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

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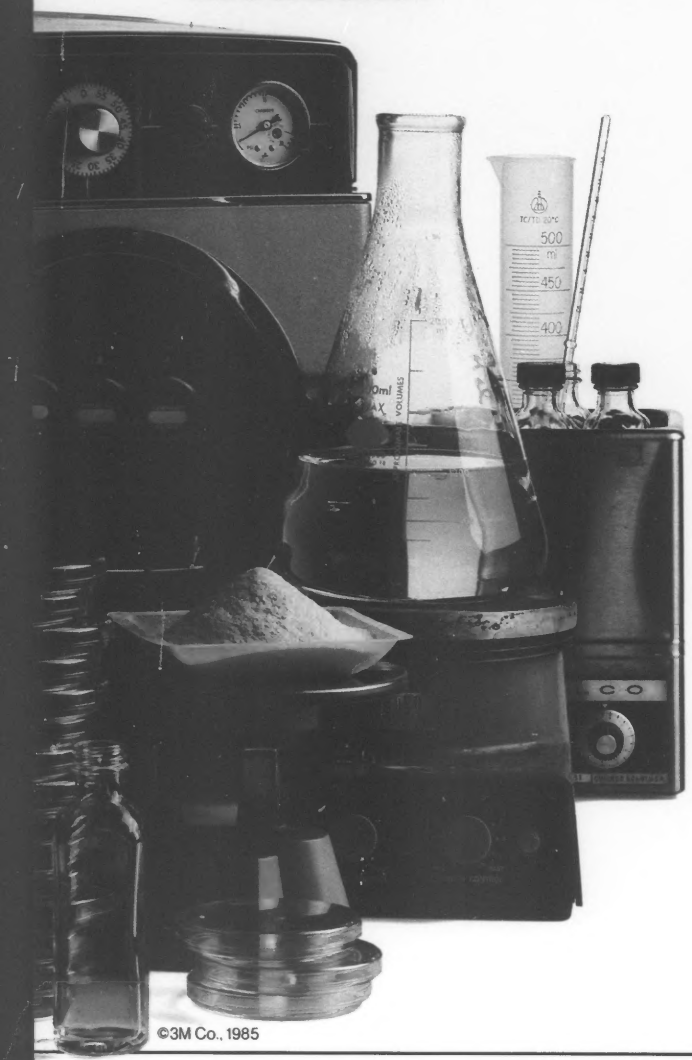

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Bulk Tank Milk Analysis For Isolating Mastogenic Bacteria

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Several systems for bacterial analysis of bulk tank milk samples consisting of special bacteriological culture techniques have been used to isolate mastogenic organisms to monitor the mastitis status of dairy herds. The bulk tank milk culturing system can also be used to evaluate the effectiveness of sanitation in milking practices and the effectiveness of teat dipping procedures leading to improved milk quality. To date no standard method of culturing bulk tank milk samples for determining mastogenic bacteria exists. A rapid and reliable method of culturing bulk tank milk samples for isolating mastogenic bacteria is described and its possible use is discussed.

There are several adverse changes in milk composition which occur when a cow has subclinical mastitis (a low grade chronic mammary gland infection). These changes result in reduced nutritional value of milk, lower cheese yields, increased processing problems, "off flavors", and shorter shelf life. A significant overall improvement in milk quality can be of major importance as a sales tool since it will result in a better tasting product which remains this way for a longer period of time, thus giving milk a better consumer image and more taste appeal. A greater understanding and appreciation of the importance of the bacteriological quality of milk has developed in the last decade, particularly in relation to product quality.

A mastitis control program benefits the dairyman by reducing cases of mastitis and the amount of milk which is discarded during the period of treatment. Individual somatic cell count service (SCCS) offered by the DHIA (Dairy Herd Improvement Association) is limited in helping the dairyman control mastitis and to improving milk quality, because it does not provide information about the mastogenic bacteria responsible for the herd's problem, which is necessary to adopt specific control measures. Mastitis control programs offered by DHIA that contain information about the major mastogenic bacteria will be more beneficial to the dairyman when the results of bulk tank milk sample cultures are included in routine DHIA-SCCS services. Veterinary practitioners and/or field dairymen using the information obtained by culturing bulk tank milk samples and the DHIA-SCCS report can evaluate the herd's mastitis status more accurately than the practitioners using only the DHIA-SCCS. The use of both services will result in the establishment and monitoring of better mastitis control programs.

Analysis of a composite sample of three to five consecutive bulk tank milk samples from the same farm is considered to be a more reliable method of evaluating the herd's mastitis status than analysis of a single sample. Consecutively taken bulk tank milk samples can help determine the mastogenic bacteria that are present in the majority of cows and may be shed intermittently. Samples taken at consecutive intervals also provide information relative to different milking procedures, short term infections, milking machine malfunctions, etc. (3,6-8,11,12,15,19,21,22,25,27). This relationship between environmental conditions on the farm, specific management practices and the relative importance of each of the common types of mastitis is reasonably well known. This information can be supplied to the farmer with the results of the bulk milk culture and emphasizes those factors which are likely to produce the best response in dealing with the mastitis problem in a herd. The system also provides a more accurate evaluation of the amount of bacterial contamination occurring during the milking process than does visual observation. Interpretation of the results of bulk tank milk cultures has been described elsewhere (6-8,11,12,25).

Several systems for bacterial analysis of bulk tank milk samples consisting of special bacteriological culture techniques have been used and discussed by other researchers (3,6-8,11,12,15,19,21,22,25,27). The system can also be used to evaluate the effectiveness of sanitation in milking practices and the effectiveness of teat dipping procedures leading to improved milk quality. To date no standard method of culturing bulk tank milk samples to determine mastogenic bacteria exists. It is the purpose of this paper to describe a rapid and reliable method of culturing bulk tank milk samples to isolate mastogenic bacteria and to consider it as a possible standardized method.

MATERIALS AND METHOD

Materials

Sample collections: Sterile vacutainers (10 ml), plastic disposable syringes (10 ml) or single service plastic bags (3 oz) are used for collecting milk samples from bulk tank.

Needles and Syringes: Sterile disposable 18G 1.5 inch needles and 10 ml sterile disposable plastic syringes are used during the dilution process.

Dilution solution: Sterile 0.1% protease-peptone (w/v) is prepared. Five ml of this solution is put into a 20 ml sterile disposable vacutainer tube and 90 ml into three sterile 200 ml flasks to be used for 1/20, 1/200, and 1/2,000 dilutions.

Plates: Five per cent sheep blood agar, *Staphylococcus aureus* selective media, streptococci selective media (TKT/EC) (23,27), coliform-selective media (MacConkey's agar) and yeast-selective media (Sabouraud's agar) are prepared and incubated for 48 h at 37°C to dry the surface of the plates used in the pour-decant surface plate method of culturing bulk tank milk samples.

METHOD OF CULTURING BULK TANK MILK SAMPLES

Step I. Bulk tank milk samples are first thawed at room temperature.

Steps II and III. Consecutive samples from one farm are poured into one sterile flask to make a composite sample and thoroughly mixed for 2 min.

Steps IV and V. Five ml of milk is withdrawn from this well mixed composite sample using a 10 ml sterile disposable syringe and 18G 1.5 inch sterile disposable needle and injected into a sterile disposable 20 ml vacutainer containing 5 ml sterile 0.1% protease-peptone solution.

Step VI. The 10 ml mixture obtained in Step V is forced through a new needle with pressure, using a new syringe, for 5 times to break up the clumps of bacteria.

Step VII. The mixture in Step VI is further mixed for 30 s with a vortex mixer.

Steps VIII and IX. This well mixed sample is then poured into a sterile flask containing 90 ml of dilution solution to obtain 1/20 (Mx1 in figure 1) dilution of the sample and swirled for 2 min.

Steps X and XI. Ten ml of this sample is withdrawn and injected into the next flask containing 90 ml of dilution solution to obtain a 10 fold dilution (1/200) (Mx2 in figure 1). Subsequent 10-fold dilution (1/2,000) (Mx3 in figure 1) is prepared by repeating the same steps.

Steps XII to XIV. Diluted samples are cultured using the pour-decant surface plate method as described below. Steps I though XIV are illustrated in Figure 1.

POUR-DECANT SURFACE PLATE METHOD OF INOCULATING MILK SAMPLES

Plates are placed on a level surface. Approximately 5 ml of diluted sample is poured onto the surface of the plate (Step XII). This plate is gently swirled to evenly distribute the sample over the surface and kept for 20 min (Step XIII). After 20 min the sample not yet absorbed onto the surface of the media is decanted (Step XIV). This permits uniform absorption of 1.4 $\pm$0.1 ml of the sample onto the media in standard 11 cm diameter petri dishes. This method makes possible the inoculation of several media with the same sample within a few seconds without using a glass spreader or calibrated loop, thus increasing the efficiency.

RESULTS AND DISCUSSION

In bulk tank milk samples most mastogenic bacteria are present in clumps. Therefore, at the beginning of the procedure, agitating the diluted milk sample by passing it through an 18G 1.5 inch needle three to five times, using a sterile disposable plastic syringe, is essential for obtaining the most probable number of mastogenic bacteria present in the milk sample (16,18,24). This also makes possible the uniform distribution of the bacterial colonies when inoculated onto the plates (Figure 2).

Several selective media have been used for isolation of different species of mastogenic bacteria. Blood agar is the media of choice for isolation of common mastogenic bacteria. TKT/FC (23,27), MacConkey's agar, and Sabouraud's agar media have been extensively used for isolation of *Streptococci spp.*, coliforms, and yeasts respectively. In areas where mycoplasma mastitis is frequently seen, culturing of the bulk tank milk samples on a special media used for isolation of *Mycoplasma spp.* is recommended. Different selective media have been used to isolate *S. aureus*. These are Mannitol agar (13,26), Mannitol salt agar (1,5,14, 20), reverse-CAMP medium (2), Tellurite Glycine (3), Baird-Parker medium (1), Baird-Parker medium supplemented with Acriflavine, Polymixins and Sulphonimide (4) and Staphylococcus 110 medium (9,10, 17) and many others used by food scientists not mentioned here.

It is difficult to recommend one of the selective media as the best media for the purpose, however, reverse-CAMP media appears to be promising for selectively isolating mastogenic *S. aureus* from bulk tank milk samples in one step. The term streptococci-selective media, staphylococci-selective media etc. have been used to indicate the need for culturing bulk tank milk samples on different selective media to speed up the procedure of identification of the mastogenic bacteria present in the sample.

This practical method of culturing bulk tank milk samples can be performed by any practitioner without requiring extensive experience in microbiology and/or expensive laboratory equipment. Using this procedure, 30 to 40 plates can be inoculated in a very short time. This system has been widely used by persons working with dairymen on various mastitis problems. It has been tested as a mastitis monitoring procedure in a routine (monthly) manner, where

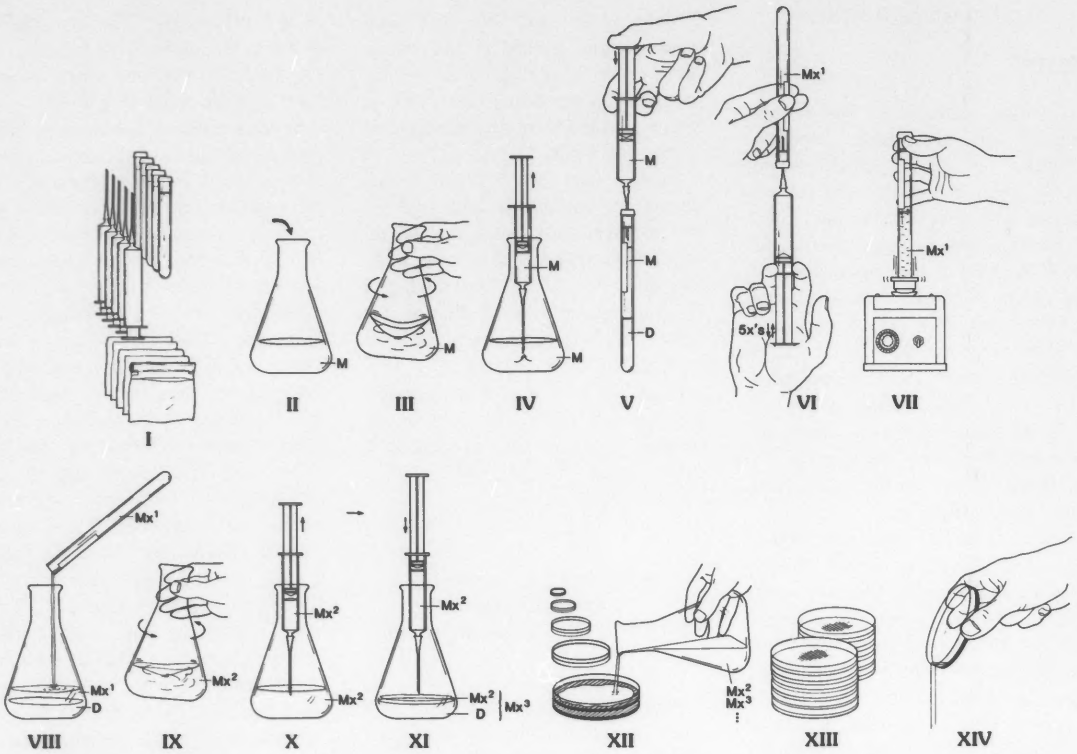

Figure 1. *Bulk tank milk samples are first thawed at room temperature. II and III. Consecutive samples from one farm are poured into one sterile flask to make a composite sample and thoroughly mixed for 2 min. IV and V. Five ml of milk is withdrawn from this well mixed composite sample using a 10 ml sterile disposable syringe and 18G 1.5 inch sterile disposable needle and injected into a sterile disposable 20 ml vacutainer containing 5 ml sterile 0.1% protease-peptone solution. VI. The 10 ml mixture obtained in Step V is run through a new needle with pressure using a new syringe for 5 times to break up the clumps of bacteria. VII. The mixture in VI is further mixed for 30 s with a vortex mixer. VIII and IX. This well mixed sample is then poured into a sterile flask containing 90 ml of dilution solution to obtain 1/20 (Mx1) dilution of the sample and swirled for 2 min. X and XI. Ten ml of this sample is withdrawn and injected into the next flask containing 90 ml of dilution solution to obtain a 10 fold dilution (1/200) (Mx2). Subsequent 10-fold dilution (1/2000) (Mx3) is prepared by repeating the similar steps. XII through XIV. Diluted samples are cultured using the pourdecant surface plate method as described below. Plates are placed on a level surface. Approximately 5 ml of diluted sample is poured onto the surface of the plate (XII). This plate is gently swirled to evenly distribute the sample over the surface and kept for 20 min (XIII). After 20 min the sample not yet adsorbed onto the surface of the media is decanted (XIV). This permits uniform adsorption of 1.4 ml of the sample onto the media in standard petri dishes, 11 cm in diameter.*

results are provided in conjunction with the SCC as a more comprehensive advisory service. There is reason to believe that the additional information provided by this method about mastitis types, and degree and probable source of bacterial exposure which can be obtained from routine bulk tank cultures using the method described in this paper, will be helpful to dairymen in further reducing somatic cell counts in milk, by guiding him to the actions which are most urgently required. The same procedure could easily be adapted by DHIA on a large scale and be incorporated into already existing somatic cell count services.

Information about the major species of mastogenic bacteria obtained using this method of bulk tank milk culturing could later be used to monitor the effectiveness of statewide or nationwide mastitis control programs. The same method can be used to culture routine bulk tank milk samples to estimate total bacterial populations for milk quality determinations by the dairy plants. In that case there is only one bulk tank milk sample taken from each farm at the time of pick-up. Therefore, there is no need for Steps I to III to make a composite sample. The procedure can be started with Step IV and different media would be used.

In conclusion, there is a need for a standard method of culturing bulk tank milk samples to isolate mastogenic bacteria. Such a method could be performed without requiring extensive training in microbiology and/or expensive laboratory equipment. The method just described could be used for this purpose by

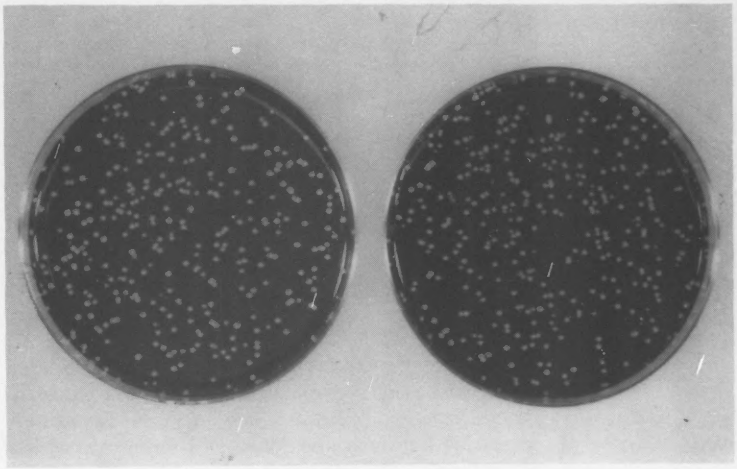

Figure 2. *Example of colony distribution of* Staphylococcus epidermidis *from the same dilution of diluted milk sample on two different media using pour-decant surface plate method of inoculation.*

veterinary practitioners, quality control laboratories, dairy scientists or other investigators in related areas. The use of this method and the current DHIA-SCCS could result in establishment of more effective surveillance of mastitis control practices in dairy herds.

