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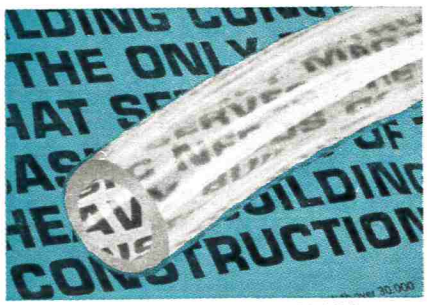

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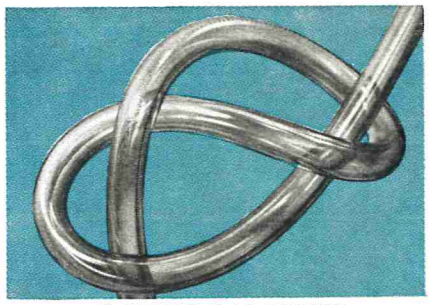

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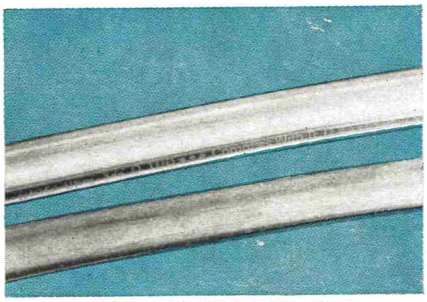

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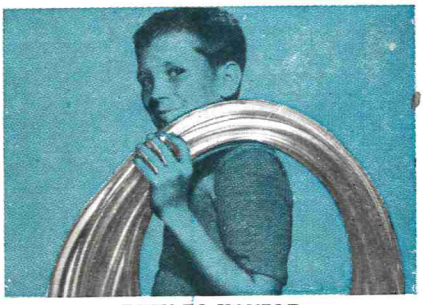

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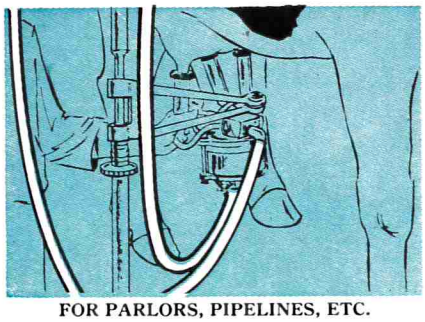

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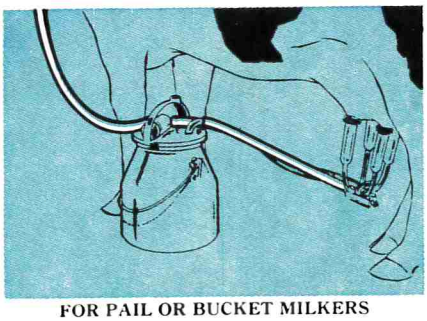

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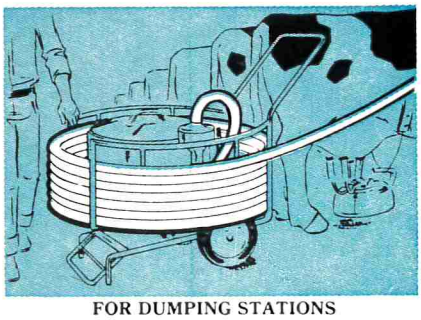

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DEEP WELL DISPOSAL OF INDUSTRIAL WASTES IN INDIANA[1]

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State Board of Health
Indianapolis, Indiana

The destruction of our water resources, both surface and subsurface, by contamination and pollution is a national problem that has attracted wide interest. Currently, the management of water sources and all of the ramifying implications are being studied by industry, local, state, and federal government agencies, colleges and universities, and the general public. This national demand for clean waters has required industry to investigate all potentially feasible methods of wastewater treatment and disposal.

Deep well disposal systems are a rather recent technique adopted by industry for wastewater disposal. For many years, however, the oil and gas interests have been utilizing return wells for increasing oil and gas field yields as well as for waste disposal. As of Juanry, 1966, there were seven industries in Indiana that operate deep well injection systems for the disposal of industrial wastewaters and one well is under construction. Recent approval has been given for three additional projects.

In 1957, the Indiana General Assembly amended the Indiana Stream Pollution Control Law for the purpose of including the subsurface water of Indiana within the jurisdiction of the Indiana Stream Pollution Control Board. Section 16 of the Stream Pollution Control Law *(3)* reads, in part, as follows: "Wherever the words water or waters shall be used in this act, they shall be construed to mean and include . . . underground water and any and all other surface and sub-surface water courses, underground reservoirs and basins . . . ."

This amendment to the Stream Law has been interpreted to mean that the Board shall have the authority to control and prevent the pollution of ground waters. Prior to 1957, no statutory authority for control of subsurface waste disposal existed other than the Rules and Regulations of the Division of Oil and Gas, Indiana Department of Natural Resources *(2)* and the Public Health Code of Indiana *(4)*. Currently, the Division of Oil and Gas continues to process the permits for subsurface disposal of salt water, sulfur-bearing water and other waste liquids resulting from oil and gas well drilling and production operations.

All projects for subsurface disposal of wastewaters, other than those resulting from oil and gas ventures, are required to be submitted to the Control Board for review and approval in accordance with Section 10 of the Stream Law *(3)*. Section 10 reads as follows: "That all plans and specifications for abatement or correction of any polluted condition shall be approved by the Stream Pollution Control Board. The Stream Pollution Control Board shall advise and consult, on request, with any person planning any correction or prevention of any pollution condition of any water of this State."

Since the 1957 amendment to the Stream Law, the Board has approved eleven industrial waste disposal projects which utilize deep well injection systems. Prior to 1957, only one known industrial waste disposal project utilized injection well techniques in Indiana. These systems utilize disposal horizons located between 70 feet and 6,160 feet below the earth surface. A brief description of these well operations follows.

Company No. 1. This company is located on the southern shore of Lake Michigan and its chief product is aluminum silica oxide catalyst. The plant's wastewater effluent is about 300 gpm and contains primarily sodium sulfate. Two injection wells about 1000 feet apart have been constructed for disposal of industrial wastewaters. The first well was developed in 1951 with a 295 foot deep disposal horizon and the second well was developed in 1953 with a 256 foot deep disposal horizon. The 256 foot deep well is utilized as an alternate or back-up facility to the 295 foot well.

The disposal horizon fluids, 50 mg/l of hydrogen sulfide and 4,000 mg/l of sodium chloride, had a higher concentration of salts than the industrial wastewater. Thus the company considered that the formation was a logical selection for waste injection. Since the contaminants are in solution and no reaction between the wastewater and the disposal horizon fluids was anticipated, the company did not provide pre-injection treatment.

Injection pressures are reportedly in the range of 50 psi. Continuous automatic monitoring of well head pressures is practiced to guard against forma-

[1]Based on a paper presented at the Annual Meeting of the Indiana Association of Sanitarians, Indianapolis, Indiana. October 7, 1965 and modified to include data available April 28, 1966.

tion failure. The company has not experienced any operating difficulties.

Company No. 2. This company is involved in government contract chemical production and its products are classified. Hundley and Matulis *(1)* reported in 1962 on the conception and development of this injection well system. The wastewaters have a pH of 10 or greater and between 1,000 to 2,000 mg/1 of suspended solids. The flow rate is approximately 100 gpm.

The Board approved the construction of a 6,160 foot deep well and the St. Simon formation was utilized as the disposal horizon. Fluids contained in the disposal horizon had the following analysis: pH, 4.9; Calcium, 2.2% (22,000 mg/l); Iron, 0.9% (9,000 mg/1); and Magnesium, 0.3% (3,000 mg/1). It was anticipated that a precipitate would form when the wastewaters and disposal horizon fluids mixed. Therefore, 2,000,000 gallons of buffer water was pumped into the disposal horizon prior to waste injection. Well head pressures are about 1,200 psi.

Pre-injection treatment consists of pH adjustment, sedimentation and filtration. Well head pressure and the specific gravity of the injected wastewaters are recorded to detect changes that might alter the usability of the well. The company has not experienced any operating difficulties.

Company No. 3. Food processing is the field of operation of this company and the well is used for the disposal of cooling waters. Operating data is as follows: Flow, 100 gpm; Contaminant, heat (80° F.); Well depth, 70 feet; Pre-treatment, none; and Well head pressure, 10 psi. The company has not experienced any operating difficulties.

Company No. 4. The field of operation of this company is chemicals and again the well is used for disposal of cooling waters. Operating characteristics are: Flow, 30 gpm; Contaminant, heat (75° F.); Well depth, 100 feet; Pre-treatment, none; and Well head pressure, 25 psi. The company has not experienced any operating difficulties.

Company No. 5. This company is engaged in the finishing of steel products and has about 60,000 gpd of waste pickling acid. The plant is located on the southern shore of Lake Michigan. The waste contains 6-10% sulfuric acid and 14-18% ferrous sulfate.

The injection well has a total depth of 4,300 feet and the injection tubing terminates at approximately 2,300 feet. The formation utilized is the St. Simon sandstone and well head pressures are about 100 psi at 275 gpm flow rate. Annulus fluids are monitored to protect against well failure. Pre-injection treatment consists of dilution to maintain ferrous sulfate and the company maintains surface neutralization facilities as an alternate in the event of well failure.

Formation fluids contained about 40,000 mg/1 of sodium chloride and between 6,000 to 7,000 mg/1 of calcium. Approximately 35,000,000 gallons of buffer water has been pumped into the disposal horizon. The company experienced an injection tube failure during the spring of 1965; however, all necessary repairs were made in less than 24 hours.

Company No. 6. Also engaged in the finishing of steel products, this company likewise has waste pickling acid that requires treatment. Approximately 1,000,000 gallons per month of 6-10% sulfuric acid and 14-18% ferrous sulfate wastes are generated. The plant is located on the southern shore of Lake Michigan.

The injection well has a total depth of approximately 4,300 feet, and the injection tubing terminates around 2,200 feet. The Mt. Simon formation is utilized and well head pressures are less than 800 psi at 100 gpm flow rate. Facilities similar to those utilized by Company No. 5 are installed for pollution control in the event of well failure. Formation fluids and buffer water injection procedures are similar to Company No. 5. The company has not experienced any operating difficulties.

Company No. 7. This steel products manufacturer utilizes two injection wells both similar to those of Companies No. 5 and No. 6 for the disposal of 6,500,000 gallons per month of waste pickling acids. The waste contains 8-37% sulfuric acid, 18-25% ferrous sulfate and 2-6% chromic acid. The plant is also located on the southern shore of Lake Michigan.

The disposal horizon is the Mt. Simon formation. Well depth is about 4,800 feet. The company will have safeguards for the well systems similar to Companies No. 5 and No. 6 with the exception that the second well will serve as a back-up facility for pollution control in the event of well failure. The company plans full-time operation of the disposal system in June, 1966.

Company No. 8. This company is engaged in the refining of oil and the plant is located in Posey County along the Ohio River. An injection well is used for disposal of 6,300 gallons per month of spent caustic containing 0.1 pound per gallon of sulfides and mercaptides of sodium and some phenol. The injection well has a total depth of 2,400 feet into the Hardinsburg formation. No pre-injection treatment is employed in the disposal system.

Company No. 9. The company is a medical clinic located in western Indiana and the well will be used for disposal of air conditioner cooling water. Operating characteristics are: Flow, 120 gpm; Contaminant, heat (103°F); Well Depth, 120 feet; and Pre-treatment, none.

Company No. 10. This milk processing plant is located in northern Indiana and the well will be used for disposal of refrigeration cooling water. Operating characteristics are: Flow, 10,000 gpd; Contaminant, heat (100°F); Well Depth, 100 feet; and Pretreatment, none.

Company No. 11. This is a chemical plant located in southern Indiana and the well will be used for disposal of 57,600 gpd of phenolic wastewater. The well will be 2,790 feet deep and the disposal horizon will be the Bethel Formation. All wastewater will be pretreated in a pressure-leaf filter and the pH adjusted prior to injection. Maximum well head pressures are calculated to be 1,050 PSIG. Standby facilities will consist of two 3-acre absorption lagoons.

The engineering staff of the Stream Pollution Control Board collaborates with geologists from the Indiana Department of Natural Resources and the Indiana Geological Survey to ascertain whether or not a prosposed injection well system will provide reasonable protection of ground resources. Only uncontaminated cooling water discharge is permitted in shallow formations.

Based on experiences with the above-described operations, the following conclusions can be made:

1. Deep well injection systems are being used successfully for disposal of certain types of industrial wastewater.
2. Pre-injection treatment consisting of pH adjustment, sedimentation and filtration may be required to maintain effective operation of the disposal system.
3. Shallow formations cannot be used for disposal of contaminated wastes.
4. The Mt. Simon formation appears to be the best formation for disposal of industrial wastewater in the state of Indiana.
5. No major operation difficulties have been encountered during operation of the disposal systems.

REFERENCES

1. Hundley, C. L. and Matulis, J. T., Deep Well Disposal. Proceedings of 17th Industrial Waste Conference, Purdue University, 1962.
2. Indiana Dept. of Natural Resources, Rules and Regulations Affecting Oil and Gas Operations, Chapter 277, Acts of 1947; amended by Chapter 137, Acts of 1951.
3. Indiana Stream Pollution Control Law, Chapter 214, Acts of 1943; amended by Chapter 132, Acts of 1945; and amended by Chapter 64, Acts of 1957.
4. Public Health Code of Indiana, Chapter 157, Acts of 1949, as amended; Sections 1750 through 1763.

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Triton DF-12 is recommended for use in rinse-aid and mechanical dishwashing detergents, spray metal cleaning formulations and detergent products where low foam at low operating temperature is desirable. This would include automatic floor scrubbing products and in-place pipeline cleaners. This surfactant has been available as a development product for approximately one year. As a result of its excellent performance, Rohm and Haas has added it to the line of Triton surface active agents.

Triton DF-12 is 100 percent active, has a mild odor and is light straw in color. The product is soluble in water and in most common solvents, including alcohols, aromatics, and chlorinated solvents. Triton DF-12 is stable in alkaline solution and in conventional acid-based detergent formulations.

For further information, write to the Agricultural & Sanitary Chemicals Department, Rohm and Haas Company, Independence Mall West, Philadelphia, Pennsylvania 19105.

KEEPING QUALITY OF DAIRY PRODUCTS OBTAINED AT RETAIL OUTLETS. I. LOW-FAT MILK, SKIMMILK AND CHOCOLATE FLAVORED MILK[1, 2]

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(Received for publication February 20, 1966)

Summary

A study was made of the bacteriological and keeping quality of low-fat milk, skimmilk, and chocolate flavored milk obtained at retail outlets. Approximately 62% of the low-fat milk samples, 81% of the skimmilk samples, and 93% of the chocolate flavored milk did not have a satisfactory flavor score (36.0 or higher) after storage at 40 ± 2 F for 14 days. The samples ranged in age from 0 to 15 days at time of purchase, the average age being 4.3 days (low-fat milk), 5.3 days (skimmilk), and 5.9 days (chocolate flavored milk). The average days kept at 40 ± 2 F after purchase was 9.5 days (low-fat milk), 7.4 days (skimmilk), and 5.9 days (chocolate flavored milk). Highly significant correlations were observed between: purchase age and initial flavor; days kept and SPC on purchase day, and days kept and SPC after 7 days' storage. The quality of products of an individual brand tended to be similar; whereas, significant quality differences were observed between brands.

Experimental Procedure

Sampling.

One-half gallon samples of low-fat milk and quart samples of skimmilk and chocolate flavored milk representing 12 brands and 9 commercial plants were obtained from supermarket-type retail outlets in Lexington, Kentucky, between August 1964 and September 1965. Samples were obtained from the front of the display case and taken immediately to the laboratory for examination. From the code numbers on the samples, processing dates were obtained from the plant managers.

Flavor evaluation and keeping quality.

All flavor evaluations were made by a panel of two or more judges experienced in the scoring of dairy products. Samples scoring below 36.0 were considered to be unacceptable. Samples were examined for flavor on the day purchased and after 4, 7, 10, and 14 days' storage at 40 ± 2 F. All flavor evaluations were made on the original container of milk.

