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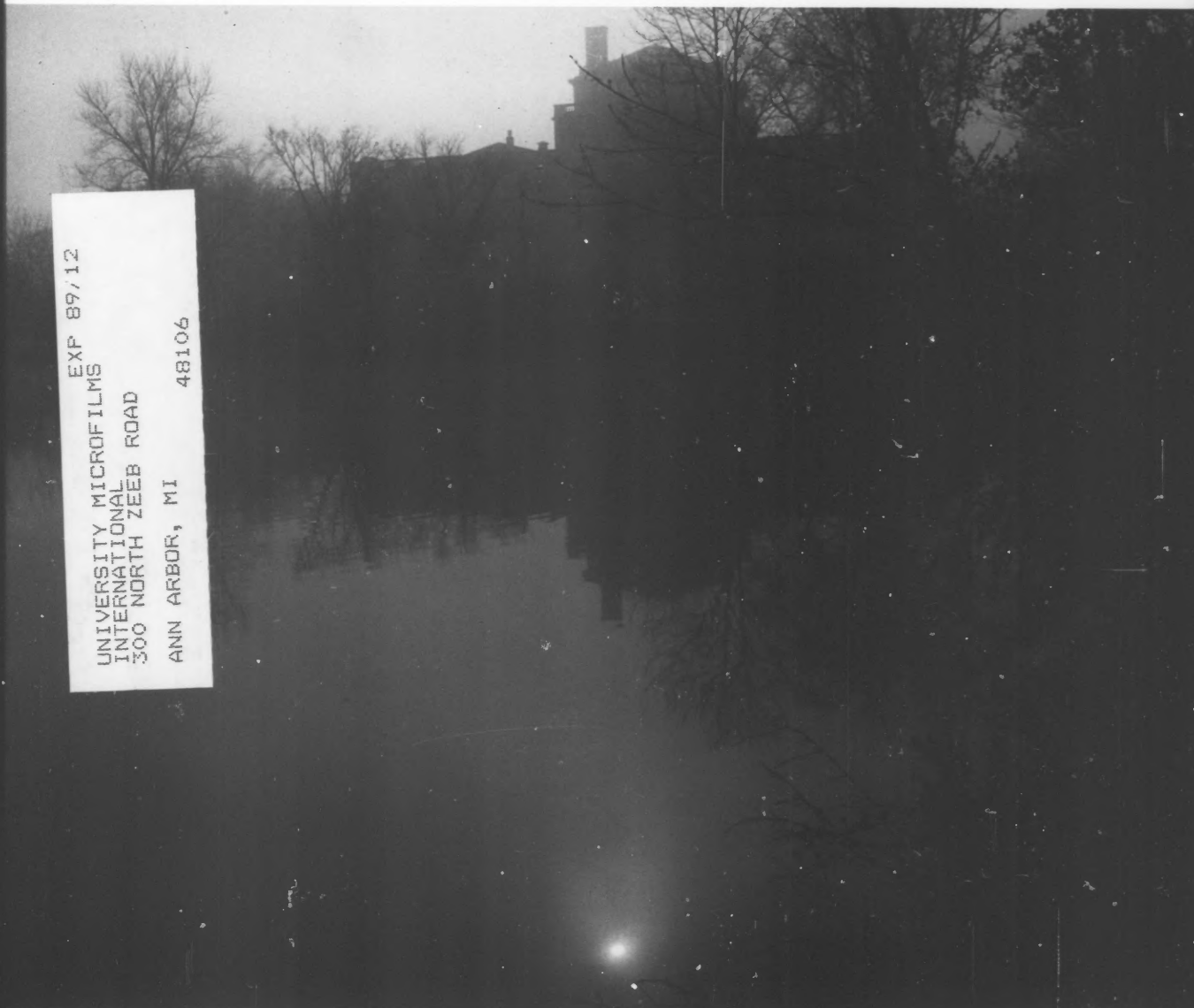
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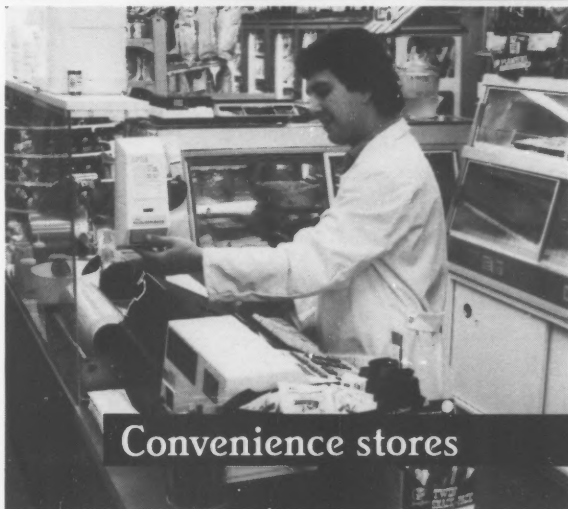
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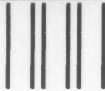


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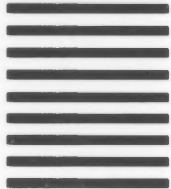
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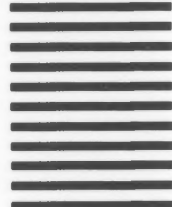
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# Thoughts From the President . . .

By  
Ron Case  
IAMFES President



I have just returned from the Annual Meeting and I am excited about what is happening with our association. We had 123 presentations this year. This is a 20% increase over last year and almost a 100% increase over three years ago. The discussions in the halls indicate that the quality of the talks was superb. Many presented data that is not available anywhere else. We had 13 students from 8 universities in this year's Developing Young Scientist competition. Congratulations to Nancy Nannen from University of Nebraska on winning this prestigious award which included a year's membership with IAMFES and \$500 provided by the Foundation Fund and our Sustaining Members.

The IAMFES Committees have been busy. The Applied Laboratory Committee has completed a study on the effects of extended incubation on coliform counts and plans to publish it. The Communicable Diseases Committee has worked hard on a how-to HACCP booklet. Hopefully it will be in print in 1990. The Dairy Quality Safety Committee has developed a series of pictograms to be used on farm cleaners and sanitizers to help with correct usage. These will be sent to chemical suppliers to get uniform symbols on chemicals. The Journal Management Committees have new ideas to make both journals better fit your needs. You will be hearing more about these in the future. The Foundation Fund is providing more money for the Audio-Visual Library so that your wait for materials will be reduced. These are only some of the highlights of the meeting. Details of the meeting and

committee activities will be reviewed in upcoming issues of the *Dairy, Food and Environmental Sanitation*.

Massachusetts is our newest affiliate. We are glad to have you as part of our association.

The *Journal of Food Protection* and IAMFES are sponsoring a symposium, "Coping with Food Safety Issues in the '90's", at the 1989 Food & Dairy Expo, November 13, 1989 at McCormick Place in Chicago. This is yet another way your Association is working on food protection.

Your Association has a new Executive Manager. He is Steven K. Halstead. Steve comes to us from the Iowa Dental Association and the Iowa Funeral Directors Association. He has had experience in all phases of association management, with expertise in membership services, budget analysis, general administration, public relations and program planning and evaluation. Steve has a BA in Science and his MA in Physics, both from the University of Northern Iowa. Before coming involved in association work, he worked with the Iowa Department of Education and Des Moines Area Community College.

Many of you have had a chance to meet Steve at the Annual Meeting in Kansas City. He has started working getting acquainted with the members, the affiliates and our activities. Your board looks forward to working with Steve and expects great things for the upcoming year.

With all this going on, how can you not be excited about IAMFES!

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# A Comparison of Preliminary Incubation Counts and Standard Plate Counts of Grade A Farm Bulk Tank Milk from Eleven States

J. T. Peeler<sup>1</sup>, J. W. Messer<sup>1</sup>, R. L. Sanders<sup>2</sup>, and H. K. Bachelor<sup>1</sup>

## Abstract

Eleven states participated in a study to compare the effectiveness of the preliminary incubation count (PI), standard plate count (SPC), and the psychrotrophic count (PSY) as sanitary indicators of farm bulk tank milk. Data on farm conditions and bacterial counts were observed on ten farms in each of the eleven states over a 1-year period (September, 1984, through August, 1985). A total of 7,862 bacterial counts (2618 - SPC; 2624 - PI; 2620 - PSY) and 1316 farm scores were recorded in the study. The overall mean SPC, PI, and PSY were 8,900, 24,000, and 810 per ml. The overall mean farm sanitation score, based on 100, was 85.9. Linear correlations among variables SPC, PI; SPC, PSY; PI, PSY; SPC, farm score; PI, farm score; PSY, farm score were 0.71, 0.60, 0.70, -0.22, -0.08, and -0.03, respectively. The study demonstrates that the SPC and PI are not highly correlated and should not be used interchangeably to regulate the National Grade A Milk supply.

The Standard Plate Count (SPC) is one of two bacterial standards specified in the Grade A Pasteurized Milk Ordinance (PMO) (13) to assess the sanitary quality of milk. The SPC requires incubation of milk at 32°C for 48 h. In 1960, Johns (2) suggested that the 32°C incubation temperature is too high to recover organisms related to sanitation. In a 1971 literature review (5) Johns cited data stating that Gram-negative rods comprise 47% of rinse

counts >250,000/sq ft<sup>2</sup> of farm dairy equipment; that most sanitation-related Gram-negative rods are psychrotrophs; and that maximum recovery of organisms related to sanitation occurs at an incubation temperature of 25°C.

Preliminary incubation (PI) of milk followed by the classical SPC was suggested by Johns in the late 1930s as a way to enhance the growth of sanitation related organisms. Johns (2) compared pre-incubation temperatures of 12.8 C (55 F) to 15.6 C (60 F), 18.3 C (65 F) and 21.1 C (70 F) and concluded that 12.8 C (55 F) was the most appropriate. Johns (6) also reported that milk quality improved for at least 6 months in an experimental farm herd after the use of PI. Field Surveys conducted to relate the PI and SPC and other sanitary indicators (1-4, 7, 11, 12) demonstrated that bacterial counts are poorly related to farm sanitation scores.

In 1983, state delegates at the National Conference on Interstate Milk Shipments (9) recommended the use of the PI count in lieu of the SPC at the discretion of the state milk regulatory agency; and use of the same enforcement procedure as mandated in the PMO (13) for the SPC. The statement of the problem as adopted would allow the simultaneous use of the PI and SPC in state and federal milk regulatory programs.

As a result of this conference decision, a study was initiated to compare the SPC and PI results in a national sampling of bulk tank milk and to evaluate their relationship to farm sanitation. The psychrotrophic count (PSY) was also determined on the milk since this value, suggested by others (1,11) may serve as a better measure of farm sanitation than the SPC or PI.

Eleven states participated in the study from September, 1984 through August, 1985. The eleven states were representative of the country geographically and as major

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<sup>2</sup>Division of Cooperative Programs, Food And Drug Administration, 200 C Street, S.W., Washington, D.C. 20204



milk producing areas. Data were collected for the 12-month period on ten farms in each state.

## Materials and Methods

### Farms

Ten farms were chosen on a single route in each state. Because the objective of the study was to compare the SPC, PI and PSY counts overall and among states, random farm selection was not cost effective. All farms produced Grade A milk. Four farms were replaced during the 12-month period; three farms went out of business in the final month of the study (August, 1985) and were lost for the last month.

### Farm Inspection

Farms were inspected by Food and Drug Administration-certified state milk rating officers using the standard rating form FD 2359K (7/78). Farms were inspected each month during the study; however, farmers were not informed of their scores to ensure that the monthly ratings did not affect the current operation of the farm.

### Samples

Samples of farm bulk tank milk were collected each month on the same day that the farm inspection was performed.

### Microbiological analyses

Samples of milk were analyzed in duplicate for SPC, PI, and PSY, according to Standard Methods for the Examination of Dairy Products (8). All samples were examined in an Interstate Milk Shippers' Accredited Milk Laboratory. Accidents occurred with 7 SPC, 3 PI, and 5 PSY samples. A total of 1309, 1313, and 1311 samples were examined for SPC, PI, and PSY, respectively.

### Statistical methods

SPC, PI, and PSY counts were transformed to  $\log_{10}$  counts to provide normality. Analysis of variance and regression procedures used are those described by Ostle and Mensing (10). Values of  $<100$  and  $>6,000,000$  were deleted from the statistical analysis since they were not quantitated. The 7353 observations reported in the summary tables reflects missing values and indeterminate observations.

## Results and Discussion

Estimates of replicate error variance ( $S_e^2$ ) in the study were 0.00466, 0.00492, and 0.03308 for the PI, SPC, and PSY count. A replicate error of  $\leq 0.005$  is considered satisfactory performance for the PI and SPC (8). No replicate error standard is available for the PSY. All laboratories in this study reported acceptable replicate count results.

The results as geometric means are summarized for the 12 months by state and month for the SPC, PI, and PSY in Tables 1 and 2. States are identified by letter.

The number of observations is listed for each mean. Estimates of the overall geometric means for the SPC, PI, and PSY were 8,900, 24,000, and 810 per ml. These values agree with those reported by Johns (2) in 1960. The range of counts in this study were  $<100$  to  $>6,000,000$  for the SPC; 100 to 150,000,000 for the PI, and  $<100$  to 3,600,000 for the PSY. Table 3 shows the distribution of means of the duplicate observations. As an example, the 95 percentile means that 95% of the observations lie below 1,300,000; 16,000 and 110,000 for the PI, PSY, and SPC. It also means that 5% of these observations were above these values. Figure 1 graphically depicts the ratio of the PI geometric mean to the SPC geometric mean by state. Overall the PI geometric mean ratio was 3.2 times the SPC geometric mean. Results demonstrate the PI-SPC relationship differs by state. The relationship between PI-SPC ranged from 1:1 to 11:1, indicating that enforcement programs based on different bacterial tests would differ among states. Table 4 shows that the percent of samples by state, based on this study, rejected by the current Grade A farm standard of 100,000 per ml would increase for all states, most to a significant degree, if the PI were used.

Linear correlations between variable pairs, SPC-PI, SPC-PSY, and PI-PSY are shown by state in Table 5 and in Figure 2. Overall correlations were 0.706 (SPC-PI), 0.597 (SPC-PSY), and 0.703 (PI-PSY). Similar overall correlations were observed by Johns (2) in 1960 and Hartley et al (1) in 1968. The SPC-PI correlation reported in this study is significantly different from zero but not predictive, as only 49% of the sums of squares are explained by the linear model. This may reflect the lack of an appropriate model (i.e., linear relation between  $\log_{10}$  SPC and  $\log_{10}$  PI) but is more likely the result of random variation. The range of individual correlations by state (Table 5) was 0.605-0.800 for the SPC-PI, 0.284-0.788 for the SPC-PSY and 0.505-0.781 for the PI-PSY. Similar wide ranges were demonstrated for the same variable pairs by months (Table 6). These wide ranges further substantiate that the relationships of the tests are too variable between states as well as over time to use any of the three count methods interchangeably.

The farm sanitation scores are listed by state (Table 1) and by month (Table 2). The correlation of the SPC, PI, and PSY to the farm sanitation score by state is presented in Table 5 and Figure 2. A negative sign means that as the farm score increased, the microbial count decreased. A positive correlation (positive sign) means that both variables moved in the same direction. Since there is only one score per farm per month, the farm score is correlated with the mean of the duplicate  $\log_{10}$  bacterial count data for each count method. Values of  $r \leq 0.27$  are not significantly different from zero at the overall  $\alpha = 0.05$  level for correlations based on 110 observations per month. Correlation of the SPC-Farm Score ranged from 0.104 to -0.462, with four states demonstrating correlation of variables, while the PI-Farm Score and PSY-Farm Score ranged from 0.147 to -0.326 and 0.194 to -0.422, with two states and one state, respectively, demonstrating correla-

TABLE 1. Geometric mean SPC, PI, PSY per ml and farm score by state.

| State | SPC <sup>a</sup> | N <sup>b</sup> | PI <sup>c</sup> | N   | PSY <sup>d</sup> | N   | FarmScore | N   |
|-------|------------------|----------------|-----------------|-----|------------------|-----|-----------|-----|
| A     | 4700             | 237            | 6200            | 240 | 490              | 161 | 88.0      | 120 |
| B     | 13000            | 236            | 49000           | 240 | 1900             | 212 | 83.7      | 120 |
| C     | 17000            | 236            | 190000          | 240 | 2600             | 228 | 89.1      | 120 |
| D     | 8200             | 236            | 22000           | 238 | 1100             | 185 | 81.0      | 120 |
| E     | 7500             | 234            | 13000           | 234 | 550              | 212 | 90.7      | 119 |
| F     | 12000            | 240            | 23000           | 240 | 1000             | 200 | 78.3      | 120 |
| G     | 10000            | 236            | 19000           | 240 | 1100             | 205 | 90.4      | 120 |
| H     | 5100             | 238            | 10000           | 238 | 340              | 138 | 85.2      | 119 |
| I     | 9200             | 236            | 36000           | 236 | 710              | 179 | 86.5      | 119 |
| J     | 8800             | 240            | 24000           | 240 | 490              | 185 | 83.2      | 120 |
| K     | 9600             | 238            | 23000           | 238 | 1200             | 217 | 88.3      | 119 |

Overall 8900 2607 24000 2624 810 2122 85.9 1316

<sup>a</sup>Standard Plate Count (8). <sup>b</sup>Number of observations. <sup>c</sup>Pre Incubation Count (8). <sup>d</sup>Psychotropic Count (8).

TABLE 2. Geometric mean SPC, PI, PSY and farm score by month for all states.

| Month       | SPC <sup>a</sup> | N <sup>b</sup> | PI <sup>c</sup> | N   | PSY <sup>d</sup> | N   | FarmScore | N   |
|-------------|------------------|----------------|-----------------|-----|------------------|-----|-----------|-----|
| <b>1984</b> |                  |                |                 |     |                  |     |           |     |
| Sept        | 8900             | 218            | 21000           | 218 | 910              | 158 | 86.1      | 109 |
| Oct         | 8900             | 220            | 22000           | 220 | 820              | 180 | 85.0      | 110 |
| Nov         | 10000            | 216            | 21000           | 220 | 950              | 194 | 85.9      | 110 |
| Dec         | 10000            | 212            | 26000           | 216 | 970              | 195 | 86.6      | 110 |
| <b>1985</b> |                  |                |                 |     |                  |     |           |     |
| Jan         | 7700             | 220            | 29000           | 220 | 1000             | 193 | 86.1      | 110 |
| Feb         | 11000            | 218            | 33000           | 218 | 1400             | 193 | 86.0      | 110 |
| Mar         | 6700             | 220            | 22000           | 220 | 830              | 197 | 85.5      | 110 |
| Apr         | 7200             | 220            | 24000           | 220 | 1000             | 186 | 85.9      | 110 |
| May         | 8300             | 216            | 41000           | 220 | 1100             | 180 | 85.7      | 110 |
| June        | 9900             | 218            | 20000           | 220 | 910              | 178 | 85.6      | 110 |
| July        | 10000            | 218            | 16000           | 218 | 740              | 135 | 85.9      | 110 |
| Aug         | 9900             | 211            | 21000           | 214 | 570              | 133 | 86.0      | 107 |

Overall 8900 2607 24000 2624 810 2122 85.9 1316

<sup>a</sup>Standard Plate Count (8). <sup>b</sup>Number of observations. <sup>c</sup>Pre Incubation Count (8) <sup>d</sup>Psychotropic Count (8).

TABLE 3. Distribution summary, percentiles for PI, PSY, SPC and farm score.

| Percentile | PI <sup>a</sup> | PSY <sup>b</sup><br>counts/ml | SPC <sup>c</sup> | Farm<br>Score |       |
|------------|-----------------|-------------------------------|------------------|---------------|-------|
| 100        | max             | 150,000,000                   | 3,600,000        | 6,000,000     | 100   |
| 99         |                 | 21,000,000                    | 150,000          | 360,000       | 100   |
| 95         |                 | 1,300,000                     | 16,000           | 110,000       | 97    |
| 90         |                 | 380,000                       | 8,900            | 56,000        | 95    |
| 75         |                 | 65,000                        | 2,600            | 19,000        | 92    |
| 50         |                 | 17,000                        | 800              | 7,900         | 87    |
| 25         |                 | 5,600                         | 200              | 3,400         | 81    |
| 10         |                 | 2,500                         | 100              | 1,600         | 74    |
| 5          |                 | 1,600                         | 100              | 1,100         | 70    |
| 1          |                 | 800                           | 100              | 600           | 64    |
| 0          | min             | 100                           | 100              | 100           | 59    |
| nd         |                 | 2,624                         | 2,122            | 2,607         | 1,316 |
| xe         |                 | 24,000                        | 810              | 8,900         | 85    |

% of observations missing or <100

or >6,000,000 0.23 19.32 0.80 0.30

<sup>a</sup>Standard Plate Count (8).