ACKNOWLEDGMENTS

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REFERENCES

1. Baird-Parker, A. C. 1962. An improved diagnostic and selective medium for isolating coagulase-positive staphylococci. J. Appl. Bacteriol. 25:12-19.
2. Beatty, B. 1979. A new medium for identification of streptococci by use of the CAMP reaction. M.S. Thesis, Mankota State University.
3. Bushnell, R. B. 1981. Mastitis: Update on recent findings. Bovine Pract. Proc. 14:7.
4. Devriese, L. A. 1981. Baird-Parker medium supplemented with Acrilavine, Polymixins and Sulphanamide for the selective isolation of *Staphylococcus aureus* from heavily contaminated materials. J. Appl. Bacteriol. 50:351-357.
5. El-Zanfaly, H. F., and M. M. Sabbour. 1983. Evaluation of pour and surface plate methods for *Staphylococcus aureus* enumeration using four selective media. Archiv fur Lebensmittlhygiene 34:146-149.
6. Farnsworth, R. J., R. J. Johnson, and F. F. Anderson. 1977. Analysis of bulk tank milk to determine the bacterial flora of mammary gland of lactating cows in a dairy herd. Bovine Pract. Proc. 9:112-115.
7. Farnsworth, R. J. 1982. Integrating microbiology into mastitis programs. Proc. 21st Ann. Mtg. National Mastitis Council, Louisville, Kentucky 26-30.
8. Farnsworth, R. J. 1984. Investigation of herds with a high occurrence of mastitis. Proc. 23rd Ann. Mtg. National Mastitis Council, Kansas City, Missouri 176-178.
9. Finegold, S. M., and E. E. Sweeny. 1961. New selective and differential medium for coagulase positive staphylococci allowing rapid growth and strain differentiation. J. Bacteriol. 81:636-641.
10. Foltz, V. D., R. Mickelsen, and W. H. Martin. 1960. The incidence of potentially pathogenic staphylococci in dairy products at the consumer level. J. Milk Food Technol. 23:280-282.
11. Guterbock, W. M. 1984. Practical aspects of mastitis control in large dairy herds. Part I. Assessing the status of mastitis. Comp. on Cont. Education 6(10):S601-S604.
12. Guterbock, W. M., and P. E. Blackmer. 1984. Veterinary interpretation of bulk tank milk. Veterinary Clinics of North America 6(2):257-268.
13. Hanssen, H. P., and O. R. Jepsen. 1984. Mannitol agar for the growth of bacteria causing udder inflammation. 2 years experience. Dansk Veterinaertidsskrifft 67:119-122.
14. Jackson, H. 1974. Loss of viability and metabolic injury of *Staphylococcus aureus* resulting from storage at 5°C. J. Appl. Bacteriol. 37:59-64.
15. Johnston, A. P. 1981. Bulk tank procedures. Bovine Pract. Proc. 14:133.
16. Law, B. A., C. M. Cousins, and M. E. Sharpe. 1979. Psychotrophs and their effect on milk and dairy product. In Russel, A. D., and Fuller, R. (eds). Cold-tolerant microbes in spoilage and the environment. Society for Applied Bacteriology Technical Series No. 13 London Academic Press 137-152.
17. Millis, N. F., E. Eager, and A. J. Hay. 1981. Survey of bacteria in private swimming pools. Med. J. Australia 30:573-575.
18. Pearson, J. K. L., C. L. Wright., and D. O. Greer. 1979. Factors affecting the frequency of isolating *Streptococcus agalactiae* from herd milk supplies and the control of the organism in the dairy herd. Br. Vet. J. 135:119-126.
19. Peterson, A. C., J. J. Black, and M. F. Gunderson. 1962. Staphylococci in competition II. Effect of total numbers and proportion of staphylococci in mixed cultures on growth in artificial culture medium. Appl. Microbiol. 10:23-30.
20. Postle, D. S., and H. Blobel. 1965. Studies of bulk milk screening procedures for mastitis. Am. J. Vet. Res. 26:90-93.
21. Sears, D. M., M. Fettinger, and J. Marsh-Soliln. 1982. Comparison of bulk tank milk sampling to survey dairy herds for *Streptococcus agalactiae* in Mississippi. J. Dairy Sci. 65 (suppl):168.
22. Smith, A. R., and S. M. Johnson. 1972. Rapid diagnosis for *Streptococcus agalactiae* and *Streptococcus uberis*. J. Milk Food Technol. 35(6):383-384.
23. Te Whaiti, I. E., and T. F. Fryer. 1977. The enumeration of bacteria in refrigerated milk. New Zealand J. Dairy Sci. and Techn. 12:51-57.
24. VanDamme, D. M. 1984. Practitioners approach to mastitis microbiology acute and subacute. Proc 23rd Ann. Mtg. National Mastitis Council, Kansas City, Missouri 133-140.
25. Ward, G. E., J. E. Madl, and R. H. Lyon. 1981. Mannitol agar for microbiological diagnosis of bovine mastitis. J. Am. Vet. Med. Assoc. 178:161-164.
26. Ward, G. E., D. S. Postle, and D. T. Berman. 1969. Recovery of *Streptococcus agalactiae* from a herd of low prevalence of infection. A method of surveillance after elimination of infection. J. Milk Food Technol. 32:259-263.

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Quality of Delicatessen Meats in Connecticut

Lester Hankin

A cooperative study by The Connecticut Agricultural Experiment Station, New Haven and the Food Division of the Connecticut Department of Consumer Protection, Hartfort

Each American consumes about 113 grams (approximately four ounces) of meat per day. Of this amount, 38% or 43 grams (1.5 ounces) is processed meat or what are commonly called delicatessen meats (3). The 43 grams of processed meat consumed per day total about 34 pounds per year.

Processed meats take many forms and are called frankforts, salami, sausage, loafs, rolls and by many fanciful or local names. Most processed or delicatessen meat is a form of sausage (4).

In the manufacture of processed meats a single type or a mixture of meats is chopped or ground and then mixed with flavorings, sugar, salt, fillers, binders, or preservatives. Sometimes non-muscle meat such as heart, gizzard, liver, snouts, and lips are used. The chopped meat called the emulsion, is then formed into various shapes and sizes and cooked, baked, or smoked. Being perishable, it is refrigerated until sold. It is purchased at sliced-to-order delicatessen counters or in refrigerated pre-packaged units.

Connecticut and U.S. Regulations for processed meat products are similar (1,7). Frankfort, bologna and salami can contain no more than 30% fat, no more than 3.5% fillers, which can include nonfat dry milk, cereal, and soy flour and protein; no more than 10% added water; and no more than 200 parts per million (ppm) nitrite. The water is usually added as ice during the grinding or chopping to cool the meat and equipment.

Loaf products such as "luxury loaf" or "pickle and pimento loaf", have no restriction on amount of added water or filler, but must contain no more than 30% fat. Uncooked sausage may contain up to 50% fat, but cooked or processed sausage is restricted to 30% fat.

In this survey of processed or delicatessen meats we tested an assortment of products and brands to give consumers an overview of ingredients and nutrients in different products. Compliance with State Regulations was also examined.

Methods

During 1982-83 one hundred fifty official samples of processed meats were collected by inspectors of the Food Division of the Connecticut Department of Consumer Protection. Samples were collected in packaged units, from sliced-to-order counters, and from bulk. Samples included 39 frankforts or kielbasas, 28 salamis or wursts, 21 bolognas, 39 loafs or rolls, and 22 miscellaneous products. The miscellaneous items included head cheese, corned tongue, turkey breast, and blood sausage.

Analysis for fat, protein, total solids, ash, added water, fillers, and nitrite were made by Official Methods (5). Sodium and calcium were determined by atomic absorption spectrophotometry (2). The percentage of total carbohydrate and calories were calculated. Carbohydrate is % total solids - (% fat + % protein + % ash). Calories per 100 grams are the % fat X 8.79 + [(% total solids - (% fat + % ash)] X 4. The mean difference of duplicate tests for fat was about a half percent and for water content was about eight-tenths percent.

Results and Discussion

Table 1 list products and meat ingredients as shown on the label. It is not possible to list all ingredients. Samples that contain MSG (monosodium glutamate) are indicated with an asterisk since this additive may be significant to some people. The table also shows analyses for nutrients and other materials. Underlined values indicate excesses. In some cases (marked with a) the material was present although not shown on the label.

Frankforts and kielbasa. The average amount of fat was 29.0% but ranged from 9.5 to 40.0%. Fourteen or 36% of the samples (nos. 1, 2, 3, 4, 5, 8, 9, 12, 15, 16, 19, 30, 36, 39) contained more than 30% fat, the legal limit. Three samples contained only chicken or turkey as the meat component; the others contained beef and/or pork, sometimes combined with chicken and such other ingredients as pork stomachs and beef hearts. (Table 1).

Only eight frankfort and kielbasa samples declare use of nonfat dry milk and only one (no. 37) contained more than the 3.5% maximum allowed. Three samples (nos. 2, 13, 22) contained undeclared filler. Some samples claimed hydrolyzed plant protein was added. There is, however, no satisfactory method to determine the amount

Table 1. Analysis of Delicatessen Meats. Sample Brand & Meat Ingredients.

		Fat, %	Protein, %	Carbohydrate, %	Added water, %	Fillers, %	Sodium, mg/100 g	Nitrite ppm	Calcium, mg/100 g	Calories per 100 g
Frankforts, Hot Dogs, Kielbasa										
	1.	34.5	12.5	8.0	0	0	870	12	20	395
	2.	31.6	10.6	5.8	8.8	0.3†	850	50	150	344
	3.	34.5	25.8	1.3	0	0.3	1250	24	22	411
	4.	37.3	17.2	1.5	0	0	890	72	8	381
	5.	36.1	14.4	2.6	0	0	1060	4	10	407
	6.	24.6	14.8	1.4	0	0	760	1	220	281
	7.	12.5	15.1	9.6	0	0	960	10	20	208
	8.	34.0	18.6	< 1.0	0	0	1070	1	110	372
	9.	32.6	12.9	6.1	0	1.9	720	2	3	363
	10.	29.8	14.4	4.1	0	2.9	790	21	13	336
	11.	30.8	11.8	4.3	3.3	0	410	7	80	333
	12.	33.5	11.2	3.2	4.5	0	1010	2	7	352
	13.	20.8	14.4	4.9	0	0.3†	650	24	130	260
	14.	30.4	11.8	8.4	2.5	0	750	10	8	339
	15.	31.9	12.4	3.8	0	0	1040	2	7	345
	16.	31.3	11.7	5.0	2.0	0	1080	4	10	341
	17.	30.6	10.8	5.9	7.1	0	1710	3	12	336
	18.	9.5	16.4	11.1	0	0	1440	0.4	—	194
	19.	34.8	12.3	3.7	0	0	690	4	514	370
	20.	28.8	17.5	< 1.0	0	0	810	0.4	2	317
	21.	29.5	17.9	< 1.0	0	0	830	30	130	334
	22.	24.9	12.3	4.6	7.5	0.7†	1100	18	4	286
	23.	22.3	13.1	1.3	7.3	0	640	6	264	253
	24.	27.9	14.9	5.1	3.0	0	70	6	80	325
	25.	28.5	15.6	1.0	0	0	920	8	40	317
	26.	26.3	14.3	7.8	0	2.7	910	56	140	319
	27.	22.4	15.4	5.1	0	0	970	52	18	279
	28.	29.6	11.9	6.4	1.1	0	1010	15	12	334
	29.	25.3	15.3	5.7	0	3.6	760	10	420	306
	30.	38.4	26.9	< 1.0	0	0	1260	19	14	448
	31.	29.3	17.1	3.9	0	0	620	14	5	341
	32.	26.1	13.6	4.1	1.6	1.5	820	10	390	301
	33.	28.5	14.1	8.0	0	2.2	690	18	24	339
	34.	30.1	17.3	4.7	0	3.0	850	8	21	353
	35.	25.1	12.9	4.8	2.9	0	910	12	8	292
	36.	32.6	13.3	6.0	0	0	1010	10	23	364
	37.	29.5	11.3	3.5	12.4	3.6	2070	0	244	318
	38.	26.0	13.6	3.9	0	0	880	7	210	299
	39.	40.0	16.1	7.1	0	2.8	1470	2	31	445
Bologna										
	40.	25.9	19.3	2.8	0	3.3	900	0	22	316
	41.	31.5	12.5	4.9	0.8	1.8	790	20	309	347
	42.	38.1	14.9	4.9	0	0	1240	7	10	414
	43.	15.8	13.1	10.0	6.1	0	190	9	80	231
	44.	36.4	16.3	5.1	0	2.3	1440	3	13	405
	45.	37.5	11.5	5.2	0	0	370	36	60	396
	46.	26.3	13.7	3.7	1.6	2.6	960	10	47	300
	47.	36.3	16.3	< 1.0	0	0	890	13	11	387
	48.	20.3	15.1	2.6	0	0	890	24	7	249
	49.	31.9	12.9	7.1	0	0.3†	1120	0.2	—	360
	50.	34.5	13.6	2.7	0	0	800	9	24	368
	51.	21.5	14.9	4.4	0	0	760	25	260	266
	52.	40.0	12.7	4.3	0	0.9	310	0	71	420
	53.	30.3	10.9	4.3	0	0	1280	4	10	327
	54.	29.4	12.4	6.0	0	0	720	4	32	332
	55.	17.8	13.6	3.8	0	0	1010	38	4	225
	56.	29.6	11.3	12.5	3.5	4.1	1160	8	280	355
	57.	20.5	12.5	6.9	0.3	0	1810	3	15	310
	58.	14.4	18.5	3.7	0	0	1270	25	20	215
	59.	29.3	11.6	5.8	3.6	0	1380	6	297	327
	60.	26.8	13.1	2.5	2.5	0	810	8	220	297
Salami & Wursts										
	61.	19.8	18.0	2.8	0	0	1030	16	16	257
	62.	13.4	23.9	< 1.0	0	0	1160	18	12	214
	63.	35.3	20.1	2.3	0	0	1790	2	4	400
	64.	43.3	19.3	3.8	0	0	1830	13	29	471
	65.	32.3	22.1	3.5	0	0.3†	1760	0	12	386
	66.	28.6	14.6	1.3	0	0.3†	330	12	80	315
	67.	24.5	12.4	8.4	2.1	0	800	3	294	299
	68.	35.6	26.9	2.0	0	0	820	6	90	429
	69.	23.3	13.7	8.5	0	0	1220	10	7	285
	70.	29.6	13.0	2.4	1.5	0	380	0	103	322
	71.	14.9	18.1	7.3	0	0	1130	14	200	232
	72.	26.3	13.9	3.7	0	0	570	1	145	301
	73.	28.3	16.2	3.7	0	0	1440	17	17	328
	74.	33.6	12.0	2.8	0.5	0	920	22	8	355
	75.	33.8	16.9	< 1.0	0	0	1130	0	690	365
	76.	33.6	19.6	3.1	0	0	1860	10	7	386
	77.	40.3	14.8	11.6	0	0	1660	10	16	459
	78.	18.1	17.4	4.5	0	0	1150	18	72	247
	79.	22.3	16.3	4.1	0	0	980	24	8	277
	80.	23.5	19.7	7.2	0	4.4	1520	3	20	314
	81.	33.5	20.7	1.7	0	0.6†	1680	9	26	386
	82.	8.3	20.4	8.8	0	0	1170	22	—	180
	83.	27.3	18.1	2.7	0	0	480	0	20	322

Table 1. Analysis of Delicatessen Meats. Sample Brand & Meat Ingredients. **(continued)**

		Fat, %	Protein, %	Carbohydrate, %	Added water, %	Fillers, %	Sodium, mg/100 g	Nitrite ppm	Calcium, mg/100 g	Calories per 100 g
	84.	23.9	14.1	7.5	0	0	880	28	200	296
	85.	27.3	20.0	1.2	0	0	1250	18	24	324
	86.	47.1	18.6	2.6	0	0	1020	0	107	499
	87.	18.4	14.3	4.0	2.9	0	1480	8	5	235
	88.	32.8	12.7	7.9	0	3.6	610	2	80	370
Loafs and Rolls										
	89.	20.8	22.4	7.6	0	0	1430	7	30	302
	90.	37.3	16.8	1.7	0	0	1050	46	19	402
	91.	6.6	18.4	14.3	0	6.6	880	8	267	189
	92.	12.8	15.0	21.0	7.0	24.9	570	14	260	257
	93.	13.0	20.2	2.2	0	0	580	13	9	204
	94.	15.5	14.7	3.3	4.1	0	600	2	90	208
	95.	18.8	11.7	9.8	8.7	0	790	0	189	251
	96.	14.9	14.1	13.0	5.3	9.8	1060	7	28	239
	97.	17.8	14.1	12.7	4.2	10.4	430	6	110	263
	98.	28.3	13.1	5.3	2.2	3.0	890	6	22	322
	99.	18.8	9.9	16.3	22.1	12.8	1140	4	31	270
	100.	1.0	19.4	18.1	0	2.2	590	28	130	159
	101.	25.8	16.3	6.1	0	4.6	670	8	120	316
	102.	16.9	14.4	6.0	0	0	157	2	8	230
	103.	21.6	13.2	12.9	2.7	5.7	650	10	210	295
	104.	18.3	13.1	6.2	6.7	0	1210	16	—	283
	105.	18.0	15.8	4.3	0	0	1130	8	540	238
	106.	20.8	13.2	8.2	14.1	9.1	910	4	684	268
	107.	21.5	9.6	8.4	20.3	5.1	1140	8	418	261
	108.	29.4	14.9	3.6	0	0	990	4	76	333
	109.	30.6	17.4	3.3	0	0	710	34	200	352
	110.	16.8	15.3	8.2	0	4.6	950	15	—	241
	111.	12.5	15.9	7.8	0	3.9	900	13	—	205
	112.	5.0	24.6	7.5	0	0	600	6	100	172
	113.	27.4	13.2	1.3	0.5	0	720	0.2	—	306
	114.	4.0	22.4	10.8	0	0	870	4	70	168
	115.	17.6	11.7	9.8	14.1	2.8	1800	6	11	241
	116.	24.9	11.1	10.9	10.8	3.5	1670	3	20	307
	117.	25.6	16.1	4.7	0	0	990	—	19	308
	118.	16.4	16.5	15.3	0	5.6	1300	—	45	271
	119.	27.0	12.9	9.8	5.0	6.1	980	0	21	328
	120.	30.3	14.8	1.9	0	3.0	1100	18	390	333
	121.	33.1	12.9	6.9	0	0	1310	14	23	370
	122.	5.3	18.1	7.7	0	0	820	0	8	150
	123.	20.0	14.9	12.5	0	3.1	1420	8	20	286
	124.	15.9	13.2	14.6	1.7	1.3†	1130	2	170	251
	125.	24.0	12.2	13.6	3.6	4.8	1590	9	24	314
	126.	15.6	20.8	5.6	0	0	730	0	30	243
	127.	5.6	18.9	5.0	0	5.6	960	34	—	145
Miscellaneous										
	128.	13.4	20.1	< 1.0	0	0	1430	0	190	178
	129.	24.1	21.9	< 1.0	0	0	750	18	2	303
	130.	19.5	19.9	< 1.0	0	0	980	16	3	252
	131.	39.1	13.1	3.8	0	2.2	880	8	430	411
	132.	9.9	19.6	< 1.0	0	—	1050	77	8	165
	133.	9.1	24.6	4.2	0	—	1930	250	8	195
	134.	5.5	20.8	10.1	0	0	560	15	130	171
	135.	33.4	17.8	2.4	0	0	1470	46	4	374
	136.	13.3	16.9	6.1	0	0	420	0	97	208
	137.	33.9	14.6	7.6	0	3.2†	950	1	210	387
	138.	21.5	15.4	2.1	0	0	1520	0	44	259
	139.	31.4	16.1	3.0	0	0	1150	4	5	352
	140.	24.0	18.1	< 1.0	0	—	1030	62	3	287
	141.	10.3	19.6	4.0	0	0	1240	18	11	184
	142.	26.5	8.8	6.2	22.7	—	760	11	12	293
	143.	9.8	13.6	5.9	14.9	0	500	22	30	163
	144.	29.1	16.4	1.5	0	0.6†	1140	48	17	328
	145.	21.3	8.6	22.5	12.5	3.6	460	0	21	311
	146.	27.0	15.8	< 1.0	0	0	1000	77	14	301
	147.	28.0	14.0	5.7	0	1.3	1050	0	20	325
	148.	20.3	13.7	9.0	3.5	3.0	740	42	210	269
	149.	23.5	14.6	11.6	0	4.7	380	2†	311	140
	150.	4.6	20.1	7.0	0	0	490	0	8	149

* indicates MSG (monosodium glutamate) listed on label
† indicates material present but not listed on label
underlined value indicates excessive amount

of this material added to meats. The total protein in processed meats depends not only on the amount of meat used but also on the amount of protein added in fillers as non-fat dry milk, soy products or hydrolyzed plant protein. The average protein was 14.7%.

All except sample 37 contained less than 10% added water, the limit allowed. All contained less than the 200 ppm nitrite allowed.

