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Dairy and Food Sanitation

A Publication for Sanitarians and Fieldmen

- The Foodborne Illness Equation
- The Common-Source Outbreak of Salmonellosis at a Milwaukee Hotel
- Quality Assurance Through the Preliminary Incubation Count



*A Publication of the International
Association of Milk, Food and
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NOW through June 30, 1982, for every two new members you have join IAMFES, Inc. your name will be placed in a drawing for a cash prize of \$75. Second prize . . . FREE registration at the IAMFES Annual Meeting.

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5. The winner will be notified July 15, 1982 and announced in the July issues of the **JOURNAL OF FOOD PROTECTION** and **DAIRY AND FOOD SANITATION**.
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Convenient
Membership form
is on
page 181.

Contest has
been extended
through
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to readers

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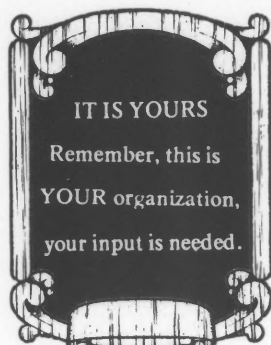
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AFFILIATE NEWSLETTER . . .

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.



The Iowa Affiliate Meeting in March as well as the Missouri Affiliate Meeting in April, were attended by member(s) of the International Office. Both meetings were very informative, and interesting. Next month's issue will announce the new officers elected. All states are asked to send in a synopsis of your meeting along with newly elected officers for publication. Please send to: Kathy R. Hathaway, State Tidbits, IAMFES, PO Box 701, Ames, Iowa 50010.

We are now beginning first renewal notices for expiring memberships. Notice the front of your envelope which will read ... **DO IT TODAY**. With each renewal notice another message will meet you on the front of the envelope. We hope to speed the renewal process up, and receive renewals **BEFORE** expiration, as it saves much time and money on sending out back issues after expiration of a membership. So ... **DO IT TODAY!**

EXHIBIT: An exhibit representing IAMFES and the journals has been purchased. The exhibit was first shown at the Missouri Affiliate Meeting. IFT '82 is upcoming, June 22-25 in Las Vegas to put the exhibit to the real test. Affiliate states will be invited to use the exhibit at their annual meetings next year.

I'M SO FAR BEHIND, I THINK I'M FIRST.

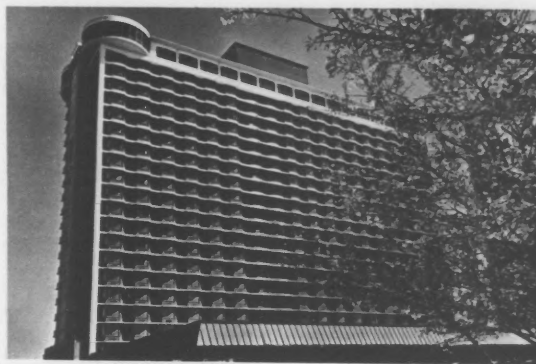
Don't temporize with fear, just go ahead and kill it.

The person who only does enough work to "get by" seldom gets much more than "BYE".

GET TWO IN '82, the IAMFES contest ends June 30 ... so get your colleagues signed up today!

Louisville in '82!

Welcome to Louisville, "Derby City, USA". We invite you to attend the 69th Annual Meeting of IAMFES, August 22-26, 1982 at the Galt House, Louisville, KY. During the meeting a variety of events are planned, ranging from a cheese & wine reception to a cruise on the Belle of Louisville (a paddle-powered, triple decked, stern-wheeler). Music and an outstanding buffet will also be a part of this cruise. Spouses' entertainment will also be a big attraction at the '82 meeting. See you there!



1982 IAMFES ANNUAL MEETING

Advance Registration Form for the 69th Annual Meeting, Aug. 22-26, Louisville, KY.

Mail to:

Joe Schureck, Registration Chairman
Milk Control Branch
Health Services Building
275 East Main Street
Frankfort, Kentucky 40621

Please check where applicable:

- | | | | |
|--------------------|--------------------------|------------------|--------------------------|
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| Member | <input type="checkbox"/> | Member | <input type="checkbox"/> |
| Non Member | <input type="checkbox"/> | | |

Make checks payable to IAMFES Meeting Fund

Advance register and save – refundable (prior to June 30) if you don't attend

ADVANCE REGISTRATION FEE (prior to July 1)

REGISTRATION FEE AT DOOR

	* Member	Spouse of Member	Student	• Member	Spouse of Member	Student	Non Member
Registration	\$20.00	\$10.00	no chg.	\$25.00	\$12.00	no chg.	\$30.00
Banquet & Cocktail Hr.	15.00	15.00	\$15.00	17.00	17.00	17.00	17.00
Cruise- Belle of Louisville (entertainment & dinner)	12.00	12.00	12.00	15.00	15.00	15.00	15.00
Total	\$47.00	\$37.00	\$27.00	\$57.00	\$44.00	\$32.00	\$62.00

Name (Member) _____

Children's First Names and Ages _____

Employer _____

Address _____

City _____ State _____ Zip _____

Means of Transportation _____

GALT HOUSE
Fourth & River Rd.
Louisville, KY 40202
Telephone 502-589-5200

Reservations must be received by July 15, 1982.

Arrival Date _____

Departure Date _____

Arrival Time _____

Means of Transportation _____

Name _____

Name _____

Address _____

State _____ Zip _____

City _____

Arrangements have been made for a flat rate of \$42.00 per room with a maximum of 4 people to the room. These rooms will have 2 double beds.

Mail directly to Galt House, Fourth and River Rd.,
Louisville, KY 40202

QUALITY ASSURANCE THROUGH THE PRELIMINARY INCUBATION COUNT

WILLIAM S. TROBAUGH

*Membership Relations Mgr.,
Mountain Empire Dairymen's Association, Inc.*

I work for the Cooperative, Mountain Empire Dairymen, Inc., located in Thornton, Colorado in the capacity of Membership Relations Manager. Our Cooperative has approximately 700 members located throughout (7) seven states, Colorado, Wyoming, Nebraska, Idaho, South Dakota, Kansas, and Oregon. Production from these members has amounted to approximately one billion pounds of milk per year.

We have seven (7) fieldmen available to instruct and aid the dairymen with quality control. We have two (2) laboratories; one in Colorado and one in Idaho. Milk samples are both trucked in and flown in. Each producer is tested for quality once a month. The violating producer is sent a missed bonus letter informing him of the results and a fieldman calls upon him as soon as possible. Handlers also are sent the results, thus they can see exactly the quality of milk they are receiving. It is my departments responsibility to see they receive the best quality possible.

The Quality Bonus Program originated January 1, 1975 after many months of consultation with the Internal Revenue Service to get approved a method of payment. Six cents (.06¢) per hundred weight was the amount paid under the original program with about 42% of the producers qualifying in the beginning and about 78% when the program was changed in October 1980. Enclosed is sheet #1 with the original program. The program was changed to Pre-incubated October 1, 1980 with changes noted on sheet #2. Sheet #3 is self explanatory in giving reasons for the change. Our beginning of the PI program showed about 42% of our producers qualifying, which was changed from 6¢ to 8¢ per cwt. this time.

During the month of July, 9 months later, we have increased our percentage to 62% which is indicated on sheet #4.

Prior to the change and enforcement of the Pre-incubated count, we mailed sheet #5 to all our producers and over the period of the nine months the program has been in effect, we feel we have improved the quality more than the previous six years of our old program, as indicated by the additional keeping quality of the milk and also the tremendous approval as expressed by the handlers with whom we do business, and also pay the premium to cover the cost of the bonus program.

In addition to the above Quality Bonus Program, MEDA also has a penalty program on antibiotics, added water and off-flavored milk, which is self explanatory on sheet #6.

QUALITY BONUS PROGRAM—EFFECTIVE JANUARY 1, 1975

The Quality Bonus Program will be determined by the total number of points a MEDA members accumulates each month as the result of tests conducted upon his production for the month. If a member accumulates 65 or more points out of the possible 70, he will be entitled to the Quality Bonus for milk delivered that month. If the total is less than 65 points, there will be no bonus.

The Bonus Program has been approved and will become effective January 1, 1975, and will remain in effect each month that MEDA is able to keep a cost of production price to Handlers high enough over Federal Order prices to maintain the Quality Bonus Program.

BONUS POINTS

Item #1	Sediment	10 points
	Acceptable #1, 2 or 3	10 points
	Not Acceptable #4	0 points
Item #2	Antibiotics	10 points
	Negative	10 points
	Positive	0 points
Item #3	Laboratory Pasteurized Count	10 points
	500 or Less	10 points
	501-1,000	5 points
Item #4	Added Water (Freezing Point)	10 points
	None Found + .530	10 points
	Added Water under .530	0 points
Item #5	Standard Plate Count	10 points
	15,000 or Less	10 points
	15,000-30,000	5 points
	Over 30,000	0 points
Item #6	Wisconsin Mastitis Test	10 points
	250,000 or Less	10 points
	250,000-600,000	5 points
	Over 600,000	0 points
Item #7	Grade A Status	10 points
	Satisfactory Compliance	10 points
	Degrade from Market	0 points

QUALITY BONUS PROGRAM—EFFECTIVE
OCTOBER 1, 1980

The Quality Bonus Program will be determined by the total number of points a MEDA member accumulates each month as the result of tests conducted upon his production for the month. If a member accumulates 65

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BONUS POINTS

Item #1	Sediment	10 points
	Acceptable	10 points
	Not Acceptable	0 points
Item #2	Antibiotics	10 points
	Negative	10 points
	Positive	0 points
Item #3	Standard Plate Count	10 points
	10,000 or Less	10 points
	10,000 to 20,000	5 points
	Over 20,000	0 points
Item #4	Added Water (Freezing Point)	10 points
	None Found	10 points
	Added Water	0 points
Item #5	PI Standard Plate Count	10 points
	15,000 or Less	10 points
	15,001-30,000	5 points
	Over 30,000	0 points
Item #6	Wisconsin Mastitis Test	10 points
	250,000 or Less	10 points
	250,001-500,000	5 points
	Over 500,000	0 points
Item #7	Grade A Status	10 points
	Satisfactory Compliance	10 points
	Degrade from the Market	0 points

WHY PRELIMINARY INCUBATION AS A QUALITY CONTROL MEASURE IN THE PRODUCTION OF RAW MILK

Milk quality is the life blood of milk and milk products. Consumer satisfaction is the number one priority. It follows then, that quality control must be based on practical and modern methods of performance maintenance at the production source.

The Standard Plate Count as used in the can production days has little value as a quality control measure with bulk milk production. More meaningful measures of quality must be used.

Temperature control through refrigeration produces an entirely different type of bacteria than experienced in the can days. These bacteria are known as psychophillic or psychrotrophic. They result from inadequate cleaning and sanitizing. They are cold loving and grow slowly at cold temperatures. Testing by the conventional Standard Plate Count when fresh, fails to detect them. Some type of stress test like holding or incubation the samples in the 50 degree Farenheit range for a period of 18 hours promotes growth if they are present. This enables the person doing the testing to determine if an adequate job of cleaning and sanitizing is being done.

It has been demonstrated over a number of years in this area and others, that if an adequate job is being done with cleaning and sanitizing that a producer need not be concerned with his product if the PI test is used to judge the quality of his product. It has been adequately documented and proven that the Standard Plate Count does not detect these poor quality bacteria and that some type of stress must be applied to bring these poor quality producing bacteria out, in order that their source may be eliminated.

In our modern methods of sale and distribution of milk, it is necessary that milk be held in storage for varying lengths of time under refrigeration. It is these cold loving bacteria that cause innumerable problems with the quality of milk products. It is necessary therefore, that those persons in charge of seeing that your product meet the necessary requirements for consumer

satisfaction. If they do not, the consumer will turn to other products.

Since a stress test such as the PI is the only one that will provide him with the tool to minimize these troublesome bacteria, then the practical approach is to provide the tool that will enable him to do a proper job.

PRODUCERS MAKING THE QUALITY BONUS FOR JULY 1981

677 Producers were tested in July 1981
417 Producers made the bonus which is 62%

- 93 (14%) Producers had a Standard Plate Count of over 20,000
- 195 (29%) Producers had a PI Standard Plate Count of over 30,000
- 12 (2.%) Producers had a Wisconsin Mastitis test of over 500,000
- 5 (.7%) Producers had a Freezing Point of under .530
- 9 (1.%) Producers had an Antibiotic test resulting in a positive
- 2 (.3%) Producers had a High Acid Test
- 1 (.1%) Producer had a Degrade from the market
- 2 (.3%) Producers had a Sediment test graded at a #4
- 45 Producers had two counts that rated 5 points, which is 7%
- 9 Producers had three counts that rated 5 points, which is 1%
- 111 Producers had one count that rated 10 points, which is 16%
- 89 Producers had two counts that rated 10 points, which is 13%
- 6 Producers had three counts that rated 10 points, which is 1%
- A total of 260 "Missed Bonus Letters" were sent, which is 38%

BONUS WINNERS FOR JULY 1981

STATE	TOTAL TESTED	TOTAL REC'D	PERCENTAGE
COLORADO	485	318	66%
IDAHO	116	71	61%
NEBRASKA	27	11	41%
SO. DAKOTA	13	5	38%
WYOMING	37	13	35%
COMBINATION	677	417	62%

SUGGESTED SANITATION PROCEDURES TO AID
IN ACHIEVING NEW PRE-INCUBATED
STANDARD PLATE REQUIREMENTS FOR
QUALITY BONUS

It is apparent that a complete sanitation and cleaning program will be required for the production of milk in order to qualify for the Quality Bonus. This includes the range from proper udder preparation to the cleaning, sanitizing, and maintenance of equipment.

1. *Udder Preparation* - Udders must be thoroughly cleaned with an approved washing and sanitizing solution. Udders must be thoroughly dried with a single service towel before attaching milking unit.
2. *Milking Units* must be attached and removed without contamination from any type of soil, manure or other unclean material.
3. *All Milking Equipment* must be cleaned immediately after each use with proper strength cleaning solution at proper temperature, followed by an acid rinse both morning and evening.
4. *All Milking Equipment* must be sanitized with sanitizing solution just before each use. (Follow direction for proper strength.)
5. *Bulk Tank* must be thoroughly cleaned; including outlet valve and cap, parts, and lids.
6. *Bulk Tank* must be sanitized with proper strength solution covering all contact surfaces before first milking.

7. *Equipment* must be maintained adequately to insure proper operation. This includes proper cooling time and storage temperatures.
8. *Sampling Dipper* must be cleaned and sanitized as thoroughly as other milk contact surfaces.
9. *Sampling Dipper* must be stored inside tank or in some area where sanitized condition can be maintained.
10. *Milking Herd* must have access to a clean, healthy, feeding and loafing area to maintain proper condition.
11. *Any Air Leaks* into your milking system during milking, allows bacteria to enter.
12. *Raw Water* from many water systems, contain high bacteria counts.

The Quality Bonus has been increased by 25% to encourage more effort to qualify. Help and suggestions are available by contacting the Field Service of your Co-op.

FIELD AND LABORATORY SERVICES DEPARTMENT BOARD POLICIES

- 1-F The Board directs that all producers excluded by the Health Department be contacted by a Field Representative to aid them in being reinstated to market. The Field Representative will notify the producer that he shall not transfer base out of his account while degraded and shall forfeit his base if degraded for 30 (thirty) consecutive days due to poor quality milk.
- 2-F Any producer responsible for milk entering a processing plant, receiving station or co-mingling with other producer milk in a transport tank that is determined to be adulterated by analysis conducted by a state certified or approved laboratory shall have deducted from his milk check the value of his milk for two days production on his first offense and on any subsequent offense. For any offense, this will be determined by the actual ticket weight times two if a producer is shipping every day or actual ticket weight if a producer is shipping every other day, times the Base price, at test on the date of violation. Adulterated milk is defined as milk which fails to meet any standard of Colorado,

Wyoming, Idaho, or Federal law and shall include, but not be limited to, milk containing antibiotics, quarternary ammonia compounds, herbicides, pesticides or insecticides above legal tolerance levels. (To clarify the above 2-F, it would be the Field Department's policy to notify a producer of a violation either by phone or by a field call. If the producer had reason to believe that his milk contains antibiotics or other adulterants, it could be checked by the Laboratory and if found adulterated, it could be dumped on the farm with credit being given on the penalty. The second offense would never be imposed until the producer has been notified of the first offense and had a chance to either check or dispose of the milk in the tank.)

- 3-F In the event a member does not produce milk that is marketable in relation to quality and flavor and eligible for pooling in the Federal Order Pool for at least fifteen (15) days out of each month, he will receive the Class III price for all the milk he produced for the month.
- 4-F Any producer having "off flavor" milk will be reimbursed for that milk at the regular rate for having "off flavor" milk-marketed to a surplus plant, and provided further that if the producer fails to correct his problem within six (6) days from the time of the first "off flavor" milk, then the producer will be paid for the milk at the Class III price until the producer no longer offers "off flavor" milk for marketing.
- 5-F Any member seeking his butterfat test will be given such by the head of the Field Department.

- 6-F New producers coming on the market will not be accepted until MEDA fieldmen notify management that the producer's yard size is adequate for the large milk transport trucks.
- 7-F Any producer member who delivers milk which is determined by the MEDA laboratory to contain added water shall have deducted from his total monthly milk weight the percentage of added water found by laboratory analysis and shall be paid accordingly.
- 8-F Any producer responsible for having a transport tank of milk rejected at a plant due to the milk's inferior quality or flavor, and this verified by the Mountain Empire Dairymen's Association, Inc., Field and Laboratory Services, shall have deducted from his milk check the value of his milk for two days production. For all offenses, this will be determined by the actual ticket weight times two if a producer is shipping every day, or actual ticket weight if a producer is shipping every other day, times the Base price, at test on the date of violation.
- 9-F Butterfat will be determined by multiplying the sample test times the pick-up ticket weight. In the event there is a test missing, the previous pick-up test will be used. Only in the final check will there be a complete tabulation of test and weights showing the average test as computed by total pounds of milk divided into total pounds of fat.
- 10-F It shall be the responsibility of all MEDA members to have their farm bulk tanks new or used calibrated by a licensed Farm Bulk Tank Calibrator and to have the tank legs grouted with cement before the milk is picked up for marketing.

