ISSN: 1043-3546

502 E. Lincoln Way • Ames • Iowa • 5001

January • 1991

Vol • 11 • No. 1 • Pages 1-56

DAIRY, FOOD AND ENVIRONMENTAL

SANITATION

JANUARY 1991

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

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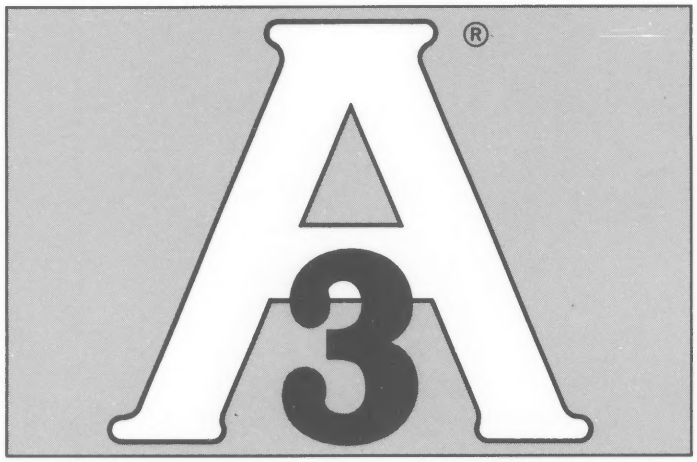

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Thoughts From the President . . .

By
Bob Sanders
IAMFES President

Well, it is time again for me to write my monthly column. Margie called today and said, "Where is it? We needed it yesterday." That's what I hate about deadlines.

First, I want to wish all a HAPPY NEW YEAR. I hope all of you made some new year's resolutions and that you have kept them longer than I did mine.

The plans for the 78th annual meeting are progressing smoothly. As I related to you last month we are planning a couple of new innovations for this year's meeting. If our plans work out, we will be offering a one day workshop on Saturday prior to the start of the meeting. Workshops have been considered for several years but this is the first year that the executive board has decided to carry it through and sponsor the workshop. I will be bringing you more information on this as the plans are finalized. Watch future journals for announcements and subject material on this workshop. Another first will be the poster session scheduled for Wednesday. Many other organizations have found these poster sessions to be very helpful in bringing information to others. If you or one of your colleagues has a project you would like to present in the form of a poster, please contact John Bruhn, Damien Gabis or Steve Halstead for details on what you need to do to present your ideas at the poster session. Additional details will appear in the February journal.

For those of you, like myself, who are working in the dairy sanitation field, you are probably making plans to attend the National Conference on Interstate Milk Shipments in April. Incidentally the NCIMS meeting will be held in the same Hotel that IAMFES will be holding it's annual meeting in July. You will get a preview of the Galt House and see what a fine facility it is and what a fine job their employees will be doing to make our annual meeting a success again this year.

It's still not too late to submit a paper for presentation at this year's annual meeting. The program committee will continue to receive abstracts up to the middle of the month. Details and abstract forms were in the October journal.

As you can see I really don't have too much to say this month. It seems this has turned into a reminder column. While I'm at it I should remind you to express your opinion on the name change for our organization. The Name Change committee will be sending out ballots along with the ballots for election of this year's new Secretary. Be sure to fill it out and express your opinion. Let's end this name controversy once and for all.

Once again, have a Happy and Prosperous New Year!

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Dairy, Food and Environmental Sanitation (ISSN-1043-3546) is published monthly by the International Association of Milk, Food and Environmental Sanitarians, Inc., executive offices at 502 E. Lincoln Way, Ames, IA 50010. Printed by Heuss Printing, Inc., 911 N. Second St., Ames, IA 50010. Second-class Postage paid at Ames, IA. **POSTMASTER**: Send address changes to Dairy, Food and Environmantal Sanitation C/O IAMFES, 502 E. Lincoln Way, Ames, IA 50010-6666.

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Dairy, Food and Environmental Sanitation, Vol. 11, No. 1, Pages 4-11 (January 1991)

Monitoring Mastitis, Milk Quality and Economic Losses in Dairy Fields

Jeffrey K. Reneau[1] and Vernal S. Packard[2]

Abstract

This paper reviews production losses from both clinical and subclinical mastitis. It also reviews the application of the bulk tank somatic cell count (BTSCC) as a monitor of mastitis in the dairy herd and as an indicator of various aspects of milk quality. In recent years, incentive payments by dairy processors for milk of low somatic cell count have begun to provide the necessary motivation to significantly improve control efforts on the dairy farm. The BTSCC appears to serve this process well. Test results provide a good gauge of the status of mastitis in a dairy herd. In addition, BTSCC has also been found to be a good indicator of the quality of raw milk, pinpointing a major source of contamination with spoilage organisms, predicting shelf-life of processed milk and dairy products and providing information about the cheese-yield potential of a milk supply.

Introduction

Lower incidence of mastitis and improved milk quality are major factors in determining farm profitability. Production of high quality milk means a higher price and more efficient milk production to the dairy farmer. To the processor, successful procurement of high quality raw milk means higher product yield in some instances and a longer shelf life of dairy products.

Today's health-conscious consumer expects high quality, safe food. Consumer acceptance of milk and milk products is the driving force of the milk quality issue today. It is anticipated that over the next decade consumer preoccupation with food safety and wholesomeness will play an important role in success or failure in maintaining or expanding markets.

Historically, milk monitors were established to safeguard human health. Brucellosis, TB and other milkborne diseases were widespread and a significant health threat. Since the advent of pasteurization, there have been relatively few incidents of milkborne disease. For the past thirty years, milk has had the reputation of being "nature's most nearly perfect food." Today, milk quality standards focus as much on maintenance and improvement of milk composition, chemical and drug purity as on disease considerations.

Whether to safeguard human health, improve dairy product acceptance or increase milk production efficiency, economics is the motivation behind all milk quality standards. Ultimately all milk quality issues become economic issues.

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Mastitis Losses

There is worldwide agreement that mastitis is the single most costly disease on the dairy farm (see Table 1). Direct comparisons are difficult because of differences in milk yield, composition, breed, lactation and previous infection status. However, comparisons between results of these studies in several different countries with cows in widely different circumstances indicate agreement that the extent of loss to mastitis is great. Miller *et al.* (70) recently reported that mastitis accounted for 26% of all dairy cattle disease costs in Ohio, a cost that was twice that of infertility and reproductive diseases. Studies in which mastitis losses were itemized (11,22,56) have concluded that approximately 70 to 80% of the loss was due to subclinical mastitis while 20 to 30% was associated with clinical mastitis (see Table 2).

Table 1. Mastitis loss expressed as effect on milk yield

Year	Investigator(s)	Country	Milk yield loss
1936	Minett and Martin	U.S.	10.8-19.5%
1958	Plastridge	U.S.	10.0-14.8%
1959	Rowland et al.	U.K.	15.3±2.5%
1960	O'Donovan et al.	U.K.	5.0-24.0%
1962	Gray and Schalm	U.S.	6.0-24.5%
1962	Rako et al.	Yugoslavia	15.2-83.9%
1964	Forster	U.S.	0.76-5.86 lb/qtr/day
1965	Appleman et al.	U.S.	0.9-6.8 lb/cow/day
1965	Car	Yugoslavia	991.5-1,500 kg/cow/lactation
1965	Natzke	U.S.	0.41-1.58 lb/qtr/milking
1965	Noorlander et al.	U.S.	3.0-10.6 lb/cow/day
1966	Daniel et al.	Canada	49 lb/cow/month/unit CMT
1966	Landrey	So. Africa	10.5-25.0%
1967	Forster	U.S.	9.4-43.3/qtr/day
1967	Hradil and Svitavsky	Czechoslovakia	8.5%
1967	Philpot	U.S.	2.8-45.5%/qtr/day
1968	Bishop and Compaan	So. Africa	30.5lb/infection (28-d period)
1969	Gayle and Moody	U.S.	10-28 lb/cow/day
1977	Dobbins	U.S.	10.2%
1979	Blosser	U.S.	11.0%

Adapted from Janzen (48).

Table 2. Percent of total mastitis loss accounted for by clinical mastitis.

	Dobbins (22) 1977 %	Blosser (11) 1979 %	Kirk (56) 1988 %
Discarded milk	3.0	10.9	3.0
Drug cost	1.0	3.6	2.7
Veterinary fees	2.5	1.8	--
Extra labor	0.5	1.8	--
Cull cost	12.7	12.7	16
	19.7	30.8	21.7

Subclinical Mastitis Loss

Measurement of Subclinical Mastitis and Economic Incentives

It has been a major effort to convince dairy farmers of the importance of subclinical mastitis. Extensive research work at NIRD in the 1960's and early 1970's led to the development of effective mastitis prevention and control methods that are the foundation of virtually all mastitis prevention methods used today. Economic data was accumulated demonstrating impressive mastitis reduction and a 300 to 500% benefit ratio by application of these methods. Yet many dairy farmers were unimpressed, and it has taken nearly 25 years to achieve application of many of these very basic mastitis control procedures.

Basically, the problem has been that: (l) dairy farmers were not convinced of the enormous impact of subclinical mastitis; a philosophy of "what you can't see won't hurt you" prevailed, and (2) there was no economic incentive to produce higher quality milk. The price of mastitis-tainted milk was the same as that of high quality, low somatic cell count (SCC) milk (15,71).

The advent of electronic somatic cell counting provided the necessary measurement tool and educational opportunity to raise dairy farmer awareness of subclinical mastitis. Finally, the invisible became more obvious. Programs monitoring bulk tank and individual cow somatic cell counts have become universally available. Reports on bulk tank somatic cell count (BTSCC) and Dairy Herd Improvement (DHI) individual cow SCC routinely reminded farmers of the subclinical mastitis problem.

In 1975, Booth stated: "...it appears that any real impact in controlling mastitis will only be created by direct financial incentives. Penalties, which would only directly affect a small proportion of farmers at the worst end of the scale, are unlikely to result in any significant improvement in the control of mastitis nationally. A financial incentive, which may be as little as 4 or 5% of the milk price, will stimulate a national effort to reduce the present high mastitis levels in our dairy herds." (15). Experience in the United States verifies this observation. California has consistently had the highest quality milk supply in the United States. Milk quality has been an issue in California longer than any other state, the first quality premium program being instituted by California Cooperative Creamery 27 years ago (66). More recent experience in England and the Upper Midwestern United States shows dramatic improvement in milk quality as a result of payment of quality premium incentives (15,31). One Upper Midwest producer cooperative has seen a decline in average annual somatic cell count from 528,000/ml at the introduction of its incentive program to 291,000/ml ten years later (3,38). A dramatic decrease in freezing point of milk supplies in the Minneapolis/St. Paul market over recent years also gives evidence of improvement in milk quality and/or composition (78).

SCC: Most Universal Estimator of Milk Quality

Kitchen (57) suggests that milk is an end point for a host of pathologic changes in response to mammary inflammation. Bennet (9) proposed that the SCC is the most universally useful measure of both milk quality and mastitis.

Traditionally, dairy and veterinary scientists have used BTSCC and individual cow SCC data as indicators of udder health. Their interest in milk microbiology has been limited mainly to interest in mastitis pathogens via individual quarter, cow or bulk tank culturing.

Food scientists, on the other hand, have focused their attention on categories of bacteria and their association with off flavors and spoilage. Methods for detecting spoilage organisms have been applied both to raw milk and finished, pasteurized products. Of late, emphasis has centered mainly on psychrotrophic bacteria, i.e., those bacterial species able to tolerate, grow and multiply at temperatures below 10°C, but whose optimum rate of growth occurs at considerably higher temperatures. Presence of high numbers of these organisms in raw milk can cause keeping quality problems in pasteurized milk products essentially free of post-pasteurization contamination with the same kinds of organisms (79). The Standard Plate Count (SPC), the test method most commonly applied to raw milk as a basis of assessing quality, does not adequately assess presence of these organisms nor of specific unsanitary conditions that might lead to their presence (8,20,53,87,94,). Both preliminary incubation (PI) of raw milk (42,51,54,64,89,95) and 5 - 7 day storage of pasteurized milk (Moseley Test) (30,52,58,64,86) have been used to enhance detection of psychrotrophs. Although both procedures serve a useful purpose in this regard, both have been or may be criticized as being lengthy and expensive procedures (8,50,64,81). Coliform tests, also used as a measure of raw and finished product quality, suffer generally the same problems as those associated with the SPC. In addition, coliform tests account for even fewer of the total potential contaminating organisms than the SPC. Similar to the PI adaptation of the SPC, PI has also been used in enumeration of coliform organisms in raw milk (2) and pasteurized milk (59). Growth of these organisms has been linked to off flavor development in pasteurized products (60).

Efficiency of testing has been greatly enhanced through introduction of several different automated procedures (18,82,85,93,102). Both the Direct Epifluorescent Filter Technique and the ATP method have been found to predict keeping quality of pasteurized milk in tests requiring not more than 24 hours (92,102). An impedimetric method has served to enumerate mesophilic, psychrotrophic and total count in raw milk within 4, 16 - 22, and 16 hours, respectively (35). As such, however, the preceding test methods evaluate essentially the same microflora as their more time-consuming counterparts. They are no more nor no less appropriate and serve no better in pin-pointing sources of contamination. In tests on raw milk, they serve no better than conventional tests in predicting keeping quality of pasteurized milk products.

The latter objection may to some extent be surmounted through modification of psychrotrophic tests to determine numbers of these organisms able to survive pasteurization. Evidence exists to indicate that a few species can do so (67,105). Those generally referred to as "thermoduric psychrotrophs" survive heat treatment of 74°C, 17 seconds (105), those termed spore formers temperature treatment of 80°C, 10 minutes (67). In both instances, organisms meeting these requirements have been found in raw milk, thereby

ensuring their presence in otherwise uncontaminated pasteurized/heat-treated milk. These organisms cause production of bitter off flavors through breakdown of proteins. That proteolysis forms the basis of their deteriorative process would suggest a negative influence both on flavor of cheese and cheese-yield potential of milk supplies (47). As a result, a test for these organisms in raw milk gives evidence of possible future quality of finished dairy products. Disadvantages include the lack of detection of other kinds of spoilage organisms as well as the addition of an intermediate step (heat treatment) in the analytical procedure.

Of obvious importance to maintenance of quality of dairy products is the application of test procedures that pinpoint significant sources of contamination. In this regard, the teats and udders of cows have been shown to be major sites. McKinnon and Pettipher (67) found that 90% of thermoduric and psychrotrophic bacteria in raw milk originated from the teat surfaces. Fortuitously enough, teat surface contamination is also directly related to incidence of mammary inflammation. Therefore, test procedures that serve directly or indirectly to measure levels of organisms associated with teat surfaces would appear to serve not only as good predictors of milk quality, but as indicators of the primary source of the organisms. In this regard, tests for psychrotrophs have been found to discriminate better than the SPC, coliform and PI applications of both SPC and coliforms the pre-milking hygiene of teats and udders (101). At the same time, the BTSCC takes on major significance as both an indicator of udder infections and of teat surface contaminants known to lead to poor quality finished dairy products. Janzen (49) was one of the first researchers to draw attention to the relationship between somatic cell concentration in raw milk and the shelf-life of the finished, processed product. Senyk *et al.* (100) found a good relationship between somatic cell counts and presence of off flavors and proteolysis in pasteurized milk. Moreover, the workers noted that flavor and chemical deterioration was not necessarily associated with bacterial growth during refrigerated storage of processed milk. High somatic cell counts, therefore, assumed significant independent potential as a predictor of shelf-life.

In recent years, major attention has been drawn to the influence of SCC on cheese yield potential of milk supplies (6). Notable in this regard is the research finding of Saeman *et al.* (96) showing a positive correlations between high SCC and milk plasmin levels and the resulting increase in casein degradation. Other workers (41) have shown that for each log unit increase in somatic cell count, casein level is reduced by 1.85%. In a cheese plant receiving one million pounds of milk daily, a loss of this magnitude translates into an annual loss in yield of cheese of over 300,000 pounds (77). In addition, increases in SCC have been found to decrease rate of acid production, increase moisture content of cheese and the time required to manufacture cheese (88). Fat recovery, too, is lowered in cheeses made from milk of high cell count (6).

As previously noted, proteolysis, the breakdown of protein that leads to losses in cheese yield, likewise causes flavor deterioration in processed milk products. Enzymes are active both in raw milk during storage and following pasteurization (98). In Ultra-High-temperature (UHT) products, presence of proteolytic enzymes reduce shelf-life by hastening off-flavor development and onset of gelation.

Based on the preceding findings, it is apparent that the dairy industry would do well to focus major attention on BTSCC as a gauge of raw milk quality. Bennet's recent conclusion that this test may very well be the most universal monitor of milk quality and mastitis (9) bears repeating and re-emphasis. At the present time, this test appears to be the cheapest, most readily available and most practical monitor to apply. However, to derive maximum benefit as a mastitis diagnostic tool, SCC data must be teamed with other more definitive microbiological test procedures. The same might also be said in application of SCC as a monitor of raw and/or finished product quality. More research would be helpful in determining the extent to which BTSCC accurately gauges these quality parameters as well as the test's reliability as an indicator of teats and udders as the primary source of contaminants. Additionally, the relative imprecision of SCC testing takes on greater significance.

Bulk Tank Somatic Cell Counting

1. As indicator of mastitis and milk quality: BTSCC is used extensively throughout Europe and North America to monitor mastitis. The National conference on Interstate Milk Shipments, with approval of the United States Public Health Service, initiated BTSCC as an indicator of milk quality in 1967 (65). Tabulation of BTSCC data across Europe by the International Dairy Federation has facilitated the monitoring of mastitis and milk quality in most European countries. Under the direction of the National Mastitis Council, similar attempts at developing a national mastitis and milk quality monitoring system are underway in the United States (10). Accumulation of such data provides opportunity to document progress of national, regional or local efforts to improve milk quality, evaluate educational impact, and identify mastitis research needs and priorities (11,45,46,83).

2. In estimating loss in milk yield: Numerous studies have drawn associations between increases in BTSCC and losses in milk yield (see Table 3). Data from various countries all indicate a significant potential for losses.

Table 3. Estimated losses in milk yield per cow for every 100,000 increase in bulk tank SCC.

Year	Investigator(s)	Country	Milk loss litres/cow/day
1971	Pearson (80)	No. Ireland	.32
1977	Mein, Gilmour and Ballek (68)	Australia	.18
1978	Gill and Holmes (39)	New Zealand	.23-.32
1982	Barnum and Meek (7)	Canada	.44
1982	Eberhart, Hutchinson & Spencer (29)	U.S.	.5

3. In estimating prevalence of herd mastitis: Pearson and Greer (80) showed that high BTSCC was associated with high prevalence of mastitis and a decreased milk yield. Westgarth (104) and Postle *et al.* (84) reported a low correlation (r = . 5) between BTSCC and mastitis prevalence. Postle concluded that the day to day variation in BTSCC's made a single BTSSC unreliable for determining mastitis prevalence. Gill and Holmes (39) found good correlation between the annual average BTSCC and both subclinical and clinical mastitis (r = .85 and .90, respectively). Eberhart *et al.* (29) also found a significant positive correlation between BTSCC and

herd mastitis prevalence with major pathogens (r=.77). When an average of multiple BTSCC was used to reduce the effects of day to day variation, each 100,000 BTSCC increase resulted in an approximate 3.3% increase in mastitis prevalence (Table 4).

Table 4. Relationship of bulk tank somatic cell counts to prevalence of intramammary infection and herd milk production.

BTSCC (1000's/ml)	% of herd production loss for BTSCC >200,000	Estimate of % quarters infected
200		6% ± 4.8%
500	6.5	16%
1000	17.7	32%
1500	28.7	48% ± 12.8%

Eberhart et al. (29).

As is apparent from the above discussion, sampling frequency also needs to be emphasized. Sampling frequency is an important consideration in the reliability and usefulness of biological data. Obviously the predictive value of milk quality and mastitis monitors is improved by increasing sampling frequency. This consideration must always be weighed with the realm of economic practicality.

Use of SCC on Individual Cows

Individual cow SCC testing by DHIA in the United States and Canada has expanded the usefulness of SCC data (23,90,91). Routine monthly SCC analyses enable identification of the infected cows in the herd, observation of herd trends and epidemiologic characterization of herd mastitis problems (90,91).

Adoption of the log 10 linear transformation of raw SCC data facilitates easier SCC analysis and more accurate interpretation. The greatest advantage of expressing raw SCC data in the linear score format is its linear relationship with milk yield (1,21,25,34,55).

Questions have been raised about the accuracy of loss estimates using linear SCC. This is particularly problematical in herds with low prevalence of mastitis or in estimating milk yield losses on individual cows with low cell counts (50,000 to 200,000/ml). Fox *et al.* (36) did show milk composition changes and milk production response consistent with those seen in mastitis in cows with quarter SCC less than 100,000/ml. However, each doubling of cell count was associated with a decrease of 0.12 kg milk production, about one third that derived by others.

Natzke (74) suggested the possibility that compensatory production of uninfected quarters may be a confounding factor in production loss estimates. It may be possible for a cow of high genetic merit but low nutritional input to shift the secretory workload to an uninfected quarter or to unaffected cells within the same quarter, and with little or no effect on milk yield. Recent work of Ebendorff *et al.* (27) adds further credibility to the idea that there is milk yield compensation by the adjacent uninfected quarters. This observation deserves further investigation and, if true, has great implications for experimental design and the future interpretation of the effect of mastitis on milk yield.

SCC: Herd Management Associations

Mastitis is recognized as a disease intensely related to herd management. Gill and Holmes (39) noticed that the milk yield loss associated with each 100,000 SCC increase was less between cows in the same herd than the loss between cows of a different herd (0.14 liters/cow/100,000 vs 0.27 liters/cow/100,000 SCC). This suggests that herds with high BTSSC suffer not only from mastitis problems, but other management problems as well. Bakken (5) demonstrated an inverse linear relationship between time spent in the barn and herd mastitis level. Osteras *et al.* (76) and Bakken (5) could account for 23 and 26%, respectively, of the herd's BTSCC variation by cow environment. Bennett (9) showed that BTSCC was a good indicator of general herd management attitude. For example, low BTSCC was not only correlated with high quality milk, but also with excellent reproductive performance. In an analysis of management parameters on Minnesota DHIA records, Appleman *et al.* (4) found that 40% of the variation in milk production could be explained by differences in six DHI management parameters. Sixteen percent of the variation in herd milk production was explained by herd SCC alone. Comparisons of Minnesota DHIA management parameters between high and low producing herds also verify Bennett's general observation that BTSCC is a good indicator of the level of herd management.

Numerous studies have been done on the effect of implementing various control procedures on SCC (7,14,17, 28,32,40,43,44,68,73,74,97,103). Consistent use of an effective teat dip, dry cow therapy, individual towels to wash and dry teats, and milking order has been extensively studied. Other management factors such as type of housing, bedding and stall maintenance, and manure handling also have great impact on herd SCC.

