MARCH, 1962
Vol. 25 No. 3

Journal of

MILK and FOOD TECHNOLOGY

49th ANNUAL MEETING
OCTOBER 24, 25, 26, 27, 1962
Ben Franklin Hotel — Philadelphia, Pa.

Official Publication

International Association of Milk and Food Sanitarians, Inc.

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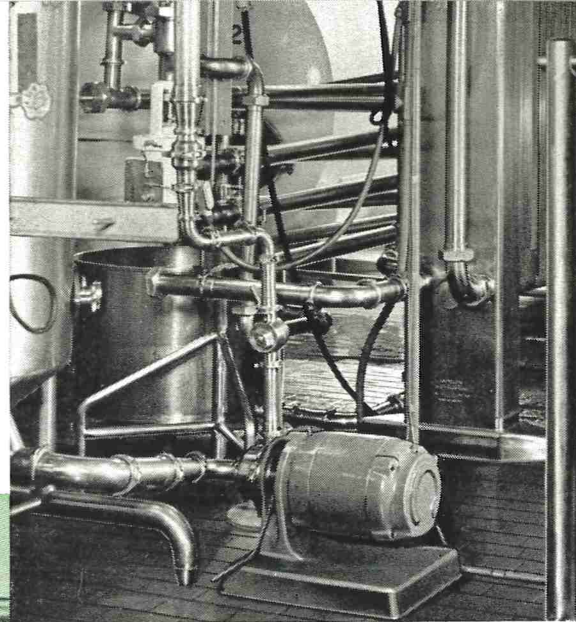

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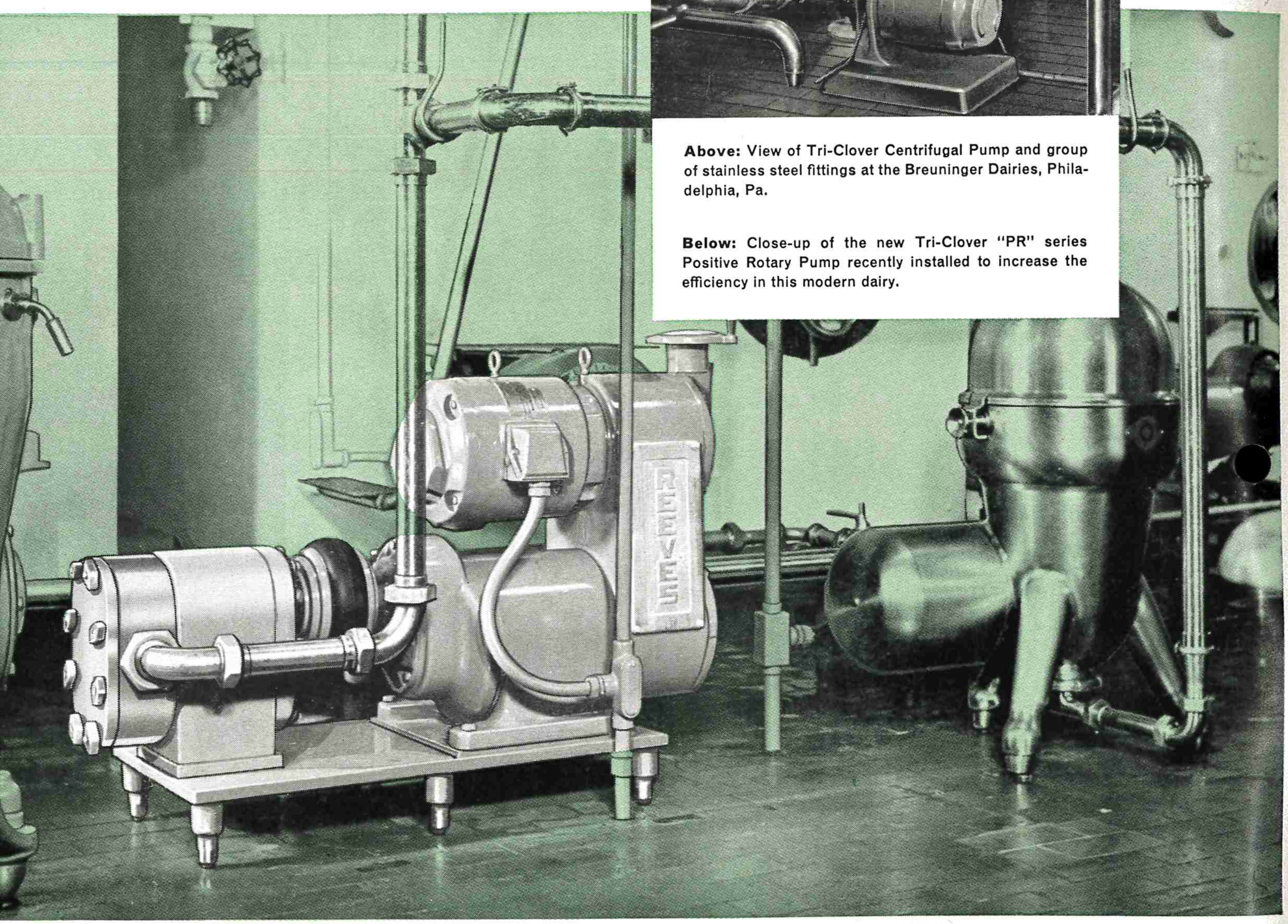
Below: Close-up of the new Tri-Clover "PR" series Positive Rotary Pump recently installed to increase the efficiency in this modern dairy.



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The Journal of Milk and Food Technology is issued monthly beginning with the January number. Each volume comprises 12 numbers. Published by the International Association of Milk and Food Sanitarians, Inc., with executive officers of the Association, Blue Ridge Rd., P. O. Box 437, Shelbyville, Ind.