Bacteriological examinations.

Official procedures *(1)* were used for standard plate counts (SPC) with incubation at 32 C, and coliform counts (CC). The samples were plated on the date purchased and again after storage for seven days at 40 ± 2 F.

Results and Discussion

Low Fat Milk.

Results obtained with the low-fat milk samples are given in Table 1.

Table 1. Keeping and Bacteriological Quality of Low-fat Milk Obtained At Retail Outlets[a]

Brand	Purchase age	Initial flavor	Days kept[b]	Total days kept[c]	Coliform count >10/ml		Standard plate count >30T/ml	
					0 days	7 days[d]	0 days	7 days[d]
	Average				Number of samples			
A	5.8	38.3	6.6	12.4	2	5	4	10
B	5.7	37.6	7.7	13.4	0	1	0	5
C	3.7	38.4	8.4	12.1	1	1	0	4
G	3.3	37.9	10.8	14.1	0	1	1	3
H	5.0	39.0	10.5	15.5	0	1	0	8
I	4.5	39.1	7.0	11.9	0	4	2	10
J	3.4	38.8	13.2	16.6	0	0	0	1
K	3.4	38.9	10.4	13.8	0	0	1	6
L	3.6	38.6	10.8	14.4	0	0	1	6
Avg	4.3	38.5	9.5	13.8	3.3	14.4	8.9	57.8

[a]Each brand sampled 10 times.
[b]From date of purchase.
[c]From date of processing.
[d]After seven days storage at 40 ± 2 F.

The samples ranged in age from 0 to 15 days at time of purchase, the average being 4.3 days. The average age of the individual brands at time of purchase ranged from 3.4 days (Brands J and K) to 5.8 days (Brand A).

[1]Published with the approval of the Director of the Kentucky Agricultural Experiment Station as Journal Article No. 66-6-18.

[2]Presented at the Annual Meeting of International Association of Milk, Food and Environmental Sanitarians, Hartford, Conn. Sept. 1965.

Initial flavor scores of the samples on the day purchased ranged from 36.0 to 40.0, the average being 38.5. The average initial flavor score of the individual brands ranged from 37.6 (Brand B) to 39.1 (Brand I). The main flavor defects found in the low-fat milk samples were: cooked, stale, unclean, feed, and "high fortification."

Considerable variation was observed in the keeping quality of the brands of low-fat milk. The average number of days kept after purchase ranged from 6.6 days (Brand A) to 13.2 days (Brand J), the average being 9.5 days. When all of the low-fat milk samples are considered together, approximately 0, 6, 21, 39, and 62% of the samples did not have an acceptable flavor score (36.0 or higher (after storage for 0 (day purchased), 4, 7, 10, and 14 days, respectively.

The variation in keeping quality among the brands is less when determined from date of processing (total days kept), than when determined from date of purchase (days kept). The difference in keeping quality is due to age of the product at time of purchase. In general, the keeping quality decreased with an increase in the age of the sample at time of purchase.

The bacteriological quality showed considerable variation among different brands and also among samples of the same brands purchased at different times. Three out of 90 samples had coliform counts >10 per ml on the day of purchase while 13 samples contained >10 per ml after 7 days storage. Eight samples had initial standard plate counts >30,000 per ml on the day of purchase, while 52 samples contained >30,000 per ml after 7 days storage. A number of samples which had initial SPC's <3,000 per ml spoiled after only 4 to 7 days storage. The primary spoilage defects were those associated with psychrophilic organisms.

Brand I which had the highest initial flavor had the poorest keeping quality. The poor keeping quality may have been due to the poor bacteriological quality of the product. All of the Brand I samples had SPC's >30,000 per ml after 7 days' storage. This is in contrast to Brand J which had the best keeping quality. Only one sample had a SPC >30,000 per ml after 7 days storage.

The linear correlations obtained for the low-fat milk samples are given in Table 4.

Highly significant correlations were observed between: purchase age and days kept (−0.48); purchase age and coliform count after 7 days' storage (0.30); purchase age and SPC after 7 days' storage (0.41); days kept and total days kept (0.83); days kept and coliform count on day of purchase (−0.35); days kept and coliform count after 7 days' storage (−0.38); days kept and SPC after 7 days' storage (−0.47); and total days kept and coliform count on day of purchase (−0.33). Significant correlations were not observed between: purchase age and initial flavor; purchase age and total days kept; purchase age and coliform count on day of purchase; purchase age and SPC on day of purchase.

Skimmilk.

Results obtained for the skimmilk samples are presented in Table 2.

The samples ranged in age from 1 to 13 days at time of purchase, the average being 5.3 days. The purchase age of Brand E was not known, since the milk containers were not coded. The average purchase age of the individual brands range from 2.5 (Brand J) to 6.9 days (Brand B).

TABLE 2. KEEPING AND BACTERIOLOGICAL QUALITY OF SKIMMILK OBTAINED AT RETAIL OUTLETS[a]

Brand	Purchase age	Initial flavor	Days kept[b]	Total days kept[c]	Coliform count >10/ml		Standard plate count >30T/ml	
					0 days	7 days[d]	0 days	7 days[d]
	Average				Number of samples			
A	5.6	37.7	8.9	14.5	1	1	1	6
B	6.9	38.6	9.1	16.0	0	1	2	7
C	5.0	38.7	8.0	13.0	0	3	1	7
D	6.8	38.4	7.0	13.8	0	0	1	8
E[e]	–	32.4	1.4	–	2	4	3	7
F	3.9	37.9	10.1	14.0	0	3	2	6
H	6.6	38.4	8.1	14.7	0	2	1	9
I	4.9	38.9	4.5	9.4	0	4	0	10
J	2.5	39.0	12.8	15.3	0	0	0	1
K	5.6	37.5	5.8	11.4	0	3	2	9
L	5.0	38.0	5.7	10.7	1	3	1	9
Avg	5.3	37.8	7.4	13.3	3.6	21.8	12.7	71.8

[a]Represents 10 samples per brand.
[b]From date of purchase.
[c]From date of processing.
[d]After 7 days storage at 40 ± 2 F.
[e]Processing dates not available.

TABLE 3. KEEPING AND BACTERIOLOGICAL QUALITY OF CHOCOLATE FLAVORED MILK OBTAINED FROM RETAIL OUTLETS[a]

Brand	Purchase age	Initial flavor	Days kept[b]	Total days kept[c]	Coliform count >10/ml		Standard plate count >30T/ml	
					0 days	7 days[d]	0 days	7 days[d]
	Average				Number of samples			
A	5.2	38.0	7.4	12.6	1	1	1	9
B	4.2	37.5	5.3	9.5	1	2	5	10
C	5.9	38.4	8.9	14.8	0	2	1	5
D	9.4	37.0	4.0	13.4	0	1	5	9
E[e]	—	35.9	5.3	—	1	3	3	10
F	4.8	37.8	5.4	10.2	3	6	3	8
H	6.9	37.9	7.9	14.8	1	1	3	10
I	4.8	38.0	4.0	8.8	1	3	3	10
J[f]	3.6	37.9	8.0	11.6	0	0	3	7
K	8.1	36.7	4.5	12.6	1	4	4	10
L	5.8	36.7	4.0	9.8	0	1	3	8
Avg	5.9	37.4	5.9	11.8	8.3	22.0	31.2	88.1

[a]Each brand sampled 10 times.
[b]From date of purchase.
[c]From date of processing.
[d]After seven days storage at 40 ± 2 F.
[e]Processing dates not available.
[f]Only sampled 9 times.

The flavor scores of the samples on the day of purchase ranged from 30.0 to 40.0, the average being 37.8. The average flavor score of the individual brands ranged from 32.4 (Brand E) to 39.0 (Brand J). The low flavor score for Brand E was due to oxidized flavor defects. Except for oxidized flavor observed in Brand E, the flavor defects were the same as those noted for low-fat milk. The average days kept ranged from 1.4 (Brand E) to 12.8 days (Brand J), the average being 7.4. The keeping quality of the skimmilk averaged 2.1 days less than that of the low-fat milk. When all skimmilk samples are considered, approximately 10, 16, 32, 60, and 84% of the samples did not have an acceptable flavor score (36 or higher) after storage for 0 (day purchased), 4, 7, 10, and 14 days, respectively.

The bacteriological quality of the skimmilk samples was not so good as that of the low-fat milk samples. The greatest differences existed in the higher number of samples having coliform counts >10 per ml and SPC's >30,000 per ml after 7 days storage. Four out of 110 skimmilk samples had coliform counts >10 per ml on the day purchased, while 24 contained >10 per ml after 7 days' storage. Fourteen samples had SPC's >30,000 per ml on day of purchase, while 79 samples contained >30,000 after 7 days storage.

Brand J, which had the best keeping quality for low-fat milk also had the best keeping quality for skimmilk. Brand I, which had the poorest low-fat milk keeping quality, also had the poorest skimmilk keeping quality. All of Brand I samples had SPC's >30,000 per ml after 7 days' storage.

Table 4 gives the linear correlations obtained for the skimmilk samples. Highly significant correlations existed between purchase age and initial flavor (−0.35); purchase age and days kept (−0.28); purchase age and total days kept (0.34); purchase age and SPC on purchase day (0.33); purchase age and SPC after 7 days storage (0.34); initial flavor and SPC on purchase day (−0.38); days kept and total days kept (0.81); days kept and SPC on purchase day (−0.41); days kept and SPC after 7 days' storage (−0.46); and total days kept and coliform count after 7 days' storage (−0.27).

When all skimmilk samples purchased from retail outlets are considered together, significant correlations were not observed between: purchase age and coliform count on purchase date and after 7 days' storage; initial flavor and SPC after 7 days' storage.

Chocolate flavored milk.

Results obtained for the chocolate flavored milk samples are given in Table 3.

The samples ranged in age from 1 to 15 days at time of purchase, the average being 5.9 days. The chocolate milk samples had a higher average purchase age than either the low-fat milk or skimmilk samples. The individual brands ranged in average purchase age from 3.6 days (Brand J) to 9.4 days (Brand D).

The initial flavor score of the chocolate milk samples were lower than those of the non-flavored milks. The flavor scores ranged from 30.0 to 39.0, the average being 37.4. Brand C had the highest average flavor score (38.4), while Brand E had the lowest score (35.9). The low flavor score for Brand E was due to oxidized flavor. The major flavor criticisms found were: unnatural chocolate flavor, too sweet,

TABLE 4. LINEAR CORRELATIONS FOR LOW-FAT MILK, SKIMMILK AND CHOCOLATE FLAVORED MILK SAMPLES PURCHASED AT RETAIL OUTLETS

	Initial flavor	Days kept	Total days kept	Coliform count on purchase	Coliform count after 7 days	SPC on purchase day	SPC after 7 days
				Low-fat milk			
Purchase Age	−0.05	−0.48**	0.08	0.11	0.30**	0.19	0.41**
Initial Flavor		0.26*	0.27*	−0.12	0.11	−0.23*	0.08
Days Kept			0.83**	−0.35**	−0.38**	−0.24*	−0.47**
Total Days Kept				−0.33**	−0.21*	−0.16	−0.27*
				Skimmilk			
Purchase Age	−0.35**	−0.28**	0.34**	0.04	−0.10	0.33**	0.34**
Initial Flavor		0.25*	0.03	−0.10	0.09	−0.38**	−0.06
Days Kept			0.81**	−0.21*	−0.21*	−0.41**	−0.46**
Total Days Kept				−0.18	−0.27**	−0.20	−0.24*
				Chocolate flavored milk			
Purchase Age	−0.28**	−0.35**	0.42**	−0.12	−0.10	0.38**	0.22*
Initial Flavor		0.47**	0.24*	0.04	0.06	−0.29**	−0.07
Days Kept			0.71**	−0.19	−0.18	−0.56**	−0.30**
Total Days Kept				−0.27**	−0.26*	−0.26*	−0.12

*Significant at 5% level.
**Significant at 1% level.

lack of flavor, burnt, coarse, and fermented. Ropiness was observed in several samples.

The keeping quality of the chocolate milk samples was poorer than that of the non-flavored milks. The average days kept ranged from 4.0 (Brands D, I, L) to 8.9 (Brand C), the average being 5.9. The total days kept was 2.0 days less than the low-fat milk samples and 1.5 days less than the skimmilk samples. The average total days kept ranged from 8.8 (Brand I) to 14.8 days (Brands C and H). When all the chocolate flavored milk samples are considered, approximately 5, 22, 45, 73, and 93% of the samples did not have an acceptable flavor (36.0 or higher) after storage for 0 (day purchased), 4, 7, 10, and 14 days, respectively.

The bacteriological counts of the chocolate flavored milks were much higher than those of the non-flavored milk samples. Nine out of 109 samples had coliform counts >10 per ml on day purchased, while 24 samples were >10 per ml after 7 days' storage. Thirty-four samples had SPC's >30,000 per ml on the day purchased, while 96 contained >30,000 per ml after 7 days' storage.

As was true of the other milk samples, Brand I had one of the poorest keeping qualities while Brand J, had one of the best. All of the Brand I samples had SPC's >30,000 after 7 days' storage.

Linear correlations for chocolate flavored milk samples are given in Table 4.

Highly significant correlations were found between: purchase age and initial flavor (−0.28); purchase age and days kept (0.35); purchase age and total days kept (0.42); purchase age and SPC on purchase day (0.38); initial flavor and days kept (0.47); initial flavor and SPC on purchase day (−0.29); days kept and total days kept (0.71); days kept and SPC on purchase day (−0.56); days kept and SPC after 7 days' storage (−0.30); and total days kept and coliform count on purchase day (−0.27). Significant correlations were not found between: purchase age and coliform count on day of purchase; initial flavor and coliform count on day purchased; days kept and coliform count on day purchased.

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THE APPLICATION OF PLASTIC CONTAINERS FOR PACKING AND PASTEURIZING MEAT OF THE BLUE CRAB *(CALLINECTES SAPIDUS)*[1]

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Summary

Sixteen-ounce portions of regular grade crab meat were packed and pasteurized in hermetically sealed rigid polypropylene "Indeplas" 307 x 400 containers. Meat from the metal and plastic containers was evaluated periodically for six months. The plastic containers gave overall product protection equal to the metal cans. Some brittleness was experienced with the plastic containers when handled roughly at refrigerated temperatures. Appearance and flavor evaluation of experimental and control samples within each treatment resulted in no significant difference until approaching four months storage. At four months and thereafter, the meat from the plastic containers appeared whiter and imparted a sweeter, more natural flavor than the control samples packed in metal containers. A preference was observed for appearance and flavor of meat processed at 185 F over that processed at 190 F. Above 190 F the meat exhibited a greyish cast and a slightly cooked flavor. Texture evaluation data indicated no significant change throughout the storage testing. Bacteriological examination indicated that the contents in both containers should be processed 110 min at 185 F for adequate pasteurization. The metal containers, due to their increased diameter, exhibited a slightly slower come-up time.

Pasteurized crab meat is processed in metal containers. The can serves the crab meat packers as an economical container able to withstand pasteurization and handling practices. Pasteurization of crab meat in metal containers was first investigated by Anzulovic and Reedy *(1, 2)* and later by Fellers *(4)* who packed an improved product with an increased shelf life during the early 1940's. In 1951, Byrd *(3)* patented a pasteurization method for short-term refrigerated storage of crab meat in cans that is presently quite widely used by the industry. During the past few years, increasing interest has developed in the use of plastic containers for the packaging of semi-perishable foodstuffs by the food industries. To date, it has not been common practice to pasteurize in the container.

This study was designed to determine the feasibility of using a molded plastic hermetically sealed container as a substitute for the tinned containers. To accomplish a satisfactory substitution, the plastic containers should exhibit material rigidity and thermal properties able to withstand processing, refrigerated storage, and shipping stresses; product protection equal to metal containers; suitable design for utilizing standard can sealing equipment in the closing operation; plastic material composition that is approved by the Food and Drug Administration; and cost comparable to the metal containers.

After preliminary examinations, an experimental "Indeplas" 307 x 400 container[2] was selected for final testing.