Sodium averaged 933 mg (milligrams) per 100 grams. If this sodium is calculated as common table salt (sodium chloride), it is 2.2% salt. The range in sodium content was broad, from 70 to 2000 mg per 100 grams.

Sugars or carbohydrates added as flavoring are usually in the form of sucrose or corn syrup, which is hydrolyzed corn starch. Lactose from nonfat dry milk would also be included as total carbohydrate. The average amount of carbohydrate was 4.4%.

Since most frankforts contain relatively large amounts of fat, the caloric content per 100 grams (about 3.5 ounces) was high, averaging 332 calories. This is about the amount in six apples or 4.5 slices of white bread.

The calcium content of these products averaged 90 mg per 100 grams. A high amount of calcium may indicate that the meat was deboned mechanically. In this process some bone may be chipped away with the meat and the bone meal incorporated into the product.

One sample (no. 23) contained an excess of phosphate, 0.86%; only 0.5% is allowed. One sample (no. 7) declared that the product contained less than 20% fat, and this was found to be correct. All samples contained less than the maximum amount of nitrite allowed.

Bologna. Bologna is similar to frankforts since essentially the same ingredients and processing are used. This product is subject to the same regulations as frankforts and kielbasa. The average fat content was 28.3%, but eight samples (nos. 41, 42, 44, 45, 47, 49, 50, 52) or a third contained more than the 30% maximum (Table 1). Five samples declared nonfat dry milk as an ingredient, but only one (no. 56) contained an excessive amount. One sample (no. 49) did not declare use of a filler, but a small amount was found.

Protein content averaged 13.8%, about 1% less than the average for frankforts. Sodium content averaged 957 mg per 100 grams. The average amount of nitrite was 12 ppm, and all samples were below the allowable 200 ppm.

Total carbohydrate averaged 4.9%, slightly more than in frankforts or kielbasa. Caloric content averaged 326 per 100 grams and calcium averaged 90 mg per 100 grams.

Salami and wursts. These products must comply with the same regulations as frankforts and bologna. The fat content of the salamis and wursts averaged 27.8%. Eleven samples (nos. 63, 64, 65, 68, 74, 75, 76, 77, 81, 86, 88) or 39% exceeded the 30% fat maximum. Protein content averaged 12.4%, about 3% higher than the average for frankforts or bologna. Three samples (nos. 65, 66, 81) contained small amounts of filler which was not declared on the label (Table 1). Two samples (nos. 80, 88) contained more than the 3.5% filler allowed.

Nitrite levels averaged 10.2 ppm, and all samples were acceptable. Carbohydrate content averaged 4.1% about the same as in frankforts, bologna and salami. Caloric content averaged 330 per 100 grams and calcium averaged 85 mg per 100 grams. Sodium averaged 1145 mg per 100 grams.

Loafs and rolls. These products have no regulatory restrictions on filler or added water. The fat content, however, can be no more than 30%. Only three (nos. 90, 109, 121) or a twelfth of the 38 samples contained an excess of fat (Table 1). The average fat content for all samples was 18.9%.

Protein content averaged 15.5%. Nitrite levels were all within regulation, averaging 34 ppm. Sodium content averaged 959 mg per 100 grams but ranged from 157 to 1800.

Carbohydrate averaged 8.7% and calories 262 per 100 grams. Calcium content averaged 129 mg per 100 grams, higher than the average for other processed meats. One sample (no. 124) contained a filler that was not listed on the label.

Miscellaneous products. The miscellaneous products were so varied that citing average values is not meaningful (Table 1). Four samples, however, (nos. 131, 135, 137, 139) contained an excess of fat. Nitrite levels were satisfactory except for sample 133 which contained 250 ppm, exceeding the 200 ppm allowed.

In these products, as in loafs and rolls, the average caloric content of 262 per 100 grams is about 50 calories per 100 grams lower than in other products, probably because they contained less fat. Two samples (nos. 137, 144) contained a filler that was not declared on the label.

Averages for all products are shown in Table 2. Loafs and rolls and the miscellaneous group contained less fat than the other groups. Protein and sodium content was about the same for all groups. On the average, loafs and rolls contained more nitrite than other products. Loafs and rolls also contained more total carbohydrates than the other groups, either from added sugars or from starchy fillers. Also, loafs and rolls were higher in calcium content, either from meat deboned mechanically or from added materials like calcium phosphate.

Some comments concerning types of meat used in making processed meats are in order. Connecticut Regulations state that meat food products must be made from meat that is not adulterated (1, 6). In Table 1 some products contain meats of types normally not expected in processed meats. As long as they are considered edible under the regulations and are listed on the label as an ingredient they may be used. Consumers of course are concerned with the aesthetics and how some meats might affect taste.

Conclusions

Of the 150 samples of processed or delicatessen meats tested, 39 were frankforts or kielbasa, 21 were bologna,

Table 2. Average values found in delicatessen meats.

Product	Samples	Fat,%	Protein,%	Carbohydrate,%	Nitrite, ppm	Sodium, mg/100 g	Calcium, mg/100 g	Calories per 100 g
Frankfort & Kielbasa	39	29.0	14.7	4.4	13.4	933	90.1	332
Bologna	21	28.3	13.8	4.9	12.0	957	90.0	326
Salami & Wurst	28	27.8	17.4	4.1	10.2	1145	84.9	330
Loafs & Rolls	39	18.9	15.5	8.7	10.2	959	129.0	264
Miscellaneous	23	20.8	16.7	5.1	31.2	951	77.4	262

28 were salami or wurst, 39 were loafs or rolls, and 23 were of miscellaneous types. Overall, 26% contained in excess of the 30% fat maximum allowed and 8% either exceeded the 3.5% filler allowed or contained a filler that was not listed on the label. Excessive fat content was more common in frankforts, bolognas, and salamis than the other groups.

Sodium in all products averaged about 1000 mg per 100 grams, but the range was from 70 to over 2000. All samples except one contained less than the maximum amount of nitrite allowed. Other analyses included protein content, calcium content, and caloric value.

Acknowledgments

Chemical analyses were by J. Hayes, M. Pyles, and M. A. Illig. Samples were collected by D. Pignataro and F. Zullo of the Connecticut Department of Consumer Protection.

References

1. Administrative Regulations, Department of Consumer Protection, Connecticut Meat & Poultry Inspection Act, part 22-395.
2. Analytical Methods for Atomic Absorption Spectrophotometry. Perkin-Elmer, Norwalk, CT.
3. Breidenstein, B.C. 1984. Contribution of Red Meat to the U.S. Diet. Food and Nutrition News *56:15-18*.
4. Kinsman, D.M. 1980. Principal Characteristics of Sausages of the World Listed by Country of Origin. Booklet, unnumbered pages.
5. Official Methods of Analysis. 1980. 13th edition, W. Horwitz, ed. Association of Official Analytical Chemists, Washington, D.C.
6. Uniform Food, Drug and Cosmetic Act, sections 22-394 and 21a-101, General Statutes of the State of Connecticut, revised to January, 1983.
7. U.S. Meat and Poultry Inspection Regulations. Title 9, Chapter III, Animal and Plant Health Inspection Service. U.S. Department of Agriculture. Wholesome Meat Act of 1967, 81 Stat. 584 (21 U.S.C.) sec. 601 et seq.

New Report Published On PCBs

Although PCB contamination of the environment needs to be dealt with, the scientific evidence indicates that heroic, exceedingly expensive corrective measures are unwarranted, according to the new report *PCBs: Is the Cure Worth the Cost?*, published by the American Council on Science and Health (ACSH), an independent scientific organization.

"America's fear of chemicals in the environment seems to be fueling an escalating corrective program that is costing the taxpayers billions of dollars. PCBs are symbolic of the situation," the ACSH report states.

The immediate replacement of PCB-containing electrical capacitors and transformers with alternative equipment "may cause more trouble than it cures," according to ACSH Associate Director Dr. Richard A. Greenberg.

"PCBs are fire-resistant, an important virtue when it comes to electrical uses," he explained. "Unfortunately, most of the currently available substitutes are not fire-resistant. Nevertheless, because it is feared that PCB-containing electrical devices might be hazardous to health, they are now being replaced with other types. The net result is the substitution of a potential fire hazard for a hypothetical health risk." Some proposed PCB cleanup efforts are economically questionable, according to ACSH.

For instance, a proposed PCB cleanup project for the upper Hudson River in the state of New York would decontaminate the river by the year 2001. If left alone, the river would clean itself up by 2013, just 12 years later. The price tag of this project is 40 million dollars, ACSH reported.

"It is very unfortunate that disposal practices of the past, which are now known to be inappropriate, led to PCB release into the environment," said ACSH Executive Director Dr. Elizabeth M. Whelan. "Certainly, we would rather not have PCBs or any other unwanted contaminant in our environment."

"The problem is being corrected, however, through reasonable cleanup efforts. Also, PCBs are no longer manufactured in the U.S. Moreover, the hazard posed by PCB contamination of the general environment is not as great as many people think. Scientific studies have shown that people who worked with PCBs for years, and therefore were exposed to much more of them than the rest of us are, have not suffered long-term damage to their health.

"The general population has little to fear from the current level of PCB exposure," she said, "and current corrective measures have ensured that our exposure will rapidly decline."

"Time itself is an important factor in resolving the PCB situation. In many instances, we would be better off letting time do its work than taking extraordinary action to remove all PCBs from a contaminated area immediately."

To obtain a copy of the report *PCBs: Is the Cure Worth the Cost?* send a self-addressed, stamped (37¢ postage), business-size (#10) envelope to PCB Report, ACSH, 47 Maple St., Summit, NJ 07901.

DFISA Holds Position As #1 Food Processing Exposition

Dairy and Food Industries Supply Association's Food & Dairy Expo is growing significantly, and shows no signs of slowing down. The exposition is the largest of its kind and the most diverse international trade show of food, dairy and liquid processing equipment, supplies and services. It is holding its position as the number one food processing exposition in North America. Food & Dairy Expo organizers say they expect another record exposition October 5-9, 1985 at the newly expanded Georgia World Congress Center, Atlanta, Georgia.

Robert L. Nissen of Ladish Co., Tri-Clover Division and president of DFISA, says since 1974 the number of exhibitors at Food & Dairy Expo has grown by one-third to a present estimated total of 401. "Exhibit space for this super show has increased an overwhelming 80 percent to a record high of 255,000 square feet."

Top industry executives, including manufacturing managers, engineers, researchers, and marketing/sales personnel are expected to attend the exposition in record numbers to conduct business in a conducive, marketing atmosphere. Visitors will receive practical information on a broad spectrum of products for the food, dairy and liquid processing industries. They'll have rare opportunities to draw up shopping lists of technologies needed for updating and expanding present facilities and/or planning future projects.

For more information on attending Food & Dairy Expo '85, contact Dairy and Food Industries Supply Association, 6245 Executive Boulevard, Rockville, Maryland 20852. 301-984-1444, Telex: 908706

Obituary

O. Everett "Cookie" Swain - a partner in Delta Aquaculture of Indianola, Miss., and retired executive vice president of Kraft, Inc. and chairman of its Retail Food Group - died at his home in Winnetka, Ill., March 13, after a short illness. He was 67.

"The food industry has lost a true champion," says John M. Richman, chairman and chief executive

officer of Dart & Kraft, Inc. "People throughout the world who knew this magnetic man were moved by his endless enthusiasm for the company and industry he served so well."

An outstanding salesman and industry leader, Mr. Swain was honored by the food distribution industry in 1978, with its highest recognition, the Albers Trade Award. At that time, the Food Marketing Institute's directors said: "He is being recognized for his years of leadership in promoting food-at-home through Kraft's advertising program, and in improving relations between the industry and the general public."

Mr. Swain's career with Kraft spanned 45 years. A member of the Board of Directors of the company for 12 years, he served as chairman of the Retail Food group from 1976 until his retirement in 1982. Mr. Swain previously was president of the former Kraft Foods Division worldwide operations. He was president of Kraft Limited of Canada for 10 years until 1968 when he returned to the United States to head Kraft's domestic and international operations. Mr. Swain joined the company as a sales representative in Jackson, Miss., in 1939. Of the many company awards that he received through the years, Mr. Swain most valued the prestigious Kraft Merit Award, which was a jade ring made by the founder J.L. Kraft for employees who performed far above their job expectations.

Family members include his wife, Mildred; a son, Dr. R. E. Swain of Mobile, Ala.; a daughter, Cynthia (Mrs. James) Pilarski of New Orleans; two sisters, Martha (Mrs. A. R.) Friday of Naples, Fla.; and Mildred (Mrs. Luther) Ballew of Memphis; and two grandchildren, Ronnie Jr. and Heather Swain.

A memorial service for Mr. Swain was held Saturday, March 16, at Winnetka Bible Church, 555 Birch in Winnetka, Ill. Private burial was in Mobile, Ala.

Revised Handbooks Available on Dairy, Waste Management Facilities

Two newly revised handbooks, one on dairy management facilities and the other on livestock waste disposal facilities and equipment, are now available.

Donald W. Bates, specialist with the University of Minnesota's Agricultural Extension Service, was one of the agricultural engineers from the North Central Region who authored the handbooks. The handbooks were published by Midwest Plan Services (MWPS) at Iowa State University.

The "Dairy Housing and Equipment Handbook," MWPS-7, is designed to help dairy producers plan new facilities or remodel existing buildings. New chapters in the 110-page publication describe the total dairy facility, an overview of the dairy operation including herd makeup, cropland requirements and housing needs, and discuss farmstead planning principles. Other new chapters cover replacement animal housing, special handling and treatment facilities (including a floor plan for a veterinary handling facility), feeding facilities and utilities. There are 27 pages of equipment plans with construction details for bunks, feeding equipment, fences and handling equipment as well as many illustrations and floor plans.

The 112-page "Livestock Waste Facilities Handbook," MWPS-18, gives agricultural waste data for manure, bedding, feedlot runoff and milking center wastewater, and design criteria and data. There is new material on manual scrape and gravity drain gutters, gravity flow channels, infiltration areas, picket dam drain gutters, recirculation flush pits, waste transfer to storage and deep pit systems for poultry wastes. Also included is an extensive worksheet that helps a producer determine manure application rates based on manure composition, soil information and crop nutrient needs.

Each handbook is available to Minnesota residents for $6.36 and to persons from other states for $6.00. The handbooks may be ordered from Extension Agricultural Engineering, 201 Agricultural Engineering Bldg., University of Minnesota, St. Paul, MN 55108. Checks should be made payable to the University of Minnesota.

NMC Elects Vice-President And Program Chairman

At the 24th annual meeting and program of the National Mastitis Council, Roger Natzke, chairman of the dairy science department at the University of Florida, was elected vice president and program chairman. The NMC is a not for profit corporation which promotes education and research in mastitis, the most costly animal disease affecting the nation's dairy herd.

The February annual meeting was held in Las Vegas, Nevada just prior to the Western Veterinary Conference, an annual affair held in that city attended by veterinarians from all over the U.S. Many took advantage of the NMC program and attended both conferences.

Serving with Natzke this coming year is Ewing Row, associate editor of Hoard's Dairyman. Row

moved up to the presidential post from the vice president-program chairman slot taken by Natzke. Continuing as secretary-treasurer is John Adams, director of milk regulatory and animal health affairs for the National Milk Producers Federation. The office of NMC is headquartered in the NMPF office at 1840 Wilson Blvd., Arlington, VA 22201.

Membership in NMC is made up of veterinarians, dairymen, cooperative and private plant fieldman, health department sanitarians, university researchers and extension personnel, and companies and representatives who serve dairymen. A good share of the NMC's budget is provided by the 72 National Members, companies which pay $300 in dues annually. Individual dues are $20 per year.

The annual meeting, held in February, and the day-long regional conference, usually held in August, provides an opportunity for all to share ideas, ask questions and hear outstanding programs and speakers.

The 1985 regional meeting will be held at the Hyatt Regency, Nashville on August 8, 1985. The annual meeting will be held February 9 through 12 at the Hyatt Regency Columbus (Ohio). For additional information contact John Adams at 703-243-8268.

Del Monte Appoints Industrial Sales Manager

Graham Nuttman has been appointed Industrial Sales Manager for Del Monte Frozen and Specialty Product, food ingredients group (formerly the Heublein food ingredients group). Graham will provide direct technical support to users and brokers of the company's line of ingredients.

Nuttman specializes in the development of new processed food products and line extensions based on Del Monte's consumer brands.

Graham holds expertise in the use of flavors and ingredients in formulated foods. He joined Heublein's food ingredients group in 1981 as Industrial Accounts Manager, and assumed his new position following the unit's relocation to San Francisco, Del Monte headquarters.

Nesbitt Receives DFISA Honor Award

Arthur W. Nesbitt, president of NASCO International, Inc., Fort Atkinson, Wisconsin, has been selected by Dairy and Food Industries Supply Association (DFISA) as recipient of DFISA's Honor Award, the Association's highest award given to members for outstanding service. Nesbitt was honored at DFISA's Annual Conference, April 14-17, 1985, Marco Island, Florida.

The presentation was made by Robert L. Nissen, Ladish Co., Tri-Clover Division and president of DFISA, who says the Honor Award is given only after long and distinguished service to the Association. Nesbitt has been involved with DFISA for 17 years and is the 25th member to receive this award.

In 1968 Nesbitt began his work with DFISA as chairman of the Annual Conference Committee. Since then, he has served as chairman - Expo Committee; vice chairman - Membership Development Committee; member - Employee Relations, Pension, Awards, Expo Promotion, Membership Development, Nomination, Contest and Fellowship Committees; and, as a past-president/Board Member now serving on the Executive and Finance Committees. One of Nesbitt's most important contributions to the Association was the formulation of the Associations Strategy Planning Committee in 1982, which he served as chairman.

NASCO International, Inc., is a major supplier of agricultural and biological education materials. Now, president of NASCO International, Inc., Nesbitt started as sales manager in 1959.

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

WEM Brochure

Computerized Food Processing Systems Brochure Now Available

• A concise, 4-page brochure provides an informative introduction to the types of computerized process controls available from Wisconsin Electrical Manufacturing Co., Inc. (WEM) for the food processing industry. Microprocessor, programmable and microprocessor/programmable controlled systems are detailed, along with the control functions they bring to the automated plant. A block diagram illustrates the versatile control and capabilities of an automated system. The brochure covers many of the process control considerations that would apply to most all processing plants.

According to WEM, most of the control systems are custom designed to meet the unique requirements of individual food processing operations. It was pointed out that the firm's concept of designing custom systems with pre-engineered, standardized components speeds application and cuts installation costs.

For more information and a copy of the new brochure, contact L. Forbes Hotchkiss, Wisconsin Electrical Manufacturing Co., Inc., 2501 S. Moorland Road, New Berlin, WI 53151. 414-782-2340.

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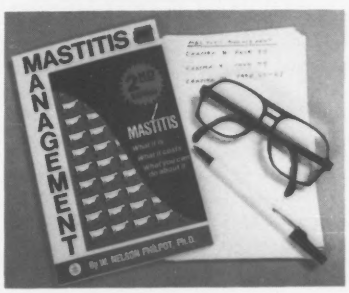

Mastitis Management

One-Step Cleaners Clean, Sanitize, Deodorize

• Oakite® Products offers two cleaners with one-step capabilities. Oakite Detergent-Sanitizer is a phosphate cleaner which cleans and sanitizes. Oakite Chlor-Tergent is chlorine based, and deodorizes in addition to cleaning and sanitizing. Both are authorized by the USDA for use in federally inspected meat and poultry plants. Both contain ingredients acceptable to the FDA, and are approved by the CDA and CDF in Canada.