<sup>b</sup>Pre Incubation Count (8).

<sup>c</sup>Psychotropic Count (8).

<sup>d</sup>Number of observations.

<sup>e</sup>Geometric mean.

TABLE 4. Percent of samples above 100,000 per ml by State.

| State | SPC                  | PI<br>count/ml | PSY       |
|-------|----------------------|----------------|-----------|
| A     | 0 (240) <sup>a</sup> | 2.9 (240)      | 0 (240)   |
| B     | 10.6 (236)           | 35.0 (240)     | 1.7 (236) |
| C     | 12.1 (240)           | 49.6 (240)     | 8.3 (240) |
| D     | 6.7 (240)            | 16.0 (238)     | 0.8 (240) |
| E     | 1.3 (234)            | 8.1 (234)      | 0 (326)   |
| F     | 5.4 (240)            | 20.0 (240)     | 0 (240)   |
| G     | 3.8 (236)            | 15.8 (240)     | 0 (236)   |
| H     | 3.4 (238)            | 9.2 (238)      | 0 (238)   |
| I     | 4.2 (236)            | 26.7 (236)     | 0 (236)   |
| J     | 4.6 (240)            | 19.2 (240)     | 0 (240)   |
| K     | 7.6 (238)            | 17.2 (238)     | 0.4 (238) |
|       | 2618                 | 2624           | 2620      |

<sup>a</sup>Number of observations, including values reported as <100 and >6,000,000 per ml.

TABLE 5. Linear correlations by state.

| State          | SPC <sup>a</sup><br>PI | SPC<br>PSY | PI <sup>b</sup><br>PSY | SPC<br>FS <sup>d</sup> | PI<br>FS | PSY <sup>c</sup><br>FS |
|----------------|------------------------|------------|------------------------|------------------------|----------|------------------------|
| A              | 0.771                  | 0.518      | 0.505                  | -0.207                 | -0.153   | 0.023                  |
| B              | 0.654                  | 0.624      | 0.728                  | -0.133                 | 0.147    | 0.194                  |
| C              | 0.644                  | 0.788      | 0.712                  | -0.104                 | 0.021    | 0.090                  |
| D              | 0.732                  | 0.644      | 0.758                  | -0.452                 | -0.241   | -0.138                 |
| E              | 0.800                  | 0.276      | 0.509                  | -0.464                 | -0.326   | -0.130                 |
| F              | 0.793                  | 0.648      | 0.781                  | -0.302                 | -0.326   | -0.422                 |
| G              | 0.664                  | 0.612      | 0.694                  | -0.036                 | -0.152   | -0.129                 |
| H              | 0.793                  | 0.371      | 0.650                  | -0.218                 | -0.114   | 0.036                  |
| I              | 0.605                  | 0.446      | 0.764                  | -0.144                 | -0.138   | -0.015                 |
| J              | 0.673                  | 0.284      | 0.608                  | -0.198                 | -0.017   | 0.064                  |
| K              | 0.675                  | 0.689      | 0.650                  | -0.326                 | -0.203   | -0.250                 |
| Overall        | 0.706                  | 0.597      | 0.703                  | -0.220                 | -0.084   | -0.027                 |
| N <sup>e</sup> | 1307                   | 1145       | 1150                   | 1304                   | 1312     | 1151                   |

<sup>a</sup>Standard Plate Count (8). <sup>b</sup>Pre Incubation Count (8). <sup>c</sup>Psychotrophic Count (8). <sup>d</sup>Farm score. <sup>e</sup>Number observations.

TABLE 6. Linear correlations by month for all states.

| Month          | SPC <sup>a</sup><br>PI | SPC<br>PSY | PI <sup>b</sup><br>PSY | SPC<br>FS <sup>d</sup> | PI<br>FS | PSY <sup>c</sup><br>FS |
|----------------|------------------------|------------|------------------------|------------------------|----------|------------------------|
| <b>1984</b>    |                        |            |                        |                        |          |                        |
| 9              | 0.640                  | 0.532      | 0.531                  | -0.167                 | -0.182   | 0.095                  |
| 10             | 0.787                  | 0.583      | 0.765                  | -0.230                 | -0.025   | 0.143                  |
| 11             | 0.788                  | 0.668      | 0.756                  | -0.291                 | -0.190   | -0.075                 |
| 12             | 0.622                  | 0.601      | 0.651                  | -0.213                 | -0.027   | 0.029                  |
| <b>1985</b>    |                        |            |                        |                        |          |                        |
| 1              | 0.654                  | 0.546      | 0.673                  | -0.181                 | -0.117   | -0.212                 |
| 2              | 0.738                  | 0.635      | 0.791                  | -0.165                 | 0.014    | -0.077                 |
| 3              | 0.630                  | 9.623      | 0.595                  | -0.235                 | -0.067   | -0.193                 |
| 4              | 0.707                  | 0.704      | 0.831                  | -0.306                 | -0.074   | -0.115                 |
| 5              | 0.666                  | 0.692      | 0.832                  | -0.252                 | -0.031   | 0.041                  |
| 6              | 0.823                  | 0.604      | 0.735                  | -0.186                 | -0.162   | -0.023                 |
| 7              | 0.825                  | 0.608      | 0.669                  | -0.236                 | -0.122   | 0.055                  |
| 8              | 0.792                  | 0.539      | 0.474                  | -0.217                 | -0.081   | 0.045                  |
| Overall        | 0.706                  | 0.597      | 0.703                  | -0.220                 | -0.084   | -0.027                 |
| N <sup>e</sup> | 1307                   | 1145       | 1150                   | 1304                   | 1312     | 1151                   |

<sup>a</sup>Standard Plate Count (8). <sup>b</sup>Pre Incubation Count (8). <sup>c</sup>Psychotrophic Count (8). <sup>d</sup>Farm score. <sup>e</sup>Number observations.

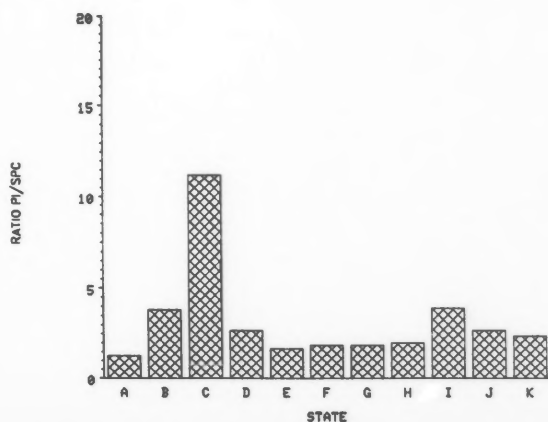


Figure 1. Ratio of overall PI geometric mean to SPC geometric mean by State.

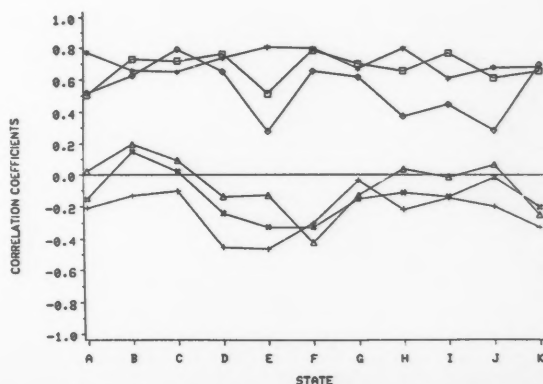


Figure 2. Linear correlation coefficients by state.\* SPC vs PI; ◇ PI vs PSY; □ SPC vs PSY; + PSY vs FS; # PI vs FS; Δ SPC vs FS.

tion between variables. The overall correlations demonstrated in this study were -0.220 for the SPC-Farm Score; -0.084 for the PI-Farm Score; and -0.027 for the PSY-Farm Score. Thus none of the three methods correlates overall to a significant degree with the farm sanitation score, and none of the states in the study would benefit from the use of the SPC and PI together to uncover problems in farm sanitation or to regulate the milk supply.

#### Acknowledgments

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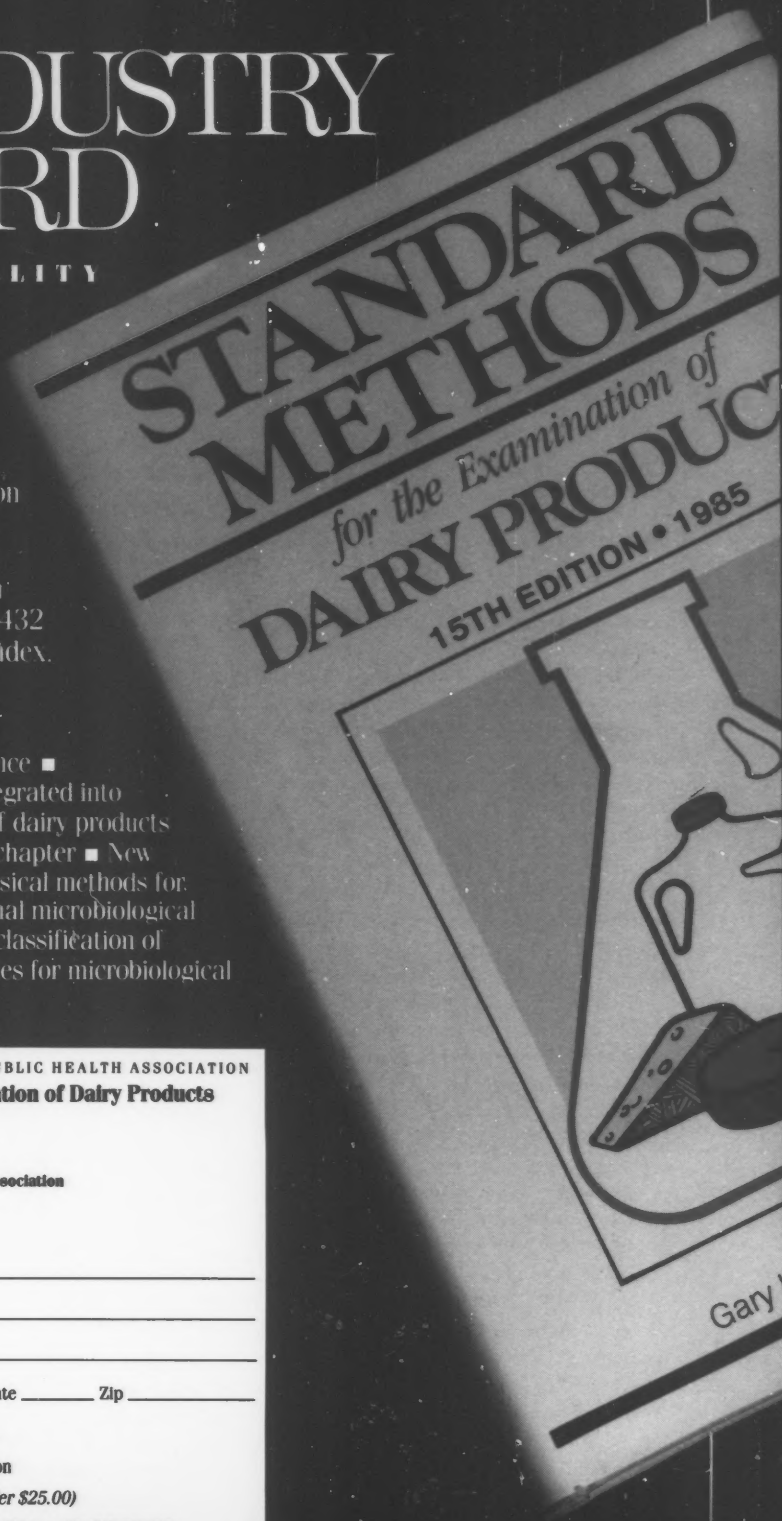
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## Reporting Reactions to Additives

by

Judy Folkenberg

Some bodies just don't like certain foods. And when that happens the body's reactions to unpalatable substances can range from headaches or hives to seizures or death.

Food additives have not been immune from blame either. With the introduction of the artificial sweetener aspartame in soft drinks in 1983, complaints blaming food additives for allergic reactions soared. To better monitor the effects of additives and deal with consumer complaints, FDA set up the Adverse Reaction Monitoring System (ARMS) in early 1985.

The surveillance system is passive; that means FDA doesn't go out looking for adverse reactions but investigates complaints it receives from individuals who suffer reactions or from their physicians. The NutraSweet Company - manufacturer of aspartame - also forwards complaints it receives to FDA.

FDA officials investigate the complaints, which are then classified by the severity of the reaction (headaches, mood changes, nausea, etc.) and by the frequency and consistency of the reaction's association with eating or drinking a particular product (did the reaction happen more than once-and how soon after eating the suspected product?).

ARMS has received nearly 6,000 complaints since its inception. Aspartame and sulfite preservatives top the adverse reaction list, together accounting for almost 95 percent of all complaints. Other culprits include the flavor enhancer monosodium glutamate, nitrite preservatives, the emulsifier polysorbate, and some dyes.

Even vitamin and mineral supplements have come in for their share of blame. There have been two reports of chemically induced hepatitis: one blamed on consumption of large quantities of a multivitamin preparation and another on a niacin supplement.

Aspartame complainers most often blamed diet soft drinks for their adverse reactions. Their most frequent complaint: headaches.

Reactions due to sulfites have been far more serious. About 1 percent of the population is sensitive to sulfites. (Most of these individuals suffer from asthma.) Approximately 50 percent of the sulfite reactions were classified as serious (for example, difficulty breathing or seizures). Twenty-seven individuals (nearly all were asthmatic) may have died from sulfites, according to ARMS data.

Sulfite complainers most often blamed salad bars for their adverse reactions. Since August 1986, FDA has prohibited the use of sulfites on raw fruits and vegetables, which includes salad bars, and complaints about sulfites have declined. More recently, FDA has proposed to keep sulfites out of many types of potatoes served in restaurants. (For more on sulfite reactions and regulations, see "An Order of Fries - Hold the Sulfites," in the March 1988 FDA Consumer.

Pinpointing a specific ingredient as the cause of an allergic reaction can be a lengthy trial-and-error process. Discovery of the exact cause has often baffled physicians and FDA.

For example, in some of the aspartame cases individuals blamed the artificial sweetener for a reaction days after they had eaten or drunk a product containing the sweetener. Was aspartame really to blame? Did all the highly publicized controversy surrounding the inclusion of aspartame in soft drinks prompt some individuals to blame health problems on aspartame. Did some individuals blame aspartame when, in fact, their adverse reactions resulted from an underlying medical disorder?

"We have no firm evidence that aspartame actually causes the number of adverse reactions that individuals claim it does," says Dr. Walter Glinsmann, associate director for clinical nutrition at FDA.

In a *New England Journal of Medicine* article on aspartame and headaches, scientists reported the results of a double-blind, placebo-controlled, cross-over study. They found that the placebo caused more headaches than aspartame.

Glinsmann notes that the number of adverse reactions individuals blame on aspartame are so varied that it is virtually impossible for one product to be guilty of such a multitude of sins. There is also no consistent relationship between a symptom and the amount of aspartame ingested or the period of time between taking aspartame and the appearance of the symptom.

"But, on the other hand, there is limited evidence from challenge tests [a test where a suspected allergen is given in a sufficient dose to try and provoke a reaction in the individual] that at least some individuals may have an allergic-type reaction such as hives to aspartame," says Glinsmann.

Three studies may help answer some of the questions



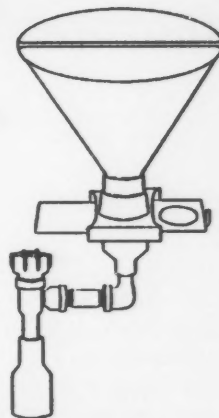
surrounding aspartame and adverse reactions. The National Institute of Environmental Health Sciences, in Research Triangle Park, N.C., is studying the relationship between aspartame and seizures in animals. Battelle Institute, whose headquarters are in Columbus, Ohio, is assessing the effect of aspartame on brain chemicals. And the Federal Aviation Agency will conduct a series of tests with pilots during flight-simulated computer exercises to see if aspartame affects cognition and perception.

If you suspect you have had an allergic reaction to an additive, contact your local physician for treatment. You or your doctor might want to then contact the nearest FDA field office (look in the blue pages of your phone book) to report the reaction.

*Judy Folkenberg is a member of FDA's public affairs staff. FDA Consumer Special Report "Safety First: Protecting America's Food Supply."*

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# Neuropeptides May Be a Future Means of Insect Control

by

Marilyn Brown

TAES Science Writer, College Station, TX 77843

Recent advances in genetic engineering have given agricultural scientists new, sophisticated avenues to explore for means of insect control.

Along one such avenue is a group of chemicals called neuropeptides, hormones that regulate over two dozen critical physiological processes of insects. These processes include molting, metamorphosis, reproduction, and physiological equilibrium processes such as water and salt balance, heartbeat, digestion, basal metabolism and protein, lipid and carbohydrate synthesis.

By altering the neuropeptides, the processes they control can be disturbed, said Dr. Larry L. Keeley, entomologist with the Texas Agricultural Experiment Station. For example, the larvae of tobacco budworm, a serious cotton pest, are susceptible to extreme changes in water excretion or retention. By manipulating the neurohormone that maintains fluid balance, the insects may be dehydrated or engaged to the point of fatality.

Another manipulation could be that the neurohormone genes might be isolated and cloned into appropriate insect pathogens or disease agents such as insect-specific viruses, Keeley said.

Other applications might include altering hormone synthesis and secretion by changing the level of neurotransmitter chemicals that regulate hormone secretion in the insect brain and synthesis of neurohormone mimics or antagonists to inhibit the processes the hormones control.

"The protein nature of neurohormones suggests that they are amenable to genetic bioengineering," Keeley said. For example, Lepidoptera larvae often are infected by species-specific baculoviruses.

"However, baculovirus infections may take as long as 5 to 10 days before death, and infected larvae can continue to feed during much of this time. A baculovirus cloning-expression vector (BEV) has been developed that is capable of high expression for foreign genes," Keeley said.

Researchers believe that insertion of diuretic neurohormone genes into the BEV would result in the uncon-

trolled synthesis of excessive amounts of the active hormone during the period of early infection in the gut wall and before the onset of viral symptoms. The hormone would stimulate rapid water loss and result in paralysis, cessation of feeding, and death due to desiccation shortly after the initial viral infection.

The combination of a natural insect-specific hormone with a species-specific virus should present a nearly ideal pesticide that affects only the target pest and has no environmental impact on non-target organisms, Keeley said.

"It is difficult to predict the most susceptible neuroendocrine-regulated processes for targeting in a pest control strategy," Keeley said.

"Past research on endocrine disruption of physiological events focused on manipulation of juvenile hormone levels to alter metamorphosis or reproduction, and some juvenile hormone mimics are commercially available to control particular insects," he said.

Disruption of metamorphosis is an ideal process to target for insect control because it is insect specific and chemicals that affect metamorphosis should be environmentally safe, Keeley said.

On the other hand, molting and metamorphosis occur only periodically, making timing critical for the application of disruptive agents. With that limitation in mind, homeostatic processes that are regulated constantly are catching researchers' attention.

Disrupting the regulation of body turgor by water pressure in soft-bodied larvae has dire consequences within a short time, Keeley said. Diuretic hormones would stimulate excessive water excretion, resulting in limpness, desiccation and death. Antidiuretics or myokinin could result in engorgement and swelling imbalance and could affect muscle contractibility, causing paralysis or hyperstimulated uncoordinated movement.

Insects in the larval stage are often at their most destructive, and the fact that they feed so voraciously on leaves with a high water content makes them especially susceptible to the action of diuretic or antidiuretic hormones, he said.

Another potential application would be disruption of specific hormone secretion. Biogenic amines -- chemicals in the brain that serve as neurotransmitters -- are well recognized as regulators for neurosecretion in vertebrate animals, but little is known about whether they have any comparable role in insects.

Octopamine is one of the primary biogenic amines of insects, and it appears to be insignificant in vertebrate animals, according to Keeley. This relative insignificance suggests that disruption of octopamine functions could have a selective action on insect neurosecretion, Keeley said. Again, this is a desirable trait, because it would decrease the likelihood that other organisms would be susceptible to the action of altering octopamine functions.

The use of natural peptidic neurohormones for pest control agents is not feasible because they are proteins or peptides and cannot enter the insect orally or through the cuticle, and they are environmentally unstable, Keeley said. But these problems may be overcome by the development of stabilized neurohormone analogs.