Experimental Methods and Procedures

Beginning September 1, 1964, 300 lbs of regular crab meat was test-packed in 16-oz containers and processed at two commercial packing plants and the Seafood Processing Laboratory. Two-thirds of the meat was packed in rigid "Indeplas" 307 x 400 containers and the remaining third in regular 401 flat metal cans as controls.

Hermetic sealing of all plastic containers was accomplished with 307 sanitary style can ends on a small motor-driven Dixie Sealer utilizing only the first closing operation. Later, additional containers were also sealed on a regular Canco closing machine. Top seaming specifications established at this laboratory for the "Indeplas" containers and utilized throughout testing were (1st operation used only):

	Dixie Sealer	*Canco Sealer*
Seam Width	.095 ± .002	.100 ± .002
Seam Thickness	.111 ± .004	.116 ± .004

All metal containers were sealed in accordance with the can manufacturer's specifications.

Each of the three facilities processed 100 lbs of crab meat, using their own processing methods and procedures. At both cooperating plants and the laboratory, the processing equipment was essentially the same. However, there were variations in processing methods.

At plant number one, the harvested crabs were cooked and refrigerated two days before they were picked and the meat processed. Pasteurizing was carried out in a steam-heated water bath, large enough to accommodate two retort baskets, and maintained at a temperature of 185-187 F. Containers were racked in the baskets and processed 105 min. The initial internal temperature was 38 ± 2 F and during processing attained a maximum of 179 ± 2 F as determined by a Brown portable potentiometer. Following pasteurization, the retort baskets were immediately transferred to a tank containing ice-cooled water at 54 F. The baskets and contents were held in the cooling tank for 85 min, at which time internal container temperature reached 64 ± 2 F.

In plant number two, the crabs were cooked the day prior to picking and processing. Equipment for pasteurizing was similar to that of plant number one except that a pasteurizing temperature of 190-192 F for 115 min was used. The

[1]Contribution No. 310. Natural Resources Institute, University of Maryland.

[2]Product of Independent Can Co., 900 S. Lakewood Avenue, Baltimore, Maryland.

initial temperature was 72 ± 2 F and reached 185 ± 2 F. Instead of the containers being racked directly into retort baskets, they were first put into covered bushel peach baskets before processing. The cooling cycle differed in that running tap water (61 F) was added to the cooling tank and discharged through an overflow pipe for 35 min, which brought the internal container temperature down to 128 ± 2 F. At this time, the containers in the bushel peach baskets were refrigerated until shipment to the laboratory for storage and testing.

The Seafood Processing Laboratory processed the third run using crabs cooked and refrigerated three days before being picked and processed. Processing was carried out in the same manner described for packer number one except that the processing time was 100 min at 185-187 F, with internal temperatures initially at 40 ± 2 F and reaching 180 ± 2 F. At the completion of the cooking cycle, the retort baskets were transferred to an iced cooling tank at a temperature of 37 F for 45 min. The internal temperature of the containers before transfer to mechanically refrigerated storage was 100 ± 2 F.

All samples were stored at the Seafood Processing Laboratory in a 33-35 F walk-in refrigerator for a period of six months. To ascertain the effect that light might have on the chemical decomposition of the crab meat fat components, one-half of the translucent plastic containers were wrapped in aluminum foil during storage; the other half were exposed to incandescent light as might be encountered in a retail market. When measured by a General Electric Foot Candle Meter Model 8DW20, the unwrapped containers were exposed to a 30-45 foot candle lumination for an average of two hours per day over the entire storage period.

Examination of samples in plastic and metal containers processed at 185 F for both 100 and 105 min exhibited bacterial growth exceeding Maryland Health Department standards. These standards specify a total absence of *Escherichia coli* and/or a bacterial count not to exceed 25,000/g. In the past, most commercial packers have pasteurized at 185 F for between 100 and 105 min, which was considered an adequate treatment for an extended shelf-life. However, recent examination of commercial samples has evidenced the existence of a bacillus type organism heretofore undetected. An inquiry among Atlantic Coast packers resulted in confirmation that they had experienced intermittent losses uncommon to the product over the past year. Therefore, tests were initiated at both plant number one and the Seafood Processing Laboratory to determine optimum corrective time-temperature relationships. After preliminary investigations, it was decided a new series of 25 containers, 15 plastic and 10 metal, should be processed at 185 F for 110 min at plant number one and evaluated.

Composite samples of the fresh crab meat were obtained in sterile bottles as the packing operations progressed. Bacteriological examinations of the fresh meat were conducted at both the Seafood Processing Laboratory and the Maryland State Department of Health Laboratory, using the latter's methods for Standard Plate Count, 25 C Plate Count, and *E. coli* most probable number per 100 g (*E. coli* MPN/100 g). Immediately following processing, and thereafter at six week intervals, the pasteurized meat was examined using the above mentioned testing methods.

In conjunction with bacteriological testing, sensory evaluations were conducted utilizing the nine point Hedonic Scale Rating System for determining statistical preference of appearance, texture, and flavor within each treatment *(5, 6)*. Panels were also conducted to determine a preference between treatments as there were variations in heat-processing and cooling cycle times and temperatures. A panel consisting of 8-10 members of the laboratory staff participated in the testing program.

Shipping tests were conducted twice by common carrier from Crisfield to Baltimore, the wholesale distribution market for most of Maryland's seafood, and return during the refrigerated storage period. As commonly practiced by industry, the filled plastic containers were packed in the regular "C" fluted waxed cardboard shipping cartons, iced with flake ice, and secured with a metal band prior to shipment.

RESULTS AND CONCLUSIONS

Evaluation of the data compiled during this study indicated that the rigid plastic container can be utilized as an appropriate substitute in which to package and pasteurize crab meat. There are certain categories which show the plastic to be slightly superior to the metal and others in which the metal has the advantage. During storage, the plastic containers provided a better general appearance and retention of flavor in the product. However, the metal container offered more product protection in processing and in shipment due to its rigidity.

The "Indeplas" containers exhibited excellent thermal conduction and stress qualities (Figure 1) during the pasteurization and cooling cycles. No leakers were evident when the top seal closing specifications were followed. However, there was a tendency for the plastic to exhibit some brittleness at prolonged refrigerated temperatures. Care should be exercised to avoid excessive rough handling.

Bacteriological examination showed (Table 1) that crab meat, packed in both metal and plastic containers, and processed at a bath temperature of 185 F for 105 min or less, spoiled over a two to four month refrigerated storage period. This meat (Packer No. 1 and No. 3) exhibited 14% and 24% losses, respectively. In the first instance, product spoilage encompassed only the metal containers, while in the latter spoilage appeared in both the metal and plastic containers. No attempt was made to ascertain the spoilage organism beyond that it is a rod-shaped, catalase +, aerobic, gram-variable sporeformer typical of the genus *Bacillus*. Over the entire testing period *E. coli* MPN/100 g examinations indicated an absence of this organism in the samples. When temperatures of 185-187 F for 110 min and 190-192 F for 115 min were used, no spoilage was detected. However, the meat processed at the higher temperature exhibited a greyish appearance and off-flavor. It is recommended that crab meat, pasteurized in this container size, should be processed at a minimum time-temperature of 185 F for 110 min, which complies with the pasteurizing recommendation of the Maryland State Department of Health *(7)*.

TABLE 1. COMPARISON OF PACKERS AVERAGE BACTERIAL TEST RESULTS

Code	Days storage	Packer 1 Time—105 min Temp.—185-187 F SPC/g	Packer 1 25 C/g	Packer 2 Time—115 min Temp.—190-192 F SPC/g	Packer 2 25 C/g	Packer 3 Time—100 min Temp.—185-187 F SPC/g	Packer 3 25 C/g	Final pack Time—110 min Temp.—185-187 F SPC/g	Final pack 25 C/g
CF[a]	0	$8.3x10^4$	$7.5x10^4$	$2.1x10^5$	$2.3x10^5$	$1.6x10^5$	$1.7x10^5$	—	—
PF[b]	1	<100	<100	<100	<100	<100	<100	<100	<100
P[c]	1	<100	<100	<100	<100	<100	<100	<100	<100
M[d]	1	$2.0x10^3$	$2.2x10^3$	<100	<100	<100	<100	<100	<100
PF	47	<100	<100	<100	<100	<100	<100	<100	<100
P	47	<100	<100	<100	<100	<100	<100	<100	<100
M	47	$1.2x10^7$	$1.4x10^7$	<100	<100	<100	<100	<100	<100
PF	103	<100	<100	<100	<100	<100	<100	<100	<100
P	103	<100	<100	<100	<100	<100	<100	<100	<100
M	103	$2.2x10^6$	$5.0x10^6$	<100	<100	<100	<100	<100	<100
PF	153	<100	<100	<100	<100	<100	<100	<100	<100
P	153	<100	<100	<100	<100	<100	<100	<100	<100
M	153	<100	<100	<100	<100	<100	<100	<100	<100
PF	205	<100	<100	<100	<100	$1.0x10^3$	$6.0x10^5$	<100	<100
P	205	<100	<100	<100	<100	$2.5x10^5$	$3.5x10^5$	<100	<100
M	205	$4.4x10^4$	$1.5x10^5$	<100	<100	$2.4x10^5$	$3.3x10^5$	<100	<100

[a]Composite Fresh.
[b]Indeplas 307x400 foil wrapped.
[c]Indeplas plain.
[d]Sanitary 401 Flat Cans.

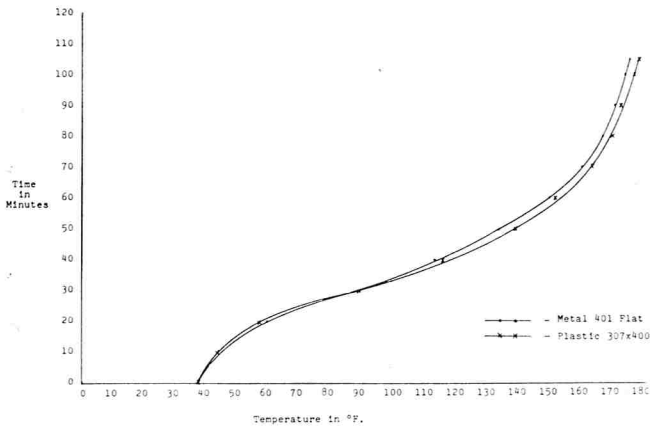

Figure 1. Typical Heat Penetration Plastic Vs. Metal.

Recommended initial temperatures should be within the 50-60 F range.

Sensory evaluation within each treatment over the six months period exhibited no significant difference between meat stored in metal and plastic until three and one-half months storage had elapsed. After this period, there appeared a significant difference (P-value = <.05) in appearance and flavor with the panel preference for meat stored in the plastic. The metal containers rendered a greyish tint to the meat along the side seam and imparted a slight metallic taste. Five and six month taste testing confirmed this observation, as the meat progressively acquired a more pronounced grayish cast and metallic off-flavor. Meat processed in plastic over the entire testing period maintained a more natural appearance and flavor. No significant difference in texture (P-value = >.05) was detected during storage.

When each of the 185 F treatments in plastic was compared with its counterpart at 190 F, there was a significant difference in both appearance and flavor (P-value = <.05). Again the meat processed at the lower temperature was preferred to that processed at 190 F. Panel comments indicated that the elevated processing temperature effected a greyish cast and slight cooked flavor in the meat, whereas the meat processed at 185 F possessed a more natural fresh crab meat appearance and flavor. No significant difference could be detected in the evaluations between the lower temperature treatments. Analysis of the texture data produced no difference between treatments.

Sensory and bacteriological testing over the storage period afforded no evidence of quality deviation because of the wide variation in each treatment's initial temperatures and those following the cooling cycles. Some of the differences which previously have been attributed to high processing temperature may be in part a result of these variations.

Foil wrapped plastic containers, as tested to determine the effects of light, showed no significant flavor difference when compared with the unwrapped containers. Presumably, the meat in the plastic containers should show no degradation when exposed to cold cabinet lights.

The filled plastic containers subjected to shipping tests, packed as described earlier, resulted in an absence of fractures. However, drop tests from as

low as three feet damaged the majority of these containers to the extent that they no longer afforded adequate product protection. Therefore, recognizing this factor of brittleness, the containers should be afforded the care exercised with glass containers such as milk bottles.

Since the termination of this project, further progress in the character of plastic composition has decidedly improved the undesirable brittleness. With this improvement, the plastic container is considered a more satisfactory substitute for the metal containers.

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TUBERCULOSIS IN MICHIGAN DEER PARKS– PUBLIC HEALTH SIGNIFICANCE[1]

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Human infection with bovine tuberculosis is today a medical rarity in the United States. This has not always been true. Fifty years ago a certain proportion of all human tuberculosis was a result of infection with *Mycobacterium bovis*, the tubercule bacillus having cattle its primary host. Human infection with this organism resulted mainly from ingestion of tuberculosis contaminated dairy products and from contact with tuberculous cattle. Bone and joint tuberculosis was a common characteristic of this type of the disease and the resultant tuberculous hunchback was not an uncommon sight.

There was ample opportunity for the human population to contract bovine tuberculosis as it was estimated in the early 1900's that about 5% of all cattle in the United States were tuberculous and that its prevalence was doubling every 15 years *(1)*. Further, in 1918 alone, nearly 50,000 tuberculous cattle carcasses were condemned as unfit for human consumption.

In 1917 the U. S. Department of Agriculture inaugurated a bovine tuberculosis eradication program that incorporated an intradermal tuberculin test and the slaughter of reactors to this test. This program is credited with reducing the incidence of tuberculosis in the U. S. cattle population from 5% in 1917 to 0.08% in 1965. In 1965 in the USA only 61 cattle carcasses were condemned due to tuberculosis on regular kill (i.e. other than reactors or suspects).

The ultimate goal of this program as indicated by its title is the complete elimination of bovine tuberculosis from the cattle population of the United States. This requires the elimination of the organism responsible for bovine tuberculosis not only from all cattle but also from all other living reservoirs of infection.

TUBERCULOSIS IN DEER PARKS

In the fall of 1962 a veterinary practitioner reported to the Michigan Department of Agriculture that he had diagnosed tuberculosis in a deer from a captive deer herd that had died after a chronic illness. The herd from which this animal came was composed of two deer species originally exotic to the United States but many generations of which had been raised in U. S. zoos and deer parks. This herd was a major feature of a privately owned roadside park that attracted large numbers of tourists during its short summer season. The Michigan and U. S. Departments of Agriculture were interested in this finding due to its possible threat to the cattle tuberculosis eradication program. Deer, however, are not included in the definition of livestock in the Michigan Department of Agriculture regulations and no investigation could be made without the cooperation of the owner. The owner in this case gave full cooperation and a testing program was undertaken which included intradermal tuberculin testing of deer, monkeys, llamas, aoudads, reindeer, and donkeys resident at this park *(2)*.

Nearly one third of over 200 deer tested were positive to the tuberculin test. No evidence of tuberculosis was found in any of the other species present. A concerted effort was made to eliminate the tuberculosis infection from the deer herd by conducting a series of tuberculin tests on the herd and removing all of the test reactors. Nearly half of these reactors were observed on post mortem examination to have tubercules in the lungs and many more had lesions of tuberculosis in other parts of the body.

Samples from many of these animals were examined by the Michigan State University Tuberculosis Research Project, and the causative organism was found to be *Mycobacterium bovis*. After conducting a number of tuberculin tests and slaughtering more than 70 reactors, chemoprophylaxis of the remainder of the herd was attempted. The herd was treated daily for two six-month periods with the drug isoniazid (I.N.H.). Periodic tuberculin testing since initiating chemoprophylaxis reveals that the disease has been successfully controlled and possibly eliminated from this herd.

Concern with this disease does not rest entirely with the Department of Agriculture's Animal Health Division. Conservation Department personnel should be concerned as all deer are quite susceptible to this form of tuberculosis. If this disease should become established in native deer herds, now free of this disease, serious losses could occur. Adverse climatic conditions, nutritional deficiencies, and the yarding or herding of deer in the northern states during the winter months creates an ideal environment for the

[1]This article is based on a slide presentation before the 22nd Annual Conference on Environmental Sanitation at Gull Lake, Michigan, March 1966.

spread of this disease should it be introduced. Once established in native deer, it would become a perennial disease problem.

