greater in group II,

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[a] *Rapidyne, West Agro Chemical Company, Bedford, New Hampshire.*
[b] *Blu-Gard, Economics Laboratory Inc., St. Paul, Minnesota.*
[c] *Bovidine, West Agro Chemical Company.*
[d] *API 20E, Analytab Products, Plainview, New York.*

although the annual incidence in clinical mastitis in group I did decline significantly between pre-trial months 1-12 and trial months 13-24.

Approximately 66% of the cows with clinical mastitis were sampled for bacterial culture of the milk. Of the organisms isolated, the coliform bacteria accounted for two thirds of the isolates in both groups. Streptococci and staphylococci were isolated in 19.51% and 19% from groups I and II respectively (table 2).

Statistical estimates of the total number of cases of clinical coliform mastitis for group I and II indicate that group II experienced significantly fewer cases of coliform mastitis than group I (table 3). The incidence of the other forms of mastitis were too low to be statistically significant.

TABLE 1. *Prevalence of clinical mastitis prior to and during the teat dip trial.*

| | Group 1 | | Group 2 | |
|---|---|---|---|---|
| | No. | Percent | No. | Percent |
| Pre-trial Months | | | | |
| 1-12 | 59 | 30.89 | 65 | 34.98≠ |
| 13-24 | 47 | 25.97+ | 45 | 24.19≠ |
| Trial Months | | | | |
| 1- 6 | 14 | 7.29 | 18 | 9.83 |
| 7-12 | 21 | 11.17* * | 3 | 1.65* * |
| Total 1-12 | 35 | 18.42 | 21 | 11.47≠ |
| 13-18 | 15 | 7.98* | 3 | 1.64* |
| 19-24 | 16 | 7.89* | 6 | 3.23* |
| Total 13-24 | 31 | 16.40+ | 9 | 4.86≠ |
| Total Months | | | | |
| 1-24 | 66 | 34.92* * | 30 | 16.30* * |

* * P≤.01 * P≤.05 comparison between groups.
+ P≤.05 comparison within group I.
≠ P≤.05 comparison within group II,

TABLE 2. *Cultures of selected clinical mastitis samples: Trial months 1-24.*

| | Group 1 | | | Group 2 | | |
|---|---|---|---|---|---|---|
| | No. | Percent | Confidence* Interval | No. | Percent | Confidence Interval |
| Coliform and other gram negative organisms | 28 | 68.29 | ±16.46 | 14 | 66.7 | ±22.77 |
| Streptococcus Species | 7 | 17.07 | ±12.73 | 4 | 19 | ±19.16 |
| Staphylococcus Species | 1 | 2.44 | ± 5.94 | 0 | 0 | |
| No Growth | 5 | 12.20 | ±11.34 | 3 | 14.3 | ±17.35 |
| Total | 41 | — | — | 21 | — | — |

* Confidence Interval.

TABLE 3. *Estimated prevalence of clinical mastitis due to coliform and other gram negative bacteria.*

| | Group 1 | Group 2 |
|---|---|---|
| Percent of Coliform and Gram Negative | 68.29 | 66.70 |
| Confidence Interval (95%) | ±15.46 | ±22.45 |
| Number of Clinical Coliform Mastitis Cases+ | | |
| Minimum | 34.86* | |
| Maximum | | 26.77* |

* P≤.05.
+Calculated from confidence interval and number of clinical mastitis cases over 24 months of trials.

TABLE 4. *Milk somatic cell counts (SCC) from the individual animals: Trial month 18.*

| | Group 1 | Group 2 |
|---|---|---|
| Geometric Mean SCC per ml. of Milk | 149,401* | 187,023 |
| S.D. | 377,689 | 341,827 |

* Differences not significant at the P=.05 level.

The somatic cell count data from all of the lactating animals on trial during month 18 is shown in table 4. Geometric means of the group I cows and the group II cows were not significantly different.

Coliform organisms were isolated from 4.9% of the teats of the group II cattle; whereas 17.8% of the teat end swabs from group I were culturally positive for coliform organisms (table 5). The other common mastitis pathogens were isolated infrequently and the differences, unlike the coliforms, were not statistically significant.

Teat end condition scoring was performed on all four teats of all the cows in group I and II. The teat ends of the group II animals had the fewest number of teats that are considered by the ranking system to trend toward abnormal. The differences were significant to the P<.01 level (table 6).

## RESEARCH IMPLICATIONS

In a herd with a very low rate of mammary infection due to the streptococci and staphylococci, the potential to incur a significant mastitis problem from coliform bacteria is high and management should be instituted to reduce and control the number of coliform bacteria contaminating the udder and teat.

It appears from this data that the teat dip with LDS as the active ingredient has the ability to reduce the number of mammary coliform infections, when compared to the group dipped with the iodophor based teat dip. Since it is most difficult to obtain non-dipped controls in field testing of this nature, no conclusion can be drawn as to the effect of either dip as compared to no dip at all.

TABLE 5. *Teat End Bacterial Culture Prior to Milking.*

| | Group 1 | | Group 2 | |
|---|---|---|---|---|
| | No. of Teats | Percent | No. of Teats | Percent |
| Coliforms[a] | 29* | 17.3 | 8* | 4.9 |
| Streptococci sp. | 3 | 1.8 | 1 | .6 |
| Staphylococci sp. | 3 | 1.8 | 1 | .6 |
| Total[b] | | | | |

[a]Includes other gram negative bacteria.
[b]The balance of the organisms isolated were coagulase negative gram positive cocci other than the streptococci, and gram positive bacilli.
* Significantly different P≤.01.

TABLE 6. *Teat End Scores[a] as Determined on Trial Month 19.*

| | Smooth/Mild | | Smooth/Severe | | Rough/Mild | | Rough/Severe | | Total Teats |
|---|---|---|---|---|---|---|---|---|---|
| | No. | Percent | No. | Percent | No. | Percent | No. | Percent | |
| Group 1 | 251* * | 40.48 | 265* * | 42.74 | 54 | 8.71 | 50* * | 8.06 | 620 |
| Group 2 | 429* * | 65.80 | 168* * | 25.77 | 39 | 5.98 | 16* * | 2.45 | 652 |

[a]Subjective numerical rating per R. L. Sieber and R. J. Farnsworth, proceedings National Mastitis Council, 1980.
* * Difference significant at P≤.01.

However given the bacteriocidal properties of iodophors it does not seem plausable to assume that they have no effect. Specific research is needed to answer that question.

The reduction of clinical mastitis in group II clearly indicates that the product containing LDS has the potential for a mode of action different from that of the common iodophor based teat dips. The mechanism of action may be based entirely on a sustained ability to kill coliform bacteria. However this concept is nonconclusive as the rate of clinical mastitis was the same for both herds during the first six months of trial and if the mode of action were predicated entirely on bacteriocidal activity the differences should been manifested within the first months of the experiment.

The teat end condition data and the teat end coliform data suggest that the product used on the cattle of group II, may have the ability to act in manner that provides some residual bacteriocidal activity as well as provide teat end conditioning effects. Both of these potential actions seem to be plausable explanations for some of the advantage observed in group II. Future research will focus on the possible teat conditioning, streak canal sealing, and long term sanitizing effects of the LDS based teat dip.

Research in both California and England (5) has shown a relationship between bedding coliform populations and the incidence of coliform mastitis. Any treatment that has the ability to maintain the integrity of the teat end and streak canal and at the same time provide a physical or antimicrobic barrier (8) at the teat end, should have the potential of reducing the incidence of coliform mastitis.

The SCC data collected on the 18th month of the trial indicates that the rate of subclinical mastitis was not significantly different between the two groups. This data along with CMT data substantiates the comparable level of subclinical mammary disease within the two groups. Thus the reduction of clinical mastitis in group II is not due to an elevated SCC protecting the udder against coliform infection. Future data analysis will compare the rate of clinical and coliform mastitis in animals of similar age and levels of production.

This particular investigation is unique as it describes a teat dip trial that has demonstrated the ability of a teat dip to reduce the number of cases of coliform mastitis. While the mechanism of action is not clear at this time, the dip may be acting well into the post milking interval and at the same time protecting the quality of the teat end. The test herd is also unique as the common types of mastitis have virtually been eliminated. Consequently little conclusion should be infered as to the effect of either product on the incidence of the more common forms of mastitis.

As dairies elect to eliminate the typical forms of mastitis and as unique management problems arise that increase the risk of coliform mastitis, new stratagies for control of these problems need to be developed and implemented.

Nonspecific recommendations for teat dipping with "effective products" may have to be expanded and refined to deal specifically with the predominant mastitis pathogen, and other unique features associated with the highly varied types of dairy management.

Future research will continue to monitor the changes that have been observed to date, refine the observations to verify the findings and will attempt to define the mechanisms that may be infecting a lower incidence of coliform mastitis. The completed project may for the first time demonstrate the role of a teat dip as a component of coliform mastitis control.


## ACKNOWLEDGMENTS

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# News and Events

## *Foster Recipient of Macy Food Service Award*

The Minnesota Section of the Institute of Food Technologists announces that Dr. E. M. Foster, Director, Food Research Institute, University of Wisconsin, Madison, Wisconsin, is the 1982 recipient of the Harold Macy Food Science and Technology Award. The award will be presented to Dr. Foster at the April 19, 1982 meeting of the Minnesota Section.

The purpose of the Macy award is to advance the profession and practice of food technology by annually selecting an outstanding example of food technology transfer or cooperation between scientists or technologists in any two of the following settings: 1) academic, 2) government, and 3) private industry. The award consists of a plaque, an honorarium, and an invitation to the awardee to address the annual award meeting of the Minnesota Section.

As a result of Dr. Foster's leadership and persistence, the Food Research Institute (FRI) was transferred to Madison in 1966 where it continued to grow and become one of the world's largest and best centers of research on food-borne disease. The mission of FRI was soon expanded to go beyond microbiology and to include work on the safety of food additives and contaminants. Early projects of this kind included investigation of the fate of nitrite in meat curing and of sulfite in the body, the metabolism of BHA and BHT, and the toxicity of mercury in fish. Thus, in seeking solutions to food safety problems for implementation by government and industry, Dr. Foster and the FRI have effectively developed and transferred food technology between academia and government and private industry.

In addition to his position as Director of FRI, Dr. Foster is also Professor and Chariman, Food Microbiology and Toxicology, University of Wisconsin.