Oakite Detergent-Sanitizer combines food-grade phosphoric acid with an anionic surfactant to clean and remove fats, oils, and dispersable protein-type soils, as well as hard water and mineral deposits. As a sanitizer, it reduces gram-positive and gram-negative microorganisms to significant levels for food-contact surfaces. It is especially recommended for use in bakeries, bottling plants, dairies, and meat processing plants.

Oakite Chlor-Tergent was developed for food plant operations where elimination of odors is also a problem. Chlor-Tergent destroys odors on contact, cleans and sanitizes, all in one application. It is effective in breweries, dairies, egg processing plants, and restaurants. In addition to providing excellent cleaning action, its chlorine based formula kills bacteria, and brightens stainless steel.

Both of these one-step products are used at low temperatures. They can be applied by brush, spray, or in tank cleaning methods. For more information on Oakite Detergent-Sanitizer and Oakite Chlor-Tergent, contact Oakite Products, Inc., 50 Valley Road, Berkeley Heights, NJ 07922, 201-464-6900.

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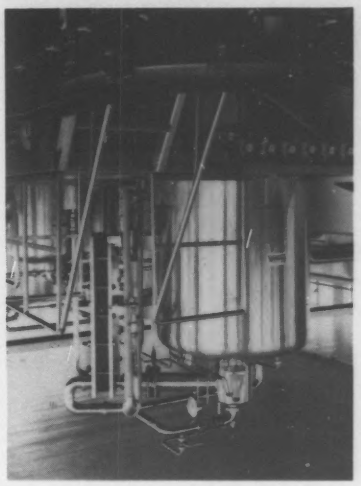
Second Edition of Mastitis Management Announced

• Babson Bros. Co. announces the second edition of *Mastitis Management* written by Dr. W. Nelson Philpot.

Two new chapters have been added to *Mastitis Management*, Interpreting DHI Somatic Cell Counts and Enhancing Adoption of Control Methods. In addition to the two new chapters, the book has a larger format with additional graphs, charts and photographs.

The purpose of the book is to increase awareness of prevention and control of mastitis; thereby increasing the productivity of dairy herds. *Mastitis Management* is intended as a handbook and reference source not only for the dairyman, but also for advisors and specialists involved in his operation. These include the veterinarian, milking equipment dealer, nutritionist, extension agent, A.I. technician, sanitarian and banker - everyone involved in implementing a herd health program.



Schmidt-Bretten Food Deaeration System

Schmidt-Bretten Introduces New Food Deaeration System

• Schmidt-Bretten, Inc., Bohemia, Long Island manufacturer of Food Processing and Heat Recovery Equipment has announced the availability of the SigmaVac Deaeration System for extended shelf life of canned, bottled and asceptic cold pack products.

The system eliminates product quality impairment by providing maximum deaeration with no evaporation. The deaeration units are available as stand-alone packages or installed as part of the Schmidt-SigmaTherm thermal treatment system. The SigmaVac allows condensable vapours and aromas to be returned to the product. For more information contact: Schmidt-Bretten, Inc., 1612D Locust Ave., Bohemia, New York, 11716; or call 516-589-2112.

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The book should also be useful as an instructional tool for vocational agricultural programs.

The main areas of *Mastitis Management* are detection, prevention, treatment and control of mastitis. Some of the guidelines offered in the second edition of the expanded 84-page book include how to stop mastitis from "robbing" the dairyman of his full profit potential.

The author, Dr. Philpot, conducts mastitis research at Louisiana State University's Hill Farm Research Station at Homer. His work has been reported in more than 300 popular and technical articles and has appeared in four movies on mastitis control.

Copies of *Mastitis Management* may be ordered at $2.30 each from Babson Bros. Co. at 2100 S. York Road, Oak Brook, Illinois 60521. Educational Volume discounts are available.

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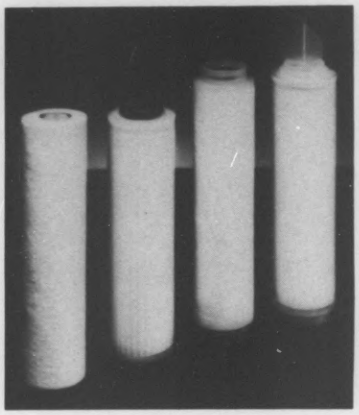

Profile™ Filter Elements

New Filters Provide Reliable Removal of Contaminants

• A new line of filters, called Profile™, providing the reliable removal of contaminants, and at the same time, no long service life for economy, is described in a new bulletin from Pall Corporation.

Using the skillful application of new principles, this product presents a breakthrough in filter technology. Each Profile element has an inner (downstream) section in which the pore diameter is constant. This section provides absolute rated filtration. An outer (upstream) section in which the pore diameter varies continuously from that of the absolute rated section, provdes effective prefiltration for every particle with a diameter larger than the rated size.

In a detailed discussion of still another new principle of the Profile filter design, the brochure explains that pore size variations are achieved by varying fiber diameter while maintaining uniform density and compressibility in the inner (downstream) section. Pore sizes can vary as much as 40 to 1. An important feature in the outer (upstream) filter design is the use of very fine fibers to achieve a given pore diameter. For example, a 10μm opening is obtained using 5μm diameter fibers for a resulting open area in excess of 50 percent, thus greatly extending service life.

Profile filters are currently being marketed to manufacturers of magnetic tape, electronic components, cosmetics, biologicals, food, beverages and a variety of chemical specialties where users have traditionally sought reliable removal of contaminants at low cost.

For additional information and product literature, please contact Pall Corporation, Literature Department, East Hills, NY 11548. 516-484-5400. Ask for bulletin PRO-300, "Pall Profile Filters."

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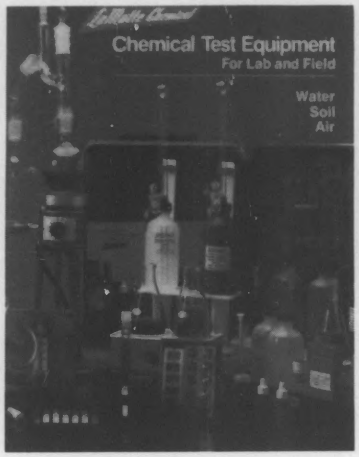

LaMotte Chemical Catalog

LaMotte Chemical's New Chemical Test Equipment Catalog

• LaMotte Chemical's new 148-page catalog entitled Chemical Test Equipment for Lab and Field offers a wide variety of test equipment and accessories for the analyst of water, soil or air quality. Featured in this catalog are individual test kits, combination field test outfits, laboratory outfits, instrumentation, tablet reagent systems and a new, extensive laboratory apparatus section.

Applications covered within the catalog include public health, food sanitation, boiler and cooling water treatment, water conditioning, waste water and sewage, environmental studies, dairy, laundry, swimming pools, metal finishing, fish farming, soil nutrient testing, plus sampling equipment for water, air and soil analysis. Also included is a listing of EPA reagent and apparatus packages for eleven chemical factors including chlorine, fluoride, C.O.D. and dissolved oxygen. This catalog represents LaMotte's most comprehensive reference source available to the environmental analyst.

For more information contact: LaMotte Chemical Products Company, P.O. Box 329, Chestertown, MD 21620. 301-778-3100.

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CLEAN-CATCH from AmCan

PICO.TAG by Waters

New HPLC Analysis of Amino Acids

• A new HPLC amino acid analysis system that allows analysis of amino acids and proteins in foods and feeds by simply changing the column and elution buffers has been introduced by Waters Chromatography Division of Millipore Corporation.

Waters PICO.TAG™ Amino Acid Analysis System features automated sample injection, analysis and data reduction for the compositional analysis of protein hydrolyzate amino acids using Waters exclusive PICO.TAG method. The PICO.TAG method is a precolumn derivatization procedure that provides high sensitivity analysis from as little as 100 nanograms of sample in less than 15 minutes using specifically designed and tested PICO.TAG column and eluents.

By simply changing the column and elution buffers, the Waters PICO.TAG system can be switched from amino acid analysis to isolation of proteins and other biological molecules in foods and feeds. With this versatility, it is practical to purify proteins one day and have a complete amino acid compositional analysis the next day using the same HPLC system.

For more information contact: Tom Ricci, Waters Chromatography Division, 34 Maple St., Milford, MA 01757. 617-478-2000.

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New and Better Reusable Mousetrap Now Available

• A new and better mousetrap called CLEAN-CATCH, which is easier to set and bait, is now available for institutions and other public buildings where mice are a problem. The new trap doesn't pinch fingers in setting and since the trapping mechanism is completely covered, you never need to see or touch the trapped mouse. It also quickly disposes of the dead mouse - automatically. And, it is reusable.

The traps are available from most institutional suppliers or direct from the maker. For literature and price lists, contact AmCan, Inc., 8232 Goldie, Walled Lake, Michigan 48088. Telephone: 313-363-2888.

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Y'All Come - Nashville '85

Come on down to the 72nd Annual Meeting of IAMFES, August 4-8, 1985, at the Hyatt Regency in Nashville, Tennessee. In addition to the education program, we've cooked up some "down home" activities, including a pre-convention Grand Ole Opry visit on Saturday evening, August 3. There's lots to do in Nashville.....hope to Tennes"see" you there!

72nd Annual Meeting
Hyatt Regency, August 4-8, 1985
Nashville, Tennessee

MAIL TO: Cecil White, Finance Chairman
TAMWFP
1418 Highland Avenue
Murfreesboro, Tennessee 37130

Make check or money order payable to:
"IAMFES 1985 Meeting Fund"

Please check where applicable:

- ☐ Affiliate Delegate
- ☐ Affiliate Member
- ☐ IAMFES Member
- ☐ Past President
- ☐ Executive Board
- ☐ Speaker
- ☐ 30 Year Member
- ☐ 50 Year Member
- ☐ Non Member
- ☐ Student

ADVANCE REGISTER BEFORE JULY 1, 1985 and SAVE!
(Refundable if cancelled prior to June 30, 1985)

ADVANCE REGISTRATION

	Member	Companion(s) Each	Student	Non Member
Registration	☐ $30	☐ $10	☐ Free	☐ $40
Grand Ole Opry** (Aug. 3)	☐ $19	☐ $19	☐ $19	☐ $19
☐ 6:30 PM ☐ 9:30 PM	**includes transportation**			
Early Bird Reception*	☐ Free	☐ Free	☐ Free	☐ Free
Tennessee Hoedown	☐ $20	☐ $20	☐ $20	☐ $20
Banquet and Reception	☐ $20	☐ $20	☐ $20	☐ $20
National Mastitis Council*	☐ Free	☐ Free	☐ Free	☐ Free

*Indicate attendance **Indicate preference for showtime

REGISTRATION AT DOOR

Member	Companion(s) Each	Student	Non Member
☐ $35	☐ $12	☐ Free	☐ $45
☐ N/A	☐ N/A	☐ N/A	☐ N/A
☐ Free	☐ Free	☐ Free	☐ Free
☐ $22	☐ $22	☐ $22	☐ $22
☐ $22	☐ $22	☐ $22	☐ $22
☐ Free	☐ Free	☐ Free	☐ Free

Name _____ Companion _____
Employer _____ Tel. No. _____
Address _____ City _____ Province/State _____ Code/Zip _____
Means of Transportation _____ Arrival Date/Time _____ Departure Date _____

Detach and mail directly to hotel

HYATT REGENCY RESERVATIONS
623 Union Street
Nashville, TN 37219

Reserve Rooms Prior to July 3, 1985 To Assure Space
Phone 615-259-1234 Telex #555 144

International Association of Milk, Food & Environmental Sanitarians, Inc.
Annual Meeting August 4-8, 1985

Name(s) _____
Address _____
City _____ State _____ Code/Zip _____ Tel. No. _____
Arrival Date/Time _____ Departure Date _____
Number Persons _____ Number/Type Rooms _____

Special Request _____

Rate: $55.00 Single, Double
FREE PARKING

Guaranteed by: American Express, Carte Blanche, Diner's Club or One Night's Deposit Plus 10.75% Tax
Card # and Type: _____ Expiration Date: _____
Cardholder Name: _____

Food Science Facts
For The Sanitarian

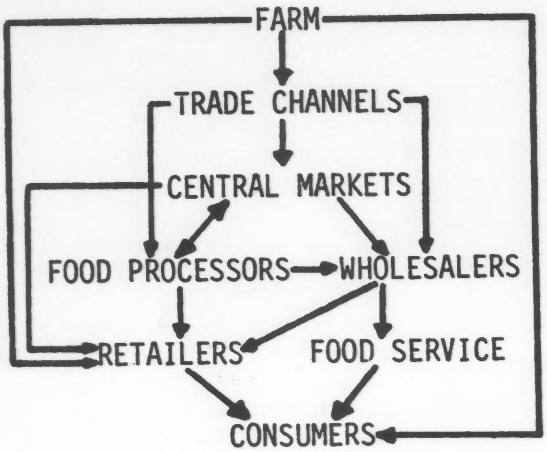
Dr. Robert B. Gravani
Cornell University
Ithaca, NY

Food Deterioration and Spoilage by Temperature

Although heat and cold have been used to preserve or extend the shelf-life of foods for centuries, temperatures, when not properly controlled, can cause food deterioration and spoilage.

Temperature can be thought of as the degree of hotness or coldness measured on a definite scale. Temperature is often taken for granted and is frequently neglected during the handling and storage of foods.

When food is harvested, or slaughtered, it begins a long journey through the complex food chain where it eventually gets to its destination, the consumer. The diagram below shows how foods move from farmer to consumer.



During every stage of the food chain - transporting, processing, handling, and storing - foods are subjected to a variety of environmental conditions and temperatures - some that are adequate and maintain product quality and others that are abusive and cause product deterioration.

What happens when food is subjected to extremes of uncontrolled temperatures?

Chemical Reaction Rates Increase

For every °F rise in temperature within the moderate temperature range where most food is handled (50°F-100°F), the rate of chemical reaction is approximately doubled. As a result, excessive heat will increase the rate of natural food enzyme reactions and the reactions of other food constituents.

- Protein will breakdown or denature
- Emulsions will break - a product like mayonnaise will separate
- Some vitamins will be destroyed
- Moisture will be lost and foods will dry out
- The color, flavor and odor of some products may be affected

Growth of Microorganisms

Temperatures certainly effect the growth of microorganisms present in the product, and various temperature ranges encourage the growth of particular types of organisms. Bacteria are usually classified according to the temperature at which they grow.

- Psychrotrophic bacteria are those that are capable of growing at 32°F-45°F but their optimum is from 68°F-86°F. They cause off flavors and defects in food products stored under refrigeration.
- Mesophilic (medium temperature loving) bacteria. Most bacteria are capable of growing at 60°F-110°F and belong in this group. Most food poisoning bacteria grow at these temperatures.
- Thermophilic (hot loving) bacteria. These microorganisms grow at higher temperatures such as 110°F-150°F.

The growth of microorganisms is a result of many chemical reactions. Increases in temperature increase the rate of these reactions, so it can easily be seen that microbes grow faster at higher temperatures.

Product Deterioration and Spoilage

Exposing foods to uncontrolled cold temperatures will also cause deterioration. Fruits and vegetables that accidently freeze and thaw have their texture and appearance

effected. Skins and surfaces of these products will often crack, leaving them susceptible to microbial attack. Some foods that become frozen may also be adversely affected. Let's take mayonnaise for example. If it is frozen the emulsion will break and the components will separate. Milk that is allowed to freeze will also have some defects. The fat will separate and the milk proteins will be damaged (denatured) causing it to curdle. The freezing of products should be intentional and done under controlled conditions.

Deterioration is caused in many foods by temperatures that are not extreme. Cold damage of several fruits and vegetables can occur at common refrigerator temperatures (35-40°F). Defects in produce exposed to cold temperatures include off color development, surface pitting and a variety of decays. Fruits and vegetables such as bananas, lemons, squash and tomatoes are products that should be held at temperatures no lower than 50°F for best quality. These products are certainly exceptions to the "generalized rule" that cold storage preserves all foods and the colder the better.

A temperature guide for the safe storage of food is shown below.

TEMPERATURE GUIDE FOR FOOD STORAGE

Food	Temperature	Relative Humidity
Meat & Poultry Products	32-36°F	75-85%
Leftover Cooked Foods	32-36°F	
Fish	30-34°F	
Eggs	40-45°F	
Dairy Products	38-40°F	
Most Fruits	40-45°F	80-85%
Most Vegetables	40-45°F	
Dry Storage	60-70°F (50°F is ideal)	50-60%
Frozen Storage	-10-0°F	

Food deterioration and spoilage by uncontrolled temperatures can be prevented through:

- Knowledge of proper temperatures required for storage of foods;
- Awareness of product handling and attention to detail; and
- Routinely checking the temperature of:
  - -- incoming raw ingredients and food products
  - -- food storage facilities - dry storage areas, coolers, refrigerators, and freezers,
  - -- transportation facilities - trucks, rail cars, etc.

Knowledgeable employees can prevent product losses by temperature abuses.

Synopsis of Papers to be Presented

A Survey for the Incidence of *Listeria monocytogenes* in Raw Milk *Joseph Lovett*, David W. Francis, Jan M. Hunt and Ronald G. Crawford* Division of Microbiology, Food and Drug Administration, Cincinnati, OH 45226

In a recent outbreak of listeriosis with a mortality rate of 30%, milk was the incriminated vehicle. To determine the incidence of *Listeria monocytogenes* in raw milk, farm-bulk-tank milk samples supplied by a milk marketing organization, which serves several hundred farms in Northern and Central Kentucky, Southwest Ohio and Southeast Indiana, were analyzed by the following procedure. Twenty-five milliliters of milk was incubated in 225-ml of enrichment broth (EB) composed of Trypticase soy broth supplemented with 0.6% yeast extract, 15 mg/l acriflavin HCl, 50 mg/l naladixic acid and 50 mg/l cycloheximide. After 24 and 48 h at 30°C, EB culture was streaked onto McBride agar. Additionally, 1 ml of EB culture was added to 9 ml of 0.5% KOH, vortexed briefly and streaked onto McBride agar. After 48 h at 35°C, suspect colonies were confirmed by morphology, straining reaction, biochemical reactions and serology, and were tested for pathogenicity in the infant mouse. Organisms confirmed as *L. monocytogenes* were isolated from 10% of the farm-bulk-tank milk samples analyzed. Serotypes 1, 4 and nontyping strains were found. Of the samples confirmed as *L. monocytogenes* by serology and biochemical reaction, half were pathogenic for infant mice when inoculated at the level of 10^2 and observed for 7 days.

A National Food Protection Examination *R. B. Gravani - Moderator* Institute of Food Science, Stocking Hall, Cornell University, Ithaca, NY 14853

During the Second National Conference for Food Protection, several white papers addressed the education and training of consumers, professionals and non-professionals, in the food industry and regulatory agency inspectors and sanitarians. One subject that generated a great deal of interest was Food Service Manager Training/Certification programs. The Educational Testing Service (ETS) of Princeton, New Jersey, is currently developing a Natural Food Protection Certification Examination for food service managers. With the assistance of educators, state and federal regulatory officials, and industry representatives, ETS is writing a 60-question multiple-choice examination. The test will seek to determine an individuals knowledge of food storage and preservation, handling, preparation and sanitation. The objectives of this cracker barrel session are to: 1) address the advantages, disadvantages, benefits and problems of the national Food Protection Certification Examination, and 2) discuss the status of this project.