"Such analogs would mimic the active conformation of the hormone at its site of action on receptor proteins and act as agonists or antagonists of the hormone," the scientist said.

Hormones contain "address" and "message" portions in their structure. Antagonists contain an address but no message. They occupy the receptor protein, blocking the natural hormone from conveying its information.

"On the other hand, agonists contain both an address and a message," Keeley said. The difference is that the message is not controlled as it is in the naturally occurring hormone, and hyperstimulation of the specific physiological process is the result.

Current research to genetically engineer BEV with neurohormone genes is hampered by the unavailability of suitable genes, Keeley said. At this point, most of the research is focusing on finding the most appropriate approach to inserting neurohormone genes into BEVs to see if they are effective.

Researchers also are in the process of modeling the peptide structure by analogs, the scientist said. "An address and a message," Keeley said.

*Reprinted from The Scientists Tell Me, Research Report, Column 663, May 24, 1989.*

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## MY TREASURER ASKED... WHY WOULD WATERTEST<sup>SM</sup> WANT TO GIVE AWAY \$105 VOC TESTS FREE TO FOOD SANITATION SPECIALISTS?

By Gene Rosov, President  
WaterTest<sup>SM</sup> Corporation of America

He was upset. As Treasurer, he knew I wasn't just talking about one free VOC (Volatile Organic Chemicals) Test worth \$105.

"You do realize how many thousands of Food Sanitation Specialists will see our offer?" he asked. That's the whole point," I said. "We're sure going to find out."

There was something else I was going to find out. I knew that if WaterTest<sup>SM</sup> could turn thousands of VOC test results around in 7 to 10 days like we guarantee, then we'd have thousands of happy new customers, customers with a good chance of becoming loyal and profitable clients.

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By the end of the meeting I had my Treasurer convinced. WaterTest<sup>SM</sup> had just been through a \$1,000,000 lab equipment upgrade. Our technology now is so advanced that we're the only drinking water lab in the country using it. For example, the robotics system we use for sample preparation gets us into single digit parts per billion (ppb) numbers — routinely! Our clients like that! They like the extra measure of accuracy our mechanized systems give them. And the fast turn around on results, too.

"Of course," I said, "it wasn't only for our speed, accuracy and state-of-the-art equipment that more than 600 commercial clients and Food Sanitation Specialists from all across the country used WaterTest<sup>SM</sup> last year. They come for our people — highly skilled people who put this equipment to the test every day — people who really know what it means to be part of a 'market driven' company." At WaterTest<sup>SM</sup>, that starts with your very own personal Account Manager who's satisfied only when you are.

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Gene Rosov

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## Du Pont Establishes Food Packaging Environmental Award

The Du Pont Company has established an environmental category for its food packaging awards. It will recognize innovation in packaging, recycling and other strategies to reduce the amount of food packaging in the solid waste stream. The Du Pont Awards are an international competition honoring innovation in food processing and packaging.

"This award will focus attention on the latest developments to make plastics food packaging more environmentally friendly through recycling as well as more efficient use of plastics in packaging design and manufacture," said Bruce Bachman, director of Du Pont's Packaging Products Division. "We believe this recognition will encourage innovation for continuing progress in the use of plastics for convenient and safe food packaging."

Plastic packaging comprises seven percent of the solid waste stream in the United States and holds tremendous potential for cost-effective resource recovery.

"The present rate of plastics recycling is far too low," said Frank Aronhalt, Du Pont's director of environmental affairs, responsible for the company's programs to provide solutions to the plastic waste issue. "Recycling technology for plastics is being refined, the collection infrastructure is taking shape and major companies are making new investment to spur the growth of plastic recycling."

Du Pont has a vital stake in reducing any adverse impact of plastic waste and has taken a leadership role in spurring the development of plastics recycling and resource recovery as a part of an integrated waste management approach on the part of consumers, industry, and government," Aronhalt added. "The environmental award category is only one part of our ongoing efforts."

Du Pont and Waste Management, Inc.(WMI) recently announced they will form a joint venture for recycling of plastics from the post-consumer waste stream. The plan combines the strengths of WMI, the largest waste management company in the world, with Du Pont's experience and leadership in plastic recycling, plastic technology and market access.

Innovations from any part of the food packaging industry are eligible for the awards competition. Also eligible are manufacturers of recycled products and equipment manufacturers who help in processing of recycled products.

The environmental category will be judged by a panel of experts in food packaging and recycling representing academia, the environmental community, industry, and government. Susan Selke, associate professor at Michigan State's School of Packaging, has agreed to serve as the panel's chairman. The judges will be looking for entries which creatively address the following criteria:

- \*Through an innovative product, encourage or provide for the re-use of plastic food packaging.
- \*Through an innovative plastics design, minimize contribution to the waste stream.

Any new product test-marketed or put into commercial use between July 1, 1988, and Nov. 15, 1989, is eligible. For machinery, orders for installation must have been placed between those dates.

Plastics must be an essential component of food packaging entries for the award. For re-use/recycling entries, the products must be composed of at least 50 percent post-consumer plastic food packaging.

The Du Pont Awards are sponsored in conjunction with the National Food Processors Association. Recognizing innovation in all aspects of food processing and packaging, the awards are designed to encourage and accelerate further industry developments.

The competition's broad focus shows that contributions made at virtually any point within the industry result in innovations that benefit consumers. Winners will be announced at the 1990 National Food Processors Association convention in San Francisco February 2-6. The deadline for entries from North America is November 15.

For more information please contact: Paul H. Wyche at 302-774-1942.

## Artificial Stomachs Bring Dairy, Human Nutrition Research to Lab

Finding the right balance of foods to keep you healthy, energetic and slim may often seem complicated. But your diet is simple compared to the complex requirements of the cow. Its four stomachs quadruple the challenge of finding a perfect diet.

University of Minnesota animal scientist Marshall Stern has tackled this problem with an unusual research tool. For six years, he has used eight artificial digesters in his research for the Minnesota Agricultural Experiment Station to simulate cow digestion.

To study the rumen, the first division of a cow's



stomach, the digesters duplicate fermentation that occurs naturally. Fermentation is started with an inoculation of actual rumen contents. "A cow's rumen can contain 100 to 150 liters, and we take up to 8 liters," Stern says. "The cow never misses it."

The digesters are kept at about 100°F, the same temperature as the rumen. Artificial saliva is added continuously to the digesters, along with pellets of the diets being studied.

Stern is especially interested in finding ways to enable cows to use protein, the most expensive part of a ration, more efficiently. Dairy and beef nutritionists know that rations should include readily degraded proteins to aid rumen microbes as well as slowly degraded proteins to provide amino acids that can be absorbed from the intestines. "Before anything ever reaches the cow's intestines, it undergoes a lot of degradation, fermentation and synthesis by rumen microbes," Stern explains. "If a protein is too degradable, not enough will reach the small intestine."

Soybean meal, a protein supplement commonly fed to dairy and beef cattle in the Midwest, is highly degradable. About 70 percent of its protein is broken down in the rumen, first into amino acids, then into ammonia which is eliminated as waste.

Many strategies have been devised to protect soybean meal protein, including treating the meal with heat, sodium hydroxide or alcohol. Using the fermenters has proved to be an efficient way to compare the effectiveness of these treatments.

Protein supplements can also be naturally protected and contain less degradable protein. This is the case, for example, with byproduct feeds, such as blood meal and feather meal.

Stern's studies attempt to wring every molecule of usable protein out of a ration. For example, one study focuses on the use of wheat straw, a highly undigestible but underutilized resource that is produced on many dairy farms.

Stern says, "Researchers at the University of Illinois have found that treating wheat straw with a hydrogen peroxide solution more than doubles its digestibility. Since the straw contains only 2 percent protein, we're testing it as part of a ration supplemented with other protein sources, such as blood meal. Our studies have shown that one effective combination is treated wheat straw, blood meal and lignosulfite-treated soybean meal. It may not sound tasty, but it's the right combination for a cow's nutrition.

"The advantage of using the fermenters instead of actual cows is control. All are kept at exactly the same temperature, the same pH, and given the same amount of ingredients at the same time. Our ultimate goal, of course, is to apply the fermenter results to the animal to look at a ration's effect on milk production and growth."

While there's still plenty to learn about what constitutes the optimum diet for a cow, the research is

also branching into the field of human nutrition. University of Minnesota human nutritionists Dennis Savaiano and Peggy Martini are setting out to study the mechanisms of lactose intolerance in humans. For their research, the artificial digesters will be set up to simulate human lower intestines instead of cows' rumens.

For additional information contact Marshall Stern at 612-624-9296.

## *'Real' Seal Awareness Continues to Grow*

Consumers are increasingly aware of the "Real"® Seal symbol, a trademark that distinguishes real dairy foods from imitations, according to independent research funded by United Dairy Industry Association.

Consumer familiarity of the dairy symbol has increased to an all-time high of 68 percent in 1988, up from 20.7 percent in 1980 when the "Real"® Seal was introduced.

"In less than a decade, the seal has become an important symbol for consumers, enabling them to distinguish between authentic and simulated dairy products," said Steve Dohrmann, ADA vice president for marketing planning. "Because of its widespread acceptance by dairy processors, the "Real"® Seal has developed into a viable marketing tool for the U.S. dairy industry."

The survey found that association and identification scores among women are higher than among men and the scores are higher among younger consumers ages 18-34. Consumer familiarity and identification of the seal are greatest for those earning \$20,000 and above.

The study, conducted by R.H. Bruskin Associates, a New Jersey-based market research firm, surveyed approximately 2,000 men and women aged 18 and older.

Currently, more than 1,300 companies, representing over three-quarters of the U.S. commercial dairy industry, have been licensed by American Dairy Association and its authorized agents to display the seal, a stylized milk drop with the word "Real" in the center.

American Dairy Association is the advertising and marketing services division of United Dairy Industry Association. UDIA is a member-driven federation which coordinates a total promotion program for U.S.-produced milk and other real dairy foods.

## *Special Week Set Aside to Address Drinking Water*

Quality drinking water is something that many Americans take for granted, so the focus of National

Drinking Water Week, in May, was to increase public awareness of drinking water issues.

"Drinking Water: On Tap for the Future" is the theme of the second annual observance.

"Safe drinking water is a resource beyond price," said Dr. John Sweeten, an agricultural engineer and water expert with the Texas Agricultural Extension Service. "Yet we take water for granted because, generally, it is abundant, cheap and of good quality. It is easy to forget the complex process that brings this water safely to our taps."

A lot of people, including scientists, engineers, and legislators and regulatory officials, devote their time to assuring quality drinking water for all citizens, Sweeten said. These efforts have resulted in the world's best water treatment technologies to overcome such water-borne diseases as typhoid and cholera in the U.S.

"Of course, there are still many problems to solve as far as safe drinking water is concerned," said the engineer. "We have various water contaminants from home plumbing, for instance, along with naturally occurring contaminants such as radon. And chemicals are posing major water pollution problems in some areas of the country."

Sweeten said that the Federal Safe Drinking Water Act of 1974 and 1986 provides a national framework for preserving and improving drinking water. Because this law requires monitoring and controlling many contaminants not previously regulated, dramatic change in public water systems will affect every community in the U.S.

"The Texas Department of Health is the lead agency for regulating the Safe Drinking Water Act in this state," Sweeten said. "This includes any public water system that serves 25 or more individuals or has 15 or more service connections."

The Texas Agricultural Extension Service has identified water as one of 12 critical issues impacting the state, Sweeten said, and is focusing many of its educational efforts on water conservation and use and improving water quality. Water also is a national initiative of the Cooperative Extension System of the U.S. Department of Agriculture.

"We are working with farmers and ranchers as well as agribusinesses and citizen groups on conserving as well as protecting safe water supplies," Sweeten said. "Since our agricultural industry is a high volume consumer of water, producers have a lot at stake as far as water conservation and water quality are concerned."

Protecting groundwater supplies is vital, Sweeten said, since almost half of the U.S. population and 95 percent of all rural residents depend on this source for their drinking water.

"Everyone has a stake in assuring safe drinking water supplies, and we should all work with local officials to protect and improve these supplies," Sweeten said. "Protecting our water supply will likely mean paying more for it in the future, but this supply

of good drinking water is neither endless nor free. We must invest now to ensure that safe drinking water remains on tap."

## *Ray Jones from Tri-Clover, Inc. Receives DFISA Distinguished Service Award*

Raymond P. Jones, director of marketing at Tri-Clover, Inc., was presented with a Distinguished Service Award from Dairy and Food Industries Supply Association, Inc. (DFISA). Jones received the award at the DFISA annual spring meeting held March 12-13, 1989 in Fort Lauderdale, Florida.

The Distinguished Service Award is a new award recognizing those who serve with distinction on a DFISA committee, on a special project or assignment and have demonstrated support of efforts to raise industry standards in product, service, efficiencies and growth. Jones has served on 12 committees over a period of 23 years. Formerly chairman of three committees, EXPO Attendance Promotion, EXPO Promotion and Marketing Services, Jones currently serves on four committees including a new assignment on the nominating committee. Jones has worked at Tri-Clover, Inc. for 33 years.

Headquartered in Kenosha, Wisconsin, Tri-Clover, Inc. is a leading manufacturer of sanitary stainless steel valves, pumps and fittings, as well as flow control, batch/weigh and Clean-In-Place (CIP) systems. Founded in 1919, Tri-Clover, Inc. is now a member of the Alfa-Laval Group, a \$1.5 billion multi-national organization headquartered in Sweden that operates more than 160 companies in 130 countries around the world.

## *CU Researcher Perfects Treatment for Whey Protein Concentrates*

With a new process developed by a Clemson University food scientist, cheese whey is becoming a more nutritious additive in many foods.

Whey, a by-product of cheese, first caught the eye of scientists in the mid-1960s when they discovered its high protein content. Since then, ultrafiltration processes have been used to isolate those proteins for use as food additives.

Until this discovery, some whey was used as animal feed, but most was discarded.

"Whey protein concentrates (WPCs) can be used as a functional ingredient in processed meats, baking goods, frozen desserts, infant formulas, and diet foods," says Charles Morr, a Clemson food scientist who is



working to increase the nutritional value and flavor of WPCs with a new process.

While WPC research is not unique (it's being studied in New Zealand, the Netherlands, and Denmark), Clemson is the only institution in the United States working on a pretreatment process to enhance WPCs, Morr says.

He is fine-tuning a pretreatment process that will improve the composition, functional properties, and nutritional value of WPCs.

He uses blue cheese whey from Clemson's dairy plant to begin his process. Pretreatment consists of cooling, adding calcium, and heating to 55 C. This helps to separate materials that may interfere with later processing treatments.

Next the whey is clarified, using milk separators and microfiltration to remove the materials formed in the pretreatment step.

The whey is then put through an ultrafiltration process. Ultrafiltration separates unwanted minerals and lactose from the needed proteins.

The final step is converting WPC to a powdered form.

"This pretreatment process speeds up the ultrafiltration process, produces WPCs with less than 1 percent residual milkfat, and improves flavor," he says.

Cheese manufacturers produce 44 billion pounds of cheese whey per year nationally. Sixteen to 20 million pounds are converted to protein concentrates. About half of those WPCs are used as additives in dairy products such as cheese spreads and frozen desserts.

The additional chemicals, filtering materials and labor needed for this pretreatment process would be additional costs for cheese manufacturers who use the process, Morr said. Although the procedure is "relatively expensive," it provides cheese manufacturers with a valuable and nutritious by-product with good economic potential, he said. The manufacturing and sale of WPCs allows the cheese manufacturer to recover a part of his cost for whey disposal, Morr adds.

"The use of WPC as a food ingredient gives consumers a greater variety of manufactured food products when they go to the supermarket," Morr said. "The food industry is no longer restricted to using raw materials just as they are produced, because those materials can now be converted into new food ingredients."

### *Boosting Paperboard Filling Efficiency: How a small dairy competes in the fluid market*

Two Nimco fillers have allowed Longacres Modern Dairy in Barto, Pennsylvania, to be competitive in an area dominated by dairy giants.

The small, family-owned fluid milk and ice cream operation purchased its first Nimco filler in 1983 to package milk and juice in tall, narrow, half-pint paperboard cartons. President Dan Longacre Jr. says they were so impressed with its performance they purchased another type of Nimco filler the following year, even though they hadn't planned on buying another filler for paperboard packaging.

The original model the dairy purchased, a 5110E, fills 110 cartons a minute in a straight-line configuration, with an automatic case and stacker downstream. The slimmer paperboard containers are used mainly for packaging milk and juices for schools.

The second filler, a model 560QH, give Longacre the flexibility of being able to fill 30 half-gallon cartons a minute, 40 quarts a minute, and both pints and half-pints at a rate of 50 cartons a minute. According to Longacre, the equipment has a turnaround discharge located near the filler's control panel that enables one person to operate the machine and case-off at the same time. Longacre says the line can be changed from half-gallons to quarts in only 10 to 15 minutes.

The company says the two fillers made an important contribution to their continued growth as a small dairy-plant operation. Says Longacre, "Compared to other fillers we've had, the Nimco fillers operate with a very low carton-loss rate and a very close fill accuracy. And they are easily maintained by our engineer."

Longacre, which processes 130,000 pounds of direct-ship milk daily, uses the fillers to package a full line of fluid milks, orange juice and fruit drinks. The fillers are run eight hours a day, four days a week.

The newest filler was purchased as part of a recently completed \$200,000 upgrading program that also included a building addition, a new ice cream freezer, and semi-automatic handling systems. "Both Nimco filling machines require minimal maintenance and floor space, which is important to our needs," says Longacre.

### *M.E. Franks Honored by A.D.P.I.*

Melvin E. "Mel" Franks, Chairman of the Board and President of M.E. Franks, Inc., St. Davids, Pennsylvania, was recognized for his many years of service to the dairy industry at the 1989 Annual Meeting of the American Dairy Products Institute held in Chicago, Illinois on April 12-13.

In his remarks honoring Mr. Franks, William F. Dietrich, President of the American Dairy Products Institute, noted the continuing and longtime support Mr. Franks has given "--not only to the American Dairy Products Institute and those segments of the industry it represents, but to the entire dairy industry." Citing "--a gentlemen who we have known and worked with for

years --" and "-- a very good friend of all of us --", Mr. Dietrich noted his personal pleasure in participating in the recognition being given to Mr. Franks.

The American Dairy Products Institute, founded in 1986 by a merger of the 61-year-old American Dry Milk Institute and the 15-year-old Whey Products Institute, is the national trade association of the processed dairy products industry. It represents firms associated with the processed dairy products evaporated and dry milks and whey products, in all matters affecting the industry including government liaison, market development and promotion, product standards, and consumer relations.

The American Dairy Products Institute is headquartered in Chicago, Illinois; its Executive Director is Dr. Warren S. Clark, Jr.

## *Biotechnology Test Aids Michigan Dairymen*

New biotechnology tests developed by Lansing-based Neogen Corporation are helping Michigan dairymen and dairy processors detect aflatoxin--a potent carcinogen--in milk and dairy cattle feed.

The Michigan Department of Agriculture, working with the Michigan Milk Producers Association, discovered aflatoxin (produced by a fungus which grows on grains and seeds) in 23 milk samples. The milk was immediately traced to the farms where it was produced.

Quick investigation revealed that the aflatoxin was present in cottonseed products used in the feed being fed to the cows, which thereby led to residues in the milk.

None of the milk that tested positive for aflatoxin reached the food chain, according to the Michigan Department of Agriculture. "All indications are that the state's milk supply is still safe," said the department's Dr. Burton Cardwell. Neogen Corporation, one of the nation's leading agricultural biotechnology firms, has developed fast and accurate tests to detect aflatoxin. The tests are more accurate, faster, and less expensive than older technologies used to detect the presence of the harmful toxins.

When the Department of Agriculture first discovered the problem, it became obvious that hundreds, perhaps thousands, of tests would need to be conducted rapidly in order to ensure that the state's milk supply continued to be safe.

Because of the department's knowledge of Neogen's activities, the company was called to join in the testing program. The firm is supplying test kits to the state's dairy producers to monitor for aflatoxin in cattle feed.

Neogen is also conducting tests in its own laboratories for farmers, feed millers, and laboratories. The firm's new testing method allows hundreds of tests to

be conducted in a few hours, instead of the few tests a day that were possible with older methods.

"The Department of Agriculture and the Milk Producers Association should be congratulated for their quick reaction to keep the state's milk supply safe," said James Herbert, Neogen President. "Fortunately, there is a simple solution to the problem. Consumers should therefore feel confident that Michigan milk is safe."