Clinical Mastitis

Clinical Mastitis: Antibiotic residues

The treatment of clinical mastitis is a major predisposing cause of antibiotic contamination of raw milk in the United States (63). Although major efforts have been and continue to be put forth to control incidence of antibiotic residues in milk, problems still occur. Brady and Katz (16), in a recent survey of commercial milk marketed in the eastern United States, found 63% of milk samples contaminated with one or more antibiotics. Tetracyclines and sulfonamides predominated as contaminants. Presence of the former was attributed to direct feeding of contaminated feeds. The latter were considered to have originated mainly through treatment of cows for mastitis.

No matter the source, presence of antibiotic residues and news media treatment of these and other food safety issues, generally, have raised awareness and concern of consumers. Markets are now likely to reflect such concerns in lowered sales; the economic stakes have risen significantly. To state these facts, however, is not to play down in any way the possible health hazards associated with antibiotic residues in food. Allergic responses to such drugs have long been recognized. More recently, attention has focused on the human health implications of the evolution of drug-resistant pathogens (26,37). Although the problem appears to be related mainly to sub-therapeutic applications of antimicrobial drugs

in feed of meat animals and poultry, all drug use poses a possible threat (19).

It also seems worthy of note that consumer apprehensions are not necessarily allayed by the fact that the amount of drug residue associated with a given incident of contamination is exceedingly low. Certainly this is true when the contaminant is a compound, like sulfamethazine, which has been found to be a possible human carcinogen.

The question of antibiotic residues, therefore, is compounded by development and use of increasingly sensitive methods of detection. Some methods now reach to a few parts per billion (99). This fact has to be seen as the basis of FDA's decision to revert from a policy of zero-tolerance for antibiotic residues to one governed by "actionable" levels. As applies to a number of potentially dangerous additives, some levels are considered so small as not to constitute a risk to public health.

Over the years and continuing in the present, the most common cause of drug residues in milk is a breach in the protocol established to ensure a drug-free milk supply (75).

As noted elsewhere, the BTSCC is currently being promoted as the most appropriate universal test of mastitis and raw and finished product quality (9). To the extent that low BTSCC counts are indicative of low incidence of mastitis, such counts likewise suggest less need for antibiotic therapy, therefore less chance of mistaken introduction of contaminated milk into market milk supplies. Wisconsin Dairy Cooperative found that, parallel to a reduction in BTSCC from 1979 to 1989, was a reduction in field staff time devoted to drug residue violations. In 1979, 11% of field staff time was allocated to drug residue investigations. By 1989, the time necessary for this activity had fallen to less than 1% (38). In a sense, therefore, BTSCC serves an additional parameter of quality over those already discussed and in a way that helps maximize field staff efforts.

Clinical Mastitis: Losses

Dairy farmers are all aware of the existence of clinical mastitis. Most are acutely aware of the cost of clinical mastitis. Several studies have documented the extent of loss caused by clinical mastitis (11,22,56) (see Table 2). These studies, however, did not attempt to determine the loss in lactational yield caused by a clinical episode of mastitis. Dabdoub *et al.* (21) noted that the severity of mastitis is on a continuum and that the average lactation linear score would measure the impact of clinical mastitis as well as subclinical mastitis.. Dohoo *et al.* (25) concur with these findings, noting that elevated cell counts tend to persist longer and stay higher in cases of acute mastitis than in milder cases. Other studies (61,106) have determined that clinical mastitis resulted in an average proportional reduction of 305-day milk yield of 5.9% and 6.4%, respectively. It appears that use of the average lactation linear score where those figures are available would be the best means of assessing the total lactational production loss caused by specific cases of clinical mastitis.

Dohoo *et al.* (24) found involuntary culling to be a major detrimental impact of cows experiencing acute clinical mastitis. Morse *et al.* (72) indicate that a mastitis episode in early lactation has more impact on lactational yield than later in lactation. MacMillan *et al.* (62) found mastitis decreased production more when diagnosed late in lactation. There needs to be a continued effort to better characterize clinical mastitis so that a prognostic economic outcome can be derived relative to the type and severity of a clinical case (69).

Clinical Mastitis: Monitoring Systems

Relatively few dairy farmers either record individual mastitis cases or, if they do, make very little management use of the information. Since clinical mastitis is obvious, it is ironic that records have not been kept. Perhaps there is uncertainty on what minimum information must be recorded to be a useful record.

While it is counterproductive to ask dairy farmers to keep elaborate clinical mastitis records, there is need to record a minimum amount of information to allow epidemiologic evaluation. The rule of thumb should be to ask farmers to record no more information than will be routinely used in the formulation of management recommendations. Cow ID, date of birth, date of calving, lactation number, etc. are routinely collected in every good dairy record system and are necessary to make full use of clinical mastitis records. Specific to clinical mastitis is the need to record the date of each clinical episode, its duration, the quarter(s) affected, the identification of the mastitis pathogen involved, and the treatment used. All are basic to a complete epidemiological analysis which can lead to specific recommendations geared toward solution of the herd's clinical mastitis problems.

Clear clinical mastitis benchmarks need to be established and definition of meaningful indices developed. At present, it is often difficult to establish definite farm goals because there is lack of recorded field experience. What really are "normal' or acceptable levels of clinical mastitis? Vague rules of thumb are currently being used (Table 5). Although helpful, these are basically arbitrary and may or may not be realistic in view of region or seasonal variations, etc. Morse *et al.* (72) point out that monthly clinical mastitis fluctuates considerably under what appears to be consistent management practices. Thus, it appears that it will require that accumulation of clinical mastitis data over several years may be necessary before accurate conclusions can be drawn.

Table 5. Assessment of clinical mastitis.

Assume: 100-cow milking herd
Average duration of treatment/withholding milk = 5 days
50 lbs daily production/cow

% of milking herd as new clinical/day	Avg. no. cows under Rx/day	No. cows treated/ month	No. cow days production discarded/month	Lbs milk discarded/ month	No. cows discarded/ year
1	5	30	150	7500	6
.5	2.5	15	75	3750	3
.25	1.25	7.5	37.5	1875	1.5
.1	.5	3	15	750	.75

Reneau, unpublished (1986).

Blowey (12,13,), a dairy practitioner in the United Kingdom, has successfully developed a clinical mastitis monitoring system. Monitoring mastitis by objective numerical indices became an integral part of the mastitis control scheme. The following indices were used: the rolling herd mean SCC, percent of cows affected, calculation of cases per 100 cows, average number of mastitis tubes used per cow for the whole

herd and per clinical case, percent of recurring cases, average number of clinical cases per affected cow, and the average number of quarters per affected cow. Over a six-year period, the incidence of mastitis among dairy herds in this veterinary practice decreased from 26.5% to 19.6%. Clinical cases decreased from 51 to 31.7 cases per 100 cows per year. Over the same period, the mean BTSCC fell from 346,000 to 243,000/ml, and usage of intramammary antibiotic tubes fell from 2.6 to 2.1 per lactating cow per year. A 12-fold return on investment in veterinary services was the calculated benefit of this mastitis control scheme. The indices use here are not all inclusive, but this is an excellent example of a successful program.

Structuring clinical mastitis data sets to facilitate calculations of clinical cases by cow age, stage of lactation, group or pen, teat injury, and udder conformation would be extremely helpful to epidemiologic analysis. Specifics about treatment and duration of treatment may also be useful. Use of graphics to visualize farm trends enhances the educational process and is a good motivator.

Conclusions

It appears clear that to meet both consumers' increasing demand for safe, high quality and wholesome dairy products and to improve productive efficiency at the farm, we must continue to improve methods of mastitis control. Continued refinement of presently used mastitis monitors as well as development of new mastitis and milk quality monitors will be necessary. At present, BTSCC appears to be a most useful tool in this effort in terms of its application to raw milk quality, its potential to pinpoint teats and udders as a serious source of contamination with milk spoilage bacteria, its usefulness in predicting shelf-life of finished milk products, its significance in predicting a potential for antibiotic usage on the farm, and, of course, as a monitoring tool in mastitis control. Demonstration of economic benefits of mastitis control at the farm level as well as the encouragement of quality incentive payments to dairy farmers for production of high quality milk, will speed adoption of proven mastitis control and prevention methods.

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Baking Industry Sanitation Standards Committee (BISSC)

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What is BISSC? This is more than likely to be your first question, followed by "What can BISSC do for me, and as a Public Health Sanitarian, what can I do for BISSC?"

Manufacturers of food production and food service equipment were, and are, constantly bombarded by compliance requirements from Regulatory Agencies.

As a result, in 1949, six intra-industry organizations within the baking industry founded the Baking Industry Sanitation Standards Committee (BISSC) to formulate construction standards for bakery equipment in an effort to eliminate major sanitation problems attributed to improper design.

In addition to industry, BISSC sought advisory assistance from IAMFES and other Public Health Associations and Agencies with the ultimate goal that all BISSC Standards would be formulated in accord with Public Health Codes and Regulations.

In 1966 the IAMFES Executive Board formed a formal BISSC Committee from their membership, who had expertise in the design and construction of bakery equipment, to provide consultation to the various BISSC Task Committees engaged in the formulation of Standards.

Recognizing the value of the role of the Public Health Sanitarian as a consultant, BISSC immediately assigned these consultants to Task Committees working on the formulation of construction standards to insure that these standards would not be in conflict with Public Health Codes and Regulations.

Participation in the BISSC program by members of IAMFES is a very rewarding experience whereby Sanitarians are made aware of the design problems encountered by equipment fabricators and how Task Committees function to solve the many problems that arise in the process of formulating a standard.

The combined efforts of the Sanitarian/Consultant and Task Committees over the years has resulted in the formulation of forty-two (42) standards, all of which are compatible with existing Codes and regulations. These standards have recently been reviewed by the BISSC Committee, updated, sometimes reworded for clarity, and published in one bound set of standards. These standards have proven to be a significant aid to the field sanitarian.

The 1990 edition of the BISSC Standards has been made available to Sanitarians from the BISSC office in Chicago or through your IAMFES BISSC chairman, Martyn A. Ronge, 2400 Farnsworth Lane, Northbrook, IL 60062.

In addition BISSC has produced a Video Tape presentation "A Sign of Our Times" for use by Sanitarians to create interest in BISSC and to foster the upgrading of bakery sanitation in their own ranks, as well as providing much needed information to equipment manufacturers. This Video Tape is also available from the BISSC offices in Chicago and the IAMFES Lending Library, free of charge, to Sanitarians.

As Sanitarians, we can make a significant contribution to the BISSC Program, especially those of us who have expertise in the design and production of bakery equipment and all of the ramifications of maintaining an acceptable level of sanitation in bakery operations and have an obligation to actively participate in the BISSC activities as consultants to the various Task Committees working on the formulation of a diversity of sanitary standards for baking equipment.

It is of vital importance to Public Health Associations and Regulatory Agencies to provide a pool of Sanitarians with special expertise in all phases of the Baking Industry and a working knowledge of the design and construction of equipment.

As Chairman of the IAMFES BISSC Committee, I am asking all IAMFES members, with expertise in the Baking field to make a commitment to serve on the BISSC Committee and aid in recruiting additional committee members by providing me with the names and addresses of Sanitarians who have the expertise, interest and mechanical background in the design and sanitary construction of baking equipment. I would like to extend an invitation to them, as well as all members of IAMFES, to become an active member of our BISSC Committee.

The general BISSC Committee currently meets once a year in the Spring in Chicago. Whenever Task Committees are formed, they also meet at the same time and are made up of representatives of Equipment Manufacturers, User Groups and a Public Health Sanitarian, whose role as a Consultant is vital to insure that Public Health Codes and Regulations are not compromised throughout the formulation of a BISSC Standard.

It is the goal of your Chairman that our IAMFES BISSC Committee host an annual symposium dedicated to offering to the IAMFES membership an in-depth look at BISSC and how the BISSC Standards can be of assistance to Sanitarians at all levels and to provide consultation to the Baking Industry for upgrading sanitation in all phases of the Baking Industry.

The purpose of this review is to create a better understanding of this IAMFES Committee. Anyone having any questions or any interest in becoming a part of BISSC, please contact Martyn Ronge, Committee Chairman.

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America's "Safe" Food

Part 2*

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Aeromonas hydrophila

The source of *Aeromonas hydrophila* is animal and human fecal matter. It may also be present in raw milk. All food may transmit this microorganism. Foods most often implicated in the transmission of *A. hydrophila* include: meat, poultry, fish, shellfish, milk and dairy products, fruits and vegetables, and prepared food products. Fish and shell fish taken from sewage-polluted waters are often a source of *A. hydrophila* [Buchanan and Palumbo, 1985].

Symptoms include: diarrhea, abdominal pain, and fever. Vomiting may occur in children under 2 years of age. In severe cases, there may be blood and mucous in fecal material and large losses of body fluid. Hospitalization may be required. Children under 7 and adults over 60 are most often affected by this pathogen [Stelma, 1989].

Statistics concerning this pathogen are not available at this time. It is known to be involved in sporadic incidents of foodborne illness. For example in 1982, *A. hydrophila* was identified as the probable cause when 472 people became ill after eating raw or undercooked oysters. Approximately 1 year later, frozen oysters taken from the same harvesting area caused an outbreak of foodborne *A. hydrophila* illness in Florida.

The temperature range for growth of this microorganism is 38° to 107°F (3° to 42°C), with optimal growth at room temperature.

Some critical problems in today's food system that lead to illness caused by *Aeromonas hydrophila* are:

1. Environmental contamination of most foods from human and animal sources.
2. Transmission and cross-contamination of *A. hydrophila* during slaughtering, processing, transport and distribution, and food preparation.
3. Multiplication of the microorganism at the approved, government "safe" storage temperature of 45°F (7°C).

Infective Viral Pathogens

Hepatitis A virus

Hepatitis A virus is a very small virus. Unlike bacteria, viruses are unable to multiply in food, but can remain viable in food at refrigeration and freezer temperatures longer than at room temperatures [Cliver, 1988].

Hepatitis A virus replicates itself in the liver of human hosts, and is passed in the feces, urine, and blood of infected individuals (who may be without symptoms). Seafood taken from sewage-polluted waters is also a common source of this virus [Millard et al., 1987].

The infective dose for this virus is unknown, but is probably very low (less than 100 virus particles). The incubation period for the illness is 15 to 50 days, depending upon dose or amount consumed in food. The onset of symptoms is abrupt and is characterized by fever, loss of appetite, nausea, abdominal pain, and a general feeling of illness. Jaundice follows. People are very infective from the latter half of the incubation period to a few days after the onset of jaundice, characterized by yellow skin color due to decreased liver function. The illness may be mild and last only 1 to 2 weeks, or it may be severely disabling, lasting for several months, and causing permanent liver damage. Convalescence is usually prolonged [Benenson, 1985].

There is an annual estimated incidence of 48,000 cases of illness due to Hepatitis A virus in the U.S., resulting in 150 fatalities [Bennett et al, 1987].

Norwalk Virus

The Norwalk virus is a small round-structured virus. It was first identified as a cause of foodborne illness in Norwalk, Ohio, in 1972. It is now known to be a leading cause of non-bacterial foodborne illness outbreaks.

People are the source of this virus and can transmit the virus by fecal-oral contamination. It is often found in water containing raw sewage. Thus, it can be found in fish and seafood and on vegetables irrigated with sewage-polluted water. It can be spread by people who do not wash their hands after using the toilet. It is of concern in daycare centers, and can spread through changing of diapers and inadequate methoths of washing hands after touching fecal material and other body fluids (vomitus and urine) by both children and staff members [Cliver 1988; Cukor and Blacklow, 1984].

The infectious dose is unknown, but is probably very low, perhaps 1 to 10 virus particles.

Symptoms include nausea, abdominal pain, loss of appetite, headache, and sometimes fever. The illness produces much vomiting in children, but in adults tends to produce diarrhea. Usually the symptoms appear within 36 hours of ingestion of the virus and last about 48 hours. Once the infected person has recovered, the virus can continue to be passed to others for another 2 or 3 days. In this way, the illness spreads quite easily [Benenson 1985].

The annual estimated incidence of illnesses due to Norwalk virus is 181,000 cases [Todd, 1989]. The illness causes extreme discomfort but is rarely fatal.

Some critical problems in today's food system that lead to illness caused by Hepatitis A and Norwalk viruses are:

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1. Environmental pollution of soil and water from raw human sewage. This type of pollution enables viruses to be transmitted to humans by fish and shellfish, vegetables, and water.
2. Foodservice personnel who are shedders when they look and feel fine.
3. Unsanitary food handling and using unwashed hands to mix foods. Food must be mixed with clean, sanitized utensils. If hands are used to mix food, they should be cleaned by using the double hand washing method, which utilizes soap, a lot of flowing water, and a fingernail brush.
4. Lack of enforcement of safety-assured hand washing procedures by foodservice operators/managers for fear employees will get angry and quit. (Employees fail to understand that feces collects under fingernails.) The infective level for virus-caused illnesses is quite low. Only correct hand and fingertip washing using a lot of soap and water, not chemicals, can reduce the viruses to a safe level.
5. People who do not wash their hands and fingertips adequately after changing diapers and cleaning up vomitus.
6. Lack of effective monitoring programs to detect viral contamination in food.

Infective Parasitic Pathogens

Toxoplasma gondii

Toxoplasma gondii is a protozoan parasite which can be transmitted by fecal-oral contamination. Cats are the original hosts for this protozoa They excrete microscopic inactive forms of this protozoa in their feces. Farm animals (notably sheep and pigs) become infected by consuming feed and water contaminated by barn cats' fecal material. Active forms of this parasite then multiply within the farm animals and encyst themselves in the brain, heart muscle, other skeletal muscle, and liver. (The cysts are microscopic and can exist as long as the farm animal lives.) When these animals are slaughtered to provide meat, the raw meat contains the cysts which can then infect humans if it is eaten raw or not heated sufficiently to inactivate various forms of this parasite [Dubey, 1986]. About 30% of all fresh pork is infected and is the main meat source of *Toxoplasma gondii* in the United States.

If cutting and grinding equipment is not thoroughly washed and sanitized, other raw meats such as ground beef can also become contaminated. About 5 % of the ground beef sold in supermarkets contains some pork because the grinding equipment is not properly cleaned between grinding operations. Cysts of this protozoa are also found in wild game meats such as elk, moose, and venison.

Symptoms of the disease in humans are fever, muscle aches, headaches, loss of appetite, and sore throat. Other symptoms will appear, depending upon the internal organ(s) involved. In pregnant women, these parasites can be carried by way of the placenta to fetal tissues. If fetuses are infected, spontaneous abortions may occur. Most infected infants show no obvious symptoms at birth, but will show signs of eye damage and mental retardation later in life [Dubey, op cit.].

It is estimated that there are over 3,300 cases of congenital toxoplasmosis each year resulting in 450 deaths of infants and young children. Other surviving infected children are mentally retarded as a result of this parasitic infection. Each year, it is estimated that over 2 million people (excluding infants) in the U. S. are also affected by this parasite, resulting in 2 to 3 deaths [Bennett, et al., 1987]. The annual medical costs due to illness and serious effects of this parasite are estimated to be 215 to 325 million dollars a year.

Pregnant women should avoid contact with cats, soil, and raw meat.

This parasite does not multiply in slaughtered meat. It is more easily inactivated by heat than are *Salmonella* spp. *Toxoplasma gondii* is also inactivated when meats are quick-frozen and stored at 5°F (-15° C) for not less than 20 days.

Some critical problems in today's food system that lead to illness caused by *Toxoplasma gondii* are:

1. Failure to interrupt the cycle of transmission of this parasite by cats. Barn cats are responsible for infecting 30 % of the pork supply in the U.S.
2. Food workers who do not clean grinders and saws between preparation of raw pork and raw beef products. This practice permits contamination of raw ground beef. When the contaminated ground beef is eaten rare, human infections result.
3. Bimetallic stem thermometers which are recommended by governmental agencies for measuring food temperatures, cannot accurately measure the temperatures of small, individual meat portions such as ground beef patties. Hence, these products may not be cooked sufficiently to destroy *Toxoplasma gondii*.

Trichinella spiralis

Trichinella spiralis is a nematode (worm) that causes the illness or disease trichinosis. Trichinosis develops when people consume raw or insufficiently cooked pork or other meat containing encysted larvae. (About 0.1% of pork carcasses are infected.) The larvae are released into the intestinal tract during digestion, where they invade the mucous membranes of the intestine. Adults develop and produce numerous larvae, which then travel through the circulatory system to skeletal muscle where they again form cysts [Healy and Juranek, 1979].

The incubation period for the first symptoms to develop varies from 1 to 2 days to as long as several weeks. Initial symptoms include nausea, vomiting, diarrhea, sweating, abdominal cramps, and loss of appetite. Later symptoms, which result from encystment of larvae in muscle, include: muscle soreness, spastic paralysis of muscles, and swelling of eyelids, face, and hands. Death can occur with severe infections, particularly if heart muscle is affected [Healy and Juranek, op cit.].

The incidence of trichinosis has declined since the 1940's due to education of pork producers and consumers. However, it is still estimated that there are over 100,000 cases of trichinosis each year in the U. S., resulting in about 1,000 deaths [Bennett, 1987].

In order to prevent the transmission of *Trichinella spiralis*, swine (pigs) must be raised under sanitary conditions. They should not be fed raw (unheated) garbage. If pork and other meats are quick-frozen and stored at 5°F (-15°C) for not less

than 20 days, *Trichinae* is inactivated. This pathogen is more easily inactivated by heat than are *Salmonella* spp. [Murrell, 1985].

Some critical problems in today's food supply that lead to illness caused by *Trichinella spiralis* are:

1. Failure to cook pork and other meat (including game meats, which are often infected with *Trichina*) to a center temperature sufficient to inactivate this parasite.
2. Using bimetallic stem thermometers to measure food temperatures. These devices do not accurately measure the temperature of individual or small portions of food.

Taenia

Taenia are tapeworms which cause disease in humans when larvae-infested muscle (meat) is eaten. (*Taenia saginata* is the name for beef tapeworms, while *Taenia solium* is the name for pork tapeworms.) People can become hosts for both beef and pork tapeworms. The adult worm is a parasite in humans, while the larvae infest animal tissues. A cycle occurs when humans pass eggs or proglottids (segments of the tapeworm) in their feces. When people defecate or spread raw sewage in crop areas, the eggs and proglottids are passed on to livestock. The eggs hatch within the animal host and develop larvae which settle in muscle. This encystment stage in livestock is called cysticercosis. When people consume raw or undercooked larvae-infested meat, the larvae develop into adulthood in their intestinal tract. This infestation of the human intestine with tapeworms is called taeniasis. The tapeworms produce eggs, which are then passed in the feces. This enables the cycle to begin again [Healy and Juranek, 1979].

Symptoms of the illness include: abdominal pain, nausea, weakness, weight loss, increased or decreased appetite, hunger pain, change in bowel habits, and nervousness. Humans may not be aware they carry this parasite until it is passed in fecal material. When these parasites become encysted in vital organs such as the liver, heart, lungs, eyes, and brain, their presence can become life threatening [Jay, 1986].

The incidence of taeniasis has declined since the 1930's. However, there is still an estimated incidence of 1,000 cases in the U.S. each year, resulting in 10 deaths [Bennett et al., 1987].