PUBLIC HEALTH IMPLICATIONS

Of major concern to everyone is the public health implication of the occurrence of tuberculosis in groups of animals to which the public has close contact. A feature of many of these deer parks is the freedom the public is allowed to mingle with, pet, and feed the deer. Adults and children hand-feed deer sufficiently hungry and tame to nuzzle those visitors who are slow at offering food. This close contact presents an ideal situation for the transmission of the tuberculosis organisms from the deer to humans. It was mentioned earlier that nearly 50% of the reactors had tubercules in the lungs. Many of these lung lesions were "open," that is, communicating with the air passageways. Therefore, the tuberculosis organisms would be present in the saliva of these deer and available for transmission to human hand and mouth. An ideal condition for aerosol-respiratory transmission of organisms is also present.

The human population coming in contact with animals in similar parks is not small. Visitors to this one park in which tuberculous deer had been found numbered nearly 200,000 annually. There are about 30 parks in Michigan alone that have deer herds and there is an active exchange of animals between many of them, increasing the chances for spread of the disease. Before tuberculosis was discovered in this one herd, sales of many of its deer had been made to many other parks in Michigan and to parks in eight other states. Investigations have revealed that some of the deer herds in these parks had also become infected.

A major problem in controlling tuberculosis or any other disease in exotic species such as these deer, is the lack of health supervision. The Department of Agriculture in most states is limited to control of diseases in livestock, and deer generally are not included in the definition of livestock. The Department of Conservation in most states is generally limited to controlling the possession of species native to that state; so exotic species do not fall under their control. Local health departments do not act unless there is some indication of danger to public health. The insidious nature of tuberculosis prevents recognition of its presence except to those people closely connected with the herd and these people may have personal reasons for suppressing any evidence of trouble.

The machinery is already available within the Animal Health Division to conduct the tests necessary to establish the tuberculosis status of exhibition species with which there is a possible public or animal health hazard. It is neither advisable nor desirable to establish a compulsory testing program for all exotic animal species in parks and zoos. However, steps should be initiated to protect the gains made in tuberculosis control in both human and livestock populations by requiring tuberculin tests of those species with which the public is allowed to contact or which are allowed to contact domestic species of livestock.

REFERENCES

1. Amberson, J. B. 1966. A Retrospect of tuberculosis. Am. Rev. Resp. Dis. 93(3):343-351.

2. Towar, D. R., Scott, R. M., and Goyings, L. S. 1965. Tuberculosis in a Captive Deer Herd. Am. Jour. Vet. Res. 26(111):339-346.

SUMMER CONFERENCE ON "THE DEMANDS OF POLLUTION CONTROL LEGISLATION"

The Florham-Madison campus of Fairleigh Dickinson University announced today that it will hold its first Summer Conference on Control of Air and Water Pollution during August 22-26, 1966. The purpose of the conference is to review the effects of air and water pollution control legislation; the methods used to correct the problem—indicated, ideal and actual; the significance of the control measures; future trends; future requirements as seen in present and proposed legislation; local, state and federal laws; their impact on existing operations and their impact in generating new business and new profit opportunities.

This program comprises a week-long series of lectures by authorities in the fields of air and water pollution. Their lectures will cover the legislative, sociological, medical, technological and economic aspects of the problem of air and water pollution. Case histories will be presented to show actual and proposed solutions.

One day will be devoted to technical presentations by representatives of manufacturers of pollution control equipment to review the capabilities of available equipment and technology to meet pollution control requirements.

It will be possible for those who cannot attend the entire conference to participate in one or more days of the program. Room and board accomodations are available at the campus.

Further information and application forms may be obtained by contacting Dr. Souren Z. Avedikian, Director, Summer Conference, "The Demands of Pollution Control Legislation," Chemistry Department, Fairleigh Dickinson University, 285 Madison Avenue, Madison, New Jersey 07940.

QUESTIONS AND ANSWERS ABOUT 3-A SANITARY STANDARDS FOR DAIRY EQUIPMENT

THOMAS L. JONES

Dairy and Food Industries Supply Association, Washington, D. C.

Q. *What is a 3-A Sanitary Standard?*

A. A 3-A Sanitary Standard for Dairy Equipment is a voluntary standard, developed by conferees representing sanitarians, equipment fabricators, dairy processors, and the U. S. Public Health Service. It covers features of sanitary design for an indicated item of machinery or process.

Q. *Why is it called "3-A"?*

A. 3-A stands for *three associations*. In the 1920's, two trade associations and one professional association formulated uniform standards for fittings used on milk pipe lines. The trade groups are now known as Milk Industry Foundation and Dairy and Food Industries Supply Association; the professional group is now known as International Association of Milk, Food and Environmental Sanitarians. The standards for fittings evolved in those early days became popularly known as "3-A" standards. Since 1944, every major dairy processing group, suppliers and equippers, and the U. S. Public Health Service have taken part . . . but the results are still referred to as *3-A Sanitary Standards*.

Q. *Who develops a 3-A Sanitary Standard?*

A. Standards are formulated by the 3-A Sanitary Standards Committees—which meet together once or twice a year. They are:

1. The Committee on Sanitary Procedure of International Association of Milk, Food and Environmental Sanitarians.
2. The Sanitary Standards Subcommittee of Dairy Industry Committee, representing the following associations of processors—American Butter Institute, American Dry Milk Institute, Evaporated Milk Association, International Association of Ice Cream Manufacturers, Milk Industry Foundation, National Creameries Association and National Cheese Institute—and also representing the association of equippers and suppliers, Dairy and Food Industries Supply Association.
3. Representatives of the Milk and Food Program, Division of Environmental Engineering and Food Protection, B. S. S., U. S. Public Health Service.

Invited to a regular meeting of all the Committees, moreover, are representatives of *all* manufacturers of record (regardless of association affiliation) of equipment of the type or types under consideration there.

Q. *How are 3-A Sanitary Standards formulated?*

A. The primary suggestion for a 3-A Sanitary Standard may come from anyone—public health officials, dairy processors, or equipment manufacturers. The suggestion may be communicated to any of the groups participating in the 3-A program which will pass it on to the Executive Committee of the 3-A Sanitary Standards Committees. If the suggestion is considered by the Executive Committee to have merit and timeliness, it is passed on in due course to the Technical Committee of Dairy and Food Industries Supply Association. The Technical Committee appoints a Task Committee of representatives of all known manufacturers of the equipment involved in the suggestion. The Task Committee develops a tentative draft of a standard which is sent to the appropriate committees and officers of Dairy Industry Committee, International Association of Milk, Food and Environmental Sanitarians, and U. S. Public Health Service. It should be noted that in these and the subsequent stages of the formulation procedure DFISA does not act through, or as a part of, the Sanitary Standards Subcommittee of Dairy Industry Committee but separately as the medium through which the views of the equipment fabricators are presented. The three groups to which the tentative draft of a standard is presented by the DFISA Task Committee suggest changes—often many changes! Sometimes, they even request a complete re-draft of the tentative standard which they have received. Their suggestions and recommendations are returned to the DFISA Task Committee which adopts them or seeks a common ground for further consideration by all the groups of the matters that are involved.

Usually, many re-writings are necessary before a tentative standard is drafted which merits discussion at a meeting of the 3-A Sanitary Standards Committees. Frequently, even after a tentative sanitary standard has progressed that far, it may be sent back to a Task Committee for further

work. If the tentative standard is agreed to by all participating parties at such a meeting then it is formally approved by:

1. The Chairman of the Committee on Sanitary Procedure of International Association of Milk, Food and Environmental Sanitarians;
2. The Chief of the Milk and Food Program, Division of Environmental Engineering and Food Protection Services, B. S. S., U. S. Public Health Service;
3. The Chairman of the Sanitary Standards Subcommittee of Dairy Industry Committee; and
4. The Chairman of the Technical Committee of Dairy and Food Industries Supply Association.

Within a year, the 3-A Sanitary Standard is published in The Journal of Milk and Food Technology, and thousands of reprints are circulated to all persons involved. Additionally, copies of each 3-A Sanitary Standard are maintained on file in the national headquarters of the major trade groups, and are always available to any interested party.

Q. *For what equipment are there currently 3-A Sanitary Standards?*

A. The basic published 3-A Sanitary Standards are listed below. In addition to those listed by serial number, there are innumerable revisions, amendments and supplements not shown here.

Serial No.	Title	Publication Date
0101	3-A Sanitary Standards for Storage Tanks for Milk and Milk Products (Amended)	5/47
0203	3-A Sanitary Standards for Pumps for Milk and Milk Products, Revised	8/63
0300	Sanitary Standards for Weigh Cans and Receiving Tanks for Raw Milk	9/47
0400	Sanitary Standards Covering Homogenizers and High Pressure Pumps of the Plunger Type	1/49
0501	Sanitary Standards for Stainless Steel Automotive Milk Transportation Tanks for Bulk Delivery and/or Farm-Pick-up Service (Amended)	9/54
0700	Sanitary Standards for Seamless and Welded Tin-Coated Can-Type Milk Strainers	1/50
0800	Sanitary Standards for Fittings Used on Milk and Milk Products Equipment and Used on Sanitary Lines Conducting Milk and Milk Products	7/52
0900	Sanitary Standards for Thermometer Fittings and Connections Used on Milk and Milk Products Equipment	3/50
1000	3-A Sanitary Standards for Milk and Milk Products Filters Using Disposable Filter Media	9/50
1100	3-A Sanitary Standards for Plate Type Heat Exchangers for Milk and Milk Products	1/52
1200	3-A Sanitary Standards for Internal Return Tubular Heat Exchangers for Use with Milk and Milk Products	11/52
1301	3-A Sanitary Standards for Farm Milk Cooling and Heating Tanks (Revised)	6/60
1400	3-A Sanitary Standards for Inlet and Outlet Leak Protector Plug Valves for Batch Pasteurizers	1/54
1500	3-A Sanitary Standards for Manually Operated Bulk Milk and Milk Products Dispensers, Multi-Service Milk Containers and Dispensing Mechanisms	9/55
1600	3-A Sanitary Standards for Milk and Milk Products Evaporators and Vacuum Pans	7/57
1700	3-A Sanitary Standards for Fillers and Sealers of Single Service Containers for Milk and Fluid Milk Products	7/62
1800	3-A Sanitary Standards for Multiple-Use Rubber and Rubber-Like Materials Used as Product Contact Surfaces in Dairy Equipment	1/63
1900	3-A Sanitary Standards for Batch and Continuous Freezers for Ice Cream, Ices and Similarly-Frozen Dairy Foods	1/63
2000	3-A Sanitary Standards for Multiple-Use Plastic Materials Used as Product Contact Surfaces for Dairy Equipment	4/64
2200	3-A Sanitary Standards for Silo-Type Storage Tanks for Milk and Milk Products	10/64
2300	3-A Sanitary Standards for Equipment for Packaging Frozen Desserts, Cottage Cheese and Milk Products Similar to Cottage Cheese in Single Service Containers	10/64
2400	3-A Sanitary Standards for Non-Coil Type Batch Pasteurizers	12/64
2500	3-A Sanitary Standards for Non-Coil Type Batch Processors for Milk and Milk Products	12/64
2600	3-A Sanitary Standards for Sifters for Dry Milk and Dry Milk Products	3/65
	3-A Accepted Practices for Permanently Installed Sanitary Product-Piepelines and Cleaning Systems	3/66
	3-A Accepted Practices for Supplying Air Under Pressure in Contact with Milk, Milk Products and Product Contact Surfaces	4/64
	3-A Accepted Practices for the Sanitary Construction, Installation, Testing and Operation of High-Temperature Short-Time Pasteurizers	6/58
	3-A Standard Method for Determining the Holding Time of High-Temperature Short-Time Pasteurizers by Means of the Salt Conductivity Test	9/50

In addition to the foregoing, over a dozen tentative sanitary standards are pending action by the 3-A Committees. Some of these are for new standards, and others provide for amendment, revision, or supplements to published 3-A Standards. The pending projects relate to the following subjects:

New Tentative Standards
Dry Milk Fillers
Milk Driers
Butter Equipment
Vacuum Flavor Chambers

Sterile Milk Processing Systems
Cleanability

Amendment, Revision, or Supplement to:
Sanitary Fittings
C-I-P Pumps
HTST Practices
Air Under Pressure Practices
Farm Tanks
Storage Tanks
Evaporators

Q. *How can a prospective buyer or inspecting sanitarian determine whether a piece of equipment complies with existing 3-A Sanitary Standards?*

A. There are two possible ways: (a) the buyer or sanitarian can look for a 3-A Symbol, which may be affixed by the manufacturer to equipment now covered by existing standards, provided the manufacturer has received authorization from the 3-A Sanitary Standards Symbol Administrative Council; or (b) if the symbol is not readily discovered he can inquire of the equipment manufacturer whether the equipment does comply with the existing pertinent 3-A standard, and he can obtain copies of the relevant standard or standards against which to carefully check the equipment himself.

Q. *What is the 3-A Sanitary Standards Symbol Administrative Council?*

A. (Note: This body is frequently referred to as "The 3-A Symbol Council.") The 3-A Symbol Council authorizes the use of the 3-A Symbol on complying equipment. It also acts appropriately in an unlikely instance of abuse of the Symbol's purpose. Of its eight members, four are representatives of International Association of Milk, Food and Environmental Sanitarians; two are representatives of processors, chosen by the Sanitary Standards Subcommittee of Dairy Industry Committee; and two are representatives of equipment manufacturers, chosen by the Technical Committee of Dairy and Food Industries Supply Association. C. A. Abele, 2617 Hartzell Street, Evanston, Illinois, currently is Secretary-Treasurer of this body.

Q. *How does the 3-A Symbol Council proceed?*

A. Under carefully developed by-laws it:

1. Receives and processes applications from equipment manufacturers desiring to use the 3-A Symbol,
2. Grants authority for the use of the 3-A Symbol on dairy equipment which is acceptably certified by the manufacturer to comply with applicable 3-A Sanitary Standards,
3. Publishes the names of manufacturers to whom, and for which types of equipment, such authority has been granted,
4. Investigates, and takes appropriate action, in instances of alleged improper or unauthorized use of the 3-A Symbol.

Q. *What does the 3-A Symbol look like?*

A. Like this:

Q. *What is the procedure to be followed in obtaining permission to use the 3-A Symbol?*

A. This is the procedure to follow:

1. Manufacturers desiring to apply the 3-A Symbol to their equipment will request from the Secretary of the Council the proper application forms which contain detailed instructions for each manufacturer to follow.
2. Application can then be made for authorization to use the 3-A Symbol. A separate application is made for each type of equipment on which it is desired to place the symbol. Each application must be accompanied by full data and sworn certification, and also by an initial annual fee for the authorization ($25.00 for each type of equipment).
3. Within thirty days of receipt of applications which are in order, authorization for use of the 3-A Symbol will be issued. This authorization will be valid for one year.
4. Authorizations may be renewed four times without re-filing applications, except in the event that the existing 3-A Sanitary Standards have been amended; in that case, a new application must be filed.
5. Names of manufacturers to which authorizations have been issued are published bi-ennially in a special section of the Directory of the

Dairy and Food Industrial Exposition. Thousands of re-prints of this section are subsequently distributed to regulatory officials, educational institutions, industry purchasing agents and all other interested parties who request it.

Q. *Once a 3-A Sanitary Standard has been developed, does that mean that no further sanitary refinements in it are possible, probable or expected?*

A. No! As sanitary science, equipment designing and manufacturing efficiencies and dairy processing techniques advance, 3-A Sanitary Standards may be amended or modified at any time, through the same channels of procedure along which the original standard has taken form. Naturally, in a vital, living field of industry, science and technology, progress is a constant goal. Progress causes, or comes from, change. The 3-A Sanitary Standards are not limiters of progress.

Q. *Has the 3-A program proved its worth?*

A. Yes. 3-A Standards are cited in the Milk Ordinance and Code of the U. S. Public Health Service. In addition, in the Standards for the Manufacture of Frozen Desserts, recommended for adoption by state regulatory agencies by the U. S. Department of Agriculture, 3-A Standards for milk house equipment, HTST practices, plastic and rubber like materials, and all new equipment are specifically required.