To ensure that aflatoxin doesn't find its way into the milk supply, dairy farmers can check feed ingredients with Neogen's easy-to-use test kits at their farms, or through the laboratories of the Michigan Department of Agriculture or Neogen Corporation itself.

The Department of Agriculture intends to accelerate testing at processing plants to see that contaminated milk does not reach the market. Milk found to contain more than one-half part per billion of aflatoxin must be destroyed, according to the Food and Drug Administration regulations.

"Although the aflatoxin in Michigan milk came from Mississippi cottonseed, dairymen should also not overlook the possibility of contaminated corn supply. A significant amount of mid-western corn is known to contain aflatoxin as a result of last year's drought," said Herbert.

The problem is "not new" to Neogen, Herbert noted. The company is also helping milk producers in Texas, who have been confronted with aflatoxin contamination in their milk for several months--primarily from contaminated corn. Large quantities of milk have been dumped as a result, and most Texas dairymen now routinely test all feed before it is used.

Michigan dairymen and processors can test feed themselves with Neogen test kits; the cost is about \$6, and requires only 10 minutes. Alternatively, samples may be sent either to the Michigan Department of Agriculture or to Neogen for testing in their laboratories.

## *Booming Superpremium Ice Cream Segment Now Facing New Challenges*

A new report reveals that the single greatest challenge facing the superpremium ice cream industry today may be the aging of the "baby boomers." Historically, market growth has been attributed to the adult consumer who is willing to pay a higher price for this higher quality product. But now, there is a very real possibility that a substantial portion of superpremium ice cream's core market will be in favor of alternative products.

According to New York-based market research firm FIND/SVP, as the baby boom generation enters middle age, they will become more health conscious and increasingly aware of cholesterol, fat and calories. This

challenge may be met through product line extensions or product reformulations such as ice milk and frozen yogurt.

In 1988, retail sales of superpremium ice cream were estimated at \$877 million, up almost 25 percent over 1987. Early findings show that the market is beginning to mature and over the next five years the annual growth of this segment is expected to gradually slow down from the current 20-25 percent to 10-15 percent.

Distribution is emerging as a significant barrier and is one condition contributing to slower market growth. Supermarket chains are in a unique position to enter the market, since they have both shelf space and distribution at hand.

Frozen novelties and ice cream alternatives have emerged to challenge the superpremiums. As the taste and texture of such alternatives approach that of superpremium ice cream, superpremium brands can expect to see some slippage, (i.e. consumers shifting to the lower-calorie, lower-cholesterol products.)

From the viewpoint of the superpremium manufacturer, however, novelties and alternative markets share many of the same characteristics as the superpremium market. Both are viewed as a threat and at the same time, an opportunity.

Lower calorie and lower cholesterol product areas are market niches where superpremium manufacturers can create brand name leveraging—by providing “healthier” products that will both maintain and expand future product sales.

Of the five national superpremium leaders, Haagen-Dazs, Frusen Gladje, Ben & Jerry's, Steve's Homemade and Great Midwestern, all have grown from small dip store operations. There are approximately 18,000 ice cream shops throughout the U.S.; 62 percent of the franchise shops and 38 percent of the independent shops all sell superpremium ice cream.

FIND/SVP forecasts that the superpremium ice cream market will top \$1.3 billion at the manufacturers level and \$1.9 billion at retail by 1993.

The Superpremium Ice Cream Market is priced at \$1,295 and available from FIND/SVP, Dept. J2, 625 Avenue of the Americas, New York, NY 10011.

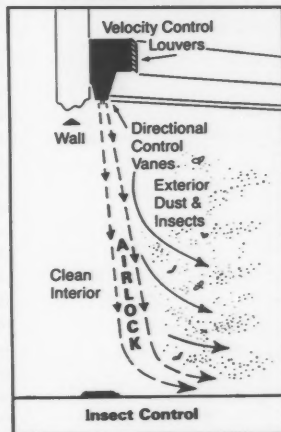
## NFI to Assist ASMI in Oil Spill Media Relations

The National Fisheries Institute will lend a staff member from their Communications Department to the Alaska Seafood Marketing Institute this summer. ASMI requested the assistance to augment their media relations program following the Exxon Valdez oil spill.

Public Affairs Representative Peggy Parker will temporarily relocate to Juneau, Alaska for this year's



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fishing season. Her job will be media relations, specifically regarding the oil spill and its impact on Alaska's seafood industry.

Ms. Parker, recently hired to fill a new position at NFI, spent ten years in Cordova, Alaska, involved in commercial fishing, processing, and seafood marketing. Cordova is fifty miles from the site of the Exxon Valdez grounding, and the largest fishing port in Southcentral Alaska. Prior to joining NFI, Ms. Parker was senior editor of *Seafood Business*, one of the nation's leading seafood trade publications.

"We're happy to work with the Alaska Seafood Marketing Institute," says NFI Executive Vice President Lee Weddig. "Accurate communications to the press and the public are very important now and will be throughout the season. Peggy has the right background and industry experience to make a real contribution."

Alaska Seafood Marketing Institute was established in 1981 as a public/private partnership between the state of Alaska and the seafood industry to generically promote Alaska seafood worldwide.

The Washington, D.C.-based National Fisheries Institute represents over 1,000 companies involved in the nation's seafood industry. NFI works closely with federal agencies, academic institutions, and the media on seafood industry issues.

Ms. Parker can be reached at Alaska Seafood Marketing Institute at (907) 586-2902.

### *Three "Tips" Flyers Help Consumers and Retail Personnel Maintain Ice Cream Quality*

Maintaining ice cream products in their desired condition requires proper handling both by consumers and in-store retail personnel. In an effort to help all parties maintain ice cream products' quality, the International Ice Cream Association (IICA) is offering three product handling flyers.

Two of the three flyers are designed for consumers; the third is for retail store personnel. All three will help preserve the quality of the ice cream and novelty products that consumers bring home. All are available through IICA member companies. "Industry response to the three flyers has been enthusiastic," said IICA President Linwood Tipton. Ice cream manufacturers, consumers, and retailers have an interest in keeping ice cream products looking and tasting good."

The first consumer flyer explains proper handling for ice cream novelties and other frozen treats; the second is about packaged ice cream.

Both consumer flyers give consumers product handling tips. Consumers are told, for example, to make the frozen novelty aisle the final stop of their

shopping trip and to minimize time between leaving the store and putting ice cream products in their home freezers.

The third flyer is directed to retail store personnel. It gives retailers tips for storing ice cream products and maintaining proper freezer temperatures.

IICA is providing sample flyers and camera-ready artwork, free of charge, to all IICA member companies. Each company can reproduce as many copies as it needs. With each sample flyer, IICA also notes the Association's color, ink, and paper selections, so member companies can make their reproductions look exactly like the samples.

IICA is the trade association for manufacturers and distributors of ice cream and other frozen dessert products. The Association's activities range from legislative and regulatory advocacy to market research, education, and training. Its 200 member companies produce an estimated 85 percent of the ice cream and ice cream-related products consumed in the United States and Canada.

### *IAMFES Secretary Nominations Due for 1990 Elections*

Nominations are now being taken for Secretary for IAMFES. This year a regulatory representative will be elected.

Once all nominations are received by the nominating committee, two persons will be chosen to run for the office. This is a five year term, moving up yearly until he or she is President of IAMFES, then serving one year after as Past President. The term of office begins the last day of the 1990 Annual Meeting. All IAMFES Executive Board Members meet three times a year.

Two people selected are placed on the ballot. The winner is determined by majority vote of the membership through a mail vote, in the spring of 1990.

Please send a biographical sketch and photograph NO LATER THAN OCTOBER 18, 1989 to the Nominations Chairperson.

**John Meyer**  
Chairman, IAMFES Nominating Committee  
NASCO International  
901 Janesville Ave.  
Ft. Atkinson, WI 53538  
414-563-2446





Elmer H. Marth

### ***UW's Marth Wins Babcock-Hart Award***

E.H. Marth, professor of food science and bacteriology at the University of Wisconsin-Madison, has received the Babcock-Hart award from the Institute of Food Technologists.

He was honored for his contributions to food technology and public health.

Marth co-invented a process that recovers most of the lactoglobulin during cottage cheese manufacture. The process produces a more nutritious product with twice the shelf life of conventionally produced cottage cheese.

He was among the first to show the effectiveness of sorbic acid against certain bacteria. Sorbic acid is now used to control spoilage and bacterial growth in cold-pack cheese food and other products.

Marth is an authority on the food aspects of *Listeria monocytogenes*, a pervasive and, until recently, little-understood foodborne pathogen. He discovered that *Salmonella*, a frequent cause of foodborne illness, survived longer than had been thought during cheese ripening.

He showed that aflatoxin, a potentially carcinogenic mycotoxin produced by the *Aspergillus* mold, could be degraded by sulfites. He also found that the strains of *aspergilli* that produced the most aflatoxin were more heat-resistant than strains producing little or no aflatoxin.

Marth teaches courses in food fermentations, food sanitation, and scientific report writing. He has written or co-written more than 500 scientific publications.

The Babcock-Hart award is named after UW-Madison biochemists S.M. Babcock and E.B. Hart, pioneers in food technology and nutritional science. Marth is the first UW faculty member to win the award. He is a Fellow of the 23,000-member Institute of Food Technologists.

Marth received the award at the IFT's annual meeting June 26 in Chicago.

For more information contact Elmer Marth (608) 263-2004.

### ***Aid To Conduct Advanced Sanitation Workshop for Managers***

Food plant managers will be able to update their knowledge of regulatory requirements and their understanding of current and future technical and industrial practices at the 1989 Advanced Sanitation and Quality Assurance Manager's Workshop in Manhattan, Kansas, October 2-4.

Conducted by the American Institute of Baking, the workshop emphasizes the changes in the food industry and provides assistance to managers to meet those changes in both technology and regulation.

"There are also changes in consumer demand," said William Pursley, vice president-sanitation at the Institute. "Our workshop will consider all of these changes to help managers keep current and make plans for future operations."

Topics discussed during the seminar include regulatory updates in food and drug, hazard analysis critical control points (HACCP), employee safety and training, and pesticide issues. By adding to that microbiology, the potentials of cryogenic cleaning, waste water treatment, pest control options, and self inspection, it then provides participants with three days of valuable information on sanitation and quality assurance subjects.

"Each participant will also have ample opportunity to meet other participants and speakers," Pursley commented. "We have obtained some outstanding leaders in the industry to supplement our staff in conducting our workshop. An income tax deduction is also allowed for educational expenses to attend."

For further information to include a colorful brochure, write to the Registrar, American Institute of Baking, 1213 Bakers Way, Manhattan, Kansas 66502, or call (913) 537-4750 or 1-800-633-5137.

## ***Sims Named MPCA Deputy Commissioner; Glumac Named Assistant Commissioner***

Barbara Lindsey Sims has been appointed deputy commissioner of the Minnesota Pollution Control Agency (MPCA), and Ann Glumac has been appointed assistant commissioner, MPCA Commissioner Gerald Willet announced today.

Sims, who has served as the agency's assistant commissioner since 1985, succeeds Michael Robertson, who was appointed director of the Minnesota Office of Waste Management last week. From 1980 to 1985, Sims worked with the MPCA as a special assistant attorney general.

Glumac will succeed Sims as the agency's assistant commissioner. Most recently, she has been an account executive for Himle Horner Inc., a public relations and public affairs firm. From 1987 to 1989, she served as committee administrator for the Minnesota House Environment and Natural Resources Committee chaired by Rep. Willard Munger of Duluth. Glumac was a political reporter with the Duluth News-Tribune for five years.

As deputy commissioner, Sims' primary responsibility will be managing the day-to-day operations of the MPCA's five divisions and the agency's support services. She will continue to represent the agency and Minnesota on several national and international commissions, including the Midwest Interstate Low-Level Radioactive Waste Commission and the International Joint Commission.

In her role as assistant commissioner, Glumac will be responsible for coordinating the MPCA's legislative activities. She will also assist in environmental policy analysis and development.

Sims, 46, is a native of Cleveland, Ohio, and holds a law degree from Boston University and a bachelor's degree in education from the University of Maryland. She lives in Minneapolis and is married with two children.

Glumac, 30, is a native of Duluth and holds a bachelor of arts degree from the University of Minnesota. She lives in St. Paul. For more information contact Dale Newton, 612/296-7768.

## ***Filtration Engineering Announces Conversion of RO System to UF System***

Filtration Engineering Co., Inc., a leader in membrane filtration technology for the dairy processing industry, recently converted a Reverse Osmosis (RO)

system to an Ultrafiltration (UF) system for a client. This conversion permits the cheese manufacturer to adjust to changing conditions in the whey market by converting its membrane filtration system at reduced cost. The conversion consisted of new membranes, control changes to meet UF requirements, and some modifications to process piping.

By utilizing Filtration Engineering's conversion technology and wide experience with both systems, the Wisconsin dairy processor made its conversion to a UF system in about 60 days, at about 35% to 40% of the cost of their original RO system. The processor requested the UF conversion to benefit from the favorable Whey Protein Concentrate (WPC) market.

More information about the possible conversion of other RO systems is available by writing Filtration Engineering, 4974 Highway 169 North, Minneapolis, MN 55428 or by calling (612) 536-0731 or toll free (800) 553-4457; FAX (612) 536-0063.

## ***Juice-Based Drinks Said To Be Fastest Growing Category In Five-Year Market Forecast For Fruit And Vegetable Juices***

Americans' interest in diet and fitness continues to mean a healthy market for the \$10.9 billion juice and juice-drink industry.

According to a new report published by FIND/SVP, a leading market research and information-services consulting firm, growth over the next five years is expected to equal the five-year period from 1983 to 1988, when the overall market for fruit and vegetable juices and drinks grew by 35 percent from \$8 billion in sales.

Non-powdered fruit and juice drinks are the fastest growing market segment. The category achieved a 17.8 percent compound annual growth rate from 1983 to 1988, and presently accounts for 23 percent of retail sales, while growth is expected to average from 6 percent to 7.5 percent a year through 1993. The report noted that sales of juice drinks are expected to exceed those of 100 percent pure fruit juices sometime within the next decade.

FIND/SVP attributes the fruit drink category's success to an increasing array of exotic flavors, more



convenient packaging like single-serve containers, and a consumer preference for natural, "healthy" ingredients. At the same time, many consumers perceive 100 percent fruit juices as "heavy", and most regard them primarily as breakfast beverages, the report said.

Pure fruit juices and blends, however, are still the market leaders. Even though the category dropped from a 76 percent market share in 1982 to less than 70 percent currently, sales growth averaged from 3 percent to 5 percent a year over the period. Retail sales for pure fruit juices, at \$7.2 billion in 1988, are forecast to grow at 4 percent a year over the next five years, with a 2 percent annual increase in volume.

The foodservice segment for juice products is also growing. Although most juice consumed is sold in frozen form, ready-to-serve chilled products are gaining rapidly, and in 1988 represented 25 percent of consumption within this market. Frozen concentrates' share of the overall juice market dropped from 43 percent in 1982 to 32 percent last year.

Accounting for a combined 10 percent of 1988 sales, vegetable juices and powdered drink mixes were a relatively static market within the past year. Vegetable juices, primarily tomato-based products, accounted for \$400 million, or 3 percent of total dollars spent in 1988. Powdered drink mixes had \$800 million in 1988 sales, or 7 percent of retail dollars, yet this category is declining in popularity.

Regionally, the strongest sales potential lies in the South and West, where current juice consumption is lowest. In the South, consumption of juices and juice drinks on a per capita basis is only half that of the Northeast, which boasts the highest nationwide consumption.

Adult female homemakers are still the primary target of juice advertising, the report noted. More than 80 percent of all households consume orange juice, which makes it the most widely consumed of any juice. Twenty percent of households are heavy users, consuming orange juice more than twice a week. The report also found that 20 percent of all households regularly consume fruit juices or drinks other than orange juice.

Sales of the top four juice and drink producers totaled \$3.6 billion or 33 percent of the industry total in 1988. Sales of the leading 20 companies totaled \$7 billion or 64 percent of the total. The remaining \$3.9 billion, or 36 percent of the juice-based beverage industry's sales, is divided among some 200 companies. Consolidation similar to that which is occurring in other food sectors is likely to occur here as well.

The 230-page report, The Market for Fruit and Vegetable Juices, is priced at \$1,295 and is available from FIND/SVP, Dept. M6, 625 Avenue of the Americas, New York, NY 10011.

For more information contact Mary Ellen Ellwood or Rich Bock of G.S. Schwartz & Co. at 212/696-4744.

## National Dairy Council Materials Rated "Excellent" By AAFP

NATIONAL DAIRY COUNCIL (NDC) recently received the endorsement of the American Academy of Family Physicians (AAFP) for several current nutrition education materials designed to help Americans learn about good health practices.

An organization of more than 60,000 practicing physician members nationwide, the AAFP bestowed top honors on all eight of NDC's submitted materials by rating them "Excellent" in AAFP's recently established review and approval procedure for patient education materials.

The AAFP praised NDC for its commitment to excellence in preparing educationally sound, well designed and exciting nutrition education materials and programs.

The NDC materials earning AAFP's "Excellent" status are:

- \* Every Woman's Guide to Health and Nutrition
- \* The All-American Guide to Calcium-Rich Foods
- \* 50 Ways to Leave Your Blubber
- \* Are You At Risk for Bone Disease?
- \* Calcium: You Never Outgrow Your Need For It
- \* LIFESTEPS Calorie Catalog
- \* What To Know About a Weight-Control Diet

Before You Eat One

- \* YOU: A Guide to Food, Exercise, and Nutrition

These materials offer practical advice on health and nutrition topics of interest to a variety of target audiences. For example, the full-color magazine "YOU: A Guide to Food, Exercise, and Nutrition", provides teens with guidelines for reaching and maintaining desirable weight for height through diet and exercise. NDC's "YOU" booklet is endorsed by the U.S. Olympic Committee, and provided to Olympic hopefuls at the Olympic Training Center.

The AAFP Foundation has provided its members with lists of those NDC materials approved with "Excellent" ratings.

All of the above programs and materials are currently available through NDC and its affiliated DAIRY COUNCIL units nationwide.

NATIONAL DAIRY COUNCIL conducts nutrition education and research programs as part of United Dairy Industry Association. UDIA is a 27-member federation which coordinates a total promotion program for U.S.-produced milk and other real dairy foods.

For more information contact Lisa Coe, 312/696-1020.

# Industry Products

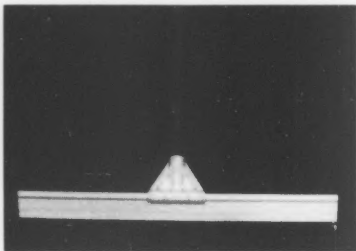
The products included herein are not necessarily endorsed by Dairy, Food and Environmental Sanitation.

## MicroSys Introduces Microbiology Information Management System For Personal Computers

MicroSys presents a computerized laboratory information management system especially designed for microbiological quality control laboratories. This unique system, which operates on personal computers, monitors microbiological and chemical tests of industrial samples. Bar coding technology and automatic calculations based on standards (BAM, MPN) ensure reliability of results and increased laboratory efficiency. Flexible reporting can track the status of samples and their test results. Out of spec results are flagged for immediate attention.

MicroSys provides customization services to fit the system precisely to your laboratory needs. For more information please circle the number below on the reader service card and mail into IAMFES.

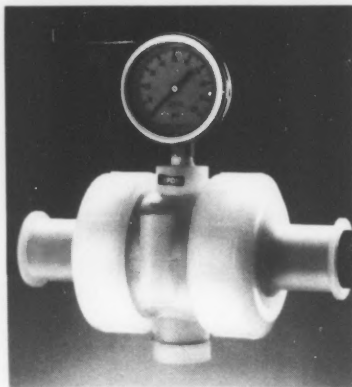
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on your Reader Service Card**



## Perflex Floor Squeegee

By applying the latest and most advanced technologies, Perflex has designed an easy-changing, smooth-handling floor squeegee. 100% polymer construction will not harbor bacteria or debris. It's tough and easy to clean. The Perflex Connector simplifies blade replacement. Push the blade through the connector until it clicks. Now it's locked in place. Push again, the blade comes out. Like changing an injector razor. Precise push/pull angle is accurately controlled by the connector.

**Please circle No. 254  
on your Reader Service Card**



The Horizontal Ultra Pure Gauge Guard from Sani-Tech eliminates bacteria and system contamination caused by dead leg by accurately monitoring pressure in line.

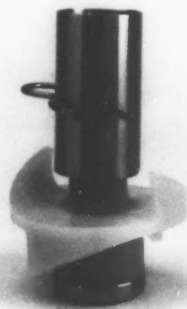
## Horizontal Gauge Guard Provides Sanitary Monitoring of in Line Pressure

The unique new Ultra Pure Horizontal Gauge Guard from Sani-Tech is specially designed to eliminate bacteria and system contamination caused by dead leg.