Dear Member:

From a sample of your milk picked up on _____, 19 ____, the following MEDA Bonus requirements were not met as indicated by our laboratory results:

ITEM I	STANDARD PLATE COUNT	Acceptable	10,000 or Less	- 10 pts.
		____Acceptable	10,000 to 20,000	- 5 pts.
		Not Acceptable	Over 20,000	- 0 pts.
ITEM II	PREINCUBATED SPC	Acceptable	15,000 or Less	- 10 pts.
		____Acceptable	15,000 to 30,000	- 5 pts.
		Not Acceptable	Over 30,000	- 0 pts.
ITEM III	FREEZING POINT	____Acceptable	.530 and Over	- 10 pts.
		Not Acceptable	Under .530	- 0 pts.
ITEM IV	ANTIBIOTICS	____Acceptable	None	- 10 pts.
		Not Acceptable	Positive Test	- 0 pts.
ITEM V	SEDIMENT	____Acceptable	#1, 2 or 3	- 10 pts.

ITEM VI	WIS. MASTITIS TEST	Not Acceptable	#4	-0 pt.
		Acceptable	300,000 or Less	- 10 pts.
ITEM VI	GRADE A STATUS	Acceptable	300,000 to 500,000	- 5 pts.
		Not Acceptable	Over 500,000	- 0 pts.
		Acceptable	Compliance	- 10 pts.
		Not Acceptable	Degrade from Market	- 0 pts.

You must have achieved 65 points out of a possible 70 points. Your score was _____ pts.

Health Department tests will not be used for Bonus payment.

Following is a brief summary and explanation of the above tests.

ITEM I STANDARD PLATE COUNT

Standard Plate Count is the total count of all bacteria in the milk.

Causes for high count: Cow health problem, poor cooling, or improper cleaning and sanitizing.

ITEM II PREINCUBATED (PI) STANDARD PLATE COUNT

PI Standard Plate Count is the total count of all bacteria in the milk as determined after being incubated 18 hours at 55 degrees Fahrenheit.

Causes for high count: Cow health problem, poor cooling, or improper cleaning, sanitizing, and raw water.

ITEM III FREEZING POINT

This indicates presence of added water to milk.

Causes: Failure to drain equipment properly, adding water to rinse the line after milking or rinsing exterior of tank with hose.

ITEM IV ANTIBIOTICS

This is a residual antibiotics found in milk.

Causes for positive test: Failure to properly follow instructions from veterinarian or on antibiotic labels.

ITEM V SEDIMENT

The sediment test shows visible foreign material that is removed by small filter discs from a sample of milk.

Causes for a poor test. Poor udder washing and drying, and improper handling of milking equipment.

ITEM VI WISCONSIN MASTITIS TEST (WMT)

WMT shows the number of leucocytes and other nucleated body cells in milk.

Causes for high count: Mastitis or inflammation of the udder, late lactating cows, fresh cows milk used too soon after calving, injured or diseased cows, or stress conditions-changes in weather, feed, location, equipment, etc.

ITEM VII GRADE A STATUS

This is the approval by the health department to sell milk on the Grade A market.

Causes to degrade: Interference with the health authority in an inspection, imminent public health hazard, or repeated violations.

A Common-Source Outbreak of Salmonellosis at a Milwaukee Hotel

PAUL J. PACE

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An alert was received at the Milwaukee Health Department laboratory on the 5, January 1981. Five cases of salmonellosis, caused by Salmonella enteritidis (Kauffmann-White schema 1,9,12:gm:-), were reported in nearby communities. W. Taylor, M. D., Bureau of Prevention, Wisconsin State Division of Health, determined that each of the 5 ill persons had attended a pre-Christmas party for employees at a Milwaukee hotel. This alert launched a chain of events which disclosed an additional 37 persons with stool cultures positive for S. enteritidis and one with a stool culture positive for S. manhattan (6,8:d:1,5). A common denominator among the additional culture-positive persons was their function as employees of the hotel, guests of an employee at one of 2 employee parties at the hotel, contacts to persons who had attended one of the 2 parties, or guest at a party held earlier at the same hotel.

A sudden clustering of a given serotype of salmonella is suggestive of a common-source outbreak of salmonellosis (2).

Thus a chain of events was set in motion which led to an interesting but somewhat frustrating experience for food sanitarians. Five persons presented with illnesses at hospitals in communities close to Milwaukee during the last 2 weeks of December, 1980. Stool specimen cultures, from each of these persons, were positive for salmonella. Serotyping of the isolates, at the Wisconsin State Laboratory of Hygiene, indicated each isolate was *Salmonella enteritidis*, Kauffmann-White schema 1,9,12:gm:- (5). W. Taylor, M.D., Bureau of Prevention, Wisconsin State Division of Health, determined that each of the 5 ill persons had attended a pre-Christmas party for employees at a Milwaukee hotel. He alerted the Milwaukee Health Department (M.H.D.) laboratory on

the 5, January 1981 and asked that an investigation be conducted locally.

S. enteritidis was ranked third among the 10 most frequently isolated serotypes of salmonella from humans in the United States during 1980 (3). However, *S. enteritidis* was serotyped, among salmonella isolates recovered from humans, on only 3 occasions during 1980 by the M.H.D. laboratory. This serotype, from 2 persons, was identified during April and May, 1980; human isolates received from 3 Milwaukee hospitals (12/29/80, 1/2/81, and 1/5/81) were also identified as *S. enteritidis*. Two of 3 patients, from whom the latter isolates were obtained, were interviewed by M.H.D. food sanitarians; it was learned that these 2 patients had attended a pre-Christmas party at the same hotel. Hospital records indicated that the third patient was employed by the hotel in question. This information reinforced the suspicion that the hotel may have been the site of a common-source outbreak of salmonellosis. A team of food sanitarians obtained a copy of the hotel catering contract which listed food and beverages provided for 650 persons on each of 2 evenings: 15, December and 16, December 1980. Stool specimens were obtained from 10 food handlers about the 9, January 1981; five of these were positive for *S. enteritidis*. An order was issued that day to restrain the culture-positive persons from employment as food or food utensil handlers. Furthermore, the hotel management was directed to order all food handlers to submit stool specimens for culture.

Food sanitarians began interviewing all available hotel employees, giving priority to those who were employed as food handlers. In the conduct of these interviews some

TABLE 1. Attack Rate of Illness Among Hotel Employees who were Interviewed.

	No. Ill	No. Not Ill	Total
Attended Party(s)	47(42%)*	66(58%)	113
Did Not Attend Party(s)	15(54%)* *	13(46%)	28
Total	62(44%)	79(56%)	141

* Includes 4 guests of employees.

* * Includes 3 contacts to guest or employee, one of these was culture positive for *Salmonella manhattan*.

guests and some contacts to guests or employees also were questioned. Approximately 9 percent, of 1300 persons who, allegedly, had attended the 2 employee parties, were interviewed. Of these 113 persons, 42 percent reported having been ill, table 1. It must be emphasized that recording of histories was begun 8, January 1981, almost one month after the dates of the suspect parties. Therefore, some doubt it cast upon the credibility of information obtained during these interviews.

Stool specimens from 271 employees, guests, and contacts were submitted for culture. More than one specimen, from many of these persons, was submitted, which increased the total number of specimens cultured to 387.

Figure 1 presents data relating onset times of illness reported by 60 persons, 57 of whom were hotel employees. Only 47, including 2 guests, had attended one or both of the parties. These data indicate 49 persons reported having become ill the day of the second party or later. Surprisingly, 11 persons reported onset times of illness to have occurred 2 days to 2 weeks prior to the day of the first party. Four of the 11 had not attended either party; one of these 4, who was culture positive, reported symptoms to have begun 10, December. Each of these 11 persons was employed by the hotel; 5 as cooks, 2 as salad girls, one as a waitress, one as a cocktail waitress, one as a cashier, and one as a hostess. Among the 11 employees, who became ill prior to the first party, 3 cooks, one salad girl, and the cocktail waitress were found to be culture positive for *S. enteritidis*. The two persons who were culture positive, among the 4 persons having onset times of illness between 1, December and 3, December, were both cooks. The cook, who reported her illness to have begun 1, December, stated she had consumed raw beef, at another restaurant, a day or two prior to onset of her illness. The plot depicted in Figure 1 indicates that the times for onset of illnesses precede and transcend those

which would incriminate only the parties of 15, and 16, December.

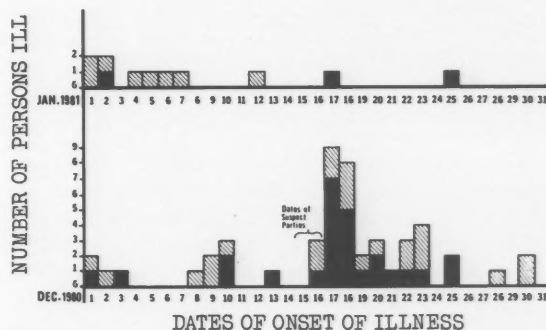


Figure 1. Dates of Onset of Illness Reported by 60 Persons.

▨ = ill, culture negative
 ■ = ill, culture positive

Another case of salmonellosis, due to *S. enteritidis*, was reported, about this time, from a fourth hospital in the Milwaukee area. This patient was not employed by the hotel in question; a link with persons who had attended the parties of 15, and 16, December could not be established. However, persistent interviewing by a food sanitarian drew a casual statement from the patient that the only Christmas party she had attended was held, at the hotel in question on 3, December 1980. This party served approximately 144 persons. Other guests were uncooperative in providing interviews or stool specimens.

Persons, other than the 5 index cases, from whom *S. enteritidis* was isolated are listed in table 3. Nine food service employees are included among the 30 hotel employees who had positive cultures. Two of these employees (No. 10 and No. 20) had not attended either party. One employee (No. 22) was culture positive, had

TABLE 2. Food Specific Attack Rate.

	Number who ate specified food				Number who did not eat specified food			
	Ill	Not Ill	Total	Percent Ill	Ill	Not Ill	Total	Percent Ill
Chicken Legs	7	4	11	64%	52	50	102	51%
Hot Shrimp	8	5	13	62%	51	49	100	51%
Herring	3	1	4	75%	56	53	109	51%
Cheese and Crackers	6		6	100%	53	54	107	50%
Deviled Eggs	4	3	7	57%	55	51	106	52%
Roast Beef	19	24	43	36%	40	30	70	57%
Roast Turkey/w Dressing	21	22	43	49%	38	32	70	54%
Au gratin potatoes	13	10	23	57%	46	44	90	51%
Peas and Carrots	9	8	17	53%	50	46	96	52%
Tossed Salad	12	11	23	52%	47	43	90	52%
Fresh Fruit Bowl	9	4	13	62%	50	50	100	50%
Macaroni Salad	12	3	15	80%	47	51	98	48%
French Pastries	12	11	23	52%	47	43	90	52%

attended either party. One employee (No. 22) was culture positive, had attended the party of 16, December, but had not suffered apparent illness. A stool specimen isolate from No. 24 was referred from an area hospital for serotyping. The patient, allegedly, was a bartender employed by the hotel. He could not be located for an interview. Information about dates of onset of illness were not obtainable from No. 25, No. 28, No. 30, No. 31, or No. 35. Therefore, these latter 7 persons, who had cultures positive for *S. enteritidis*, are not included in Figure 1. Four of the culture positive persons (No. 11, No. 12, No. 29, and No. 31) were guests of employees at one of the parties and 2 (No. 28 and No. 32) were contacts to persons who had attended one of the parties although they themselves had not attended.

One person, a son of No. 27 was found to have a culture positive for *S. manhattan* with onset of illness reported to have occurred 19, January 1981. It is unlikely that this individual was infected as part of the apparent common-source outbreak of salmonellosis.

Inspection of the hotel's kitchen revealed a number of items categorized as unsatisfactory by the M.H.D. Restaurant and Tavern Inspection Report. Among these were: A) Improper storage temperatures in service counters and salad preparation coolers. B) Substandard temperature of the final rinse cycle of the dishwasher. C) Inadequate sanitization of cutting boards and cutting instruments. D) Failure to sanitize cutting boards and cutting instruments between use with raw foods and

cooked foods. E) Failure to enforce a requirement for kitchen employees to wash hands upon return from smoking or restroom breaks. F) Failure to cool gravies and soups rapidly. G) Reseeding of leftover food from a serving pan into a new batch.

Two samples of chicken salad, prepared in the hotel kitchen, were collected 22, January 1981 and 25, February 1981. Salmonellae were recovered from neither of these. However, a total aerobic bacteria plate count, in excess of 2.3×10^8 per gm, suggested the first sample may have been mishandled after preparation (6). The sample which was collected later produced a bacterial count of 2.3×10^5 per gm.

Cutting utensils and surfaces of cutting boards were examined for cleanliness by a standard procedure (1). Bacteriological results confirmed inspection reports which indicated improper sanitization. Salmonellae were not recovered from any of these samples. Water samples collected from 7 taps, located in the hotel kitchen, met bacteriological standards for drinking water quality (4).

Lack of credible data, because of the time lapse between the dates of the suspect parties and the dates individuals were interviewed, casts doubt on the validity of food specific attack rates, table 1. However, the occurrence of illness among employees who had not attended either party and among some party-goers, prior to the dates of the suspect parties, suggests doubt that the parties were the only occasion of the common-source outbreak of salmonellosis. At least 2 cases of

TABLE 3. Roster of Persons, Other than Five Index Cases, from whom *Salmonella enteritidis* was Isolated.

No.	Hotel Affiliation	Date of Onset of Illness	Symptoms*	Dates Attended Party, Dec.	Positive	Dates of Cultures Negative
1	Cook	Dec. 3	N, C, V, D	16	Jan. 13	
2	Dishwasher	Dec. 21	D	16	Jan. 14,16	Jan. 19,21,27
3	Cook	Dec. 1	N, C, V, D	16	Jan. 10,16	Jan. 30;Feb. 6
4	Cook	Dec. 13	C, D	15,16	Jan. 9,16,21; Feb. 9,12,22; Mar. 3,5,9,12,26; Apr. 2,16,24,28; May 11	Jan. 17, Mar. 25; Apr. 8,10; May 1, 19,20
5	Cocktail Waitress	Dec. 17	N, C, D, F	16	Feb. 4,12	Feb. 21; Mar. 2
6	Bartender	Dec. 17	N, C, D, V, F	15	Jan. 16, Feb. 2,12,18; May 5,16,26	Apr. 16; May 11
7	Coat Check Girl	Dec. 20	N, C, D, F	16	Jan. 9,19	Mar. 25
8	Salad Girl	Dec. 10	N, C, V, D	15,16	Jan. 9, 16,17,23,25,30	Feb. 6,12,13
9	Waitress	Dec. 16	V, D	15	Jan. 16,21,23;Feb. 12	Feb. 16,24
10	Bartender	Jan. 2	D	--	Jan. 16	Feb. 23,24
11	Guest of #7	Dec. 23	Hospitalized	16	Dec. 29; Jan. 21; Mar. 10; Apr. 1	
12	Guest of #22	Dec. 19	Hospitalized	16	Jan. 5, 14,15	
13	Receptionist	Dec. 17	D	16	Jan. 19	
14	Waitress	Dec. 18	D	16	Jan. 16	Jan. 26,27
15	Cocktail Waitress	Dec. 18	?	15	Jan. 16,28; Feb. 12	Jan.26;Feb.16;Mar.2
16	Bartender	Dec. 17	N, D	15	Jan. 23	Feb. 2,3,9,12
17	Sales	Dec. 18	D	16	Jan.27;Feb.2,8,9,21	Feb. 16,26
18	Waitress	Dec. 25	D	16	Jan. 15	Jan. 26
19	Catering	Dec. 25	V, D	16	Jan. 19	Jan. 25,26
20	Cocktail Waitress	Dec. 10	N, C	--	Jan. 26	Feb. 2,9
21	Waitress	Dec. 18	?	16	Jan. 16	Jan. 26,27
22	Saute Cook	--	--	16	Jan. 9	Jan. 29
23	Sales	Jan. 17	C,D	16	Jan.19,26;Feb. 10	
24	Bartender	?	Hospital-Outpatient	?	Jan. 2	
25	Dishwasher	?	?	?	Jan. 16,27	Jan. 28; Feb. 4
26	Dishwasher	Dec. 17	?	15	Jan. 20	Jan. 30; Feb. 6
27	Housekeeping	Dec. 22	?	?	Jan. 21	Feb. 2,4
28	Son of #11	?	?	--	Jan. 21	Apr. 1
29	Spouse of waitress who was culture Negative	Dec. 20	?	16	Jan. 21	Feb. 3,21
30	Banquet Setup	?	?	?	Jan. 22	Feb. 12
31	Guest of #19	?	?	16	Jan.23;Feb.3,4,12,13	Mar. 23,25
32	Son of #33	Jan. 25	?	--	Jan. 28; Feb. 11	
33	Recreation Manager	Dec. 18	?	16	Jan. 28	Feb. 17,18
34	Banquet Setup	Dec. 17	?	16	Feb. 4	Feb. 25,26
35	Banquet Setup	--	--	?	Feb. 6	
36	Bartender	Dec. 17	?	16	Feb. 9	Feb. 13,16

* N = nausea, C = cramps, V = vomiting, D = diarrhea, F = fever.

salmonellosis, confirmed by isolation of *S. enteritidis*, in children who had not attended either party attest to secondary transmission of the disease. The mother of one child and the father of the other, were also culture positive for *S. enteritidis*. They were the probable source of infection for their children. However, as with the common-source outbreak, a vehicle for transmission of the infective agent from parent to child could not be established. The mother of one of the children was not an employee of the hotel but had been a guest at the party. Another young lady (non-employee) who was culture positive also had been a guest at the party. It would appear that their only opportunity for infection would have been at the party. However, they themselves may have been secondarily infected by victims of the common-source outbreak. One of the young ladies was the daughter of a wardrobe checker, employed at the hotel, who was culture-positive. The other was a steady girl friend of a saute cook, employed at the hotel, who was culture positive but asymptomatic.