Problems Associated with Applying Sewage Sludge to Cropland *Robert K. Bastian* U. S. Environmental Protection Agency, Office of Municipal Pollution Control (WH-595), 401 M St., SW, Washington, D.C. 20460

In an effort to help fulfill the country's commitment to reducing water pollution, many communities have either built new municipal wastewater treatment plants or upgraded previously existing treatment facilities. The production of an increasing volume of sewage sludge is a direct result of the success achieved by these facilities in reducing the amounts of organic matter and nutrients discharged into our Nation's waterways. An increasing interest in recycling sewage sludge by applying it to cropland as a soil amendment and source of organic fertilizer has occurred as many of the traditional methods of sludge disposal have become environmentally constrained or politically unacceptable, or simply too expensive for many communities to afford. At the same time more and more farmers are showing an interest in using sewage sludge as a means of decreasing fertilizer costs and improving the soil, while maintaining high yields. However, as with all sludge management practices, there are potential problems that must be considered when applying sewage sludge to cropland. A number of these potential problems will be described along with some of the steps being taken by various State and Federal agencies to help assure that proper land application procedures are followed, while at the same time encouraging such beneficial uses of this residual of our municipal water pollution control facilities.

Raw Milk Screening Policies *John J. Althaus* Milk Marketing, Inc., 8257 Dow Circle, Strongsville, OH 44136

It is of highest priority that each plant receiving direct ship raw milk follow a daily program of moitoring the quality of raw milk receipts. A program of screening is not complete until *prompt* notification of field service of loads or producers not meeting quality screening requirements is done. Immediate follow up by field service is the key to reducing problems. Milk at farm level must be resampled same day or by next morning for microscopic examination before permitting scheduled pick-up. The key to a successful screening program is being able to obtain a representative sample which will add creditability to results obtained. Two reliable methods are the agitated plant load sample or driver last stop sample. Provisions should be made to provide for more stringent requirements when necessary. The following are some of the minimum requirements which must be included in a successful screening program: 1) Visual inspection at tank manhole, 2) Smell for off odors, 3) Milk temperature below 40°, 4) Microscopic examination, 5) Check for inhibitors and antibiotics, 6) Cryoscope freezing point.

Control of Trichinosis by Low-Dose Irradiation of Pork *R.J. Brake, K.D. Murrell, E.E. Ray*, J.D. Thomas, B.A. Muggenberg, J.S. Sivinski* Los Alamos National Laboratory; U.S.D.A. Animal Parisitology Institute; New Mexico State University, Las Cruces, NM 88003; Inhalation Toxicology Research Institute; and CH2M Hill

The underlying reason for the concern about trichinosis is the absence of an inspection program to detect the presence of infective larvae in fresh pork in the United States, even though the prevalence rate of infected swine has markedly decreased

over the past 30 years. Gamma irradiation of *Trichinella spiralis*-infected pork with a dose of 15 to 30 krad renders the parasite sexually sterile and blocks maturation of ingested larvae in the host gut. Irradiation of freshly slaughtered (prerigor) hog carcasses indicate that larvae distributed throughout the skeletal muscles have essentially identical radiosensitivities. Neither the age of the encysted muscle larvae nor the oxygen tension in the meat significantly affected the radiosensitivity. Holding of meat after irradiation leads to little, if any, recovery of trichina viability. The data indicate that 30 krad cesium-137 gamma radiation can be delivered to split market weight hog carcasses with acceptable uniformity, and that such a dose can provide a substantial margin of safety for human consumption of heavily infected meat.

Effects of an Automatic Backflush System on Milk Iodine Levels *T. Wyatt Smith* and Stephen B. Spencer* University of California, Animal Science Extension, Davis, CA 95616 and The Pennsylvania State University, 8 Borland Laboratory, University Park, PA 16802.

A study was conducted to determine the effects of an automatic iodine backflushing system on milk iodine levels. Milking machine clawpieces were divided into left and right halves with each having a milk outlet. The right side of the unit was backflushed while the left side served as the control. An iodide electrode was used to determine milk iodide levels in samples collected from the milk of each udder half. Analysis of iodine concentrations in milk samples collected after liners and milk transport hoses had been in use for 1000 cow milkings revealed a significant difference ($P<.01$) of iodine in milk from backflushed udder halves. Mean iodine levels were 243 μg of iodine per liter of milk from the control udder halves and 486 μg per liter from backflushed halves. When new milk hoses and teatcup liners were placed in use, milk iodine concentrations were equal from control and backflushed halves for the first cow milked. Thereafter, iodine concentrations increased in milk from backflushed halves as compared to control halves. Results suggest this increase was due to the absorption of iodine into the milk transport hoses and subsequent release in milk as it passed through the hoses.

Ability to Sequester Transferrin-Iron as an Indicator of Virulence in *Vibrio vulnificus* *G.N. Stelma, Jr.*, A.L. Reyes, and C.H. Johnson* Division of Microbiology, Food and Drug Administration, Cincinnati, OH 45226

The capacity of virulent *Vibrio vulnificus* strains to sequester iron from highly saturated serum transferrin was evaluated for ability to assess virulence *in vitro*. Virulent and avirulent isolates were tested for production of phenolate siderophore, utilization of iron from saturated human transferrin, and ability to grow in normal rabbit serum. The virulent isolates were consistently positive in all three tests; however, some of them required induction of siderophore synthesis before they grew in the rabbit serum. Some avirulent isolates were negative in all three tests, whereas others were positive in two or more. Avirulent isolates that were positive for transferrin-iron utlization are missing some other critical virulence factors. Our observations suggest that ability to sequester iron from highly saturated transferrin is necessary but not sufficient for virulence since that ability was also found in some avirulent strains. A reliable *in vitro* system will probably require testing for multiple virulence factors.

Environmental Health Data Processing - It Works *Dudley J. Conner* and Anita Travis* Department for Health Services, Division of Consumer Health Protection, 275 E. Main Street, Frankfort, KY 40621

In 1978, the Food and Sanitation Branch of the Kentucky Department for Health Services implemented the Sanitation Program Information Formulator (SPIF) System, which was developed by the Food and Drug Administration. As a result of experience with the SPIF System, an environmental health management information system has been developed and implemented for all environmental programs. This system provides site specific information for local units and aggregate data for state office use on a statewide basis. Reports for management and for individual environmentalists are generated, which facilitates program planning and evaluation in all environmental health areas of responsibility.

HACCP for Food Service *John J. Guzewich* Food Protection Section, New York State Department of Health, Room 421, Tower Building, Empire State Plaza, Albany, NY 12237

A review of foodborne disease outbreak data compiled by the Centers for Disease Control since 1966, and by New York State's Foodborne Disease Surveillance Program since 1980, has shown little change in important features: 1) the same agents predominate salmonella, *Staphylococcus aureus* and *Clostridium perfringens*, 2) the same major vehicles continue to transmit the agents: roast beef, ham and turkey, 3) food service establishments are the most commonly reported public place of mishandling, and 4) (a) improper cooling, (b) lapse of a day or more between preparation and serving, (c) improper hot storage, (d) infected food handler, and (e) inadequate reheating are the contributing factors most commonly reported in foodborne outbreaks. The repetitive nature of these data suggest that current food service regulatory programs are not having sufficient impact on controlling these factors. The hazard analysis critical control point approach provides a system to focus on controlling the foodborne disease features identified by disease surveillance. HACCP in food service begins with a risk assessment to identify high risk estabishments. The preparation of high risk potentially hazardous foods in these establishments is then observed and evaluated to identify opportunities for bacterial contamination and/or survival and/or growth. Critical control points are identified. Monitoring points to prevent contamination, survival and growth are established, taylored to that food service establishment. Subsequent regulatory inspections focus on the effectiveness of the establishments monitoring of their critical control points. Routine food service establishment inspections focus on the HACCP principals and control points.

Dairy Quality

by **Darrell Bigalke,** *Food & Dairy Quality Mgmt., Inc., St. Paul, MN*

Fluid Milk Quality

Quality dairy products may be described in two ways: 1) from a consumer standpoint where a high degree of consumer acceptance is necessary considering safety, shelf-life, desirable sensory attributes, and freedom from product defects, 2) another description may be made from a processor's standpoint where quality is defined based on conformance to specifications. The two descriptions coincide in that the specifications must be based on a high degree of consumer acceptance. Certainly specifications for high quality fluid milk should be established that reflect a low degree of product defects, an extended shelf-life, and a high degree of consumer acceptance.

The fluid milk processor who is not accurately determining or measuring the quality of their products is not likely to be producing quality products. Accurately determining dairy products' quality requires a combination of sensory evaluations, microbiological evaluations, and consumer complaint follow-up. To effectively achieve quality, specifications should be developed based on these parameters.

Development of specifications for sensory and microbiological evaluations will aid in management of quality programs to achieve product quality. Of equal importance, information obtained from these evaluations will aid in identification of causes of product defect. Presently, many dairy operations rely on consumer complaints and microbiological data alone to determine their products' quality. These tests, alone, will not fully or accurately reflect fluid milk products' quality. For example, oftentimes consumers will complain that fluid milk products are "sour." However, rarely will fluid milk products be sour (high titratable acidity) but are more likely to be fruity, bitter, oxidized, rancid, or some other sensory defect caused by different control deficiencies. An understanding of what defects are present in fluid milk products and what are the causes of these defects is necessary to achieve quality.

Management of quality by conformance to specifications would accomplish effective product evaluation which, in turn, could provide insight into causes of product defects.

To determine fluid milk products' quality, the following product evaluation policy is suggested.

A. Conduct a daily sensory evaluation, initial Standard Plate Count, and Coliform Count on one high fat and one low fat product from each filler.

B. Conduct the Moseley Keeping Quality Test on one high fat and one low fat product from each filler from each day's production. The Moseley Keeping Quality Test should be conducted at 1/2 the expected code date. In other words, if a dairy is coding for 14 days, the Moseley Keeping Quality Test should be conducted on day 7. If 16 day shelf-life is expected, the Moseley Keeping Quality Test should be conducted on day 8.

C. A Standard Plate Count and sensory evaluation should be conducted at the end of code. The end of code may be the date posted on the carton or the day at which the product is legally required to remain safe and palatable.

D. Aggressive follow-up on consumer complaints in-including microbiological and flavor analysis on the products that a complaint originated.

Table 1, below, suggests some specifications that may be applied to the tests outlined in the product evaluation policy above.

Table 1. *Fluid Milk Quality Specifications.*

Initial Production Evaluation	
SPC	< 1000/ml
Coliform Count	< 1/ml
Sensory Evaluation	No defects present Flavor Score 38$^+$
Defects in Packaging	< .01%
Moseley Evaluation (1/2 of Code)	
SPC	< 2000/ml
Coliform Count	< 1/ml
Sensory Evaluation	No defects present Flavor Score 38$^+$
End of Code	
SPC	< 1,000,000/ml
Sensory Evaluation	No objectionable flavors Flavor Score 36$^+$ No physical defects

The intent of this newsletter is to suggest a product evaluation policy and specifications for fluid milk products. It should be pointed out that this is only a suggested product evaluation policy with specifications and that an effective Quality Control program must include ingredients, specifications and evaluation, process control, distribution control, and other necessary functions to achieve the production of quality products.

Next month's *Dairy Quality Update* will discuss guidelines for identifying sources of product defects.

N.M.C.
NATIONAL MASTITIS COUNCIL

Most mastitis is spread during milking. Proper hygiene and correct milking procedures are crucial to mastitis control, said Tom Fuhrmann, an Arizona veterinarian who specializes in mastitis control and who recently joined the management team of United Dairymen of Arizona, a dairy cooperative headquartered in Tempe.

Because of large and sophisticated milking systems, high cow numbers, emphasis on cow through-put and hired labor, keeping proper milking procedure is the single most difficult and important step in mastitis control.

Fuhrmann said there is agreement regarding general principles of milking management. Yet too often, there are major failures in implementation of an exact routine designed to fit the facilities, personnel and conditions.

Attention to details is absolutely essential. Fuhrmann used cow preparation as an example. He said there is general agreement that teats should be clean and dry when milked. Just how to accomplish the goal varies. Many dairies in the Southwest have holding pens equipped with spray-type washers. However, a few are not constructed that way. Others have an additional "drip pen" to allow cows to "dry" prior to entering the parlor.

Once cows enter, premilking cow preparation varies from none with immediate machine attachment to foremilking with a strip cup, predipping, udder and teat washing and/or drying and finally machine attachment.

While dairymen milk under a variety of cow preparation systems with variable degrees of success, it is impossible to generalize as to what is best for everyone. It is necessary to evaluate each situation and then, with sound hygiene principles and cooperation of management personnel, design a very specific milking routine.

Once a routine has developed, adoption is the next step. Milkers must be shown the how and why cows are to be milked according to the routine. Training sessions need to address all areas of milker responsibility including: detecting malfunctioning equipment, detecting and handling mastitis cows and using proper milking procedures.

Monitoring milkers is a continuous process. Observation is one method. However, many large dairies milk round the clock making it impossible. Two other methods include evaluating milk filters after each milking shift and interpreting bulk tank coliform counts.

If the milk filter surface contains dirt or manure, then there is an apparent fault in premilking hygiene and milkers obviously are milking dirty and/or wet cows. If it contains clots or gargot, milkers have failed to detect cows with clinical mastitis. Similarly, if coliform counts are elevated above 500 per milliliter, there is strong indication that dirty or wet cows are being milked.

Information for this item was taken from the proceedings of the 1985 annual meeting of the National Mastitis Council. For information about mastitis or the council, contact the National Mastitis Council office at 1840 Wilson Blvd., Arlington, VA 22201.

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KAMFES Holds Annual Educational Conference

The Kentucky Association of Milk, Food and Environmental Sanitarians, Inc. held it's annual Educational Conference for Fieldmen and Sanitarians, February 19th & 20th, 1985 at the Executive Inn, Louisville, Kentucky.

One hundred and eighty six members registered to attend the Conference on the first day. Of this number, one hundred and forty-two were preregistered. On the second day, one-hundred and sixty-three registered, with one hundred and twenty-seven of those being preregistered.

At the close of the Conference there were two hundred and seventy-seven names on the membership rolls. Thirty seven were life members. Twenty-three new members were enrolled during the Conference registration.

The Conference resulted in the election of the following new officers: Bland Dorris, President; Dale Marcum, Vice President; Betty Kelly, Sec-Treas; Ross Stratton and Kenny Yeager, Region 3; D.S. Hughes, Region 4; and William Murphy, Region 5.

Life memberships were awarded to two members nearing retirement. They were: George Linton and Arthur Unglaub, both from the Louisville and Jefferson County Health Department.

Five new membership certificates were awarded at the Conference.

The Outstanding Sanitarian Award-Plaque was presented by George Jones for the Economics Laboratory/ Klenzade Products, St. Paul, Minnesota to Dudley Conner.

The Dairy Industry Award-Plaque was presented by Roger McDonald, of the Monarch Chemical Division of the H. B. Fuller Company of Minneapolis, Minnesota, to Quentin Billingsley of Dairymen, Inc.

The Service Award was presented to Johnson's Dairy of Ashland.

The Steve Sandlin Jr., Achievement Award-Plaque was presented to Kathryn Runyon, of Fiveco Health District.

Mr. Fred Wiche, Farm and Garden Director for WHAS Radio and TV was the luncheon speaker for the Awards banquet.

Business Meeting

President Mattingly opened the session with the Presidential address. He described his attendance at the IAMFES annual conference in Canada as being the highlight of his term of office. He commented on his impression of the absence of litter on the landscape of the country.

Committee reports were submitted as follows: William Murphy for the Long Range Planning Committee; Bill Grigsby, reported on Farm Methods; Russell Bledsoe, Nominating Committee, reported the election results; no report was submitted by the Publicity Committee. Dudley Conner reported for the Legislative Committee - the theme of his report centered on members having more contact with their legislators. No resolutions were submitted by the Resolutions Committee. Dr. Blackwell reported for the Professional Standards Committee. Their efforts have focused in two areas, they are: salary study of Sanitarians in all neighboring states and compilation of job duties of various classifications of Environmentalist.

The Secretary-Treasurer requested the assistance of all members in updating their current addresses.

President Mattingly briefed members on the bid from the Capital Plaza Hotel in Frankfort for the 1987 Annual Conference. He pointed out that this bid was basically equal to the bid from the Executive Inn. He asked for a show of hand of those who would be interested in moving the meeting site to Frankfort in 1987. No one showed willingness in moving to the proposed site.

Ms. Frances Veverka, of Columbus, Ohio, a candidate for 2nd Vice-President of NEHA spoke and requested KAMFES support for her candidacy.

Harry Grenawitzke, Regional Vice-President for NEHA from Monroe, Michigan spoke on the activities of the organization.

Leon Townsend, Secretary-Treasurer of IAMFES spoke and reminded members of the fact that this years meeting would be held August 4-8 in Nashville, Tennessee.

The Secretary-Treasurer reported the KAMFES assets as of February 13, 1985 included $5,384.22 bank balance, a $2,000 Certificate of Deposit, plus $217.21 in interest accumulated on the certificate. Total assets of the Association are $7,601.43.

AIMFES & Dairy Fieldmen Combine Meeting

The Associated Illinois Milk, Food and Environmental Sanitarians Board of Director's recently voted to combine with the Dairy Fieldmen's Conference for a fall meeting, to be held September 9 and 10 in Champaign, Illinois. There will not be a spring meeting of the association in 1985. This combined meeting of the Illinois Sanitarian's and the Dairy Fieldmen will convene at 1:00 p.m., September 9 and adjourn at noon on the 10th.

Please make plans to attend. We will be sending out program and exact location information as soon as it is finalized.

Some of the subjects that will be discussed on our program are:

1. "Industry and regulatory viewpoints" by Dr. John Nelson of Kraft and Mr. Phil Sheeler of the FDA.

2. "What's new in the dairy case? New Product Development" by Dr. George Muck of Dean Foods.

3. Extended shelf life using "Ultra-Clean" fillers.

4. The use of magnetic flow meters for HTST pasteurization.

5. Concentrating milk on the farm using reverse osmosis and ultrafiltration.

6. Antibiotic tests; new types for farm and plant use.

7. Raw milk quality and its effect on cheese yield and fluid milk products.

8. A discussion on "Effective Communication."

This will give you an idea as to some of the subjects that will be covered at our fall meeting.

We look forward to providing an educational, informative and enjoyable meeting in September in Champaign.

1985 Virginia Association Annual Meeting Held

The Virginia Association of Sanitarians & Dairy Fieldmen held their 1985 annual meeting on the campus of Virginia Tech, in Blacksburg, VA., on March 5-6, 1985.

Some topics and speakers included: Effective Use of the $.15 for Milk Promotion, Ray Jones; Dairy Regulation Review, M. W. Jefferson; P.I. Testing of Raw Milk, William Arledge.

The following officers were elected for the 1985-86 year:

President - Greg Snow
Past President - Joe Satterfield
1st Vice President - Ray Hall
2nd Vice President - Donna Izac
Secretary-Treasurer - W. J. Farley, Jr.