The sanitary Horizontal Gauge Guard accurately monitors pressure directly in the line without the need for tee's. A flexible VITON elastomer spool assures accurate readings for pressure and vacuum operations.

Liquid filled horizontal gauges are stocked in a range from 0 to 100 psi. Alternative ranges are available upon request from the manufacturer. Horizontal gauges are stocked in PVDF and Polypropylene in standard sizes from 1/2" to 3" with custom sizes available.

**Please circle No. 255  
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## New Microbicide Registered for Conveyor Lubricant Uses

A new, broad spectrum microbicide developed by Rohm and Haas Company has been granted EPA registration for use in concentrate and use-dilution conveyor lubricants. KATHON® CL microbicide is effective in controlling listeria monocytogenes, a bacterium found in dilute conveyor lubricants. The microorganism -- a health-endangering pathogen -- is a problem particularly in lubricants used on conveyor lines for dairy products.

Breweries and bottling plants also will benefit from the use of KATHON CL microbicide in conveyor lubricants. The microbicide controls a broad spectrum of other bacteria and fungi, including mold and yeast, that can contaminate and foul the lubricant fluid systems in these plants.

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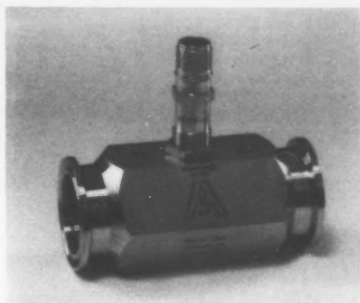
## Chemdet Introduces New Sanitary S-Turbodisc for Total Internal Tank Cleaning

The new sanitary S-Turbodisc from Chemdet, Inc. introduces superior CIP (clean-in-place) tank cleaning results at low pressures and with low flows. Designed for CIP tank cleaning applications in the food, dairy, beverage, cosmetic, pharmaceutical and similar industries, the Sanitary Turbodisc conforms to applicable FDA, USDA and 3A standards for materials in contact with foods, pharmaceuticals and dairy products.

Self-operated by the cleaning fluid, the S-Turbodisc provides a vigorous, dense spray to thoroughly clean tank interiors. The uniquely designed curved disc provides a spray pattern so comprehensive, it cleans all surfaces on the inlet tube and above the cleaning head.

Made of stainless steel and approved plastic, the S-Turbodisc has only four parts which are held together with a simple clip. This special design makes the inspection or cleaning of individual parts quick and easy, and with only one moving part, little or no maintenance is required. There are no small holes to block and the minimum orifice size is 1/8 in. (3.175 mm). No oil or grease lubrication is used. The cleaning fluid is the only lubrication necessary.

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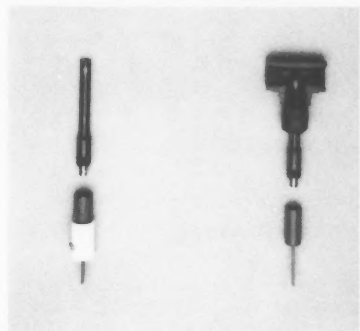


### 3-A Sanitary Turbine Flowmeters

The Hoffer sanitary design flowmeter is accepted as meeting 3-A Sanitary Standard No. 28-00 for measurement of process liquid consumables. When you select a Hoffer 3-A meter, you get the widest range capability and size selection available in the industry.

The Hoffer 3-A meter is available in eleven (11) sizes with standard Tri-Clamp fittings. The meter's range covers flow rates from .35 to 650 GPM. Sizes range for 1/4 to 3 inches. Linearity is +/- .5% of reading or better. However, premium linearities of +/- .1% can be obtained with the use of the Hoffer Model ACC100 Linearizer. The construction material is 316 stainless steel. Hard carbon composite sleeve bearings are available for those aggressive process liquids.

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### Multi-Purpose Process Electrode

The S222-C combination pH electrode, from SENSOREX, incorporates economy and versatility in one. The electrode can be used for both in-line and submersion applications. A double "O" ring seal quick disconnecter provides for easy replacement. The recessed bulb design provides maximum protection against breakage. The electrode is available in single and double junction designs as well as ORP.

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### Hydrogen Peroxide in Air Monitor

CEA Instruments' TGM 555 Peroxide Monitor reliably and continuously monitors levels below 1 ppm. Typical full scale range of the analyzer is 0-2 ppm, adjustable from 0-0.2 ppm detecting as low as 2 ppb, up to 0-10 ppm full scale. The unit utilizes the DPD procedure.

The unit is applicable for the food packaging pharmaceutical, cosmetic, photographic, plastic and bleaching/dyeing industries, among others. Weighing only 30 pounds, the unit has digital readout and a recorder output of 0-1V. Built on a 19" panel, the unit can be rack mounted if desired. The instrument is interchangeable by the user to other gas parameters.

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### BenchMate Workstations: Personal Automation for Valuable People

Zymark's new BenchMate Workstations are a series of personal automation instruments designed to eliminate the routine sample preparation tasks of the modern high productivity laboratory. Depending on the model, the BenchMate Workstations can perform combinations of the following operations: *liquid dispensing*, including solvent and reagent additions, internal standard additions and serial dilutions; *membrane filtration*; *solid phase extractions* and *HPLC injection*. There are four BenchMate Workstations to choose from - the 110, 120, 210 and 220. Each unit comes fully preprogrammed and ready to operate with only your analytical method variables, such as, number of samples and specific volumes etc. to input. The BenchMate Workstations can operate as stand alone units or interfaced to industry standard personal computers. Sample capacities depend on your specific application, however, the BenchMate Workstations are designed to accommodate up to 200 sample tubes.

Please circle No. 261  
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### New Spectate Test Speeds Identification of Salmonella Bacteria

Spectate, a new test for quickly and accurately identifying Salmonella bacteria in food, is now available from Stauffer Chemical Company.

Despite generally high hygiene standards within the food processing industry, there has been a significant increase in Salmonella food poisoning in recent years—from 3,200 reported cases in the United States in 1984 to almost 7,000 reported cases in 1987. Along with their search for ways to decrease this number, representatives from the meat, poultry, seafood and dairy processing industries are also demanding faster ways to test for Salmonella.

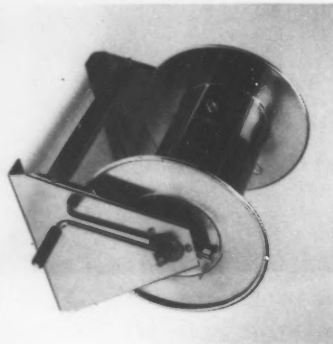
Spectate meets that demand by reducing the number of days needed to identify a contaminated sample. Instead of using traditional microbiological testing methods, which can take up to five days, food processors can use Spectate and have an accurate identification in as little as 48-hours.

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on your Reader Service Card

### BacTrace<sup>®</sup> Affinity Purified Antibody to Listeria Species

BacTrace<sup>®</sup> affinity purified antibody to *Listeria*, genus specific, is designed by Kirkegaard & Perry Laboratories, Inc. for use in ELISA systems or in fluorescent antibody slide techniques. It offers distinct advantages for the rapid detection of *Listeria* in food samples. The antibody is specific to *Listeria*, a food-borne pathogen that causes listeriosis. Affinity purification enhances the desired antibody specificity and minimizes cross-reactivity. The antibody demonstrates high sensitivity to *Listeria* and reacts with all 33 species tested in our laboratory. It is available unlabeled or labeled with peroxidase, phosphatase, or fluorescein. Technical support and complementary products, including a positive control, are available to aid in the development of immunoassay systems.

Please circle No. 263  
on your Reader Service Card



### **Stainless Steel Hand Crank Hose Reels**

Reelcraft's new "ALL" Stainless Steel Hand Crank Reels offer hose capacities of 300', 1/2" I.D., up to 150' 3/4" I.D., and working pressures up to 3000 P.S.I. The "ALL" Stainless reel offers hardened stainless bearings and full flow 1/2" and 3/4" rotary stainless steel swivels with Viton O-rings for permanent supply line attachment. Stainless steel brackets and a unitized reinforced spool with rolled outer edges are Electro Polished for a mirror like finish.

User benefits include protection against corrosion, compact hose storage, reduced hose handling labor, increased hose life, and eliminates the safety hazard of unstored hose.

**Please circle No. 264  
on your Reader Service Card**

### **Wet/Dry Vac Plugs into Pal- let Truck**

DL Sales' cleaning system features an industrial wet/dry vacuum that is picked up by and electrically connected to an available 24-v walkie or rider pallet truck. Called the Aisle-A-Gator, it cleans hard-to-reach areas and has no cords to clutter walkways or traffic lanes. It features dual 24-v vacuum motors, dual replaceable filters, a pallet-sized steel cart with room for an additional container, 10-ftx1 1/2-in. hose, and tools.

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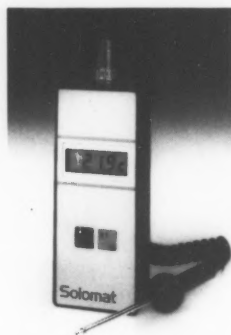
### **New Pump Design from APV Crepaco**

APV Crepaco has expanded its pump product range to include the new Series "M" Rotary Pump with stainless steel rotors. With this new pump line, the company now offers sanitary rotary pumps with the largest capacity range (to 980 US GPM), the highest operating pressure (to 435 psig) and the widest variety of sealing options for the food, dairy, beverage, chemical and pharmaceutical industries.

The new APV Crepaco Series "M" stainless steel, lobe-type pumps feature modular construction for the utmost in product flexibility and interchangeability. Inspection and maintenance are made easy with a replaceable cartridge assembly containing shafts, timing gears, bearings and rotors; ensuring minimum downtime.

Unique among sanitary lobe pumps, the standard Series "M" pumps fully meet the 3A requirements on mechanical cleaning (Clean-In-Place) without costly modification or need for special designs.

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### **435 Digital Thermometer**

Solomat introduces a new pocket-sized platinum RTD thermometer for quick, precise temperature measurements. The model 435 has a range from -310 to +1400°F (-190 to +800°C) with resolution to 0.1°F/C. Patented Solomat linearization results in long term stability and accuracy of +/- 0.15°F.

The model 435 utilizes front membrane switches for convenient operation. The display is on easy to read, 3 1/2 digit LCD with Low Battery, Polarity, Open Circuit and Decimal Point indicators. The unit will operate 200 hours with a standard 9 volt alkaline battery. It is available with an optional 0-1 volt or 4-20 mA analog output. Solomat also offers a wide range of temperature probes to use with the 435 thermometer for air, immersion, penetration and surface measurements.

**Please circle No. 267  
on your Reader Service Card**



### **The Hydro-Retriever 380 BHD**

The Hydro-Retriever 380BHD, from Advance Machine Company, now features "Power-Flo-Steering". This patent pending feature allows the operator to easily maneuver and scrub around pallets, racks and other obstructions—all the time cleaning and vacuuming dry a thirty-eight inch path. To turn, the operator simply pulls back one of the side-by-side operating handles and pushes the other forward.

**Please circle No. 268  
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### **Save on Recovery and Haz- ardous Materials Pumping**

The new Pulse Link™ modular control system, from QED Environmental Systems, Inc., lowers the cost of ground water and product recovery pumping equipment by as much as 50% through design innovation. Additional savings come from Pulse Link's reliable performance, ease of installation in existing wells down to 2" diameter, and fast delivery.

The compact 6"x6" modules are engineered for easy system installation, expansion, and upgrading. A single-well control system consists of a Pulse Sender™ (which operates any size Pulse Pump™) and an optional Level Mate™ on-off control. A multi-well system consists of one Pulse Sender and up to six Well Master™ remote well operators.

**Please circle No. 269  
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### **Universal Interface Couples HPLC to Gas Phase Detectors**

Vestec Corporation, the acknowledged leader in LC-MS

announces release of a new Universal Interface for coupling HPLC to gas phase detectors. This new interface provides the key ingredient for a new generation of Sensitive Detectors for HPLC. The first application demonstrated in the Vestec booth at PITCON, connects reversed phase HPLC using standard 4.6mm columns to electron ionization (EI) mass spectrometry. The new Universal Interface also allows high-performance coupling of HPLC to all of the other universal and selective detectors commonly employed with GC including:

- \* flame ionization (FID)
- \* flame photometric (FPD)
- \* photoionization (PID)
- \* thermal conductivity (TC)
- \* FT-IR, electron capture
- \* and many others

The Universal Interface provides routine, reliable operation since it contains no moving parts and no critical adjustments are required. In combination with nearly universal gas phase detectors such as FID, this new Interface provides the long-sought Universal, Sensitive Detector for HPLC.

**Please circle No. 270  
on your Reader Service Card**

### **Brochure Provides Information on Membrane Filters and Equipment**

A new brochure from Millipore outlines the complete line of membrane filters and holders used in a variety of laboratory filtration applications.

Products featured include low-protein-binding, low-extractable Durapore<sup>®</sup> membranes which have been designed for maximum purity and durability. These membranes are ideal for tissue culture media filtration and, due to its broad chemical compatibility, HPLC sample preparation.

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



### **Stainless Steel Ultrasonic Level Sensor for Washdown and Caustic Environments**

New from Kistler-Morse is the Sonocell<sup>™</sup> Model S/T, an

ultrasonic level sensor made of stainless steel. The Model S/T withstands continuous high temperature environments of up to 230°F and clean in place washdowns up to 250° F. Stainless construction also enables the sensor to continue to work accurately in caustic conditions.

Designed for manufacturing plants requiring regular high-temperature washdown of equipment or processors of caustic materials, the Sonocell Model S/T will provide solutions to level measurement of solid or liquid materials for manufacturers of food and dairy products, chemicals, plastics, resins and pharmaceuticals.

**Please circle No. 272  
on your Reader Service Card**

### **New EPA-Accepted Digital Radon Monitors**

Nuclear Associates announces the availability of two accurate, easy to use Radon Monitors that have been tested and accepted by the U.S. Environmental Protection Agency. These state-of-the-art monitors have push-button controls and digital readouts that allow for easy testing without having to send anything to a laboratory for analysis.

Unlike passive methods of radon detection which only provide one-time measurements, these Radon Monitors are designed to conform to the EPA's latest measurement protocol, providing continuous short and long-term readings. They utilize a silicon detector that provides 24-hours-a-day, 365-days-a-year monitoring, and micro-computer technology to store and analyze the data.

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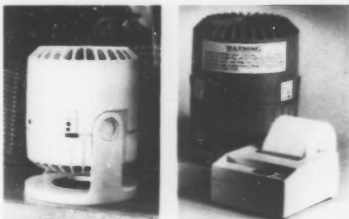
### **ARL Offers New IBM PS/2-Based Software for Model 3560 AES Spectrometer**

Fisons Instruments' Applied Research Laboratories will introduce the new IBM PS/2-based software for its Model 3560 atomic emission spectrometer at the 1989 Pittsburgh Conference in Atlanta.

The Model 3560 with the unique Minitorch<sup>™</sup>, which reduces argon consumption by 40%, will feature powerful new analytical software designed for the novice or occasional user. The easy-to-use software, featuring pull-down menus, color graphics and on-line help prompts, guides the user through most required operations.

The new software, combined with the Model 3560's high-throughput, simultaneous analysis and argon-saving Minitorch<sup>™</sup> make the instrument one of the most advanced on the market. The Model 3560 uses either one or two of four different sample excitation systems: inductively coupled plasma (ICP), argon spark, glow discharge lamp (GDL) and DC Arc.

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# Food and Environmental Hazards To Health

## Unintentional Poisoning Mortality - United States, 1980-1986

*March 19-25, 1989, marks the 28th annual observance of National Poison Prevention Week (NPPW). NPPW is intended to alert the public to the problem of unintentional poisoning (the ingestion, injection, inhalation, or absorption of a chemical agent that results in unanticipated illness or death), the fifth leading cause of unintentional injury deaths in the United States. The traditional goal of NPPW is prevention of poisoning among children. Although childhood poisoning mortality has decreased in recent years, morbidity associated with poisoning in this age group remains a major public health problem. In 1987, 731,954 poisoning exposures among children <6 years of age were reported to the American Association of Poison Control Centers' National Data Collection system; 22 of these children died, and 107,844 others became ill. The number of exposures to household medicines and chemicals can be reduced by more widespread use of safety-packaged products by parents and other caretakers of children. The following report focuses on unintentional poisoning mortality among young adults, including poisonings from both the medical and nonmedical use of drugs.*

Unintentional poisoning deaths in the United States were analyzed for 1980-1986 using final mortality data from CDC's National Center for Health Statistics (NCHS). Age-adjusted mortality rates were directly standardized to the 1980 U.S. population.

From 1980 through 1986, the mortality rate of unintentional poisonings in the United States increased from 1.9 to 2.3 deaths/100,000 population. This 7-year trend appears to be explained by a 49% increase in the rate of deaths from drug poisoning, including drugs used for both medical and nonmedical purposes. Mortality rates of unintentional poisoning by other solids and liquids and by gases and vapors decreased by 15% and 25%, respectively, during 1980-1986. In 1986, the most recent year for which NCHS mortality data are available, drug poisonings accounted for 1.6 deaths/100,000 persons and 73% of all unintentional poisoning deaths.

In 1986, the leading causes of fatal unintentional drug poisonings were opiates and related narcotics and local anesthetics including cocaine. Most of the fatal poisonings by other solids and liquids were due to alcohol ingestion (352 deaths). Exposure to motor vehicle exhaust (475 deaths) accounted for nearly half the deaths due to unintentional poisoning by gases and vapors.

The mortality rate of unintentional poisonings for males remained more than twice that for females during 1980-1986. The rates for blacks of both sexes were consistently

higher than those for whites. In 1986, the rate for black males was 5.4 deaths/100,000 persons, and for white males, 3.2 deaths/100,000 persons.

The highest mortality rates of unintentional poisonings for both blacks and whites were for young adult men (20-39 years of age). Men in this age group accounted for 40% of all unintentional poisoning deaths during 1980-1986. In 1986, among young adult men, unintentional drug poisonings were responsible for 2065 deaths or 5.1 deaths/100,000 persons, an 85% increase from 1980.

In 1986, the leading causes of fatal unintentional drug poisonings for young adult men were opiates and related narcotics (619 deaths) and local anesthetics including cocaine (436 deaths). By comparison, in 1980, among young adult men, 213 deaths resulted from poisoning by opiates and related narcotics, and 73 deaths, from poisoning by local anesthetics including cocaine. In 1980 and 1986, additional deaths occurred among young adult men from unintentional poisonings by drug combinations, and an unknown number of these deaths involved opiates or cocaine.

The mortality rate for unintentional poisonings among children <15 years of age was 0.3 deaths/100,000 persons in 1986, a 10% decrease from 1980. In 1986, 147 such deaths occurred among children <15 years of age, including 62 deaths from gases and vapors and 54 from drugs. **Editorial Note:** Unintentional poisoning mortality is predominantly a problem of young adults, particularly men 20-39 years of age. NCHS data indicate that the misuse of drugs, primarily opiates and related narcotics and cocaine, was responsible for a substantial increase in such deaths among men in this age group from 1980 through 1986. The impact of drug use on mortality is only partially conveyed by enumeration of unintentional poisoning deaths. The mortality rate for young adult men rose during 1980-1986 for deaths attributed to drug dependence, nondependent drug abuse, and poisoning by drugs in which the intentions of the decedent are undetermined. For suicide by drugs, the mortality rate in young adult men remained nearly constant (1.6 deaths/100,000 persons in 1986).

The National Institute on Drug Abuse (NIDA) has reported increases in morbidity and mortality associated with nonmedical use of both heroin/morphine and cocaine during 1985-1987. Through its Drug Abuse Warning Network (DAWN), NIDA monitors emergency departments and medical examiners' offices in selected locations for drug-related emergency visits and deaths. In 1987, cocaine was the most frequently reported drug involved in emergency visits, and heroin/morphine and cocaine each were involved in more than one third of deaths reported to DAWN. According to DAWN data for 1987, persons 20-39 years of age accounted for 70% of all drug-abuse

emergency visits and 65% of all drug-abuse deaths.

Reducing unintentional poisoning mortality among young adults requires prevention programs and treatment efforts that focus on the use of illicit drugs. Although medical complications of illicit drug use often emerge early in adulthood, initiation of drug use during adolescence is an important risk factor for later hazardous use. This suggests that deterring or even delaying initiation of drug use among adolescents is an appropriate goal of prevention. However, the recent increase in unintentional drug poisoning deaths among young adults underscores the need for drug education and treatment that focus on illicit drug users who are 20-39 years of age.