The USDA inspects beef carcasses for signs of cysticercosis and condemns carcasses that have extensive signs of tapeworm cysts. However, carcasses with few lesions or cysts can be marketed, if the cysts are removed and the carcasses are exposed to freezing temperatures of 15° F (-10°C) or lower for 10 to 20 days. Obviously, inspection procedures are inadequate. The larvae are more easily destroyed by heat than are *Salmonella*.

Some critical problems in today's food system that lead to illness caused by *Taenia* are:

1. Use of meat (beef and pork products) that has not be federally inspected.
2. Failure to cook infected meat (beef) to a center temperature of 140°F (60°C).
3. Consumption of raw or rare meat from animals that are infected.

Anasakis spp.

Anasakis spp. are nematodes (worms) in fish. Consumption of raw or insufficiently cooked fish infected with this parasite may cause anisakiasis in people.

Natural hosts for adult worms are marine mammals such as dolphins, whales, and seals. Eggs excreted by these marine mammals are eaten by shellfish. The shellfish are eaten by fish or squid. The life cycle is completed when they are, in turn, eaten by sea mammals.

People become infected by eating raw or under-cooked seafood such as sushi. Anisakiasis is common in countries like Japan, the Netherlands, and Scandinavia where people eat raw and under-processed fish [Healey and Juranek, 1979].

Signs and symptoms of the illness include irritation of the digestive tract and throat. Anisakine larvae can either remain free or become attached to the human digestive tract to cause irritation, inflammation, or ulceration. The larvae do not mature in people. These tiny worms can be expelled by coughing or vomiting [Benenson, 1985]. Often, they must be removed surgically from the stomach.

Foodservice establishments intending to serve raw or slightly heated seafood products must buy fish and seafood from suppliers who certify the safety of their products. If seafood is obtained from a source that does not certify the safety of the seafood, the seafood must be heated according to *Salmonella* pasteurization standards or frozen and stored at -4°F (-20°C) for at least 60 hours.

Some critical problems in today's food system that lead to anasakiasis are:

1. Use of fish taken from contaminated waters.
2. Failure to clean fish soon after catching them in order to prevent the larvae from migrating (moving) from the intestinal tract to the muscle of the fish.
3. Consumption of raw or insufficiently heated seafood.

Toxin and/or Spore Producing Pathogenic Bacteria

Staphylococcus aureus

Staphylococcus aureus is commonly found in the throat, on hair, in feces, and on the skin of 40% of all humans and almost 100% of all animals. This microorganism is usually present in sores and infected skin lesions. When this microorganism is present in cooked food (usually as a result of cross-contamination, human contamination, and survival of cells when products are not heated adequately), and is given proper conditions for multiplication, it produces a heat-resistant enterotoxin that is not inactivated by boiling for 25 minutes or longer [Bergdoll, 1989]. Ingestion of foods containing this toxin causes illness.

Outbreaks of staphylococcal foodborne intoxication have resulted from consumption of processed meats, cooked poultry, meat and fish products, egg salads, potato salad, sauces, dairy products (milk, cheese, and butter), custard or cream-filled baked products, and canned mushrooms. Outbreaks occur as the result of contamination of precooked food, often through unsanitary handling and holding food at temperatures that allow the growth and production of toxin by *S. aureus* [Bergdoll, op cit.; Newsome, 1988].

There is usually a rapid onset of illness within 2 to 6 hours after ingestion of food in which *S. aureus* grew and produced toxin. Symptoms include vomiting, severe abdominal cramps, and diarrhea. The illness usually lasts 24 hours and is rarely

fatal. Its most severe effects are experienced by the elderly and by infants [Benenson, 1985].

It is estimated that there is an annual incidence of over 1,155,000 cases of *S. aureus* foodborne illness, resulting in 5 to 8 deaths [Todd, 1989].

There must be a population of over 1 million *S. aureus* cells per gram of food to produce enough toxin to cause illness [Newsome, 1988]. Vegetative cells of *S. aureus* are more resistant to heat inactivation than are cells of *Salmonella* spp. It is not uncommon to find low levels of survivors in cooked foods. The temperature range for growth of *S. aureus* is 43.8°F to 122°F (6.5° to 50°C) [Halpin-Dohnalek and Marth, 1989]. Toxin is not produced below 50°F nor above 114.8°F (46° C) [Tatini, 1973]. Optimum growth occurs between 86°F to 104°F (30° to 40°C). Under these conditions, staphylococci can double their numbers every 19 minutes. This means that if cooked food items contaminated with *S. aureus* are held at warm kitchen temperatures or for a few hours on a buffet line, the heat-resistant enterotoxin will be produced and people will become ill. **Reheating food will not inactivate this toxin.**

Some critical problems in today's food supply that lead to staphylococcal foodborne illness are:

1. Animals that have staphylococcal infections at time of slaughter and are the source of contamination of raw meat products.
2. Foodservice personnel who work in foodservice facilities with infected cuts and abrasions, boils, and pimples. They do not disinfect and cover these areas. As a result, *S. aureus* is spread into food. If the food is allowed to remain at temperatures between 50°F (10°C) and 115° F (46°C), it will multiply and produce toxin.
3. Managers who do not check employees for infections and allow foodservice personnel with skin infections to continue working in foodservice facilities.
4. Allowing buffet food to remain at *S. aureus* multiplication temperatures for many hours because of lack of adequate knowledge and equipment.

Bacillus cereus

B. cereus, a spore-forming microorganism, is present in soil and can be isolated from a wide variety of vegetation and foods. It has been found to be present in the intestinal tract of 10 percent of healthy adults. It is often present in dairy products, meats, spices, dried products, and cereals (particularly rice). Food products implicated in this type of illness have included: cereal dishes containing corn and cornstarch, potatoes, vegetables, meat products, puddings, soups, sauces, fried rice, and milk and dairy products. Vegetative cells of *B. cereus* are destroyed by most cooking processes, but heat-resistant spores survive [Johnson, 1984].

When cooked food containing spores of *B. cereus* is cooled and allowed to remain at warm kitchen temperatures, the spores germinate to form viable cells. The population of cells increases in the food. Illness results from ingestion of food containing a large number of cells of *B. cereus* that then produce toxin in the intestine. Illness also occurs when food containing preformed toxin from the growth of *B. cereus* is ingested [Kramer and Gilbert, 1989].

There are two types of *B. cereus* foodborne illness: a diarrheal illness and an emetic illness. The diarrheal illness is most often associated with meat products, soups, potatoes and starchy vegetables, puddings, and sauces. The onset of symptoms occurs 8 to 16 hours after ingestion of food containing the microorganisms and/or toxin. Symptoms include abdominal pain and diarrhea, and occasionally, nausea and vomiting. The illness lasts for a short time, 12 to 14 hours. Complications are rare [Kramer and Gilbert, op cit.].

The emetic (vomiting) form of illness may result in diarrhea and abdominal cramps, but is most often characterized by nausea and vomiting. Its onset occurs 1 to 5 hours after ingestion. The duration of the illness is from 6 to 24 hours. This type of illness is most often associated with rice dishes and pasta products that were held at improper temperatures and slow cooling of large quantities of food.

The infectious dose is 500,000 *B. cereus* cells per gram of food. This number of microorganisms is capable of forming enterotoxin in food as well as in the intestine [Kramer and Gilbert, op cit.].

B. cereus multiplies in food at temperatures between 41°F (5°C) and 122°F (50°C) [Johnson et al., 1983]. It can double in population every 27 minutes at 86°F (30°C) [Wong et al., 1989].

The estimated annual incidence of *B. cereus* is 84,000 cases [Todd 1989]. The illness is of short duration and is rarely fatal, but can cause extreme discomfort until it passes.

Critical problems in today's food supply that lead to illness caused by *Bacillus cereus* are:

1. Holding cooked foods (e.g., rice, potatoes, refried beans, and cornstarch products) at room temperature for long periods of time prior to reheating or serving them.
2. Cooling foods at temperatures that allow the germination and growth of cells of *B. cereus*.
3. Failure of foodservice personnel to use good personal hygiene when working in foodservice facilities. People can be carriers of this microorganism. If they do not wash their hands and under their fingernails after defecating, they can transmit this pathogen to anything they touch or handle.

Clostridium perfringens

Clostridium perfringens (both vegetative cells and spores) is found in soil, sewage, manure, water, and dust. It has been found in the intestinal tract of healthy humans and animals. Many raw foods, particularly meats and vegetables, are likely to be contaminated with *C. perfringens* when they reach food preparation areas.

Outbreaks of illness usually involve foods high in protein. (*C. perfringens* has a requirement for 12 to 13 amino acids.) The foods include: meats, poultry, soups, gravies, sauces, stews, and casseroles [Labbe, 1989].

When food is cooked, the vegetative cells are destroyed. However, spores survive. If protein-rich foods, such as roast beef, turkey, gravies, and sauces are allowed to cool slowly and remain at temperatures that allow outgrowth of the surviving spores, vegetative cells will multiply rapidly to large numbers in the food and create a significant hazard [Craven, 1980].

Foodborne illness due to *C. perfringens* usually occurs 8 to 24 hours after ingestion. The illness is caused by ingestion of a large number of vegetative cells. When the vegetative

cells reach the intestine, they form spores and release an enterotoxin that causes diarrhea and severe abdominal pain. Nausea is uncommon; fever and vomiting are unusual. Fatalities can occur in the very young and elderly [Benenson, 1985; Labbe, 1989].

The infective dose is a cell population of 500,000 cells or more per gram of food [Benenson, op cit.]. This number of cells can form rapidly in foods because *C. perfringens* has a very rapid generation time and can double in number every 7 minutes at 105.8°F (41°C) [Willardson, et al., 1977]. *C. perfringens* grows at temperatures between 59°F (15°C) and 127.5°F (53°C) Labbe, 1989].

There is an estimated annual incidence of over 650,000 cases of foodborne illness due to *C. perfringens* in the U.S. each year, which result in 6 to 7 fatalities [Todd, 1989].

Some critical factors in today's food system that lead to illness due to *Clostridium perfringens* are:

1. Failure to use cooking methods which ensure that food products heat rapidly enough to control the multiplication of this pathogen.
2. Failure to hold hot protein items above 130° F (54.4°C) because hot holding equipment thermostats are not accurate.
3. Failure to use rapid cooling methods that prevent the multiplication of *C. perfringens*.
4. Failure of foodservice personnel to use good personal hygiene and proper methods of hand washing when handling food products.
5. Failure to use clean, sanitized equipment to penetrate meat and poultry. Unsanitized equipment such as cook's forks and metal spits used to rotate meat can inject *C. perfringens* into the center of food products where they will multiply.
6. Failure of refrigeration makers to design refrigeration systems that have the capacity to cool food safely and rapidly.

Clostridium botulinum

Spores and vegetative cells of *C. botulinum* are present in soil, water, and sludge near bodies of water. The numbers of foods in which types of *C. botulinum* have been found is limitless. Six strains of *C. botulinum* are pathogenic to people. Most cases of classical human botulism are due to the multiplication of types A, B, and E in food and subsequent production of neurotoxins in foods. Ingestion of food containing the neurotoxins causes severe illness. Death results if prompt diagnosis and administration of antitoxin are not made [Hauschild, 1989; Lynt and Kautter, 1982].

Infant botulism is also of concern. It differs from classical human botulism in that it is caused by the ingestion of both vegetative cells and spores of *C. botulinum*. Corn syrup and honey have been implicated as transfer foods. The microorganism multiples in the intestinal tracts of infants and produces neurotoxin, which is then absorbed in the blood. The result is respiratory failure and cardiac arrest. This condition is now thought to be one of the causes of "sudden infant death syndrome." Only infants under 1 year of age are affected [Pierson and Reddy, 1989]. Each year there are a reported 60 to 100 cases of infant botulism, which result in 6 to 10 deaths. More cases of SIDS may be due to botulism than are accurately diagnosed. The reported annual incidence of foodborne adult botulism has averaged about 100 cases per year since 1980, resulting in 2 to 3 deaths [Bennett et al., 1977].

C. botulinum strains are also divided into two types based on their effect on protein food: proteolytic and nonproteolytic strains. Proteolytic strains or types hydrolyze (break down) protein in food and produce off-flavors and odors, giving indication of their growth and presence. Non-proteolytic types do not hydrolyze proteins and hence, give no indication of their growth or presence. Proteolytic types are found on vegetables, meats, and dairy products. Non-proteolytic types tend to be associated with fish and seafood products but may also be found in other foods. The proteolytic types grow at temperatures between 50°F to 118°F. The non-proteolytic types grow in a lower temperature range of 38° to 113°F (3.3° to 45°C). All types grow best in anaerobic conditions (without air) [Hauschild, 1989].

Most outbreaks of botulism (53%) are associated with vegetables. However, fish and seafood products, meat products (beef, pork, and poultry), condiments (chili sauce, tomato relish, and salad dressing), and dairy products have also been causes of incidents. Between 1899 and 1976, home-processed foods accounted for the majority of incidents (72%), while commercially processed foods were involved in about 8.6% outbreaks. Unknown vehicles were responsible for the other 20% of outbreaks. In the past few years, restaurant/foodservice outbreaks have occurred, involving 30 to 50 people in each incident. Foods implicated in these outbreaks have included: garlic in oil, potato salad, reheated baked potatoes, and patty-melt sandwiches.

Foodborne botulism results from consumption of food in which *C. botulinum* multiplied and produced toxin. Symptoms of the illness usually develop within 12 to 72 hours after consumption of the toxin-containing food. Symptoms include nausea, vomiting, fatigue, dizziness, headache, skin dryness, dryness of the mouth and throat, constipation, paralysis of muscles, double vision, and difficulty in breathing. Duration of the illness is dependent upon the amount of toxin ingested and the over-all health of victims. Treatment involves administration of anti-toxin and respiratory therapy. Death results in 10% of diagnosed cases [Benenson, 1985; Hauschild, 1989].

When foods are cooked, vegetative cells of *C. botulinum* are destroyed; however, heat-resistant spores survive. The spores form vegetative cells when conditions favoring growth are present.

Some critical problems in today's food system that cause botulism are:

1. Insufficient processing of home-canned or commercially canned low-acid foods (most vegetables, meat, poultry, and fish products) with storage at room temperature.
2. Failure to maintain proper storage conditions below 38°F (3.3°C) for refrigerated, vacuum packaged foods, such as smoked fish and sous vide items.
3. Packing fresh vegetables (e.g., mushrooms) in airtight packages and displaying them in supermarkets at temperatures above 50°F (10° C).

Summary

This paper discusses the current status of the safety of

food in the United States. The major problem is not chemical residues of herbicides and insecticides. The major problem is microbiological. Animals, people, and environmental conditions are natural vectors for the microbial contamination of food. Microorganisms on or in foods must be decreased and kept at levels which are safe for human consumption.

At this time, governmental agencies (national, state, and local) mislead consumers. It is often implied that government inspection of food products or sanitation checks by municipal or state health agencies ensures the safety of food. These inspections often only provide an aesthetic satisfaction.

Anyone is allowed to produce, sell, or market food without demonstrating the correct knowledge of hazards that exist or may develop in the food and how to control these hazards. No pre-control or prevention systems are required of anyone. Governmental agencies rely on inspections to prevent hazardous conditions from developing or occurring.

It seems unlikely that governmental regulation and surveillance will change during the next few years. There are continual funding cuts to these regulatory agencies, hence there is no focus on prevention.

The solution is simple. It is up to the consumer to demand the supplier certification of raw food products of all kinds. This certification identifies the food or food product as safe for consumption. If the owner of the restaurant, hospital administrator, president of the supermarket chain, or poultry producer will not certify the levels of microorganisms on the foods, foods and services must be purchased from people who will certify their products.

It is possible to grow, produce and supply safe food. Properly educated and trained people can accomplish this today.

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Dairy, Food and Environmental Sanitation, Vol. 11, No. 1, Pages 21-23 (January 1991)

What to do When F.D.A. Inspects Your Facilities

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Food plant or warehouse personnel need to understand their firm's rights and responsibilities before and during any Establishment Inspection by the Federal FOOD AND DRUG ADMINISTRATION.

This training bulletin will describe most of these rights and responsibilities and offer suggestions for procedures to follow during an inspection.

FDA's Authority

The authority of the agency (FDA) to inspect and description of penalties for denial of FDA's intent to inspect are included in the Title 21 U.S. Code: Federal Food, Drug and Cosmetic Act, as amended 1985.

A 220-page softbound copy of this FFD&C Act is available for purchase from the U.S. Government Printing Office, Washington, D.C. 20402.

The key portion of the Act relating to FDA's authority and inspectional procedures is as follows:

> Sec. 704. (a)(1) For purposes of enforcement of this Chapter, officers or employees duly designated by the Secretary, upon presenting appropriate credentials and a written notice (FD Form 482) to the owner, operator, or agent in charge, are authorized (A) to enter, at reasonable times, any factory, warehouse, or establishment in which food, drugs, devices, or cosmetics are manufactured, processed, packed, or held, for introduction into interstate commerce or are held after such introduction, or to enter any vehicle being used to transport or hold such food, drugs, devices, or cosmetics in interstate commerce; and (B) to inspect, at reasonable times and within reasonable limits and in a reasonable manner, such factory, warehouse, establishment, or vehicle and all pertinent equipment, finished and unfinished materials and containers and labeling therein ... A separate notice shall be given for each entry made during the period covered by the inspection. Each such inspection shall be commenced and completed with reasonable promptness.
>
> (b) Upon completion of such inspection of a factory, warehouse, or other establishment, and prior to leaving the premises, the officer or employee making the inspection shall give, the owner, operator, or agent in charge a report in writing setting forth any conditions or practices observed by him which, in his judgement, indicate that any food, drug, device, or cosmetic in such establishment (1) consists in whole or in part of any filthy, putrid, or decomposed substance, or (2) has been prepared, packed or held under insanitary conditions whereby it may have been rendered injurious of health (FD Form 483). A copy of such report shall be sent promptly to the Secretary.
>
> (NOTE: This "notorious" Section 704(b)(2) is known as the "may" clause since only the possibility of contamination or adulteration need be shown. Remember: direct or indirect contamination need not exist -- only the potential for this.)
>
> (c) If the officer or employee making such inspection of a factory, warehouse, or other establishment has obtained any sample in the course of the inspection, upon completion of the inspection and prior to leaving the premises, he shall give the owner, operator, or agent in charge a receipt describing the samples obtained (FD Form 484).
>
> (d) Whenever in the course of any inspection of a factory or other establishment where food is manufactured, processed, or packed the officer or employee making the inspection obtains a sample of any such food, and an analysis is made of such sample for the purpose of ascertaining whether such food consists in whole or in part of any filthy, putrid, or decomposed substance, or is otherwise unfit for food, a copy of the results of such analysis shall be furnished promptly to the owner, operator, or agent in charge.

Recently reduced funding for the Agency has resulted in considerable selectivity in enforcement activities. Increasingly, FDA is spending the most time in specific industry groups or plants whose records of plant sanitation are substandard. Usually, the time between a previously favorable inspection and the next will be much greater than that following an unfavorable one.

It is the policy of FDA that their inspectors do not give advice, recommendations, or other information than that required during the post-inspection conference (Sec. 704(b)). For their part, company employees should not discuss operations or the inspection with FDA to avoid making indiscreet or incorrect statements. Any sanitation files maintained by a firm are *not* legally subject to review by FDA, but if in management's opinion, the contents reflect favorably on awareness and an especially good sanitation program, they can be offered for review.

General Items of Concern to FDA

The following, in rough order of importance, are the factors FDA believe contribute to filth or poor sanitation in a food plant:

1. Employee behavior or practices, poor personal hygiene, improper attire, work habits conducive to product contamination, or even the lack of adequate training or supervision.
2. Rodent, bird or other vertebrate pests.
3. Insect, spiders, mites, or other invertebrate pests.
4. Dirty, inaccessible, or uncleanable food processing or handling equipment or utensils.
5. Raw commodities or ingredients, water or ice, etc., in insanitary conditions.
6. Insanitary or inadequate employee personal service areas including lavatories, locker rooms, lunch rooms, etc.
7. General plant structure including surroundings or grounds relating to cleanliness and pest exclusion.
8. Waste and/or sewage disposal practices.
9. Storing or handling of any products, raw or unfinished, which are subject to rodent or insect pest infestation.

What You Should Do During An Inspection

Here are some suggested actions or procedures to follow during an FDA Establishment Inspection:

1. Train your receptionist to directly and immediately advise top management of the presence of any FDA representative. Be certain the General or Plant Manager, any Assistant Manager, Director of Quality Assurance or Plant Sanitarian are advised.
2. Once the inspector has been logged or signed in, he should be interviewed as soon as possible and not be kept waiting (perhaps no more than 15 minutes maximum).
3. Confirm the inspector's identity, accept his FD Form 482 "Authorization to Inspect," and determine whether the inspection is to be an Abbreviated or Comprehensive, or other type of inspection.
4. Be certain the FDA inspector has required protective safety or sanitation equipment for the inspection including, but not limited to, bump cap or hard hat, safety glasses and ear plugs, if necessary, and *effective* hair restraints (beard snood, if necessary).
5. Many firms have developed, with the assistance of their legal counsel, a written statement entitled "(Company's name) Policy Relating to Regulatory Inspections" which can be presented to an inspector during the pre-inspection interview. Two items of importance are as follows:
   a. Prohibition of any photographs during the audit (see your legal counsel on this).
   b. Any request by FDA to review records other than bills of lading from your plant into interstate commerce should be submitted in writing.

   Both the "photograph" and "records review" subjects should be clarified up front during the pre-inspection conference.
6. Arrange for a salaried person to accompany the FDA inspector during his visit, if at all possible. Here are some suggestions for this guide:
   a. He should not "guide," in fact, but should only *accompany* the inspector wherever he wishes to tour.
   b. The guide should be cooperative, businesslike, and knowledgeable of basic plant or warehouse operations.
   c. He should not converse with the inspector other than to answer questions as simply as possible. He should maintain a neutral posture, neither friendly nor hostile. He should not elaborate on product flow, on processing systems, on quality control/incoming goods inspection/pest control procedures, or volunteer any other information about the company or the plant.
   d. He should not carry an electric torch or flashlight and should only participate to the extent of taking duplicate samples of material sampled by FDA.
   e. He should take detailed notes to the extent possible and rewrite these following each day of a multi-day inspection. Notes should describe the inspection as thoroughly as possible. Include areas and times spent inspecting. List questions asked by FDA and replies to these. Include anything suggesting the inspector's special inspectional interests, etc.
   f. If the occasion arises, the guide should remind the inspector to converse with employees or to question them only in his presence.
   g. The guide should attempt to determine which departments or areas the inspector intends to inspect during subsequent days and advise the General or Plant Manager.
7. If any deficiencies can be corrected on the spot or during the course of the inspection, take immediate action. Even if the item is still listed on the "I observed ..." report (FD Form 483), such immediate correction will reflect favorably.
8. Samples taken by FDA should be split (they'll usually do this) or duplicate samples should be taken and labeled. In-company analysis will depend on the sample, and handling (preservation) will depend on the subject contaminated.