The frustration of food sanitarians in their efforts to determine the origin of this common-source outbreak received a temporary remission. Review of information obtained during interviews of some of the hotel employees revealed an allegation that it was the practice of hotel management to serve food items remaining from hotel functions to employees. These foods, allegedly, were transferred from the central kitchen to an employees' lunchroom the next day. Some of the employees stated that foods, which were reheated, were not hot at the time of serving. This practice allegedly was ongoing at the hotel and could account for the wide distribution of onset times of illness depicted in Figure 1. This alternative explanation of the origin of the outbreak is based on anecdotal information. Therefore, it also is unsatisfactory, leaving food sanitarians with a true dilemma.

The data support the conclusion that a common-source outbreak of salmonellosis did, in fact, occur at a Milwaukee hotel during the month of December, 1980. The alertness of a State of Wisconsin Division of Health

epidemiologist, the diligent efforts of City of Milwaukee food sanitarians, and the cooperation of the hotel's management staff were joined to contain the outbreak. The infective source was not determined. However, questionable food handling practices at the hotel were corrected. Thus, food sanitarians fulfilled one objective of their professional dedication.

The above recount of the experiences of public health professionals is presented for review. Hopefully, critical evaluation of this investigation will contribute to amelioration of the approach used by food sanitarians in the discharge of their professional responsibility on the public health team.

ACKNOWLEDGMENTS

Interviews, inspections of premises, and collection of specimens were conducted by Milwaukee Health Department Food Sanitarians: Joanne Regan, Charles Eigen, and Leo Wagner.

REFERENCES

1. Anonymous. 1967. Procedure for the bacteriological examination of food utensils and/or food equipment. Public Health Service Publication No. 1631, U.S. Department of Health, Education, and Welfare, Cincinnati, Ohio.
2. Collins, R. N., M. D. Treger, J. B. Goldsby, J. R. Boring, III, D. B. Coohon, and R. N. Barr, 1968. Interstate outbreak of *Salmonella newbrunswick* infection traced to powdered milk. JAMA 203:838-844.
3. Centers for Disease Control. Human *Salmonella* isolates - United States, 1980. MMWR 1981; 30:377-379.
4. Greenberg, A. E., Connors, J. J., and D. Jenkins (ed.) 1981. Standard methods for the examination of water and wastewater, 15th ed. American Public Health Association, Washington, DC.
5. Kauffmann, F. 1972. Serological diagnosis of salmonella species Kauffmann-White schema. The Williams-Wilkins Co., Baltimore, MD.
6. Pace, P. J. 1975. Bacteriological quality of delicatessen foods: Are standards needed? J. Milk Food Technol. 38:347-353.

THE FOODBORNE ILLNESS EQUATION

BILL LAGRANGE

Food Technology, ISU

This Foodborne illness (FBI) equation includes the five factors required for an outbreak of foodborne illness. Leave out any one or more of the factors in the FBI formula.

Remember, the smell or appearance of food provides no clue that pathogenic bacteria, even in high numbers, are present. Food spoilage may be caused by bacteria that change the food chemicals and cause flavor, odor, appearance, and texture changes. FBI causing bacteria rarely cause these obvious changes.

Canned low acid food may show obvious signs that pathogenic bacteria are present in the food. Bulged ends of cans, gassy, smelly, and off colored food in the cans should not be tasted. Swollen cans should be discarded without being opened.

The Factors of the FBI Equation

Factor 1---Pathogenic Bacteria

The primary sources of the pathogenic bacteria responsible for foodborne illness are raw foods such as meat, poultry, seafoods, and vegetables. People involved in food preparation and service are primary sources of FBI causing bacteria. Raw meat and poultry may contain some pathogenic bacteria in spite of following all necessary preventive precautions. So the primary objective in food preparation is to destroy these dangerous bacteria and to not allow conditions to exist during preparation and service of food that will allow these bacteria a chance to reproduce and metabolize their poisons.

Pathogenic Bacteria

+

Perishable Food

+

Warm Temperature

+

Time

+

Empty Stomach

Stomach Ache

Studies of FBI outbreaks show that 500,000 or more pathogenic bacteria in each gram (28 grams/ounce) of food are required to initiate a FBI in most people. For these large numbers of bacteria to be in food, there must be either gross contamination of the food with the pathogenic bacteria and/or extensive growth and increase in numbers of these bacteria on or in the food.

To avoid or minimize the numbers of pathogenic bacteria in food, follow these points:

1. Buy quality food from reliable dealers. Do not use home canned or preserved food in food service establishments. Buy top grade foods.
2. Store raw foods properly and promptly:
Frozen at 0 F or less;
Perishables at 40 F or less;
don't store raw and cooked

food close together in refrigerated storage. Dry foods in cool, dry and pest free protected storage.

3. Wash raw foods, if appropriate, to remove surface soil and microorganisms including the FBI causing bacteria.
4. Work with clean utensils, hands, preparation surfaces, and work areas.
5. Avoid cross contamination of cooked food from raw food bacteria via hands, utensils, preparation surfaces and storage facilities.
6. Practice good personal hygiene, wear head covering, wear clean clothing, cover cuts and sores with bandages and plastic gloves and not work if afflicted with lower or upper respiratory infections. The nose and throat, skin, especially cuts, and the intestinal track are the primary habitat of some foodborne illness causing bacteria.
7. Include effective pest control program. Insects and rodents carry pathogenic bacteria.

Factor 2---Perishable Food

Perishable foods contain enough moisture and nutrients that will allow bacteria to grow. Dairy, meat, poultry, and fish foods and vegetables are basic foods that contain the nutrients needed for either spoilage or FBI causing bacteria.

Also puddings, custards, and prepared dishes such as casseroles

provide the proper nutrients and moisture for bacteria to reproduce.

Dry and acid foods will not support growth of pathogenic bacteria.

Factor 3---Warm Temperature

FBI causing bacteria grow in the temperature range of 45-120 F. They reproduce most rapidly at 70-115 F, depending somewhat on the particular pathogen. So avoid leaving perishable food in the 40-140 F range. A few degrees on both ends of the FBI bacterial growth range provides a safety factor. Use cold and heat to your advantage in food safety--know the food's temperature.

1. Use a thermometer to check the temperature of food--be sure of your food temperature--don't guess or assume temperatures.
2. Store and display foods at either 140 F and above or at 40 F or less. Foods must be heated or cooled to these temperatures before being displayed in cold or warm food holding equipment. Thermometer check displayed food to make sure of correct temperatures.
3. Store perishable food at 40 F or less. FBI causing bacteria will not grow at 40 F or less. Cold

air does not rapidly conduct heat from food. Cool hot food with cold water or ice prior to refrigeration. Also decrease the size of food quantities to encourage food to cool rapidly. Stirring liquid food helps speed cooling.

Freezing foods stops growth of FBI bacteria. Do not rely on freezing to destroy these bacteria. Freezing preserves the bacteria as well as the food. The bacteria will begin growth again after the food is warmed to 45-120 F.

4. Pathogenic bacteria begin to die at 140 F or higher. A few minutes at 150 F or a few seconds at 165 F will destroy the FBI pathogenic bacteria, except heat resistant spores of *Clostridium prefringens* and *botulinum*. The trichinosis parasite sometimes found in pork is destroyed at 145 F.

Factor 4---Time

Minimize the time food is in the 40-140 F range. Once bacteria are in these temperature growth range, they have about an hour lag time before reproduction starts. After this lag time, reproduction can take place rapidly, especially between 70 and 115 F. The generation time then can

be just 20 to 30 minutes and bacteria populations on and in foods can increase rapidly.

Carelessness with Factors 3 and 4 (temperature and time) are frequently involved in foodborne illness outbreaks.

Factor 5---Food Consumption

The primary objective of food preparation and service is for the food to be consumed and enjoyed. If the food is not safe, consumer enjoyment will be short lived.

People vary somewhat in their susceptibility to contracting a foodborne illness. Such factors as the amount of the unsafe food consumed, general health of the person, and the person's age are involved. Younger children and older adults, in general, are considered more susceptible to foodborne illness. Each person also varies as to their resistance to pathogenic bacteria and their poisons.

When we eat, we take for granted that the food is safe. Food service personnel must be positive about food safety. A positive offense of food safety is the best defense against food poisoning.

DON'T COMPLETE THE FBI EQUATION!

Procedures to Investigate Foodborne Illness

*Epidemiological Investigations Section
Division of Field Operations
EDRO, FDA*

Those concerned with food supply and with public health should make every possible effort to ensure complete investigation and reporting of foodborne disease. Without reliable, complete information, trends in foodborne disease incidence and the casual factors of the disease are difficult to detect. New foods, new processing methods, new packaging techniques, and other innovations could at any time give rise to until now unrecognized agents of foodborne disease. These combine to present an ever-changing picture to those concerned with surveillance.

Prompt, thorough. These key words characterize the best way to handle food - related complaints. Quick action and careful investigative procedures, teamed with timely referral to public health officials will help make the evaluation of foodborne hazards a success.

When a report of a problem about a food or illness attributed to a food is received, record the information on an Alert/Complaint Record.

An alert or a complaint can pertain to foodborne illness, food spoilage, adulteration of a product, mislabeling, or an unsanitary establishment. Alerts can also be initiated by reports from physicians, by records of isolations of foodborne pathogens by laboratories, by calls to poison control centers, and by reports of treatment given in hospital

emergency rooms or by emergency squads.

During the initial conversation with a complainant or with a professional who gives information, emphasize that all suspect food and its original containers and packages be retained or recovered and that specimens of stools and vomitus be collected from ill persons.

It is most important to secure food samples and clinical specimens as quickly as possible after the onset of illness. Tell the complainant to refrigerate, but not freeze, all food samples and clinical specimens until the health agency evaluates the epidemiologic evidence and, if necessary, makes further arrangements to get them.

Log alert and complaint data by recording the time of onset of the first symptom of the illness, number of persons who became ill, name of the food alleged to have caused the illness, names of the places at which the stricken person ate (during the 72 hours before onset), and type of agent isolated.

Refer complaint to proper agency and assign the responsibility for the investigation to one or more members of a public health investigative team. Refer complaints that involve problems which fall outside your agency's jurisdiction to the appro-

priate authority.

Prepare for the investigation by assembling a kit of forms and equipment so that when notified of an outbreak you can start the investigation without delay. Restock and maintain the kit to ensure continued sterility of sampling equipment and good condition of specimen containers.

If the alert or complaint suggests a large outbreak, inform laboratory personnel that clinical specimens and food samples will probably be collected to arrive at the laboratory.

Take steps to verify the diagnosis. A physician, an ill person or hospital personnel, may report suspected cases of foodborne illness. Regardless of the source of the report, the diagnosis must be verified by a thorough case history and, if possible, by examination of appropriate food samples and clinical specimens. This verification is done by public health professionals.

Get case histories by first contacting the affected person, identifying yourself and your agency and explaining the purpose of the visit or call.

Exhibit a genuine concern for persons affected and be sincere when requesting personal and confidential information. Communicate a sense of urgency of the investigation and

emphasize the positive contribution that has already been made by the complainant or that will be made by the respondents to the control and prevention of foodborne illness.

Word questions so that the person being interviewed will describe his illness and the foods and events that he feels were associated with it in his own way. Never suggest answers by the way you put your questions.

Ask specific questions to clarify the patient's comments. Realize that people are sometimes sensitive to questions about age, sex, ethnic group, special dietary habits, excreta, disposal, and housing conditions. Words questions thoughtfully.

Information can usually be deduced from observations. If doubt remains, confirm your guesses by asking indirect questions. Information on recent travel, gatherings, or visitors may provide a clue to common sources or events which would otherwise be difficult to pinpoint.

Physicians and hospitals' records can be useful in verifying reported signs, symptoms, and other clinical data and can sometimes rule out the possibility of foodborne illness. Before contacting a physician or a hospital, become familiar with laws and codes relating to medical records

to be assured of legal access to these records.

Gather information about all meals and snacks eaten 72 hours before onset of illness. The food, even the meal, which precipitated the illness might not be obvious. The type of illness will sometimes give a clue.

If the first and predominant symptoms are nausea and vomiting concentrate questions on foods that have been most recently eaten. If the first and predominant symptoms are diarrhea and abdominal cramps, be suspicious of foods eaten 6 to 20 hours before onset of illness. If diarrhea, chills, and fever predominate, be suspicious of foods eaten 12 to 72 hours before onset of illness.

Remember, these suggestions relate to common foodborne illnesses. The more unusual illnesses often present different clinical patterns. For instance, some illnesses—such as typhoid fever and hepatitis A have incubation periods greater than 72 hours.

Use this detailed interview approach with every person who has been identified in the initial complaint or alert even though some may not have been ill, until you have sufficient information to determine whether there is, indeed, a foodborne disease outbreak. At this time,

consider notifying the district, state, or provincial epidemiologist about the outbreak.

The next step involves obtaining clinical specimens. Because some foodborne pathogens remain in the intestinal tract for only a few days after onset of illness, obtain clinical specimens at the time of the initial interview or as soon as possible thereafter.

In general, the kind of specimen to be taken depends on signs and symptoms; vomitus if the person is vomiting or has recently done so; stool specimen or rectal swab if the person has diarrhea; blood if the person has a generalized infection and fever; and blood and either stool or rectal swabs if botulism is suspected.

Other specimens may be needed if certain other diseases are suspected. Before collecting specimens, ask laboratory personnel about the proper methods for collection, preservation, and shipment. The laboratory will provide appropriate specimen containers.

Tell the ill persons how to collect stool specimens and how to get them to the laboratory. To expedite the investigation and to ensure that specimens are obtained from the right person, a medical professional should take the rectal swabs. Stool-

collection kits usually contain a transport medium to protect pathogens and keep them from being overgrown by normal fecal flora.

If a kit is used incorrectly or for purposes other than those intended, the specimen in it can be unsuitable for laboratory examination. If you are in doubt about the proper technique for using the various laboratory specimen kits, ask laboratory personnel to explain the procedure.

Lastly, collect food samples. If the victim or other exposed persons have some leftovers from foods or beverages that were eaten in the last 72 hours, or some ingredients that were used in such foods, take samples for laboratory examination.

Caution these persons not to use stocks of suspect foods until the investigation is complete. The most highly suspect food or foods can be examined first. The others can, if necessary, be held refrigerated in the laboratory for testing later.

Collect samples aseptically with sterile implements (knives, spoons, tongs, spatulas) and put them into sterile jars or plastic bags. If foods are to be examined for organophosphate pesticides or heavy metals, do not use plastic containers, because substances from the plastic can leach into the food and thus interfere with analysis.

The size of the sample should be adequate to provide the laboratory with enough material for all necessary examinations. A sample weighing approximately (1/2 to 1 pound) or measuring (1/2 pint to 1 quart) will generally suffice. If less is available, collect all of it.

Take packaged foods to the laboratory in their original containers, if feasible. Leftover foods can be contaminated after serving, and they can be held at temperatures that allow microbial growth or that kill pathogens.

Record the temperature of the room, refrigerator, or warmer in

which the food was stored. Also, record the temperature of the food that remains after the sample has been collected.

Label each container, package, or tube with the complaint number of the outbreak and sample number. For legal reasons, seal the sample container in such a way that the container cannot be opened without breaking the seal.

Write the date, time of sealing, and your name on the tape. Inform the laboratory of the type and number of specimens and samples, and consult on methods to preserve and transport samples time of their arrival, and person who will receive shipment. A copy of the form and list should accompany samples to the laboratory; another copy should be retained.

Rapidly chill samples of perishable foods which are not frozen at the time of collection to a temperature below (40 F), and keep them at this temperature until they can be examined. Do not freeze food samples; certain foodborne bacteria (such as *Clostridium perfringens*) die off rapidly during frozen storage. Keep frozen food frozen until examined.

Transport refrigerated or frozen samples to the laboratory in an insulated container, packed with an appropriate refrigerant to maintain the desired temperature during transit.

Send samples to the laboratory by the most expeditious transport. Air, bus, or automobile are usually faster than mail. Samples sent by mail should be clearly marked: "PERISHABLE FOOD SAMPLE FOR BACTERIOLOGICAL EXAMINATION - RUSH," "PRIORITY." Label specimens according to applicable regulations governing transport of hazardous material.

If the suspect food is a commercial product, check the original package or container for a code number that can be used to identify the place and time of processing. Notify all agencies

responsible for regulating the products alleged or suspected to have caused the illness.

If deemed necessary, collect additional packages bearing the same code number so that tests can be done for microorganisms, toxins, seam defects, vacuum, leaks, or other conditions.

Make epidemiologic associations by a preliminary evaluation of data as soon as possible. First, decide whether or not an outbreak has occurred, then develop an hypothesis about the causal factors from the assembled information.

An outbreak is an incident in which two or more persons have the same disease, have similar symptoms, or excrete the same pathogens; and there is a time, place, and/or person association between these persons. A foodborne disease outbreak is one in which a common food has been ingested by such persons.

However, a single case of suspected botulism, mushroom poisoning, paralytic shellfish poisoning, or other rare disease, or a case of a disease that can be definitely related to ingestion of a food, can be considered as an incident of foodborne illness and warrants further investigation.

Sometimes it will be obvious from an initial report that a foodborne disease outbreak has occurred simply because of the number of persons displaying certain symptoms at or near the same time.

Many complaints, however, involve illness in only one or two persons, and deciding either that a particular food was responsible, or that its consumption and the onset of illness was only coincidental, is often difficult.