The 1985-86 officers of the Virginia Association of Sanitarians and Dairy Fieldmen. Left to right - Ray Hall, 1st Vice President; Greg Snow, President; Donna Izac, 2nd Vice President; Joe Satterfield, Past President; and W. J. Farley, Jr., Secretary-Treasurer.

FAMFES ANNUAL EDUCATIONAL CONFERENCE

The Florida Association of Milk, Food and Environmental Sanitarians held their 40th Anniversary Educational Conference at the Quality Inn, Cypress Gardens, Florida, April 17-19, 1985. There were 93 registered for the meeting with 84 members and guests attending the Anniversary Banquet.

There were four well attended scientific sessions and an afternoon luncheon and tour. The 12 scientific presentations covered a wide variety of topics: Management for Quality Improvement, Bruce Ellison of Diversy-Wyandotte West; Comparison of Antibiotic Screening Tests, Dr. Oliver Kaufman; Forthcoming Changes in Federal Regulations Affecting Labeling of Food, Terry Ryan of Borden; How to Get 100 on Your Next IMS Rating, Wm. A. Brown, Florida Department of Agriculture and Consumer Services; New Innovations in Cleaning and Sanitizing of Food Handling Equipment, Stanley Lovett, Klenzade; Dairy and Food Contract Compliance as seen by the Military Health Service, Wm. O. Blalock of U.S. Army Health Service Command; An Update on Child Care Services in Florida, Janella Eslinger of the Florida Department of Health and Rehabilitative Services; Health Hazards Associated with Microwave Cooking, Dr. Richard Matthews of Food Science and Human Nutrition Department, University of Florida; Imperial Flavors, Lionel Bailey, Quality Control Manager.

The Thursday afternoon program consisted of a trip to the Publix Complex at Lakeland for a tour of their Dairy Plant and a luncheon sponsored by Publix. This was followed by a trip back to Winter Haven and a comprehensive tour of the Imperial Flavor plant.

The papers presented on Friday morning included HRS Update - New Regulations by Eanix Poole, Administrator, Environmental Health Program, Florida Department of Health & Rehabilitative Services; Current Issues in the Florida Department of Agriculture & Consumer Services, Dr. Martha Rhodes, Assistant Commissioner of Agriculture; Quality Standards in Interstate Milk Shipments, William Arledge of Dairymen Inc., Louisville, Kentucky; and a discussion and demonstration - Moisture, Fat and Solids Analysis of Food & Dairy Products, by Gordon Magee and Cathy Hagen of CEM Corp.

At the Annual Banquet, Dick Jolley as M.C. recognized the FAMFES Past Presidents who were attending the meetings: Dr. Kenneth Smith, President in 1966 and 1983-84; R.F. Jolley, 1968; Dave Fry, 1970-71; Jay Boosinger, 1976-77; Tom Hart, 1977-78; Lupe Wiltsey Loza, 1978-79; William A. Brown, 1979-80; Doris Marchetti, 1981-82; James L. Strange, 1984-85; and in addition Past Presidents of IAMFES, Dr. Franklin W. Barber, 1959 and David D. Fry, 1978.

Special guests at the Banquet were Marc Vargas and his parents, Mr. and Mrs. Luis Vargas of Orlando. Marc is the winner of the FAMFES $500 Scholarship Award

given each year to a student in the Food Science and Human Nutrition Department at the University of Florida. We were pleased to honor Marc, a Junior at the University.

Again, as at each meeting since 1977, a winner for the door prize consisting of an all expense trip to the IAMFES Annual Meeting was drawn from tickets presented to each member attending the Banquet. Dr. Oliver Kaufman was the lucky person but he graciously declined the award saying he was going to attend the IAMFES meeting anyway and the award should go to someone who might not otherwise attend. The actual winner was Dr. Frank Busta, Chairman of the Food Science and Human Nutrition Department at the University. Two additional tickets were drawn for alternate winners; first alernate James Orrock, Velda Farms, Ft. Lauderdale; and second alternate Charles Ricker, Flav-O-Rich, Jacksonville.

At the Annual Business Meeting the following Officers and Directors were elected and installed:

President - Clifford Muncy, Velda Farms, Miami

President Elect - Richard Jolley, Indiana Dairy Farmers Association, Bradenton

Past President - James Strange, Florida Department of Agriculture, Tallahassee

Secretary/Treasurer - Dr. Franklin W. Barber, Ft. Myers

Directors

Dr. James Jezeski, Professor Emeritus, University of Florida, Gainesville

Dr. Oliver Kaufman, Consultant, Bradenton

Chester Marsh, General Manager, Publix, Lakeland

Marian Ryan, Florida Department of Agriculture, Auburndale

David Fry, Bordens, Orlando

The FAMFES 1985-86 Board: left to right - Director, Dave Fry; President, Clifford Muncy; Directors, Chester Marsh and Dr. Oliver Kaufman; Secretary-Treasurer, Dr. Frank Barber, Past President, James Strange; and President Elect, Dick Jolley. Absent: Directors - Dr. James Jezeski and Marion Ryan.

FAMFES Past Presidents honored at the Annual Banquet during the 1985 Annual Educational Conference at Cypress Gardens, FL, April 17-19, 1985 were left to right - Dave Fry, 1970-71; James Strange, 1984-85; Doris Marchetti, 1981-82; Dick Jolley, 1968; Lupe Wiltsey Loza, 1978-79; and Jay Boosinger, 1976-77.

President Clifford Muncy congratulates Marc Vargas, the FAMFES Scholarship Award winner for 1985, with Dr. Frank Busta, Chairman of the Department of Food Science and Human Nutrition at the University of Florida.

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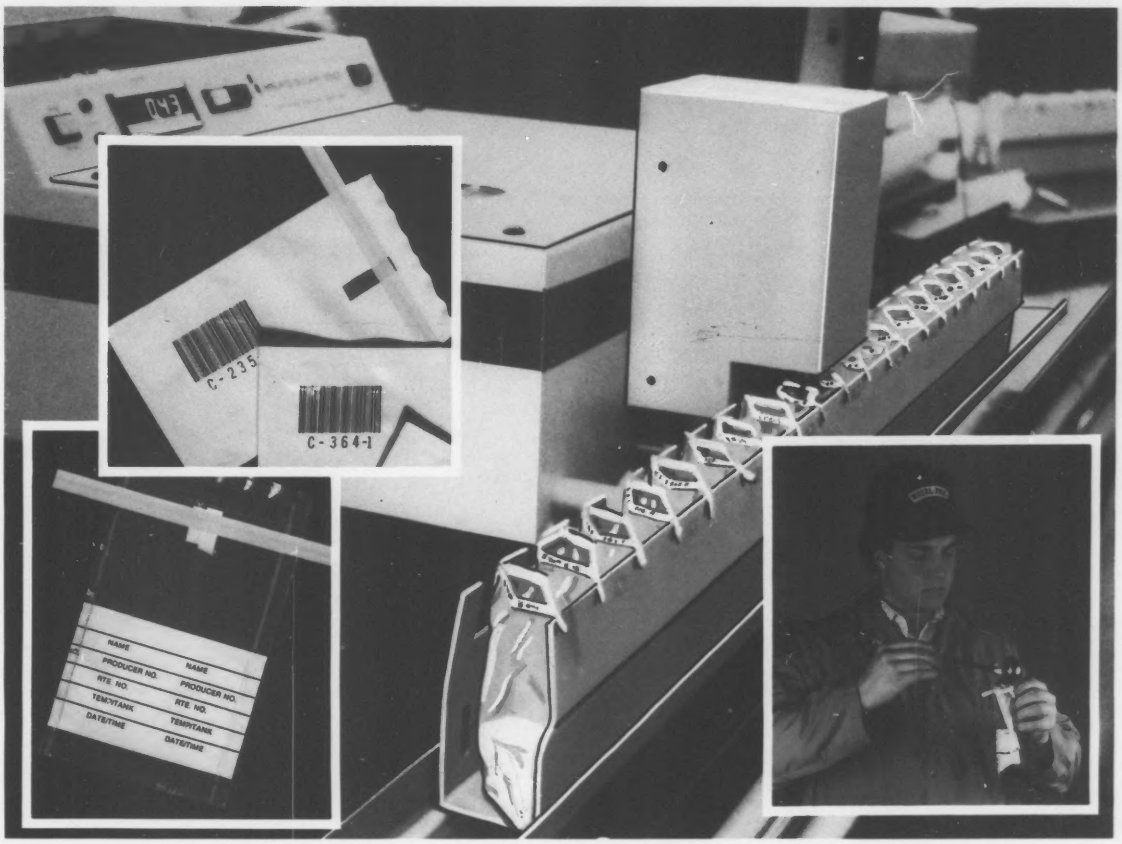

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2.3 MILLION POISONINGS ESTIMATED IN '83

The largest study ever of accidental and deliberate poisonings in the United States shows that Americans are careless with toxic substances and that their children are the chief victims. Of 251,012 poisoning cases documented by the American Association of Poison Control Centers, 90 percent occurred in the home and 64 percent of the victims were under 6.

The association's report is based on information gathered in 1983 from 16 poison control centers serving 11 percent of the U.S. population. It is the largest annual poisoning data base ever compiled in the United States. From this data base it is estimated that there were more than 2.3 million poisonings nationwide during the study period, according to the report, published in the September 1984 issue of the *American Journal of Emergency Medicine*.

Drugs were responsible for 103,297 of the reported poisonings. The single medicine most often involved was acetaminophen, sold under such brand names as Tylenol, Panadol, Datril and Anacin-3. According to the report, products containing acetaminophen were involved in 14,511 cases.

Once the major drug cause of accidental poisoning in young children, aspirin was the culprit in 8,195 cases logged in the study.

Non-drug substances accounted for 150,857 of the poison exposures reported in the study. (Some poisonings were caused by more than one substance.) The greatest number were caused by cleaning substances, such as bleaches, disinfectants and detergents (22,347 exposures). Next came plants, such as the philodendron and dieffenbachia (22,326 exposures).

Figures such as these serve to remind parents that common household products continue to be a threat to young children. To encourage the public to learn about the dangers of accidental poisonings and to take preventative measures, President Reagan has designated March 17 to 23 as "National Poison Prevention Week."

National Poison Prevention Week is sponsored by national medical, pharmacy, nursing, dental and hospital associations; health and safety groups; organizations representing manufacturers and distributors of consumer products, including medicines; and government agencies such as FDA and the Consumer Product Safety Commission.

FDA has prepared a short videotape on preventing childhood poisoning. Organizations that want copies of the tape can write to: Poison Tape, FDA/HFN-5, 5600 Fishers Lane, Rockville, MD 20857. (FDA Consumer, March 1985)

INVESTIGATIONAL CONCERNS OF THE 80's

Burton L. Love, Director of Investigations Branch,
Buffalo District, U.S. Food & Drug Administration,
599 Delaware Ave., Buffalo, NY 14202

A series of difficult problems face the regulators/investigators during the remainder of the 80's and on into the next century. These problems include: Rising public expectation caused by increased public awareness as well as the speed of the media today; Personnel expectations which now require that we consider not only whether our people have a job but also whether the job our people do is important and has impact; Increases in industrial complexity; Politics which will cause pressure to maintain services while resources are decreased; General complexity.

One of the possible answers to these difficult problems is the computer. If we honestly answer the question, 'What business are we in?', we will admit we are in the information business. We don't make widgits. We handle information.

Although computers present many problems themselves, they will provide an appropriate means to solving many of the other problems with which we are faced.

The future of the regulators is with computers. I believe we can expect a number of innovations such as: The paperless office; Direct input/output by field personnel; Communication between databases; Immediate availability of data; Faster decisions; Better handling of problems.

We all have to learn as much as we can as quickly as we can to become computer literate or the future will pass us by. (N.Y. State Assn. Milk and Food Sanitarians, Ann. Rep. Jan. 1985).

DIPTHERIA-TETANUS-PERTUSSIS VACCINE SHORTAGE

On February 12, 1985, the American Academy of Pediatrics hosted a meeting to discuss ways of dealing with the current shortage of diptheria-tetanus-pertussis(DTP) vaccine. The meeting was attended by representatives of the American Medical Association; American Academy of Family Practice; the vaccine manufacturer; state, county, and city health officials; the U.S. Department of Defense; and the U.S. Department of Health and Human Services.

Available information indicates that, overall, state health departments have approximately 2.3 month's supply of DTP vaccine on hand, but this vaccine is not uniformly distributed, with 18 states having supplies on hand of 1 month or less. Because of close inventory monitoring and prudent use of DTP reserves held by the manufacturer, vaccine has remained available in the public sector to date.

A survey conducted by eight different state health departments of 583 physicians indicate approximately one-third had had difficulties in obtaining DTP vaccine, and approximately one-half were following the current recommendations to defer the DTP doses for 18-month-old and 4- to 6-year old children. In four states, where inventory estimates were made, physician's current inventories ranged from 1.9 to 2.9 month's supply.

Lederle Laboratories reported the release for distribution of one DTP vaccine lot on February 12. This lot, about 35,000 vials (525,000 doses) has been divided among the company's five regional distribution centers located in Los Angeles, California; Atlanta, Georgia; Chicago, Illinois; Philadelphia, Pennsylvania; and Dallas, Texas. This vaccine is being distributed to health-care providers now.

Because currently available supplies of DTP vaccine are limited, the manufacturer is carefully coordinating the distribution of vaccine to both public and private health-care providers. Following extensive discussions, the group reached the following conclusions and recommendations:

1. Current information indicates that adequate supplies of DTP vaccine should become available in mid- or late 1985.

2. Until adequate supplies become available, it is important to continue the currently recommended practice of deferring the DTP vaccine doses for 18-month-old and 4- to 6-year old children to assure that the initial three-dose immunization schedule for infants is met.

3. Practitioners should not administer partial doses of DTP vaccine in an effort to make the vaccine go further, since the

degree of protection afforded by such partial doses is not certain.

4. Diptheria-tetanus vaccine should not be substituted in the routine DTP vaccine schedule for 18-month old and 4- to 6-year old children.

5. It is important for practitioners to establish recall systems to insure that children whose doses are deferred are recalled for the DTP vaccine they need once supplies become available.

6. Because some children will have their 18-month or "preschool dose" of DTP vaccine deferred this spring and summer, it may be necessary for day-care centers or school systems to allow provisional enrollment of such children until they can receive the needed doses.

7. As soon as adequate supplies become available, the Academy of Pediatrics and the U.S. Public Health Service will notify physicians so they can again resume the full DTP immunization schedule and recall those who need additional doses.

Reported by U.S. Public Health Service Interagency Group to Monitor Vaccine Development, Production and Usage. MMWR February 22, 1985.

From the Harvard Medical School Health Letter, March, 1985:

MYTHS ABOUT RAW MILK

Despite consistent evidence to the contrary, some people still believe that raw milk is healthier than the pasteurized kind. The purported advantages of raw milk include: higher nutritive value; protection from dental decay; greater resistance to disease; improved fertility; higher content of needed enzymes and hormones; and even the presence of "anti-stiffness factor" (which has never been isolated or in any other way defined). *The simple truth is that these claims for raw milk either have no scientific basis or are vastly over-rated.* To the extent that they may entice health-conscious people to substitute raw milk for pasteurized milk, the claims are downright dangerous. In an article entitled "Unpasteurized Milk - The Hazards of a Health Fetish," the risks of infection from raw milk are set forth in alarming detail by authors from the Center for Infectious Diseases. Eleven bacterial diseases are described: salmonella and campylobacter infections lead the list by far, but 9 "lesser contenders" (including tuberculosis and staphylococcal infections) are known to be spread by contaminated raw milk.

From the standpoint of one's health, the most important component of unadulterated raw milk is germs. And in all probability, the major effect on the person drinking raw milk will be an attack of infectious diarrhea (*Journal of the American Medical Association*, October 19, 1984).

FOOD SALVAGE

The Association of Food & Drug Officials and the U.S. Food & Drug Administration announce the availability of the 1984 Model Food Salvage Code. The model code was initiated by AFDO and has been jointly developed with FDA to provide the food salvage industry with appropriate standards and guidelines for food salvaging, and state and local governments with a comprehensive model law and recommended enforcement procedures for the regulation of the food salvage industry. Copies of the model code are available from AFDO, P.O. Box 3525, York, PA 19402. Prepaid price is $2.50/copy (1-10 copies); $2.00 each for over 10 copies.

Environmental News Digest 11/12/1984

CARBON MONOXIDE POISONING - SOUTH DAKOTA

On October 17, 1984, a physician of the Pierre (South Dakota) Service Unit, Indian Health Service, reported a nighttime incident of poisoning by an unknown substance involving a family of six that resided in a newly renovated, well-insulated house.

Shortly after midnight, the mother and two youngest children were taken by ambulance to a local hospital, with symptoms of nausea, dyspnea, vomiting, tachycardia, cyanosis, and faintness. Around 1:00 a.m., the mother called home and learned that the oldest child had developed similar symptoms. A second call, 45 minutes later, found the father and second oldest child to be symptomatic also. All family members were evacuated and recovered without treatment.

On October 18, the district and service unit sanitarians visited the house to search for hazardous conditions. Also present were the tribal housing authority director, a liquid propane gas dealer, and the furnace dealer. Before arrival, the heat had been turned off, and the house ventilated. MSA carbon monoxide (CO) dosimeters were placed in one bedroom and in the living room. Within 1 hour of closing the windows and starting the furnace, high levels of CO (35 or more parts per million (ppm)*) were detected in the two rooms. Examination of the furnace and water heater (both propane-fired) revealed improper venting and faulty furnace operation. The air shutters on the furnace burners were closed to such an extent that proper venting/drafting became impossible. The products of combustion then leaked from the furnace into the basement air, where they were drawn into the air-return duct and disseminated throughout the house.

The system was rectified by providing sufficient air to the burners, cleaning the soot from the flues, and closing the basement intake vent in the air-return duct.

Editorial Note: Despite efforts to reduce the number of unintentional CO poisonings through public education, standards, and improved product design, nonfatal and fatal CO poisonings continue to occur. Each year, an estimated 10,000 persons in the United States seek medical attention because of exposure to CO gas, and approximately 1,500 die from CO poisoning.

CO is a common gas produced by the incomplete combustion of any carbon-containing or organic solid, liquid, or gaseous fuel. The amount of CO produced during fuel burning is increased by incorrect air-fuel mixture, insufficient ventilation of combustion gases, and insufficient intake of fresh air. Although CO is odorless, colorless, tasteless, and non-irritating, it is often combined with other products of combustion that may produce a sharp odor and may irritate the eyes. CO exerts its toxic effect by binding to circulating hemoglobin in the lungs to reduce the oxygen-carrying capacity of the blood. Homoglobin absorbs CO over 200 times more readily than oxygen. CO-bound hemoglobin, called carboxyhemoglobin (COHb), is unavailable to transport oxygen. Exposure to low levels of CO causes headache, dizziness, and sleepiness. Continued exposure brings on nausea, vomiting, and heart palipatation. Prolonged exposure to high levels of CO causes unconsciousness or death. Death can occur when blood contains from 60% to 80% COHb.

Because CO is one of the most widely encountered toxic gases, and understanding of hazard prevention and of the

symptoms that result from exposure is necessary for preventing CO poisonings. Symptoms of low-level exposure should always be considered a warning of a potentially serious problem. If CO exposure is suspected, the health department should be contacted, and the dwelling in question should be inspected.