What You Can Expect An FDA Inspector To Do

1. He will present his official FDA credentials for identification along with an Authorization to Inspect notice (FD Form 482).
2. He will usually appear for an inspection during the day shift of operations.
3. He will already have reviewed a file on your firm, his Agency's previous inspection reports, or actions against you.
4. He will carry a camera into your plant and use it unless advised not to do so. He may argue three

times that his Agency has *legal* authority to take photographs, but if met with continued prohibition, he will eventually begin the inspection without his camera.

(NOTE: Clarification on this issue and in-company policy *must* be predicated on legal advice from your counsel.)

5. FDA inspector will present a Report of Observations (FD Form 483) at the conclusion of an inspection only if they note discrepancies, potential avenues of contamination, etc. Do not become complacent if no form is left. This only means they observed nothing untoward at the time of the audit.
6. FDA inspectors will also give you a Receipt for Samples (FD Form 484) if samples are taken. You can charge the Agency for samples, but few firms do so for samples of only modest value. Receipt of an FD Form 484 ensures that you will receive a copy of any analysis performed. This will usually follow within three months or fewer.
7. As previously mentioned, FDA inspectors will rarely offer advice, relate how competitors might have solved problems similar to those found in your plant, etc., nor will they argue or enter into lengthy disagreements once an observation has been written down.

What You Should Do Following An Inspection

If at all possible, try to host the post-inspection conference during an afternoon which would allow time for a letter to be written to FDA addressing each item listed on the FD Form 483. Such a letter may be delayed pending corporate review, planning and response, but it should follow any inspection as soon as possible.

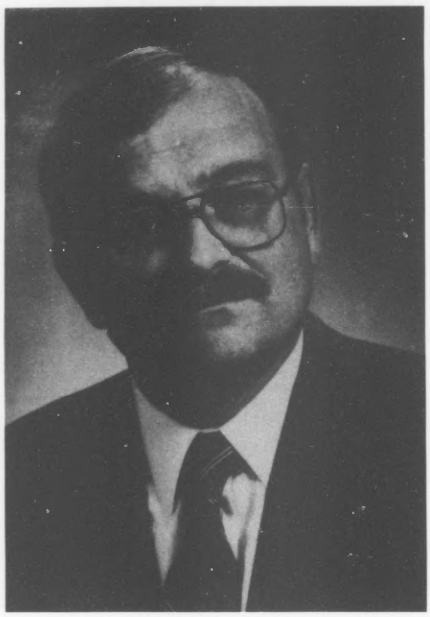
In the letter express *thanks* to the Agency for the inspection and for bringing to attention items requiring correction or attention. Other than in any obvious errors in fact, it is usually best not to argue with either the inspectors or the Agency. Try to list realistic dates of correction if structural modifications are necessary.

This letter from a firm is not required by the Act, but it demonstrates a firm's concern and interest and defines corrective action -- all of which FDA will regard favorably.

Finally, any top management of an inspected firm should receive copies of any FD Form 483 and/or a report of the inspection (including corrective action) from the plant's point of view.

The U.S. FOOD AND DRUG ADMINISTRATION is a most fair and thorough regulatory agency. They act in the interest and protection of the consumer, which is also a food firm's interest. All food companies should cooperate with the FDA and strive to maintain the highest possible levels of sanitation at all times. If you feel, however, at any time that any FDA representative has been unfair in any criticism, report this to your top management. The FDA would welcome such comments if management desires to pass these on.

News



Raymond W. Rzegocki

Rzegocki Appointed Groen National Sales Manager

Groen, A Dover Industries Company, has announced the appointment of Raymond W. Rzegocki as National Sales Manager for their Process Equipment Group. Rzegocki will report to Louis P. Thomas, General Manager of the Process Equipment Group and will work out of Groen's Corporate Headquarters in Elk Grove Village, Illinois.

Rzegocki came to Groen from Standard Metal Products Company where he served as National Sales Manager. He has also served as Regional Sales Representative and Manager of Sales & Operations Services for Armstrong Containers Inc.

"With his strong background in sales, marketing and customer service, and proven leadership abilities, Ray Rzegocki will make a strong addition to the Process Group marketing team," according to Thomas.

Rzegocki is a 1969 graduate of Columbia College in Chicago, where he earned his Bachelor of Arts degree in Communications and a 1988 graduate of Governors State University, where he earned a Masters of Arts degree in Communications.

Groen is the worlds largest producer of batch processing agitator kettles and a leader in the development of continuous heat exchange technology, serving food, confectionery, drug, chemical, cosmetic, and munitions processors around the world.

For more information contact Groen Division/Dover Corporation, 1900 Pratt Boulevard, Elk Grove Village, Illinois 60007, (312)439-2400.

National Conference on Interstate Milk Shipments

The National Conference on Interstate Milk Shipments (NCIMS) biennial meeting will be held April 22-26, 1991, at the Galt House, Louisville, Kentucky.

NCIMS is a voluntary milk protection program which is the envy of many other food organizations. It is based on the cooperation of industry, state Departments of Health and Agriculture, the Milk Safety Branch of the Food and Drug Administration and related educational institutions.

The mission of the Conference is to "Promote the Best Possible Milk Supply for all the People by:

1) Adopting sound, uniform procedures acceptable by participating state milk sanitation agencies.
2) Promoting mutual respect and trust between state milk sanitation agencies of producing and receiving states.
3) Utilizing Public Health Service/Food and Drug Administration personnel for training programs and using that agency as a channel for the dissemination of information among state agencies for the objective of promoting uniformity among the states and regions.
4) Acquainting producers, processors and consumers with the purpose of the Conference through the media of meetings, conferences, press releases, publications etc.

The basic document is the Pasteurized Milk Ordinance (PMO) developed jointly by past Conferences and FDA. The PMO is updated after each conference.

The working body of NCIMS is composed of:

A) Executive Board - a twenty-two (22) member governing body composed of state enforcement and rating agencies, local health authorities, industry, educational institution, laboratory, USDA and FDA.
B) Three Councils, each with twenty members equally divided between state enforcement and rating agencies, producer and processor groups.
C) Delegates. Each state, District of Columbia and US Trust Territories may appoint a delegate to the Conference, with each having one vote. (The vote is split evenly between departments in those states wherein enforcement and rating responsibilities are divided).

The NCIMS program is a volunteer program which assures that milk made available to consumers will be free of contaminants, meets stringent bacterial and temperature standards in production and processing, and has been transported and handled under well defined sanitary conditions.

This spirit of reciprocity between states is fundamental to the NCIMS program. Each Conference addresses new issues to keep abreast with new production and processing technology, new screening methods and animal treatment techniques.

Since all fifty (50) states and the District of Columbia participate in the Conference it is rare if a state does not adopt changes made during a Conference. This gives rise to a uniform program throughout the country and avoids industry the cost and confusion of duplicate inspections and consumers are assured that milk purchased in one part of the country has been produced, processed and handled under the same sanitary standards as in other areas. The US military services depend solely on the Interstate Milk Shippers List published quarterly by FDA listing sources of raw and pasteurized milk and milk products which have been rated under procedures approved by the NCIMS.

All attendees at the Conference are encouraged to discuss problems of interest to them in the Council Meeting and General Sessions. However, only official delegates, representing state enforcement and rating agencies may vote at the final session on accepting or rejecting recommended changes in the PMO and Conference Procedures.

The NCIMS Conference is an excellent example that voluntary food protection programs can and do work. This one has been successful for forty years. Uniformity and reciprocity are major tenets of the NCIMS Program.

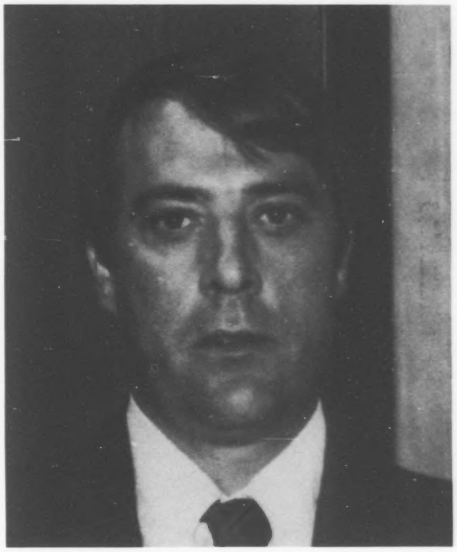
For more information regarding the April 22-26, 1991 Conference or other NCIMS matters contact the Executive Secretary/Treasurer Leon Townsend, 110 Tecumseh Trail, Frankfort, Kentucky, 40601. Telephone and/or FAX (502)695-0253.

Standards for Grades of Dry Milk Including Methods of Analysis

The American Dairy Products Institute, national trade association of the processed dairy products industry, announces the availability of a revised edition of its Bulletin #916, "*Standards for Grades of Dry Milk Including Methods of Analysis.*" The publication contains comprehensive information about dry milk products including definitions, composition, general and specific grading requirements, and detailed methods of analysis for the testing of nonfat dry milk, instant nonfat dry milk, dry whole milk, dry buttermilk, and dry buttermilk product.

This publication is useful to manufacturers, handlers, and purchasers of dry milk products for it provides complete information necessary to verify the composition, quality and wholesomeness of these products.

For further information about this publication, contact the American Dairy Products Institute, 130 North Franklin Street, Chicago, IL 60606. Telephone: (312)782-4888 FAX: (312)782-5299.



Ronald G. Fox, Manager/Equipment Division of Alex C. Fergusson, Inc., leading maker of cleaners, degreasers and sanitizers.

AFCO Appoints New Technical Services Manager

Alex C. Fergusson, Inc. (AFCO products) has appointed Ronald G. Fox to the new position of Manager, Technical Services, according to Robert F. Sistowicz, AFCO President.

135 year old AFCO is a leading supplier of cleaners, degreasers, and sanitizers to the food processing, pharmaceutical and beverage industries. Various systems and equipment have been developed by AFCO to store, transport and apply the over 4,000 products made by the company.

Fox has spent 20 years in food processing and plant sanitation, first with Kraft, Inc. and then with Fleur de Lait Foods.

For more information, contact Alex C. Fergusson, Inc., Spring Mill Drive, Frazer, PA 19355, (215)647-3300.

Golden Guernsey Cooperative Recognized for Wastewater Management

Golden Guernsey Cooperative, Sparta, WI, has received an Outstanding Achievement Award in Water and Wastewater Management for its ongoing efforts to conserve water and minimize wastewater effluent at its dairy processing facility in Sparta.

The award is given by the Monarch Division of H.B. Fuller Company, producer of sanitation chemicals for the dairy and food processing industries and a recognized advocate of industrial environmental responsibility.

Through programs initiated in 1989-90, Golden Guernsey has cut water usage at its Sparta facility by nearly 50 percent and effectively reduced, by as much as 40 percent, the effluent it discharges to the municipal wastewater treatment plant. The Grade A milk plant daily processes 1.5 million pounds of milk into special-blend dry and condensed milk products.

"Preserving our environment and natural resources is a key concern of H.B. Fuller Company and many of its customers," said Paul Dorwart, vice president and general manager, Monarch Division. "Golden Guernsey is an excellent example of a business putting this concern into action. Our award to Golden Guernsey recognizes its achievement and ongoing efforts to preserve and conserve water, one of our planet's most precious natural resources."

The Monarch Division of H.B. Fuller Company is a supplier of sanitation chemicals to the dairy farm, dairy plant and food processing industries. H.B. Fuller Company is a worldwide manufacturer and marketer of specialty chemical products, including adhesives, sealants, coatings, paints, waxes and sanitation chemicals, with Fiscal 1989 sales of $753 million.

For more information contact Bill Belknap, Public Relations Manager, (612)647-3604.

FDA/NMFS Joint Seafood Initiative

The Food and Drug Administration (FDA) and National Marine Fisheries Services (NMFS) are currently conducting a pilot study of a proposed new joint voluntary seafood inspection program which builds upon the current resources and expertise of both agencies. This program is based on the Hazard Analysis Critical Control Point (HACCP) concept with additional parameters. The final program will be a fee-for-service inspection program that will use an official mark to indicate that a firm is meeting the requirements of the program.

FDA and NMFS believe that a joint HACCP-based program will lead to more efficient regulation of the seafood industry, and add further assurance of the safety, wholesomeness and proper labeling of seafood. It will also provide recognition to firms which successfully operate under a HACCP-based plan.

The HACCP based system emphasizes continuous problem prevention and problem solving on the part of industry from the water to the consumer rather than relying solely on governmental facility inspections and analysis of end product samples. The FDA/NMFS program applied to fish and fish products will encompass the following hazards:

- Food Safety - Issues usually addressed through biological, chemical or physical criteria, and distinct issues relating to food hygiene or fraud.
- Food Hygiene - Characteristics of a product or process relating to wholesomeness or sanitation.
- Economic Fraud - Illegal or misleading actions which defraud consumers, including species substitution, short weight, overglazing and short fill.

This is a specific non-traditional approach to control biological, chemical, physical and/or economic hazards in foods. It is a two-part process by industry performed to address potential problems on a commodity and process basis. The first deals with defining consumer hazards that could be presented by a product. The second part deals with:

- flow charting each operational step of a food process,
- defining the hazards associated with each step and assessing its relative importance,
- identifying the critical control points of the process,
- determining the preventative measures which can be used to reduce the hazards to acceptable levels,
- determining the monitoring procedures either by observation or measurement to determine that the hazard is being controlled, and
- delineating the specific records necessary for monitoring to ensure hazards are being controlled.

Of the firms which have volunteered to participate in the pilot, sixteen (16) attended a two-day seminar recently in Chicago, IL. They received instruction on how to identify critical points in their processing plants and how to develop a HACCP plan specific to their operation. The firms represented all areas of the country as well as a broad spectrum of the industry, including finfish, crab, shrimp, surimi and specialty products.

Under the pilot, the firms will, with FDA and NMFS assistance, develop HACCP-based plans which will then be submitted to the agencies for review. Upon acceptance of the plans, inspections will be conducted to validate that the plans are applicable, and then monitoring and verification inspections will be conducted by NMFS and FDA to assure adherence to the plans. The current pilot applies to the domestic fish and fish product processing industry only. Plans are underway to develop similar pilots for imported fish products, shellfish and products sold at retail.

Hands Free Faucet

Beating out over 1,000 international entries, the world's only 'multi-temperature' 'hands-free' faucet was recently awarded a gold medal at the 18th International Exhibition of Inventions and New Techniques in Geneva, Switzerland.

This exceptional unit, the Thermatronic, offers unsurpassed levels of hygiene and conservation as it allows the user to obtain a supply of hot, cold, or warm water without touching any taps, levers or knobs.

The Thermatronic approach to germ free, contamination free water flow is so effective that it exceeds all stringent health regulations and public expectations!

The Thermatronic unit is easy to install, connects to any type or shape spout or shower head, and is simple to operate. The automatic cut-off conserves water and thermal energy. By doing away with faucets altogether, the need for costly time consuming cleaning and disinfecting of taps is also eliminated.

People of all ages, irrespective of hand mobility can now activate a water flow that gives a variation of temperature and two time operating cycles. The Thermatronic is especially suited to those suffering from arthritis, the very senior, the physically handicapped, and those suffering a lack of sensory perception, among others.

In the home the Thermatronic can be remotely mounted such that a running bath or shower cannot pose a risk to infants or children of severe accidental burns or scalding . . . and there is another bonus -- it saves cleaning up of messy soap/water splatter on faucets.

The Thermatronic has numerous applications: retirement homes, schools, prisons, mental institutions, military facilities, athletic facilities -- in fact, any application where greater conservation, convenience, and cleanliness is needed or required. The Thermatronic is currently in wide use in restaurants, hospitals (including surgery scrub rooms), pharmacies, beauty centers, and other facilities where cross contamination caused through hand operated taps can pose a serious health risk.

For more information contact Savas Mercouriou, 38 Walnut Street, Haddonfield, NJ 08033, (609)429-0281.

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1991 IAMFES AWARDS NOMINATIONS

The International Association of Milk, Food and Environmental Sanitarians is proud of its members and their contributions.

As a member, you are entitled to nominate deserving colleagues for the IAMFES Awards.

Nomination forms need to be completed and back to the Ames office by April 3, 1991.

1. Previous award winners are not eligible for the same award. Check pages 30 and 31 in this issue for a complete listing of past award winners.

2. Present Executive Board members are not eligible for nomination.

3. Candidates must be current IAMFES members in order to be nominated.

Presentation of these awards will be during the IAMFES Annual Meeting July 21-24, 1991 at the Galt House, Louisville, Kentucky, during the Annual Awards Banquet Wednesday evening.

NOMINATION FORMS WILL BE MAILED OUT TO THE MEMBERSHIP THE END OF JANUARY. SEND COMPLETED MATERIALS TO:

Steven K. Halstead
IAMFES, Awards
502 E. Lincoln Way
Ames, IA 50010-6666

Questions? Call 800-369-6337 (includes Iowa) 800-284-6336 (Canada), 8-4:30 weekdays, or FAX 515-232-4736.

The following lists the awards that you may nominate a person for.

Nominate a deserving colleague for these prestigious IAMFES Awards:

- **SANITARIANS AWARD** - in recognition of outstanding service to the profession of the Sanitarian.
  $1000 award and plaque

- **EDUCATOR AWARD** - presented to an educator in recognition of outstanding service in academic contributions to the profession of the Sanitarian.
  $1000 award and plaque

- **CITATION AWARD** - for many years of devotion to the ideals and objectives of the association.
  plaque

- **HAROLD BARNUM INDUSTRY AWARD** - in recognition of outstanding service to the public, IAMFES and the profession of the Sanitarian.
  $500 award and plaque

- **HONORARY LIFE MEMBERSHIP** - for devotion to the high ideals and principles of IAMFES.
  plaque and lifetime membership with IAMFES

Past IAMFES Award Winners

EDUCATOR-INDUSTRY AWARD

1973-Walter A. Krienke
1974-Richard P. March
1975-K. G. Weckel
1976-Burdet H Heinemann
1977-Elmer H. Marth
1978-James B. Smathers
1979-Joseph Edmondson
1980-James R. Welch
1981-Francis F. Busta

In 1982 this award was split into the Educator Award and the Harold Barnum Award (for industry).

EDUCATOR AWARD

1982-Floyd Bodyfelt
1983-John Bruhn
1984-R. Burt Maxcy
1985-Lloyd B. Bullerman
1986-Robert T. Marshall
1987-David K. Bandler
1988-Edmund A. Zottola
1989-Vernal Packard
1990-Michael Stiles

HAROLD BARNUM AWARD

1982-Howard Ferreira
1983-C. Dee Clingman
1984-Omer Majerus
1985-William L. Arledge
1986-Hugh C. Munns
1987-J. H. Silliker
1988-Kenneth Kirby
1989-Lowell Allen
1990-Roy Ginn

CITATION AWARD

1951-J. H. Shrader and William B. Palmer (posthumously)
1952-C. A. Abele
1953-Clarence Weber
1954-C. K. Johns
1955-R. G. Ross
1956-K. G. Weckel
1957-Fred C. Baselt
1958-Milton R. Fisher
1959-John D. Faulkner
1960-Luther A. Black
1961-Harold S. Adams
1962-Franklin W. Barber
1963-Merle P. Baker
1964-W. K. Moseley
1965-H. L. Thomasson
1966-J. C. Olson, Jr.
1967-William V. Hickey
1968-A. Kelley Saunders
1969-Karl K. Jones
1970-Ivan E. Parkin
1971-L. Wayne Brown
1972-Ben Luce
1973-Samuel O. Noles
1974-John C. Schilling
1975-A. R. Brazis
1976-James Meany
1977-None Given
1978-Raymond A. Belknap
1979-Harold E. Thompson, Jr.
1980-Don Raffel
1981-Henry V. Atherton
1982-None Given
1983-William B. Hasting
1984-Elmer H. Marth
1985-Ralston B. Read, Jr.
1986-Cecil E. White
1987-None Given
1988-Carl Vanderzant
1989-Clem Honer
1990-None Given

SANITARIANS AWARD

1952-Paul Corash
1953-E. F. Meyers
1954-Kelley G. Vester
1955-B. G. Tennent
1956-John H. Fritz
1957-Harold J. Barnum
1958-None Given
1959-William Kempa
1960-James C. Barringer
1961-Martin C. Donovan
1962-Larry Gordon
1963-R. L. Cooper
1964-None Given
1965-Harold R. Irvin
1966-Paris B. Boles
1967-Roger L. Stephens
1968-Roy T. Olson
1969-W. R. McLean
1970-None Given
1971-Shelby Johnson
1972-Ambrose P. Bell
1973-None Given
1974-Clarence K. Luchterhand
1975-Samuel C. Rich
1976-M. W. Jefferson
1977-Harold Bengsch
1978-Orlowe Osten
1979-Bailus Walker, Jr.
1980-John A. Baghott
1981-Paul Pace
1982-Edwin L. Ruppert
1983-None Given
1984-Harold Wainess
1985-Harry Haverland
1986-Jay Boosinger
1987-Erwin P. Gadd
1988-Kirmon Smith
1989-Robert Gales
1990-Leon Townsend

HONORARY LIFE MEMBERSHIP AWARD

1957-J. H. Shrader
1958-H. Clifford Goslee
1959-William H. Price
1960-None Given
1961-Sarah Vance Dugan
1962-None Given
1963-C. K. Johns and Harold Macy
1964-C. B. and A. L. Shogren
1965-Fred Basselt and Ivan Parkin
1966-M. R. Fisher
1967-C. A. Abele and L. A. Black
1968-M. P. Baker and W. C. Frazier
1969-John Faulkner
1970-Harold J. Barnum
1971-Wiliam V. Hickey
1972-C. W. Dromgold and E. Wallenfeldt
1973-Fred E. Uetz
1974-H. L. Thomasson and K. G. Weckel

and Past Presidents

1975-A. E. Parker
1976-A. Bender Luce
1977-Harold Heiskell
1978-Karl K. Jones
1979-Joseph C. Olson, Jr.
1980-Alvin E. Tesdal
1981-Robert M. Parker
1982-None Given
1983-Orlowe Osten
1984-Paul Elliker
1985-Patrick J. Dolan,
Franklin W. Barber and
Clarence K. Luchterhand
1986-John G. Collier
1987-Elmer Marth and
James Jezeski
1988-Kenneth Whaley and
Paul J. Pace
1989-Earl Wright
Vernon Cupps
1990-Joseph E. Edmondson

SHOGREN AWARD

1972-Iowa Affiliate
1973-Kentucky Affiliate
1974-Washington Affiliate
1975-Illinois Affiliate
1976-Wisconsin Affiliate
1977-Minnesota Affiliate
1978-None Given
1979-New York Affiliate
1980-Pennsylvania Affiliate
1981-Missouri Affiliate
1982-South Dakota Affiliate
1983-Washington Affiliate
1984-None Given
1985-Pennsylvania Affiliate
1986-None Given
1987-New York Affiliate
1988-Wisconsin Affiliate
1989-Georgia Affiliate
1990-Texas Affiliate

MEMBERSHIP ACHIEVEMENT AWARD

1986-Iowa Affiliate
1987-Florida Affiliate
1988-Florida Affiliate
1989-California Affiliate
1990-California Affiliate

PAST PRESIDENTS

1912-C. J. Steffen
1913-C. J. Steffen
1914-C. J. Steffen
1915-A. N. Henderson
1916-Claude F. Bessio
1917-Wm. H. Price
1918-Alfred W. Lombard
1919-James O. Kelly
1920-Ernest Kelly
1921-C. L. Roadhouse
1922-H. E. Bowman
1923-Geo. E. Bolling
1924-J. B. Hollingsworth
1925-T. J. Strauch
1926-G. C. Supplee
1927-W. A. Shoults
1928-Ira V. Hiscook
1929-H. R. Estes
1930-R. E. Irwin
1931-A. R. B. Richmond
1932-W. B. Palmer
1933-H. N. Parker
1934-P. F. Krueger
1935-C. K. Johns
1936-G. W. Grim
1937-J. C. Hardenbergh
1938-A. R. Tolland
1939-V. M. Ehlers
1940-P. D. Brooks
1941-L. C. Frank
1942-F. W. Fabian
1943-C. A. Abele
1944-C. A. Abele
1945-R. R. Palmer
1946-R. R. Palmer
1947-R. G. Ross
1948-W. D. Tiedeman
1949-A. W. Fuchs
1950-M. R. Fisher
1951-K. G. Weckel
1952-H. L. Thomasson
1953-H. J. Barnum
1954-John D. Faulkner
1955-I. E. Parkin
1956-Harold S. Adams
1957-Paul Corash
1958-Harold Robinson
1959-Franklin Barber
1960-W. V. Hickey
1961-John Sheuring
1962-Charles E. Walton
1963-Ray Belknap
1964-John H. Fritz
1965-W. C. Lawton
1966-Fred E. Uetz
1967-P. R. Elliker
1968-A. N. Myhr
1969-Samuel O. Noles
1970-Milton E. Held
1971-Dick B. Whitehead
1972-Orlowe M. Osten
1973-Walter F. Wilson
1974-Earl O. Wright
1975-P. J. Skulborstad
1976-H. E. Thompson, Jr.
1977-H. V. Atherton
1978-David F. Fry
1979-Howard Hutchings
1980-Bill Kempa
1981-William Arledge
1982-Harry Haverland
1983-Robert Marshall
1984-A. Richard Brazis
1985-Archie Holliday
1986-Sidney E. Barnard
1987-Roy Ginn
1988-Leon Townsend
1989-Robert Gravani
1990-Ron Case

Updates . . .