Certain diseases that are highly communicable from person to person (such as epidemic viral gastroenteritis) or are associated with a common place (such as carbon monoxide poisoning) may simulate a foodborne illness.

If additional complaints connected

with the same food or eating at the same place are received, food is almost certain to be involved. A good food-related or enteric disease alert/complaint log helps to make a quick check for other similar complaints. For this reason, routinely review the log.

If complaints are received from different individuals having common time, place, or person associations, then the probability that an outbreak has occurred is increased.

Time associations primarily refer to onset of similar illnesses within a few hours or days of each other. Place associations deal with buying foods from the same place, eating at the same establishment, residing at the same place, or attending the same event. Person associations have to do with common experiences, such as eating the same foods or being of the same age, sex, ethnic group, occupation, social club, or religion.

Once some of these associations become obvious, verify the outbreak by identifying and questioning other persons who were at risk by virtue of their association with the ill persons.

From time, place, and person associations that have been established or suggested by the investigation so far, formulate an hypothesis to explain the most likely type of illness, the most likely vehicles, where and how the vehicles could have become contaminated, and other causal relationships. Test the hypothesis by obtaining additional information to prove or disprove its validity.

Having established that there has been an outbreak and having formulated hypotheses to explain the probable food, agent, and source of contamination, many investigators are reluctant to try to find out what really happened and to prove their hypotheses.

Interpretations based on such limited investigations are rarely relevant to the actual occurrence. This is unfortunate, because such reports find their way into national reporting

systems and can then be used as a basis for food regulations and programs which are not realistic.

No two foodborne disease outbreaks are identical; the order of investigation will not, therefore, always follow the outlined sequence of procedures. Some of the investigative steps can usually be done simultaneously by different investigators. Additional procedures may also be required. The principle and techniques described, however, will suffice for most investigations.

If the outbreak affects a large number of persons or food establishments, request assistance from other health professionals. A team (consisting of an epidemiologist, a microbiologist or chemist, a sanitarian, and others) is ordinarily needed to make a sufficiently detailed foodborne illness investigation. Such personnel can usually be provided by local, state or provincial, or national agencies concerned with health, food and drug, environment, fish, or agriculture.

Continue to search for additional persons who had time, place, or person associations with the identified cases. Seek and interview both ill and well persons who have such associations.

If the suspect meal was served during a particular occasion, get the name of the person in charge, because it is likely that this person has a list of names, possibly even addresses and phone numbers of persons who attended.

Secure menus of suspect meals as soon as possible. Additional cases can be identified by checking reservation books and credit card receipts. Recheck the food-related, enteric disease alert/complaint log for recently received complaints that may be related to the outbreak.

Contact other health agencies and, if deemed helpful, hospital emergency rooms, poison control centers, and local physicians to find additional cases. At this stage of the

investigation, interviews can be speeded up by reviewing the event itself to stimulate each person's recall.

Ask about specific symptoms that are known to be common to the syndrome so far recognized and mention each food served at the event or meal.

The number of persons to be interviewed depends on the number who ate and the proportion of them who are probably affected. As a rule of thumb, if no more than 100 people attended the meal, an effort should be made to interview everyone. If several hundred were present, a random, representative sample should be interviewed.

As soon as possible, collect as many appropriate specimens from as many of the affected persons as will not overload the laboratory. In large outbreaks, it is usually sufficient to obtain specimens from 10 to 20 persons who manifest illness typical of the outbreak and specimens from an equal number of exposed, but non-ill, persons.

In smaller outbreaks, obtain specimens from as many of those ill and those at risk as practicable. Laboratory information obtained from the first patients may be useful to physicians in the treatment of cases who are detected later.

Before visiting the location where the suspect food was produced, processed, prepared, stored, or served, gather appropriate forms and sampling and specimen-collecting equipment (preferably pre-assembled in a kit).

Inform laboratory personnel that a field investigation will be made and that samples and specimens will be collected. Confer with them about special media to take and special sampling procedures; make arrangements for transport of samples to the laboratory.

Upon arrival at the place where the suspect food was processed or prepared, or where the implicated

meal was served, introduce yourself to the person in charge and state your purpose. Emphasize that the purpose of the investigation is to determine what contributed to the outbreak, so that preventive measures can be taken.

Attempt to create a spirit of cooperation, because a positive, communicative, working relationship exhibited by management with the investigator influences the workers' attitudes toward the investigative team.

Many factors could have contributed to contamination or bacterial multiplication before foods came under the control of the manager; so, assure him that these possibilities will also be investigated. Inform the manager of the activities proposed and benefits that may be gained from the findings for educating his workers.

Collect samples of any of the suspect foods that are left, of any potentially hazardous foods left from the suspect meal, and of any foods available from an allegedly contaminated lot.

Using a menu or data from an attack-rate table determine which of the foods from the implicated meal are most suspect and take samples of them. Check storage areas for items that may have been overlooked.

Also, check garbage for discarded foods or containers. This is necessary because suspect foods often will be discarded by an operator if he thinks that someone may have become ill as a result of eating food in his establishment.

Because one of the primary tasks of the investigator is to prevent further illness, take appropriate action to prevent distribution or serving of any suspect food until it has been proven safe. If there are no foods left from the suspect meal or lot, try to get samples of items that have been prepared subsequently to the suspect lot but in a similar manner.

Also, collect ingredients or raw items used in the suspect food. Determine supplier, distribution, and code information on packaged foods to aid any investigation that might be made of the same lot in distribution channels. Use aseptic techniques to collect samples.

If a food is already suspect, separately interview all persons who were directly involved in processing, preparing, or storing of the food and others who could have observed preparation and storage.

Ask questions in a sequence that will disclose the flow of food from the time it was received until it was served or sent out. Especially ask about foods that were prepared several hours or a day or more before being served at the suspect meal.

Ask similar questions, suitably modified, of the managers or workers who were involved in producing, transporting, processing, preparing, or storing food at other levels of the food chain, as well as persons who prepared the food at home.

Food workers who think they could be criticized or suffer punitive action because of their possible role in the outbreak do not always accurately describe the food handling as it happened. Their descriptions should be plausible and account for possible sources of contamination and indicate possibilities of survival and potential for growth of pathogens.

If the description does not contain all the information desired, reword the questions and continue the inquiry. Seek confirmation of one person's story by talking to others who have knowledge of the food operation or by watching the food preparation or processing practices. Be alert for inconsistencies among the accounts as told by different persons.

Animals may be infected with *Salmonella*, *Clostridium perfringens*, *Staphylococcus aureus*, and other pathogens. During slaughtering and

processing, meat carcasses can become contaminated with those pathogens. Raw poultry, pork, and other meats are often contaminated when they come into kitchens.

If any of these agents is suspected in an outbreak, samples of meat and poultry, meat scraps, drippings on refrigerator floors, and deposits on saws or other equipment can sometimes be helpful in tracing the primary source.

Swabbing food contact surfaces of equipment that had contact with the suspect food can often establish links in the transmission of contamination. This is especially helpful if a common utensil or piece of equipment is used for raw foods and then for cooked foods.

Swab these surfaces with sterile swabs, moistened with a sterile solution. Break off the tip of the swab into a tube containing 5 to 10 ml of this solution or into a tube of enrichment broth for specific pathogens.

Samples or swabs from air filters, drains, vacuum sweepings, food scrap piles, dried deposits on equipment, and dead ends of pipe lines may reflect the presence of organisms that previously were in the establishment.

Evaluate the cleanliness and the manner and frequency of cleaning equipment. Seek opportunities and possible routes of cross-contamination between raw and cooked foods. Ingredients may be the initial source of pathogens, so find out which ingredients were added before and which were added after any thorough cooking or heat processing.

Workers can be a source of foodborne pathogens. Enterotoxigenic *Staphylococcus aureus* strains are carried in the nares of a large percentage of healthy persons. They are often found on the skin and occasionally in feces. *Clostridium perfringens* can be recovered from the feces of most healthy persons.

Workers are sometimes infected

with other enteric pathogens. If the same type of pathogenic organism is recovered from a fecal specimen of a worker and the suspect food, do not immediately conclude that the worker was the source. Consider the events that took place before the outbreak.

A worker who ate some of the implicated food could be one of the victims. A history that includes a skin infection (boil or carbuncle) or a gastrointestinal or a respiratory disturbance preceding the preparation of the suspect food would be more incriminating.

Look for pimples, minor skin inflammation, boils, and infected cuts and burns on unclashed areas of the food worker's body; ask if there are any infections in other areas. If deemed necessary, make arrangements for the workers to be examined by a physician. Inquire about recent illnesses, especially gastrointestinal symptoms, and check time cards to disclose dates of absence from work.

If staphylococcal food poisoning is suspected, swab the lower half-inch of the nostrils of all workers who came in contact with the suspect food. Request a medical professional to obtain a culture from any skin lesion which is found. Rectal swabs can be useful; the responsible *Staphylococcus* may have come from an anus or perineum.

Put each specimen in an individual tube containing a sterile preservative solution or transport medium as recommended by laboratory personnel and take them to the laboratory.

When there is an indication that the outbreak was caused by *Salmonella*, *Shigella*, *Clostridium perfringens*, or other organisms that cause enteric infections, give each worker who handled the suspect food a suitable container for a stool specimen.

Then, instruct this person in its use and tell him when the specimen will be picked up or how to send it to

the laboratory. As an alternative, rectal swabs may be obtained. Other specimens may also be needed, depending on the disease that is suspected (see table of Illnesses Attributed to Foods).

In addition to tracing sources of contamination, the circumstances that permitted survival and growth of foodborne pathogens in the implicated foods must be identified. This information is vital to develop preventive measures.

Identify these factors by careful, patient questioning of food workers, by checking temperatures of foods (during processing) and equipment (in which the foods were held), and by conducting studies to determine time-temperature conditions of processing and storage.

Consider also times and temperatures which were involved in freezing, thawing, cooking or thermal processing, hot and cold holding, chilling, reheating, and any other steps of the processing operations.

Organize and group the data obtained from the interviews of both ill or well persons who partook of the suspect meal or food or who attended a common event. From appropriate calculations and analyses, the illness can be classified, the hypothesis tested as to whether the outbreak was associated with a common source, a vehicle can be determined, and the necessity for further field or laboratory investigation can be decided.

An epidemic curve is a graph that depicts the distribution of the time of

onset of the initial symptoms of all cases that occurred in a disease outbreak. Use a scale in days or weeks for hepatitis A; use a scale in hours for staphylococcal food poisoning.

The epidemic curve helps to determine whether the outbreak originated from a common-source vehicle, such as food, or from person-to-person propagation. A common-source epidemic curve is characterized by a sharp rise to a peak; the fall usually being less abrupt than the rise. The curve continues for a period approximately equal to the duration of one incubation period of the disease.

A person-to-person curve is characterized by a relatively slow, progressive rise. The curve will continue over a period equivalent to the duration of several incubation periods of the disease.

Determine predominant symptoms by constructing a table as illustrated below:

The percent of ill persons who manifest each symptom is obtained by dividing the number of individuals reporting a given symptom by the number of individuals reporting any symptom (20 in this example) and multiplying by 100.

This information helps one to determine whether the outbreak was caused by an agent that produces a neurological, enteric, or generalized illness. Either infections or intoxications will be suggested. Such information can cast suspicion on certain

Frequency of symptoms

Symptoms	Number of cases with symptom ¹	Percent
Vomiting	17	85
Nausea	12	60
Diarrhea	12	60
Abdominal cramps	6	30
Headache	3	15
Fever	2	10

¹Number of cases = 20

foods and can indicate appropriate laboratory tests.

The incubation period is the interval between ingestion of a food or metal contaminated with enough pathogens to cause illness and the appearance of an initial symptom of the illness. Calculate this interval for each case.

Individual incubation periods will vary because of individual resistance to disease, differing amounts of food eaten, uneven distribution of the infectious agent or toxin throughout the food, and other factors.

The shortest and longest incubation periods give a range. Calculate the median incubation period (the mid-value of a list of individual incubation periods when they are ordered in a series from the shortest to the longest or the average of the two middle values if such a series is composed of an even number of values).

The median, rather than the mean, is used because the former is not influenced by exceptionally short or long incubation periods which are sometimes reported in outbreaks of foodborne illness.

The median and range of the incubation period, coupled with information regarding predominant symptoms, from bases upon which to judge whether the disease in question is an infection or an intoxication and thereby determine what laboratory tests should be done.

Complete the Food-Specific Attack Rate Table. It provides an easy way

to compare the percentage of ill persons who ate each food with the percentage of ill persons who did not eat each food.

To calculate the percent of ill persons for a specific food (food-specific attack rate (within a given group, divide the number of ill persons who ate a particular food by the total number (both ill and well) who ate the same food and multiply by 100. Do the same for the total number who did not eat the particular food. An example from the following table is: 74 (ill, who ate braised beef)/91 (total, who ate braised beef) \times 100 = 81%.

The attack rate table is useful in identifying the food responsible for an outbreak of illness. This food will usually have the highest attack rate (percent ill) in the column for persons who ate the food and the lowest attack rate in the column for persons who did not eat the food; it will also have the greatest difference the two rates.

For example, in the above table the attack rate for persons who ate braised beef was 81%; the attack rate for persons who did not eat this food was only 18%. Thus, the difference in the two percentages was +63, the greatest for the foods listed. Therefore, braised beef is the suspect food.

As complete a report as possible should be submitted so that these agencies can make full interpretations of the report and develop a meaningful foodborne disease data bank. Send copies of the report to

any agency having jurisdiction over products implicated in the report, to any agency that initiated the alert, and to any agency that participated in the investigation.

The primary purpose of a foodborne disease investigation is to prevent further illness. This can be accomplished either at the time of the investigation or immediately afterwards by identifying a contaminated or otherwise hazardous product and removing it from the market.

To decrease incidence of foodborne illness, identify causal factors, develop practicable preventive procedures, and communicate them to those who can put them into practice. Factors shown by experience that frequently contribute to outbreaks are cited in the table of Illnesses Attributed to Foods.

Survey establishments that process or prepare similar foods to see whether conditions that contribute to outbreaks of illness are widespread. If so, initiate an industry-wide training program.

If education fails to achieve the desired results, take other action (such as hearings, seizures, and prosecution) to correct hazardous operational procedures.

Alert the public to hazardous conditions that can affect them and motivate them to become concerned about their food supply.

Most foodborne illnesses are preventable, but prevention requires constant vigilance on the part of

Food-specific attack rate table

Foods	Number of persons who ate specific foods				Number of persons who did not eat specific foods				Difference in percent
	Ill	Not ill	Total	Percent ill	Ill	Not ill	Total	Percent ill	
Braised beef	74	17	91	81	2	9	11	18	+63
Peas	48	20	68	71	28	6	34	82	- 11
Cabbage salad	36	12	48	75	40	14	54	74	+ 1
Buttered biscuits	46	12	58	79	30	14	44	68	+11
Peaches	62	22	84	73	14	4	18	78	- 5
Milk	60	16	76	79	16	10	26	62	+17

those in the food industry and in health and regulatory agencies to see that the hazards are understood and questionable operating procedures are avoided.

REFERENCES

1. Fox, J. P., Hall, C. E., and Elveback, L. R., 1970. *Epidemiology: Man and Disease*. Macmillan, London.
2. MacMahon, B. and Pugh, T. F., 1970. *Epidemiology: Principles and Methods*. Little, Brown and Co., Boston, Massachusetts.
3. Bryan, F. L., 1972. *Guide for Investigating Foodborne Disease Outbreaks and Analyzing Surveillance Data*. Center for Disease Control, Atlanta, Georgia.
4. Bryan, F. L. 1971. *Diseases Transmitted by Foods (a classification and summary)*. Center for Disease Control, Atlanta, Georgia.
5. Peavy, J. V., Eddins, D. L., and Dyal, W. W. *Descriptive Statistics (Rates, Ratios, Proportions, and Indices)*. Center for Disease Control, Atlanta, Georgia.
6. Peavy, J. V., Eddins, D. L., Dyal, W. W., and Sanders, R. E. *Descriptive Statistics (Tables, Graphs, and Charts)*. Center for Disease Control, Atlanta, Georgia.
7. Peavy, J. V., Eddins, D. L., and Dyal, W. W. *Descriptive Statistics (Measures of Control Tendency and Dispersion)*. Center for Disease Control, Atlanta, Georgia.
8. Benenson, A. S. *Control of Communicable Diseases in Man 1970*. The American Public Health Associates, Washington, D.C.
9. *Procedures To Investigate Foodborne Illness, Third Edition - 1976*. International Association of Milk, Food and Environmental Sanitarian, Inc.
10. Roueche, B. 1967. *Analyses of Epidemiology*. Little, Brown and Co., Boston, MA.
11. U.S. Department of Health, Education, and Welfare, Public Health Service, Center for Disease Control, Atlanta, Georgia, 1967-1975. *Foodborne Outbreaks Annual Summary*.
12. U.S. Department of Health, Education, and Welfare, Public Health Service, Center for Disease Control, Atlanta, Georgia, 1975. *Botulism in the United States*.

Committee Reports

The meeting of the Farm Methods Committee was convened by Chairman Termunde at 7:00 p.m. on Monday, February 15, 1982, at the Executive Inn, Louisville, Kentucky.

In attendance were approximately 40 committee and subcommittee members.

Chairman Termunde indicated that he had received an excellent response to his request for updated information on affiliations, interests, addresses, and phone numbers. The information was very helpful in preparing subcommittee assignments.

Chairman Termunde expressed his apologies to those members that received delinquent notices when they were in fact IAMFES members.

Subcommittee Chairmen were asked to have their interim reports completed and submitted to Chairman Termunde and the appropriate Assistant Chairmen. The following preliminary subcommittee reports were given.

ANTIBIOTICS, PESTICIDES AND OTHER ADULT-ERANTS SUBCOMMITTEE

No one was present to report.

CLEANING AND SANITIZING OF FARM MILK EQUIPMENT

Subcommittee Chairman Welch indicated that the committee was active and was addressing 16 specific problems.