The April 19th award dinner will be held at the Marquette Inn, Minneapolis. Friends and colleagues of Professor Foster are invited to attend. Those interested should contact Karen Dragon, The Delmark Company, Inc., 5360 West 23rd St., Minneapolis, MN 55416, (612) 925-2100.

## Proposed Standard Change for Margarine and Oleomargarine

The U.S. Department of Agriculture today proposed changes in its standard for margarine and oleomargarine to make them more consistent with international and Food and Drug Administration standards.

"Current USDA policy allows margarine manufacturers to prepare and label margarine according to Food and Drug Administration regulations," said USDA Food Safety and Inspection Service Administrator Donald L. Houston. "The new standard would make this policy formal and thus make the standard more compatible with current industry practice." The standard would allow a wider variety of substances to be used in the manufacture of margarine and oleomargarine. It would also specify that any future revisions in the FDA standard would be carefully studied by USDA and corresponding changes in the USDA standard considered.

Although manufacturing practices vary little among the different kinds of margarine, under provisions of the Meat Inspection Act, the USDA is responsible for margarine and oleomargine that contains animal fat. The Food and Drug Administration is responsible for other kinds. The two terms, margarine and oleomargarine, are used interchangeably.

For further information contact: Annie Johnson, FSIS Hearing Clerk, Rm. 2637-S, USDA, Washington, D.C. 20250.

## Economical Wastewater Treatment in Milk Processing

For over ten years, aeration supplied by a low-pressure Hinde Air-Aqua System has treated wastewater from milk processing, both effectively and economically. That's the conclusion of a detailed paper by Harold Woolshlager, superintendent of a combined industrial-domestic sewage treatment plant in Lowville, New York. The community's aerated-faculative treatment plant is one of only 13 percent in the entire nation not in violation of its National Pollutant Discharge Elimation System permit at some time during each year.

Only 60 hp is required by the Air-Aqua installation here to provide 98 percent BOD and 97 percent SS removal from flows averaging 950,000 gallons and 2,200 lbs. BOD per day. In addition to low electrical costs, more money is being saved by the minimal mechanical maintenance required, and by the system's natural oxidation of solids to eliminate sludge handling.

Treatment has continued to be effective, summer and winter, through hydraulic surges of 3,700,000 gpd and snows ranging up to 319 inches annually, Woolshlager further reports.

Despite shock loads from cheese-making which reach 40,000 ppm, effluent meets EPA standards, he notes.

For more information contact: Hinde Engineering Company, 654 Deerfield Road, Highland Park, IL 60035. In Canada, Hinde Manufacturing, 260 Burlington Street East, Hamilton, Ontario L8L 4H4.

## *Unlimited Life to Foods with New Plastic Sealing Process*

A new patented plastic sealing process that will provide almost unlimited life to foods has been developed by the Protective Sealing Corp.

The wrap can not be penetrated by bacteria or other harmful elements, thus giving fresh, frozen, dehyrated and cooked foods an indefinate life-span, according to Delano Barboza, president of the company. This is accomplished without changing the shape or natural properties of the food. Although transparent and pliable, this unique sealing has the protective qualities of tin.

According to Barboza, the effects on certain industries such as food and industrial packaging will be far-reaching. "The process is like putting something in a tin can," he said. "Outside elements will not be able to penetrate the sealing. It will open up new long distance markets, extend shelf-life and shipping time of a product. It will allow for centralized packaging and eliminate the need for preservatives in foods, reducing costs and stabilizing buying."

The need for bags and pouches that require gas flushes in packaging sausages and frankfurters will also be eliminated, Barboza said. That type of food preservation process is objectionable to the FDA and to foreign markets.

The machine will sell for approximately $60,000. Barboza says under normal use, the machine will pay for itself within six months.

The Protective Sealing Corp. office is located with California Financial Coordinators. For Further information contact Delano Barboza at 6700 Fallbrook Ave., Canoga Park, CA 91307, 213-710-0411.

## *Certain Cheeses Fight* Dental Decay

Scientists at the University of Minnesota have uncovered a link in humans between eating certain kinds of cheese and prevention of dental decay.

Charles Schachtele, a UM professor of dentistry and microbiology, reported that aged Cheddar, Swiss and Monterey Jack cheeses apparently battle cavities by preventing sugar from forming an acid layer on teeth. These cheeses, he said, are the only foods known to have this property.

Singling out the protein, fat, mineral or other component that gives these cheeses their shielding ability may someday lead to sweeping changes at the dinner table, the professor pointed out.

"Once we define what makes the cheese apparently anticariogenic (anticavity) we possibly could put the same substance into other foods," he said. "It could open the door to the creation of a whole line of foods that don't cause tooth decay."

That would be welcome news to millions of Americans who will spend an estimated $6 billion on dental bills this year, Schachtele said.

Cavities form when colonies of bacteria called dental plaque stick to the teeth. The bacteria break down the carbohydrate foods we eat, changing sugars to plaque acid. The plaque adheres this acid to the teeth, where it attacks the tooth enamel and eventually causes decay.

Schachtele's studies followed earlier experiments with laboratory rats suggesting that aged Cheddar might be an effective cavity fighter. His work is the first indication that all three cheeses have this protective effect in humans.

In his research, Schachtele labeled seven cheeses he tested as "friendly to teeth" because they produced little or no plaque acid and did not promote tooth decay. These cheeses were aged Cheddar, Gouda, Brie, blue, Monterey Jack, mozzarella and Swiss.

"I would say these cheeses are clearly among the few foods you can eat and be sure they won't damage your teeth," Schachtele said.

Additional tests revealed something even more surprising. Aged Cheddar, Monterey Jack and Swiss blocked an approximate 1,000-fold increase in tooth acid that normally would be triggered by sugar water.

Schachtele measured plaque acid production of the cheeses in three human subjects by attaching tiny acid sensors to their molars. He used the standard pH scale to measure the acid. The "resting" pH level, before any food was chewed, was 6.5 to 7.0. Any dip below 6.5 meant the acid level had increased.

None of the seven "friendly" cheeses allowed the plaque pH to dip even to 6.0, and all returned to the 6.5 range within minutes. These short, initial pH dips were due to the acid in the cheese, not a bacterial reaction, he noted.

Schachtele then tested each cheese to determine if it could shield the teeth from plaque acid. Participants chewed a small piece of each cheese for one minute, then immediately swished sugar water in their mouths after each sample. The results were consistent: aged Cheddar, Swiss and Monterey Jack blocked the sugar from producing acid that could lead to decay.

"We were totally surprised by the reaction," Schachtele said. "We don't know yet if the plaque just didn't produce acid because of the cheese or if the acid was rapidly neutralized by it."

Schachtele and his associate, Mark Jensen, an assistant professor of dentistry at the university, are now trying to determine what enables these cheeses to act like "dietary toothbrushes."

"Our goal is to nail it down within a year," Schachtele explained.

Schachtele's study is one of 32 research projects sponsored by National Dairy Council in 1982.

## Free Guide for Food Service Operators

"Disposing of Food Service Disposables", a guide to food service operators in planning effective waste management systems, has recently been issued by the Single Service Institute and is now available to food service establishments and people in the disposables industry.

The 12-page publication was prepared by the Institute from research materials provided by the American Public Works Association and Keep America Beautiful, Inc. The Institute is the national trade association of manufacturers of disposable food service and packaging products.

In announcing the new booklet, Charles W. Felix, Vice President of the Institute in charge of environment, health and public affairs, said: "The makers of paper and plastic disposables feel a strong responsibility to help our communities as they strive to solve municipal waste disposal problems. In particular, we seek to aid food service operators, who are important customers of our industry's disposable products and who must regularly dispose of food wastes economically and sanitarily. We feel sure that SSI's new guide will be helpful to food service establishments in their disposal efforts."

The new publication provides full coverage of the key elements in waste management systems -- waste accumulation stations, on-site processing, waste removal and disposal -- with details on equipment and costs. Government regulations concerning waste handling and disposal are also described. Checklists are included for waste management planning and for litter control in food service operations, along with a list of sources for further information.

A free copy of "Disposing of Food Service Disposables" may be obtained from the Single Service Institute, 1025 Connecticut Avenue, N.W., Washington, D.C. 20036.

## *Calf Hutches Keep Calves Healthy*

It's easier to keep calves healthy in calf hutches than in other forms of calf housing, recent research studies show.

"Dairy farmers may have to choose between saving time or saving calves," says Jeff Reneau, extension dairy specialist at the University of Minnesota.

Both warm and cold housing systems will work well if they're managed properly, Reneau says. Cold housing takes less energy and capital investment. But warm housing is usually more labor efficient and more comfortable for those who care for the calves.

A three-year study at the University of Wisconsin, Marshfield, compared two types of warm housing with two types of cold housing. Warm housing consisted of floor level, individual pens and elevated individual stalls. The two types of cold housing were calf hutches and individual pens in a pole building.

Daily gains weren't different among the groups. But death losses were higher (eight percent) in warm housing than in the cold housing (three percent). No calves in the hutches died.

There were more scours (56 percent of the calves) in the warm housing than in the cold environment (36 percent). The warm housing was more labor efficient. Average time spent per calf per day was 4.8 minutes for warm housing and 5.9 minutes for the cold housing.

Another recent study showed 4 percent calf losses from calves raised in hutches compared to 11 percent from farms not using hutches.

"You don't need temperatures above freezing," Reneau says. "There are many calves raised without heat in subzero weather. Research data gives about 70 degrees F. as the ideal temperature for top growth.

"But field studies comparing calves housing in warm vs. cold housing show no differences in growth rates if nutrient requirements are met. Calves in subzero temperatures require extra energy and should be fed accordingly," Reneau says.

Ideal temperatures are 35 to 45 degrees F. since drinking cups don't freeze, you need less bedding and it's more comfortable for the calf feeder. "But far too many calf barns are too warm," Reneau says. "In these cases, there will be more disease problems if ventilation and sanitation aren't adequate," he says.

With calf hutches, you don't have to worry about ventilation as long as the hutch front is open for the free exchange with outside air. The hutch should be positioned so that the open front is opposite prevailing winds.

## *Cured or Smoked Poultry can be Frozen*

Keep delicious cured or smoked chicken right at your fingertips by storing it in the freezer.

Cured or smoked chicken can be kept in a freezer without losing taste or quality for up to a year, points out Dr. James H. Denton, poultry marketing specialist with the Texas Agricultural Extension Service, Texas A&M University System.

It can be kept safely in the refrigerator for up to two weeks but should be frozen after that, the specialist says.