Robert Sanders (l) pictured with Dick B. Whitehead

3-A Sanitary Standards Committee Honors Robert Sanders

The 3-A Sanitary Standards Committees presented Robert Sanders with the 3-A Bronze Plaque at the November meetings in Milwaukee, WI. The plaque is an honorary award given by the Dairy and Food Industries Supply Association (DFISA) and the 3-A Sanitary Standards Committees.

The plaque is periodically given to an individual who shows extraordinary contributions towards the improvement of the 3-A committees.

Sanders has worked in the dairy industry most of his life and has been active with the 3-A Sanitary Standards program for almost 30 years.

Currently serving as president of the International Association of Milk, Food and Environmental Sanitarians (IAMFES), Sanders was first appointed as a member to the IAMFES Committee on Sanitary Procedures while working with the Iowa Department of Health. He is a member and past-president of the Iowa Association of Milk and Food Sanitarians.

The 3-A Sanitary Standards Committees' objective is to formulate standards and accepted practices for equipment and systems used to process milk and milk products. DFISA serves as the secretariat for the 3-A program.

For more information regarding the 3-A Sanitary Standards Committees, contact Dr. Tom Gilmore, secretary of the 3-A Committees, 6245 Executive Boulevard, Rockville, MD 20852 (301)984-1444.

February 6-7, 1991. Food Processors' Sanitation Workshop. Holiday Inn, Santa Nella, CA. Presented by the University of California Cooperative Extension and Food Processors' Sanitation Association, along with representatives of various food trade associations. The workshop includes a wide variety of sanitation topics, including microbiology, pest management, sanitizers, cleaner theory and employee motivation. For more information, contact Food Science and Technology Extension, University of California, Davis, CA 95616, (916)752-1478.

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800 Service Available for Canada

Finally, it's here. We wrote to our Canadian members informing them of the line and are now attaching stickers to their journals and letters, reminding them of the service. The number to call if you live in Canada is (800)284-6336.

1991-92 IAMFES Membership Directory Listings Due

This year's Annual Membership Directory is scheduled for distribution the end of March 1991. Once again, the Directory will feature governmental and commercial listings. The deadline to submit your company or agency listing is February 1, 1991. For further information, contact the IAMFES office at (800)369-6337 or (800)284-6336 (Canada).

New Monthly Feature in *Dairy, Food and Environmental Sanitation*

Begining this month, a new column "Federal Register," will provide excerpts of government actions relevant to IAMFES members (see page 38).

Industry Products

On-line Analyzer Monitors Chlorine for 3-1/2 Cents per Hour

A new brochure from Hach highlights a continuous chlorine analyzer for drinking water, wastewater, heating/cooling and reverse osmosis systems. Using only one pint each of indicator and buffer reagent per month, the CL17 is no more costly to use than the least expensive chlorine test kits. A cost analysis is included in the brochure.

The CL17 can accurately and continuously monitor a water stream for free or total chlorine, round the clock. Featuring a 0-5 mg/L range, 0.01 mg/L resolution and automatic color/turbidity compensation, the CL17 uses the USEPA-approved DPD colorimetric method for drinking water and wastewater. An optional serial input/output interface allows the CL17 to output data to an external printer or computer through a standard RS-232C interface.

Hach Company - Loveland, CO

Please circle No. 257
on your Reader Service Card

The Tried & Proven Stomacher® Lab Blender 400 Has Been Updated

The redesigned Stomacher Lab Blender 400 Mark II offers several added features, making it even more invaluable for QC/QA microbiology. Three preset speeds and four preset time settings make the Stomacher Lab Blender easier to use. The Stomacher's newly styled design makes maintenance easy and convenient.

Sample blending takes place within a sturdy, disposable plastic bag. Clean up is unnecessary and cross contamination is eliminated.

The Stomacher Lab Blender will segregate microorganisms from Dairy, Frozen, Canned and Processed Foods, as well as from Meat, Poultry, Fish, Flour Products, Fruits and Vegetables.

Tekmar Co. - Cincinnati, OH

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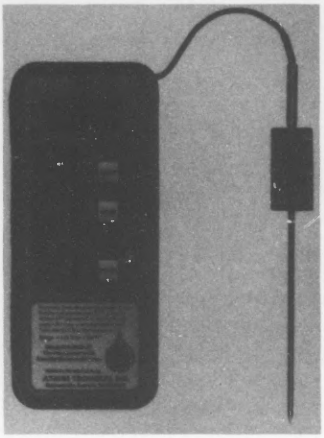

A New Version of the 330 Series of Fryer/Cooking Vat Thermometers Now Available

A new-longer probe version of the 330 series of fryer/cooking vat thermometers is now available from Atkins Technical of Gainesville, Florida.

The four-inch needle probe offers greater flexibility and accuracy be reaching deeper into a frying vat. This is useful not only to reach the product during cooking but also to measure the levels of heat in the oil. When the oil is not circulating and when it's necessary to reach the elements and cold spots found near the bottom of most commercial fryers, longer probes can be provided. Improved temperature measurement accuracy heightens the quality of prepared products and prevents overheating.

More than 25 major food service chains use the 330 series thermometers -- the most accurate instrument and probe systems available.

The 330 series is an instrument and permanently attached probe combination which achieves unparalleled accuracy by calibrating out thermocouple probe errors as well as circuit errors. Reliable, durable and compact, the thermometer is O-ring sealed against moisture making it useful in dishwashing and refrigerated areas as well as outdoors where weather may be a factor. The digital read out facilitates readability, increases resolution and allows for repeatability of measurements. This contributes to fewer operator errors and a decreased need for re-calibration.

The 330 series instrument and new four-inch probe sells for $115.00.

Atkins Technical Inc. - Gainesville, FL

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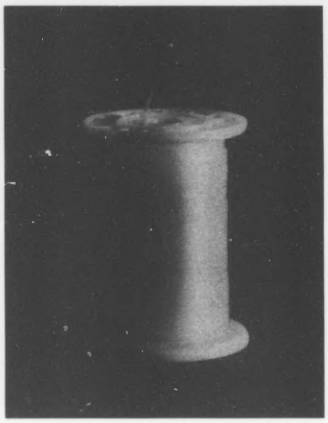

High Purity Microbore Tubing Features Non-Contaminating Construction

Durable, non-toxic Excelon® Micro-Line® tubing from Thermoplastic Processes, Inc. features a non-contaminating, high purity formulation ideally suited for laboratory and instrumentation use.

The sturdy, flexible tubing permits greater ease in configuration and assembly. Excelon Microbore tubing is available in sizes from .010" to .050" ID.

Excelon Micro-Line tubing meets Pharmacopeia Class VI, National Formulary Standards.

Thermoplastic Processes, Inc. - Stirling, NJ

Please circle No. 260
on your Reader Service Card

New Macroseptic® Flooring Systems with Intersept® Fight Microbe Growth Around the Clock

For food processing facilities, hospitals, laboratories -- anyplace that demands a hygienically fresh environment -- General Polymers' new Macroseptic Flooring Systems with Intersept provide round-the-clock, life-of-the-floor defense against microbial growth. The product has been shown to reduce bacterial growth by 90% or more, depending on local conditions.

Macroseptic is a seamless, hard-surface flooring that includes the powerful antimicrobial, Intersept. It provides strength, skid resistance, and ease of maintenance -- plus continuous antimicrobial action that supplements regular cleaning for a more hygienic workplace environment.

Effective Against Bacteria and Fungi for the Life of the Floor

Intersept is an amine neutralized organic phosphate, E.P.A. - registered as an antimicrobial agent and U.S.-patented as the active ingredient in Macroseptic flooring. It inhibits the growth of microbes by attacking their cellular walls, causing them to lose their ability to multiply and colonize. It is effective against a broad spectrum of Gram-positive and Gram-negative bacteria, as well as a wide variety of fungi.

Intersept is safe. It is non-phenolic and contains no arsenic, formaldehyde or heavy metals (no tin, no lead, no mercury, no copper, no zinc). It can be installed safely in inhabited environments.

And because Intersept is an integral part of the Macroseptic floor, it will not wash off, wear off or lose its biostatic properties over the life of the floor.

Systems for a Wide Variety of Applications

Macroseptic systems are available to match virtually any flooring need. For heavy-duty applications, 1/4" to 3/8" surfacing can be applied on new concrete or structurally sound substrate. Slurry systems at 1/16" to 1/8" are available for moderate wear conditions. Thin-Set Terrazzo systems and fine, colored quartz aggregates provide decorative options. And varying surface textures offer non-skid safety where necessary.

In addition, Macroseptic can be applied as a high-performance acrylic sealer to existing terrazzo, ceramic tile, or concrete floors. And its biostatic capabilities can also be added to walls as part of General Polymers' Hi-Build Wall Systems.

Registered Effectiveness

Because Intersept remains effective throughout the life of a Macroseptic floor, every installation is permanently registered by General Polymers. And a medallion with the registration number is permanently installed in the floor itself, serving as a permanent reminder that the floor provides constant defense against potentially harmful microbes.

General Polymers Corp. - Cincinnati, OH

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on your Reader Service Card

Whatman Acquires Laboratory Filter Business

Whatman Inc., manufacturers of specialty products for filtration and purification, announces the acquisition of the assets of the filter devices business of Genex Corporation.

The business consists of a range of patented membrane products, including a syringe-and-filter device widely used by technicians in analytical laboratories.

Dr. Lewis L. Metts, President of Whatman, Inc., said: "We are committed to real sales growth through innovative filtration products.

"The product line we have bought from Genex has significant competitive advantages, and is in a fast-growing segment of the market. "It fits well into our existing range of microfiltration products, and will be sold under the Whatman brand name through our worldwide distribution network."

Whatman, Inc. - Clifton, NJ

Please circle No. 262
on your Reader Service Card

Rapid Antibiotic Test Kit

The key to success in international business is found in working closely with customers and reacting to their needs.

With this in mind and the ever increasing demand for rapid tests in the Dairy Industry, LUMAC B.V., Landgraaf, The Netherlands, has recently developed a new Rapid Antibiotic Test Kit which screens incoming tanker milk for the presence of antibiotic residues.

The test is based on the activity measurement of *Streptococcus thermophilus* (OL 1010.59). This bacteria strain is grown and stressed under controlled conditions especially to increase its sensitivity towards milk antibiotics. The activity of this bacteria is expressed by a color change after the addition of a color substrate. In the absence of antibiotics, the bacteria will produce an enzyme system which will oxidise the color substrate. As a result, a purple color is developed. In the presence of antibiotics, the production of this enzyme is inhibited, hence no color change occurs.

The kit contains ready for use reagents and includes test tubes. The test is easy to perform, provides results within 35 minutes and has a sensitivity even better than presently used methods. The results are evaluated by visual comparison of the color development in a control milk and in the test sample.

With such features and benefits, this test is a real step forward in rapid antibiotic testing for the Dairy Industry.

LUMAC B.V. -
Landgraaf, The Netherlands

Please circle No. 263
on your Reader Service Card

New Cleaner Takes Slipping and Sliding out of Cleaning Floors

Beverage, dairy and food processors are now able to maximize plant safety, cleanliness and cost savings with the use of Solid Low Slip™ floor cleaner and the Solid One™ dispenser, now available from Klenzade, a Service of Ecolab Inc.

Produced as a non-filming formulation designed to help reduce the change of worker accidents, Solid Low Slip is a premium heavy-duty detergent formulated for use in mechanical floor scrubbers. Because of its heavy duty formulation, Solid Low Slip is excellent for removing black tire marks from floor surfaces while minimizing the slippery film typically left behind by other floor cleaning products.

Solid Low Slip, like other Klenzade solid products, eliminates the need to manually mix or add powder or liquid detergents, as well as the possibility of misusing pails of unmarked product stored in the plant.

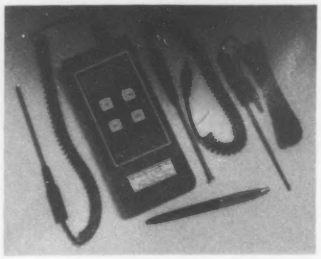
Solid One Solid Product Dispenser

The Solid One is a unique solid product dispensing system designed for use with Klenzade's Solid Low Slip floor cleaner. An example of the latest in solid dispenser technology, Solid One makes possible safe, virtually spill-proof transfer of concentrated chemicals.

By using the Solid One, managers can significantly increase plant safety and reduce costs. Spills from bulk tanks or 55-gallon drums are virtually eliminated, as are the drums themselves. Solids also mean workers spend less time in direct contact with concentrated chemicals. The Solid One dispensing system makes measuring cups, scoops and hand pumps obsolete with controlled transfer dispensing directly into mechanical floor scrubbers.

Klenzade, a Service of Ecolab Inc.
St. Paul, MN

Please circle No. 264
on your Reader Service Card



New Brooklyn Precision Digital Thermometer

Features high accuracy and Economical price

Brooklyn introduces a New economical digital thermometer using 10 K thermistor probes to achieve a+0.2° accuracy! This lightweight, portable unit boasts an expanded temperature range of -40 to 300°F (and -40 to 150°C) in 0.1° resolution. Using a low battery drain L.C.D. it also has a backlight switch for readability in dark environments. Membrane touch pad is sealed for protection against liquid or corrosive chemical spills.

The #6661 Thermometer is ready to use in any application with the Utility Probe (liquids; semi-solids), Air Probe (exposed sensor for air temperature), or Surface Probe (machine surfaces, pipes, tanks, etc).

Brooklyn's digital thermometer #6661 is priced at just $79.00 including alkaline battery and storage case or with Nicad battery and recharger at $116.00. Probes additional.

Brooklyn Thermometer Company, Inc. - Farmingdale, NY

Please circle No. 265
on your Reader Service Card

Rapid Rotavirus Test

Simple Procedure, Requires No Instrumentation

API® Rotavirus Detection System from Analytab Products (API) is a rapid 75 minute monoclonal antibody enzyme immunoassay for detecting rotavirus in fecal specimens. Highly specific and sensitive, API Rotavirus Test provides clear-cut definitive results. Positive results indicating the presence of rotavirus antigen are determined visually by the appearance of a blue color. The simple four-step procedure with room temperature incubation requires only 5 minutes hands-on time.

No instrumentation is needed. Designed for convenience, all reagents are ready-to-use and supplied in dropper bottles, eliminating the need for pipets. API Rotavirus Test is available in a 48 test kit supplied in breakaway microwells. Since each well can be used individually, the API Rotavirus Test offers the flexibility to test multiple or single specimens, depending on your needs.

Analytab Products - Plainview, NY

Please circle No. 266
on your Reader Service Card

New Catalog Describes Ashland Chemical's Products and Services

Ashland Chemical, Inc. has available a new catalog describing its complete line of products and services.

An international leader within the chemical industry, Ashland Chemical produces and distributes a full range of chemicals, specialty chemicals and plastics. The catalog provides information on product lines and distribution locations, services, company philosophy and capabilities.

Ashland's products include basic petrochemicals, resins for reinforced plastics, structural and pressure-sensitive adhesives and foundry chemicals. Specialty areas include resins for automotive, marine and other reinforced plastics applications, high-purity chemicals for semiconductor production and laboratory use, and gas-cured coatings systems.

The company is a leading national distributor of ingredients and specialties for food, beverages, cosmetics and pharmaceuticals.

Its Drew Marine and Drew Industrial divisions make it the international leader in specialty chemicals and supplies for the merchant marine industry and a leading source for water and fuel treatment chemicals.

One of the largest distributors of industrial chemicals and solvents, Ashland Chemical also is the leading North American distributor of packaged thermoplastics and is rapidly expanding its international thermoplastics distribution businesses. In addition, the company is the only full-service national distributor of resin, fiberglass and other materials for the fiber reinforced plastics industry.

Another key business is a comprehensive nationwide environmental services program. The company also provides a wide range of services and support to aid customers in the responsible handling of chemicals.

Ashland Chemical, Inc. - Columbus, OH

Please circle No. 267
on your Reader Service Card

Alkaline Phosphatase Testing on Charm II

Do you need alkaline phosphatase Testing that's sensitive, cost-effective, fast and easy? Try the Charm Alkaline Phosphatase Test, (the CAP Test), now available from Penicillin Assays Inc. The CAP Test uses standard Charm II equipment -- making the versatile Charm II System a better investment than ever.

Sensitivity is important! The CAP Test detects as low as 0.005% raw milk contamination in pasteurized milk, chocolate milk, skim milk, cream and other dairy products.

Concerned about the cost? Don't be. The CAP Test is the lowest priced alkaline phosphatase test on the market. CAP Test reagents are inexpensive, and no additional equipment is required.

Looking for speed and simplicity? The CAP Test takes only 4 minutes to test one sample, and up to six samples can be tested in 5 minutes. The easy-to-use, 3-step CAP Test requires no training.

Sensitivity, low cost, speed, simplicity -- the CAP Test has it all!

Penicillin Assays Inc. - Malden, MA

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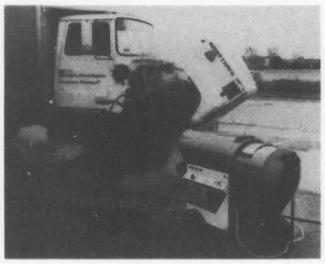

Delco's Versa 100 2 + 2 Steam Cleaner Combines Water & Steam Cleaning Capabilities in One Machine

Delco's versatile Versa 100 2 + 2 steam cleaner combining both water and steam cleaning capabilities can handle a multitude of cleaning applications.

The "Interpump" plunger pump provides long and durable life for the Delco pressure system. All wetted parts of the pump are ceramic or stainless steel for corrosion protection. And maintenance is easy with the one-piece unitized check valves.

Operator safety was in mind when the Delco Versa 100 2 + 2 was designed. A high limit switch senses the water temperature, so, if the temperature should become excessive, the flow of fuel to the burner is automatically stopped. In addition, a heavy-duty, seamless heating coil extends the life of the unit.

Each Delco Versa 100 2 + 2 comes with a 25' by 1/2" R-1 safety wire braid high pressure hose and a chrome-plated, fully insulated gun assembly. The flow rate is 150 gph, when steam is utilized. There is a 2.5 gpm flow, with an operating pressure of 1000 psii, when hot water is used.

Clarke Industries, Inc. - St. Louis, MO

Please circle No. 269
on your Reader Service Card

The Wisconsin Dairy Herd Improvement Cooperative Has teamed with PSION and CAPITOL VIALS to streamline testing.

Wisconsin produces 17.5% of the nation's milk, and the state's DHI, the largest such organization in the country, is responsible for testing and maintaining records for the milk of 840,851 cows - almost half of Wisconsin's cow population.

The information collected by the DHI provides production and management data to dairy farmers to increase their herd' profitability.

For years, DHI field technicians and dairy producers recorded data from milk samples onto preprinted farm sheets which had individual cow identifications, the latest recorded changes of their status, and information from the last test day. The technicians forwarded completed sheets to laboratories along with the corresponding milk samples. There, status changes were manually keyed into a desktop computer. Information was subsequently transmitted to a processing center where it followed through a series of screening and editing procedures. Missing or illogical data was corrected manually before reports were processed and mailed to individual farmers.

The entire process took well over three days to complete. With the high volume of samples tested - approximately 250,000 monthly -- the system was burdened by time consuming manual processes which were prone to error.

Today, the Wisconsin DHI incorporates an Automated Data Identification system with software and bar coded vial caps from CAPITOL VIALS, and PSION hand-held computer systems as its backbone. Now, all field recording is done with bar code scanners connected to PSION hand-held computers. The scanners read from vials and bar coded menus to retrieve milk weights, status codes and breeding dates. The farmers and DHI field testers are provided with datapaks (the hand-held computer's equivalent to floppy disks) for each herd that contain information previously recorded on the farm sheets.

The computer is strapped to the operator's belt or wrist or placed in a pocket, freeing both hands for sample collection. One-piece, bar coded vials are used to collect milk samples.

Testers log and save status changes into the hand-held computer. The program scans for missing or confusing information while still on the farm, ensuring completely accurate data collection. Upon completion of the test, the information is printed and given to the herd owner. Instant access to this information gives the owner the opportunity to make necessary adjustments to feeding and other herd management functions immediately.

From the farm, the datapak is shipped to the testing lab. There, the datapak can be separated from the samples and the samples mixed with others because the unique bar codes are their identifying links. The datapak information is downloaded to a computer linked to a central network. Information collected by bar code readers on the vial testing instruments is also recorded to the network. At this stage, all results are matched and transmitted to a dairy records processing center where the records are stored.