EDUCATION SUBCOMMITTEE

Subcommittee Chairman Nichols reported the receipt of the excellent material from the North East Dairy Practices Committee.

PLASTICS SUBCOMMITTEE

Subcommittee Vice Chairman Kirby reported that several members had picked up samples of apparently unapproved tubing that was being forwarded to Chairman Saffian for evaluation. He requested additional samples from any interested persons.

PRECOOLING RAW MILK ON THE DAIRY FARM

SAMPLING OF MILK IN TRANSPORT TANKS

A lengthy report had been received since the last committee meeting, but no one present could give an update on current committee activities.

COORDINATION OF MILKING SYSTEM INSTALLATION RECOMMENDATIONS

Subcommittee Chairman Appleby reported that a second draft of the proposed pipeline application form had been completed. The committee is also looking at the mechanical recommendations for cleaning large diameter pipelines.

WATER TREATMENT AND PROTECTION

Subcommittee Vice Chairman Atherton indicated that the committee was looking at the quality standards for recycled cooling water. The committee was asked to look at reliable on farm water supply treatment methods that might be used if regulatory authorities outlaw iodine treatment.

ANIMAL WASTE MANAGEMENT

Subcommittee member Don Rollins reported that delegate action at the last NCIMS prohibited the feeding of body waste materials to lactating dairy cows.

STANDARDIZATION OF PROCEDURES FOR UNIFORM INSPECTION AND RECOMMENDATIONS FOR MASTITIS PREVENTION AND CONTROL

Subcommittee Chairman Reeder indicated the committee members were working with the MNC Education Committee. This committee has developed one brochure and would have one on somatic cell counting available this year. The fieldman's handbook is being prepared. A video tape prepared in British Columbia has been received, but has not been reviewed.

FARM SANITATION CHEMICAL ADVISORY COMMITTEE

Member Maynard David indicated that he had not received any recent correspondence. He was concerned about the increasing prevalence of bulk delivery of farm chemicals. These products are without warning labels and could present a potential problem to farm labor and equipment. The apparent etching of stainless equipment by cold temperature cleaning products used in high temperature solutions was discussed. Ken Kirby thought this may be the result of using a lower grade stainless steel or the grit of the surface finish was not satisfactory.

Earl Wright indicated that the 1981 Farm Methods report had been reprinted in *Dairy and Food Sanitation*. He welcomed articles for the magazine.

Boyd M. Cook
Acting Secretary

Calendar

1982

May 19--WAREHOUSE SANITATION SEMINAR FOR MANAGEMENT AND WAREHOUSE PERSONNEL, Ramada Inn, Wheat Ridge, Colorado. Food Sanitation Institute, Jean Day, Coordinator, 1019 Highland Avenue, Largo, FL 33540.

May 20--WAREHOUSE SANITATION SEMINAR FOR MANAGEMENT AND WAREHOUSE PERSONNEL, Airport Park Hotel, Inglewood, California. Food Sanitation Institute, Jean Day, Coordinator, 1019 Highland Avenue, Largo FL 33540.

May 22-26--NATIONAL RESTAURANT ASSOCIATIONS 63rd ANNUAL SHOW, Chicago's McCormick Place. For more information contact: Susanne Martin, 312-644-5800, at Sheila King Public Relations, or Jeffrey Prince, 800-424-5156, at the NRA Washington, D.C. office.

May 23-24--SANITATION THROUGH DESIGN. Holiday Inn - Downtown, Minneapolis, Minnesota. Food Sanitation Institute, Jean Day, Coordinator, 1019 Highland Avenue, Largo FL 33540.

May 24-26--ANNUAL PA DAIRY SANITARIAN'S LABORATORY DIRECTOR'S CONFERENCE. Pennsylvania State University, State College, PA. For more information contact: Agricultural Conference Coordinator, 409 J. O. Keller Building, University Park, PA 16802, or Sidney E. Barnard, 814-865-5491.

May 25-27--MICROBIOLOGY FOOD SANITATION SHORT COURSE. Holiday Inn - Downtown, Minneapolis, Minnesota. Food Sanitation Institute, Jean Day, Coordinator, 1019 Highland Avenue, Largo, FL 33540.

May 30-June 3--1982 CIFST 25th SILVER ANNIVERSARY CONFERENCE, Queen Elizabeth Hotel, Montreal, Canada. For more information contact: Jim Wells CIFST Conference, PO Box 273, Macdonald College, Ste. Anne de Bellevue, Quebec, Canada, H9X 1C0.

June through August--GORDON RESEARCH CONFERENCES, "Frontiers of Science", New Hampshire. Contact: Dr. Alexander M. Cruickshank, Director, Gordon Research Conferences, Pastore Chemical Laboratory, University of Rhode Island, Kingston, Rhode Island 02881, 401-783-4011 or 401-783-3372.

June 6-9--INTERNATIONAL FROZEN FOOD TRADE FAIR, Grosvenor House, London, England. For more information contact: Sharon Evans, Eagle Exhibition Consultants Ltd, 129-141 High St., Epping, Essex CM 16 4AG.

June 9--WAREHOUSE SANITATION SEMINAR FOR MANAGEMENT AND WAREHOUSE PERSONNEL, Albert Pick Motor Inn, Houston, Texas. Food Sanitation

Institute, Jean Day, Coordinator, 1019 Highland Avenue, Largo, FL 33540.

June 10-11--CREATIVE MARKETING COMMUNICATIONS WORKSHOP for food and dairy equipment and supply companies. Chicago O'Hare/Kennedy Holiday Inn. For more information contact: Dairy and Food Industries Supply Association, 6245 Executive Blvd. Rockville, MD 20852, phone 301-984-1444.

June 12-16--85th ANNUAL CONFERENCE OF THE ASSOCIATION OF FOOD AND DRUG OFFICIALS. Hyannis Regency, Hyannis, MA, Cape Cod, hosted by the New England Food and Drug Officials Association. Contact: Eaton E. Smith, 23 Bevin Boulevard, East Hampton, CT 06424.

June 14-18--MINICOMPUTERS AND MICROPROCESSORS: INTERFACING APPLICATIONS FOR THE FOOD INDUSTRY. Course is limited to 20 students. For more information contact: University Extension, University of CA, Davis, CA 95616, phone 916-752-0880.

June 19-23--ANNUAL EDUCATIONAL CONFERENCE OF THE NATIONAL ENVIRONMENTAL HEALTH ASSOCIATION. New Orleans, Louisiana. Contact: Larry Krone, NEHA, 1200 Lincoln Street, Suite 704, Denver, Colorado 80203.

June 21-22--THE FIFTH NATIONAL FOOD POLICY CONFERENCE by The Community Nutrition Institute and the Food Marketing Institute. This year's conference is entitled, "New Challenges for Nutrition." For more information contact: Pat Kelly CNI, 1146 19th St., NW, Washington, DC 20036, phone 202-833-1730.

June 21-25--75th AIR POLLUTION CONTROL ASSOCIATION MEETING. New Orleans, Louisiana. Contact: APCA, P.O. Box 2861, Pittsburg, PA. 15230.

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.

June 23--SYMPOSIUM ON TERMINOLOGY: The cornerstone of Global Communications Through Standards. For more information contact: Wayne P. Ellis, H. B. Fuller Company, PO Box 625, Springhouse, PA 19477, phone 215-628-2600.

July 15-August 1--EUROPEAN DAIRY STUDY TOUR. For more information contact: Mr. Tony Nankervis, G&N Travel Service, "ACMAL House", 566 St., Kilda Rd., Melbourne 3004, Victoria, Australia.

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. 10-12--SOUTHERN REGION FOOD EDUCATIONAL WORKSHOP. Vanderbilt Holiday Inn, Nashville, Tennessee. Food Sanitation Institute, Jean Day, Coordinator, 1019 Highland Avenue, Largo, FL 33540.

Aug. 13--SANITATION THROUGH DESIGN. Vanderbilt Holiday Inn, Nashville, Tennessee. Food Sanitation Institute, Jean Day, Coordinator, 1019 Highland Avenue, Largo, FL 33540.

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

Sept. 1-2--"PROSPECT FOR FOOD". The Summer Symposium of the Institute of Food Science and Technology will be held at the University of York and will be on the theme "Prospect of Food", dealing with aspects of nutrition, storage and raw materials. Details and registration forms available on request from: Dr. K. C. Yates, Hon. Secretary, IFST North of England Branch, Kelloggs Co., of Great Britain Limited, Park Road, Stretford, Manchester, M32 8RA.

Sept. 15-17--20th YANKEE CONFERENCE ON ENVIRONMENTAL HEALTH. Cromwell, Connecticut. Contact: Leon F. Vinci, P.O. Box 1300, Middletown, CT. 06457.

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

1983

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

Aug. 14-19, 1983--5th WORLD CONFERENCE ON ANIMAL PRODUCTION, Nihon Toshi Center, Tokyo, Japan. For more information contact: The 5th WCAP Conference Secretarial, c/o National Institute of Animal Industry, Tsukuba Norindanchi, PO Box 5, Ibaraki 305, Japan.

1984

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

Growth and Change in the European Food Ingredient Market

Markets for food ingredients in European Economic Community nations are projected to experience strong growth during the first half of this decade, says Frost & Sullivan, Inc.

Commercial utilization of flavor enhancers will jump by 112%, from 80,400 tons in 1981 to 170,600 tons by 1985, the marketing research firm predicts in a study, *New Food Ingredients in Europe*. Over the same period, consumption of proteins is seen increasing 64% from 660,000 tons to 1.09 million tons, while bulking/texturizing agents grow 52% from 47,600 tons to 72,500 tons and sweeteners advance 6% from 11.3 million tons to 12.0 million tons.

Figuring behind the expansion in ingredients are projected annual growth rates of 5-10% in such key areas as snack foods, soft drinks, processed meats, frozen foods, convenience products and baked goods.

Growth in the overall food market and changes in food consumption patterns "necessitate a continued stream of new products, and this in turn requires a continued availability in the introduction of new food ingredients," Frost & Sullivan comments. "This will come despite the agitation by vocal minorities who wish to eliminate all 'additives' from food. This (elimination) of course is basically impossible. The need for additives or ingredients to meet consumer requirements in terms of taste, texture, nutrition, appeal and convenience is both permanent and growing."

"Despite both economic and health hazard pressures, the need for new non-nutritive (low-calorie) sweeteners is great, and the scene is set for one or two of these becoming permitted and widely used in the next decade," Frost & Sullivan remarks. "The practicality of the replacement of sugar has already been demonstrated by the use of high fructose syrups (HFS) as well as other sweet syrups, where permitted. However, artificial barriers have often been placed in the way of using such materials where they apparently provide a hazard to national interests (e.g., sugar from beet in Europe). The potential for new fully tested and price competitive non-nutritive sweeteners in the next two or three years could lead to dramatic changes."

The report points out that development of new ingredients is becoming increasingly beset by economic difficulties stemming largely from costs involved in establishing and proving product safety. "This virtually means that such new ingredients will only be developed by large multinational corporations willing to invest these large sums," Frost & Sullivan suggests.

The trend of most development work emanating from the United States and Far East (particularly Japan) is expected to continue. However, manufacture of these materials will shift to Europe, perhaps under license, the report speculates.

For further information contact, Customer Service, Frost & Sullivan, Inc., 106 Fulton Street, New York, NY 10038, (212) 233-1080.

Pest Control Correspondence Course Offered

There is one problem common to every food service operation -- from a four-star restaurant in New York City to a mom and pop diner in the country. That problem is roaches.

Certainly no other single factor can have such a swift and devastating impact on the reputation of an establishment than the news that "the place has bugs."

"To help food service managers protect themselves against this menace, a team of experts led by Gary W. Bennett of the Entomology Department at Purdue University has put together an excellent 19-lesson self-study program entitled the *Pest Control Technology Correspondence Course*," stated Brother Herman Zaccarelli, Director of the Restaurant, Hotel, and Institutional Management Institute at Purdue University.

Practical advice on combating roaches, ants, flies, rats,

and other pests is provided in a concise, step-by-step style. Attention is given to the various pesticides and equipment available today and how they are used successfully. And there is an up-to-date summary of the laws and regulations governing the pest control industry.

The Restaurant, Hotel, and Institutional Management Institute (RHIMI) provides individual programming designed exclusively for organization, companies, institutions, and all segments of hospitality/food service in: Management-Supervisory Development, Employee Training, Purchasing and Cost Control, Food and Beverage Control, Food Systems and Food Production, and Sales and Marketing.

For additional information about this new course and how it might benefit you, as well as information about RHIMI's educational services, contact Brother Herman E. Zaccarelli at RHIMI at (317) 494-2749.

Mycotoxins Study Completed

Researchers at the Russell Research Center (USDA) in Athens, GA., completed a six months study of mycotoxins using bioluminescent bacteria. Findings showed that toxicity determinations with freeze dried bacteria parallel those derived with mammalian cell cultures, are more reliable, faster, and less costly.

Drs. Ida Yates and James Porter concluded that results obtained by the bacterial bioluminescent procedure have demonstrated a more reliable method for assessing mycotoxins than previously reported. According to Yates, the instrumental bioassay method employed could possibly provide short-term testing for food and feedstuffs when suspected to be contaminated, thereby significantly reducing test duration and cost.

Mycotoxins are toxic fungal metabolites found as contaminants in many agricultural products, Yates said. "These compounds cause deleterious effects in biological systems and have been implicated in carcinogenesis, toxicosis and teratogenesis in mammalian populations. Also, ingestion of contaminated feedstuffs lead to insidious problems related to the reproduction, health, and growth performances in both animals and humans," Yates said.

Research was done by dissolving mycotoxins (aflatoxin B₁, rubratoxin B, zearalenone, penicillic acid, citrinin, ochratoxin A, PR-toxin, and patulin) in appropriate solvents and analyzing the solutions for purity and quantity before proceeding with the bacterial bioluminescence assay.

The research project was presented as a paper by Yates, coauthored by Porter, at the annual meeting of the American Society of Microbiology in Atlanta, Ga., March 7-12, 1982.

CEU's Available to IFSEA members

The 3,500-member International Food Service Executives Association will grant credit to IFSEA members who successfully complete home study courses of the National Institute for the Foodservice Industry.

Max Jaeger, International Certified Food Executive chairman, said that IFSEA evaluated NIFI courses and recommended their accreditation. Any individual who successfully complete any one or all of the five courses will earn continuing education units (CEU's) from Purdue University, West Lafayette, Indiana.

For further information, contact Department of Instructional Planning, National Institute for the Foodservice Industry, 20 North Wacker Drive, Suite 2620, Chicago, Illinois 60606; telephone 312/782-1703.

Mass Production of Rennin

Cheese is one of the oldest products of biotechnology. But now the newest form of biotechnology--genetic engineering--may come to the aid of cheese makers through the mass production of an enzyme important in making quality cheeses.

The enzyme is called rennin and comes from the stomach of young calves. But with calves becoming more and more scarce, the cheese industry in recent years has been replacing rennin with cheaper microbial enzymes. These, unfortunately, produce cheese considered less desirable by many in the food industry.

The more expensive aged cheeses mainly rely upon rennin to clot milk proteins into curds, which eventually become cheese. If an international race among genetic engineers to clone rennin is successful, its supply would be assured, perhaps at lower cost, and cheese fanciers could relax.

One of the contestants in the rennin race is University of Wisconsin-Madison molecular biologist John T. Stout, who said he and some other laboratories already have accomplished the initial steps in cloning.

Stout first collects material from the lining of the calf's fourth stomach. Next he isolates certain molecules called messenger RNAs that carry genetic information. He then converts them into another genetic molecule called DNA.

With the help of "restriction" enzymes--the biological scissors that originally made genetic engineering possible--he inserts the DNA into plasmids of the bacterium *E. coli*, "the workhorse of genetic engineers." Plasmids are small circles of DNA living inside a bacterial host.

Stout spreads the bacteria on a nutrient gel where they form colonies, or clones. "I've investigated hundreds of colonies," he said, "but now I'm concentrating on a few that seem to contain the DNA molecule I'm interested in--the one that spells out the information for making a complete rennin molecule.

"The next step is to find if the inserted rennin gene works in its bacterial host. For those clones that give positive answers, and for some that don't, further engineering of both the plasmid and its rennin insert will be necessary for efficient enzyme production."

When rennin is finally manufactured by engineered microorganisms, Stout believes it will mark the first instance of genetic engineering put to use in the food sector.

For more information contact: John T. Stout, 608-262-7970.

Call for Papers for Second National Dairy Conference

The American Society of Agricultural Engineers announces a Call for Papers for the Second National Dairy Housing Conference, to be held March 14-16, 1983, in Madison, Wisconsin.

The purpose of the Conference is to establish the state-of-the-art in design of dairy production facilities. The Call for Papers emphasizes survey papers on state-of-the-art systems as opposed to specialized research reports. The information is to benefit dairy producers, fieldmen, extension personnel, and designers.

Specific topics include: feeding systems; maternity, treatment, and handling facilities; milking centers; and overall system descriptions. Proposals are also sought for cold and warm climate facilities for: milking cows; calves, heifers, and dry cows; and manure handling.

The deadline for proposals is *June 14, 1982*. *Single-page abstracts* should be sent to: William G. Bickert, Program Chairman, NDHC, Agricultural Engineering Dept., Michigan State University, East Lansing, MI 48823.

Culling Your Herd

Don't cull cows and leave an empty stall in the barn unless you have better animals to replace them, advises Earl Fuller, extension farm management specialist at the University of Minnesota.

"An old farm management adage says 'a cow in the stall is better than no cow at all,'" Fuller says. He suggests this guideline: analyze whether the suspect cow contributes a positive gross margin above the salvage value of her feed and the added electricity, veterinary expenses, breeding fees, testing fees and other expenses that go with keeping her.

"If the cow does, then she contributes something to paying overhead, servicing debt and possibly even some returns to labor.