Denton explains that cured chicken has been soaked or injected with a brine of salt, sugar and nitrate and that the nitrate acts as a preservative to slow bacterial growth.

Chicken stored for 12 months was equal to freshly smoked chicken for flavor, texture and juiciness. Bacterial counts remained unchanged during the storage period.

Take advantage of season specials on smoked chickens or turkeys by buying several and storing them in the home freezer. They'll be just as tasty a year later, says Denton.

## Detection Instrument "Sniffs Out" Diseased Food & Plants From Entering The U.S.

Uncle Sam's scientists are creating machines with a sense of smell so keen they'll be able to tell a real lime from the lime-scented aftershave lotion inside your closed suitcase.

Purpose: To stop diseased and pest-ridden food and plants from slipping into the country.

As a bonus, you'll probably cross U.S. borders with less hassle.

"If you travel abroad very much, you'll likely be among the first to know when these odor-sensing machines are perfected and in use," said chemist James Cavanaugh. "You would spend less time waiting in line while customs and agriculture inspectors open people's baggage to look at the contents."

Cavanaugh and his colleagues are working on the detection instruments at the U.S. Department of Agriculture's Eastern Regional Research Center of the Agricultural Research Service here. Their goal is to develop technologies that will more easily detect food and plants carrying pests and disease."

Expectations are that the devices eventually will "smell" the whole spectrum of food and plants concealed in suitcases.

Despite the best efforts of inspectors at our borders, some diseases and pests hitch rides into the U.S., said Harvey Ford, deputy administrator of USDA's Animal and Plant Health Inspection Service. A single fruit, vegetable, plant or piece of meat that looked okay to an untrained traveler's eyes has been known to threaten food supplies and cause agricultural damage mounting to millions of dollars.

Tons of contaminated foodstuffs were confiscated at U.S. airports in 1980 alone.

"Examples of what we're trying to prevent are the well-known outbreaks of medflies in California and in Florida," said Ford.

"We hope the new sensing devices now being developed will help us win the battle against diseases and pests at our borders so we don't have to fight the same wars over and over again in the fields where our food and fiber are grown. This is a situation where a few dollars spent on prevention really can be worth far more than the many millions a cure can cost."

Ford emphasized that the nation's crops and livestocks are highly vulnerable to many foreign animal and plant pests and diseases that can be transmitted by agricultural items frequently brought into the U.S. by individuals.

"The high cost of eradicating the resulting epidemics and infestations is only part of the picture," he said. "Other consequences are higher food prices and threats to the nation's food supplies."

Cavanaugh and his co-workers at the USDA research center here are experimenting with instrumentation that will differentiate among the scents of food, humans and cosmetics. They also are identifying and characterizing odors that will be used as a reference or data bank for the electronic sensing equipment.

"We already can detect the basic differences in odors electronically, but further research is needed to be sure a false alarm is not sounded when a scent such as perfume is detected," said Cavanaugh.

Other teams of USDA-sponsored scientists are looking at additional technologies. One, at the Georgia Tech Research Institute, is on the use of microwaves that reflect off items in luggage. Another, at the USDA Research Center in Berkeley, Calif., is on x-ray imagery of suitcases.

Until the sensing devices are perfected, the USDA animal and plant health protection agency will have to do its job as best it can with existing technology.

You can help avoid the problem simply by being careful about what you bring across the border, but the precautions you should take are not always obvious. A booklet that tells you what you need to know when you plan a trip abroad, entitled "Travelers' Tips," is yours for the asking.

Obeying the rules outlined in the booklet can save you time and prevent personal inconvenience as well as help keep pests and diseases out of American crops. For a free copy, write: Travelers' Tips, USDA/APHIS Information, G-187 Federal Building, 6505 Belcrest Road, Hyattsville, Md. 20782.

Specify whether you want the booklet in English or Spanish. It's available in both.

For more information contact: Dr. James Cavanaugh, Physical and Chemistry Instrumentation Laboratory, Eastern Regional Research Center, Agricultural Research Service, U.S. Department of Agriculture, Philadelphia, Pa. 19118, 215-233-6609.

# An Abbreviated IAMFES History of the Seventies

C. K. JOHNS

*Stittsville, Ont. and Bonita Springs, Fl.*

The Seventies will be remembered principally as being the decade during which H. L. ("Red") Thomasson retired as Executive Secretary and Managing Editor of the Journal of Milk and Food Technology, and Earl O. Wright took his place. Another major event was the greatly needed change in the name of the Journal to a much more appropriate one, the Journal of Food Protection. And during the same period there was a noticeable increase in the number of papers published from the non-dairy field and a steady growth in the size of the Journal. For the latter, most of the credit must be given to the editor, Dr. Elmer H. Marth, who was also acting as the Chairman of the Intersociety Council concerned with the development and publication of the 14th edition of "Standard Methods for the Examination of Dairy Products," which finally saw the light of day in December 1978. To be able to carry on these two activities along with those of Professor of Food Science, University of Wisconsin-Madison, indicates a very efficient person. The Association is deeply indebted to Elmer for the excellent reputation the Journal has developed, attracting research articles from so many countries.

And now for a few details of what happened in each year. For this information I have had to rely mainly upon the Annual Reports.

In 1970, the IAMFES met at Cedar Rapids, Iowa, with Milton E. Held presiding. In his Presidential Address, he urged that the Association launch a vigorous campaign for food protection from source to consumer. At the Awards Banquet, the CITATION AWARD went to Ivan E. Parkin. Ivan obtained his B.S. in Agriculture from the University of Connecticut, and for many years was on the faculty at Pennsylvania State University as Dairy Extension Specialist. He was President of IAMFES in 1954-55 and served with distinction on the Committee on Sanitary Procedures, the Farm Methods Committee and many others. In 1965 this Association recognized his many years of faithful service by awarding him an HONORARY LIFE MEMBERSHIP. Although he retired in 1963, he has continued uninterrupted attendance at the annual meetings. He has thereby continued to make himself available to the Executive Board and other members for consultation and advice. For the past several years he has ruled as a firm but fair parliamentarian at annual business meetings. Ivan holds, and is not afraid to manifest, a genuine affection for his fellow man. This explains why he has been so generally liked by those privileged to know him.

In 1970, no SANITARIAN'S AWARD was made, due to lack of adequate competition. But an HONORARY LIFE MEMBERSHIP was presented to Harold J. Barnum, who well deserved this recognition of his services. "Barney", as he is affectionately known, obtained his B.S. degree from Montana State University, and the M.S. from Michigan State University. In 1929 he began his career as a milk inspector for the City Health Department in Detroit. Over the years he became recognized as both a professional sanitarian and an able administrator. In 1947 he was made Chief of Milk Sanitation Services for Denver City and County. Within a few years he had re-organized his office, promoted industry and public co-operation in joint sanitation programs, and has raised Denver's milk sanitation ratings to commendably high levels. He also devoted a great deal of effort to furtherance of sanitation on the national scene. He was elected to the Executive Board of IAMFES and served as President in 1952. Since then he has served on many of the Association's committees and has been Chairman of the National Conference on Interstate Milk Shipments, Secretary of the National Products Labeling Committee, Executive Secretary of the Dairy Products Improvement Institute, and a member of the Advisory Committee for the 1965 USPHS Grade A Milk Ordinance and Code. In 1957 he received the coveted IAMFES SANITARIAN'S AWARD.

In 1971 the Annual Meeting was held in San Diego, with Dick B. Whitehead presiding. It was decided to raise fees by $4.00/year. C. A. Abele resigned from the 3-A Symbol Council after a long period of service as chairman. The president emphasized that Sanitarians and other Public Health officials must be better trained than in the past in order to meet the demands of our times. Earl O. Wright was chosen to replace him. The CITATION AWARD went to L. Wayne Brown, of Madison, Wis. A native Wisconsiner, he received his B.S., M.S. and Ph.D. in Chemistry, Bacteriology and Dairy Industry. In 1934 he was a bacteriologist with the Wisconsin Department of Agriculture; now he was Director of the Bureau of Microbiology at Madison. Wayne joined the Association in 1939, and was instrumental in organizing the Wisconsin Association of Milk and Food Sanitarians in 1943. He served as Secretary-Treasurer from that date to this. He initiated

and continued to prepare the Association's News-Letter, and received the Award of the Wisconsin Sanitarians in 1968. He served as Affiliate Representative to IAMFES Affiliate Council for many years. On several occasions he served as Secretary, and was again elected in 1971.

The SANITARIAN AWARD for the year was given to Shelby Johnson. Born in Kentucky, he graduated from West Kentucky State College in 1950 with a B.S. in Agriculture. He took graduate work in Agricultural Education at the University of Kentucky, and in 1957 obtained an M.S. in Public Administration from the University of North Carolina. He taught Vocational Agriculture until 1954, when he joined the Kentucky Department of Health as Food Inspector. In 1959 he became Director, Food and Drug program. In 1967 he became Director of the Environmental Services program, and finally Director, Division of Environmental Services in March 1971.

As a member of the Kentucky Association of Milk, Food and Environmental Sanitarians, of which he was president in 1963-4, he received the OUTSTANDING SANITARIAN'S AWARD in 1967. In addition to his activities in the IAMFES he was active in many other organizations, including the American Intersociety of Sanitarians. He also served on the Executive Board of the National Conference on Interstate Milk Shipments since 1965 and was Chairman of the Conference from 1967 to 1971.

Johnson's accomplishments in the field of public health are legion, and only a few can be cited here. Before 1963 there was no regulatory control of manufacturing milk in Kentucky. On his advice a Dairy Advisory Committee was appointed in 1962 to work with him in developing a state-wide regulation for producers and processors. This was adopted in 1963 and implemented early in 1964. This regulation has been used as a guideline by five adjoining states as they developed similar regulations. Before 1967 carbonated beverage plants in Kentucky were not subjected to specific regulations, and many of the labels used were at variance with codes prescribed in the Kentucky Food, Drug & Cosmetic Act. As a result of conferences with all interested bodies, Johnson drafted a regulation for the soft drink industry which became effective early in 1967. He also recognized the need for a uniform state-wide food service code. Starting toward this goal in 1967, the code was developed with the aid of the Kentucky Restaurant Association and other interested bodies and became effective July 1, 1969. Since Johnson has been with the Kentucky State Board of Health, he had developed 19 other regulations which have been adopted in the state. He also contributed to improving facilities offered by many Kentucky trailer parks, and licensing of septic tank cleaners. He was instrumental in obtaining federal funds to study pesticide usage in Kentucky.