Q. *If a person desires more information about specific aspects of the 3-A Sanitary Standards for Dairy Equipment program, where should he turn?*

A. To the headquarters of any national dairy industrial trade association; or, more specifically, to C. A. Abele, Secretary-Treasurer of the 3-A Symbol Council, 2617 Hartzell Street, Evanston, Illinois, on matters relating to the use of the 3-A Symbol; to the Secretary of the Technical Committee of Dairy and Food Industries Supply Association, 1145 19th Street, N. W., Washington, D. C. 20036, on matters pertaining to equipment design or fabrication; and to the Executive Secretary of International Association of Milk, Food and Environmental Sanitarians, P. O. Box 437, Shelbyville, Indiana, to purchase published copies of existing 3-A Sanitary Standards.

LETTER TO EDITOR

2184 Braeside Avenue,
Ottawa 8, Ont.
June 1, 1966

Editor, Journal of Milk & Food Technology:

During recent months several papers have been published in the Journal dealing with the relative value of various tests for determining the bacteriological quality of farm bulk tank milk supplies. In each case, arbitrary count standards have been chosen for each test on the basis of their being equal in terms of the percentage of samples exceeding these values, and the interrelationships between such samples studied. From such studies conclusions are then drawn concerning the relative value of the suggested standards, alone and in various combinations. The soundness of the conclusions drawn may be open to question, however. The purpose of running a bacteriological test on raw milk is presumably to detect deviations from good sanitary conditions and practices. Yet in none of these studies is any indication given as to the relative value of the various tests in this regard.

With the widespread use of farm bulk tanks, there is increasing recognition that the results obtained with the SPC on a fresh sample of milk may be misleading. The large volume of milk passing through milking machines and other equipment so dilutes the bacterial contamination that the SPC may be well below 10,000/ml even when the equipment is obviously unclean! If such conditions are to be detected, it would seem necessary to subject the sample to Preliminary Incubation (PI) to encourage the growth of these contaminating bacteria. While this will not show up all cases of insanitary conditions and/or practices, the experience of a number of producers' organizations and plants has been that the SPC with PI is much superior to the fresh SPC in doing so. Regardless of whether the SPC is low — even below 10,000/ml — a high count following PI indicates a failure in the sanitation program. Surely this is what we as sanitarians should be interested in, rather than whether or not the sample will meet the lenient standards suggested in recent papers.

There is growing evidence that with equipment in good physical condition, properly cleaned and sanitized, it is no problem to produce milk with a low SPC even after PI. At the University of Vermont, milkers receive a bonus if counts remain below 5,000/ml after PI! This suggests that present standards in most areas are so lenient that they can be met by even an indifferent producer who makes half an effort. Should not consideration be given to establishing standards stiff enough to challenge the good producer, and cause the indifferent one either to improve his practices or to get out of milk production?

C. K. Johns

THE PROBLEM OF RABIES CONTROL[1]

Animal rabies is definitely on the rise in the United States. There were more than 4,700 laboratory-confirmed cases nationwide in a broad variety of animals in 1964 (the last year for which figures are available), an increase of about 16 percent over the previous year.

Rabies is one of approximately 60 human diseases known to be caused by a virus. Unlike many of the viral diseases, the rabies virus remains largely an unknown quantity. What *is* known is that the virus attacks the central nervous systems and if not arrested causes the death of its victim.

The most common carriers of the rabies virus have been dogs, but more and more frequently wildlife such as foxes, skunks, racoons, and, most frightening of all, bats, have become the transmitting agents of the ancient disease. The latter mammals, nocturnal and ordinarily harmless by nature, may yet live up to their literary reputation as symbols of ghoulish terror. And this is what concerns the public health authorities.

Bats have been shown to be true carriers of the rabies virus, that is, they are capable of transmitting the disease to other wildlife (or humans) without themselves becoming ill. There are untold numbers of bats inhabiting caves and grottoes in the United States. At the famous Carlsbad Caverns of New Mexico a standing tourist attraction is the departure of uncounted millions of bats from the caves to hunt the night through for food, returning at first light to roost for another day in the blackness of the caves' interiors.

Awesome as the spectacle is as an example of nature's mysterious rhythm of life and incredible fecundity, it is even more awe-inducing as a possible public health problem. Who knows what contacts the bats make during their nightly search for food? A bitten fox made rabid attacks a cow or dog or skunk which, in turn, driven to a frenzy characteristic of the more common rabies virus, attacks a farmer, a rural boy waiting for the school bus, a farm housewife collecting her mail or a camper beaching his canoe. The ramifications of a single bite are frightening. Multiplied by the millions, they give anxiety to the most conservative experts.

A Long-Time Enemy

From the medical records of the ancients, we know that the scourge of rabies long has been known to man. Though many classical physicians and medical men accurately "diagnosed" rabies, even noting the victim's customary refusal to take water (because of inability to swallow)—which causes the disease to sometimes be called "hydrophobia."

It wasn't until the late 19th century that protection against it became practical. The great French chemist, Louis Pasteur, becoming convinced after experimentation that the disease could be prevented by vaccination, had the opportunity to inoculate a nine-year-old victim of dog-bite with a specially prepared "serum" and thus save the child's life. Until this day, the Pasteur treatment has remained the principle agent against rabies after the putative victim has been bitten. However, it is far from perfect. Bites by rabid animals directly to the head or neck, i.e., close to the center of the nervous system are not infrequently unaffected by the Pasteur treatment. Then, too, the treatment, a series of injections over a two or three week period, is expensive and in some cases dangerous. Some reactions to the Pasteur treatment have been known to result in encephalomyelitis, an inflammation involving both the brain and spinal cord and, ultimately, death.

However, it has been responsible for saving many lives and rabies, untreated or ignored, is invariably a fatal disease. A heartening note is that improved vaccines are under development.

Though perhaps an obvious and overly simple statement, the best protection against rabies is the eradication of the disease itself. In an editorial some years ago, the *American Journal of Public Health*, commented "The ultimate solution to the rabies problem is predicated on the control and eventual elimination of the disease from the animal population." Several nations of the world have accomplished just that. Among them are England, Australia, New Zealand, Norway, Sweden, and Denmark.

What Is Rabies Like

The rabies victim not only suffers intensely, but is a harrowing sight as he sinks into a coma and eventual death. Rabies is passed ordinarily from animals to man by a bite from the rabid animal. Uusually, the rabies symptoms develop within two weeks to three months after the bite has been incurred. However, if the bite has been on the head or face and is of a severe nature, symptoms may manifest themselves in as few as ten days. With slight wounds the incubation period is longer and has been known, though rarely, to have been delayed a year or even longer.

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[1]From an American Veterinary Medical Association press release, March, 1966.

Rabies is not an inevitable result of a bite from an infected animal. The fact is that less than 20 percent of the individuals exposed to the disease contact it. But that, of course, is not the point. No one knows who will develop rabies and who will not, thus making inoculation of all exposed persons vital. Once symptoms appear there is no known cure. Persons with bites on the face or hands have been shown, statistically, to be more vulnerable to the disease than those with wounds inflicted upon other parts of the body. Children, naturally and most tragically because of their carefree and casual habits, are its most frequent victims. It has been estimated that 60 percent of rabies-induced fatalities are youngsters.

There are two types of rabies—so-called "dumb" and "furious" rabies with the latter being the more common. At first, dogs infected with the virus will act strangely, that is, there will be a departure from normal habits. Either the animal will be unnaturally withdrawn or abnormally attentive. Following this stage, which lasts only a couple of days, the dog will have an irresistible tendency to wander far afield. And it is then that the damage is done for it is during this period of roving that he is "mad." The dog will bite humans or animals at will thus infecting them with the fatal virus. It is also during this period that the animal appears to be frothing at the mouth, the familiar symbol of the "mad" or rabid dog. Actually, the animal's appearance is not caused by undue salivation, but to an accumulation of the saliva due to difficulty in swallowing. When the roving is over, the animal comes home to die. Returning to his familiar haunts, he finds an isolated place to suffer his final paroxysms, lapse into a paralytic state, and die.

"Dumb" rabies differs in that there is no roving or "mad" period. Paralysis, usually of the lower jaw, is the first recognizable symptom. This soon spreads to the limbs and vital organs resulting very shortly in death.

Human beings, since rabies principally attacks the central nervous system, experience the same spasms of moody depression or abnormal excitement in the early stage. Later, as the disease secures its hold, the hapless victim endures seizures of pain, an often maniacal fury, a dread of water or liquid, and an extreme sensitivity to alterations of temperature, light, and surroundings. Frequently, it is necessary to keep the advanced rabies patient under sedation. Finally, in most cases, paralysis and coma quiet the victim until death ends his misery.

What To Do If Bitten

It should be emphasized that everyone bitten by domestic or wild animals need *not* undergo antirabic treatment. If the bite or scratch has been inflicted by an animal obviously not rabid or demonstrating any sign of rabies, the treatment is not necessary.

At the same time, there are several situations in which the antirabic treatment is imperative. Obviously, if the bite has come from an animal known to be suffering from rabies or has certain suggestive symptoms, the treatment should be commenced at once. Also, treatment is mandatory if the animal causing the injury has been killed or is otherwise unavailable for observation and diagnosis.

Ideally, according to the American Veterinary Medical Association, the animal, be it a dog or whatever, should be apprehended, confined, and placed under the care and supervision of a veterinarian. For about two weeks it will be treated normally and if no rabies symptoms manifest themselves and it remains well otherwise, it can be released and the matter forgotten.

If, however, rabies symptoms appear, the veterinarian will have the animal destroyed in such a manner as not to damage the brain. The head is then dispatched to a laboratory to be examined for the presence of "Negri bodies" in the brain tissue as they are considered certain evidence of rabies. When to begin the antirabic treatment depends on the individual situation and the advice of the supervising veterinarian and attending physician.

Control and Elimination

Though horrible in its ramifications and impervious to cure, rabies not only can be controlled, it can be eliminated. Many persons each year are inconvenienced, to say the least, by having to take antirabic vaccinations. Sometimes farm animals have to be destroyed and many pets needlessly die. Yet all of this could be prevented.

Control is domestic animals is not very complicated and once established not very difficult to maintain. But it takes determination and cooperation especially on the part of pet owners.

Many localities not only require that dogs be licensed but vaccinated against rabies as well. The AVMA unequivocally supports the vaccination program and urges all pet owners to have their pets vaccinated whether or not required to do so by local ordinances. Veterinary medical scientists have developed vaccines which are safe and effective and offer maximum protection against rabies. Every dog three months of age or older should be vacinnated. Three-month old puppies should be re-vaccinated in six months. Generally, all dogs should be vaccinated once a year. A veterinarian is the best source of information on the necessary frequency of vaccination for a pet. Vaccination is in no way harmful to the animal.

The AVMA further recommends strict observance of local rabies control regulations and local leash and licensing laws. Also, all pets should be identified by a license tag and a rabies inoculation tag, stray dogs should be reported to the police or local pound, and if bitten by an animal, the victim should contact his physician immediately and report the injury to the local board of health or police department.

At its 102nd annual meeting in Portland, Oregon, in July, 1965, the AVMA's house of delegates adopted a model rabies control ordinance which could well serve any community as a guide. The ordinance would require dogs to be vaccinated for rabies, the impoundment of rabies suspects and of all other dogs lacking a valid rabies vaccination tag. It also sets forth provisions for the handling of dogs bitten by rapid animals.

INFORMING THE PUBLIC

However, there is one problem which cannot be solved by legislation and that is the need of the public for more education concerning the care of pets. Pet owners should be fully informed about the laws of their community; they should also understand that these laws are intended to protect rather than to restrict. Local dog clubs, particularly obedience training clubs, are often willing to put on demonstrations that emphasize the advantages of good care and training. Often the most aggressive and vociferous agitators, on both sides of a question, are persons who are the least well informed or who are prejudiced on a particular issue.

Of particular interest is the increasing occurrence of rabies in wildlife and the resultant relationship to outdoor recreation. Recurring outbreaks of rabies among animals such as bats, skunks, and foxes and their transmission of the disease are major problems in attempting to control rabies in the United States.

Sylvatic (bat) rabies, as it is termed by the experts, is on the increase. Furthermore, it is difficult to control. Avoiding overpopulation of wildlife is, of course, an obvious method but it, too, presents many difficulties. Nevertheless, ways can and will be found enabling science to finally master this ancient scourge.

FOOD TECHNOLOGY MARCHES FORWARD[1]

Advances in food processing and packaging during the past few years portend the arrival of a variety of new items aimed toward greater convenience-in-use as well as improvement in variety and quality. Frozen foods have reached an annual volume of 9 billion pounds compared to about 21 billion pounds for canned foods. "Boil-in-the-bag" and similar items which retain fresh flavor and require only heating in boiling water prior to serving, are enjoying wider consumer acceptance.

Modern techniques which have shown promise and are coming into more extensive commercial use are a modified system of high-temperature, short-time processing (at 250 F and 18 lb. above atmospheric pressure); continuous foammat drying of citrus, tomato, and other juices; extremely low-temperature (−320 F) freezing of such foods as avocadoes, tomato slices, melons, and sea foods; and improved methods of volatile essence recovery in the concentration of fruit products.

The added cost of new processing and packaging methods is only partially offset by the lower freight and handling costs. It remains for the market place to decide how much the public is willing to pay for improvements in quality, convenience, and year-round availability. That not all new products succeed is indicated by the estimate that in 1964 the loss in product failures amounted to $3.25 billion. This, however, should be considered in the light of the fact that the food industry in the U. S. has reached an annual volume of $117 billion.

[1]From *Food and Drug Research,* April, 1966, a publication of Food and Drug Laboratories, Inc., Maspath, N.Y.

BILL HICKEY TO BE EDITOR OF HOND

William V. Hickey, formerly Assistant Editor of the *Health Officers News Digest,* has been named Secretary of The Public Health Committee of the Paper Cup and Container Institute and editor of HOND.

Bill joined the Institute as Field Consultant of the Public Health Committee in 1957. He was previously with the Salt Lake City and Utah State Health Departments.

As Secretary, he is replacing Howard E. Hough, who has joined the staff of the Health and Welfare Assn. of Allegheny County, Pittsburgh, Pa. Prior to joining the Institute staff six years ago, Mr. Hough had served as Chief of the Bureau of Health Education in the Illinois Dept. of Public Health, Springfield.

Bill is past president of IAMFES and has long been active in Association affairs.

EDUCATIONAL MATERIAL REVIEWED BY DAIRY FARM METHODS SUB-COMMITTEE

As indicated in the 1965 report of the Committee on Dairy Farm Methods, the Subcommittee on Education under the chairmanship of Vernon D. Nickel, St. Louis, Mo. Division of Health, contacted extension services of state universities, state departments of agriculture and state and local health departments to request for review all available brochures, pamphlets, bulletins and papers on subjects of interest in the dairy farm field. Ultimately some 200 publications were received covering such topics as in-place cleaning of pipe lines and bulk tanks, mastitis control, rancidity problems and inhibitors in milk.

Most of these publications are considered useful as educational material to persons having various responsibilities in the production and sanitary control of milk and milk products. In order to enhance the distribution and use of this material, some of the pamphlets and bulletins selected by the subcommittee have been abstracted for this issue of the Journal with information on the source of publication. The original date of publication is given if available. Additional material will be reviewed in subsequent issues of the Journal.

Vermont Dairy Field Service Manual

This is a mimeographed loose-leaf compilation of material including check-lists for equipping and operating a milkhouse, trouble shooting procedures for fieldmen, basic requirements for a farm water supply, selection and use of cleaning compounds, and a simplified discussion on dairy bacteriology. There is also a reprint of an article, "Is Your Bulk Tank Showing Signs of Age."

In addition to this Manual is a Circular 130 entitled "Clean Milking Equipment", a 12-page publication which presents in outline form the step-by-step cleaning and sanitizing of milking machines, bulk tanks and pipelines and includes recommendations for a well-equipped milk house. Attractive illustrations are utilized.