MMWR 3/17/89

### Trichinosis Surveillance, United States, 1986

*Trichinella spiralis* is a parasite of carnivorous animals that causes the disease trichinosis. In the United States, people become infected by eating poorly cooked pork products or wild animal meat that is infected with the parasite. Although fewer than 100 cases per year are reported to CDC, trichinosis continues to persist as a public health problem in this country. Public health officials believe that the reported cases represent only a fraction of the total number of cases, since many of the mild or asymptomatic infections are undetected or are misdiagnosed unless they are related to more severe cases.

In 1986, 51 cases of trichinosis were reported to CDC from 12 states and the District of Columbia. Thirty-six (71%) of these cases occurred in New Hampshire, Hawaii, Massachusetts, and Pennsylvania. Pennsylvania reported the largest number of cases, 15, or 29% of the total.

In 1986, commercial pork products accounted for only three isolated cases of trichinosis. The other cases of trichinosis caused by pork included wild boar or pork purchased directly from a farm.

Among those cases in which the food item was known or suspected, pork was incriminated in 26 (61%) cases, bear meat in 14 (33%), and other meat in three (7%) cases.

Trichinosis is a preventable disease. The U.S. Department of Agriculture requires that ready-to-eat pork products be heat treated or frozen to kill the parasite before the products are sold to consumers. Fresh pork products, unless they are specifically labeled as "trichinae tested" or "trichinae free," must be cooked to 77°C (170°F), a temperature that will kill the parasite. All wild animal meat must be assumed to be infected with trichinae and also cooked to 77°C (170°F) to safeguard against this disease.

### "Not for Use in Dairy Cattle" Label Required for Sulfa Drugs

On December 15, 1988, CVM director Dr. Gerald B. Guest sent a letter to all holders of approved New Animal Drug Applications and/or interim clearances for sulfamethazine products stating that labels for products for use in cattle should contain the warning statement "Not for use in dairy cattle." In a July 5, 1984 *Federal Register* notice, FDA stated, among other things, that mastitis caused by *Streptococcus* spp. was one of the acceptable disease claims for sulfamethazine use in cattle. Upon further consideration, however, FDA also believes that these products were being used in lactating dairy cows, despite the warning in the labeling not to use the products in cows producing milk for human consumption.

This is an issue of particular concern because of an FDA survey which detected sulfamethazine residues in milk. In addition, results of a study by CVM's Beltsville Research Division indicate that these residues in milk are probably due primarily to the use of dosage form sulfamethazine products.

Under the Food, Drug, and Cosmetic Act, the presence of sulfamethazine residues in milk adulterates the milk. Results of rat and mice studies by the National Center for Toxicological Research had raised significant questions about the safety of residues of sulfamethazine in edible products, such as milk or meat of food-producing animals.

For these reasons, FDA requested that all sponsors of sulfamethazine-containing drugs that bear claims for mastitis or imply use in dairy cattle revise all such labels to delete reference to mastitis, or at least restrict the mastitis claim to beef cattle alone. Additionally, any restrictions against use in lactating animals or animals providing milk for human consumption should be extended to a complete prohibition against use in dairy cattle.

FDA Veterinarian Mar/Apr '89

### Handle with Care

Any food that is improperly handled is a potential source of food-borne illness. Pathogens can thrive in all sorts of conditions--in warm or cool temperatures, raw or processed foods, and with or without oxygen.

Generally speaking, the rules for avoiding pathogen growth should be applied most fervently for meat, poultry, fish, eggs and dairy products. However, harmful bacteria can also be found in such seemingly innocuous foods as pasta, chocolate and coconut, and we all know about how mold forms on bread after a while.

Raw vegetables can pick up bacteria from the soil or through handling. Canned foods that have a low acid content (for example, green beans, mushrooms, corn and beets) might be a multiplying place for bacteria that cause deadly botulism. The bacterium that causes that illness -

- *Clostridium botulinum* -- grows without the aid of oxygen.

Staph infections (from *Staphylococcus aureus* bacteria) are often traced to cream-filled pastries that have been left too long at room temperature. Meat, poultry, egg products, tuna, and potato and macaroni salads that have been left out too long are other sources of this malady, which is often hard to tell from the flu.

The possibility of cross-contamination means that any food can become a source of food poisoning. So remember the basics: Keep everything clean, and keep hot food hot and cold food cold.

FDA Consumer Special Report; "Safety First: Protecting America's Food Supply"

### Trichinosis -- Down but Not Quite Out

Trichinosis is an example of a food-borne illness that has become rare today, in all probability because people realize that pork has to be cooked well to kill the carrier of the illness, a nematode worm called *Trichinella spiralis*.

The U.S. Centers for Disease Control reported recently that fewer than 100 cases of trichinosis a year are now being reported. However, the CDC report qualifies the figure by noting that only a fraction of the total number of cases gets into the record books.

In 1985, there were 46 cases reported to CDC from 11 states. In 1984, the total was 65 cases and one death. However, 1983, brought reports of only 30 incidents. CDC said the annual incidence has "declined progressively" since the late 1940s and 1950s.

Pork led the list of meats causing the problem, responsible for 49 percent of the cases in 1985. Bear meat accounted for 35 percent. In the 35 cases in which the method of preparation was identified, nine involved raw meat.

The trichinosis worm is seldom found in commercial meat, CDC reported, citing an estimated nationwide rate of less than one in a thousand in slaughterhouses.

FDA Consumer Special Report; "Safety First: Protecting America's Food Supply"

### Scombroid Fish Poisoning -- Illinois, South Carolina

Scombroid fish poisoning is an acute syndrome resulting from consumption of fish containing high levels of histamine. This report summarizes investigations of two outbreaks of scombroid fish poisoning in Illinois and South Carolina in 1988.

**Illinois.** On February 26, 1988, eight cases of scombroid fish poisoning occurred in Chicago in five patrons and three employees of a private club who had eaten a buffet lunch. Six of the ill persons experienced symptoms that included headache, nausea, flushing, dizziness, and diarrhea 90 minutes after the meal. The median duration

of symptoms was 9.5 hours. Investigation by the Illinois Department of Public Health revealed that seven of the ill persons had eaten mahi mahi with dill sauce; the eighth had eaten the dill sauce scraped from the serving pan that held the fish. Three persons noted that the fish tasted "Cajun," and one stated that it had a hot or spicy taste.

The club had purchased 10.5 pounds of frozen mahi mahi from a suburban Chicago distributor the week before it was served. The distributor's records revealed that fish from one of two lots of mahi mahi had been sent to the club. On March 1, the state health department placed both lots under embargo. The lots included boxes with evidence of freezer burn, a sign of thawing and refreezing, but these boxes were held by the distributor as damaged goods and not used. The Food and Drug Administration (FDA) tested fish from 17 boxes in these lots; no fish from boxes with evidence of freezer burn were sampled. Six samples had histamine levels >50 mg/100 g (range: 50-160 mg). The fish was kept in the club's freezer at 0-5 F (-15.0 C-- -17.8C) until February 26, when it was thawed by placing it under running water for 15 minutes. The fish was then cut into portions, placed flat in pans in the cooler, and baked as needed during lunch until the supply was depleted.

**South Carolina.** In September 1988, nine cases of scombroid fish poisoning in Charleston were investigated by the South Carolina Department of Health and Environmental Control. Of the nine cases, five occurred after consumption of a midday meal at a restaurant September 9, one case followed an evening meal at a second restaurant September 10, and three cases occurred after an evening meal of fish prepared at home but obtained from the first restaurant.

The median age of the nine ill persons was 55 years (range: 18-64 years); five were women. Illness occurred 5-60 minutes after the meal (median time to onset of symptoms: 38 minutes). Symptoms included flushing, diarrhea, headache, feverishness, nausea, rapid pulse, pruritus, dizziness, vomiting, facial swelling, numbness around the mouth, and stomach pain. Symptoms resolved in all persons within 10 hours (median: 6 hours). Five patients required emergency room treatment, and one was admitted for observation because of underlying cardiac disease.

Two persons noted that the fish had a slight peppery taste, and one person noted a metallic taste. All had eaten yellow-fin tuna supplied by the same local distributor. FDA analyses of two samples from the yellow-fin tuna revealed histamine levels of 728 mg/100 g and 583 mg/100 g, respectively.

The yellow-fin tuna were probably caught 1 day before purchase in waters off the coast of New Jersey, Rhode Island, and Virginia, and were cleaned and packed in ice on the boat. They were then obtained from docks in Cape May and Barnegat Light, New Jersey, by a regional supplier in Philadelphia 3 days before the outbreak. After purchase, the fish were repacked in ice and delivered by truck to Philadelphia, where they were divided into two lots and repacked in ice for shipment to wholesalers. They

left the Philadelphia supply plant by refrigerated truck 12 hours after arrival. The wholesaler in Charleston received 188 pounds of yellow-fin tuna from the supply truck 1 day before the outbreak, processed the tuna into steaks, and shipped 17 pounds of steaks from the same fish to each of the two restaurants implicated in the outbreak. Tuna steaks from the same shipment were supplied to 12 other Charleston restaurants, all of which reported receiving the fish in ice. Both implicated restaurants kept the fish packed in ice and refrigerated before it was broiled and served to customers. One day after the outbreak, a telephone survey of emergency rooms in the Charleston area revealed no other cases suggestive of scombroid poisoning. All restaurants that had received yellow-fin tuna supplied by the Charleston wholesaler from this shipment were notified.

**Editorial Note:** During 1973-1986, 178 outbreaks of scombroid poisoning affecting 1096 persons (median: two cases/outbreak) were reported. Outbreaks have been reported from 30 states and the District of Columbia, with Hawaii reporting the largest number of outbreaks (51), followed by California (29), New York (24), Washington (19), and Connecticut (nine). The fish species was known in 143 (80%) of the scombroid outbreaks; the most commonly reported types were mahi mahi (66 outbreaks), tuna (42 outbreaks), and bluefish (19 outbreaks).

Scombroid poisoning is named for the family Scombridae, which includes tuna and mackerel, but this illness can occur after ingestion of any dark-fleshed nonscombroid species containing high levels of free histidine. When these fish are improperly refrigerated, free histidine is broken down to histamine by surface bacteria. This latter compound is thought to produce the clinical manifestations of illness; hence, some investigators have termed this syndrome histamine poisoning.

Illness begins minutes to hours after ingestion of the toxic fish. Symptoms resemble a histamine reaction and frequently include dizziness, headache, diarrhea, and a burning sensation or peppery taste in the mouth. Facial flushing, tachycardia, pruritus, and asthma-like symptoms can also occur. Illness is usually mild and duration is short, making treatment unnecessary. For more severe cases or in patients with underlying medical conditions, oral antihistamines may be beneficial. Intravenous cimetidine has been anecdotally reported to ameliorate symptoms but its use warrants further study.

Scombroid poisoning is diagnosed by history and clinical symptoms combined with the measurement of histamine levels in implicated fish. Fresh fish normally contains <1 mg/100 g of histamine; levels of 20 mg/100 g in some species have been reported to produce symptoms. The FDA has established 50 mg/100 g of histamine as a hazardous level in tuna, a level exceeded in both outbreaks in this report. Investigation failed to reveal evidence of improper storage. Experimental studies indicate that histamine formation is low at refrigerator temperatures and negligible in fish stored at  $\leq 32$  F ( $\leq 0$  C). As these outbreaks demonstrate, cooking toxic fish is not protective. There-

fore, the key to prevention of scombroid poisoning is continuous icing or refrigeration of all potentially scombrototoxic fish from the time they are caught until they are cooked.

NNWR 3/10/89

## Pesticide Residue Levels Found Safe

Most FDA tests of foods sold in America during 1987 revealed little or no pesticide residues, according to a recent FDA report based on the agency's food monitoring program and its annual Total Diet Study of prepared foods.

Of the 14,492 food samples (half were imports) analyzed over the year, FDA found that 95 percent contained no illegal residues and 57 percent had no residues at all. Not all samples were tested for all possible pesticides, however. The few illegal residues that were found were mainly from pesticides used on crops they were not approved for; only about one in four exceeded an Environmental Protection Agency tolerance, all of which have generous safety margins. Milk, eggs, and dairy products had the least amount of residues.

In the Total Diet Study, FDA tests foods found typically in the American diet that have been prepared in a normal way -- cleaned, cooked, and so forth. Residues of only 53 pesticides were found in the 936 samples tested, none at levels of concern. As in earlier years, this analysis showed that residue intakes were well below the acceptable daily intakes established by the United Nations' Food and Agriculture Organization and World Health Organization.

For additional information, see "Setting Safe Limits on Pesticide Residues" in the October 1988 *FDA Consumer*.

Copies of *FDA Pesticide Program, Residues in Foods -- 1987* can be obtained from: Norma Yess (HFF-420), FDA Division of Contaminants Chemistry, 200 C St., S.W., Washington, D.C. 20204.

*FDA Consumer* 3/89

## Cave-Associated Histoplasmosis -- Costa Rica

An outbreak of histoplasmosis occurred among a group of university students who entered a cave in Santa Rosa National Park, Guanacaste Province, Costa Rica, on January 4, 1988. The cave was inhabited by about 500 bats, including three species of fruit bats (*Glossophaga soricina*, *Carollia perspicillata*, and *Carollia subrufa*) and one species of vampire bats (*Desmodus rotundus*). The cave consisted of two entrances to a single chamber 20 x 75 x 5 feet in size. Bat guano covered the floor of the cave, and the ground was noted to be exceptionally dry for the season.

Seventeen students (mean age, 24 years; range, 20-40 years) entered the cave to observe the bats and photograph a small boa constrictor feeding on them. The students



were in the cave an average of 26 minutes (range, 3-90 minutes). Fifteen (88%) of the 17 students became acutely ill within 9-24 days (mean, 14.4 days); 12 remained ill 14 days after onset of symptoms. One student, who did not enter the cave, did not become ill. Signs and symptoms among the 15 ill persons included fever (93%), headache (87%), cough (80%), dyspnea (80%), chest pain (73%); and myalgia (53%). Two patients were hospitalized, but all recovered without antifungal treatment.

Chest x-rays were obtained for 12 of the 15 patients; 10 had bilateral diffuse fluffy nodular parenchymal infiltrates. Late acute-phase and early convalescent-phase serum specimens (3 and 5 weeks after exposure to the cave) and urine specimens (5 weeks after exposure) were obtained from all 15 patients. Twelve of the 15 patients had evidence of histoplasmosis by complement fixation test, immunodiffusion test, or urinary antigen detection test.

**Editorial Note:** Histoplasmosis is caused by inhalation of spores of *Histoplasma capsulatum* from its natural soil habitat. Growth of *H. capsulatum* requires moderate temperatures, high humidity, and a source of nitrates, often from decomposing feces of bats or birds. *H. capsulatum* has been isolated from both bat caves and bird roosts, and human infection has been associated with exposure to both sources.

This outbreak is typical of bat-cave-associated histoplasmosis. The high attack rate (88%) could be explained by the relatively young age of the persons entering the cave or by exposure to a large inoculum of *H. capsulatum* spores. The extraordinarily dry ground in the cave also may have increased the dispersion of spores in the cave. *H. capsulatum* has been more readily isolated from caves under dry conditions than after flooding.

Cave-acquired histoplasmosis differs in several respects from histoplasmosis associated with bird roosts. Bats, unlike avian species, may become infected with *H. capsulatum*. Therefore, formaldehyde spraying, a useful control measure for avian-associated sources of histoplasmosis, may be ineffective in reducing the risk of infection in a bat cave because bats can recontaminate the cave. Furthermore, skin test surveys have shown that persons living near contaminated caves have a lower prevalence of reactivity to histoplasmin than spelunkers living in the same area. This finding suggests that *H. capsulatum* infection occurs only in persons who enter contaminated caves. In contrast, airborne dispersal of organisms from bird roosts can cause outbreaks involving at least several square kilometers.

Much of Santa Rosa National Park consists of mature deciduous dry forest in the relatively dry climate of north-west Costa Rica. During the rainy season (June-November), a seasonal river usually floods the cave that was associated with this outbreak and washes out the bat guano. However, flooding had not occurred because of extraordinarily low rainfall during this year's rainy season. Measured rainfall since 1978 has averaged 160 cm per year, but only 50-70 cm were recorded during 1987. The cave is accessible from a hiking trail and is commonly included

on tours of the park led by local field biologists. No illness was reported among groups from the same university who entered the cave in January 1983 and January 1986. Officials of Santa Rosa National Park and field biologists in the area have been notified of the outbreak, and warning signs have been posted outside the cave.

MMWR 5/27/88

## Little or No Risk Seem from Vet Antibiotics

Feeding small doses of antibiotics to livestock to promote growth or prevent infection probably poses little if any risk to people who consume meat, milk or eggs from the animals, but a final verdict is not yet in, according to experts who have reviewed the available information.

A report of a new risk assessment study done for FDA by the National Academy of Science's Institute of Medicine (IOM) says the group was "unable to find data directly implicating subtherapeutic doses of antibiotics in livestock with illnesses in people," or to come up with a "numerical answer" about the risk the animal medication posed to humans. IOM did give FDA a statistical method with which to assess the risk. Using the model, with what it identified as "limited" and "sometimes conflicting" data, IOM estimates that the doses of antibiotics given to livestock to promote growth or prevent infection would account for less than 2 percent of the human deaths due to food-borne, antibiotic-resistant *Salmonella*. (Although officially, only somewhere between 150 and 220 deaths a year are related to *Salmonella* poisoning, the IOM estimates that, because of under-reporting, the actual figure may be closer to 500.)

The committee felt that stopping the use of antibiotics to promote growth in livestock might reduce the total number of human deaths due to *Salmonella* poisoning, but that this cannot be supported scientifically. A greater impact could be achieved by more careful use of proper techniques of food preparation, the report said. FDA added that, whether resistant to antibiotics or not, food-borne organisms in raw meat and other raw food products generally do not pose a health risk if the food is properly handled and cooked. (For information on proper food handling, see "Mother Nature's Regulations on Food Safety" in the April 1988 *FDA Consumer*.)

The report, "Human Health Risks with the Subtherapeutic Use of Penicillin or Tetracyclines in Animal Feed," can be obtained from FDA's Center for Veterinary Medicine, HFV-12, 5600 Fishers Lane, Rockville, Md. 20857.

*FDA Consumer* 4/89



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# FDA Food Service Code Interpretations

During the August IAMFES Conference there were several heated debates on cold storage temperature requirements for potentially hazardous foods. FDA's draft Unicode proposed lowering the current standard 45°F to 40°F. Several organizations argued that present equipment couldn't meet the lower temperature standard or that the cost of additional energy would be too high for the food service industry.

FDA's reason for lowering cold storage requirements to 40°F is simple: a number of foodborne pathogens are now known to grow and multiply at temperatures below 45°F. In fact *Listeria monocytogenes* is capable of doubling in numbers at a temperature of 39.2°F! As the public demands and uses more ready to eat foods expect to see more cases of foodborne illness being caused by *Listeria*.

To help settle the current debate on lowering cold storage requirements I am asking all readers of this column to participate in a national survey. This survey is being called the National Fourth Tuesday in September Food Temperature Check. Participation is easy. All you have to do is select a random food service facility and check food temperatures on the 4th Tuesday in September.

Use the following format for reporting your findings:  
a. Time of inspection; b. Type of cold storage unit checked (walk in/reach in); c. Temperature shown on the thermometer inside the unit; and d. the product temperature of at least three potentially hazardous food items. While this won't be a highly scientific study it should be fun and provide some insight to current practices in the field.

**OFF THE CLIPBOARD:** The Illinois Department of Public Health has developed a useful training aid on potentially hazardous foods. This training aid can be used for inservice training for inspectors and in manager certification training programs. A number of scenarios let participants apply their knowledge of pH and water activity to determine if a food handling practice is a problem. - Don't forget to take part in the National Third Tuesday in September Food Temperature Check. Send your survey findings in by the end of September. To obtain a copy of the Illinois training aid send a self addressed and stamped envelope (SASE) to: FDA Interpretations Committee, P.O. Box 1832, Frederick, Maryland.

Homer C. Emery, RS  
Chair, FDA Interpretations Committee

# Affiliate News

## T.A.M.F.E.S. Annual Meeting Report

The 7th annual meeting of the Texas Association of Milk, Food and Environmental Sanitarians was held June 6 and 7 at the Green Oaks Inn in Fort Worth, Texas. Over 255 persons registered for the meeting. A "hand's on laboratory" program was held Monday morning and was conducted by Mr. Joe Bare with the Texas Department of Health. A golf tournament was held Monday afternoon at Fort Worth's Glen Garden Country Club. Fifteen teams with four members each turned out for this third annual golf tournament. Dr. C.R. Allen, Director of Region 5, Texas Department of Health, gave the welcoming remarks Tuesday afternoon.