Among other awards was the awarding of an HONORARY LIFE MEMBERSHIP to William V. Hickey. Born in Washington, D.C., he obtained his education at the University of Utah, supplemented with additional work in Water Supplies, Sanitation, Dairy Science and Microbiology at the University of Utah and Utah State University. From 1936 to 1944 Hickey was employed as a Sanitarian by the Salt Lake City Board of Health and the Utah State Department of Health. In 1944 he became Director, Division of Foods and Sanitary Engineering, Salt Lake City Board of Health, and continued thus until 1957, when he joined the staff of the Plate, Cup and Container Institute (now the Single Service Institute). One of his duties was to edit *Health Officer's News Digest* (now *Environment News Digest*). Upon retirement, he held an appointment as Adjunct Professor of Environmental Science at Rutgers University, New Brunswick, N.J.

Bill was president of IAMFES in 1960. He also called the first meeting on mastitis control in 1960, which led to the formation of the National Mastitis Council. He also contributed to IAMFES by serving on the Sanitarian's Joint Committee, the Food Equipment Sanitary Standards Committee and the Food Protection Committee. He also continued active in other professional societies. He is Past President of both Utah and New Jersey Public Health Associations, and served as Secretary of the Section on Environment and as a member of the Governing Council of the American Public Health Association.

The 59th Annual Meeting of the IAMFES at Milwaukee in 1972 was one of the most successful held in recent years, with around 450 members and guests registered. It was held in co-operation with the National Association of Dairy Fieldmen, and the summer meeting of the National Mastitis Council also attracted some 300 participants. Orlowe M. Osten presided. The Awards Banquet this year featured a review of the history of the IAMFES by Dr. K. G. Weckel. This presentation served to commemorate the founding of the Association (originally the Dairy and Milk Inspectors Association) in Milwaukee in 1911, with one representative each from Australia and Canada. How we had grown! At the banquet the CITATION AWARD was given to Ben Luce. Ben obtained his B.S. in Dairy Science from the University of Idaho. Subsequently he spent a few years with the dairy industry before joining the Washington State Department of Agriculture, where he ended up as Chief of the Dairy Inspection Service. He has lectured for several years at Washington State University and the University of Idaho on dairy farm and plant sanitation.

Ben served for six years as Secretary-Treasurer of the Washington Milk Sanitarian's Association, and as Chairman of the Examiners, Washington State Registered Sanitarian's Board. He is a Past President of

the Washington State Dairy Institute Alumni, and has served on numerous committees. For many years he was active in the affairs of IAMFES. He served on several subcommittees of the Farm Methods Committee, the Committee on Sanitary Procedures, and the Committee on Recognition and Rewards. He distinguished himself primarily by his accomplishments with the Affiliate Council while serving as Chairman for the past four years. He was a member of the Interstate Milk Shippers Conference Task Committee, the National Labeling Committee on milk and dairy products, and the advisory committee of the National Mastitis Council. Ben Luce has become well known by many sanitarians and others, not only for the magnitude of his commitments but also for his ability and knowledge and willingness to help his fellow man. For more information, see Vol. 35, pp. 67-9, JMFT.

The SANITARIAN'S AWARD was given to Ambrose P. Bell, of Louisville, Ky. A native of Colorado, Bell received his B.S. degree in Civil Engineering (with an option in Sanitary Science) from Colorado A and M University in 1940. In 1941 he joined the District of Columbia Health Department as a public health engineer, and since 1948 has been with the Louisville and Jefferson County Department of Public Health. Seeing that the Health Department needed new facilities, for more than 10 years he promoted and sought funds for a new building, which was dedicated in 1969. When he came to Louisville there was no Sanitary Code. He developed and administered programs to enforce rules and regulations covering a wide range of sanitation problems, most of which are still in effect today.

Bell has served as president of each of the following associations: Kentucky Association of Milk, Food and Environmental Sanitarians, Kentucky Public Health Association, Ohio Valley Conference of Food and Drug Officials, and the Maryland-Delaware Food and Drug Officials. He holds membership in a number of professional societies. He has lectured on Environmental Health at the University of Louisville Medical School and has served on numerous local, regional and national committees.

The SHOGREN AWARD, honoring Claire and Arthur Shogren for their contributions to dairy and food sanitation, was developed by the Affiliate Council to give annual recognition to the affiliate organization with the most outstanding program. The Committee on Recognition and Awards selects the winner, the first such award going to the Iowa Association of Milk, Food and Environmental Sanitarians. The presentation to Glenn Gavin was made by Ben Luce, retiring chairman of the Affiliate Council. Both Shogrens received Honorary Life Memberships in 1964.

The Committee on Recognition and Awards has felt that there should be an award honoring members who have made exceptional contributions to food and/or environmental safety and sanitation. As persons in industry and universities have not been eligible for the Sanitarian's Award, they have recommended a new award for these members. The Milking Machine Manufacturer's Council of the Farm and Industrial Equipment Institute has agreed to provide $1,000 annually for such an award.

HONORARY LIFE MEMBERSHIPS were awarded to C. W. Dromgold and E. Wallenweldt. Dromgold served the Philadelphia Dairy Council on raw milk quality after graduation from Pennsylvania State University until 1935, when he joined the Milk Control Section, St. Louis Health Division. There he has served as Dairy Sanitarian, Dairy Sanitation Supervisor and finally Acting Administrative Chief of the Milk Control Service in 1971. In 1960 he received the SANITARIAN SERVICE AWARD for 25 years' membership in the Missouri Association of Milk and Food Sanitarians, and in 1971 the same organization presented him with its "SANITATION CITATION AWARD" for outstanding work in the field of sanitation.

Professor Evert Wallenfeldt received his B.S. degree in Agriculture from Iowa State University in 1926. After teaching agriculture and chemistry for two years at Bloomer, Wis., high school, he moved to Cornell University and in 1929 obtained the M.S. degree in Dairy Industry. From 1929 to 1938 he served the Borden Company as a dairy fieldman, supervisor of special products and technical problems section, and research bacteriologist. In 1938 he became an Extension Specialist at the University of Wisconsin at Madison. He is now an Emeritus Professor of Food Science, continuing to teach in Farm and University short courses at Madison.

Wallenfeldt's professional career was largely devoted to improving milk quality, achieving uniformity in field work and dairy inspection procedures, assisting dairy plants to develop effective quality control programs, improving the quality of dairy products, and improving the design and construction of equipment used to handle and process milk. He served on numerous university, state-wide and national committees. Many of these activities were directly related to problems confronting the dairy industry. He continues active in numerous professional societies, including IAMFES, American Dairy Science Association and the American Public Health Association.

In 1973, the 60th Annual Meeting of the IAMFES was held in Rochester, N.Y., being hosted by the New York Association of Milk and Food Sanitarians and the Department of Food Science of Cornell University, with some 600 members and guests registered - by all odds the largest turnout to date. The summer meeting of the National Mastitis Council also attracted some 300

participants. President Walter F. Wilson reported results of a recent referendum of renewing negotiations with the National Environmental Health Association. Of those members who voted, 297 favored further negotiations, while 288 were opposed to dealing further with NEHA on this matter. Of the NEHA members who voted on the same question, 1352 voted in favor of further negotiations, while only 137 opposed such a move. Among actions taken by the Executive Board was the appointment of Earl O. Wright as the new Executive Secretary, effective January 1, 1974, when H. L. Thomasson retired. At the Awards Banquet, the CITATION AWARD was made to Samuel O. Noles. Sam was a native of Arkansas, where he completed work at a junior college. He then worked in the Texas oil fields, followed by four years in the U.S. Army Veterinary Corps. While there he was concerned with the quality control of meat and dairy products. After release from the Army, Sam took a position with the Health Department in Gainesville, Fla., where he also attended the University of Florida and graduated in 1948 with a B.S. degree in Dairy Science. In 1949 he joined the Florida State Board of Health as Milk Consultant, a position he still held. He was on educational leave in 1951-52 and obtained his M.P.H. degree from the University of Florida.

Sam was a member of IAMFES since 1945. During that period he was an active member of the following committees: Sanitary Procedures, Farm Methods, Membership, Affiliate Council and Awards and Recognition. He served on the Executive Board from 1966 to 1971, and was President in 1968-69. In addition he served twice as President of the Florida Association of Milk and Food Sanitarians. He continued active in Alpha Zeta, Phi Sigma, American Public Health Association, Florida Public Health Association, National Society of Professional Sanitarians, National Conference on Interstate Milk Shipments and the National Environmental Health Association.

The SANITARIAN'S AWARD was not given this year, but the new award, the UNIVERSITY-INDUSTRY AWARD, went to Prof. Walter A. Krienke, Associate Professor of Dairy Science at the University of Florida in Gainesville. He was born in 1907 near Enid, Okla. After public and high schools he enrolled at Oklahoma A & M College (now Oklahoma State University), and in 1932 obtained the B.S. degree with a major in dairying. He then worked for the Carnation Company for six years before returning to his alma mater to receive his M.S. degree in 1940. He continued with more course work while he served as instructor and did research. In 1945 he moved to the University of Illinois as Assistant Dairy Technologist, and in 1947 to the University of Florida as Associate Professor and Associate Dairy Technologist. He was one of the first to be concerned about antibiotic residues in milk, and from 1949 to 1955 served as Chairman of the Antibiotic Committee of the American Dairy Science Association. Largely through his efforts Florida became the first state to routinely test milk for the presence of antibiotics. His pioneering effort ultimately resulted in nation-wide testing of milk for antibiotics.

Some of Krienke's other research contributions concerned rancidity in milk (resulting from improperly installed pipelines and improperly operated pumps), variability in composition of milk, methods to determine the chlorine content of milk, adulteration of milk fat, viscosity of ice cream mix, Vitamin K and the lactic fermentation in milk, oxidized flavor in milk, spray-drying of milk, measuring the freezing point of milk, frozen milk and frozen concentrated milk, and secretion by the cow of dietary phosphorus in milk. He was the author of numerous scientific papers and popular articles, as well as station circulars and similar publications.

The SHOGREN AWARD this year went to the Kentucky Affiliate. It was presented to Leon Townsend, secretary of the Affiliate, by D. B. Whitehead.