PSION, Inc. - Wellesley, MA

Please circle No. 270
on your Reader Service Card

Federal Register

USDA - Agricultural Marketing Service Proposes Revisions in U.S. Standards for Grades of Bulk American Cheese for Manufacturing

Excerpted from Federal Register Vol. 55, No. 230, 11/29/90.

Summary: This document proposes revisions in the United States Standards for Grades of Bulk American Cheese for Manufacturing. This proposal would make a number of changes in the standards to improve the grading criteria for bulk American cheese. These changes would be the first major revision of the standards since 1971.

The proposed revisions would expand the quality factor categories, reflect changes in production technology and marketing practices, and allow the use of antimycotics, as recently authorized by the Food and Drug Administration (FDA). The Agency believes this proposal would provide improved accuracy in grading and better assurance in grading and better assurance in obtaining the desired quality of cheese for government and commercial purchasers.

Supplementary information: This proposed rule has been reviewed under USDA guidelines implementing Executive Order 12291 and Departmental Regulation 1512-1 and has been classified as a "non-major" rule under the criteria contained therein.

The proposed rule also has been reviewed in accordance with the Regulatory Flexibility Act, 5 U.S.C. 601 *et seq*. The Administrator, Agricultural Marketing Service, has determined that the proposed rule, if promulgated, would not have a significant economic impact on a substantial number of small entities because use of the standards is voluntary and the revisions would not increase costs to those utilizing the standards.

1. *Provide Criteria for Evaluating the Potential Suitability of the Cheese for the Intended Period of Storage*

Bulk American cheese refers to a single piece of American cheese weighing more than 100 pounds (usually packed in 500- to 640-pound containers). Under the present grade standards, bulk cheese has three grade levels - Extra, Standard and Commercial. Extra grade bulk cheese is often placed in storage for extended periods of time. However, due to poor storability, excessive amounts of cheese have been subsequently downgraded. This proposed revision would give the grader more guidance in identifying cheese that has the best keeping-quality characteristics for long-term storage. The Extra grade classification would be separated into two subparts - short-hold and long-hold. Extra grade short-hold cheese should be processed within 4 months of the time of grading. Extra grade long-hold cheese is considered suitable to be held longer than 4 months before use. Long-hold cheese possesses characteristics which should allow it to maintain its quality longer than short-hold cheese. It is possible that some cheese designated as long-hold cheese may not maintain the Extra Grade quality throughout the curing process.

2. *Permit the Use of Safe and Suitable Antimycotics on the Surface of Bulk Forms of Cheese During Curing and Storage, as Sanctioned by FDA*

The FDA recently amended the standards of identity for several cheeses to permit the use of antimycotics on the exterior of bulk cheeses during curing and aging (21 CFR part 133). The National Cheese Institute, a trade association representing U.S. cheese manufacturers, had petitioned FDA to permit the broader use of safe and suitable antimycotics. Previously, use was permitted only on cuts and slices in consumer-size packages for a number of standardized cheeses.

Bulk American-type cheeses are often packaged in large barrels and the packaging methods used result in the cheese curd being loosely filled into the container. The loosely packed curd increases the exposed surface area of the curd, thus increasing the opportunity for mold growth. Provision for the use of antimycotics will be beneficial in preventing or inhibiting mold development on bulk cheese.

3. *Add the Quality Factors "Finish and Appearance" in Determining Final Grade*

When the bulk grade standard was first developed, bulk cheese was usually stored for only short periods of time before further processing. Consequently, exterior characteristics such as rough surface and whey and moisture droplets on the cheese surface were not considered significant defects during the grading process. More recently, government practice is to store the product for much longer periods of time as large purchases are made. Finish and appearance characteristics thus are more significant in determining the final grade of cheese intended to be aged.

4. *Redefine Packaging Requirements*

Presently, the construction designs of acceptable secondary containers vary significantly. The general-type packaging requirements outlined in this proposed revision will provide considerable latitude for new developments in packaging technology.

5. *Add "Flat" and "Rancid" Flavors to the List of Flavor Characteristics*

When off-flavors not referenced in the grade standards are encountered during grading activities, the cheese is classified "Below U.S. grade requirements." Flat and rancid flavors are not encountered often; however, the standards should make provision for them and for the appropriate corresponding grade. The revised standards would more accurately evaluate these off-flavor characteristics.

6. *Change the Title of These U.S. Grade Standards*

The current title is "United States Standards for Grades of Bulk American Cheese for Manufacturing." The proposed title is "United States Standards for Grades of Bulk American Cheese. The revisions would change the title of the standard and the definition of the product to accurately describe the cheeses identified within these standards.

USDA grade standards are voluntary standards that are developed pursuant to the Agricultural Marketing Act of 1946 (7 U.S.C. 1621 *et seq*.) to facilitate the marketing process. Manufacturers of dairy products are free to choose whether or not to use these grade standards. USDA grade standards for dairy products have been developed to identify the degree of quality in the various products. Quality in general refers to usefulness, desirability, and value of the products - its marketability as a commodity. When bulk cheese is officially graded, the USDA regulations and standards governing the grading of manufactured or processed dairy products are used. These regulations also require that fees and charges be assessed for grading services provided by USDA. The Agency believes this proposal would provide improved accuracy in grading and better assurance in obtaining the desired quality of cheese for government and commercial purchasers.

All written submissions made pursuant to this notice will be made available for public inspection at the Dairy Division, Agricultural Marketing Service, U.S. Department of Agriculture, room 2750 South Building, Washington DC, during regular business hours.

Dates: Comments must be received on or before January 28, 1991.

Addresses: Comments should be sent to: Director, Dairy Division, Agricultural Marketing Service, U.S. Department of Agriculture, room 2968, South Building, P.O. Box 96456, Washington DC 20090-6456.

For Further Information Contact: Diane D. Lewis, Dairy Products Marketing Specialist, Dairy Standardization Section, USDA/AMS/ Dairy Division, room 2750, P.O. Box 96456, Washington, DC 20090-6456, (202)447-7473.

Food and Environmental Hazards to Health

Rocky Mountain Spotted Fever and Human Ehrlichiosis - United States, 1989

Rocky Mountain Spotted Fever

In 1989, state health departments reported 603 cases of Rocky Mountain spotted fever (RMSF) to CDC, a 2.0% decrease from the 615 cases reported in 1988. The incidence rate was 0.25 per 100,000 persons. Of the 603 cases, 224 (37.1%) were reported from the South Atlantic region and 100 (16.6%) from the West South Central region. Oklahoma had the highest rate (62 cases, 1.9 per 100,000); other states with high rates were North Carolina (118 cases, 1.8 per 100,000), Montana (14 cases, 1.8 per 100,000), South Carolina (40 cases, 1.1 per 100,000), and Missouri (53 cases, 1.0 per 100,000). Detailed case reports were submitted on 487 (80.8%) cases. Of these, 300 (61.6%) were laboratory-confirmed, 15 (3.1%) were classified as probable, and 172 (35.3%) were not confirmed. Of the 487 cases, males accounted for 63.1% of cases. For 78.3% of cases, onset of symptoms occurred between May 1 and August 31 (with 46.8% of cases occurring in May and June); for 58.3%, a tick exposure within 14 days of symptoms was reported. Predominant manifestations included fever (90.4% of cases), headache (88.7%), myalgia (82.8%), rash (77.9%), and rash on palms (50.0%). The triad of fever, headache, and rash was present in 49.1% of cases. Age-specific incidence rates were highest in children aged 5-9 years (0.35 per 100,000) and lowest in persons aged 20-29 years (0.15 per 100,000). The overall case-fatality rate was 1.2%. For persons ≥ 20 years of age, the case-fatality rate was 1.5%; for persons <20 year of age, the rate was 0.6%.

Although the total number of RMSF cases reported in 1989 decreased slightly from 1988, large increases in the number of cases occurred in two Mid-Atlantic states: New Jersey (from none in 1988 to 26 cases in 1989) and Pennsylvania (from two cases to 23 cases). A large decrease occurred in Kansas (26 cases in 1988 to 11 cases in 1989). The reasons for these fluctuations are unknown.

Human Ehrlichiosis

Ehrlichia is a genus in the family *Rickettsiaceae*; members of the genus are characterized by their parasitism of white blood cells. In 1986, human illness (ehrlichiosis) caused by an *Ehrlichia* (*E. canis* or a closely related species) was first recognized in the United States. Like RMSF, the disease appears to be transmitted by ticks and presents as an acute febrile illness (fever often exceeds 39 C [102.2 F]). Other common symptoms of ehrlichiosis and RMSF include myalgia, headache, and nausea and other gastrointestinal symptoms. Unlike RMSF, however, rash is usually fleeting and occurs in approximately one third of ehrlichiosis cases. About half of the patients have mild leukopenia, thrombocytopenia and elevation of the alanine aminotransferase and aspartate aminotransferase.

Although no formal surveillance system exists for human ehrlichiosis, in 1989, 38 cases were detected by informal laboratory-based surveillance. Ten states had confirmed cases of human ehrlichiosis: Missouri (14 cases), Virginia (10), Oklahoma (four), Georgia (two), Tennessee (two), Washington (two), Arkansas (one), Illinois (one), Louisiana (one), and Texas (one). No fatal cases of human ehrlichiosis were reported for 1989.

Editorial Note: During the 1980s, reported cases of RMSF declined from a high of 1170 cases in 1981 to 592 cases in 1987; small fluctuations in the number of cases have occurred since then. North Carolina led the nation in reported number of cases each year during the decade (mean: 179 per year), but Oklahoma had the highest incidence rate during 7 of the 10 years (mean: 3.1 per 100,000). Cases reported in males during the 1980s consistently exceeded those in females by a 3:2 ratio. The case-fatality rate was highest in 1982 (4.7%) and lowest in 1989 (1.1%).

Because no laboratory test is consistently positive during the first 2 weeks of illness, patients with suspected RMSF should be treated empirically and serologic tests delayed until both acute and convalescent serum specimens are available. The indirect fluorescent antibody (IFA) and the indirect hemagglutination (IHA) tests are the most sensitive and specific of these tests. Complement-fixation, latex agglutination, and microagglutination are specific but lack the sensitivity of the IFA and IHA tests; negative results in one of these tests does not exclude the diagnosis of RMSF. The Weil-Felix test should not be used because it lacks both sensitivity and specificity. When paired serum specimens are not available, single specimens can be tested, but results may not be positive during the first 2 weeks of illness.

When diagnosis is considered essential to proper case management during the first 2 weeks of illness, a number of rapid diagnostic tests can be considered. Most untreated RMSF patients have rickettsemia; however, to determine the presence of rickettsiae, testing should be performed in only a few reference laboratories since laboratory-acquired infections have been reported. If a rash is present, a definitive diagnosis can sometimes be made by detecting *Rickettsia rickettsii* antigen in skin lesions, using a direct fluorescent antibody technique. However, the availability of this test is limited, and its sensitivity is only about 50%-70%. Recently, polymerase chain reaction technology was applied to the detection of *R. rickettsii* in the blood of a group of patients during the acute phase of infection.

Although substantially fewer cases of human ehrlichiosis than RMSF are reported, two recent studies indicate that in some geographic areas the incidence of human ehrlichiosis may equal or exceed that of RMSF. Of 249 paired serum samples submitted to the Oklahoma State Department of Health for RMSF testing in 1987, 29 (11.6%) were positive for antibody to *E. canis* and 29 (11.6%) were positive for *R. rickettsii*. Hospital-based active surveillance for human

ehrlichiosis in southeast Georgia for an 18-month period in 1987 and 1988 detected eight cases, an annual rate of 5.3 per 100,000; during the same period, one case of RMSF was detected in this area.

Because no vaccine exists for RMSF, the best preventive measure is avoidance of tick-infested areas. Persons who must enter these areas should wear protective clothing. Attached ticks should be removed by grasping them with fine tweezers at the point of attachment and pulling gently. When fingers are used instead of tweezers, they should be protected with facial tissue and washed afterwards.

The polymerase chain reaction diagnostic test for RMSF and serologic tests for human ehrlichiosis are available for selected patients following consultation with state health departments or CDC's Viral and Rickettsial Zoonoses Branch, Division of Viral and Rickettsial Diseases, Center for Infectious Diseases (telephone [404]639-1075). RMSF cases should be reported to state health departments.

MMWR 5/4/90

Alcohol Use and Aquatic Activities - Massachusetts, 1988

More than 8,000 drowning fatalities occur in the United States each year, making drowning the third most common cause of death from unintentional injury in the United States. Although 25%-50% of adult and adolescent drowning victims had consumed alcohol near the time of death, information regarding drinking behaviors during aquatic activities is limited. In September 1988, the Boston University School of Public Health surveyed Massachusetts adults aged ≥20 years to determine in what settings and how often they consumed alcoholic beverages on or near the water during their most recent aquatic activity in August 1988.

A statewide probability sample was conducted through a random-digit-dialing procedure. Of 306 adults called, 294 (96%) participated in the survey. A total of 221 (75%; 107 [79%] men, 114 [72%] women) respondents reported a mean of 13 days of aquatic activities during August 1988. The most frequently reported aquatic activity was swimming (169 [76%]), followed by boating (55 [25%]), and fishing from shore (31 [14%]). The most frequently reported site of activity was the ocean (120 [54%]), followed by lakes or ponds (57 [26%]), pools (38 [17%]), rivers (five [2%]), and other settings (1 [<1%]).

Of persons reporting aquatic activities, 38 (36%) men and 13 (11%) women reported that they had consumed alcohol on the last occasion. Among alcohol users, 15 (29%) reported having consumed ≥4 drinks from 2 hours before until completion of the activity. Men who drank reported consuming more (mean: 3.5 drinks) than women (mean 2.4 drinks) in an aquatic setting. The proportion of drinking did not vary substantially by location or activity. Respondents aged ≥50 years were less likely than younger respondents to report drinking on the last occasion on or near the water.

Editorial Note: The relationship between alcohol use and water recreation fatalities has been documented in a variety of settings. For example, the National Transportation Safety Board estimated that alcohol use was associated with 32%-64% of recreational boating deaths in 1983. In a North Carolina study of drownings from 1980 through 1984, 399 (46%) of 869 drowning victims ≥15 years of age tested positive for blood alcohol, and 286 (33%) had blood alcohol concentrations (BACs) of >0.1 g/dL.

The ratio of male-to-female drowning rates in the United States is approximately 12:1 for drownings associated with boating and approximately 5:1 for other drownings; the gender difference in drowning rates does not change with age. The Massachusetts data suggest that differences by sex in aquatic-activity-related morbidity and mortality may be associated with differences in behavior (e.g., use of alcohol, use of personal flotation devices, and participation in different types of water activities rather than exposure to aquatic environments. Men are more likely than women to drink alcohol on or near the water.

In the United States, more than 50 million persons engage in various recreational (noncommercial) boating activities on at least 8 days per year, and 90% of all deaths from recreational boating result from drowning. The prevalence of alcohol use during aquatic activities in Massachusetts was high when compared with the estimated prevalence of alcohol exposure among weekend nighttime drivers, who have the highest overall estimate known among U.S. drivers. This information suggests the need to 1) strengthen education about the risks of drowning in all aquatic environments and 2) clarify the relationship between alcohol use, drowning, and other water recreation injuries.

MMWR 5/25/90

Dairy, Food and Environmental Sanitation Instructions for Authors

Nature of the Magazine

Dairy, Food and Environmental Sanitation is a monthly publication of the International Association of Milk, Food and Environmental Sanitarians, Inc. (IAMFES). It is targeted for persons working in industry, regulatory agencies, or teaching in milk, food and environmental protection.

The major emphases include: 1) practical articles in milk, food and environmental protection, 2) new product information, 3) news of activities and individuals in the field, 4) news of IAMFES affiliate groups and their members, 5) 3-A and E-3-A Sanitary Standards, amendments, and lists of symbol holders, 6) excerpts of articles and information from other publications of interest to the readership.

Anyone with questions about the suitability of material for publication should contact the editor.

Submitting Articles

All manuscripts and letters should be submitted to the Editor, Margie Marble, 502 E. Lincoln Way, Ames, Iowa 50010-6666.

Articles are reviewed by two members of the editorial board. After review, the article is generally returned to the author for revision in accordance with reviewer's suggestions. Authors can hasten publication of their articles by revising and returning them promptly. With authors' cooperation articles are usually published within three to six months after they are received and may appear sooner.

Membership in IAMFES is not a prerequisite for acceptance of an article.

Articles, when accepted, become the copyright property of *Dairy, Food and Environmental Sanitation* and its sponsoring association. Reprinting of any material from *Dairy, Food and Environmental Sanitation* or republishing of any papers or portions of them is prohibited unless permission to do so is granted by the editor.

Reprints

Reprints of an article may be ordered by the author. An order form for reprints will be sent to you. Reprints may be ordered with or without covers, in multiples of 100. Reprint costs vary according to the number of printed pages in the article. Reprints cannot be provided free of charge.

Types of Articles

Dairy, Food and Environmental Sanitation readers include persons working as sanitarians, fieldmen or quality control persons for industry, regulatory agencies, or in education. *Dairy, Food and Environmental Sanitation* serves this readership by publishing a variety of papers of interest and usefulness to these persons. The following types of articles and information are acceptable for publication in *Dairy, Food and Environmental Sanitation.*

General Interest

Dairy, Food and Environmental Sanitation regularly publishes nontechnical articles as a service to those readers who are not involved in the technical aspects of milk, food and environmental protection. These articles deal with such topics as the organization and application of a milk or food control program or quality control program, ways of solving a particular problem in the field, organization and application of an educational program, management skills, use of visual aids, and similar subjects. Often talks and presentations given at meetings of affiliate groups and other gatherings can be modified sufficiently to make them appropriate for publication. Authors planning to prepare general interest nontechnical articles are invited to correspond with the editor if they have questions about the suitability of their material.

Book Reviews

Authors and publishers of books in the fields covered by *Dairy, Food and Environmental Sanitation* are invited to submit their books to the editor. Books will then be reviewed and the review will be published in an issue of *Dairy, Food and Environmental Sanitation.*

Preparation of Articles

All manuscripts should be typed, double-spaced, on 8-1/2 by 11 inch paper. Side margins should be one inch wide.

The title of the article should appear at the top of the first page. It should be as brief as possible and contain no abbreviations.

Names of authors and their professions should follow under the title. If an author has changed location since the article was completed, his new address should be given in a footnote.

Illustrations, Photographs, Figures

Wherever possible, submission of photographs, graphics, or drawings to illustrate the article will help the article. The nature of *Dairy, Food and Environmental Sanitation* allows liberal use of such illustrations, and interesting photographs or drawings often increase the number of persons who are attracted to and read the article.

Photographs which are submitted should have sharp images, with good contrast.

Examples of Proper Bibliographic Citations

Paper in a journal

Alderman, G. G. and E. H. Marth. 1974. Experimental production of aflatoxin in citrus juice and peel. J. Milk Food Technol. 37:308-313.

Paper in a book

Marth, E. H. 1974. Fermentations. pp. 771-882. In B. H. Webb, A. H. Johnson, and J. A. Alford (eds.), Fundamentals of dairy chemistry (2nd ed.), AVI Publishing Co., Westport, CT.

Book

Fennema, O. R., W. D. Powrie, and E. H. Marth. 1973. Low-temperature preservation of foods and living matter. Marcel Dekker, Inc., New York. 598 p.

Patent

Hussong, R. V., E. H. Marth, and D. G. Vakaleris. 1964. Manufacture of cottage cheese. U. S. Pat. 3,117,870. Jan. 14.

Affiliate News

Illinois Affiliate Holds Outstanding Conference

An outstanding fall conference was held in Elgin, Illinois, by the Illinois affiliate on October 23, 1990.

Titled "AIMFES Dairy & Food Sanitation Conference," it provided latest information on the chemistry of cleaning by technical representatives of the H.B. Fuller/Monarch Chemical Division, and the Klenzade Division of Ecolab Incorporated. Training manuals were provided for all attendees.

The pathogens in food and dairy related areas were reviewed as a part of the session. Also included was a review and demonstration of cleaning agents, wetting agents and sanitizers and their proper uses in effective cleaning and sanitizing.

Tracy Mosteller of the Department of Food Science and Technology, Virginia Polytech Institute and State University discussed her research in a lecture titled "Biofilms: Identity, Risk and Controls."

Speaking on the legal requirements for cleaning and sanitizing in the Food Industry was Jorge Hernandez of the Illinois Department of Public Health, Division of Food, Drugs and Dairies.

Charles Price, Senior Milk Specialist from the Federal Food and Drug Administration reviewed the latest regulatory requirements as applied to farm and plant processing of milk and milk products.

Responsible for the excellent conference was president-elect and program chairman, Joe Delaney of Prairie Farms Dairy.

At the luncheon and business meeting the reports on the International Meeting were made by Ron Case (Kraft Foods), immediate past-president of IAMFES and Charles Price (FDA) of Illinois/Wisconsin Host Committee.

The AIMFES election results were announced. Marlena Bordson, Illinois Department of Health (acting dairy program manager), was elected 2nd vice president and Robert A. (Bob) Crombie of the Crombie Company was elected secretary-treasurer. Cheryl Pieper, Elgin Honey-Hill was elected Sergeant at arms. Carl Ziesemer (Evanston-North Shore HD) and Bruno Jedwabnik (Dominick's Fine Foods) are auditors for the new year's business.

A plaque was given to Clem Honer for his years of service to AIMFES as Secretary/Treasurer. Clem is moving to Indianapolis, the headquarters of *Dairy Field Today*. Clem is the Technical Editor of the new dairy processing industry magazine.

Robert A. Crombie

Upcoming IAMFES Affiliate Meetings

1991

FEBRUARY

•**19-20, Georgia Association of Food & Environmental Sanitarians Annual Meeting** will be held at the Holiday Inn - Airport North in Atlanta, GA. For more information call Al Fain at (404)469-2701.

MARCH

•**5-6, Virginia Association of Sanitarians and Dairy Fieldman Annual Conference** will be held at the Donaldson Brown Continuing Education Center in Blacksburg, VA. For more information contact Haney Hodges at (703)362-8877

APRIL

•**3-5, Missouri Milk, Food and Environmental Health Associations' Annual Conference** will be held at the Ramada Inn, Columbia, MO. For more information contact Richard Janulewicz at (816)781-1600.

MAY

•**14-16, Pennsylvania Association of Dairy Sanitarians and Dairy Laboratory Analysts Annual Conference** at the Keller Conference Center, Penn State University, University Park, PA. For more information, contact Sid Barnard, 8 Borland Lab, University Park, PA 16802, (814)863-3915.

Minnesota Sanitarians Association, Inc.

Minutes - Annual Meeting
September 13, 1990

President Groehler called the meeting to order and welcomed the people to the meeting. There were about 140 registrants at the Conference and the majority of them stayed for the MSA Annual Meeting. This was one of the largest crowds we have ever had. President Groehler asked Roy Ginn to review the minutes from the Annual Meeting of September 14, 1989. The minutes were approved as read.