Featured speakers for the general session gave talks on the following subjects: "Sanitizers for the Food and Drug Industry", "Handheld Computers for the Milk and Food Inspection Program", "The Villains and Victims of Product Tampering", "F.D.A. Cooperative Programs - Milk, Food and Shellfish", and "Environmental Concerns".

On Wednesday morning separate sessions concerning dairy and food interests were held.

Speakers for the dairy sessions included the following: John Adams, National Milk Foundation, "1989 PMO Changes"; John R. Miller, Seiberling Associates, Inc., "Computerized Controls for Milk Processing Plants"; John Bruhn, University of California, "Vitamin A Content of Low Fat Milk"; and Glenn Witte, Milk Industry Foundation, "Milk and Ice Cream Update".

Speakers for the food session were the following: James C. Hesby, Black and Verch Company, "Ionization as a Disinfectant"; Dr. William Hope, Riedel Environmental Services, "Managing Hazardous Spills"; Dr. John Newman, F.D.A., "Health Fraud"; Paul A. Lazzaro, Lazzaro and Associates, "Crisis Management"; and Tammy Way, A.M.S.I., "Microbiological Safety of Refrigerated, Vacuum-Packed Foods".

On Wednesday afternoon a seminar by special request of F.D.A./U.S.D.A. was held for the milk industry and milk regulatory personnel. This seminar was held in order to discuss regulatory procedures for the enforcement of illegal drug residues in tissues of dairy animals.

Speakers included Dr. Morse Waguespack, U.S.D.A. Meat and Poultry Inspection; Dr. Pat Basu, U.S.D.A.; Dr. Steven Vaughn, Center for Veterinarian Medicine, F.D.A.; and Gary Pierce, Supervisory Investigator, F.D.A.

A short business meeting was held after the Wednesday morning meeting with the following persons elected as officers: President - Dr. Al Waggoner, President-elect - Kenneth Seaman, Treasurer - Dr. Ron Richter, Secretary - Janie Park, and Terry Ryan - Past President.

Plaques for outstanding service to T.A.M.F.E.S. were given to Gerald Hein and Kenneth Seaman.

## Upcoming IAMFES Affiliate Meetings

1989

### SEPTEMBER

**14-15, 13th Annual Wisconsin Laboratory Education Conference** will be held at the Oshkosh Hilton and Convention Centre in Oshkosh, Wisconsin. For registration information, contact: Laura Rauschl, Program Chairman, c/o Schreiber Foods, Inc., PO Box 19010, Green Bay, WI 54307-9010 (414) 437-7601.

**19-21, New York State Association of Milk and Food Sanitarians**, to be held in Buffalo, New York, at the Sheraton-Buffalo Airport Hotel. For more information, contact: Paul Dersam, 27 Sullivan Rd, Alden, NY 14004, 716/937-3432.

**20-21, Wisconsin Association of Milk and Food Sanitarians Annual Meeting**, will be held at the Holiday Inn East, Madison, WI. Contact: Neil Vassau, PO Box 7883, Madison, WI 53707 608/267-3504.

**25-27, Indiana Environmental Health Association Fall Conference** to be held at the Howard Johnson, Lafayette, IN. For further information call Tammy Barrett, IN State Board of Health (317) 633-0173.

### OCTOBER

**18-19, Iowa Association of Milk, Food and Environmental Sanitarians**, will hold its annual conference at the Holiday Inn, Waterloo, Iowa. For information, contact: Dale Cooper, Box 69, Manchester, IA 52057 (319) 927-3212.

### NOVEMBER

**7-9, North Dakota Environmental Health Association Annual Meeting** to be held at the Sheraton Galleria Hotel, Bismarck, ND. For more information contact: Allen Saylor, 701-224-4762.

1990

### FEBRUARY

**26-27, Kentucky Association of Milk, Food and Environmental Sanitarians' Annual Conference** will be held at the Holiday Inn Convention Center, Louisville, Kentucky. For more information, contact: Debbie Pierce, Secretary, KAMFES, PO Box 1464, Frankfort, KY 40602 (502) 564-3340.

Tuesday night a barbecue and country western dance was enjoyed by participants in Fort Worth's historic stockyard area.

Additional activities by members of T.A.M.F.E.S. consisted of a trip to China by several members. This was a People to People's Sanitarian Delegation led by Janie Park and Al Votion. Members visited dairy plant operations, milk processing plants, seafood processing plants, a poultry processing plant, and other operations in several cities in China. Visits with counterparts and informative talks were given by several members of the group. Many new friends were made on this fascinating trip. All delegate members felt that this was a worthwhile project. Also, the T.A.M.F.E.S. organization along with the Texas Department of Health and the Food and Drug Administration hosted several schools throughout Texas on the basic pasteurization of milk and milk plant sanitation.



*Speaker - Jerome K. Kozak, F.D.A. Director, Division of Cooperatives Programs, Washington, D.C.*

## ***IAMFES Secretary Nominations Due for 1990 Elections***

Nominations are now being taken for Secretary for IAMFES. This year a regulatory representative will be elected.

Once all nominations are received by the nominating committee, two persons will be chosen to run for the office. This is a five year term, moving up yearly until he or she is President of IAMFES, then serving one year after as Past President. The term of office begins the last day of the 1990 Annual Meeting. All IAMFES Executive Board Members meet three times a year.

Two people selected are placed on the ballot. The winner is determined by majority vote of the membership through a mail vote, in the spring of 1990.

Please send a biographical sketch and photograph **NO LATER THAN OCTOBER 18, 1989** to the Nominations Chairperson.

**John Meyer**  
**Chairman, IAMFES Nominating Committee**  
**NASCO International**  
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*Gerald Hein receiving AMPI Plaque for outstanding service to T.A.M.F.E.S. Presented by Terry Ryan, President Borden, Inc.*



*Kenneth Seaman receiving Vandervoorts Plaque for outstanding service to T.A.M.F.E.S., presented by Terry Ryan.*





# N.M.C.

NATIONAL MASTITIS COUNCIL

## Poor Treatment Procedures Can Lead to Nocardia and Yeast Mastitis

Although uncommon, mastitis can be caused by *Nocardia*, most frequently, *N. asteroides*. The reservoir and vectors of *Nocardia* mastitis have not been well established. *Nocardia* are found naturally in the environment, and presumably the soil is the source of teat skin contamination by *Nocardia*. Often contaminated mastitis treatment preparations and infusion needles are suspected as the vector of *Nocardia* mastitis transmission. However, cases of mastitis infections by *Nocardia* have been reported in heifers which never received intramammary treatment.

Like many mastitis pathogens, *Nocardia* can cause sub-clinical, clinical, or acute mastitis. Often it is associated with chronic mastitis as evidenced by fibrosed udders. As with any mastitis infection, milk production and quality is reduced by *Nocardia* infection. *Nocardia* are resistant to a number of antibiotics used to treat mastitis. Thus, if an antibiotic preparation is contaminated by *Nocardia*, the organisms can survive in the preparation and be infused into the gland during subsequent use of the antibiotic. In addition, if the teat end is not properly cleaned, dried, and thoroughly disinfected prior to infusion, organisms present on the teat may be forced through the streak canal into the udder during treatment. Although some herds may experience an outbreak of *Nocardia* mastitis, usually it is restricted to only a few cows within a herd. Generally *Nocardia* is not a problem in herds which follow a good hygiene program.

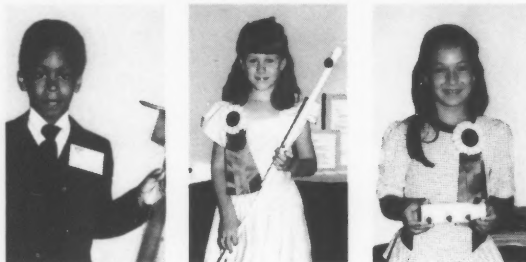
Mastitis caused by yeast and yeast-like fungi is similar in nature to *Nocardia* mastitis. Sources of outbreaks include contaminated antibiotic preparations and inadequate preparation of teat ends prior to treatment. Yeasts are not bacteria and are, therefore resistant to antibiotics. Yeast will colonize the skin of cows, but generally are not considered invasive or contagious. Thus, they are opportunists and gain entrance into the gland through improper treatment procedures. Mastitis caused by yeast is rarely acute, but will cause a substantial, chronic condition. Milk quality and quantity are adversely affected by yeast mastitis. Treatment is difficult, antimycotics have to be used.

The best protection against *Nocardia* and yeast mastitis infections is cleanliness. Keep stalls and loafing areas clean and dry; avoid dirt lots if possible. When treating, either during lactation or the dry period, use an aseptically prepared antibiotic and thoroughly clean and disinfect the teat end with alcohol prior to infusion. Avoid "home-brew" treatments and use of multiple infusions from the same bottle or syringe.

This article is one in a continuing series made available by the National Mastitis Council.

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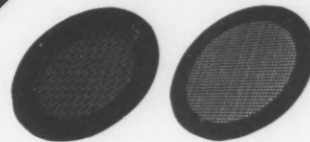
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CIRCLE READER SERVICE NO. 358



# 3-A Sanitary Standards for Formers, Fillers and Sealers of Single Service Containers for Milk and Fluid Milk Products

Number 17-07

Formulated by  
International Association of Milk, Food and Environmental Sanitarians  
United States Public Health Service  
The Dairy Industry Committee

It is the purpose of the IAMFES, USPHS, and DIC in connection with the development of the 3-A Sanitary Standards program to allow and encourage full freedom for inventive genius or new developments. Specifications for Formers, Fillers and Sealers of Single Service Containers for Milk and Fluid Milk Products heretofore and hereafter developed which so differ in design, material, fabrication or otherwise as not to conform with the following standards, but which, in the fabricator's opinion, are equivalent or better, may be submitted for the joint consideration of the IAMFES, USPHS, and DIC at any time.

## A

### SCOPE

#### A.1

These standards cover the sanitary aspects of equipment for performing all or a part of the following integral functions: mechanically forming, filling and sealing single service containers for milk and fluid milk products and all parts which are essential to these functions that are furnished as a unit by the manufacturer. These standards do not pertain to the single service container or to free standing container forming equipment or to milk fillers used to fill preformed blow molded single service plastic gallon, 1/2 gallon or quart milk containers.

#### A.2

In order to conform with these 3-A Sanitary Standards, formers, fillers and sealers of single service containers shall comply with the following design, material and fabrication criteria.

## B

### DEFINITIONS

#### B.1

*Product:* Shall mean milk or fluid milk products.

#### B.2

*Container:* Shall mean a single service package or the material being formed into the package.

#### B.3

*Mechanical Forming Equipment:* Shall mean the equipment for performing all or part of the following integral functions without manual contact with any product contact surface of the container: feeding, opening, seaming, forming and sealing, and all parts which are essential to those functions that are furnished as a unit by the manufacturer.

#### B.4

*Mechanical Filling Equipment:* Shall mean the equipment for filling the container with the product without manual contact with any product contact surface of the container.

#### B.5

*Mechanical Sealing Equipment:* Shall mean the equipment for closing and/or sealing the filled container without manual contact with any product contact surface of the container.

#### B.6

##### Surfaces

##### B.6.1

*Product Contact Surfaces:* Shall mean all surfaces which are exposed to the product, surfaces from which liquids may drain, drop or be drawn into the product or into the container, and surfaces that touch product contact surfaces of the container.

##### B.6.2

*Non-Product Contact Surfaces:* Shall mean all other exposed surfaces.

#### B.7

*Mechanical Cleaning or Mechanically Cleaned:* Shall denote cleaning solely by circulation and/or flowing chemical detergent solutions and water rinses onto and over the surfaces to be cleaned, by mechanical means.

#### B.8

*Engineering Plating:* Shall mean plated to specific dimensions or processed to specified dimensions after plating.<sup>1</sup>

#### B.9

*Arithmetical Mean (Ra):* Shall be the arithmetical mean of the absolute values of the profile departure within a sampling length.

## C

### Materials

#### C.1

All product contact surfaces shall be of stainless steel of the AISI 300 Series\*<sup>2</sup> or corresponding ACI\*<sup>3</sup> types (See Appendix, Section E.), or metal which under conditions of intended use is at least as corrosion-resistant as stainless steel of the foregoing types and is non-toxic and non-absorbent, except that:

#### C.1.1

Those surfaces of container forming, closing and sealing devices which touch the product contact surfaces of the container or from which liquids may drain or drop into the container may be made of a non-toxic, non-absorbent metal that is corrosion-resistant under conditions of intended use or may be made of metal made corrosion-resistant and wear-resistant by a covering of an engineering plating of chromium and/or nickel or an equally corrosion and wear resistant non-toxic metal.

#### C.1.2

Integral stainless steel pumps may be covered by an engineering plating of electroless nickel alloy.\*<sup>1</sup> (Also see Appendix, Section H.)

#### C.1.3

Rubber or rubber-like materials may be used for filling nozzles, plungers, compression-type valve plugs, gaskets, diaphragms, sealing rings, O-Rings, rollers, belts, drip shields, protective caps for sanitary connections, container forming and closing parts, filling valve parts, seals and parts having the same functional purpose.

#### C.1.4

Rubber and rubber-like materials when used for specified applications shall comply with the applicable provisions of the 3-A Sanitary Standards for Multiple-Use Rubber and Rubber-Like Materials, Number 18-00.

#### C.1.5

Plastic materials may be used for filling nozzles, plungers, compression-type valve plugs, gaskets, diaphragms, sealing rings, O-Rings, rollers, belts, drip shields, protective caps for sanitary connections, container

forming and closing parts, filling valve parts, seals, short flexible transparent connectors, sight glasses and parts having the same functional purpose.

#### C.1.6

Plastic materials when used for specified applications shall comply with the applicable provisions of the 3-A Sanitary Standards for Multiple-Use Plastic Materials, Number 20-15.

#### C.1.7

Bonded rubber and rubber-like materials and bonded plastic materials having product contact surfaces shall be of such composition as to retain their surface and conformational characteristics when exposed to conditions encountered in the environment of intended use and in cleaning and bactericidal treatment or sterilization.

#### C.1.8

The final bond and residual adhesive, if used, of bonded rubber and rubber-like materials and bonded plastic shall be non-toxic.

#### C.2

Single service gaskets of a sanitary type may be used.

#### C.3

In a former-filler-sealer designed to be sanitized or sterilized by steam, hot air, chemical, or other means, all materials having a product contact surface used in the fabrication of fittings, valves, tubing, gaskets and non-metallic component parts shall be such that they retain their mechanical, metallurgical, and chemical integrity under the conditions encountered in the environment of intended use and in cleaning and bactericidal treatment or sterilization.

#### C.4

All non-product contact surfaces shall be of corrosion-resistant material or material that is rendered corrosion-resistant. If coated, the coating used shall adhere. All non-product contact surfaces shall be relatively non-absorbent, durable and cleanable. Parts removable for cleaning having both product contact and non-product contact surfaces shall not be painted.

## D

### FABRICATION

#### D.1

All product contact surfaces shall have a finish at least as smooth as a No. 4 ground finish on stainless steel sheets and be free of imperfections such as pits, folds and crevices in the final fabricated form (See Appendix, Section F.), except that:

#### D.1.1

Surfaces used to apply sterilizing chemicals to the product contact surfaces of the package material have a surface finish at least as smooth as an Ra finish of 125 microinches (3.18 micrometers) to assure effective performance.\*<sup>4</sup>

#### D.1.2

Product contact surfaces of container forming parts shall have a smooth finish in compliance with D.1 herein and be readily cleanable.

\*<sup>1</sup>QQ-C-320b: Federal Specification for Chromium Plating (Electrodeposited). Amendment 4, April, 1987. Available from: General Services Administration, Seventh and D Sts., NW, WFCIA, Washington, DC 20405 (202-472-2205).

QQ-N-290a: Federal Specification for Nickel Plating (Electrodeposited) November 12, 1971. Available from: General Services Administration, Seventh and D Sts., NW, WFCIA, Washington, DC 20405 (202-472-2205). MIL-C-26074C: 3 May 1985 -- Military Specifications: coatings, electroless nickel, requirements for; as amended by Notice One, 14 May 1971. Supt. Documents, U.S. Printing Office, Washington, DC 20402.

\*<sup>2</sup>The data for this series are contained in the following reference: AISI Steel Products Manual, Stainless & Heat Resisting Steels, December 1974, Table 2-1, pp. 18-19 Available from American Iron and Steel Institute, 1000 16th St., NW, Washington, DC 20036.

\*<sup>3</sup>Alloy Casting Institute Division, Steel Founders Society of America, Cast Metal Fabrication Bldg., 455 State St., Des Plaines, IL 60016.

\*<sup>4</sup>Additional information on arithmetical mean (Ra) is contained in ANSI B46.1-1978 available from the American National Standards Institute, 1430 Broadway, New York, NY 10018 (212/354-3300).

- D.2 All permanent joints in product contact surfaces shall be continuously welded and all welded areas shall be at least as smooth as the adjoining surfaces except that:
- D.2.1 Hoses with permanently attached sanitary fittings may be used for short flexible connections provided they retain their surface and conformational characteristics when exposed to conditions encountered in the environment of intended use and in cleaning and bactericidal treatment or sterilization.
- D.2.2 Woven wire screen may be used in fill nozzles to minimize the generation of foam in the containers.
- D.2.2.1 Woven wire screens shall be designed so they are readily accessible for cleaning, sanitizing and inspection. (See Appendix, Section K.)
- D.2.2.1.1 Screen wires shall be circular in cross section and shall be no less than 0.010 inch (0.25 mm) in diameter.
- D.2.2.1.2 There shall be no more than 40 wires per inch.
- D.2.2.1.3 Multiple screens and/or perforated plates, if used, shall be stacked no more than seven layers thick. Spacers between screens and/or perforated plates, if used, shall be accessible for cleaning and inspection.
- D.2.2.1.4 The edges of the screens shall be pressed, bonded or otherwise treated to prevent unraveling.
- D.3 The thickness of engineering plating on product contact surfaces shall not be less than 0.0002 inch (0.005 mm), except that when these surfaces are other than stainless steel, the thickness of engineering plating shall not be less than 0.002 inch (0.05 mm).
- D.3.1 The minimum thickness of an engineering plating of electroless nickel alloy, as specified in C.1.2 shall be 0.002 inch (0.05 mm).
- D.4 All product contact surfaces shall be readily accessible, and easily cleanable, either when in an assembled position or when removed. Removable parts shall be readily demountable. Fillers designed to be mechanically cleaned and sanitized shall be accessible for manual cleaning and inspection.
- D.5 All product contact surfaces shall be self-draining or self-purging except for normal clingage. The bottom of the filler tank shall have a minimum pitch of 1/8 inch per foot (3 mm per 30 cm) toward the plane of the outlet(s).
- D.6 All filler bowls shall be effectively covered and covers shall be self-draining.
- D.6.1 Filler bowls not designed for sterilization with pressurized steam or mechanical cleaning shall be equipped with a cover having a drop-flange which overlaps the rim of the bowl by at least 3/8 inch (10 mm). The edges of all openings in the bowl cover shall extend upward at least 3/8 inch (10 mm) or be fitted with a permanently attached sanitary pipeline connection conforming to D.13.
- D.6.2 Openings in the bowl cover, except those fitted with a permanently installed sanitary pipeline connection, shall be provided with covers having a downward flange of not less than 1/4 inch (6 mm) so designed as to prevent liquid from entering the filler tank.
- D.6.3 In sealed fillers designed to be sterilized with pressurized steam, the filler tank, if used, shall comply with the applicable ASME code for Pressure Vessels.\*<sup>5</sup>
- D.7 The filling equipment shall be so designed that adjustments necessary during the operation may be made without raising or removing the filler bowl cover(s).
- D.7.1 Filling equipment for aseptic or extended shelf-life operation shall be designed so that adjustments necessary during the operation may be made without jeopardizing the sterility of the unit.
- D.8 Bonded rubber or rubber-like materials and plastic materials having product contact surfaces that are a covering or a gasket to be bonded shall be bonded in such a manner that the bond is continuous and mechanically sound, and so that when exposed to the conditions encountered in the environment of intended use and in cleaning and bactericidal treatment, the rubber and rubber-like material or the plastic material does not separate from the base material. The final bond shall conform to criteria in C.1.7 and C.1.8.
- D.9 Gasket grooves or gasket retaining grooves shall not exceed 1/4 inch (6 mm) in depth or be less than 1/4 inch (6 mm) wide except those for standard O-Rings smaller than 1/4 inch (6 mm).
- D.10 All internal angles of 135 degrees or less on product contact surfaces shall have minimum radii of 1/4 inch (6 mm), except that:
- D.10.1 Smaller radii may be used when they are required for essential functional reasons such as those in filler nozzles. In no case shall such radii be less than 1/32 inch (1 mm) except that:
- D.10.1.1 Holes in perforated plates used in filler nozzles to

\*<sup>5</sup>Section 8 ASME Boiler and Pressure Vessels Code. Available from American Society of Mechanical Engineers, 345 E. 47th St., New York, NY 10017.

minimize the generation of foam in the containers may be round, square or rectangular. If round, the holes must be a minimum of 1/32 inch (1 mm) in diameter. If square or rectangular, the least dimension must be no less than 0.020 inch (0.51 mm) with corner radii of no less than 0.0050 inch (0.13 mm).