An HONORARY LIFE MEMBERSHIP was presented to Fred E. Eutz, a native of New York City with a yen for the country. During his high school days Fred spent his summers working on dairy farms. In 1925 he received his B.S. degree from Cornell University, with majors in Dairy Manufacturing and Rural Engineering. He then became a milk inspector for the New York City Department of Health and continued until 1929 when he became Assistant Chief of the Milk Division. He then joined the Borden Company and became the Assistant General Manager of Reid's Union Dairy and Reid Ice Cream Corporation in Brooklyn. (The companies were acquired by Bordens in 1927.) Fred remained with Bordens until his retirement in 1970, when he was Assistant to the Vice-President in Charge of Production, East Division, Ice Cream and Milk. Since then he was kept busy as consultant to the food and dairy industries.

Many of Fred's activities with Borden's centered around sanitary control of dairy products, establishing improved laboratory facilities, and keeping informed about regulations and regulatory agencies that controlled production and processing of dairy products. He served on the 3-A Sanitary Standards Committees, the Sanitary Control Committee of the International Association of Ice Cream Manufacturers, and the Standards Committees of Ice Cream Associations of New York and New Jersey. Other committee work included the Northeast Dairy Practices Committee and the Dairy Industry Equipment Committee of the New York Association of Milk and Food Sanitarians. He is a member of both the New York and Connecticut Associations of Milk and Food Sanitarians.

Fred became interested in IAMFES some 45 years earlier when Bill Palmer, the first editor of our Journal, asked him to present papers at several annual meetings and to contribute editorial material for the Association's publication. Since then he has served as President of both IAMFES and the New York affiliate. He holds honorary life memberships from both New York and Connecticut affiliates, has received the EMMET R. GAUHN MEMORIAL AWARD from the New York Affiliate, and has been recognized for his contributions to 3-A Sanitary Standards and to the ice cream industry.

The 61st Annual Meeting of IAMFES was held in St. Petersburg, Fla. in 1974, in conjunction with the Annual Meeting of the Florida Association of Milk and Food Sanitarians and the Summer Meeting of the National Mastitis Council. More than 600 persons attended one or more of the three meetings.

This year was certainly one of changes! And the biggest of course was that "Red" Thomasson had retired at the end of last year, to be succeeded by Earl O. Wright as Executive Secretary and Managing Editor of the Journal. Until the incoming President took over, Earl was really 'wearing two hats' as he was also President. "Red" continued as consultant for 1974 while arrangements were being made to transfer the office from Shelbyville, Ind., to Ames, Iowa, and the Journal was being assembled and put out from Shelbyville while a new printer was being found in Ames.

Among other changes was the presentation of 14 contributed research papers at the technical sessions. In his report to the Executive Board, the Editor, Dr. Elmer Marth, commented that in 1973 for the first time the Journal published more papers dealing with non-dairy foods than with dairy foods, reflecting the diminished support for research in the dairy field. It was also the year when a very active Membership Committee chaired by Harold Heiskell added 384 new members to the Association. And two new affiliates, from Ontario and Alberta, have joined from Canada.

The Association owes "Red" a great deal for his services since he joined it in 1939. When he became Executive Secretary and Managing Editor of the Journal, the Association was in deep financial trouble; he succeeded in reorganizing the Association so that it was soon on a sound financial basis. During his tenure of office the number of affiliates grew from 11 to 25 and the membership in IAMFES grew accordingly. It was most fitting that special recognition was given to "Red" when he retired. Dick B. Whitehead, a former President, organized the recognition for "Red" and presided over this part of the program at the Awards Banquet. He began by introducing the Thomassons' four children, who had been brought to the meeting unknown to their parents! Whitehead then presented "Red" with a special plaque and with approximately $1,300 contributed by the affiliates of IAMFES.

"Red" was born in Indianapolis in 1903. After graduation from high school he worked for a printing firm and a bill-collecting agency. In 1924 he enrolled in Franklin College, from which he graduated in 1928 with major work in sociology, economics, history and political science, with minor work in science. He was a member of Phi Delta Theta, Blue Key (honor society) and the Interfraternity Council. He also served as Editor-in-Chief of the college yearbook. In 1929 "Red" and Margaret were married in Fort Worth, Texas, where he had accepted a position after graduation. From 1928 to 1938 "Red" held the following positions: salesman for Sellers Supply Co. in Fort Worth, manager of Fertig Dairy in Shelbyville, Ind., employee of Fertig Dairy Co. in Indianapolis, automobile salesman, then operator of a clothing store in Shelbyville. In 1938 he accepted a position with the Dairy Division of the Indiana State Board of Health, and in 1939 was put in charge of the Grade A milk program for the entire state. While with the Board of Health, he obtained adoption of 70 ordinances for Grade A milk, covering 92% of the urban population of Indiana. His efforts led to eventual adoption of a state-wide Grade A law. He was also responsible for hiring and training personnel to implement the Grade A milk ordinances.

In 1939 "Red" joined IAMFES and served as President in 1951-52. He served continuously as a member of the Committee on Sanitary Procedures since elected to office. In 1951 he became Executive Secretary and Managing Editor for IAMFES, establishing headquarters in Shelbyville. As previously mentioned, the number of affiliates and membership in IAMFES grew considerably during his tenure of office. The Journal of Milk and Food Technology became a monthly publication in 1954, and now approximately 4,000 copies were distributed in the U.S. and 74 other countries. He devoted much time during his last 25 years to improving the knowledge of sanitarians and others so they could more effectively improve the nation's public health. His efforts had not been in vain, and the Association saluted him for a job well done and wished him well in his retirement.

IAMFES history continues in the April issue.

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Convenient Membership form is on page 127.

# AFFILIATE NEWSLETTER . . .

This page has been devoted to YOU, the IAMFES affiliates. Your input is needed on whether you feel this page should be a regular feature to serve as a communication source between the state and international office. Please respond.

**WHO'S WHO**. . .When you need a question answered, here are the people you need to talk to depending on the question at the IAMFES office.

CIRCULATION, address changes, customer service, affiliate billing. . . JEANINE STRODTMAN

ADVERTISING, manuscript reprints...SUZANNE TRCKA

IDEAS, articles, suggestions for Dairy and Food Sanitation...KATHY HATHAWAY, Editor (note: Journal of Food Protection manuscripts should be directed to Elmer Marth, Univ. of Wisconsin, Madison, WI)

3-A-STANDARDS, overall questions...EARL WRIGHT, Exec. Secretary

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A person without enthusiasm is like a car without gasoline.

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**CONFUSED. . .ABOUT DIRECT BILLING?** . . . .many people are. So here is an easy step by step look for those affiliate states who have elected to have IAMFES do their billing:

If you have any additional question, contact JEANINE at IAMFES office, or your affiliate secretary.

**1.** Individuals will be sent a renewal notice two months prior to expiration of their membership (and subscription to the journals).

**2.** This notice contains the price of the Journal of Food Protection, Dairy and Food Sanitation and the combination rate, (which is your best buy). Plus your state dues as an affiliate member.

**3.** Your second renewal notice (if you haven't renewed) will reach you approximately one month before expiration.

**WHAT'S GOING ON**. . . We'd like to know and other states would like to know what you are doing, what's new and what's coming up within your state group. Send your STATE TIDBITS to Kathy Hathaway, IAMFES, PO Box 701 Ames, IA 50010.

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If inventors feared criticism, we would still be traveling by ox cart and wearing homespun clothing.

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**4.** Simpy send your renewal form and check including your state affiliate dues to the IAMFES office: PO Box 701 Ames, IA 50010.

**5.** If you do not renew and decide to do so at a later date, all back issues for the year will be sent to you.

**6.** You may join as a state affiliate only if you desire.

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Suppose you get another man's goat. What are you going to do with it?

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## MEMBERSHIP APPLICATION

All memberships on calendar year basis, Memberships include subscription to *Journal of Food Protection, Dairy and Food Sanitation,* or both journals.

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Check one: *Foreign: add $5 per publication for postage.

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**Mail all above requests to:**
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# Calendar

March 15-24---UNIVERSITY OF MARYLAND 32nd ANNUAL ICE CREAM SHORT COURSE. College Park, MD. Contact: Dr. Joseph Mattick, Dept. of Dairy Science, Animal Sciences Center, College Park, MD 20742, 301-454-3926.

March 22-26---MID-WEST WORKSHOP IN MILK AND FOOD SANITATION. The Ohio State University. Contact: John Lindamood, Dept. of Food Science and Nutrition, 2121 Fyffe Road, The Ohio State University, Columbus, OH 43210.

Mar. 22-26, 1982---MICROANALYTICAL SANITATION SERIES II (Intermediate Quantitative Interpretive), Melbourne, FL. Course sponsored by American Association of Cereal Chemists, 3340 Pilot Knob Road, St. Paul, MN 55121.

March 23---IOWA ASSN. MILK, FOOD AND ENVIRONMENTAL SANITARIANS CONFERENCE. Starlite Motel, Ames, IA. Contact: Hale Hansen, Dept. of Health, Lucas Bldg., Des Moines, IA. 50319.

March 24---IOWA DAIRY INDUSTRY CONFERENCE. Starlite Motel, Ames, IA. Contact W. S. LaGrange, Food Technology, Iowa State University, Ames, IA. 50010.

March 25---UNIVERSITY OF MARYLAND 32nd ANNUAL ICE CREAM CONFERENCE. Center of Adult Education, College Park, MD. Contact: Dr. Joseph Mattick, Dept. of Dairy Science, Animal Sciences Center, College Park, MD 20742, 301-454-3926.

March 31---NINTH CNA/IFT/ISMS NUTRITION SYMPOSIUM, "Current Issues Facing Food, Nutrition and Health Professionals." Ramada O'Hare, Des Plaines, IL. Sponsored by Chicago Nutrition Association, Chicago Section of Institute of Food Technologists, and Illinois State Medical Society. Contact: Chicago Nutrition Association, CNA/IFT/ISMS Symposium, PO Box 87664, Chicago, IL 60680 or Theresa M. Gargano, 312-998-3576.

April 2-4---1982 WESTERN CONVENTION-EXHIBIT of Vending and Foodservice Management, Brooks Hall, San Franciso. (Expected Attendance, 3,000). Contact: Walter Reed, National Automatic Merchandising Association, 7 South Dearborn Street, Chicago, IL 60603, 312-346-0370.

April 5-6-7---MISSOURI AFFILIATE MEETING. Ramada Inn, Columbia, MO.

April 13-15---FLORIDA AFFILIATE MEETING. University of Florida, Gainsville, FL.

April 21-23---57th ANNUAL MEETING of the American Dry Milk Institute and the 11th Annual Meeting of the Whey Products Institute will be held jointly at the Chicago Marriott O'Hare Hotel, 8535 West Higgins Road (at O'Hare Airport), Chicago, IL.