Material was prepared by the Vermont Extension Service, University of Vermont, Burlington. 1960-1962.

Missouri Publications on Mastitis and Components of Milk

The first brochure of four pages entitled "Detecting Mastitis on the Farm" briefly reviews the application and use of the California Mastitis Test on the farm, the test procedure and interpretation of results. Benefits of the test program are listed and recommendations are made for good milking practices to support the program.

The second is a four-page issue of the M. U. Science and Technology Guide covering the topic "The Components of Milk—Variation, Measurement and Value." The bulletin reviews factors influencing the content of butterfat, protein, lactose, minerals and solids-not-fat and discusses the degrees of variation of content and the disease and physiological disorders which may affect the variation. The bulletin concludes with a discussion of the comparative market values of milk components, market trends and attendant problems of production.

The bulletins were published by the Extension Division of the University of Missouri, Columbia. 1962-1964.

The Milking Machine and Mastitis

This eight-page brochure emphasizes that defective milking machines and poor milking procedures are major causes of mastitis. The proper operation of a milker unit is covered in some detail and significant steps to follow in assuring good operation are enumerated. Careful preparation of the cow before milking and other practices to avoid milking injuries are underscored. A simplified check list for machine operation and maintenance is provided.

The Agricultural and Home Extension Service of Pennsylvania State University at University Park published this brochure. 1962.

Antibiotics in Milk

"Antibiotics in Milk" is Circular No. A-356 issued by the Exension Service of North Dakota State University at Fargo. It is a three-page brochure on the hazards of promiscuous use of antibiotics and suggests effective and proper methods of administering treatment. Alternate mastitis prevention programs are recommended. This publication is in condensed form for use as a producer mailing piece. 1964.

Relative Cleanability of Various Stainless Steel Finishes

This 36-page booklet is a collection of four research reports based on studies conducted to determine the relative cleanliness of Type 302 stainless steel with 2B, 3, 4 and 7 finishes as encountered in the dairy

industry. Following development of a laboratory technique, an evaluation of these finishes was made on farm bulk milk tanks, a plate heat exchanger (HTST unit), a pasteurizing unit and steel dispenser milk cans. In addition, stainless steel tubing with finishes approximating No. 2, 4 and 7 finishes were evaluated in both hot and cold milk handling systems.

It was concluded from the studies that the influence of other factors of cleanability is much more important than the effect of finish.

The booklet was prepared by the Michigan Agricultural Experiment Station, Michigan State University, East Lansing. 1960-1961.

MASTITIS—ITS PREVENTION AND CONTROL

In this well-illustrated pamphlet of 16 pages the anatomy of the udder, causes of mastitis, mastitic agents and treatment are discussed in layman's language. The function of milk-let-down, the importance of managed milking and the mechanics of milking are covered in some detail. Common defects of milking equipment are enumerated and a preventive mastitis program is summarized.

This Bulletin No. 188 is a publication of the University of Maryland Extension Service at College Park, Maryland. 1962.

ADDITION OF DAIRY SANITATION CHEMICALS TO MILK

A 22-page booklet entitled "Some Aspects of Milk Quality After Addition of Dairy Sanitation Chemicals" reviews the results of intentional adulteration of milk samples with various chemicals including chlorine, quaternary ammonium compounds, iodine products, cleaner-sanitizers, general farm cleansers and household detergents. Methods of testing are outlined and effects from various concentrations on flavor and bacteria reduction are shown. Among the conclusions drawn were that scented household detergents can present a serious flavor problem even when present in limited degree and that residues from normal use of iodophors are not likely to cause an iodine flavor.

The booklet was issued by the Agricultural Experiment Station, University of Vermont at Burlington. 1962.

LYE-SOLUTION STORAGE OF MILKING MACHINE RUBBER INFLATIONS

Two Michigan State University publications deal with the removal of fat from rubber parts of milkers and the comparative effectiveness of dry versus lye-solution storage methods. The first is a five-page reprint of an article summarizing studies made in storing rubber milking machine inflations under actual field conditions. Both natural and synthetic inflations were utilized. The advantages of storage in a 5% lye solution over dry storage was demonstrated.

The second publication is in the form of a mailing piece and briefly describes the problem to dairymen of absorption of butterfat in rubber parts. A wet storage procedure using an affective lye solution is described and a method for making up a solution is outlined.

These are publications of the Cooperative Extension Service of Michigan State University at East Lansing. 1959-1956.

MASTITIS HANDBOOK OF THE OKLAHOMA STATE MASTITIS CONTROL COMMITTEE

A 23-page mimeographed handbook on mastitis has been prepared for distribution by the Oklahoma State Mastitis Control Committee to dairy fieldmen, county agents, vocational agricultural teachers, health officials and dairy equipment dealers. After a brief discussion of the causes and characteristics of mastitis, the publication covers such topics as general management of cattle and facilities, practices pertaining to the cow in the milking stall, practices concerning equipment and methods and procedures for mastitis screening tests. The stated purpose of the publication is to make available pertinent information from research in agriculture, home economics and related fields.

The handbook is distributed by the Oklahoma Agricultural Extension Service, Oklahoma State University, Stillwater. 1963.

MILKING MANAGEMENT AND ITS RELATION TO MILK QUALITY

A rather complete treatise on milking management to control mastitis and to improve milk quality, this 64-page booklet opens with a discussion on mastitis, its economic importance, its effect on milk, its causes and recognized treatment. Then follows an explanation of the California Mastitis Test and its purposes and benefits as a part of a regular control program.

Chapters are devoted to principles of milking and a comprehensive and well-illustrated discussion of the various milking systems now utilized. Factors to consider in selecting a suitable system are covered in some detail. A step-by-step method of analysis of milking systems is offered with a sample

check sheet for recording test data and for interpretation of results.

The booklet concludes with a section on milking maintenance including a check list for inspection and upkeep and a general section on dairy sanitation covering selection and proper use of detergents and sanitizers, care of milking equipment, rubber parts and vacuum lines and the cleaning of pipelines and bulk tanks.

The Agricultural Extension Service at the University of California at Davis is the publisher of this booklet. 1964.

THE CONNECTICUT MASTITIS PROGRAM

A series of six four-page bulletins have been released by the Extension Service of the University of Connecticut at Storrs. The first bulletin discusses mastitis from a dairyman's standpoint and describes the Connecticut program designed to aid the milk producer in the control and eradication of mastitis. The second bulletin offers recommendations for herd management which should be incorporated in a sound mastitis control program.

Sanitation practices are discussed in the next circular and the adverse effects of poor sanitation are pointed out. Proper care of the cows before milking and the need for sanitary milking methods are emphasized. The milking machine and actual milking practices in their relation to causes and control of mastitis are the areas covered by the fourth and fifth bulletin.

Treatment of mastitis is the subject of the final issue in the series. It is pointed out that although treatment alone is not the answer to the problem, it does have a definite place in a comprehensive mastitis control program. However, the producer is cautioned against the wholesale introduction of antibiotics when a flare-up occurs.

The attractive bulletins are prepared in the form of letters to the dairyman and provision is made for the signature of the county agricultural agent.

CLEANLINESS—THE BIGGEST STEP TOWARD QUALITY MILK

This 11-page pamphlet is designed to emphasize the importance of cleanliness in the production of high quality milk and basic steps are given in a recommended farm sanitation program for dairymen serving either the Grade A or manufacturing market. Topics covered include herd health, water supply and waste disposal, design and operation of the milking barn and milkhouse, selection of equipment, the importance of cooling, and proper methods of cleaning and care of milking equipment, pipelines and bulk tanks. Selected illustrations support the text.

The bulletin is distributed by the Cooperative Extension Service of Iowa State University at Ames. 1962.

ASSOCIATION AFFAIRS

HTST PRACTICES REVISED BY 3-A COMMITTEES

Recommended 3-A HTST practices now extend to the processing of ice cream mix and dry milk, as well as fluid milk, as a result of a revision of the practices approved in Oklahoma City, May 12, at a regular meeting of the 3-A Sanitary Standards Committees. Previously the 3-A Accepted Practices on HTST construction, installation, testing and operation covered HTST technology only as it applied to fluid milk.

The revision also recognizes advancing technology by including reference to flavor control chambers in the sections dealing with fluid milk applications. This was the first revision of the HTST Accepted Practices since their adoption by the 3-A groups in 1958. The revised practices will be published in *The Journal of Milk and Food Technology* before the end of the year.

More than 75 persons attended the 3-A sessions, representing makers of dairy equipment, dairy processors, and sanitarians and regulatory personnel. The meeting was chaired by Dean Stambaugh, Hawthorne-Mellody Farms Dairy, Inc., in his capacity as Chairman of the Sanitary Standards Subcommittee of Dairy Industry Committee.

Also approved at the Oklahoma City meetings was a brief amendment to the 3-A Plastic Standard to include Nylon 6 as a new generic class of plastics for which acceptable test values have been established. Other tentative standards considered related to those for driers, and dry milk fillers, as well as tentative amendments to the 3-A Sanitary Standards for fittings, farm tanks, and evaporators, and practices for air under pressure.

The 3-A program for dairy equipment is the result of cooperation among three groups: (1) dairy processors, the users of dairy equipment; (2) dairy

industrial suppliers and equippers, the manufacturers and sellers of dairy equipment; and (3) public health officials and sanitarians, the regulatory officials under whose jurisdiction the equipment is installed and used.

The 3-A program, which is supported by every national dairy trade association, is an entirely voluntary undertaking which has resulted in standards' being issued for 26 items of dairy industrial supplies or equipment. Equipment which complies with the standards may carry the 3-A Symbol, provided its manufacturer received authorization to do so from the 3-A Symbol Council.

Generally speaking, 3-A standards and practices are acceptable in public health jurisdictions in nearly every town, city or state in the United States. 3-A Sanitary Standards and Practices are cited in the Grade A Pasteurized Milk Ordinance of the U. S. Public Health Service.

ILLINOIS MILK SANITARIANS HOLD SPRING CONFERENCE

The Associated Illinois Milk Sanitarians held its 24th Annual Spring Conference on May 9, 1966 at beautiful Pheasant Run Lodge near St. Charles, Illinois. More than 250 members and guests were present.

The program was opened by an interesting discussion of the highlights of the 1965 Grade A Pasteurized Milk Ordinance by W. R. McLean of the Chicago Regional office of the Public Health Service. "Mac" reviewed some of the new developments under the ordinance. Dr. James Harper of Ohio State University utilized a series of slides to stress the significance of psychrophylic organisms and their effect on the shelf life of milk and certain dairy products.

Folowing luncheon W. B. Peterson, Director of Marketing for the Illinois Agricultural Association, gave an enlightening talk on trade possibilities for the dairy industry in the Far East and other foreign areas. Mr. Peterson was a member of a recent trade mission to the Far East under the auspicies of Illinois Governor Kerner.

In the afternoon session Erwin P. Gadd of the Missouri State Board of Health reviewed problems involved in interstate milk movements. Dr. E. W. Speckman of the National Dairy Council in Chicago presented some interesting facts and follies about fat diets.

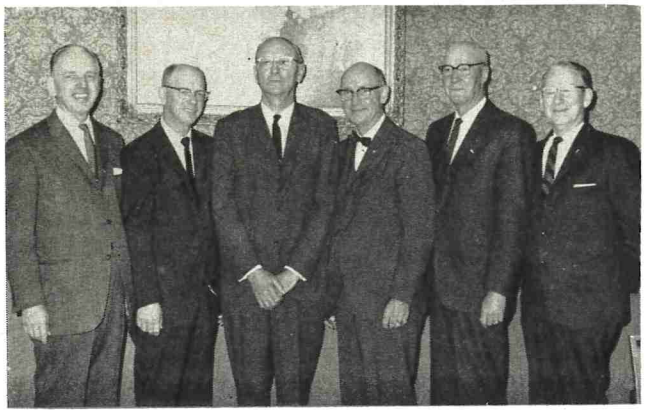
Special guests at the meeting were Adnan Asad Ayyash of Jordan and Haile Retts of Ethiopia who are investigating agricultural methods in Illinois under the sponsorship of the Administration for Industrial Development.

L. to R.: Henry Ellsworth, Lazarus Labs, Past Pres. & Director; Erwin Gadd, Speaker, Missouri State Board of Health; Wm. Dixon (Klenzade, retired), Assoc. Editor of Journal of Milk and Food Technology; Roy Fairbanks, Ill. Dept. of Public Health, Program Chairman.

James Meany, Chicago Dept. of Health, Secretary; W. B. Peterson, Dir. of Marketing, Ill. Agricultural Assn., Luncheon Speaker; Harold Jensen, Wilmette Health Dept., President.

Joseph Peterson, Borden Co., Immediate Past President; Dr. Elwood Speckmann, National Dairy Council, Speaker; Dr. James Harper, Ohio State Univ., Speaker.

Paul Scherschel, PMA Chicago, Director; Howard McQuire, Ill. State Dept. of Health, Program Chairman.



W. B. Peterson, Luncheon Speaker; Harold Jensen, President; L. H. Weiner, retired from Bordon Co.; Lowell Oranger, retired Supt. of Foods & Dairy, State Dept. of Ag.; Dr. H. C. Wiley, retired from Borden Co.; Enos Huffar, Chief of Milk and Foods, State Dept. of Ag.

Howard McQuire, State Dept. of Health; Haile Retta, Ethiopia; Adnan Asad Ayyash, Jordan; Elmer Kachelhoeffer, Will County Health Dept. Mr. Kachelhoffer is the host for the two visitors from the foreign lands. They are spending one month in the Joliet area investigating agricultural methods. They are in the U.S. under the auspices of the Admin. for Industrial Development.

MICHIGAN SANITARIANS HOLD ANNUAL CONFERENCE

The Michigan Association of Sanitarians enjoyed a successful annual Conference on Environmental Health on March 15-16, 1966 at the Gull Lake Conference Center. More than 100 members and guests were in attendance.

The well-diversified program included discussion of such topics as: New Pasteurization Requirements for Egg Products; Tuberculosis in Michigan Deer Parks; Water and Food-Borne Viruses; Effective Sampling in Food Control Programs; Controlled Environments for Food Storage; Effective Photography as a Program Aid; Atomic Energy and the Environment; and Recovery of Organisms from Food and Water.

The Sanitarian of the Year award went to John R. Fleming, Director of Environmental Health for Berien, Cass and Van Buren Associated Health Departments, for his meritorious service in public health in Michigan and his major activities on behalf of the Michigan Association.

John's responsibilities largely involve the coordination and direction of environmental health programs in the tri-county area. Rather extensive programs are maintained in water supply and waste water treatment, with emphasis on the broader aspects of water quality management. He is involved in subdivision review and approval, county and township zoning programs, and overall community planning activities and also has responsibility for many areas of housing and environment control. Programs in food and milk control are on a cooperative basis with other state agencies, notably the Michigan Department of Agriculture.

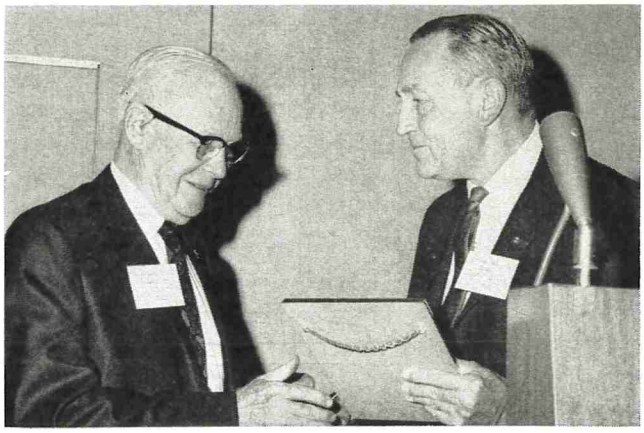
In addition to his environmental health responsibilities, he is also assigned the task of assisting in the overall administration of the Van Buren County Health Department. Under this tri-county arrangement, each county maintains a separate county public health agency in addition to the joint administrative structure. This arrangement is rather unique in Michigan and still in the "testing" phase as an acceptable organizational approach to expanding the strengthening public health services.