To prevent CO poisoning, the air inlet to any device that burns fuel must be properly adjusted and regularly cleaned. If the air inlet to such equipment is improperly adjusted, or the inlet is blocked by dirt, soot or grease, the amount of CO produced will increase sharply. Sufficient ventilation of combustion gases to the outside air is also critical. One should periodically inspect vents for defects and obstructions and ensure that all horizontal vent pipes rise steadily from the appliance to the chimney. Annually, a qualified technician should adjust all fuel-burning appliances for correct fuel-air mixture, proper ventilation of combustion gases, and sufficient fresh-air intake.

Other prevention recommendatons include: (1) never burn charcoal inside the home or in confined spaces; (2) never use a gas oven to warm a room; (3) never burn anything in an improperly vented stove or fireplace; (4) never run an automobile engine, lawn mower, or any combustion engine in an enclosed area; and (5) always ensure adequate natural ventilation for portable, fuel-fired space heaters.

*There are currently no indoor air pollution standards. However, the U.S. Environmental Protection Agency ambient air quality standards for CO are: 9ppm, maximum 8-hour concentration, and 35 ppm, maximum 1-hour concentration, neither to be exceeded more than once per year.

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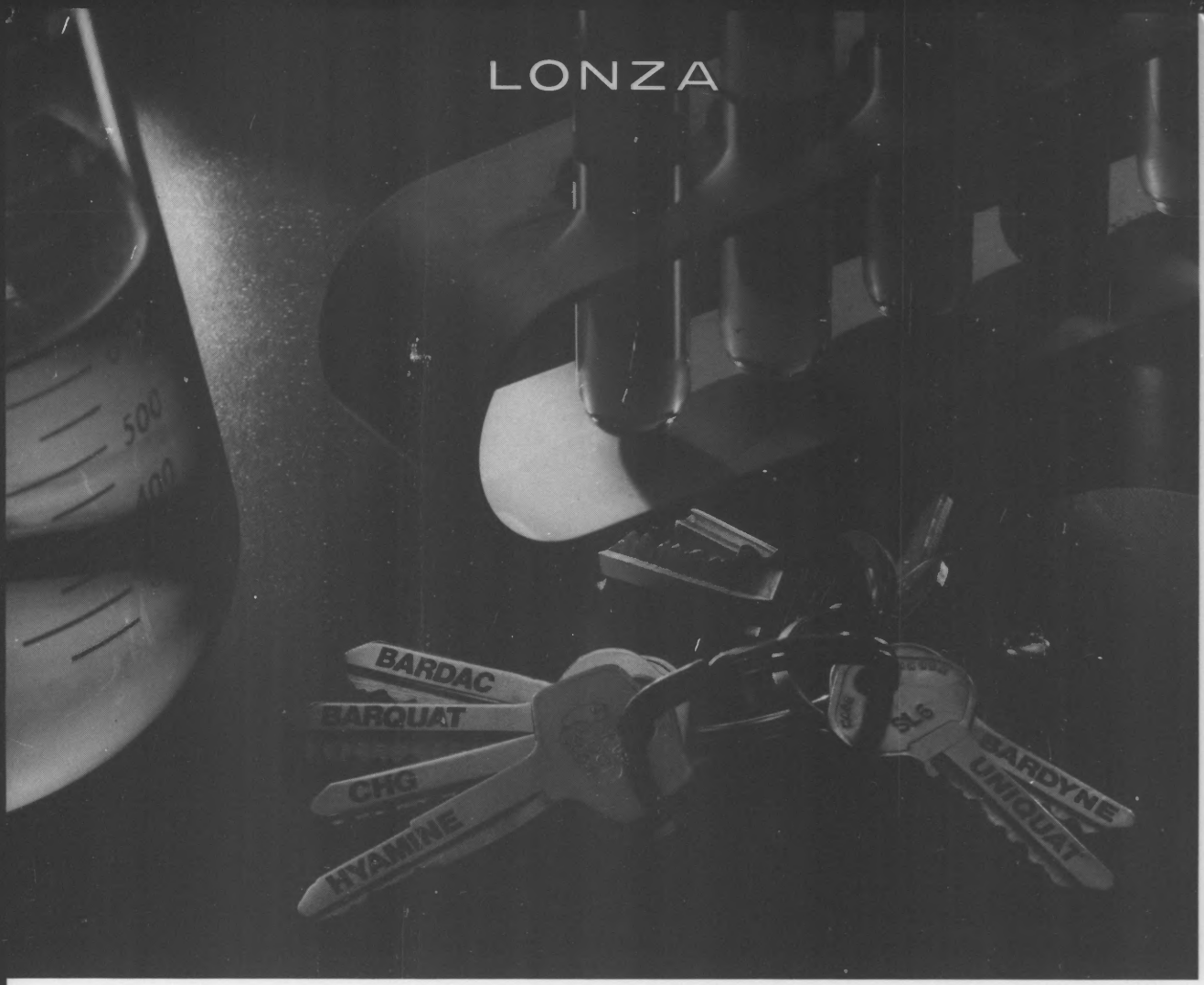

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Abstracts of papers in the July Journal of Food Protection

To receive the* Journal of Food Protection *in its entirety each month call 515-232-6699, ext. A.

The "Phoenix Phenomenon" During Resuscitation of Fungi in Foods, John A. Koburger and Richard A. Dargan, Food Science and Human Nutrition, University of Florida, Gainesville, FL 32611

J. Food Prot. 48:556-557

During attempts to increase recovery of fungi from foods by providing for a period of resuscitation before plating, a rapid decrease in cell numbers was observed with certain samples. This decrease in numbers occurred for about the first 12 h of incubation followed by a gradual increase in viable cell count thereafter. This pattern of growth has been termed the "Phoenix Phenomenon" and is associated with repair of metabolic injury. Numerous attempts to overcome this decrease in numbers by altering resuscitation menstrua and plating media were not successful.

Effect of pH and Water Hardness on the Sanitizing Activity of Five Commercial Iodophors, Dale L. Fredell, Bruce B. Cords and Bertha J. Givins, Research and Development Department, Economic Laboratory, Inc., St. Paul, Minnesota 55118

J. Food Prot. 48:558-561

The effect of increasing pH (4 to 10) on the sanitizing activity of iodophors was measured by the Association of Official Analytical Chemists' Germicidal Detergent Sanitizers Method against four organisms of importance to the food industry. These organisms were *Staphylococcus aureus, Escherichia coli, Pseudomonas aeruginosa* and *Salmonella cholerasuis*. Also, the effect of 250 ppm (as $CaCO_3$) water hardness on iodophor activity was measured. In general, sanitizing efficacy was reduced at pH levels above pH 8.0. This reduced activity was more evident in hard water. Of the four orgnaisms tested, *S. cholerasuis* was least resistant and *E. coli* was most resistant to the action of iodophors.

Evaluation of Dichloran-Rose Bengal Agar for Enumeration of Fungi in Foods, J. A. Koburger, F. C. Chang and C. 1. Wei, Food Science and Human Nutrition Department, University of Florida, Gainesville, Florida 32611

J. Food Prot. 48:562-563

Samples of flour, corn meal, ground meat and carrots were analyzed by standard procedures for presence of fungi using both Dichloran-Rose Bengal (DRBC) and Plate Count agar with antibiotics. Bacterial contamination was so extensive with ground meat and carrot samples on DRBC that meaningful fungal counts could not be obtained. Therefore, DRBC is not recommended for routine enumeration of fungi in foods.

Resistance of Yeast Species to Benzoic and Sorbic Acids and to Sulfur Dioxide, Alan D. Warth, CSIRO Division of Food Research, P.O. Box 52, North Ryde, NSW, 2113 Australia

J. Food Prot. 48:564-569

Effects of sorbic and benzoic acids and SO_2 on the growth and survival of 12 strains of yeasts, differing widely in their preservative resistance, were studied. Exponential phase cultures not adapted to preservative were tested under anaerobic conditions at pH 3.5. In general, species tolerant of one preservative were also tolerant of the others, but significant differences in the relative effectiveness of the preservatives were found in some species. Maximum tolerated levels of benzoic acid ranged from 0.5 mM for *Hansenula anomala* to 4 mM for *Zygosaccharomyces bailii*. The range in tolerance to SO_2 was 0.05 mM free SO_2 for *Klockera apiculata* to 2.8 mM for *Z. bailii*. The principal effect of sorbic and benzoic acids was to reduce cell yield. At higher concentrations, growth rates and lag times were affected. Benzoic acid generally inhibited growth less than sorbic acid, but had a greater effect on lag time and so had a similar overall degree of effectiveness. Cultures treated with SO_2 characteristically showed long lag times of up to 600 h. Reductions in growth rate and final yield were often not apparent, mainly because SO_2 became bound by metabolic products.

Inhibition of *Clostridium botulinum* in Comminuted Bacon by Short-Chain Alkynoic and Alkenoic Acids and Esters, C. N. Huhtanen, H. Trenchard and L. Milnes-McCaffrey, Eastern Regional Research Center, Agricultural Research Service, U.S. Department of Agriculture, 600 East Mermaid Lane, Philadelphia, Pennsylvania 19118

J. Food Prot. 48:570-573

Several short-chain alkynoic and alkenoic acids and esters were screened for inhibition of gas production by *Clostridium botulinum* in cans of comminuted, nitrite-free, temperature-abused bacon. The most active compounds were propiolic (2-propynoic) acid, methyl and ethyl propiolate, 2-propenoic acid, methyl and ethyl propenoate, and mono- and dimethyl and ethyl fumarate. Maleic acid, methylmaleic acid, ethyl maleate, 2-methyl propenoic acid, *trans*-2-methyl crotonic acid, 3-methyl-2-butenoic acid, 3-methylallyl alcohol, vinyl crotonate, methylmalonic acid, dimethyl glutarate, 2,4-hexadien-1-ol, *cis*-3-hexenoic acid, 4-pentenoic acid, *trans*-2-pentenoic acid and

ethylidene acetic acid were less active. A more comprehensive study on the inhibition of toxin formation by *C. botulinum* in comminuted nitrite-free bacon was done by comparing equimolar quantities of some of these compounds with $NaNO_2$ at 120 μg/g and sorbic acid at 9 and 18 mM (0.10 and 0.20%). These studies showed that propiolic acid was more effective than either nitrite or sorbic acid. Compounds in this study less active than nitrite or sorbic acid were 3-methylallyl alcohol, 2,4-hexadien-1-ol, dimethyl glutarate and methylmaleic acid.

Fermentation of Bananas and Other Food Wastes to Produce Microbial Lipid, Bonita A. Glatz, Marion D. Floetenmeyer and Earl G. Hammond, Department of Food Technology, Iowa State University, Ames, Iowa 50011

J. Food Prot. 48:574-577

Candida curvata D, a lipid-accumulating yeast, was grown on a variety of carbohydrate-rich waste materials. *C. curvata* lacks the necessary enzymes to grow well on cellulosic materials, such as corncobs and oat hulls, but it grew well on materials rich in sugar, such as molasses and ripe bananas. Under controlled conditions in a fermenter, growth and lipid production were not very efficient on a molasses substrate. Ripe bananas supported good growth and lipid production and seem to be a promising substrate for fermentation to produce lipid.

Bacteriology and Weight Loss of Pork Carcass Treated with a Sodium Hypochlorite Solution, George C. Skelley, Gonzalo E. Fandino, J. Hutto Haigler and Rufus C. Sherard, Jr., Animal Science Department, Clemson University, Clemson, South Carolina 29631

J. Food Prot. 48:578-581

One hundred thirty-two pork carcasses were used with 36 of these receiving a wash with tap water and 96 receiving a wash with tap water plus 200 ppm of sodium hypochlorite. The first trial involved 16 carcasses measured for total aerobic psychrotrophs. A reduction ($P<.05$) in the bacterial level was found on those carcasses sprayed for 10 min with a 200 ppm sodium hypochlorite solution. Three additional trials involved 116 carcasses that were measured for degree of shrinkage after a 24 h chill. Shrinkage was reduced ($P<.01$) from a high of 2.46% for the controls to slight increases in weight for those treated for 30 min. Generally there was a linear relationship with reduction of shrinkage and length of spraying with a 200 ppm sodium hypochlorite solution.

Comparison of Three Methods for Estimating Surface Bacteria on Pork Carcasses, Joseph C. Cordray and Dale L. Huffman, Department of Animal and Dairy Sciences, Alabama Agricultural Experiment Station, Auburn University, Auburn, Alabama 36849

J. Food Prot. 48:582-584

Surface bacteria on skinned and scalded pork carcasses were evaluated using three different techniques: moist-swab contact (swab method), direct agar contact (Rodac method) and mylar adhesive tape (mylar method). The objective of this study was to investigate the feasibility of using one of the less expensive and quicker techniques as a tool for estimating microbial loads. Thirty-six pork carcasses were evaluated for surface contamination at four locations: ham, loin, shoulder and inside the thoracic cavity. Statistical analysis utilized the $\log_{10}$ of the number of observations per cm^2. For all four locations evaluated, there was a difference ($P<0.05$) between the swab and Rodac method. A significant difference was also observed between the swab and mylar methods; however, there was no significant difference between the Rodac and the mylar methods. The correlation coefficients between methods were: swab vs. Rodac (0.43), swab vs. mylar (0.46), and Rodac vs. mylar (0.62). These data suggest that the use of mylar adhesive tape is a good alternative method for estimating surface bacterial loads.

Microbial Flora of Cod Fillets (*Gadus morhua*) Stored at 2°C in Different Mixtures of Carbon Dioxide and Nitrogen/Oxygen, Inga-Maj Stenström, Department of Applied Microbiology, Chemical Center, University of Lund, P.O. Box 124, S-221 00 Lund, Sweden

J. Food Prot. 48:585-589

Cod fillets were stored in different combinations of carbon dioxide and oxygen/nitrogen at 2°C and the development of the microflora was studied during storage. The shelf life, expressed as the time for the microflora to reach 1×10^6 CFU/g, successively increased as the CO_2 concentration increased. No significant effects were noted whether oxygen or nitrogen was used together with CO_2 to comprise the gas mixtures. In 100% CO_2, the total aerobic count did not exceed 1×10^6 CFU/g during the storage period. The microflora of the fresh cod fillets consisted of *Flavobacterium* spp., *Alteromonas putrefaciens*, *Moraxella*-like organisms and *Pseudomonas* spp. After 6 d of storage in air, the total aerobic count had reached 5×10^7 CFU/g and the microflora was dominated by *A. putrefaciens* (62%) and non-fluorescent *Pseudomonas* spp. (28%). After 26 to 34 d of storage, *Lactobacillus* spp. and *A. putrefaciens* dominated the spoilage flora in the different gas mixtures and the total count amounted to 3×10^5 to 2×10^7 CFU/g. The ratio of *Lactobacillus* spp. at the termination of storage in the different gas mixtures increased in the order of air $<50\%CO_2/50\%N_2$ $<50\%CO_2/50\%O_2$ $<90\%CO_2/10\%N_2$ $<100\%CO_2$ $<90\%CO_2/10\%O_2$, whereas the ratio of *A. putrefaciens* decreased in the same order. Considering the technical difficulties in using an atmosphere at 100% CO_2 and the microflora developing during storage in the different gas mixtures, it is suggested that a suitable gas mixture for retail packages should be 50% CO_2/50% O_2.

Acid Equilibrium Development in Mushrooms, Pearl Onions and Cherry Peppers, William H. Stroup, Roger W. Dickerson, Jr. and Melvin R. Johnston, Food and Drug Administration, Division of Food Technology, 1090 Tusculum Avenue, Cincinnati, Ohio 45226

J. Food Prot. 48:590-594

Mushrooms, pearl onions, and cherry peppers were packed with either citric acid or acetic acid to determine the time required for the pH inside the particulates to decrease to 4.8 or less. The blanched products were packed into home canning jars, covered with acidified brine, and pasteurized in steam at 100°C. After storage at 25°C, pH measurements were taken on samples of drained brine, individual particulates, and a puree of all particulates. With acetic acid, equilibrium pH was achieved in approximately 1, 15, and 30 d for mushrooms, onions, and peppers, respectively. Longer times would be required to achieve equilibrium pH for each product with citric acid. The time required for the pH inside the particulates to decrease to 4.8 or less was a function of acid type, initial acid concentration, and the product being acidified. With sufficient acidulant to achieve an equilibrium pH of 4.6 or less, the time required for particulates of mushrooms, onions, or peppers to decrease to pH 4.8 or less was 7 d or less in all instances. Since studies (inoculated packs) of similar products have shown that a minimum of about 10 d is required for *Clostridium botulinum* growth at a pH of 5.0, the rate of acidification for these products was sufficient to prevent growth of *C. botulinum*.

Prevalence and Distribution of *Campylobacter jejuni* and *Campylobacter coli* in Retail Meats, N. J. Stern, M. P. Hernandez, L. Blankenship, K. E. Deibel, S. Doores, M. P. Doyle, H. Ng, M. D. Pierson, J. N. Sofos, W. H. Sveum and D. C. Westhoff, Meat Science Research Laboratory, ASI, Beltsville Agricultural Research Center, Agricultural Research Service, USDA, Beltsville, Maryland 20705

J. Food Prot. 48:595-599

Nine cooperating laboratories, distributed throughout the United States, determined the interlaboratory reproducibility of a sensitive, selective method for isolation of *Campylobacter jejuni* and *Campylobacter coli* from foods, and determined the prevalence and distribution of the organism in retail meats. A double-blind inoculated/recovery experiment demonstrated the ability to detect two cells of *C. jejuni* and *C. coli* per g of meat at a rate of 96% among the cooperating laboratories. However, a 7.5% false-positive rate for the presumptive detection of the organism was also reported. Samples of ground beef, beef flank steak, lamb stew meat, broiler chicken, pork sausage (without antimicrobials), and pork chops were selected to assess the presence of campylobacters. Each cooperator purchased five of each of the above samples from the refrigerated case of two retail outlets at quarterly intervals throughout the year. A total of 2,160 retail samples were analyzed for the presence of *C. jejuni* and *C. coli*. Results indicated that about 30% of the 360 chickens sampled yielded the organism. Analysis of 1,800 red meat products yielded campylobacters at a rate of about 5.1%. Pork samples yielded *C. coli* and other meats yielded *C. jejuni*. Higher numbers of isolations from the red meats were made during June and September (8.6%) as compared with December and March (4.2%). These results provide a baseline for the prevalence of campylobacters in these selected foods, and also support epidemiologic data associating mishandled foods of animal origin as a potential vehicle in human gastroenteritis.

Solutes that Protect *Staphylococcus aureus* against Heat-Induced Injury and Their Effect on Cellular Leakage, James L. Smith, Robert C. Benedict and Sharon M. Kalinowski, Eastern Regional Research Center, Philadelphia, Pennsylvania 19118

J. Food Prot. 48:600-602

A number of compounds including salts, sugars, polyols, and amino acids protected *Staphylococcus aureus* 196E from injury during heating; additionally, most of the compounds reduced or prevented heat-induced leakage of 260 and 280 nm absorbing materials from the cells. In the presence of polyols (sorbitol, mannitol, xylitol, or glycerol) or fructose, heated cells leaked more ultraviolet-absorbing materials than controls lacking solutes even though the solute-treated cells showed little or no injury. The ability of polyols and fructose to induce leakage of cellular constituents during heating of *S. aureus*, even though few injured cells were found, suggests that leakage from cells undergoing stress does not always indicate injury.