April 22-23---PACIFIC NORTHWEST FOOD SCIENCE AND TECHNOLOGY CONFERENCE. "Electronic Control in the Food Industry---Microprocessors to Computers." Tyee Inn, Olympia, Washington. Contact: Jean Canfield, WSU Conference Assistant, 4525 Libby Rd., NE, Olympia, WA 98506, 206-754-6870.

April 22-23---SOUTH DAKOTA ENVIRONMENTAL HEALTH ASSOCIATION ANNUAL MEETING. SDSU, Brookings, SD. For more information contact: Ron Stangeland, SDSU, Brookings, SC.

Apr. 26-30, 1982---MICROANALYTICAL SANITATION SERIES III (Advanced Qualitative Interpretive), Melbourne, FL. Course sponsored by American Association of Cereal Chemists, 3340 Pilot Knob Road, St. Paul, MN 55121.

April 27---IAMFES SPRING SEMINAR, Elgin, IL at the Blue Moon Restaurant. Registration begins at 8:30 a.m. For more information contact: Robert Crombie, 521 Cowles Ave., Joliet, IL 60435. 815-726-1683.

April 28---SOUTHERN CALIFORNIA FOOD PROCESSORS SANITATION WORKSHOP. Presented by the University of California Cooperative Extension with assistance from industry trade associations and food industry personnel. Inn at the Park, Anaheim, California. For more information contact Paulette De Jong, Food Science and Technology, University of California, Davis, CA 95616, 916-752-1478.

May 12-13---FOOD MICROBIOLOGY UPDATE. University of California, Davis, CA. Topics covered include sampling, new trends and methods for detection, enumeration, and identification of microorganisms, microbial aspects of food processing methods, pathogens, and the significance of microorganisms in food. Contact Paulette De Jong, Food Science and Technology, University of California, Davis, CA 95616. (916) 752-1478.

June 22-25---IFT "FOOD EXPO," Las Vegas, NV. Contact: Dan E. Weber, Director of Marketing/Administration, IFT, 221 N. LaSalle St., Chicago, IL 60601.

July 20-24---HOSPITAL, INSTITUTION, AND EDUCATIONAL FOOD SERVICE SOCIETY (HIEFSS) is announcing the relocation of its 1982 Annual Meeting. The 22nd Annual Meeting and Exposition is at Stouffer's Inn On The Square in Cleveland, Ohio. This is a change in date, city and hotel. For more information contact: Carolyn Isch, 4410 West Roosevelt Road, Hillside, IL 60162, 312-449-2770.

Aug. 22-26---IAMFES ANNUAL MEETING. Galt House, Louisville, KY. Contact: Earl Wright, IAMFES, PO Box 701, Ames, IA 50010, 515-232-6699.

September 24---1982 FOCUS ON FOOD SCIENCE SYMPOSIUM IV. Kansas State University, Manhattan, KS. For more information contact: F. E. Cunningham.

October 7-10---1982 NATIONAL CONVENTION-EXHIBIT of Vending and Foodserivce Management, The Rivergate, New Orleans. (Expected Attendance, 7,000). Contact: Walter Reed, National Automatic Merchandising Association, 7 South Dearborn Street, Chicago, Illinois 60603, 312-346-0370.

Nov. 15-19---PACK EXPO 82, INTERNATIONAL PACKAGING WEEK, McCormick Place, Chicago, IL. For more information: 2000 K Street, NW, Washington, DC 20006, 202-331-8181.

August 6-11, 1983---IAMFES ANNUAL MEETING, Stouffers, St. Louis, MO.

August 3-9, 1984---IAMFES ANNUAL MEETING, Edmonton, Alberta, CN.

# JFP Abstracts

*Abstracts of papers in the March* Journal of Food Protection

**Enumeration of Indicator Organisms in Foods Using the Automated Hydrophobic Grid-Membrane Filter Technique,** M. H. Brodsky, P. Entis, A. N. Sharpe and G. A. Jarvis, QA Laboratories Limited, 135 The West Mall, Unit 2, Etobicoke, Ontario, Canada M9C 1C2, Bureau of Microbial Hazards, Health and Welfare Canada, Ottawa, Ontario, Canada and Food Statistics and Operational Planning, Health and Welfare Canada, Ottawa, Ontario, Canada

*J. Food Prot.* 45:292-296

The automated HGMF technique was compared against accepted traditional methodology for the recovery and enumeration of coliforms, *Escherichia coli*, enterococci and *Staphylococcus aureus* from a variety of naturally and artificially contaminated foods. The overall ratios of recovery of the HGMF relative to conventional methods were 0.88 for coliforms, 0.80 for *E. coli*, 0.81 for enterococci and 0.80 for *S. aureus*. Our results suggest that the automated HGMF system is a viable alternative to conventional most-probable-number and spread plate techniques for the isolation and enumeration of foodborne microorganisms on selective media; however, consideration must be given to modifying procedures for the optimal recovery of stressed cells by this automated membrane filtration technique.

**Effect of Added Wheat Gluten and Mixing Time on Physical and Sensory Properties of Spent Fowl Restructured Steaks,** S. C. Seideman, P. R. Durland, N. M. Quenzer and C. W. Carlson, Animal Science Department and Nutrition-Food Science Department, South Dakota Agricultural Experiment Station, South Dakota State University, Brookings, South Dakota 57007

*J. Food Prot.* 45:297-300

Spent fowl meat (50% dark/50% white meat) was flaked and formulated to include: (*a*) no added wheat gluten (control), (*b*) 1% wheat gluten and (*c*) 2% wheat gluten. Each formulation was mixed for 5 min, half was removed and the remainder was mixed an additional 10 min. After mixing, each formulation was pressed into logs, frozen and cut into steaks. Steaks were evaluated for fat and moisture content, cooking loss, textural properties and sensory attributes. Neither addition of wheat gluten nor mixing time had any significant effect on moisture and fat content or total cooking losses. Texture desirability ratings showed a preference for the firmer steaks made with added gluten and mixed for 15 min. These steaks were also rated as being more juicy. Addition of 2% wheat gluten adversely affected flavor desirability.

**Determination of Aerobic Plate and Yeast and Mold Counts in Foods Using an Automated Hydrophobic Grid-Membrane Filter Technique,** M. H. Brodsky, P. Entis, M. P. Entis, A. N. Sharpe and G. A. Jarvis, QA Laboratories Limited, 135 The West Mall, Unit #2, Etobicoke, Ontario, Canada M9C 1C2

*J. Food Prot.* 45:301-304

The Hydrophobic Grid-Membrane Filter (HGMF) technique, using an automated counting system, (ISO-GRID™ Sample Processor) was compared against the conventional pour plate technique for aerobic plate counts, and against a spread plate technique for enumerating yeasts and molds in foods. A total of 179 samples, involving five different food types, were compared for aerobic plate counts and 177 samples, representing four different food types, were compared for yeast and mold counts. In all cases, the HGMF counts determined by the Sample Processor were shown to be equivalent to, or greater than, counts obtained using conventional methods.

**Factors Controlling the Growth of Gram-Negative Bacteria in Vacuum-Packed Bologna,** D. L. Collins-Thompson, D. Wood and M. Jones, Department of Environmental Biology, University of Guelph, Guelph, Ontario, Canada N1G 2W1

*J. Food Prot.* 45:305-309

Gram-negative organisms were isolated from vacuum-packed bologna only after 7-8 weeks of storage at 5 C. These isolates were identified as *Acinetobacter* sp., *Enterobacter hafniae, Enterobacter aerogenes, Serratia marcescens* and *Serratia liquefaciens*. Nitrite tolerance tests on these isolates at pH 5, 5.5 and 6 showed that only *Acinetobacter* sp. may be controlled by nitrite and pH levels associated with bologna during the initial storage period. The nitrite tolerance of these organisms was linked to their ability to deplete nitrite at 5 C in broth cultures under anaerobic conditions. Associated growth experiments were done at 15 C in APT and BHI broths under anaerobic conditions. These studies with *E. aerogenes* and *S. liquefaciens* in the presence of *Lactobacillus brevis* or *Lactobacillus buchneri* showed varying degrees of inhibition of the gram-negative isolates. The major factor which appeared to influence this inhibition in both broth cultures and bologna was glucose levels.

**Fate of Nonpathogenic and Enteropathogenic *Escherichia coli* During the Manufacture of Colby-like Cheese,** Jeffrey L. Kornacki and Elmer H. Marth, Department of Food Science and the Food Research Institute, University of Wisconsin, Madison, Wisconsin 53706

*J. Food Prot.* 45:310-316

Pasteurized whole milk was artificially contaminated with 100 to 1000 *Escherichia coli*/ml and was used to manufacture Colby-like cheese. Some cheeses were made so their composition differed from that of normal Colby cheese. Cheeses were cut in half and stored at 3°C and 10°C. *E. coli* was enumerated by surface-plating of samples on Trypticase Soy Agar (TSA) with an overlay of Violet Red Bile Agar (VRB). *E. coli* increased by 100 to 1000-fold, depending on the strain, to about $1 \times 10^6$/g of curd, in most instances, by the end of the cook (3.5-3.9 h). After this point numbers of *E. coli* in cheeses generally decreased over a period of weeks. One strain of enteropathogenic *E. coli* (EEC) could not be detected after 4 weeks, and another (in all but one instance) after 6 weeks. However, EEC in one lot of cheese persisted at numbers in excess of $1 \times 10^3$/g after 12 weeks of refrigerated storage. EEC survived at low levels (<350/g) for many weeks in one instance. Cheeses of poor quality (high moisture and pH) were made to assess the effects of improper manufacture on survival of *E. coli*. In these cheeses, *E. coli* eventually reached numbers in excess of $1 \times 10^8$/g and persisted for many weeks at high numbers. Survival of *E. coli* in Colby-like cheese appeared to be influenced by pH, salt and temperature; pH seemed to have the greatest effect on survival of the bacterium.