Officers for the coming year are: Robert Lyons, of East Lansing, President; Edward P. O'Rourke, of Royal Oak, President-Elect; Theodore J. Kilmer, of Pontiac, Secretary; and Ralph Florio of Waterford, Treasurer. Sam Stephenson of Holland is Past President.

C. A. ABELE HONORED BY 3-A

The 3-A Honor Award for 1966 was made to C. A. "Abe" Abele on May 10, 1966, at the 3-A Sanitary Standards Committees Meetings at Oklahoma City, Oklahoma. Sponsored by the Dairy Industry Committee, the Award in the form of an elegant bronze plaque gives recognition to a selected individual who has made major outstanding contributions to the 3-A program.

It is entirely fitting that "Abe" be honored by the Award. He was one of the members of the 3-A Committees when they were formed in 1944 and was a very effective chairman of the Committee on Sanitary Procedures for IAMFES until his resignation a few years ago. He has been a member of the 3-A Symbol Council since it founding in 1955 and continues to serve as its secretary-treasurer.



C. A. Abele (left) receives the 3-A Honor Award Plaque from Fred E. Uetz.

"Abe's" whole life has been devoted to the betterment of public health. Following graduation he spent 20 years with the Alabama State Department of Public Health. For 8 years he was director of county dairy inspection for the Chicago Board of Health and since 1948 has held his present position as Director of Public Health Research for the Diversey Corporation of Chicago, Illinois.

The 3-A bronze plaque was presented to "Abe" by Fred E. Uetz of the Borden Company and President of the International Association of Milk, Food and Environmental Sanitarians, Inc. Previous recipients of the Award are E. H. Parfitt in 1963 and Tom Burress in 1964.

MISSISSIPPI SANITARIANS USE NEWS MEDIA FOR PROMOTING ANNUAL MEETING

The Mississippi Association of Sanitarians successfully utilized the state newspapers, TV and radio stations and other publicity releases to promote its 5th Annual Meeting on May 5-6, 1966 at Jackson. The result was a highly satisfactory conference with full attendance.

Prior to the meeting a story was released to the leading papers and TV and radio stations outlining the purpose for the gathering of sanitarians, engineers, dairymen and food handlers and highlighting the two-day program and featured speakers. A similar release to the same media after the meeting briefly reviewed the more significant developments in the program and identified the officers elected for the coming year.

Of special interest was the handling of releases to local newspapers in each county in Mississippi. This material not only furnished brief but adequate information on the Conference but made special mention of the local sanitarian, his identification with the State Association and his committee memberships and association activities.

To further promote attendance an invitation was sent to each milk plant superintendent, receiving station manager and fieldman in the state with comments on certain aspects of interest and a copy of the program. Finally, a copy of the program was sent each member with a memorandum outlining some of the Association matters to be covered at the meeting.

The program itself provided for discussion of a number of topics of general interest including community water systems, abnormal milk, effective public relations and restaurant sanitation. Several out-of-state speakers participated in the program including H. L. "Red" Thomasson, Executive Secretary of IAMFES, who spoke on matters of concern to both the international and state associations.

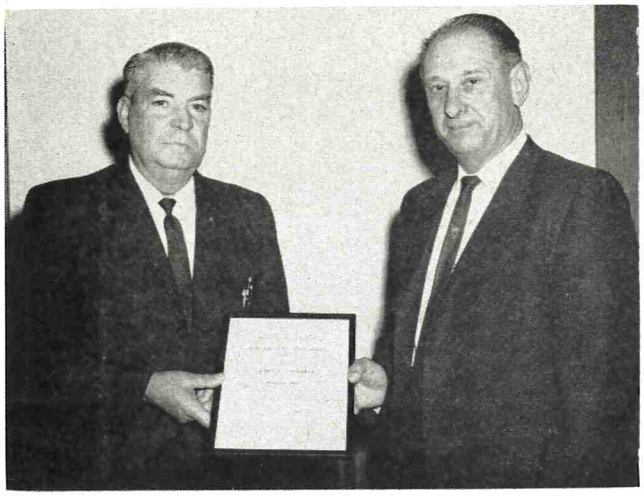
Jack M. McMillan was Publicity Chairman for the 1966 meeting. The 1966-67 officers are P. L. Bradshaw, President; L. J. Butler, President-Elect; J. T. Miller, Jr., 1st Vice-President; Ben Stewart, 2nd Vice-President; J. O. May, Secretary-Treasurer. J. L. Knight is Past President.

MARVIN CAMPBELL WINS MISSOURI 1966 SANITARIAN AWARD

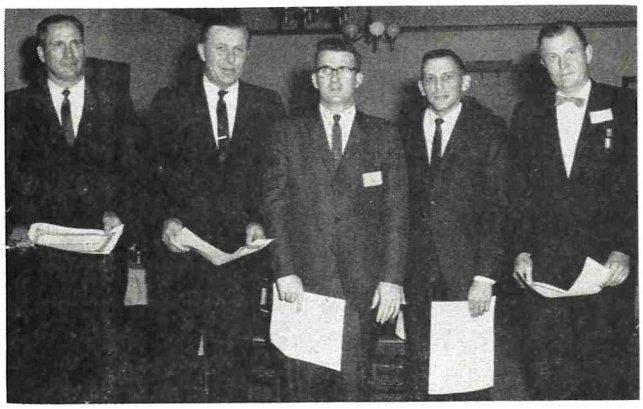
At its Annual Spring Conference on April 4-5, 1966, the Missouri Association of Milk and Food Sanitarians honored Marvin Campbell of Cape Girardeau County as 1966 Sanitarian of the Year. The nomination was made in recognition of his long service in the public health field and his active support of the Missouri Association.

The Award citation states in part: "For the past eighteen years, Marvin Campbell has ably served the citizens of Cape Girardeau County in a highly efficient manner. His accomplishments have reflected a sincere dedication to the end that his community enjoy the maximum health conditions possible through sanitation procedures. He has met the task of administering a program that, by public health standards, requires the services of two sanitarians. His outstanding performance has made the sanitarian a respected professional whose services are a valuable asset to the community. His knowledge, skill and keen insight of the sanitarian's profession have drawn wide attention and the Cape Girardeau area is frequently chosen as a training site for new sanitarians and in-service training activities.

"Marvin has proven to be an excellent educator in teaching the art of proper food handling techniques. He has planned and arranged for the production of a series of training slides on the milk program which have been widely used by civic organi-



Earl White, Springfield, (left) presents the Sanitarian's Award to Marvin Campbell, Cape Girardeau.



Recipients of the 10-year pin. (Left to right) Eugene Young, Marshfield; A. F. Crownover, Poplar Bluff; J. G. Lemonds, Independence; Warren Manning, Benton; C. M. Copley, Jr., St. Louis.

Elected officers for the year 1966-67 (left to right) Erwin P. Gadd, Secretary-Treasurer, Jefferson City; C. M. Dromgold, Second Vice President, St. Louis; Charles Neighbors, First Vice President, Kansas City; James I. Kennedy, President, Popular Bluff; Earl White, Out-Going President, Springfield.

zations and college groups."

Once again the Spring Conference was most successful with near record attendance. The program included topics covering a diversity of interests and discussions at the individual sessions were lively and informative.

A feature of the Conference is the award of 10-year service pins and this year the recipients were Eugene Young of Marchfield, A. F. Crownover of Popular Bluff, J. G. Lemonds of Independence, Warren Manning of Benton and C. M. Copley, Jr. of St. Louis.

Officers elected for the 1966-67 period are: James I. Kennedy, President; Charles Neighbors, 1st Vice-President; C. M. Dromgold, 2nd Vice-President; and Erwin P. Gadd, Secretary-Treasurer. Earl White is Out-Going President.

NEW EXAMINATION PROGRAM FOR SANITARIAN REGISTRATION

The Professional Examination Service of the American Public Health Association is undertaking a project to develop a new examination for use in the registration of sanitarians by State boards. This work is being done with contract support from the U. S. Public Health Service. The new examination will be constructed under the guidance and with the assistance of a national professional advisory committee of leaders in the environmental health field.

The new examination will be offered to State registration boards by the Professional Examination Service of the American Public Health Association. The project also provides for the construction of a group of questions, which will form the nucleus of a question pool to be added to yearly and to be reserved for the use of the committee in revising the examination.

The Sanitarian National Professional Advisory Committee met in New York on June 2 and 3 to begin its work. Members of the Committee are Gilbert Kelso of Atlanta, Ga.; Larry Gordon, Albuquerque, N. Mex.; Harry Steigman, Harrisburg, Pa.; Verne Reierson, Portland, Ore.; H. S. Adams, Indianapolis, Ind.; and Harold Robinson, Washington, D. C.

NOTICE

3-A Accepted Practices For Permanently Installed Sanitary Product-Pipelines and Cleaning Systems became effective June 9, 1966. This 3-A Accepted Practices replaces the old 3-A Suggested Method for the Installation and Cleaning of Cleaned-In-Place Pipe Lines For Use In Milk and Milk Products Plants, dated March-April, 1953.

KENTUCKY FIELDMEN AND SANITARIANS CONFERENCE

Milk quality and land management were the main topics of the Conference of Fieldmen and Sanitarians held recently at the University of Kentucky, Lexington. The Conference was sponsored jointly by the University's Department of Dairy Science and the Kentucky Association of Milk, Food and Environmental Sanitarians.

Discussions of milk quality included talks on milk composition as well as bacteriological problems. Dr. J. C. Olson, University of Minnesota, led several discussions on the latter subject while Dr. T. R. Freeman, University of Kentucky, gave a paper on composition. Others discussing quality problems were Dudley J. Connor, Kentucky Department of Health, Frankfort; R. C. Rintelmann, Klenzade Products, Beloit, Wis.; and Lloyd Duncan, Zero Manufacturing Co., Washington, Mo.

In the management sessions problems of production volume, forage programs, waste disposal systems, and sire programs were subjects of discussion. Speakers were Dr. L. T. Fisher, U.S.D.A. Animal Health Division; Dr. R. J. Henshaw, Kentucky Department of Agriculture, Frankfort; H. L. Hunt, Pet Milk Co., Greenville, Tenn.; J. O. Mead, Dairy Equipment Co., Madison, Wis.; R. L. Connor, KABA, Louisville; and Harvey Hamilton, Warren Thompson, and E. C. Scheldenhelm, University of Kentucky.

At a luncheon during the Conference, three awards for outstanding service were made. A plaque and $100 savings bond was presented by the Sanitarians' Association to Paris Boles, Wayne County Health Department, Monticello. The presentation was made for his outstanding work as a sanitarian. He is a former recipient of this award and a recipient of a similar award by the International Association of Milk, Food and Environmental Sanitarians.

Bill Holland, McCracken County Health Department, Paducah, presents a plaque for outstanding service as a sanitarian to Paris Boles, Wayne County Health Department, Monticello. Observers are R. L. Cooper, Calloway County Health Department, and H. L. Thomasson, Executive Secretary, IAMFES, Shelbyville.

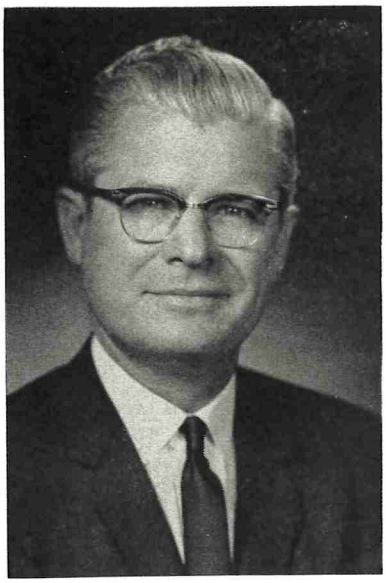
Lyman Knierem, L. K. Quality Services, Louisville, presents Ed Napier, Sealtest Foods, Louisville, a plaque for his outstanding service as a fieldman. Observers are Dr. C. E. Barnhart, Agricultural Experiment Station, and Dr. H. E. Randolph, University of Kentucky.

Dr. H. E. Randolph (left), Department of Dairy Science, University of Kentucky, welcomes out of state speakers. From left to right are: Lloyd Duncan, Zero Manufacturing Co., Washington, Dr. J. C. Olson, Jr, University of Minnesota; J. O. Mead, Dairy Equipment Co., Madison, and R. F. Rintelmann, Klenzade Products, Beloit.

For the first time an award was made for the outstanding fieldman in the state. Ed Napier, Sealtest Foods, Louisville, received this plaque based on his service to producers, his cooperation with regulatory and educational personnel, and status among his fellow workers. The award was made available to the Association by Sep-Ko Chemicals, Minneapolis, Minnesota. Ralph Shearer, Southern Belle Dairy, Somerset, Kentucky, was presented with a plaque for outstanding service to the Dairy Industry and to the Association.

NEWS AND EVENTS

FOOD RESEARCH INSTITUTE MOVED TO WISCONSIN



Dr. E. M. Foster, new Director of Food Research Institute.

The University of Wisconsin will be the new home of the Food Research Institute, which has been housed at the University of Chicago for 20 years. E. M. Foster, University of Wisconsin bacteriologist, will take over as new director when the institute is moved on July 1. The institute is dedicated to the task of providing consumers with a safe food supply.

"The Food Research Institute has achieved international recognition for its excellent work on food-borne diseases," Foster says. He sees this tradition continuing at the University of Wisconsin and hopes to expand the research interests of the institute. "It is clear that many food disease questions remain to be answered," Foster states. Botulism, for instance, is still a problem for commercial food processors, as shown by the outbreak in 1963. Foster has conducted research on botulism in recent years and will continue to do so as director of the institute.

Furthermore, salmonellosis in increasing rapidly, and staphylococcal poisoning is still the most common food-borne disease. "The variety and wholesomeness of foods available to U. S. consumers are unmatched anywhere in the world," Foster points out. "But even today there are occasional outbreaks of food poisoning, and new problems seem to be threatening." The significance of viruses, pesticide residues, and several other potential food-borne hazards is still unknown. And new hazards may be introduced as foods are processed, packaged, and distributed in new ways.

The food industry is extremely important in Wisconsin, and substantial research programs on food-borne disease are already underway, primarily in the College of Agriculture and School of Home Economics. University bacteriologists are studying botulism and staphylococcal poisoning, for example. *Clostridium perfringens*, food poisoning organisms sometimes carried in meats, are being investigated by scientists in the department of foods and nutrition. Veterinary scientists are investigating salmonellae and animal-borne viruses that may infect man through foods. Scientists in several departments are studying pesticide residues in foods and potential problems of mold produced toxins.

"We expect to make full use of such research talents in developing an enlarged and integrated research program on foods at the University of Wisconsin," Foster says.

Gail M. Dack, director of the institute since its formation, is retiring, but will retain interest in the institute and be available for advice and consultation. In addition, three researchers already with the institute will become faculty members in the College of Agriculture, holding joint appointments in various departments and the institute.

Merlin S. Bergdoll, who received his Ph. D. degree from Purdue University in 1946 as an agricultural biochemist, has served with the Food Research Institute since 1946. His current interests are in the production, purification and chemistry of staphylococcal enterotoxins.

Dean O. Cliver, a 1960 graduate of Ohio State University with a Ph.D. degree in microbiology, is currently associated with the Institute and will accompany it to Wisconsin. His research interests are viruses and food as carriers of virus diseases.

H. Sugiyama, who holds a Ph.D. degree in microbiology from the University of Chicago, has been associated with the Food Research Institute since 1951. For the past several years, he has been investigating the mode of action of staphylococcal enterotoxin in animals. Staphylococcal poisoning is the most common food borne disease in the country.

Fundamental research will be stressed in the institute, Foster says. Product development, testing and analysis will be left to others. "Our goal will be to provide the basic information necessary to assure a safe and wholesome food supply," he says.

Scheduled to receive increasing emphasis is the training of graduate students in principles of food

protection. The number of people now receiving this training is not adequate to meet the requirements of the food industry. In addition to the institute's basic research and training functions, it will remain a clearing house for information of possible public health significance about foods and containers. Institute personnel have worked closely with both industry and government on a variety of problems dealing with safety and wholesomeness of foods.