"Culling the herd severely to reduce overall production and raise prices is a good thing for the dairy industry," Fuller says. "But it's not necessarily good for the individual dairy farmer faced with relatively lower milk prices who's in a cost-price squeeze."

For more information contact: Earl Fuller, 612-373-1145.

Re-evaluation of U.S. Food Safety Policy

The United States food safety laws need a comprehensive re-evaluation, according to a report released by the American Council on Science and Health (ACSH).

"Making extensive changes in U.S. food safety policy will be a challenging task," said Dr. Elizabeth M. Whelan, Executive Director of ACSH, "but we believe that such changes may be necessary if we are to develop a policy that meets the needs of the 1980s and beyond."

"The last major changes in our food safety laws were made in 1958. Since then, there have been enormous scientific and technological advances in this field," said Dr. Fredrick J. Stare, Professor of Nutrition, Emeritus, at the Harvard School of Public Health, and Chairman of the ACSH Board of Directors.

Dr. Stare pointed out that "because these advances have not been incorporated into the laws, we have faced difficult regulatory situations concerning food ingredients such as saccharin and nitrite."

The ACSH report discusses the potential impact of the Hatch-Wampler bill (S.1442 and H.R.4014), a current proposal to change the food safety laws. This bill has been the focus of intense public debate, with consumer advocates and food processors often taking opposing sides.

"The Hatch-Wampler bill represents a real advance in the interpretation of scientific developments in the food safety area," according to Dr. F. J. Francis, Professor in the Department of Food Science and Nutrition at the University of Massachusetts and a Scientific Advisor to ACSH.

Dr. Francis said that the bill "addresses the concept of absolute safety with the realization that it is unattainable. It also provides for full and open debate in the public arena of the science and politics involved in important decisions by provision for peer review."

"While the Hatch-Wampler bill is not without its drawbacks," ACSH Associate Director Dr. David Roll said, "it is an excellent first step toward a much-needed modernization of the food safety laws. The bill considers many of the weaknesses of the present laws, and proposes effective ways to deal with them."

The American Council on Science and Health is an independent, nonprofit educational association promoting scientifically balanced evaluations of food, chemicals and the environment. ACSH has offices in New York, New Jersey, and Washington, DC.

Copies of the ACSH report *The U.S. Food Safety Laws: Time for a Change?* can be obtained from the American Council on Science and Health, 47 Maple St., Summit, N.J. 07901. Phone: 201-277-0024.

Cattle Cloning in Minnesota

Work on cattle cloning--producing from one single fertilized egg many identical cattle--is progressing at the University of Minnesota, according to Alan Hunter, leader of the five-person team working on the Agricultural Experiment Station project.

The project involves several stages, including freezing embryos and embryo transfer. But one initial hurdle was recently passed with the development of a new way to retrieve eggs for fertilization which eliminates the expensive surgical removal from the cow of one egg at a time.

The eggs are retrieved by removing a cow ovary at the slaughterhouse, taking it back to the laboratory, and gently scraping or scoring the surface of the ovary to release the eggs. All of the cow's eggs are present in her ovary, though in an arrested state.

Because these eggs have been retrieved in an arrested state, before they can be fertilized, they must be matured to the same state as if the cow had ovulated them. This step has also been accomplished in the lab. "We've matured the egg in the test tube. The next step is to try to fertilize it in the test tube, and create an eight-cell embryo in the test tube," Hunter says.

The process of cloning moves in several stages, and the success of each step is dependent on critical factors such as egg maturity and the hormonal balance of the recipient cow. Hunter hopes to be working at the implanting stage of the process by this summer.

Eventually, cloned calves will be useful in research in separating genetic from environmental variables. It would also give the cattle industry the ability to select top-producing cows and keep reproducing them to get more.

For more information contact: Alan G. Hunter, Agric. Ext. Service, Univ. of MN, St. Paul, MN 55108, phone 612-376-5676.

Technical Courses Offered

The State Training Branch, formerly the Cincinnati Training Facility is responsible for the FDA training of Federal, State and local regulatory personnel in the milk and food sanitation area. A complete roster of short-term technical courses planned for presentation by the State Training Branch now through September 30, 1982 is available. The training courses are free of charge and are open on a nationwide basis. Transportation and per diem costs are the responsibility of the participants or sponsoring agency. For more information contact: Director State Training Branch Division of Federal-State Relations, EDRO, Food and Drug Administration, 550 Main St., FOB Room 8002, Cincinnati, OH 45202, phone 513-684-3771.

Highlights of the Second International Colloquium on World Sweeteners Policy

The Second International Colloquium on World Sweeteners Policy, held in March in Tarpon Springs, Florida, drew over 600 participants with top-quality presentations on a wide array of sweetener issues. Topics discussed included, world supply and demand for sweeteners, panel discussion on sugar and nutrition and alternative sweeteners. Other sessions focused on the International Sugar Agreement, cost of U.S. sugar production, with presentations by major industry representatives, as well as costs in major world production areas.

As a result of the strong industry-wide support generated from the Colloquium, a third session has been scheduled for January 30-February 2, 1983, in Phoenix, Arizona. The Colloquium is sponsored by the Sugar Users Group, a group composed of fifteen trade associations representing food processors using sugar as an ingredient. Principal members include the International Association of Ice Cream Manufacturers, the National Soft Drink Association, Biscuit and Cracker Manufacturers' Association, the Chocolate Manufacturers Association and the American Bakers Association.

For more information contact: Dawn M. Brydon, Sugar Users Group, 910 17th St. NW, Suite 1105, Washington, DC 20006, phone 202-296-4250.

Johnson Recipient of the New Dairy Spotlight Award

Robert T. Johnson, chief operating officer of CONNA Corporation, is the first recipient of the new Dairy Spotlight Award of the Dairy Products Association of Kentucky (DPAK).

Johnson was recognized by DPAK at its recent meeting in Louisville, Ky., for outstanding service to the group. The association consists of dairy processors and suppliers who are working for the betterment of the industry in Kentucky.

The Dairy Spotlight Award is made to a person in the dairy industry for his contributions to the industry and for his civic activities.

Johnson is a past president of the Southern Association of Dairy Food Manufacturers and the Dairy Products Association of Kentucky. He serves as a director of the International Association of Ice Cream Manufacturers.

CONNA Corporation, with headquarters in Louisville, Ky., is a holding company whose primary subsidiaries operate or franchise more than 430 Convenient Food Mart and other stores and more than 320 retail gasoline outlets.

For more information contact: Robert T. Johnson, CONNA Corp., PO Box 35680, Louisville, KY 40232, phone 502-584-1281.

PROGRAM

Sixty-Ninth Annual Meeting International Association of Milk, Food and Environmental Sanitarians, Inc.

*In Cooperation with the
Kentucky Association of Milk, Food & Environmental Sanitarians, Inc.
August 22-25, 1982*

Galt House

Louisville, Kentucky

REGISTRATION TIME

Sunday, August 22 - 1:00 PM - 5:00 PM
Monday, August 23 - 8:00 AM - 5:00 PM
Tuesday, August 24 - 8:00 AM - 5:00 PM
Wednesday, August 25 - 8:00 AM - 5:00 PM
Thursday, August 26 - 8:00 AM - 12:00 Noon

REGISTRATION FEES

	Advance	At Door
Registration Fee-Member	20.00	25.00
Registration Fee-Non-Member	30.00	30.00
Student	No Chg.	No Chg.
Spouse	10.00	12.00
Banquet	15.00	17.00

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SUNDAY-AUGUST 22

1:00-5:00 PM	Registration-Third floor
1:30-5:00 PM	Executive Board Meeting-Anchor
8:30 AM-5:00 PM	Council of State Sanitarians Registration Agencies-Kings Head
6:00-7:00 PM	Early Bird Reception-Court/Del Quay
9:00-11:00 PM	Executive Board Meeting-Anchor

MONDAY-AUGUST 23

8:00 AM-5:00 PM	Registration-Third floor
8:00 AM-5:00 PM	Executive Board Meeting-Anchor

8:00 AM-5:00 PM	Spouses' Hospitality-Turf/Kent
8:00 AM-5:00 PM	Food Equipment/Sanitary Standards Committee-Mayors
8:30 AM-5:00 PM	Farm Methods Committee-Liverpool
8:30 AM-5:00 PM	Committee on Communicable Disease Affecting Man-General's
8:30 AM-5:00 PM	Sanitarians Joint Council-Lord Crewe
8:30 AM-Noon	Journal of Food Protection, Management-Commissioner's
8:30 AM-Noon	Dairy and Food Sanitation, Management-Corn Island
10:00 AM	Cleaning Procedures Task Force I.M.S. Commissioner's Room.

MONDAY-AUGUST 23

1:00 PM	IAMFES Membership Committee Meeting. Oak Room.
2:00-5:00 PM	Council of Affiliates-Kings Head
1:30-5:00 PM	Milking Machine Manufacturers-Dorset
1:30-5:00 PM	National Conference on Interstate Milk Shipments-Queen
1:30-5:00 PM	Applied Laboratory Methods Committee-Corn Island
1:30-5:00 PM	Committee on Foot and Mouth Disease-Old River

TUESDAY-AUGUST 24

Morning - General Session - Cochran
 Robert Marshall, Presiding

DOOR PRIZE

INVOCATION-Lyman C. Knierem,
 Louisville, KY

WELCOMING ADDRESS

PRESIDENTIAL ADDRESS - Harry
 Haverland, U.S. Food & Drug Administration, Cincinnati, OH

IMPACT OF REDUCTIONS IN
 STATE CONTRACT MONIES-W.
 Y. Cobb, U.S. Food & Drug Administration, Washington, DC

Teat Dip Committee. Commissioner's Room.

MILK BREAK

DOOR PRIZE

ANNUAL BUSINESS MEETING -
 Harry Haverland, President

1. Report of Executive Secretary
2. Report of Secretary-Treasurer
3. Committee Reports
4. 3-A Symbol Council Report
5. Report of Resolution Committee
6. Report of Affiliate Council
7. Old Business
8. New Business
9. Election of Officers

TUESDAY-AUGUST 24

**Afternoon - Food Sanitation - Water Poet
Richard A. Brazis, Presiding**

- 1:25 PM DOOR PRIZE
1:30 PM MAXIMIZING EFFICIENCIES IN FOOD PROCESSING SYSTEM - Nancy Moon, University of Georgia, Athens, GA
2:00 PM UPDATE ON MODEL RETAIL FOOD MARKET REGULATIONS - H. Thompson Price, Jr., U.S. Food & Drug Administration, Philadelphia, PA
2:20 PM ATTACHMENT AND ENTRAPMENT MICROORGANISMS BY FOOD AND SKIN-Edmund A. Zottola, University of Minnesota, St. Paul, MN
3:10 PM BREAK
3:25 PM DOOR PRIZE
3:30 PM MICROBIAL AND SANITARY ASPECTS OF FROZEN FOOD MANUFACTURE-Tom Maier, Banquet Foods, Co., St. Louis, MO
4:00 PM FROZEN FOODS: RETAIL ASPECTS-Hugh Symons, American Frozen Foods Inst., McLean, VA
4:30 PM FACTORS CONTRIBUTING TO FOOD BORNE DISEASE IN CANADA-Ewen C. D. Todd, Bureau of Microbial Hazards, Ottawa, Ontario
4:45 PM AFFILIATE COUNCIL MEETING - Queens (3rd floor)
7:00-9:00 PM CRACKER BARREL SESSION - FOOD SANITATION
Michael Doyle, Presiding
7:05 PM THE MEANING OF HIGH AEROBIC PLATE COUNTS IN FOODS - O. W. Kaufmann, U.S. Food & Drug Administration, Cincinnati, OH

TUESDAY-AUGUST 24

**Afternoon - Milk Sanitation - Cochran
Archie Holliday, Presiding**

- 1:25 PM DOOR PRIZE
1:30 PM UHT: HOW, WHY AND ITS PROSPECTS - William Roberts, Dairymen, Inc., Louisville, KY
2:00 PM SAFETY ASPECTS OF FEEDING ANIMAL WASTES TO DAIRY CATTLE-Joseph P. Fontenot, Virginia Tech State University, Blacksburg, VA
2:30 PM INDUSTRY SUPPORT OF RESEARCH AND EXTENSION-John White, Virginia Tech State University, Blacksburg, VA

- 2:50 PM
3:05 PM
3:10 PM

- BREAK
DOOR PRIZE
DISEASES TRANSMITTED BY RAW MILK AND MILK PRODUCTS-Frank Bryan, Centers for Disease Control, Atlanta, GA
3:40 PM ASEPTIC PACKAGING - Charles Sizer, Brik Pak, Inc., Dallas, TX
4:10 PM OBTAINING APPROVAL FOR USE OF A DAIRY FOOD PLANT WASTEWATER PRETREATMENT BY-PRODUCT IN ANIMAL FEEDS-D. R. Landes, W. A. Bough and D. G. Rollins*, Special Products, Inc., Springfield, MO
4:45 PM AFFILIATE COUNCIL MEETING - Queens (3rd floor)
7:00-9:00 PM CRACKER BARREL SESSION - MILK SANITATION-Cochran
Gary Lane, Presiding
7:05 PM THE MILK SUPPLY SITUATION - Al Ortego, Dairymen, Inc., Louisville, KY

TUESDAY-AUGUST 24

**Afternoon - Topics of Interest - Liverpool
Edward Aylward, Presiding**

- 1:25 PM DOOR PRIZE
1:30 PM NITRATE REDUCTION BY *PARACOCCLUS DENITRIFICAN* ISOLATE FROM CURED MEAT-Paul Muneta* and R. Jasman, Food Research Center, Moscow, ID
1:50 PM NITRITE DEGRADATION AND STABILIZATION IN FROZEN AND AQUEOUS SOLUTIONS - Paul Muneta*, R. Jasman and L. Butler, Food Research Center, Moscow, ID
2:10 PM MILKY SPOILAGE AND REDUCED SHELF LIFE OF COMMERCIALY PREPARED HOT DOG WIENERS-F. A. Draughon* and N. G. Nisbett, University of Tennessee, Knoxville, TN
2:30 PM EFFECT OF PRESERVATIVES AND SELECTIVE AGENTS ON HEAT INJURED *BACILLUS CEREBUS* SPORES - Andrea Maka* and Russell S. Flowers, Silliker Laboratories, Chicago Heights, IL
2:50 PM INACTIVATION OF SPOILAGE BY N-A-POLMOTYL-L-LYSYL-L-LYSINE ETHYL ESTER DICHLORIDE-J. B. Lutey, P. C. Vasavad* and T. Richardson, University of Wisconsin, River Falls, WI
3:10 PM BREAK

- 3:30 PM THE INCIDENCE OF *YERSINIA ENTEROCOLITICA* IN FLUID MILK IN NEW YORK STATE - Robert B. Gravani* and Patricia G. Stewart, Cornell University, Ithaca, NY
- 3:50 PM RECOVERY OF *CAMPYLOBACTER JEJUNI/COLI* FROM INOCULATED FOODS BY SELECTIVE ENRICHMENT-Michael P. Doyle, University of Wisconsin, Madison, WI
- 4:10 PM MICROBIOLOGY OF SHARAWA AND THE POSSIBLE FOODBORNE HAZARDS-M. Ayaz*, F. Othman, T. Bahareth and A. Al-Sogair, Regional Agriculture and Water Research Center, Riyadh, Saudi Arabia
- 4:30 PM ISOLATION OF SALMONELLAE FROM LYMPH NODES, SPLEENS AND FECES OF ANIMALS SLAUGHTERED AT RIYADH PUBLIC ABBATOIR - Nassim H. Nabbut* and Habeeb M. Al-Nakhli, Regional Agriculture and Water Research Center, Riyadh, Saudi Arabia
- 4:50 PM SURVIVAL OF SOME STARTER BACTERIA USED IN HARD CHEESE MANUFACTURING IN THE PRESENCE OF H₂O₂ - S. M. El-Gendy*, H. Habel-Gali, T-Nassib and N. el-Hoda Hanafy, Assuit, Egypt

WEDNESDAY-AUGUST 25
General Session - Cochran
William Arledge, Presiding

- 8:25 AM DOOR PRIZE
- 8:30 AM ROLE OF CONTINUING EDUCATION FOR THE SANITARIAN - David Z. McSwane, School of Public & Environmental Affairs, Indianapolis, IN
- 9:00 AM SOME ASPECTS OF FOOD REGULATION IN THE '80's - John H. Nelson, Kraft, Inc., Glenview, IL
- 9:30 AM USE OF A MICRO-COMPUTER FOR IMPROVING FOODSERVICE SANITATION PROGRAMS-Homer C. Emery, Alamo Heights City Engineers Office, Alamo Heights, TX
- 9:50 AM BREAK
- 10:05 AM DOOR PRIZE
- 10:10 AM FOOD ALLERGIES-Steve L. Taylor, University of Wisconsin, Madison, WI

- 10:40 AM TRAINING: CREATIVE WAYS TO MAKE IT WORK FOR YOU! - Robert B. Gravani, Cornell University, Ithaca, NY
- 11:00 AM SODIUM IN PROCESSED FOODS: A PUBLIC HEALTH CONCERN - Emilie Skaar, Christiansburg, VA
- 11:30 AM ROLE OF pH IN THE USE OF CLEANERS AND SANITIZERS - J. V. Chambers, Purdue University, Lafayette, IN