**Quality of Meat from Cattle Fed Sewage Solids,** E. E. Ray, R. T. O'Brien, D. M. Stiffler and G. S. Smith, Department of Animal and Range Sciences and Department of Biology, New Mexico State University, Las Cruces, New Mexico

88003 and Texas Agricultural Extension Service, Texas A&M University, College Station, Texas 77843

*J. Food Prot.* 45:317-321

Beef heifers in a feedlot were fed an experimental (E) diet containing gamma-irradiated ("pasteurized") dried sewage solids as 20% of the diet. Similar heifers received a conventional diet and served as controls (C). Four heifers from each group were slaughtered at the 68th day of the feeding program. Carcasses from E were smaller than from C (202 versus 245 kg), had less fat thickness (.76 versus 1.0 cm) and less internal fat (2.5 versus 2.9%). Steaks, roasts and ground beef (composite of all trimmings) were displayed for 3 d in a refrigerated (2-4°C) meat case. Ground meat from E was superior to C in lean color and overall visual acceptance; but the reverse was true for steaks and roasts ($P<.05$). Steaks and roasts from C were evaluated slightly higher than E in firmness of lean, resulting from more subcutaneous carcass fat of C. Microbial contamination of carcasses was assayed by cultures from swabs taken from the diaphragm muscle and the 12/13th rib area of hanging sides (at slaughter and days 2 and 7 postmortem) and from swabs and core samples of product at day 0 and days 3 and 17 postmortem. Colony counts from core samples taken from bulk ground beef (C) and soaked in peptone water averaged $8.5 \times 10^4$ for day 0 and $7.5 \times 10^6$ for day 3 samples, while samples from E carcasses averaged $3.8 \times 10^4$ (day 0) and $4.1 \times 10^7$ (day 3). Colony counts from surface swabs of beef patties averaged $4.6 \times 10^4$ (day 0) and $5.7 \times 10^6$ (day 3) for C and $6.5 \times 10^4$ (day 0) and $9.4 \times 10^6$ (day 3) for E. Microbial counts of the product surveyed in this study did not differ ($P>.05$) due to diets (E vs. C). Livers and kidneys from cattle fed the E diet had higher levels ($P<.05$) of Fe and Pb than those from cattle receiving the C diet.

**Occurrence of *Yersinia enterocolitica* in Poultry Products,** E. De Boer, B. J. Hartog and J. Oosterom, Food Inspection Service, Postbus 9012, 7200 GN Zutphen, The Netherlands; Food Inspection Service, Enschede, The Netherlands and National Institute of Public Health, Bilthoven, The Netherlands

*J. Food Prot.* 45:322-325

In a study on isolation of *Yersinia enterocolitica* from poultry products, usefulness of the following enrichment media was evaluated: phosphate-buffered saline solution with and without addition of 1% sorbitol plus 0.15% bile salts, modified Rappaport medium and selenite broth. Plating was performed on MacConkey agar directly from the incubated broths and after treatment of the enrichment broths with a potassium hydroxide solution. Seventy-three of 108 (68%) samples of poultry products contained *Y. enterocolitica. Y. enterocolitica* was isolated most frequently after enrichment in phosphate-buffered saline solution with sorbitol and bile salts. Nearly all *Y. enterocolitica* strains were found after KOH-treatment. Serotyping showed that the isolated strains mainly belonged to the category of the non-pathogenic, so called "environmental" strains.

**Interactions of *Lactobacillus* and *Propionibacterium* in Mixed Culture,** Jennifer A. Parker and Nancy J. Moon, Food Science Department, University of Georgia, Experiment, Georgia 30212

*J. Food Prot.* 45:326-330

Four species of *Lactobacillus* (*L. acidophilus, L. casei, L. delbrueckii* and *L. bulgaricus*) were paired with four species of *Propionibacterium* (*P. pentosaceum, P. shermanii, P. acidi-propionici* and *P. freudenreichii*) and were grown in pure and mixed culture to assess associative interactions. Experiments were performed using a defined synthetic medium with glucose as an energy source and casamino acids as a nitrogen source. A differential respirometer (32°C) and Warburg flasks were used; growth, carbon dioxide, and acid production were measured. Fifteen of the 16 paired cultures had less growth, acid, and carbon dioxide produced than pure culture controls. In some pairs, both cultures were inhibited by mixed cultivation while in others only the *Propionibacterium* was inhibited. In several mixtures, the *Lactobacillus* culture was apparently unaffected by mixed culturing. In *P. shermanii* and *L. acidophilus* mixed culture, a beneficial synergistic effect on growth, carbon dioxide, and volatile and nonvolatile acid production was observed. Little lactate accumulated in the mixed culture medium and was apparently used as an energy source and resulted in increased carbon dioxide and acid production by the *P. shermanii.*

**Psychrotrophic Bacteria Reduce Cheese Yield,** C. L. Hicks, M. Allauddin, B. E. Langlois and J. O'Leary, Food Science Section, Department of Animal Science, University of Kentucky, Lexington, Kentucky 40546

*J. Food Prot.* 45:331-334

Psychrotrophic strains of *Bacillus* and *Pseudomonas* that demonstrated both proteolytic and lipolytic activity were incubated with Grade A milk. The yield of direct-acid cheese manufactured from inoculated milk decreased as psychrotrophic inoculation level increased. Yield reduction resulted from both lipid and protein degradation, and accounted for approximately 45 and 55% of the dry matter loss, respectively. Fat losses were observed from decreased milkfat tests and increased acid degree values. Protein losses were observed from increased non-protein nitrogen and whey nitrogen values. Therefore, cheese yield studies must involve assays of both protein and lipid on a dry matter basis. Acid degree values and fat disappearance in stored milk and total nitrogen in whey were the best indicators of reduction in yields. Although bacterial enumeration, titratable acidity and pH were not good indicators of yield, they may be important in determining when yield loss starts.

**Fate of Microbial Contaminants in Lettuce Juice,** R. B. Maxcy, Department of Food Science and Technology, University of Nebraska, Lincoln, Nebraska 68583

*J. Food Prot.* 45:335-339

Lettuce is a common menu item that may involve bacteria of public health significance. The most favorable environment for bacterial growth is the exudate (juice) from cut or broken leaves. Bacteria from growing lettuce and those added during harvesting, transportation and storage are able to grow in the exudate. At 10 C gram-negative, psychrotrophic bacteria become the predominant elements of the microflora, while at 20 C the microflora resemble those commonly associated with lactic fermentation of vegetables. Increasing the concentration of solids in lettuce juice to simulate evaporation from droplets of exudate suppressed growth of some members of the natural flora but had little effect on added bacteria of public health significance. Vacuum packaging only decreased slightly the rate of growth of the normal flora in droplets of lettuce juice. All the results indicated lettuce juice may be important as a harborage for bacteria of public health significance.

**Soaking of Mustard Seeds to Release Microorganisms in Making Plate Counts,** M. S. Cowlen and R. T. Marshall, Department of Food Science & Nutrition, University of Missouri-Columbia, Columbia, Missouri 65211

*J. Food Prot.* 45:340

Experiments in plating mustard seed showed that soaking in buffered dilution water for 10 min and shaking 25 times resulted in dislodgement of most microorganisms attached to the seeds.

**Ammoniation of Whole Cottonseed at Atmospheric Pressure and Ambient Temperature to Reudce Aflatoxin $M_1$ in Milk,** R. L. Price, O. G. Lough and W. H. Brown, Department of Nutrition and Food Science, Cooperative Extension Service and Department of Animal Sciences, University of Arizona, Tucson, Arizona 85721

*J. Food Prot.* 45:341-344

Aflatoxin-contaminated cottonseed was treated with 1 1/2% ammonia and 10% water and packed into a 3 m in diameter by 30-m long polyethylene bag and held for 21 d. The ammoniated cottonseed was fed to lactating dairy cattle in two different trials. (*a*) Ammoniated cottonseed was added to a standard dairy ration for 90 cows at a level of 3.5 kg per cow per day for 19 d. Non-ammoniated cottonseed was then fed at the same level for 7 d. Daily analysis of the milk from the bulk tank was performed. No differences in aflatoxin $M_1$ from the background level of 0.1 μg/L was noted until the 22nd day of feeding. The maximum aflatoxin $M_1$ level was reached at 0.55 μg/L on days 25-27. Levels returned to 0.1 μg/L 4 d after resumption of the feeding of the standard dairy ration. (*b*) Two and two tenths kg per day of ammoniated or non-ammoniated seed were added to rations of each of 6 dairy cows for 7 d. Milk samples were taken two milkings before feeding of the cottonseed, at each milking during the feeding and for 7 d after cottonseed feeding ceased. Analysis of milk for aflatoxin $M_1$ showed a maximum level of 1.8 μg/L from the group receiving the untreated cottonseed and a maximum of 0.18 from the group receiving the ammoniated meal. Milk from both groups was negative for aflatoxin $M_1$ 6 d after cottonseed feeding ceased. Ammoniation of whole cottonseed included in the ration of dairy cattle was effective in reducing the amount of aflatoxin $M_1$ in their milk by approximately 90% but not in completely eliminating it at treatment conditions used.

**Nurmi Concept for Preventing Infection of Chicks by *Salmonella*: Comparison of Fecal Suspensions and Fecal Cultures Administered into the Crop and in Drinking Water,** B. Blanchfield, M. A. Gardiner and H. Pivnick, Bureau of Microbial Hazards, Food Directorate, Health Protection Brach, Department of National Health and Welfare, Ottawa, Ontario, Canada K1A 0L2

*J. Food Prot.* 45:345-347

Fecal suspensions and anaerobic fecal cultures prepared from adult chicken feces and administered by gavage into the crop or via drinking water were compared for their ability to protect newly hatched chickens against *Salmonella* infection. Good protection (decreased infection by ⩾ 90%) was obtained with as little as $10^{-4}$ g of feces or $10^{-2}$ ml of a fourth serial fecal subculture. The two methods of administration were equally effective. Treatment of chicks with serially passaged fecal cultures via drinking water may provide adequate protection at a minimum cost, and with a low probability of transmitting viral or parasitic agents.

**Characterization of Deoxyribonuclease-Positive Enterococci Isolated from Milk and Milk Products,** V. K. Batish, H. Chander and B. Ranganathan, Dairy Bacteriology Division of National Dairy Research Institute, Karnal-132001 (Haryana), India and Southern Regional Station, National Dairy Research Institute, Adugodi, Bangalore-560030, India

*J. Food Prot.* 45:348-352

Five hundred and ten isolates of enterococci recovered from milk and milk products were screened for deoxyribonuclease (DNase) production. Of the 166 (32.5%) DNase-positive cultures, 29 (5.7%) produced thermonuclease that resisted boiling for 15 min. Although the incidence of thermolabile DNase-positive enterococci was 50.5% in Cheddar cheese, the majority of thermonuclease-producing enterococci was recovered from dried milks and infant foods. On the basis of biochemical, physiological and serological tests, all DNase-producing enterococci were characterized as *S. faecalis* var. *faecalis* (21), *S. faecalis* var. *zymogenes* (9), *S. faecalis* var. *liquefaciens* (90), *S. faecium* (23) and *S. durans* (16). The predominant thermonuclease-positive type was *S. faecalis* var. *faecalis* followed by *S. faecalis* var. *zymogenes*. Six strains of enterococci were found to be toxigenic when tested in ligated rabbit ileal loops, infant mice and rabbit skin.