Foster feels that the institute occupies a unique position in that it is tied to neither industry nor government. "As an unbiased agency, we believe the institute can perform an important service to the food industry, to regulatory agencies, and to the public.

NUTRITION FOUNDATION MARKS 25TH YEAR

When the Nutrition Foundation was organized twenty-five years ago, a few days before Pearl Harbor, fifteen founding member companies started the Foundation's scientific research and public education program.

It was a new and is still a unique idea the companies were attracted to—the idea being that industrial competitors could pool their efforts and set up a Foundation entirely in the public interest. The Nutrition Foundation was set up to support research in nutrition at universities and medical schools and to help spread the word of new nutritional discoveries to the public. A Scientific Advisory Committee, made up of well-known nutrition scientists, guides the grant program. Now the Foundation has 67 member companies in the food and allied industries.

War problems occupied the chief attention of the Foundation during its first years, of course, and many research projects closely related to the war effort were started. For example, studies were made which led to improvements in life raft survival rations. The Foundation supported work on ways to feed aviators to increase their tolerance to decreased oxygen supply at high altitudes. Nutritional studies of fatigue and resistance to stress were undertaken. Methods of detecting nutritional deficiencies were developed. Attention was given to the conservation of nutrients, particularly vitamins, during dehydration, cooking, freezing, sterilization and storage.

One of the first moves of the new Foundation was to provide financial support for the Food and Nutrition Board of the Academy of Sciences-National Research Council. War Order Number One, which directed the enrichment of white bread and flour with iron and vitamins, grew out of work of the Board. Enrichment is generally believed to be a major factor in the virtual disappearance from the United States of some deficiency diseases that were widespread before this program was started. One of the important activities of the Food and Nutrition Board was the establishment of the recommended dietary allowances for the American people—the allowances are the guides which all physicians, nutritionists and dietitians use in defining a properly-balanced diet for men, women and children.

Protein foods were another area in which the Foundation was, and is, active. One of the first of the Foundation's grants went to the University of Illinois for studies which achieved a feat that had long eluded scientists—the identification of the amino acids that are "essential" for men and the establishment of the amounts of these nutrients must be ingested to keep the body in good health.

Cholesterol, not so many years ago a little-known chemical name for a mysterious waxy material, and now a household word, has been under study by Foundation grantees for nearly 25 years. The early studies concerned the metabolism of cholesterol in the liver. After cholesterol became well-known, the Foundation feared that too many people (including physicians) subscribed to the view that dietary cholesterol intake, itself, was the sole cause of heart attacks and strokes.

A special fund of over a million dollars was provided by the Foundation to twenty-four universities for scientific work done over a five-year period. The Foundation contributed, through support of this scientific work, to the knowledge of the relationship of diet to heart attacks and strokes that is most widely held today. The question of saturated or unsaturated fats in the diet is still under investigation as are the possible roles of exercise, cigarette smoking and other factors.

The Nutrition Foundation has provided some $7 million dolars in support of nutrition science in the twenty-five years. Recently, two new areas of nutritional interest have been opened. The first is the physiology of taste. Taste is not as well understood as are some of the other senses. It is believed by the Foundation that basic research on taste may have important but unforeseeable effects on eating in the underdeveloped nations as well as in this country.

Second, the Foundation is supporting research which seeks to explore how mental development and learning are altered by poor nutrition. Some exploratory research suggests that malnutrition may have adverse effects on the mind of the developing child. This important new area of nutrition is being opened up, in part at least, through funds from the Nutrition Foundation.

The Foundation has a Food Industries Advisory Committee which provides a direct line of communication between the Foundation and its member

companies. The top research official of each member company belongs to the committee. It holds a three-day annual meeting where scientists report on new developments in different areas of nutritional interest.

The Foundation also publishes *Nutrition Reviews*, a monthly publication covering developments in nutrition science. Dr. Herbert E. Longenecker, President of Tulane University, is chairman of the board of trustees of the Nutrition Foundation.

ROBERT E. HARGROVE, HONORED FOR RESEARCH ON CHEESE STARTERS

Robert E. Hargrove, a U. S. Department of Agriculture bacteriologist, was honored May 17 for his development of a method now widely used by commercial cheesemakers to protect their bacterial cultures from a costly virus known as bacteriophage.

This virus, commonly called phage, spread rapidly in cheese plants after 1950 and cost the industry as much as 5 million dollars a year by making a total estimated loss of 1 percent of the cheese made and significantly lowering the quality of another 10 percent. Bacteriophage has now been virtually eliminated by a simple phosphate treatment for starter milks devised by Mr. Hargrove.

In recognition of this development, Secretary of Agriculture Orville L. Freeman presented Mr. Hargrove with the Department's Superior Service Award. The award recognizes Mr. Hargrove's discovery that starter failures caused by bacteriophage can be prevented if the milk in which the cultures are grown is preheated in the presence of phosphate salts. The phosphate acts by binding the calcium in the milk so that it is no longer available to nourish the phage virus.

Until the development of this treatment, contamination of cultures with phage was virtually impossible to prevent because phage organisms are present in almost all cheese plants. Once established in a cheese culture, phage prevents the development of the acidity required for cheese production by destroying the bacteria or at least hindering their vigorous, abundant growth.

When Mr. Hargrove's method of preventing bacteriophage was announced in 1959, it was quickly adopted by the cheese industry. At first phosphate was added to fluid milk to make the starter. Later Mr. Hargrove worked out a method for adding the phosphate to nonfat dry milk. Phosphated milk powder for making cheese starters is now available commercially and is widely used as insurance against starter failures.

The inventor of this process has worked since 1948 in the Dairy Products Laboratory of the Eastern Utilization Research and Development Division in Washington, D. C. Mr. Hargrove attended Murray State University and continued his education at the University of Kentucky, where he received his B. S. degree in 1946 and his M. S. in bacteriology in 1948.

In 1955, Mr. Hargrove was one of the members of a research team that received the Department's Superior Service Award for the development of a time—and labor-saving method of making Cheddar cheese.

ILLINOIS MASTITIS COUNCIL FORMED

In order to assist the state dairy industry to meet the requirements of the 1965 Grade A Milk Ordinance with respect to control of mastitis, Illinois dairy industry representatives met in April to form an Illinois Mastitis Council.

Members of the Council are Enos G. Huffer, Illinois Dept. of Health; Joseph Peterson, The Borden Company; Dr. G. W. Meyerholz, University of Illinois; Tom Braddock, DeLaval Separator Company; Ernest Winings, Pure Milk Association; and Dr. W. M. Raudabaugh, Illinois State Veterinary Medical Association. Mr. L. K. Wallace, Illinois Milk Producers Association was appointed secretary.

It was planned to start the program of testing for abnormal milk before July 1, 1966 in order to comply with the requirements for interstate milk shipments which become effective on July 1, 1967.

INTERSTATE MILK SHIPMENTS CONFERENCE COMMITTEES

Several interim committees directed to report at the 1967 National Conference on Interstate Milk Shipments at Miami Beach have been appointed by Howard K. Johnston, Chairman of the Conference. Each committee was charged with specific responsibilities for action including the study of problems in various assigned areas and the submission of recommendations to the Conference.

The Committee on Abnormal Milk is chaired by John B. Herrick, Iowa State University, and its charge is to advise the Public Health Service on the implementation of the program for control of abnormal milk. The Committee on Nonfat Dry Milk in Consumer Packaging will be under the chairmanship of C. K. Luchterhand of the Wisconsin State Board of Health. It will further study the need for nonfat solids in consumer packaging.

Henry V. Atherton of the University of Vermont is chairman of the Committee to Study 45°F Temperature Standards and its charge is to resolve the

differences of opinion relative to the 45°F temperature standards for pasteurized products and of suspension of permit for bacterial, coliform and temperature violations without opportunity for a hearing.

The Committee on Reciprocity is chaired by Rudolph Schneider of the Albert Lea Cooperative Creameries Association of Albert Lea, Minnesota. This committee will undertake to define reciprocity and investigate the possibility of having the Public Health Service designate by appropriate means those states and communities which are complying with such definitions.

R. M. Parry of the Connecticut Department of Agriculture and Natural Resources is chairman of the Committee on Single Service Containers. His committee will assist the Public Health Service in establishing criteria for listing single-service container manufacturing plants and producers.

A further committee was appointed to study the problem of over-the-road tank trucks involved in carrying products on return trips after delivering dairy products to receiving areas. Chairman of this committee is Luther Hortman of the Louisiana State Board of Health. It is charged with proposing regulations serving to limit payloads to acceptable food products.

The 1967 National Conference will be held April 2-6 at the Deauville Hotel at Miami Beach, Florida.

PENNSALT GRANULAR ACID CLEANER FOR THE DAIRY AND FOOD INDUSTRIES

A new high-quality, granular acid cleaner, which contains a unique combination of acids, acid phosphates and multiple wetting agents, is now available for the dairy and food industries from Pennsalt Chemicals Corporation. Designated G. A. C., the new cleaner penetrates food soils normally insoluble in ordinary cleaning compounds and alkaline cleaners, and rinses freely with minimum water. It quickly removes milkstone, foodstone, eggstone, beerstone, hard water deposits and other residues in a wide range of applications.

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The new cleaner may be applied manually in recommended use concentrations. It also can be applied by soak and spray and circulation methods. Its granular crystals dissolve rapidly, even in hard water. For additional information, write to the Dairy and Food Department, Pennsalt Chemicals Corporation, 3 Penn Center, Philadelphia, Pa. 19102.

WALKER BULLETIN OF SILO STORAGE TANKS

A comprehensive 8-page bulletin contains information on the advantages and exclusive features of the Walker stainless steel silo-type storage tanks for the dairy and food industries. Cutaway drawings show tank construction and operation and specifications and dimensions are charted for easy reference.

The Walker venting system developed by company engineers is graphically illustrated and the CIP cleaning system is explained in detail. Copy of the bulletin can be obtained from the Walker Stainless Equipment Co., Elroy, Wis.

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STUDY VIRUS DESTRUCTION AND EXTENSION OF FOOD "SHELF LIFE"

New methods of destroying the disease-producing potential of viruses and other substances in milk and food are being sought by a group of scientists at the U. S. Public Health Service's Robert A. Taft Sanitary Engineering Center in Cincinnati. A part of the work also involves finding how "shelf-life" (food storage time) may be lengthened without increasing the danger of spoilage.

One of the principal studies under way concerns the use of heat to destroy typical viruses that may produce disease in humans and animals. The viruses are a mouse leukemia virus, Rous Sarcoma virus; Simian virus 40; Adenovirus 12; Moloney leukemia virus; Rauscher leukemia virus and Herpes simplex virus. The studies stemmed from preliminary reports that tiny particles looking like viruses had been found in cow's milk by the powerful electron microscope. Milk, to which the harmful viruses have been deliberately added for purpose of the investigation, is being subjected to studies to provide exact information on whether heat treatment is completely effective in inactivating these viruses; that is, in rendering them harmless.

In the same series of studies, milk pasteurization equipment is used to find out how much heat milk receives during current commercial processing. If it is learned that present industrial processes do not provide enough heat for a long enough time to safeguard milk from all harmful microorganisms, increases in pasteurization times and temperatures may be recommended.

A second study concerns the irradiation of food products to inactivate viruses. It has been determined that exposure to irradiation by Cobalt-60 will kill disease-causing bacteria, while at the same time leaving flavor in some foods unchanged. The irradiation studies are providing exact information on amounts of exposure required to inactivate viruses. As in the case of the milk research, if it should be found that bacteria-killing irradiation cannot kill the harmful organisms without producing undesirable taste changes, researchers will have to seek other methods of viral inactivation.

The food irradiation studies involve learning the radiation resistance of a total of 30 viruses, including common intestinal and respiratory viruses known to be transmitted in food. The studies are being conducted by the Army, which wants to develop a method to inactivate spoilage-causing bacteria and viruses so as to increase the time that prepared foods may be safely stored.

A third study is being conducted on the resistance of the same viruses to heat, as opposed to irradiation treatment.

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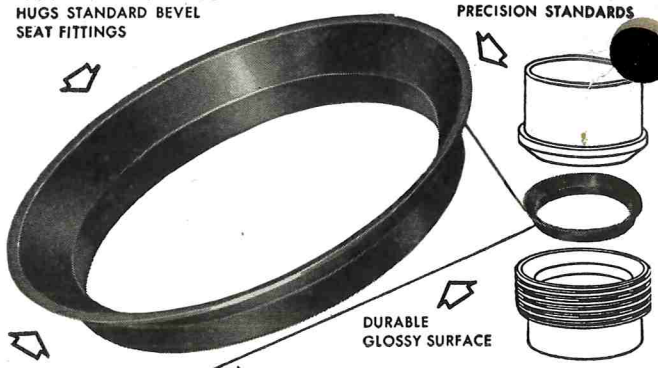

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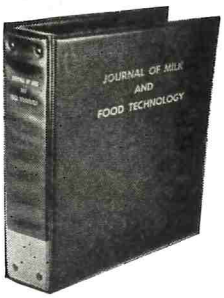

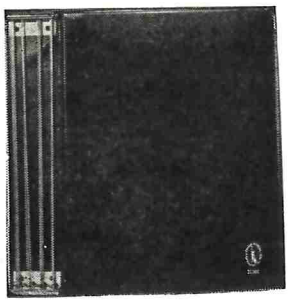

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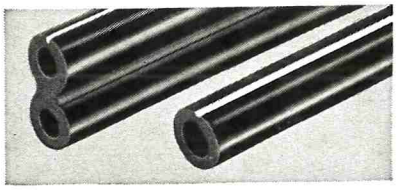

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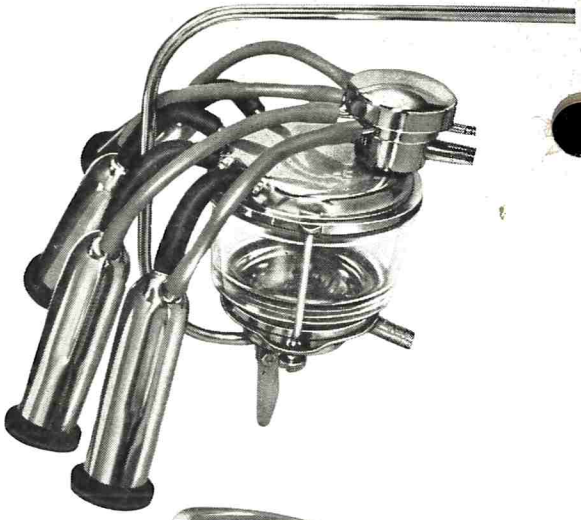

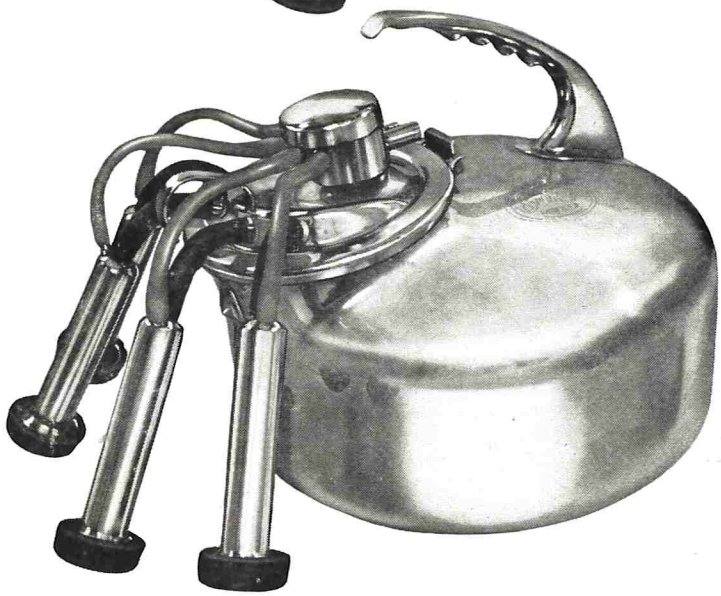

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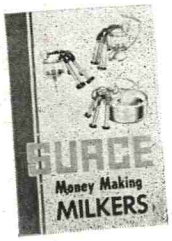

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