President Groehler asked Roy Ginn to review the 1989-90 audit. The financial statement is from September 1, 1989 to August 31, 1990. The audit was conducted by Edith Balthazor. The audit showed that as of August 31, 1989, we had $16,762.37. We had income of $7,276.95; expenditures of $6,024.36 for a net worth of $18,014.96. A motion was made and seconded to accept the audit.

President Groehler called on the Membership Chairman, Greg Pittman to give a membership report. Greg told the group that we have 263 members; 20 honorary members; and 83 IAMFES members, as of June, 1990.

President Groehler told the membership that we are privileged to have Margie Marble, Assistant Executive Director of IAMFES and Editor of *Dairy, Food and Envi-*

ronmental Sanitation with us. Margie wanted to congratulate Dr. Zottola because one of his students, Bob Roberts, won first place in the Developing Scientist Award. She also congratulated Roy Ginn for receiving the Harold Barnum Industry Award. She said that the Minnesota Sanitarians had approximately 90 members on their books and would like to see the rest of MSA join the International. Margie said due to printing costs of *Dairy, Food and Environmental Sanitation*, the dues had increased to $40.00 and for both of the Journals it is $70.00.

The next item on the agenda, President Groehler called on the Nominating Chairman, Mike Krim, to present his report. Mike told the group that the Nominating Committee was putting only one name up for Secretary-Treasurer. He said Roy is willing to serve another year. A motion was made and seconded to elect Roy E. Ginn as Secretary-Treasurer. Motion carried. Mike said that the Nominating Committee has two names to submit for Vice President: Paul Nierman and Dennis Decker. Ballots were passed out to the membership for the vote, results to be announced at the Awards Banquet. President Groehler called for Old Business and New Business and there was none. The meeting was recessed to the Awards Banquet at the Holiday Inn, Shoreview.

There was a hospitality time at 5:30 p.m. and dinner was served at 6:00 p.m. 156 people attended the banquet. The Holiday Inn served a very fine prime rib dinner.

President Groehler welcomed the people and asked Paul Nierman, President of Dairy Technology Society, to make some remarks. Paul welcomed the Dairy Technology Society and invited anybody who would like to attend the Society's meeting to come on the Monday evening in November. President Groehler asked Margie Marble IAMFES, to come forward. She presented to Bill Coleman a plaque in recognition of the several years he has served as Chairman of the Affiliate Council. Bill was very pleased. Bill, in that position, was a member of the IAMFES Board. President Groehler asked Dave Smith, Awards Chairman, to present the awards. Don Berg received the Award of Merit; Joseph H. Hoehn received Honorary Membership Award; Francis Jeno received the Field Service Award; and Neal Scott received the Dairy Service Award. The following eleven retirees received The Certificate of Retirement: Carl Anderson, Jim Kupfer, Ivan TerMaat, Roland Wiener, Norb Kuehne, Dennis Steinmetz, Richard Thompson, Glen Grove, George Mittag, Lee Whiting, J. Fred Jensen.

President Groehler asked Mike Krim to announce the winner of the election. Paul Nierman is the new Vice President.

President Groehler asked Kirk Cox to come to the podium and take over as President of the Association. Kirk adjourned the meeting at 7:45 p.m.

Respectfully submitted,
Roy E. Ginn, Secretary-Treasurer
Minnesota Sanitarians Association

IAMFES Audio Visuals Library

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DAIRY

❑ **Causes of Milkfat Test Variations and Depressions** - (140 slides-tape-script-30 minutes). This set illustrates the many factors involved in causing milkfat test variations or depressions in your herd, including feeding, management, stage of lactation, age of samples, handling of samples, and testing procedures. The script was reviewed by field staff, nutritionists, laboratory personnel and county extension staff. It is directed to farmers, youth and allied industry. (Penn State-1982)

❑ **Controlling Volumes and Fat Losses** - (110 slides-tape-script-30 minutes). Keeping milk volume and product loss from farm to supermarket of fluid dairy products is discussed. This set was done with the cooperation of the dairy industry who reviewed the script and provided opportunities to take pictures. It is designed to be used by milk plants for their processing personnel, regulatory representatives, field staff and milk haulers. (Penn State-1982)

❑ **Ether Extraction Method for Determination of Raw Milk** - (26 minute video). Describes the ether extraction procedure to measure milkfat in dairy products. Included is an explanation of the chemical reagents used in each step of the process. (CA-1990)

❑ **The Farm Bulk Milk Hauler** - (135 slides-tape-script-30 minutes). This set covers the complete procedure for sampling and collecting milk from farms. Each step is shown as it starts with the hauler entering the farm lane and ends when he leaves the milk house. Emphasis is on universal sampling and automated testing. Funds to develop this set were provided by The Federal Order #36 Milk Market Administrator. (Penn State-1982)

❑ **Frozen Dairy Products** - (27 minute videotape). Developed by the California Department of Food and Agriculture. Although it mentions the importance of frozen desserts, safety and checking ingredients; emphasis is on what to look for in a plant inspection. Everything from receiving, through processing and cleaning and sanitizing is outlined, concluded with a quality control program. Directed to plant workers and supervisors, it shows you what should be done. (CA-1987)

❑ **The Gerber Butterfat Test** - (7 minute video). Describes the Gerber milkfat test procedure for dairy products and compares it to the Babcock test procedure. (CA-1990)

❑ **High-Temperature, Short-Time Pasteurizer** - (59 minute videotape). Provided by the Dairy Division of Borden, Inc. It was developed to train pasteurizer operators and is well done. There are seven sections with the first covering the twelve components of a pasteurizer and the purpose and operation of each. The tape provides the opportunity for discussion after each section or continuous running of the videotape. Flow diagrams, processing and cleaning are covered. (Borden, Inc., 59-min.-1986)

❑ **The How and Why of Dairy Farm Inspections** - (110 slides-tape-script-15 minutes). This was developed at the request of seven northeast dairy cooperatives and with their financial support. Emphasis is on clean cows, facilities and equipment and following proper procedures. Regulatory agencies cooperated in reviewing the script and taking pictures. This was developed for farmers, youth and allied industry. (Penn State-1984)

❑ **Milk Plant Sanitation: Chemical Solution** - (13 minute video). This explains the proper procedure required of laboratory or plant personnel when performing chemical titration in a dairy plant. Five major titration are reviewed ... alkaline wash, presence of chlorine and iodophor, and caustic wash and an acid wash in a HTST system. Emphasis is also placed on record keeping and employee safety.

❑ **Milk Processing Plant Inspection Procedures** - (15 minute videotape). Developed by the California Department of Food and Agriculture. It covers pre and post inspection meeting with management, but emphasis is on inspection of all manual and cleaned in place equipment in the receiving, processing and filling rooms. CIP systems are checked along with recording charts and employee locker and restrooms. Recommended for showing to plant workers and supervisors. (CA-1986)

❑ **Processing Fluid Milk** - (140 slides-script-tape-30 minutes). It was developed to train processing plant personnel on preventing food poisoning and spoilage bacteria in fluid dairy products. Emphasis is on processing procedures to meet federal regulations and standards. Processing procedures, pasteurization times and temperatures, purposes of equipment, composition standards, and cleaning and sanitizing are covered. Primary emphasis is on facilities such as drains and floors, and filling equipment to prevent post-pasteurization contamination with spoilage or food poisoning bacteria. It was reviewed by many industry plant operators and regulatory agents and is directed to plant workers and management. (Penn State-1987)

❑ **Producing Milk of Good Quality and Flavor** - (114 slides-tape-script-25 minutes). The steps and corrective measures necessary to produce quality milk with good flavor are outlined. It is directed at dairy farmers, field staff, milk haulers and youth. (Penn State-1982)

❑ **Tests for Milk Quality and Composition** - (140 slides-tape-script-25 minutes). This set shows and describes in simple terms the various quality tests performed on milk samples. These include bacteria, antibiotics, freezing point, pesticides, somatic cells, flavor and others. The purpose, desirable results, and ways to improve poor results are outlined. It was developed for farmers, youth, field staff and allied industry. (Penn State, 1983)

FOOD

❑ **BISSC - A Sign of Our Times** - (50 slides-script-tape). The presentation was prepared by the Baking Industry Sanitary Standards Committee. The purpose of BISSC, formed in 1949 by six of the national organizations serving the baking industry, is to develop and publish voluntary standards for the design and construction of bakery equipment. Those Standards are now recognized as the definitive sanitation standards for equipment used in the baking industry.

❑ **Food Quality, Food Safety, and You!** - (80 slides, script, and cassette tape). This is an educational program designed for consumers. The presentation deals with the role of the consumer in maintaining the freshness, quality and safety of food in the home. It is intended for use by home economists, dieticians, cooperative extension agents and others interested in food quality and safety. (Cornell University)

❑ **Food Safe - Series I** - (4-10 minute videos). (1) "Receiving & Storing Food Safely", details for food service workers the procedures for performing sight inspections for the general conditions of food, including a discussion of food labeling and government approval stamps. (2) "Foodservice Facilities and Equipment", outlines the requirements for the proper cleaning and sanitizing of equipment used in food preparation areas. Describes the type of materials, design, and proper maintenance of this equipment. (3) "Microbiology for Foodservice Workers", provides a basic understanding of the microorganisms which cause food spoilage and foodborne illness. This program describes bacteria, viruses, protozoa, and parasites and the conditions which support their growth. (4) "Foodservice Housekeeping and Pest Control", emphasizes cleanliness as the basis for all pest control. Viewers learn the habits and life cycles of flies, cockroaches, rats, and mice. (Perennial Education).

❑ **Food Safe - Series II** - (4-10 minute videos). Presents case histories of foodborne disease involving (1) *Staphylococcus aureus*, (sauces) (2) *Salmonella*, (eggs) (3) *Campylobacter*, and (4) *Clostridium botulinum*. Each tape demonstrates errors in preparation, holding, or serving food; describes the consequences of those actions; reviews the procedures to reveal the cause of the illness; and illustrates the correct practices in a step-by-step demonstration. These are excellent tapes to use in conjunction with hazard analysis critical control point training programs. (Perennial Education).

❑ **Food Safe - Series III** - (4-10 minute videos). More case histories of foodborne disease. This set includes (1) Hepatitis "A", (2) Staphylococcus Aureus (meats), (3) Bacillus Cereus, and (4) Salmonella (meat). Viewers will learn typical errors in the preparation, holding and serving of food. Also included are examples of correct procedures which will reduce the risk of food contamination. (Perennial Education).

❑ **Food Safety Is No Mystery** - (34 minute videotape). This is an excellent training visual for food service workers. It shows the proper ways to prepare, handle, serve and store food in actual restaurant, school and hospital situations. A policeman sick from food poisoning, a health department sanitarian, and a food service worker with all the bad habits are featured. The latest recommendations on personal hygiene, temperatures, cross contamination, and storage of foods are included. (USDA-1987)

❑ **Legal Aspects of the Tampering Case** - (about a 25-minute, 1/2" videocassette). This was presented by Mr. James T. O'Reilly, University of Cincinnati School of Law at the fall 1986 Central States Association of Food and Drug Officials Conference. He emphasizes three factors from his police and legal experience - know your case, nail your case on the perpetrator, and spread the word. He outlines specifics under each factor. This should be of the greatest interest to regulatory sanitarians, in federal, state and local agencies. (1987)

❑ **On the Line** - (30 minute VHS videocassette). This was developed by the Food Processors Institute for training food processing plant employees. It creates an awareness of quality control and regulations. Emphasis is on personal hygiene, equipment cleanliness and good housekeeping in a food plant. It is recommended for showing to both new and experienced workers.

❑ **100 Degrees of Doom ... The Time and Temperature Caper** - (14 minute videotape). Video portraying a private eye tracking down the cause of a salmonella poisoning. Temperature control is emphasized as a key factor in preventing foodborne illness. (Educational Communications, Inc.).

❑ **Pest Control in Seafood Processing Plants** - (26 minute videotape). Videotape which covers procedures to control flies, roaches, mice, rats and other common pests associated with food processing operations. The tape will familiarize plant personnel with the basic characteristics of these pests and the potential hazards associated with their presence in food operations.

❑ **Product Safety and Shelf Life** (40 minute videotape). Developed by Borden Inc., this videotape was done in three sections with opportunity for review. Emphasis is on providing consumers with good products. One section covers off-flavors, another product problems caused by plant conditions, and a third the need to keep products cold and fresh. Procedures to assure this are outlined, as shown in a plant. Well done and directed to plant workers and supervisors. (Borden-1987)

❑ **Psychiatric Aspects of Product Tampering** - (about a 25 minute, 1/2" videocassette). This was presented by Emanuel Tanay, M.D. from Detroit, at the fall 1986 conference of CSAFDA. He reviewed a few cases and then indicated that abnormal behavior is like a contagious disease. Media stories lead to up to 1,000 similar alleged cases, nearly all of which are false. Tamper proof packaging and recalls are essential. Tampering and poisoning are characterized by variable motivation, fraud and greed. Law enforcement agencies have the final responsibilities. Tamper proof containers are not the ultimate answer. (1987)

❑ **Safe Handwashing** - (15 minute videotape). Twenty-five percent of all foodborne illnesses are traced to improper handwashing. The problem is not just that handwashing is not done, the problem is that it's not done properly. This training video demonstrates the "double wash" technique developed by Dr. O. Peter Snyder of the Hospitality Institute for Technology and Management. Dr. Snyder demonstrates the procedure while reinforcing the microbiological reasons for keeping hands clean. (Hospitality Institute for Technology and Management).

❑ **Sanitation for Seafood Processing Personnel** - A training video suited for professional food handlers working in any type of food manufacturing plant. The film highlights Good Manufacturing Practices and their role in assuring food safety. The professional food handler is introduced to a variety of sanitation topics including: 1) food handlers as a source of food contamination, 2) personal hygiene as a means of preventing food contamination, 3) approved food storage techniques including safe storage temperatures, 4) sources of cross contamination, 5) contamination of food by insects and rodents, 6) garbage handling and pest control, and 7) design and location of equipment and physical facilities to facilitate cleaning.

❑ **Sanitizing for Safety** - (17 minute video). Provides an introduction to basic food safety for professional food handlers. A training pamphlet and quiz accompany the tape. Although produced by a chemical supplier, the tape contains minimal commercialism and may be a valuable tool for training new employees in the food industry. (Indiana -1990)

❑ **Seafood Q & A** - (20 minute VHS). Anyone who handles seafood, from processor to distributor to retail and foodservice, must be prepared to answer questions posed by customers. This tape features a renowned nutritionist and experts from the Food & Drug Administration, the National Marine Fisheries Service, and the National Fisheries Institute who answer a full range of questions about seafood safety. Excellent to educate and train employees about seafood safety & nutrition. (National Fisheries Institute).

❑ **Tampering: The Issue Examined** - (37 minute videotape). Developed by Culbro Machine Systems, this videotape is well done. It is directed to food processors and not regulatory sanitarians or consumers. A number of industry and regulatory agency management explain why food and drug containers should be made tamper evident. (Culbro-1987)

❑ **Wide World of Food Service Brushes** - An 18 minute video tape that discusses the importance of cleaning and sanitizing as a means to prevent and control foodborne illness. Special emphasis is given to proper cleaning and sanitizing procedures and the importance of having properly designed and constructed equipment (brushes) for food preparation and equipment cleaning operations.

ENVIRONMENTAL

❑ **Acceptable Risks?** - (16 minute VHS). Accidents, deliberate misinformation, and the rapid proliferation of nuclear power plants have created increased fears of improper nuclear waste disposal, accidents during the transportation of waste, and the release of radioactive effluents from plants. The program shows the occurrence of statistically anomalous leukemia clusters; governmental testing of marine organisms and how they absorb radiation; charts the kinds and amounts of natural and man-made radiation to which man is subject; and suggests there is no easy solution to balancing our fears to nuclear power and our need for it. (Films for the Humanitites & Sciences, Inc.).

❑ **Air Pollution: Indoor** - (26 minute VHS). Indoor air pollution is in many ways a self-induced problem ... which makes it no easier to solve. Painting and other home improvements have introduced pollutants, thermal insulation and other energy-saving and water-proofing devices have trapped the pollutants inside. The result is that air pollution inside a modern home can be worse than inside a chemical plant. (Films for the Humanities & Sciences, Inc.).

❑ **Asbestos Awareness** - (20 minute videotape). This videotape discusses the major types of asbestos and their current and past uses. Emphasis is given to the health risks associated with asbestos exposure and approved asbestos removal abatement techniques (Industrial Training, Inc.).

❑ **Down in the Dumps** - (26 minute VHS). Garbage is no laughing matter. The fact is that we are running out of space to dump the vast amounts of waste we create each day. Since many of the former methods of disposal are environmentally unacceptable, what are we to do? The program examines the technological approaches to the garbage dilemma, including composting, resource recovery, and high-tech incinerators, and public reaction to the creation of new waste treatment facilities. (Films for the Humanities & Sciences, Inc.).

❑ **Fit to Drink** - (20 minute VHS). This program traces the water cycle, beginning with the collection of rain water in rivers and lakes, in great detail through a water treatment plant, to some of the places where water is used, and finally back into the atmosphere. Treatment of the water begins with the use of chlorine to destroy organisms; the water is then filtered through various sedimentation tanks to remove solid matter. Other treatments employ ozone, which oxidizes contaminants and makes them easier to remove; hydrated lime, which reduces the acidity of the water; sulfur dioxide, which removes any excess chlorine; and flocculation, a process in which aluminum sulfate causes small particles to clump together and precipitate out. Throughout various stages of purification, the water is continuously tested for smell, taste, titration, and by fish. The treatment plant also monitors less common contaminants with the use of up-to-date techniques like flame spectrometers and gas liquefaction. (Films for the Humanities & Sciences, Inc.).

❑ **Kentucky Public Swimming Pool and Bathing Facilities** - (38 minute videotape). It was developed by the Lincoln Trail District Health Department in Kentucky and includes all of their state regulations which may be different from other states, provinces and countries. It was very well done and could be used to train those responsible for operating pools and waterfront bath facilities. All aspects are included of which we are aware, including checking water conditions and filtration methods. (1987).

❑ **Putting Aside Pesticides** - (26 minute VHS). This program probes the long-term effects of pesticides and explores alternative pest-control efforts; biological pesticides, genetically-engineered microbes that kill objectionable insects, the use of natural insect predators, and the cross-breeding and genetic engineering of new plant strains that produce their own anti-pest toxins. (Films for the Humanities & Sciences, Inc.).

❑ **Radon** - (26 minute VHS). This program looks at the possible health implications of radon pollution, methods homeowners can use to detect radon gas in their homes, and what can be done to minimize hazards once they are found.

❑ **RCRA - Hazardous Waste** - (19 minute video). This videotape explains the dangers associated with hazardous chemical handling and discusses the major hazardous waste handling requirements presented in the Resource Conservation and Recovery Act. (Industrial Training, Inc.).

❑ **Waste Not: Reducing Hazardous Waste** - (35 minute VHS). This tape looks at the progress and promise of efforts to reduce the generation of hazardous waste at the source. In a series of company profiles, it shows activities and programs within industry to minimize hazardous waste in the production process. Waste Not also looks at the obstacles to waste reduction, both within and outside of industry, and considers how society might further encourage the adoption of pollution prevention, rather than pollution control, as the primary approach to the problems posed by hazardous waste. (Umbrella films).

OTHER

❑ **Diet, Nutrition and Cancer** - (20 minute video). Investigates the relationship between a person's diet and the risk of developing cancer. The film describes the cancer development process and identifies various types of food believed to promote and/or inhibit cancer. The film also provides recommended dietary guidelines to prevent or greatly reduce the risk of certain types of cancer.

❑ **75th IAMFES Annual Meeting Presentations.** 30 cassette tapes covering the complete conference. 5 videotapes covering various symposia and sessions (For more specific information, contact Vicki.)

If you are interested in checking out any of our audio-visuals, please fill out this form with the box or boxes checked as to which presentations you wish to view. Mail to: IAMFES, Lending Library, 502 E. Lincoln Way, Ames, IA 50010-6666. (You'll be notified by telephone when your tape or slide set is being mailed. Material from the Lending Library can be checked out for one week only so that others can benefit from its use.)

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New IAMFES Members

California

Keith Gomes
California Milk Producers
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Connecticut

Dennis A. Hoben
Pepperidge Farm, Inc.
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Coming Events

1991

February

•**3-5, Frozen Food Conference** will be held at J.W. Marriott at Lenox, Atlanta, GA. For more information contact the IDFA, 888 Sixteenth Street, NW, Washington, DC 20006; (202)296-4250.

•**4-7, Freezing Technology Short Course for the Frozen Food Industry** will be held on the University of California Davis campus. For further information, please contact Robert C. Pearl or Sharon Munowitch, University Extension, University of California, Davis, CA 95616; (916)757-8899.

•**5-7, Environmental Regulation Course**, sponsored by Executive Enterprises, Inc., will be held at the Seattle Airport Hilton, Seattle, WA. For more information contact Executive Enterprises, Inc. at (800)831-8333.

•**6-8, Managing Sales and the Sales Team**, sponsored by the International Dairy Foods Association, will be held at the Holiday Inn International Drive Resort, Orlando, FL. For more information contact the International Dairy Foods Association, 888 Sixteenth Street, NW, Washington, DC 20006; (202)296-4250.

•**11-13, Environmental Regulation Course**, sponsored by Executive Enterprises, Inc., will be held at the Cleveland Hilton South, Cleveland, OH. For more information contact Executive Enterprises, Inc. at (800)831-8333.

•**11-15, Bakery Management**, sponsored by the American Institute of Baking, will be held at AIB in Manhattan, Kansas. For registration information call (913)537-4750 or (800)633-5137.

•**13-14, Dairy and Food Industry Conference**, The Ohio State University, Department of Food Science & Technology, 2121 Fyffe Road, Columbus, OH 43210-1097. For more information contact Dr. John Lindamood (614)292-7765.

•**19-20, Georgia Association of Food & Environmental Sanitarians Annual Meeting** will be held at the Holiday Inn - Airport North in Atlanta, GA. For more information call Al Fain at (404)469-2701.

•**19-21, Environmental Regulation Course**, sponsored by Executive Enterprises, Inc., will be held at The Monteleone Hotel, New Orleans, LA. For more information contact Executive Enterprises, Inc. at (800)831-8333.

•**19-21, Environmental Regulation Course**, sponsored by Executive Enterprises, Inc., will be held at San Diego Princess, San Diego, CA. For more information contact Executive Enterprises, Inc. at (800)831-8333.

•**21-22, Chemical Labeling Conference**, sponsored by Executive Enterprises, Inc., will be held at the Sheraton Carlton Hotel, Washington, DC. For more information contact Executive Enterprises, Inc. at (800)831-8333.

•**20-22, National Research & Development Conference on the Control of Hazardous Material**, sponsored by the Hazardous Materials Control Research Institute, to be held at the Disneyland Hotel, Anaheim, CA (301)589-0182.

•**25-27, Environmental Regulation Course**, sponsored by Executive Enterprises, Inc., will be held at Southland Center Hotel, Dallas, TX. For more information contact Executive Enterprises, Inc. at (800)831-8333.