Prevalence of Coagulase-Positive *Staphylococcus* in Market Meats in Awka, V. C. Nwosu, Department of Industrial Microbiology, Anambra State University of Technology, Awka Campus, Awka, Anambra State, Nigeria

J. Food Prot. 48:603-605

Sixteen samples each of various beef parts including muscle, liver, kidney, heart, and intestines from a local market in Awka, Anambra State of Nigeria were analysed for presence of coagulase-positive *Staphylococcus*. A total of 80 meat samples was evaluated of which 54 samples or 67.5% had coagulase-positive staphylococci. The percentage of the various meat samples that had coagulase-positive staphylococci was 18.8% for muscle, 75% for liver, 68.8% for kidney, 75% for heart and 100% for intestinal samples. Muscle tissue had the lowest staphylococcal count log (1.65 - 2.97/g), whereas intestinal samples had the highest count (log 5.88 -6.97g). The organ meats had staphylococcal counts of log 3.10 - 4.89/g for liver samples, log 3.27 - 4.75/g for kidney samples and log 3.15 - 4.90/g for heart samples.

Enumeration and Reduction of *Campylobacter jejuni* in Poultry and Red Meats, Norman J. Stern, Paul J. Rothenberg and Jacqueline M. Stone, Meat Science Research Laboratory, Beltsville Agricultural Research Center, Agricultural Research Service, U.S. Department of Agriculture, Beltsville, Maryland 20705

J. Food Prot. 48:606-610

This paper compares alternative methods for enumerating *Campylobacter jejuni* in meat products, the optimal levels of blood supplementation for enrichment recovery of the organism from chicken and ground beef, and means to reduce or eliminate campylobacters from chicken through organic acid washes or freeze/thaw treatments. Direct plating onto Campy-BAP medium resulted in equivalent or greater recovery of *C. jejuni*, compared with MPN procedures using two media described in the literature. Subsequent studies employed direct plating, as it was also faster and simpler than the MPN procedures. Enum-

eration of enrichment cultures from a blood-containing selective enrichment broth indicated that optimal levels of blood supplementation for the recovery of campylobacters was dependent on the food investigated. Not only did 0% blood supplementation enhance recovery of the organism from inoculated ground beef, but 7% supplementation actually decreased the numbers recovered from this product. The requirement for blood supplementation was reversed when *C. jejuni* recovery from chickens was assessed. Significant increases were seen when 7% supplementation was employed as compared with either 1 or 0% blood in the enrichment broth. A freeze (-15°C)/thaw treatment of chicken carcasses reduced the numbers of *Campylobacter* detected by a factor of greater than 100. Finally, 0.5% of either lactic or acetic acid washes of chicken carcasses at 50°C reduced the numbers of *C. jejuni* present.

Quantitative Evaluation of a Bovine Antibiotic Infusion Product by Milk Residue Depletion Studies, Lyse Larocque and George A. Neville, Chemical Standards Division, Bureau of Drug Research, Health Protection Branch, Health and Welfare Canada, Tunney's Pasture, Ottawa, Ontario, Canada K1A 0L2

J. Food Prot. 48:611-615

Cows (six) were treated as for bovine mastitis by an intramammary infusion containing penicillin G, streptomycin, neomycin and polymyxin B sulfate. After termination of treatment, milk samples were drawn at intervals of 12 h and assayed for the antibiotics by standard techniques. Residues of penicillin, streptomycin and neomycin were found to persist beyond the milk withholding time of 96 h as stated on the label of the product. Streptomycin residue was found to persist in milk from 50% of the cows beyond 14.5 d, whereas no detectable level of polymyxin B was found in the milk samples. Manufacture of the formulation evaluated in this study was discontinued in 1983.

Characteristics of Acid-Injury and Recovery of *Staphylococcus aureus* in a Model System, Anne E. K. Zayaitz and Richard A. Ledford, Department of Food Science, Cornell University, Ithaca, New York 14853

J. Food Prot. 48:616-620

Injury and recovery characteristics of *Staphylococcus aureus* after exposure to acetic, hydrochloric, and lactic acids were studied. Cells of *S. aureus* were acid-injured at 37°C for 30 min in acidic isotonic saline solutions and were enumerated on Trypticase Soy Agar (TSA) and Trypticase Soy Agar with 7% NaCl (TSAS). A difference of at least 25% between counts on the non-selective (TSA) and selective (TSAS) media was considered evidence of acid injury. The activities of coagulase and thermonuclease were reduced in injured cells. The absence of leakage of 260/280 nm absorbing material from acid-injured cells, together with the absence of change in membrane fatty acids, indicated that membrane damage was not associated with acid injury. Inhibition of RNA synthesis was observed. During recovery, renaturation and synthesis of proteins, including enzymes and ribosomal proteins, occurred which then provided the intracellular conditions for subsequent growth.

Economic Loss from Foodborne Diease and Non-Illness Related Recalls Because of Mishandling by Food Processors, Ewen C. D. Todd, Bureau of Microbial Hazards, Food Directorate, Health Protection Branch, Health and Welfare Canada, Sir Frederick G. Banting Research Centre, Tunney's Pasture, Ottawa, Ontario K1A 0L2, Canada

J. Food Prot. 48:621-633

Costs relating to 17 foodborne outbreaks and 3 non-illness related recalls where 12 different types of processed food had been mishandled are presented and compared. Direct (easily measurable) costs amounted to a total of $578,497,352, with costs of individual problems ranging from $83,000 to $164,890,338 and a median average cost per case of $34,362. Some indirect costs were also determined; these include the value of pain, grief, suffering and death, and of loss of housekeepers' productivity and leisure time. The economic impact of a processed food problem is typically greater than that of a foodservice problem, although the latter occurs more frequently. The costs associated with foods that have resulted in more severe types of illnesses, such as botulism or typhoid, are invariably high, not only because of medical expenses but also because health control agencies perceive that risks for the population are great and public recalls must be made. Often this type of problem can involve a whole industry, e.g., the processing and marketing of canned corned beef, salmon or tuna where economic losses have measured $150 million or more.

Calendar

1985

July 13-20, RAPID METHODS AND AUTOMATION IN MICROBIOLOGY WORKSHOP, to be held at Kansas State University, Manhattan, KS. For more information contact: Jan Hurley, Conference Coordinator, 800-255-2757 (outside Kansas) or 913-532-5575 (in Kansas or outside the U.S.).

July 14-17, SECOND INTERNATIONAL CONFERENCE ON FOULING AND CLEANING IN FOOD PROCESSING (ICFCFP), to be held in Madison, WI. For more information contact: Daryl Lund, University of Wisconsin-Madison, Department of Food Science, 1605 Linden Drive, Madison, WI 53706. 608-262-3046.

July 15-17, TECHNIQUES IN MEASUREMENT WORKSHOP, to be held in Palo Alto, CA. For more information contact: Tragon Corporation, 365 Convention Way, Redwood City, CA 94063. 415-365-1833.

July 15-26, REFRIGERATION TECHNOLOGY FOR BAKERY MAINTENANCE ENGINEERS, to be held in Manhattan, KS. For more information contact: Mrs. Donna Mosburg, Registrar, American Institute of Baking, 1213 Bakers Way, Manhattan, KS 66502. Register by phone: Call Donna 913-537-4750 or 1-800-633-5137.

July 22-26, PRINCIPLES OF BAKERY PRODUCTION, to be held in Manhattan, KS. For more information contact: Mrs. Donna Mosburg, Registrar, American Institute of Baking, 1213 Bakers Way, Manhattan, KS 66502. 913-537-4750.

August 3-9, 1985 ANNUAL MEETING OF THE SOCIETY FOR INDUSTRIAL MICROBIOLOGY, to be held at the Westin Hotel, in Copley Place, Boston, MA. For more information contact: Mrs. Ann Kulback - SIM Business Secretary, SIM Headquarters, 1401 Wilson Boulevard, Arlington, VA 22209.

AUG. 4-8, IAMFES ANNUAL MEETING to be held at the Hyatt Regency, Nashville, TN. For more information contact: Kathy R. Hathaway, IAMFES, Inc., P.O. Box 701, Ames, IA 50010. 515-232-6699.

August 5-9, "BIOTECHNOLOGY: MICROBIAL PRINCIPLES AND PROCESSES FOR FUELS, CHEMICALS AND BIOLOGICALS," to be held at the Massachusetts Institute of Technology, Cambridge, MA. For more information contact: Director of Summer Session, MIT, Room E19-356, Cambridge, MA 02139.

August 19-30, IN-STORE BAKERY TRAINING PROGRAM, to be held in Manhattan, KS. For more information contact: Donna Mosburg, Registrar, American Institute of Baking, 1213 Bakers Way, Manhattan, KS 66502 913-537-4750.

August 25-30, 9TH SYMPOSIUM OF WAVFH. The World Association of Veterinary Food Hygienists (WAVFH) will hold their 9th Symposium in Budapest, Hungary. For more information contact: 9th WAVFH Symposium, Organizing Commitee, Mester u. 81, H-1453 Budapest Pf 13, Hungary.

September 9-12, ASEPTIC PROCESSING AND PACKAGING OF FOODS, sponsored by The International Union of Food Science and Technology Food Working Party of the European Federation of Chemical Engineering, to be held in Tylosand, Sweden. For more information contact: Ann-Britt Madsen, Kurssekretariatet, Lund Institute of Technology, P.O. Box 118, S-221 00 Lund, Sweden.

September 16-20, MAINTENANCE MANAGEMENT SEMINAR, to be held in Manhattan, Kansas. For more information contact: Mrs. Donna Mosburg, Registrar, American Institute of Baking, 1213 Bakers Way, Manhattan, KS 66502.

September 17-19, NEW YORK STATE ASSOCIATION OF MILK AND FOOD SANITARIANS, to be held at the Sheraton Inn, Syracuse, NY. For more information contact: D. K. Bandler, 11 Stocking Hall, Cornell University, Ithaca, NY 14853. 607-256-3027.

September 25-26, SIXTH ANNUAL JOINT EDUCATIONAL CONFERENCE, to be held at Valley Inn, Neenah, WI. For more information contact: Ron Buege, West Allis Health Department, 7120 West National Avenue, West Allis, WI. 414-476-3770.

September 30 - October 2, ADVANCED SANITATION PROGRAM, to be held in Chicago, IL. For more information contact: Shirley Grunder, American Institute of Baking, 1213 Bakers Way, Manhattan, KS 66502. 913-537-4750.

September 30 - October 11, IN-STORE BAKERY TRAINING PROGRAM, to be held in Manhattan, KS. For more information contact: Donna Mosburg, Registrar, American Institute of Baking, 1213 Bakers Way, Manhattan, KS 66502. 913-537-4750.

October 1-2, SOUTH DAKOTA STATE DAIRY ASSOCIATION CONVENTION to be held at the Ramada Inn, Sioux Falls, So. Dakota. For more information contact: Shirley W. Seas, Ex Secretary, Dairy Science Dept., So. Dakota State University, Brookings, SD 57007.

October 1-3, STORAGE LIVES OF CHILLED AND FROZEN FISH AND FISH PRODUCTS, to be held at The Conference Centre, University of Aberdeen, Aberdeen, Scotland. For more information contact: IIR Conference Organiser, Torry Research Station, PO Box 31, 135 Abbey Road, Aberdeen AB9 8DG, UK.

October 2-4, WORKSHOP IN FOOD FLAVOR: DEVELOPMENT, MANUFACTURE AND USE, to be held at the University of Minnesota, St. Paul, MN. For more information contact: Joanne Parsons, Office of Special Programs, 405 Coffey Hall, 1420 Eckles Avenue, University of Minnesota, St. Paul, MN 55108. 612-373-0725.

October 5-9, DFISA FOOD & DAIRY EXPO '85, to be held at the Georgia World Congress Center, Atlanta, GA. For more information contact: Bruce L. D'Agostino, Director, Public Relations, Dairy and Food Industries Supply Assoc., Inc., 6245 Executive Boulevard, Rockville, MD 20852-3938. 301-984-1444, Telex: 908706.

October 7-9, BIOTECHNOLOGY IN THE FOOD PROCESSING INDUSTRY, sponsored by the Department of Food Science and Nutrition, University of Minnesota. To be held at the University Radisson Hotel, Minneapolis, Minnesota. For more information contact: Lynette Marten, 405 Coffey Hall, 1420 Eckles Avenue, St. Paul, MN 55108. 612-373-0725.

October 8-9, SEMINAR ON NEW DAIRY PRODUCTS VIA NEW TECHNOLOGY, jointly sponsored by USNAC and IDF, Georgia World Congress Center, Atlanta. For more information contact: Harold Wainess, Secretary, U. S. National Committee of IDF (USNAC), 464 Central Avenue, Northfield, IL 60093. 312-446-2402.

October 14-18, ADVANCED BAKERY PRODUCTION, to be held in Manhattan, KS. For more information contact: Mrs. Donna Mosburg, Registrar, American Institute of Baking, 1213 Bakers Way, Manhattan, KS 66502. Register by Phone: Call Donna at 913-537-4750 or 1-800-633-5137.

October 21-23, STABILITY AND QUALITY CONTROL WORKSHOP, to be held in Palo Alto, CA. For more information contact: Tragon Corporation, 365 Convention Way, Redwood City, CA 94063. 415-365-1833.

October 21-26, 69TH ANNUAL SESSIONS OF THE INTERNATIONAL DAIRY FEDERATION AUCKLAND, NEW ZEALAND. For more information contact: H. Wainess, Secretary, U. S. National Committee of the IDF (USNAC), 464 Central Avenue, Northfield, IL 60093. 312-446-2402.

October 22-23, CALIFORNIA ASSOCIATION OF DAIRY AND MILK SANITARIANS ANNUAL CONFERENCE, to be held at the Clarion Hotel, 401 East Millbrae Avenue, Millbrae, California. For more information contact: Richard C. Harrell, Executive Sect/Treas, 1554 West 120th Street, Los Angeles, CA 90047.

October 21-25, 69TH ANNUAL SESSIONS OF THE INTERNATIONAL DAIRY FEDERATION, to be held in Auckland, New Zealand. For more information contact: H. Wainess, Secretary, U.S. National Committee of the IDF (USNAC), 464 Central Avenue, Northfield, IL 60093. 312-446-2402.

October 28-30, PCO RECERTIFICATION, to be held in Manhattan, KS. For more information contact: Shirley Grunder, American Institute of Baking, 1213 Bakers Way, Manhattan, KS 66502. 913-537-4750.

1986

AUG. 3-7, IAMFES ANNUAL MEETING to be held at the Radisson South, Minneapolis, MN. For more information contact: Kathy R. Hathaway, IAMFES, Inc., P.O. Box 701, Ames, IA 50010. 515-232-6699.

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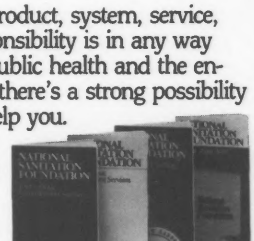

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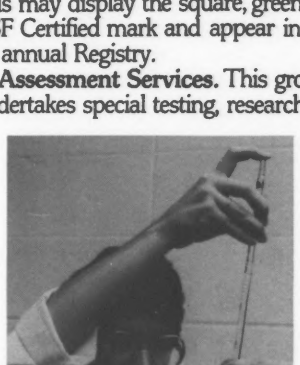

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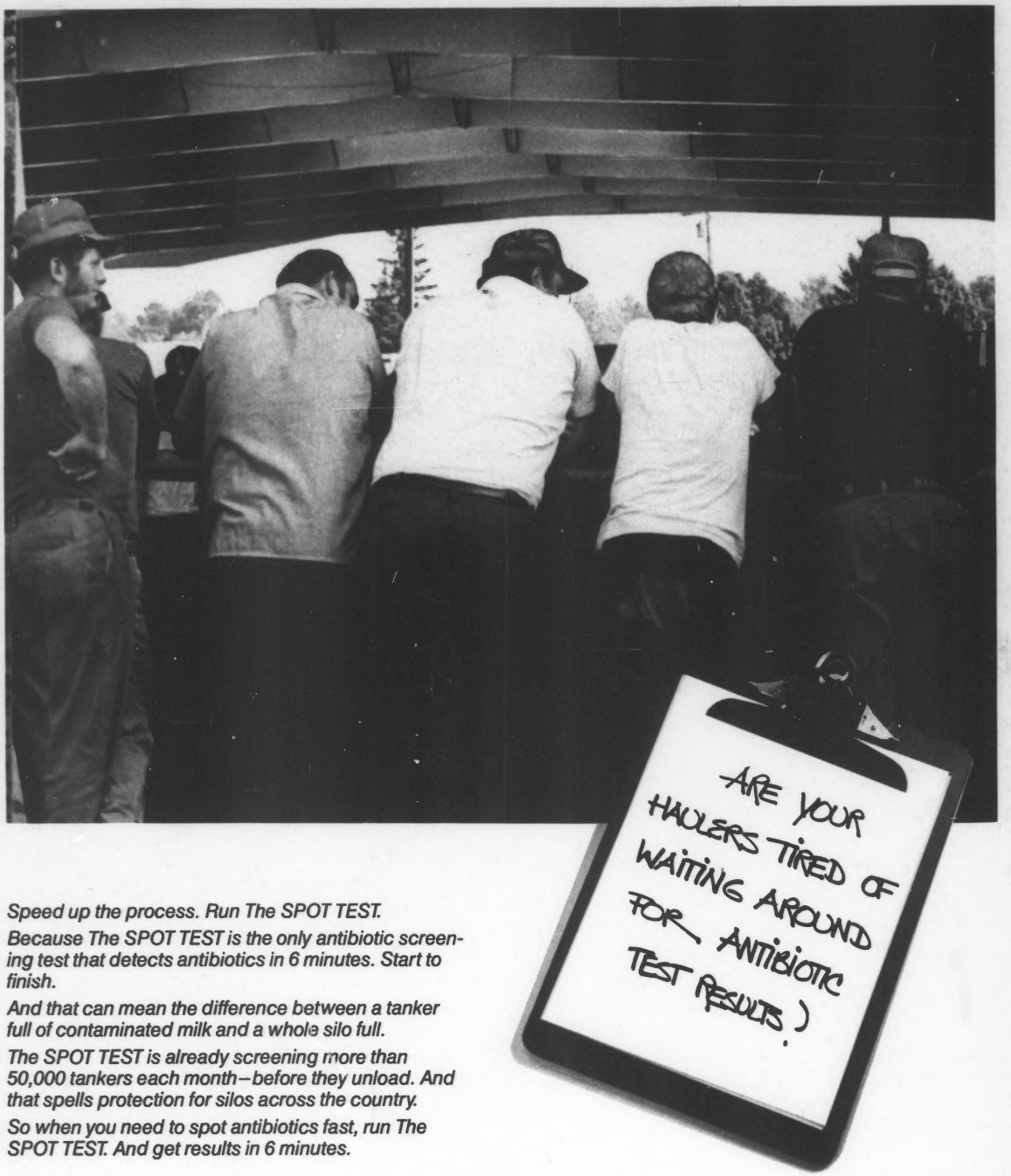

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