WEDNESDAY-AUGUST 25

Afternoon Session - Food Sanitation - Water Poet
Irving Bell, Presiding

- 1:25 PM DOOR PRIZE
- 1:30 PM IMPACT OF A CERTIFICATION TRAINING PROGRAM ON MANAGERIAL ATTITUDES TOWARD FOODSERVICE SANITATION - Florence P. Emery
- 2:00 PM SEMI-PUBLIC WATER SUPPLIES -Clyde Baldwin, Natural Resources & Environmental Protection, Frankfort, KY
- 2:30 PM VIRUSES IN FOODS - Ed Larkin, U.S. Food & Drug Administration, Cincinnati, OH
- 3:00 PM BREAK
- 3:15 PM DOOR PRIZE
- 3:20 PM MICROWAVE COOKING - R. E. Baldwin, University of Missouri, Columbia, MO
- 3:50 PM UPDATE ON COMPENDIUM OF METHODS FOR THE EXAMINATION OF FOODS - R. B. Read, U.S. Food & Drug Administration, Washington, DC
- 4:10 PM NEW CONCEPTS IN INSTITUTIONAL FEEDING-Richard Gillespie, U.S. Food & Drug Administration, Cincinnati, OH
- 4:40 PM A SURVEY OF FRESH MARKET TURKEY FOR *CAMPYLOBACTER JEJUNI* - Joseph Lovett*, Jan M. Hunt and David W. Francis, U.S. Food & Drug Administration, Cincinnati, OH

WEDNESDAY-AUGUST 25

Afternoon Session - Milk Sanitation - Cochran
Bruce Langlois, Presiding

- 1:25 PM DOOR PRIZE
- 1:30 PM ADDED WATER IN MILK-William Arledge, Dairymen, Inc., Louisville, KY
- 2:00 PM THE MICROFLORA OF RAW MILK FOR CHEESE MANUFACT-

- URE-Edward B. Aylward*, Joseph O'Leary and Bruce E. Langlois, University of Kentucky, Lexington, KY
- 2:20 PM ADVANCED TECHNOLOGY IN PROCESS CONTROLS - Dale A. Seiberling, Seiberling Associates, Inc., Roscoe, IL
- 2:50 PM THE EFFECT OF MASTITIS ON CHEESE YIELD, MILK PRODUCTION, MILK COMPOSITION AND STARTER CULTURE ACTIVITY-B. E. Leavitt*, J. O'Leary, R. J. Harman and C. L. Hicks
- 3:10 PM BREAK
- 3:25 PM DOOR PRIZE
- 3:30 PM DHI IN THE FUTURE - Edward Troutman, University of Kentucky, Louisville, KY
- 4:00 PM ANTIBIOTIC DETECTION PROGRAMS-Sidney Barnard, Pennsylvania State University, University Park, PA
- 4:30 PM SURVIVAL OF SALMONELLA IN EGG LIQUEUR - R. W. A. W. Mulder and M. C. Vander Hulst, Spelderholt Institute for Poultry Research, The Netherlands

WEDNESDAY-AUGUST 25

- 7:30 AM NATIONAL MASTITIS COUNCIL EXECUTIVE COMMITTEE BREAKFAST MEETING - Old River
- 3:00 PM NATIONAL MASTITIS COUNCIL BOARD OF DIRECTORS MEETING-Anchor

WEDNESDAY EVENING-AUGUST 25

- 6:00-7:00 PM RECEPTION-Cochran
- 7:00-10:00 PM AWARDS BANQUET-Archibald PRESIDING-Harry Haverland, President
- INVOCATION
- INTRODUCTIONS
- PRESENTATION OF AWARDS - Bill Kempa
- Samuel Crumbine Award
- Citation Award
- Honorary Life Membership
- Sanitarian's Award
- Sponsors* - Monarch Chemicals, Div. of H. B. Fuller; Klenzade Products, Div. of Economics Laboratories; Wyandotte Corp., Inc.
- Harold Barnum Award
- Sponsor* - NASCO
- Educator Award

Sponsor - Milking Machine Manufacturer's Council of the Farm and Industrial Equipment Institute

Norman F. Sherman Award

Sponsor - National Institute for the Foodservice Industry

Installation of Officers

Past-president's award

THURSDAY-AUGUST 26

- 7:30 AM IAMFES EXECUTIVE BOARD BREAKFAST MEETING-Old River
- 8:30-5:00 PM NATIONAL MASTITIS COUNCIL SUMMER MEETING-Cochran

NATIONAL MASTITIS COUNCIL

1982 Summer Meeting Program

Thursday, August 26, 1982

Galt House

Louisville, Kentucky

Presiding for Morning Program - Bill Van Cleave -
Diarymen, Inc., Louisville, KY

- 8:00 AM REGISTRATION
- 8:20 AM GREETINGS-Allan Bringe, NMC President, Madison, Wisconsin
- 8:30 AM EFFECT OF MILK QUALITY ON PRODUCTION AND PRODUCE YIELD-Joe O'Leary, Department of Animal Sciences, University of Kentucky, Lexington, KY
- 8:50 AM COMPONENT PRICING AND PREMIUM PAYMENTS - Ed Aylward, Department of Animal Sciences, University of Kentucky, Lexington, KY
- 9:10 AM MASTITIS THERAPY: EFFECTIVE TREATMENT OR DOUBLE TROUBLE-Louis Newman, Director, Livestock Disease Diagnostic Center, University of Kentucky, Lexington, KY
- 9:30 AM THE ANTIBIOTIC RESIDUE PROBLEM: FROM THE FIELD-MAN'S PROSPECTIVE: FROM THE VETERINARIAN'S PROSPECTIVE - Robert Farst, Field Service Supervisor, Cincinnati Division, Milk Marketing, Inc., Cincinnati, Ohio and Dave Farst, Veterinarian, Arcanum Veterinary Clinic, Arcanum, Ohio
- 10:00 AM BREAK
- 10:20 AM A FAST AND FURIOUS LOOK AT MASTITIS !!!! - Louis Newman, Diagnostic Center, University of Kentucky, Lexington; Robert Harmon, Department of Animal Sciences, University of Kentucky, Lexington;

and William Crist, Department of Animal Sciences, University of Kentucky, Lexington

How much does mastitis cost?
The causative organisms.
How do I attack the problem?
When do infections occur?
Should I treat dip?
Should I dry cow treat?
Lactation treatment: pros and cons.
Should I vaccinate for mastitis?
Treating the acute flair-up.
How important is the milking machine?
Proper milking procedures.
How to interpret and use somatic cell counts.
Effective use of the diagnostic laboratory.
What can I do with mastitic milk?
Don't buy mastitis!

11:50 AM LUNCH

Presiding for Afternoon Program - Charles Hickerson - Dairyman, Maysville, Kentucky

1:10 PM ANSWERS TO YOUR BURNING QUESTIONS-Morning Speakers

1:30 PM SOURCES OF BACTERIAL CONTAMINATION TO THE COW - Lawrence Heider, Extension Veterinarian, Ohio State University, Columbus, OH

1:50 PM DON'T OVERLOOK THE DRY PERIOD IN MASTITIS CONTROL-R. J. Eberhart, Veterinary Medical Department, Pennsylvania State University, University Park, PA

2:10 PM BREAK

2:30 PM A MASTITIS CONTROL PROJECT INVOLVING 38 HERDS THE PROJECT METHODS AND GOALS-Gary Lane, Department of Animal Sciences, University of Kentucky, Lexington, KY

A DAIRYMAN'S VIEW OF THE INTEGRATED APPROACH TO MASTITIS CONTROL-Les Manley, Dairyman, Springfield, Kentucky

A VETERINARIAN'S ROLE IN INTEGRATED MASTITIS CONTROL-Sue and Phil Billings, Veterinarians, Springfield, Kentucky

3:00 PM OUTLOOK FOR THE DAIRY INDUSTRY-Ben Morgan, Jr., Dairyman, Inc., Louisville, Kentucky

3:20 PM QUESTION THE SPEAKERS

3:40 PM

ADJOURN

ENTERTAINMENT

6:00-7:00 PM Sunday - EARLY BIRD RECEPTION-Court/Del Quay

6:30-10:30 PM Monday - BELLE OF LOUISVILLE BOAT CRUISE

6:00-7:00 PM Wednesday - RECEPTION-Cochran

7:00-10:00 PM Wednesday - AWARDS BANQUET -Archibald

SPOUSE'S PROGRAM

MONDAY-AUGUST 23

Hospitality Program (Part of day)

1:00-3:30 PM WELCOME PROGRAM - a 2 hour and a half program held in the hospitality suite with coffee served. Members are welcomed and have time to meet friends. VISITOURS shows a professional slide film on the highlights of Louisville. A brief outline of the tours is presented along with time for questions as to shopping, restaurants, brochure presentation and several door prizes awarded. A program called "Shades of You" will be presented by color expert, Barbara Furlong. A member of the audience will be selected to enjoy a free consultation.

TUESDAY-AUGUST 24

Hospitality Program (Full day)

9:30-3:30 PM CITY TOUR - Five-hour City Tour will include Churchill Downs, St. James Court area, U of L, Speed Museum, Cave Hill, downtown and Old Louisville, Butchertown, Farmington.* Also a drive by antique stores will be included. Lunch will be at Seelbach.

WEDNESDAY-AUGUST 25

Hospitality Program

10:00-3:00 PM One bus will go to Lillian Marshall's in St. James Court (1431) for a visit and serving of tea/coffee and English scones -- Food editor and author of *Cooking Across The South*. A second bus will go to visit Big Six Henderson, the last of the great revenue agents and veteran of more than 5000 moonshine raids into Kentucky's hollows. Both groups will enjoy shopping with lunch on their own in the Jefferson Mall.

* FARMINGTON-an historic home designed from a plan by Thomas Jefferson and completed in 1810 by John and Lucy Fry Speed. Abraham Lincoln visited his close friend, Joshua Speed (son of Judge John Speed), at Farmington in 1841.

JFP Abstracts

Abstracts of papers in the May Journal of Food Protection

Modification of the Processing Method for Home-Preservation of Tomato Juice, J. L. Collins, Y. Che Man, F. A. Draughon and I. E. McCarty, Department of Food Technology and Science, Institute of Agriculture, The University of Tennessee, P.O. Box 1071, Knoxville, Tennessee 37916

J. Food Prot. 45:580-583

A modification (low water level bath, LWL) of the recommended water bath (high water level bath, HWL) procedure was used to process tomato juice in quart jars. The LWL bath contained one-fifth the amount of water recommended for the HWL bath. Use of the HWL bath required 59 min and 1838 watt-hours of electricity to heat the bath and process hot packed (92°C) juice for 15 min. In comparison, 34 min and 1065 watt-hours of electricity were required when the LWL bath was used. Samples of juice were inoculated with log 3.0 *Bacillus coagulans* per ml, processed in each of the two baths, and stored up to 12 weeks at 27°C. Aerobic mesophiles were found only in juice processed in the HWL bath and stored 4 weeks and in juice processed in the LWL bath and stored 0 weeks. The aerobic mesophile count (log₁₀) of juice processed in the HWL bath and stored 4 weeks was a mean log 1.4 per ml. Similar juice processed in the LWL bath had a mean log 1.3 aerobic mesophiles per ml. Juice processed in both water baths and stored for 8 and 12 weeks exhibited mesophilic counts of <1 log per ml. None of the inoculated, processed samples had a mean count greater than 1 log per ml of juice for aerobic, acid forming mesophiles; aerobic thermophiles; anaerobic mesophiles and thermophiles; and mold. Using temperature values and microbiological measurements, one may conclude that the LWL bath was as effective as the HWL bath for processing tomato juice while allowing for a substantial saving of time and electricity.

Comparison of VRB and VRB-2 Agars for Recovery of Stressed Coliforms From Stored Acidified Half-and-Half, C. L. Reber and R. T. Marshall, Department of Food Science and Nutrition, University of Missouri-Columbia, Columbia, Missouri 65211

J. Food Prot. 45:584-585

Half-and-half was acidified with delta-gluconolactone, inoculated with three species of coliform bacteria, stored for 31 days at 5°C, and examined for numbers of viable coliforms on VRB and VRB-2 agars. Loss of culture viability was logarithmic with recovery of 50 and 10% of initial numbers on days 7 and 30, respectively. *Escherichia coli* had significantly more recoverable injured cells than did *Enterobacter aerogenes* or *Klebsiella pneumoniae*. As time of storage increased, the proportion of injured to noninjured cells also increased. However, the maximal number of injured cells was on the thirteenth day of storage of *E. coli*-inoculated product. VRB-2 agar averaged 20% higher in productivity than VRB agar.

Glucoamylase Production by a Newly Isolated Strain of *Aspergillus niger*, Vilas P. Sinkar and Norman F. Lewis, Biochemistry and Food Technology Division, Bhabha

Atomic Research Centre, Trombay, Bombay 400 085, India

J. Food Prot. 45:586-589

A newly isolated indigenous fungus, *Aspergillus niger* #57 was found to be a prolific producer of glucoamylase. Stationary cultivation led to significantly higher yields than those obtained using submerged culture. The crude enzyme exhibited temperature and pH optima of 60°C and 4.0, respectively.

Acylation of Anthocyanins in Red Onions, A. B. Moore, F. J. Francis and M. E. Jason, Department of Food Science and Nutrition, University of Massachusetts, Amherst, Massachusetts, 01003 and Department of Chemistry, Amherst College, Amherst, Massachusetts 01002

J. Food Prot. 45:590-593

Chromatographic fractions of the onion pigment profile were examined for acylation by alkaline hydrolysis, visible/UV spectral, IR spectral, GLC, and NMR techniques. Results indicative of acylation were shown by alkaline hydrolysis and IR spectral analyses. The suspected acyl portion was shown not to be a cinnamic acid by visible/UV spectral analysis. NMR and GLC methods failed to detect acylation in the onion pigment system. Small amounts of assay material, low sensitivity for detection of some of the possible acyl acids, removal of the acyl by complex formation, loss of the acyl due to high volatility and low acid transfer in partitioning systems are some of the factors identified as interfering with acyl detection.

Microstructure of Various Chemical Compounds Crystallized on Cheddar Cheese, C. J. Washam, T. J. Kerr and V. J. Hurst, Department of Dairy Science, Department of Microbiology and Department of Geology, University of Georgia, Athens, Georgia 30602

J. Food Prot. 45:594-596

Five chemical compounds (tyrosine, sorbic acid, calcium lactate, calcium phosphate and sodium chloride), which have previously been reported to occur as crystals on various cheeses, were induced to crystallize on the surface of mild Cheddar cheese. These crystals were observed and photographed, using scanning electron microscopy (SEM). The distinct features exhibited by the crystals of each compound demonstrate the potential use of SEM in identification of crystals on cheese as well as in studying the factors contributing to their formation.

Fate of Aflatoxin M₁ in Parmesan and Mozzarella Cheese, Robert E. Brackett and Elmer H. Marth, Department of Food Science and the Food Research Institute, University of Wisconsin-Madison, Madison, Wisconsin 53706

J. Food Prot. 45:597-600

Three batches each of Parmesan and mozzarella cheese were prepared, using milk which was naturally contaminated with aflatoxin M₁. These cheeses were analyzed for aflatoxin M₁ content at intervals while Parmesan was ripened for 43 weeks or mozzarella was stored for 17 weeks. There was a 5.8-fold enrichment of AFM₁ in the Parmesan cheese over that in the milk from which the cheese was made. Apparent levels of aflatoxin M₁ in Parmesan cheese started high, decreased until about the 22nd week of age and then slowly increased until the cheese was 43 weeks old, but the final concentration was less

than that found initially. There was an 8.1-fold enrichment of AFM₁ in mozzarella cheese over that in the milk from which it was made. Levels of aflatoxin M₁ in mozzarella cheese varied slightly but remained near initial concentrations throughout the storage period.

Psychophysical Relationships Between Perceived Sweetness and Color in Cherry-Flavored Beverages, J. L. Johnson, E. Dzenolet, R. Damon, M. Sawyer and F. M. Clydesdale, Department of Food Science and Nutrition, University of Massachusetts, Amherst, Massachusetts 01003

J. Food Prot. 45:601-606

Sweetness of cherry-flavored and colored beverages, containing 3.2 to 4.8% sucrose, was quantified by a panel of 10 men and women, ages 22-50, using magnitude estimation. Five intensities of cherry colors were formulated using increasing volumes of Red 40 and a constant volume of both Blue 1 and imitation cherry flavoring. Color measurements from the Gardner XL-23 Colorimeter and the G. E. Recording Spectrophotometer were converted to L*, a* and b*. Sweetness was evaluated against sucrose concentration and arctan (a* /b*). Magnitude tests to evaluate color acceptability and pleasantness were also conducted. All magnitude estimates were normalized and subjected to a two-way ANOVA. Sweetness perception was highly correlated with increasing sucrose concentration ($r^2 > .90$), producing a power function exponent of 1.98. Sweetness increased approximately 3 to 13% with increasing color intensity in solutions containing 3.96 to 4.4% sucrose. The exponent describing the sweetness-color relationship was less than 1.0, and followed the power law over a narrow range of color intensities. Color 4 was the most acceptable color and color 3 containing 4.6% sucrose had the most pleasant taste. Color might be used to replace some sucrose and can optimize pleasurable taste sensations.

Microbiological Comparison of Hot-Boned and Conventionally Processed Beef Plate Cuts During Extended Storage, J. E. Kennedy, Jr., J. L. Oblinger, and R. L. West, Food Science and Human Nutrition Department and Animal Science Department, IFAS, University of Florida, Gainesville, Florida 32611

J. Food Prot. 45:607-614

The development of microflora on hot-boned and conventionally processed beef plate cuts was investigated from time of slaughter and/or fabrication throughout vacuum-packaged storage for 6 weeks at 0-1 C. Cuts from each processing treatment were analyzed immediately post-mortem and after 0.5, 1, 1.5, 2, 4, 7, 14, 21, 28 and 42 days of storage. Fabrication, packaging and chilling of beef plates were carefully controlled to minimize differences in chilling rates and contamination of hot and conventionally processed cuts. Microbial analyses included enumeration of mesophilic, psychrotrophic and total *Enterobacteriaceae* populations as well as taxonomic characterization of corresponding microbial isolates. Microbial counts of hot-boned cuts were generally higher than corresponding counts of conventionally processed cuts with significant differences ($p < 0.05$) detected between mesophilic and psychrotrophic counts at most storage intervals between 14 and 42 days. Earlier predominance of organisms such as *Lactobacillus* spp. and *Brochothrix thermosphacta* on hot-boned vs. conventionally processed cuts was indicated by taxonomic determinations. Psychrotrophic *Enterobacteriaceae*, including *Hafnia alvei* and *Yersinia enterocolitica*-like organ-

isms, were recovered in high numbers from a few samples after 28 and 42 days of storage regardless of processing technique. Differences in the development of microbial flora on hot and conventionally processed beef cuts could not be explained on the basis of differences in initial chill rates between treatments.