D.10.1.2

Smaller radii may be used in fillers when they are required for essential functional reasons such as those for paper scoring devices or mandrels.

D.10.2

The minimum radii in gasket grooves or gasket retaining grooves other than those for standard 1/4 inch (6 mm) and smaller O-Rings shall be not less than 1/8 inch (3 mm).

D.10.3

The minimum radii in grooves for standard 1/4 inch (6 mm) O-Rings shall be not less than 3/32 inch (2 mm) and for standard 1/8 inch (3 mm) O-Rings shall not be less than 1/32 inch (1 mm).

D.11

Shields or guards shall be provided and shall be so designed and located to prevent liquid or other contaminants from draining or dropping into the container or product, or onto product contact surfaces.

D.11.1

Shields and guards may not be required in equipment designed for aseptic or extended shelf-life operation if the system provides a controlled environment such as an enclosure pressurized with sterile air or inert gas, or an environment controlled by flowing air rendered sterile by incineration, filtration, irradiation, or other means.

D.11.2

Each fill valve or valve block shall have a deflector shield installed at the lowest practical location in such a manner that it will collect the maximum amount of condensate draining from the exterior of the valve and valve block and discharge it to waste away from the open container.

D.12

There shall be no threads on product contact surfaces except as provided in D.16.

D.13

All sanitary fittings and connections shall conform with the applicable provisions of the 3-A Sanitary Standards for Fittings, Number 08-19, rev.

D.14

All tubing shall comply with the 3-A Sanitary Standards for Polished Metal Tubing, Number 33-00.

D.15

Flow meters, if used, shall conform with the applicable provisions of 3-A Sanitary Standards for Flow Meters, Number 28-01.

D.16

Pumps, if used, shall conform with the applicable provisions of 3-A Sanitary Standards for Centrifugal and Positive Rotary Pumps, Number 02-08 or 3-A

Sanitary Standards for Homogenizers and Pumps of the Plunger Type, Number 04-03.

D.17

Coil springs having product contact surfaces shall have at least 3/32 inch (2 mm) openings between coils including the ends when the spring is in a free position. Coil springs shall be readily accessible for cleaning and inspection.

D.18

If coding and/or dating is to be performed, coding and/or dating devices shall be designed, installed and operated such that these operations are performed in such a manner that open containers are not subject to contamination. If shielding is provided, it shall be properly designed and installed to preclude contamination of open containers.

D.19

The filler shall be mounted on legs or casters that will provide a clearance between the lowest fixed point on the filler and the floor of at least 4 inches (10.2 cm) when the base outlines an area in which no point is more than 12 1/2 inches (32 cm) from the nearest edge, or a clearance of at least 6 inches (15 cm) when any point is more than 12 1/2 inches (32 cm) from the nearest edge.

D.19.1

Legs, if provided, shall be smooth with rounded ends and have no exposed threads. Legs made of hollow stock shall be sealed.

D.19.2

Casters, if provided, shall be durable and of a size that will permit easy movement of the filler.

D.20

Any guard(s) required by a safety standard that will not permit accessibility for cleaning and inspection, shall be designed so it (they) can be removed without tools.

D.21

Non-product contact surfaces shall have a smooth finish, be free of pockets and crevices and shall be readily cleanable. Surfaces to be coated shall be effectively prepared for coating.

D.22

*Defoamer System*

D.22.1

Milk and milk products from continuous defoamers shall not be returned directly to the filler bowl. (See Appendix, Section G.)

D.22.2

If a defoamer system is provided, all surfaces from which foam may drain, drop or be drawn into the product shall be constructed in conformance with D.4. All surfaces of blower or vacuum lines subject to contact with foam shall be constructed in such a manner as to be readily accessible for cleaning and sanitizing.

D.23

Steam used as the sterilizing medium of product contact surfaces shall meet the criteria for culinary steam

as specified in 3-A Accepted Practices for a Method of Producing Steam of Culinary Quality, Number 609-00.

D.24 Recirculated cooling media shall be non-toxic and properly protected. Mandrels, piping and other equipment cooled by recirculated cooling media shall be designed to preclude leakage of cooling media or condensate into product or containers.

D.25 When supplied by the manufacturer, equipment for the intermittent fogging or spraying of sanitizer solutions shall be installed in such a manner that they do not interfere with the access to all product contact surfaces for cleaning and inspection.

D.25.1 Automatically timed intermittent systems shall operate only after the filling operation has been stopped, and all containers isolated and/or properly protected before fogging or spraying begins. Sufficient time shall be allowed for solutions to drain from the equipment before filling is resumed.

D.26 All air under pressure used in contact with product or product contact surfaces shall be in compliance with 3-A Accepted Practices for Supplying Air Under Pressure in Contact with Milk, Milk Products and Product Contact Surfaces, Number 604-03.

## APPENDIX

E

### STAINLESS STEEL MATERIALS

Stainless steel conforming to the applicable composition ranges established by AISI\*<sup>2</sup> for wrought products, or by ACI\*<sup>3</sup> for cast products, should be considered in compliance with the requirements of Section C.1 herein. Where welding is involved, the carbon content of the stainless steel should not exceed 0.08%. The first reference cited in C.1 sets forth the chemical ranges and limits of stainless steels of the 300 series. Cast grades of stainless steel corresponding to types 303, 304, and 316 are designated CF-16F, CF-8 and CF-8M, respectively. These cast grades are covered by ASTM\*<sup>6</sup> specifications A351/A351M, A743/A743M, and A744/A744M.

F

### PRODUCT CONTACT SURFACE FINISH

Surface finish equivalent to 150 grit or better as obtained with silicon carbide properly applied on stainless steel sheets is considered in compliance with the requirements of Section D.1 herein.

G

### HANDLING OF COLLECTED MILK

If the milk or milk product collected in the defoamer

system is intended to be used for human consumption, the following procedures are recommended:

G.1

It should be protected from contamination during collection and in subsequent handling.

G.2

It should be maintained at or below 45 degrees F (7 degrees C) or less.

G.3

It should be repasteurized.

H

### ELECTROLESS NICKEL ALLOY

H.1

An electroless nickel alloy coating having the following composition is deemed to be in compliance with C.1.2 herein:

Nickel - 90% minimum

Phosphorous - 6% minimum and 10% maximum, as a supersaturated solution of nickel phosphide in nickel. Traces of carbon, oxygen, hydrogen, and nitrogen. No other elements.

K

### RECOMMENDED CLEANING AND SANITIZING OF MULTIPLE-USE NOZZLE SCREENS

The filler nozzle screens should be mechanically cleaned with the rest of the filler system. The screens should then be removed, inspected, cleaned as needed and autoclaved at 250 degrees F (121 degrees C) for 30 minutes. The screens should be reassembled in the filler nozzle immediately prior to sanitizing the filler.

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\*Available from ASTM, 1916 Race St., Philadelphia, PA 19103.

These standards shall become effective December 6, 1989, at which time the 3-A Sanitary Standards for Fillers and Sealers of Single Service Containers for Milk and Fluid Milk Products, Number 17-06 are rescinded and become null and void.



# Coming Events

1989

## OCTOBER

- **1-4, Fourteenth Annual Tropical and Subtropical Fisheries Technological Conference of the Americas.** To be held at Buckhead Holiday Inn, Atlanta, GA. For more information, contact: Keith Gates, The University of Georgia Marine Extension Service, PO Box Z, Brunswick, GA 31523 (912) 264-7268.
- **2-4, Advanced Quality Assurance & Sanitation Managers Workshop.** American Institute of Baking, Manhattan, KS, (913) 537-4750.
- **10-12, Second Annual International symposium on Biotechnology,** College Park, MD, (301) 454-6056
- **11-13, Food Preservation,** sponsored by the American Association of Cereal Chemists will be held in San Diego, CA. For more information, contact: AACC, 3340 Pilot Knob Rd., St. Paul, MN (612) 454-7250.
- **15-18, MIF & IICA 1989 Convention,** Boston, MA, (202) 296-4250.
- **17-18, AIB Food Plant Sanitation Workshop for Food Plant Employees,** will be held at the Red Lion Inn, San Jose, California. For more information contact: The Registrar at (913) 537-4750 or 1-800-633-5137.
- **22-24, National Frozen Food Convention and Exposition** to be held at the Hilton, Atlanta, GA. For information on the convention, contact: National Frozen Food Association, PO Box 398, Hershey, PA 17033 (717) 534-1601, or the American Frozen Food Institute, 1764 Old Meadow Lane, Suite 350, McLean, VA 22102 (703) 821-0770.
- **23-24, Pests Associated with Food Industry and Environmental Sanitation Seminar,** Okumura Biological Institute, Holiday Inn, Elk Grove Village, IL. Contact: George Okumura, 6669 14th St., Sacramento, CA 95831 916/421-8963.
- **23-25, Quality Control and Stability and Testing.** Organizational approaches to establishing product quality monitoring systems within manufacturing and R&D: methods for measuring product quality and stability, including design and analysis. For more information, contact: Marjorie Sterling Stone 415/365-1833.
- **23-25, California Association of Dairy & Milk Sanitarians** will be held at the Holiday Inn, Visalia, CA. For more information, contact: Jack Coppes (213) 699-4313.
- **25-26, Advanced Course on Pest Recognition and Food Industry Problems,** Okumura Biological Institute, Holiday Inn, Elk Grove Village, IL. Contact: George Okumura, 6669 14th St., Sacramento, CA 95831 916/421-8963.
- **30-Nov. 1, 7th Annual Conference on New Products,** in Ft. Lauderdale, FL.

## NOVEMBER

- **2-5, Second International Symposium on Horticulture & Human Health.** Alexandria, VA, Radisson Mark Plaza, (703) 836-4606.
- **4-9, EMA 1989 National Educational Conference and Trade Show** to be held in Clearwater Beach, Florida at the Holiday Inn Surfside. For more information, contact EMA headquarters at 1019 Highland Ave., Largo, FL 34640 (813) 586-5710.
- **6-8, 1989 Food Processing Waste Conference,** will be held at the Omni International Hotel, Atlanta, GA. For more information, contact: Edd Valentine or Chuck Ross, Georgia Tech Research Institute, Economics Development Laboratory, Environment, Health and Safety Division, O'Keefe Bldg, Atlanta, GA 30332 (404) 894-3412.
- **6-10, Advanced Bakery Production.** American Institute of Baking, Manhattan, KS. Contact: Melinda Enns at (913) 537-4650.
- **9-10, Water Activity,** sponsored by the American Association of Cereal Chemists, will be held in Chicago, IL. For more information, contact: AACC, 3340 Pilot Knob Rd., St. Paul, MN 55121 (612) 454-7250.
- **11-15, Dairy and Food Industries Supply Assoc., Inc.** McCormick Place, Chicago, Illinois.
- **13-14, Tailoring Dairy Packaging & Distribution - Tomorrow's Needs** sponsored by the International Dairy Federation and the U.S. National Committee of the International Dairy Federation. This Seminar will be held in conjunction with the DFISA Expo in Chicago. For more information, contact: Harold Wainess, Secretary, U.S. National Committee of the IDF, 464 Central Ave., Northfield, IL 60093 (312) 446-2402.
- **13-14, Sanitation Through Design.** American Institute of Baking, Manhattan, KS. Contact: Melinda Enns at (913) 537-4750.
- **13-17, Cookie and Cracker for Allied Personnel.** American Institute of Baking, Manhattan, KS. Contact: Melinda Enns at (913) 537-4750.
- **15-17, Gum Chemistry and Technology,** sponsored by the American Association of Cereal Chemists, will be held in Chicago, IL. For more information, contact: AACC, 3340 Pilot Knob Rd., St. Paul, MN 55121 (612) 454-7250.
- **16, Sanitation Workshop for the Food Industry.** Presented by the University of California Cooperative Extension with assistance from industry trade associations and food industry personnel. Held at Inn at the Park, Anaheim, California. For more information, contact Kathryn Boor, Food Science and Technology, UCD, Davis, CA 95616; (916) 752-1478.
- **23, Ontario Food Protection Association • Annual Meeting and Scientific Symposium,** Foodborne Lister-

## Other IAMFES Publications

IAMFES also publishes:

- Procedures to Investigate Foodborne Illness
- Procedures to Investigate Waterborne Illness
- Procedures to Investigate Arthropod-borne and Rodent-borne Illness  
Used by health department and public health personnel nationwide, these manuals detail investigative techniques and procedures based on epidemiologic principles for the identification and analysis of illness outbreaks and their sources.
- 3-A Sanitary Standards for Dairy and Egg Processing Equipment  
Formulated by the cooperative effort of industry and regulatory groups, the standards represent criteria for the cleanability of dairy and egg processing equipment. The standards cover materials and fabrication of the equipment design.

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osis: Science or Politics. Airport Hilton Hotel, 5875 Airport Road, Mississauga, Ontario. For more information, call Patrick Kwan at (416) 672-6633.

•28-30, **Experimental Baking.** American Institute of Baking, Manhattan, KS. Contact: Melinda Enns at (913) 537-4750.

## DECEMBER

•4, **Pesticide Applicator Certification Seminar,** Okumura Biological Institute, Clarion Hotel, Sacramento, CA. Contact: George Okumura, 6669 14th St., Sacramento, CA 95831 916/421-8963.

•4-6 **Microbiology and Engineering of Sterilization Processes.** A three day course given at the University of Minnesota, St. Paul Minnesota Campus. For further information contact Dr. William Schafer, Course coordinator, Department of Food Science and Nutrition, 1334 Eckles Avenue, St. Paul, MN 55108, 612-624-4793.

•4-6, **Bagels! Bagels! Bagels!** American Institute of Baking, Manhattan, KS. Contact: Melinda Enns at (913) 537-4750.

•5-6, **Pests Associated with Food Industry and Environmental Sanitation Seminar,** Okumura Biological Institute, Clarion Hotel, Sacramento, CA. Contact: George Okumura, 6669 14th St., Sacramento, CA 95831 916/421-8963.

•5-7, **International symposium** to be held at Battelle in Columbus, Ohio. Registration material available from Phillip Wells, The Conference Group, 1989 West Fifth Avenue, Suite 5, Columbus, Ohio 43212, 614-424-5461, FAX 614-488-5747.

•6-7, **Starch: Structure, Properties, and Food Uses,** sponsored by the American Association of Cereal Chemists, will be held in Chicago, IL. For more information, contact: AACC, 3340 Pilot Knob Rd, St. Paul, MN 55121 (612) 454-7250.

•7-8, **Advanced Course on Pest Recognition and Food Industry Problems,** Okumura Biological Institute, Clarion Hotel, Sacramento, CA. Contact: George Okumura, 6669 14th St., Sacramento, CA 95831 916/421-8963.

•18-20, **In-Store and Retail Bakery Management.** American Institute of Baking, Manhattan, KS. Contact: Melinda Enns at (913) 537-4750.

1990

## JANUARY

•8-12, **Technology of Bakery Production.** American Institute of Baking, Manhattan, KS. Contact: Melinda Enns at (913) 537-4750.

•8-12, **Electrical Troubleshooting.** American Institute of Baking, Manhattan, KS. Contact: Melinda Enns at (913) 537-4750.

•15-26, **Baking for Allied & Non-Production Personnel.** American Institute of Baking, Manhattan, KS. Contact: Melinda Enns at (913) 537-4750.

•17-19, **5TH Annual Biotechnology Process Engineering Symposium** at the Massachusetts Institute of Technology. For more information contact: Biotechnology Process Engineering Center, Conference Coordinator, M.I.T., Room 20A-207, Cambridge, MA 02139

•29-31, **Baking Production Technology.** American Institute of Baking, Honolulu, HI. Contact: Melinda Enns at (913) 537-4750.

•29-Feb. 1, **Basic Food Processing Sanitation.** American Institute of Baking, Manhattan, KS. Contact: Melinda Enns at (913) 537-4750.

## FEBRUARY

•5-June 15, **Baking Science and Technology #136.** American Institute of Baking, Manhattan, KS. Contact: Melinda Enns at (913) 537-4750.

•5-9, **Specialized Cookie.** American Institute of Baking, Manhattan, KS. Contact: Melinda Enns at (913) 537-4750.

•12-16, **Bakery Management.** American Institute of Baking, Manhattan, KS. Contact: Melinda Enns at (913) 537-4750.

•26-27, **Kentucky Association of Milk, Food and Environmental Sanitarians' Annual Conference** to be held at the Holiday Inn Convention Center, Louisville, KY. For more information, contact Debbie Pierce, Secretary, KAMFES, PO Box 1464, Frankfort, KY 40602 (502) 564-3340.

## MAY

•23-25, **Rural Health Conference,** will be held at the Ramkota Inn in Pierre, South Dakota.

## AUGUST

•15-18, **FOOD PACIFIC, 1990** will be held at Vancouver's domed stadium, B.C. Place. Those wishing to attend may obtain further information by contacting: B.C. Food Exhibitions Ltd., 190-10651 Shellbridge Way, Richmond, B.C., Canada V6X 2W8 (604) 660-2288.

## SEPTEMBER

•10-13, **104th Annual International Meeting & Exposition,** to be held at the Clarion Hotel, New Orleans, Louisiana. For more information, contact: Margaret Ridgell, AOAC, Suite 400, 2200 Wilson Blvd., Arlington, VA 22201-3301 (703) 522-3032.

## OCTOBER

•7-12, **Twenty-Third International Dairy Congress**, will be held in Montreal, Canada. For further information, contact: Richard Stern, Executive Director, International Dairy Congress, 1990, PO Box 2143, Station D, Ottawa, Ontario, Canada K1P 5W3 (613)238-4116.

## NOVEMBER

•6-8, **International Cheese Technology Exposition** will be held in Milwaukee, Wisconsin. For further information, contact: USCMA/WCMA, P.O. Box 2133, Madison, Wisconsin, 53701, (608)255-2027.

## DECEMBER

•12-18, **American Society of Agricultural Engineers** will be sponsoring the International Symposium on Agricultural and Food Processing Wastes. For more information contact: Jon Hiler, American Society of Agricultural Engineers, 2950 Niles Road, St. Joseph, MO 49085 616/429-0300.

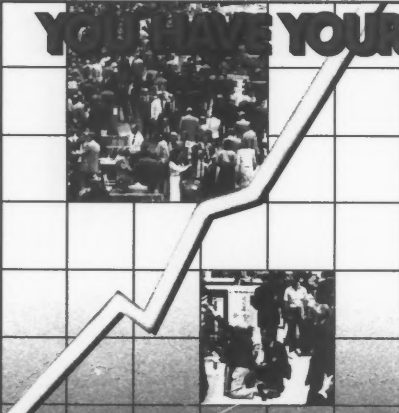
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## JANUARY

•22-23, **Third Annual Southern California Food Industry Conference** will be held on the campus of Chapman College in Orange, California. For more information contact: Walt Clark, Chapman College, Food Science & Nutrition Department, Orange, CA 92666 PH: (714) 997-6869 FAX: (714) 532-6048 or Patrick Cochran, La Loma Foods, P.O. Box 8863, Riverside, CA 92515 PH: (714) 351-4300 FAX: (714) 351-3635.

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|------------------|-------------------|---------------|------------|---------------|
|                  |                   |               | CIA        | BST           |
| Beta-lactams     | Benzylpenicillin  | 2             | 3          | 3             |
| Sulfonamide      | Sulfamethazine    | 5             | 10         | 15,000-20,000 |
| Tetracycline     | Tetracycline      | 250           | 250        | 800           |
| Marcrolides      | Erythromycin      | 20            | 200        | 200           |
| Chloramphenicol  | Chloramphenicol   | 50            | 3000       | 10,000        |

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Nothing works like a Charm.

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