**False-Positive Reactions in the Immunoprecipitation Test for Meat Identification,** I. R. Tizard, N. A. Fish and F. Caoili, Department of Veterinary Microbiology and Immunology, Ontario Veterinary College, University of Guelph, Guelph, Ontario, Canada N1G 2W1

*J. Food Prot.* 45:353-355

During the course of experiments into the specificity of the ring precipitation test it was found that a commercial anti-porcine serum reacted with bovine plasma. When this phenomenon was investigated it was found to be non-immunological in nature and that plasma obtained from blood treated with calcium chelating agents gave a positive reaction with normal serum. The species of origin of the reactants appeared to have no effect on the reaction. Further analysis indicated that a similar false-positive reaction could be obtained using sodium ascorbate either as an anticoagulant or as an additive to ground beef. Preliminary studies were conducted on the mechanism of this reaction.

**Effect of Non-Salting of Cheddar Cheese Made with Induced Starter Failure on Growth of Clostridia and Keeping Quality of Processed Cheese,** G. F. Ibrahim, Dairy Research Centre, Department of Agriculture, P.O. Box 217, Richmond, N.S.W. 2753, Australia

*J. Food Prot.* 45:356-359

Batches of pasteurized milk inoculated with spores of *Clostridium sporogenes, C. perfringens, C. butyricum* and *C. tyrobutyricum* were used to produce 8 batches of Cheddar cheese without starter activity. At the end of cheddaring, half the curd was salted and each curd portion was pressed separately for 18 h at ambient temperature. The cheese was stored for 6 weeks at both 11 and 4 C then processed. Samples of each batch of processed cheese were maintained at room temperature and at 37 C for at least 10 months. The results showed that although the salted cheese (SC) contained 5%

salt-in-moisture and less moisture content than that of the unsalted cheese (USC), no appreciable difference was observed in growth rate of clostridia in both USC and SC. After processing, there was no significant difference between spore counts in the cheese originating from either USC or SC. No defects which could be attributed to clostridial activity developed during storage. Browning of processed cheese stored at 37 C was far greater in batches originating from SC as compared with those originating from USC. Results of this investigation were compatible with results published previously regarding omission of salting of low acid Cheddar cheese with the object of retarding *Staphylococcus aureus* growth and enterotoxin production.

**Stability of Radurized Indian Mackerel (*Rastrelliger kanagurta*) as a Function of Temperature,** V. Venugopal, S. V. Ghadi, S. K. Ghosh, M. D. Alur, S. N. Doke and N. F. Lewis, Biochemistry and Food Technology Division, Bhabha Atomic Research Centre, Trombay, Bombay-400 085, India

*J. Food Prot.* 45:360-362

The influence of 1.5 kGy of gamma irradiation on the stability of Indian mackerel (*Rastrelliger kanagurta*) stored at temperatures of 0, 5, 10 and 15 C was examined. Using several indices for assessment of quality, it was found that the radiation treatment suppressed the rate of spoilage of fish stored at the above temperatures. However, the relative spoilage rates of both unirradiated and irradiated mackerel were similar as a function of storage temperature. The storage-life of fish calculated on the basis of the Spencer and Baines equation for evaluation of spoilage compared favorably with scores obtained by organoleptic evaluation.

**Irradiation of Food for Public Health Protection,** R. B. Maxcy, Department of Food Science and Technology, University of Nebraska, Lincoln, Nebraska 68583

*J. Food Prot.* 45:363-366

Irradiation of food has a long history and has potential for improving public health protection, yet the technology is still not being used commercially. Public acceptance of the process has been hindered by fear and controversy, which involved erroneous definition of radiation as a food additive followed by some ill-conceived and ill-interpreted research. In general, all research has indicated radiation to be bactericidal with various degrees of effectiveness, depending on the specific bacteria being studied. The gram-negative psychrotrophic bacteria, as well as other *Enterobacteriaceae*, are quite sensitive to radiation and these bacteria are of particular interest to those persons responsible for protecting the quality of fresh red meat. Bacteria resisting less than sterilization doses in irradiation processes have been studied. Acquired increased resistance of bacteria through exposure survival, and subsequent growth of pure cultures can be obtained only through special laboratory manipulations. None of the presently available data indicate bacteria surviving irradiation are of special public health significance.

**Influence of Processing on Nutrients in Foods,** Daryl B. Lund, Department of Food Science, University of Wisconsin, Madison, Wisconsin 53706

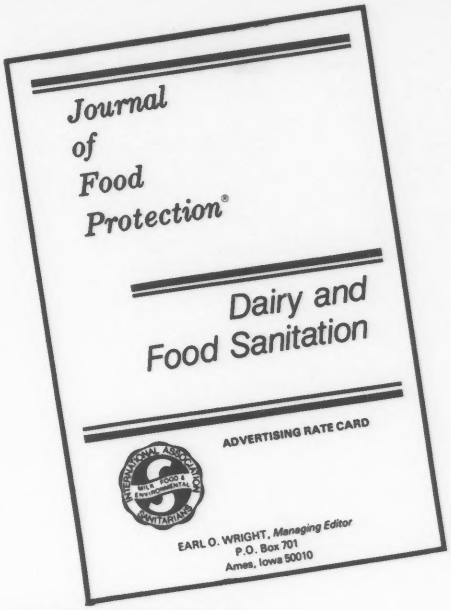
*J. Food Prot.* 45:367-373

Considerable research effort has been devoted to the effect of processing on nutrients in foods. Yet only recently has a systematic approach been used to identify changes in processes which result in improved nutritional content of the product. The catalyst for this systematic approach has been the generation of kinetic data on the influence of environmental factors on the stability of nutrients which can then be used in process models. The effort to quantify reactions important in foods must continue for both nutrients and toxic constituents, but because of limited resources, we should conscientiously choose which environmental factors and which nutrients or toxic substances will be studied. The example of improving nutrient retention in canned foods by choice of time/temperature treatment and by changing geometry is used to illustrate the application of modeling. Additional research effort is warranted on the effect of water activity on nutrient stability, the generation of toxic substances during processing and the bioavailability of nutrients as influenced by processing.

**Use of Sorbates in Meat Products, Fresh Poultry and Poultry Products: A Review,** Michael C. Robach and John N. Sofos, Monsanto Company, 800 North Lindbergh Boulevard, St. Louis, Missouri 63166 and Department of Animal Sciences, Colorado State University, Fort Collins, Colorado 80523

*J. Food Prot.* 45:374-383

Extensive research conducted in recent years has examined the efficiency of both potassium sorbate and sorbic acid (sorbates) as antimicrobial agents in a wide range of processed meat, and fresh and processed poultry products. In addition to their action against pathogens, effects of sorbates on product shelf-life, sensory qualities, and nitrosamine formation have also been examined in laboratory, pilot plant and commercial scale studies. The use of sorbates in these products appears to extend several benefits to both producers and consumers. Extensive studies involving bacon have shown a major reduction in nitrosamine levels associated with inclusion of potassium sorbate and reduction of sodium nitrite in the curing brine. Simultaneously, the low sodium nitrite/potassium sorbate combinations have maintained or even improved antibotulinal activity in temperature-abused products. In addition, potassium sorbate or sorbic acid have delayed growth and toxin production by *Clostridium botulinum* in other products including cooked and cured red meat and poultry sausages. The compounds have also been shown to extend the shelf-life and delay growth of other pathogenic microorganisms in several products including bacon; cooked, cured meat sausages; cooked, cured or uncured poultry products; fresh poultry; and other meats, including dry cured and fermented products. Sensory evaluation studies have shown that sorbate levels recommended for use in these products (0.26%) do not have adverse effects on product quality characteristics. Allergic type symptoms attributed to experimental bacon from one study were not linked directly with either potassium sorbate or other formulation ingredients, and all available information does not indicate development of any adverse effects from use of sorbates at recommended levels. In summary, the results of studies conducted in meat products indicate that sorbates deserve consideration as potential alternatives to current formulations or processes involved in the manufacture of processed meat and fresh and processed poultry products.

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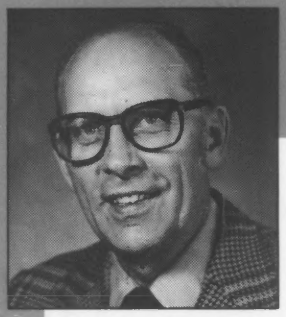

***Dr. Clarence C. Olson, Extension Dairyman***

*Professor Olson is a member of the Department of Dairy Science, University of Wisconsin, Madison. Born and raised on a Wisconsin dairy farm, and a graduate of the University of Minnesota, he began his extension career in North Dakota, taking responsibility in extension programs with both dairy producers and industry. Under his direction, the state saw a rebirth and expansion of Dairy Herd Improvement Association testing programs, the development of membership organizations to provide AI services, and a nearly-complete changeover from farm separated cream to bulk sale of high quality whole milk. He returned to his native state in 1961 to direct training programs for Dairy Herd Improvement Supervisors and Lab Technicians and, since 1973, has led membership promotion and educational programs aimed at helping dairymen and the industry make more profitable use of the Dairy Herd Improvement program.*

## DHIA Is The Key To Progress

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"Through this evolutionary process, DHIA records are now more than just measures of cow performance. The current emphasis is on management guidelines for feeding, breeding, selection and for complete records of identification and ancestry.

"The newest option available to DHIA members is somatic cell testing to evaluate udder health. This effort at improving milk quality along with quantity is very appropriate. Not only is it a valuable tool for the herd owner and the veterinarian but it also monitors the cows environment in order to help prevent mastitis.

"Feed testing and ration balancing are other new options available to members. We do our best to encourage these practices so that the benefits of superior genetics and the investments made in raising a heifer calf to producing age may be realized in more net income via the bulk tank.

"In summary, if we have been effective in promoting 'progress' in our DHIA herds, then faster adoption of new research should result in greater production by DHIA cows. A look at the data shows this has happened because cows on DHIA are currently outproducing cows not on test by over 4000 lbs. of milk yearly. Therefore, the bottom line reads only one way—we believe that if you milk cows and you want to make your cows worth more, then DHIA will insure your future."