Evaluation of a Test Strip Used to Monitor Food Processing Sanitation, M. A. Cousin, Food Sciences Institute, Purdue University, West Lafayette, Indiana 47907

J. Food Prot. 45:615-619

A test strip, which contained a small absorbent pad on the end of a plastic strip for detection of microbial contamination of liquids and surfaces, was compared to standard rinse solution and surface contact methods. Bottles and food contact surfaces were unclean, cleaned or cleaned and sanitized before being evaluated with test methods. Results from test strips correlated well with those of the standard rinse solution method for bottles that were clean and/or sterilized, but not for those that were heavily contaminated. When test strips were used on cleaned contact surfaces, counts were one log cycle greater than those of contact plate or swab methods; however, the three surface methods correlated well for surfaces that were cleaned and sanitized. To insure that the contact methods were recovering microorganisms, surfaces were spread with known levels of *Escherichia coli* and *Staphylococcus aureus*. Results correlated well for low levels of contamination, but not for levels greater than 1×10^4 organisms/25 cm². Overall, test strips could be used for quick indication of sanitation of cleaned and sanitized food contact surfaces and containers if special precautions and limitations were understood.

Fermentation of Blanched-Bean Soymilk with Lactic Cultures, A. A. Patel and S. K. Gupta, Division of Dairy Technology, National Dairy Research Institute, Karnal-132001, India

J. Food Prot. 45:620-623

Soymilk obtained through blanching and grinding of soaked beans was examined for its suitability for fermentation with certain lactic cultures. Acid production as well as flavor and texture characteristics of the fermented soymilk were substantially improved by lactose fortification. Citrated soymilk on culturing, had a slightly improved flavor. Cultured whey-soymilk had a slightly weaker consistency but better flavor than lactose-enriched soymilk.

Proteolytic Inactivation of Thermonuclease Activity of *Staphylococcus aureus* During Recovery from Thermal Injury, Anne E. K. Zayaitz and R. A. Ledford, Department of Food Science, Cornell University, Ithaca, New York 14853

J. Food Prot. 45:624-626

Staphylococcus aureus cells were injured thermally by exposure to 55°C for 15 min and allowed to recover for various lengths of time at 37°C in Trypticase Soy Broth. During recovery, thermostable nuclease (TNase) production was measured using a turbidimetric-spectrophotometric method. Production increased during recovery until approximately 2 h after injury when the amount of TNase began to decrease unexpectedly. Protease(s) was thought to be degrading the TNase, and positive results of gelatin agar diffusion tests and heat inactivation experiments supported this hypothesis. Protease inhibitor studies with ethylene diamine tetraacetate (EDTA) and phenyl methyl sulfonyl fluoride (PMSF) confirmed

the involvement of protease(s) in the observed decrease in TNase activity. Implications of TNase inactivation in screening of foods for enterotoxigenic staphylococci are discussed.

Microanalytical Quality of Tomato Products: Juice, Paste, Puree, Sauce and Soup, S. M. Cichowicz, J. S. Gecan, J. C. Atkinson and J. E. Kvenberg, Division of Microbiology and Division of Mathematics, Food and Drug Administration, Washington, DC 20204

J. Food Prot. 45:627-631

A national retail market survey was made to determine the levels of mold contamination in apricot, peach, and pear nectars and in apricot, peach, and pear infant purees. A total of 1987 samples were analyzed. The mean and range of Howard mold counts for each product were apricot nectar 1.5% (0-15%), peach nectar 1.2% (0-8%), pear nectar 1.1% (0-9%), apricot puree 1.0% (0-10%), peach puree 0.9% (0-9%) and pear puree 0.5% (0-6%).

Containers with an End Flat Against the Side Wall or Bottom of a Retort: Effect on Heating Rate and the Sterilization Value, I. J. Pflug, Department of Food Science and Nutrition, 543 Shepherd Laboratories, University of Minnesota, 100 Union Street S. E., Minneapolis, Minnesota 55455

J. Food Prot. 45:632-633

In crateless retorts under certain conditions, it is possible for a few cans in the retort load to have an end flat against a solid wall. Cans under this condition will have a temperature response parameter, f_h , larger than cans surrounded by the heating medium and a smaller sterilizing value (F_0). The f_h and F_0 -values of cans, both with an end flat against a solid wall and surrounded by the heating medium, are calculated to show the magnitude of the effect and the possible hazard when this condition exists and is ignored. It is recommended that the possibility of a wall effect be determined as part of the prevalidation inspection, and that the heat penetration test program be based on the results of this inspection.

Mold in Fruit Nectars and Infant Fruit Purees, Ruth Bandler, John S. Gecan and John C. Atkinson, Division of Microbiology, Food and Drug Administration, Washington, DC 20204

J. Food Prot. 45:634-635

A national retail market survey was conducted to determine the sanitary quality of tomato products: juice, paste, puree, sauce and soup. The official methods of the Association of Official Analytical Chemists were used to count molds, rot fragments, fly eggs and maggots. The most frequently encountered defect was mold decomposition. Howard mold counts for all products ranged from 0 to 57%. Mold count means ranged from 2.0 to 9.4%. The percent of samples containing mold ranged from 55.4% for tomato soup to 98.9% for tomato paste. Rot fragment counts ranged from 0 to 560/g, fly egg counts ranged from 0 to 5 and maggot counts ranged from 0 to 2/100-g sample.

Evaluation of a Method for Recovery of Virus from Oysters, R. Sullivan and J. T. Peeler, Virology Branch and Microbial Biochemistry Branch, Division of Microbiology, Bureau of Foods, Food and Drug Administration, U.S. Public Health Service, U.S. Department of Health and Human Services, Cincinnati, Ohio 45226

J. Food Prot. 45:636-637

A method was developed for recovery of virus from single oysters, using coxsackievirus B-2 as a model. The viruses were released by blending the oyster tissues in a 1% nonfat dry milk-1% salt solution and Freon TF at pH 9. Low speed centrifugation separated the sample, which was subsequently detoxified with activated carbon and Cat-Floc. The average recovery of the inoculated virus was 59%.

Contamination and Growth of *Bacillus cereus* and *Clostridium perfringens* in Mexican-Style Beans, Susan Nester and Margy Woodburn, Department of Foods and Nutrition, School of Home Economics, Oregon State University, Corvallis, Oregon 97331

J. Food Prot. 45:638-642

Two major problems in production procedures used in Mexican restaurants identified through interviews with managers were failure to cool large quantities of beans rapidly and failure to reheat beans thoroughly before placement on the steam table. Experiments were designed to study the effects of varying temperatures, incubation time, and location in the product on growth of *Bacillus cereus* and *Clostridium perfringens*, singly and combined, in cooked mashed pinto beans. Growth of both *B. cereus* and *C. perfringens* was rapid at 37°C, with numbers of cells associated with illness reached in 4 and 6 h, respectively. *B. cereus* may present more of a health hazard, since obvious signs of spoilage did not occur in these beans until 12 h, whereas *C. perfringens* caused obvious spoilage of beans within 6 to 8 h. Numbers of *B. cereus* usually associated with illness were found at 12 h at 23°C. The beans appeared to be spoiled before this level was reached with *C. perfringens* at 24 h. Good growth of both species occurred in both top and bottom locations. Of 42 restaurant samples of bean dip and mashed beans analyzed for contamination with *B. cereus* and *C. perfringens*, only two samples were found to contain either organism and these were present in low numbers. Two samples were, however, found to contain large numbers of coagulase-positive *S. aureus* (>100,000/g).

Inexpensive Device for CIP Cleaning of the Inside of a Beef Carcass Spray Chamber, M. E. Anderson, H. E. Huff, R. T. Marshall and W. C. Stringer, U.S. Department of Agriculture, Agricultural Research Service, 113 Eckles Hall, and Food Science and Nutrition Department, University of Missouri-Columbia, Columbia, Missouri 65211

J. Food Prot. 45:643-645

An automated device for spray-type cleaning-in-place of a beef carcass washer constructed of linear polyethylene was evaluated by microbiological tests. Swabbing of seams at the welded joints, followed by plating of the swab rinse solution, disclosed that cleaning reduced counts by more than 99%. The average number of microorganisms recovered from seams after cleaning was 80/cm². However, it was necessary also to manually clean certain joints weekly. Flat surfaces were quite adequately cleaned according to results of tests with RODAC plates. With RODAC plates, numbers of yeasts and molds recovered on potato dextrose acid agar were better indicators of sanitary condition than numbers of coliforms on violet red bile agar or numbers of staphylococci on Baird-Parker agar.

Microbiological and Organoleptic Qualities of Bruised Meat, C. O. Gill and J. C. L. Harrison, Meat Industry Research Institute of New Zealand (Inc.), P.O. Box 617, Hamilton, New Zealand

J. Food Prot. 45:646-649

Naturally bruised tissues from the carcasses of cattle and sheep slaughtered and processed at a commercial abattoir were compared with unbruised tissues from similar areas of the same carcasses. There were no microbiological differences between the two types of tissue when bruised tissues were subject to the same conditions as unbruised tissue during processing of carcasses. Bruised tissue had a slightly higher water content and imparted a salty taste to minces prepared from it. However, the presence of bruised tissue was not detected organoleptically when it was added at a level of 10% to unbruised mince.

Identification of Bacteria Isolated from Fresh and Temperature Abused Variety Meats, J. L. Oblinger, J. E. Kennedy, Jr., C. A. Rothenberg, B. W. Berry and N. J. Stern, Food Science and Human Nutrition Department, University of Florida, Gainesville, Florida 32611 and Meat Science Research Laboratory, U.S. Department of Agriculture, Beltsville, Maryland 20705

J. Food Prot. 45:650-654

The microflora associated with fresh and temperature abused beef livers, kidneys, hearts, tongues and pork livers was identified. Variety meats were obtained from a packing plant and allocated to three packaging treatments, i.e., vacuum packaging, polyvinyl chloride film wrapping and no wrapping (unwrapped). Isolates were characterized from fresh variety meats following frozen storage for three weeks at -29 ± 2 C; and following simulated temperature abuse. Classification of 1555 isolates obtained from aerobic plate counts at 35, 20 and 7 C is provided. Fresh variety meats were found to be contaminated with a variety of bacteria commonly associated with fresh red meats immediately post-mortem, with *Micrococcus* sp. being the most frequently isolated gram-positive bacterium and *Escherichia coli* the predominating gram-negative isolate. Frozen variety meats before simulated temperature abuse reflected a higher proportion of gram-positive organisms and fewer *Enterobacteriaceae* than fresh variety meats. Abused variety meats yielded predominately *Pseudomonas* strains, except where vacuum packaging was used, in which case isolates were predominately *Lactobacillus* sp. and *Micrococcus*.

In Vitro Effect of Bean Amylase Inhibitor on Insect Amylases, J. R. Powers and J. D. Culbertson, Department of Food Science and Technology, Washington State University, Pullman, Washington 99164-6330

J. Food Prot. 45:655-657

The activity of a bean amylase inhibitor against amylases extracted from several insects was tested. Amylases extracted from Mediterranean flour moth larvae (*Anagasta kuhniella*), red flour beetle adults (*Tribolium castaneum*), both adults and larvae of *Tribolium confusum* (confused flour beetle) and yellow mealworm larvae (*Tenebrio molitor*) were inhibited while adult granary weevil (*Sitophilus granarius*) amylase was not inhibited by the bean inhibitor. The *T. molitor* amylase interaction with the bean inhibitor was studied further. Inhibition of the *Tenebrio* enzyme is expressed slowly at pH 5.4, but lowering the pH or raising the ionic strength of incubation media caused a marked increase in rate of expression of the inhibition.

Food Safety: Problems of the Past and Perspectives of the Future, E. M. Foster, Food Research Institute, University of Wisconsin 1925 Willow Drive, Madison, Wisconsin 53706

J. Food Prot. 45:658-660

Historically, most bacterial food poisoning in the United States is associated with mishandling, either in the home or in the food service establishment. Outbreaks traceable to errors in processing plants are rare. When they do occur they are often associated with changes in processing or packaging technology whose effect is not determined before the product is on the market. Areas of future concern that need research include (1) a better understanding of the mycotoxins; (2) how to minimize *Salmonella* contamination in animal products; (3) how to prevent, or at least predict, red tides; (4) better bactericidal agents that can be applied to foods; (5) an understanding of the nature and significance of mutagenic agents that are produced in foods during cooking.

The Salmonella Problem: Current Status and Future Direction, John H. Silliker, Silliker Laboratories, Inc., 1139 East Dominguez Street, Suite 1, Carson, California 90746

J. Food Prot. 45:661-666

Human salmonellosis continues to be an important public health problem. Consumer mishandling of poultry, meat and dairy products is the most frequent cause of outbreaks. Attempts to educate consumers in proper food handling practices have had disappointing results. Denmark has an intensive program directed towards students in the 7, 8, 9 and 10th grades. Canada is contemplating a similar program for students at the high school level. Similar efforts do not exist in the U.S. Contaminated animal feed continues to be an important source of infection to livestock. The recent rise in the importance of *Salmonella agona* and *Salmonella hadar* illustrates again the important chain leading from feed contamination to livestock infection to human infection. Scandinavian countries have intensive programs directed toward control of *Salmonella* in domestic meat animals. Indications are that this has decreased the incidence of *Salmonella* in livestock and that concurrently there has been a decreased incidence of human salmonellosis in these countries. The Nurmi concept, involving oral administration of the gastrointestinal flora of adult birds into newly hatched chicks and poults, shows promise as a practical and economical approach to reducing the incidence of salmonellae in poultry.

International Perspectives for Microbiological Sampling and Testing of Foods, D. S. Clark, Bureau of Microbiological Hazards, Food Directorate, Health Protection Branch, Health and Welfare Canada, Ottawa, Canada K1A 0L2

J. Food Prot. 45:667-671

The 3-class acceptance plan, developed by the International Commission on Microbiological Specifications for Foods (ICMSF), is an important innovation which, by accommodating a tolerable number of microbiological values that may appear to exceed an ideal limit, recognizes normal distribution ranges and thereby removes a major prejudice against the use of microbiological criteria for appraising food quality. The plan has gained wide acceptance in the 7 years since it was proposed and will likely be even more broadly accepted in the future. Three-class plans are used in official standards or in working guidelines in several countries and in recommended microbiological specifications in Codex codes of hygienic practice for egg products, foods for infants and children, and pre-cooked shrimps and prawns. This paper explains the principles of the 3-class acceptance plan and provides information on the structure and function of the ICMSF.

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SOMEONE YOU SHOULD KNOW IN THE DAIRY INDUSTRY



Jim Rahr, Dairy Sanitation Routeman

Jim Rahr works for Botens Dairy Supply, in Cuba, N.Y. and has been a routeman for nine years. Before that he was a dairyman with one of the largest herds in Allegany Co., N.Y. A graduate of New York State Agriculture Technical Institute, and the Surge Training Center in Illinois, Jim offers his views on the value of a dairy route sanitation program.

"For a dairyman trying to make a living from his commitment to the dairy industry, a routeman is his link to the dairy equipment dealership. The routeman is the dealership in the field, sharing the latest information on good milking practices, improved equipment and better sanitation.

Qualities Of a Routeman

"A good routeman needs three basic qualities to help him succeed: Honesty, knowledge of his customer's business, and respect for that customer. A man is only as good as his promise, and if my promise is no good, that's the way I'm perceived. This means when I say I'll deliver a part or merchandise, I make sure I deliver it on time as promised.

"Dairyman expect me to know about their business. Sometimes I feel like a walking encyclopedia, but to help a man do a better job, you have to know the things that can help him. My years as a dairyman helped greatly, and I still keep up on the latest dairy information.

"Respect for the dairyman may be the most important part of a routeman's job. You have to remember the dairyman is a businessman, and his beliefs are part of his livelihood. You might see a way to do something differently to help him out, but you tell him from a position of respect, not superiority.

How We Help

"Since we're bringing the dealership to the dairyman, we can help in a number of ways right there. Our services include:

- Testing the dairyman's water and prescribing the best detergent to meet his needs.
- Making sure service is available to him when his equipment needs attention.
- Leaving enough supplies so the dairyman won't run out and have his operation suffer.
- Delivering supplies in bulk, at the lowest price we can offer.

- Informing him on the latest information which can help improve his operation.
- Checking important details such as vacuum pump oil and vacuum controls to make sure they're working properly.

"In addition, there are some intangible values which only a routeman who's involved with his customer can offer. Like suggesting help from an outside source such as a vet or extension specialist. Understanding the dairyman's thinking helps me serve him better. Once he understands I'm only in business if he is, he knows I want to help him succeed.

"You can't be pushy, but you want the dairyman to understand the importance of things like changing inflations often enough to protect his herd, and using the right products for proper sanitation. I try to think to myself, if I were this dairyman, what would I want to know to help improve my business? This helps me explain things without seeming pushy or like a hardline salesman.

"Another important service which helps both routeman and dairyman is the records kept on supplies used. When I was on the farm, I was a stickler for record keeping and I still believe in it. My records assure the dairyman enough supplies without overstocking. I also know how often inflations need to be replaced.

"We want to help the dairyman help his cows' performance. In my dairy, I had a sign in my parlor which read, 'Every Cow Is A Lady, Treat Her As Such.' I modified that as a motto for our dealership to say, 'We Are The Milking Cow's Friends.' I truly believe a route program is worthwhile for the dairyman and his herd or I wouldn't be in it, and you can take my word on that!"