•**25-27, How to Comply with OSHA Regulations**. For more information contact the University of Florida, TREEO Center, 3900 SW 63rd Boulevard, Gainesville, FL 32608-3848 or call (904)392-9570.

•**27-March 1, Ice Cream Technology Conference**, sponsored by the International Dairy Foods Association, will be held at the Tradewinds on St. Petersburg Beach, St. Petersburg, FL. For more information contact the IDFA, 888 Sixteenth Street, NW, Washington, DC 20006; (202)296-4250.

•**28-March 1, Asbestos Abatement: Management Planning**. For more information contact the University of Florida, TREEO Center, 3900 SW 63rd Boulevard, Gainesville, FL 32608-3848 or call (904)392-9570.

•**28-March 2, Labeling of Bakery Products**, sponsored by the American Institute of Baking, to be held at the Downtown Marriott Hotel in Chicago. For additional information write to the Registrar, American Institute of Baking, 1213 Bakers Way, Manhattan, KS 66502 or call (913)537-4750 or (800)633-5137.

March

•**4-7, Better Process Control School.** For more information contact William Schafer, Ph.D., University of Minnesota, Department of Food Science and Nutrition, 1334 Eckles Avenue, Room 265, St. Paul, MN 55108, (612)624-4793.

•**4-8, Hazardous Waste Site Safety**. For more information contact the University of Florida, TREEO Center, 3900 SW 63rd Boulevard, Gainesville, FL 32608-3848 or call (904)392-9570.

•**5-6, Virginia Association of Sanitarians and Dairy Fieldman Annual Conference** will be held at the Donaldson Brown Continuing Education Center in Blacksburg, VA. For more information contact Haney Hodges at (703)362-8877.

•**6-7, CDR Cheese Research and Technology Conference** will be held at the Holiday Inn West Towne, Madison, WI. Sponsored by the Center for Dairy Research, University of Wisconsin-Madison. For additional information, call Sarah Quinones, at (608)262-2217.

•**6-8, Environmental Regulation Course**, sponsored by Executive Enterprises, Inc., will be held at Flamingo Hilton, Las Vegas, NV. For more information contact Executive Enterprises, Inc. at (800)831-8333.

•**7-9, Dairy Distribution Interchange**, sponsored by the International Dairy Food Association, will be held at the Royal Oceans Hotel, New Orleans, LA. For more information contact the IDFA, 888 Sixteenth Street, NW, Washington, DC 20006; (202)296-4250.

•**9, Hazardous Waste Site Supervision**. For more information contact the University of Florida, TREEO Center, 3900

SW 63rd Boulevard, Gainesville, FL 32608-3848 or call (904)392-9570.

•**10-13, IEFP '91**, sponsored by the Food Processing Machinery & Supplies Association, to be held at the McCormick Place, Chicago, IL. For information contact FPM&SA at (703)684-1080.

•**11-13, Environmental Regulation Course**, sponsored by Executive Enterprises, Inc., will be held at The Grand Hotel, Washington, DC. For more information contact Executive Enterprises, Inc. at (800)831-8333.

•**11-14, Better Process Control School**. For more information contact Robert Price, Ph.D., University of California, Department of Food Science, 250 Cruess Hall, Davis, CA 95616, (916)752-2194.

•**12-14, Environmental Regulation Course**, sponsored by Executive Enterprises, Inc., will be held at the Los Angeles Hilton & Towers, Los Angeles, CA. For more information contact Executive Enterprises, Inc. at (800)831-8333.

•**13, Indiana Dairy Industry Conference**, sponsored by the Food Science Department at Purdue University. For more information contact James V. Chambers, Purdue University , (317)494-8279.

•**18-20, Environmental Regulation Course**, sponsored by Executive Enterprises, Inc., will be held at The Palmer House, Chicago, IL. For more information contact Executive Enterprises, Inc. at (800)831-8333.

•**18-20, Better Process Control School**. For more information contact Jack Matches, Ph.D., University of Washington, HF-10, Institute for Food Science and Technology, Seattle, WA 98195, (206)545-1941.

•**18-21, Better Process Control School**. For more information contact Jorg Augustin, Ph.D., University of Idaho, Food Research Center, Moscow, ID 83843, (208)885-6456.

•**18-22, Molds and Mycotoxins in Foods,** sponsored by the American Association of Cereal Chemists, will be held in Lincoln, NE. For more information contact the American Association of Cereal Chemists, Short Course Program, 3340 Pilot Knob Road, St. Paul, MN 55121 or call (612)454-7250.

•**21-22, Clean Air Act From A to Z**, sponsored by Executive Enterprises, Inc., will be held at the Grand Hyatt Washington, Washington, DC. For more information contact Executive Enterprises, Inc. at (800)831-8333.

•**25-27, Environmental Regulation Course**, sponsored by Executive Enterprises, Inc., will be held at the Atlanta Hilton & Towers, Atlanta, GA. For more information contact Executive Enterprises, Inc. at (800)831-8333.

•**25-28, Better Process Control School**. For more information contact Winston Bash, Ph.D., Ohio State University, Food Industries Center, 140 Howlett Hall, 2001 Fyffe Court, Columbus, OH 43210, (614)292-7004.

•**25-28, Better Process Control School**. For more information contact Walter L. Clark, Ph.D., Chapman College, Food Science & Nutrition Department, 333 North Glassell, Orange, CA 92666, (714)997-6869.

•**25-29, Better Process Control School**. For more information contact Robert C. Wiley, Ph.D., University of Maryland, Food Science Program, Holzapfel Hall, 1122A, College Park, MD 20742-5611, (301)454-2829.

•**25-29, Mid-West Workshop in Milk and Food Sanitation**, The Ohio State University, Department of Food Science & Technology, 2121 Fyffe Road, Columbus, OH 43210-1097. For more information contact Dr. David Dzurec (614)292-7723.

•**26-28, Environmental Regulation Course**, sponsored by Executive Enterprises, Inc., will be held at the Sheraton Society Hill, Philadelphia, PA. For more information contact Executive Enterprises, Inc. at (800)831-8333.

•**26-28, Western Dairy and Food Industry Conference** to be held at the University of California-Davis. For more information contact John Bruhn and Shirley Rexroat, Department of Food Science & Technology (916)752-2191.

April

•**1-5, Asbestos Abatement: Project Management & Supervision**. For more information contact the University of Florida, TREEO Center, 3900 SW 63rd Boulevard, Gainesville, FL 32608-3848 or call (904)392-9570.

•**2-3, Getting Started with HACCP**, sponsored by the American Association of Cereal Chemists, will be held in Chicago, IL. For more information contact the American Association of Cereal Chemists, Short Course Program, 3340 Pilot Knob Road, St. Paul, MN 55121 or call (612)454-7250.

•**2-5, Better Process Control School**. For more information contact C.E. Johnson, Ph.D., University of Wisconsin, Department of Food Science, Babcock Hall, 1605 Linden Lane, Madison, WI 53706, (608)263-2013.

•**3-5, Missouri Milk, Food and Environmental Health Association's Annual Conference** will be held at the Ramada Inn, Columbia, MO. For more information contact Richard Janulewicz at (816)781-1600.

•**8-9, Annual Meeting: National Cheese Institute and American Butter Institute** will be held at the Chicago Marriott Downtown, Chicago, IL. For more information contact the International Dairy Foods Association, 888 Sixteenth Street, NW, Washington, DC 20006, (202)296-4250.

•**10, 41st Annual University of Maryland Ice Cream Conference.** For more information contact Dr. James T. Marshall, Department of Animal Sciences, University of Maryland, College Park, MD 20742, (301)405-1375.

•**15-16, Clean Air Act From A To Z**, sponsored by Executive Enterprises, Inc., will be held at The Palmer House, Chicago, IL. For more information contact Executive Enterprises, Inc. at (800)831-8333.

•**15-16, Air Toxics Regulation Conference**, sponsored by Executive Enterprises, Inc., will be held at the Washington Hilton & Towers, Washington, DC. For more information contact Executive Enterprises, Inc. at (800)831-8333.

•**15-18, Better Process Control School**. For more information contact James V. Chambers, Ph.D., Purdue University, Food Science Department, Smith Hall, W. Lafayette, IN 47907, (317)494-8279.

•**17-19, Shelf Life of Foods**, to be held in New Brunswick, NJ. For more information contact the Office of Continuing Professional Education, Cook College, Rutgers University, P.O. Box 231, New Brunswick, NJ 08903 or call (908)932-9271.

•**21-26, The National Conference on Interstate Milk Shipments** will be held at the Galt House, Louisville, KY. For additional information contact Leon Townsend, Executive

Secretary/Treasurer, 110 Tecumseh Trail, Frankfort, KY 40601; (502)695-1088.

•**22-23, Pesticides: Strategic Planning For The Future**, sponsored by Executive Enterprises, Inc., will be held at the Grand Hyatt Washington, Washington, DC. For more information contact Executive Enterprises, Inc. at (800)831-8333.

•**22-23, Canadian Environmental Regulation Course**, sponsored by Executive Enterprises, Inc., will be held at the Holiday Inn Crown Plaza, Toronto, Ontario. For more information contact Executive Enterprises, Inc. at (800)831-8333.

•**29-May 2, Better Process Control School**. For more information contact Gerald D. Kuhn, Ph.D., Pennsylvania State University, Department of Food Science, 116 Borland Building, University Park, PA 16802-7501, (814)863-2965.

May

.**4-9, 1991 Food Structure Meeting** will be held at the Hyatt Regency Hotel in Bethesda, MD. For more information contact Dr. Om Johari, Scanning Microscopy International, P.O. Box 66507, Chicago, IL 60666-0507, or call (708)529-6677.

•**6-7, Air Toxics Regulation Conference**, sponsored by Executive Enterprises, Inc., will be held at Seattle Airport Hilton, Seattle, WA. For more information contact Executive Enterprises at (800)831-8333.

•**7-8, Canadian Environmental Regulation Course**, sponsored by Executive Enterprises, Inc., will be held at The Palliser, Calgary, AB. For more information contact Executive Enterprises, Inc. at (800)831-8333.

•**7-8, Clean Air Act From A To Z**, sponsored by Executive Enterprises, Inc., will be held at The Westin Oaks, Houston, TX. For more information contact Executive Enterprises at (800)831-8333.

•**9-10, Maximizing Product Safety Workshop** will be held at the Diagnal Data Corporation, Lakeland, FL. For more information contact the International Dairy Foods Association, 888 Sixteenth Street, NW, Washington, DC 20006; (202)296-4250.

•**13-15, Sanitation and Safety for the 90's**, sponsored by The American Sanitation Institute, for food processors and warehousers, will be held at the Hampton Inn-St. Louis Union Station. For more information and/or registration materials, contact Louann Morrow toll-free at (800)325-3371 or, in Missouri, (314)725-2555, or write The American Sanitation Institute, P.O. Box 24198, St. Louis, MO 63130.

•**13-16, Better Process Control School**. For more information contact D.L. Downing, Ph.D., Cornell University-NYSAES, Department of Food Science and Technology, Geneva, NY 14456, (315)787-2273.

•**13-16, Purdue Aseptic Processing and Packaging Workshop**, sponsored by the Food Science Department at Purdue University. For more information contact James V. Chambers, Purdue University, (317)494-8279.

•**13-17, Better Process Control School**. For more information contact Aurora S. Hodgson, Ph.D., University of Hawaii at Manoa, Department of Food Science & Human Nutrition, 1920 Edmondson Road, Honolulu, HI 96822, (808)948-6564.

•**14-16, Pennsylvania Association of Dairy Sanitarians and Dairy Laboratory Analysts Annual Conference** at the Keller Conference Center, Penn State University, University Park, PA. For more information, contact Sid Barnard, 8 Borland Lab, University Park, PA 16802, (814)863-3915.

•**16-17, Groundwater Contamination**, sponsored by Executive Enterprises, Inc., will be held at the Washington Hilton & Towers, Washington, DC. For more information contact Executive Enterprises, Inc. at (800)831-8333.

•**18-22, 72nd Annual National Restaurant Association Hotel-Motel Show** will be held at the McCormick Place, Chicago, IL. For more information contact the NRA, 150 N. Michigan Avenue, Suite 2000, Chicago, IL 60601; (312)853-2525, FAX (312)853-2548.

•**20-21, The Hazardous Waste Regulation Course**, sponsored by Executive Enterprises, Inc., will be held at the Washington Hilton & Towers, Washington, DC. For more information contact Executive Enterprises, Inc. at (800)831-8333.

•**21, Dairy Cost Accounting Workshop** will be held at the Chicago O'Hare Marriott, Chicago, IL. For more information contact the International Dairy Foods Association, 888 Sixteenth Street, NW, Washington, DC 20006; (202)296-4250.

•**22, U.W. Dairy Manufacturer's Conference** to be held at the Mead Inn, Wisconsin Rapids, WI. For more information, contact Bill Wendorff, Dept. of Food Science, 1605 Linden Drive, Madison, WI 53706, (608)263-2015.

June

•**13-14, Listeria and Food Safety,** sponsored by The Aseptic Processing Association, will be held in Laval, France. For more information contact the Conference Secretariat, ASEPT, B.P. 49, 53020 Laval Cedex, France.

•**17-20, Better Process Control School**. For more information contact Robert M. Grodner, Ph.D., Louisiana State University, Food Science Building, Baton Rouge, LA 70803-4280, (504)388-5206.

•**24-25, The Hazardous Waste Regulation Course**, sponsored by Executive Enterprises, Inc., will be held at the O'Hare Marriott, Chicago, IL. For more information contact Executive Enterprises at (800)831-8333.

•**27-28, Chemical Labeling Conference**, sponsored by Executive Enterprises, Inc., will be held at the Sheraton Plaza Chicago, Chicago, IL. For more information contact Executive Enterprises at (800)831-8333.

July

•**11-18, International Workshop on Rapid Methods and Automation in Microbiology, XI**, and **Mini-symposium July 11-12th** at Kansas State University. Contact Daniel Y.C. Fung, Director, Tel (913)532-5654 or FAX (913)532-5681, 207 Call Hall, KSU, Manhattan, KS 66506.

•**21-24, International Association of Milk, Food and Environmental Sanitarians 78th Annual Meeting** to be held at the Galt House, Louisville, KY. For more information contact Julie at (800)369-6337 or (800)284-6336 (Canada).

August

•**5-9, Biotechnology: Principles and Processes**, will be held at the Massachusetts Institute of Technology, Cambridge, MA. For more information, please contact the Director of Summer Session, MIT, Room E19-356, Cambridge, MA 02139.

September

•**10-11, Marketing Development Seminar** will be held at The Registry, Denver, CO. For more information contact the International Dairy Foods Association, 888 Sixteenth Street, NW, Washington, DC 20006; (202)296-4250.

October

•**6-9, Annual Meeting and Convention: Milk Industry Foundation and International Ice Cream Association** will be held at the Marriott River Center, San Antonio, TX. For more information contact the International Dairy Foods Association, 888 Sixteenth Street, NW, Washington, DC 20006; (202)296-4250.

•**26-30, Food & Dairy Expo 91,** sponsored by Dairy & Food Industries Supply Association, to be held at the McCormick Place, Chicago. For more information contact DFISA, 6245 Executive Boulevard, Rockville, MD 20852-3938 (301)984-1444.

•**29-30, Dairy Food Processors' Symposium** will be held at the Palmer House, Chicago, IL. For more information contact the International Dairy Foods Association, 888 Sixteenth Street, NW, Washington, DC 20006; (202)296-4250.

November

•**6-9, The Fundamentals of Selling & Merchandising** will be held at the Holiday Inn, Chicago, IL. For more information contact the International Dairy Foods Association, 888 Sixteenth Street, NW, Washington, DC 20006; (202)296-4250.

To insure that your meeting time is published, send announcements at least 90 days in advance to: IAMFES, 502 E. Lincoln Way, Ames, IA 50010-6666.

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IAMFES

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On My Mind . . .

By
Steven K. Halstead
IAMFES
Executive Manager

. . . is the new year

January is named, of course, after the Roman god Janus. Janus is pictured as a "two faced" person. Two faced in the sense of looking forward and backward at the same time.

As January is the beginning of the new year, it is appropriate that we look forward, but can we do so without also looking back? Hardly, it seems.

Can the Art Institute compare with a tour of the Jim Beam Distillery?

For example, as we look ahead to the 1991 Annual Meeting to be held July 21-24 in Louisville, Damien Gabis and John Bruhn are putting together a terrific program and are adding new aspects that will make the program more inviting for everyone.

In our excitement, however, it is hard to forget the outstanding educational program last year. At the risk of hurting the feelings of those not named, I would like to say that if you didn't attend the symposia on HACCP, Solid Waste, and Biofilms, you missed truly outstanding presentations.

And the social functions . . . what can I say? The Illinois and Wisconsin affiliates not only showed us a great time, they also showed what true cooperation is all about.

But, can a Taste of Chicago compare with dinner on a paddle wheeler? Can the Art Institute compare with a tour of the Jim Beam Distillery? Only time will tell. You'll have to come to Louisville to find out!

Don't get the wrong idea. These past meetings are not ghosts that haunt us but rather heroes that give us inspiration for the future.

Like Janus, we look forward even as we remember the past. And like Newton, we see the future, because we are able to stand on the shoulders of giants!

. . . is trash

On a Saturday morning, last March, I found myself cleaning up the store room at the office. Among other things, we had 62 boxes of JFP's and DFES's from as far back as 1988.

We called all over Des Moines in an effort to give them away. Nobody wanted them because they were printed on slick paper. In the end, we had the "trash man" pick them up - they either went to the landfill or the city incinerator.

With that painful memory in mind, we sought ways of preventing a reoccurrence. First off, we reduced the number of extra journals we had printed each month. Then we started using old journals where possible at trade shows and affiliate meetings.

Ron Case and Harry Haverland made arrangements with the United Nations to have some of the extras distributed to developing countries.

These are all good things and I am not the least bit sorry for doing them - they needed to be done - but now everybody is clamoring to buy waste paper. Now there is a market for recycled paper and the paper companies are working hard to meet that demand.

We don't get anything for it, but neither does the landfill or the incinerator.

This has led us to the next step - recycling our junk mail, that is. Now, instead of throwing our junk mail away, we separate it into three boxes. At the end of the week, our printer picks up the boxes and mixes our waste with his. When he has a truck load, off it goes to market.

We don't get anything for it, but neither does the landfill or the incinerator. And our waste baskets are nearly empty at the end of the week.

What a payoff for such a small effort!

To receive information on membership with IAMFES Circle 360 on this card

IAMFES

International Association of Milk, Food and Environmental Sanitarians Inc.

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Reader requests for information are sent to the appropriate company. Follow-up on reader requests are the responsibility of the company advertising.

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This second Reader Service Card is provided to allow co-workers to also respond to companies of interest.

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Please send information on items circled below: Deadline 60 days from issue date

101	114	127	140	153	166	179	192	205	218	231	244	257	270	283	296	309	322	335	348
102	115	128	141	154	167	180	193	206	219	232	245	258	271	284	297	310	323	336	349
103	116	129	142	155	168	181	194	207	220	233	246	259	272	285	298	311	324	337	350
104	117	130	143	156	169	182	195	208	221	234	247	260	273	286	299	312	325	338	351
105	118	131	144	157	170	183	196	209	222	235	248	261	274	287	300	313	326	339	352
106	119	132	145	158	171	184	197	210	223	236	249	262	275	288	301	314	327	340	353
107	120	133	146	159	172	185	198	211	224	237	250	263	276	289	302	315	328	341	354
108	121	134	147	160	173	186	199	212	225	238	251	264	277	290	303	316	329	342	355
109	122	135	148	161	174	187	200	213	226	239	252	265	278	291	304	317	330	343	356
110	123	136	149	162	175	188	201	214	227	240	253	266	279	292	305	318	331	344	357
111	124	137	150	163	176	189	202	215	228	241	254	267	280	293	306	319	332	345	358
112	125	138	151	164	177	190	203	216	229	242	255	268	281	294	307	320	333	346	359
113	126	139	152	165	178	191	204	217	230	243	256	269	282	295	308	321	334	347	360

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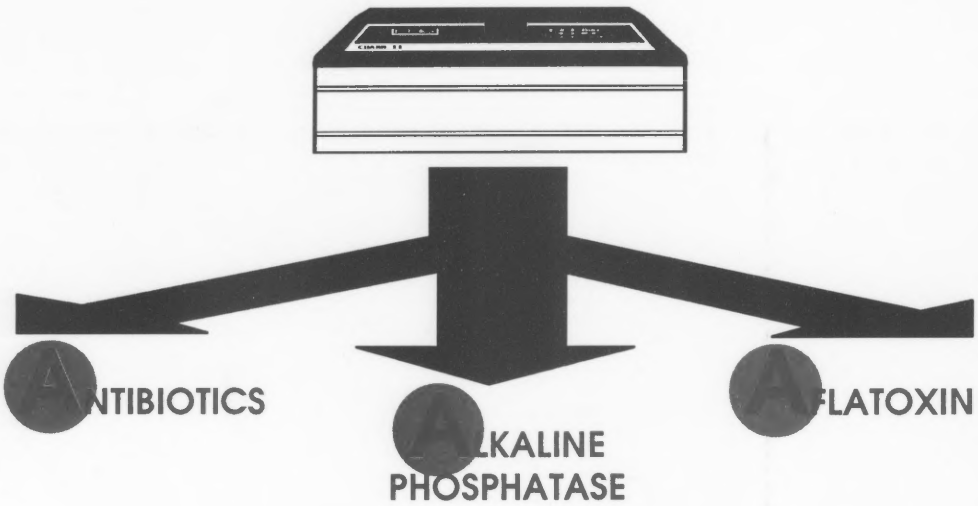
The Triple A Investment.



The Charm II System is the "Triple A" investment — antibiotics, aflatoxin, and now alkaline phosphatase testing. And your Charm II investment will keep growing — because we add new tests and improve the ones we have *without changing the equipment*.

The new Charm Alkaline Phosphatase Test (CAP Test) detects as little as 0.005% raw milk in pasteurized milk, chocolate milk, cream and other dairy products in less than 4 minutes.

We've made other advances, too. Try our new tableted reagents for 7 families of antimicrobial drugs (beta-lactams, macrolides, novobiocin, tetracyclines, sulfa drugs, aminoglycosides and chloramphenicol) — as well as aflatoxin. You'll find the tablets reduce testing time, add convenience and cut waste.

Naturally, as with all of our assays, our new tests are accurate. All Charm Tests come with control standards, and can be set to meet your requirements. Standard curves are also provided.

But the best part about our new developments is how much money they'll save you. For two reasons. First, each test is the lowest priced of its kind on the market.

And second, by using the same standard Charm II equipment, all of these assays continue to pay dividends. Because instead of changing the equipment, we've improved and adapted our tests to work — *and work well* — on the existing Charm II System.

And that makes the Charm II a *very* smart investment.

The Charm II System.
The investment that keeps growing.

Nothing works like a Charm.

Please circle No. 187 on your Reader Service Card

Penicillin Assays Inc.

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