Entered as second class matter at the Post Office at Shelbyville, Ind., March 1952, under the Act on March 3, 1879.

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Journal of

MILK and FOOD TECHNOLOGY

Official Publication

International Association of Milk and Food Sanitarians, Inc.

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Vol. 25 March, 1962 No. 3

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Business Matters: Correspondence regarding business matters, advertising, subscriptions, orders for single copies, etc., should be addressed to H. L. Thomasson (address above).

Subscription Rates: One volume per year Individual non-members, Governmental and Commercial Organization subscription,
1 yr. $8.00
Public and Educational Institution Libraries, 1 yr. $6.00
Single Copies $1.00

Orders for Reprints: All orders for reprints should be sent to the executive officer of the Association, P. O. Box 437, Shelbyville, Ind.

Membership Dues: Membership in the **International Association of Milk and Food Sanitarians, Inc., is $7.00 per year,** which includes annual subscription to the **Journal of Milk and Food Technology.** All correspondence regarding membership, remittances for dues, failure to receive copies of the journal, changes of address, and other such matters should be addressed to the Executive Secretary of the Association, H. L. Thomasson, Box 437, Shelbyville, Indiana.

EDITORIAL

Specialization Versus Generalization in Sanitation Work

As in all other areas of human endeavor, the role and responsibilities of the sanitarian are constantly changing. Thirty years ago most of the practical work of the sanitarian (inspector as he was then known) involved comparatively elementary matters relating to milk, food handling and water supplies. As techniques in those few areas of sanitation became more refined, specilization became the order of the day, but as the responsibilities of the sanitarian have broadened, it appears to many that the pendulum has swung too far in the direction of generalization. In too many instances the sanitarian, particularly at the local level, is expected to be a Jack-of-all-trades with resulting weakness in many areas. The sanitarian today has important responsibilities with respect to public and private water supplies, public and private waste disposal, air pollution, food handling, food processing, fish and shellfish, milk and milk products, rodent and insect control and public housing to name a few of the most prominent fields directly affecting the public health.

In order to effectively understand the prevention and control of radiological, bacterial and chemical contamination of food, water, air and other environmental factors, more than a superficial knowledge of microbiology, engineering, radiology, epidemiology and last, but not least, public relations, is required. That few individuals will be expert in all of these fields is obvious. As Paul Corash so ably pointed out in his "Professional Status for the Sanitarian" published in the August, 1957, issue of the Journal of Milk and Food Technology, ". . . the health problems of our environment can be dealt with, if at all, only by those possessing the highest degree of technical skill and training." Furthermore, the factors seriously and directly affecting the well-being of our citizens are so complex that the individual is in many instances totally incapable of protecting himself from environmental hazards. Even the best knowledge available applied with maximum proficiency may be of questionable adequacy. Therefore, if the sanitarian of today is to competently serve the fellow members of his community and nation, it is mandatory that his qualifications meet the highest scientific, professional and ethical standards.

These are lofty ideals and some may feel them to be impractical and visionary. None the less, it is the considered opinion of this writer that unless definite progress is made in the direction indicated, the goal of the sanitarian in the attainment of a truly professional status is doomed, and the citizens of this nation will be the losers.

We believe that there is an increasing awareness of the importance of the trained sanitarian on the part of other public health workers, affected industries and the informed public. Now is the time for the sanitarian, through individual effort and through his professional organizations, to accept the challenge and move from mediocrity to his rightful status. Achievement will depend, to a great degree, upon the development of much higher educational and training standards than have been the rule in the past. We are aware of the inadequacy of salary scales in effect for both public and private sanitarians. Bemoaning this fact will do little to correct the situation, but raising the professional standards can only tend to promote more adequate salaries.

We also realize that under some circumstances a rather wide degree of generalized knowledge and ability is the only presently available practical approach to the day-to-day obligations. For example, many small local health departments obviously do not have adequate funds for specialized sanitarians, nor do some of them have population responsibilities large enough to warrant a diversity of personnel abilities to cover all fields of sanitation. We believe the most logical approach to this problem is consolidation of adjacent local health departments into districts of adequate size to provide capable sanitarian staffs. To further alleviate this problem, the services of well-trained specialists should be made available to these health departments and communities by state or federal agencies for on-the-job training, advice and direct assistance. Such arrangements will do much to raise the effectiveness of the sanitation programs and in so doing will raise the stature of the sanitarian in the eyes of his co-workers in public health and gain the respect of the people he serves.

We have taken considerable liberty with the title of this editorial, "Specialization Versus Generalization in Sanitation Work," but it has been our intention to emphasize the importance of elevating the standards of scientific training and performance capabilities of the sanitarian. The vocation of sanitarian will never reach its full potential under a philosophy of "professional Jack-of-all-trades."

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Opinions expressed in this editorial are those of the author and do not necessarily represent those of this Association.

CHLORINATED HYDROCARBONS DEPOSITED IN BIOLOGICAL MATERIAL [1]

II. ANIMAL AND ANIMAL PRODUCTS

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Milk

Extensive studies have been reported on residues of chlorinated hydrocarbons in milk after dairy cows or barns were sprayed with insecticides *(66)* or after cows ingested insecticide contaminated feed *(67)*. Spraying cows and/or barns with DDT resulted in milk residues of 0.3 to 33.6 ppm. Highest levels were generally encountered shortly after spraying. In some instances DDT persisted in milk for 119 and 126 days after cows had received their last spray treatment. Milk from cows sprayed with methoxychlor contained from 0.13 to 0.4 ppm initially. Residues of this insecticide disappeared from milk quite rapidly. Data obtained for other chlorinated hydrocarbons used as sprays were similar to those just discussed.

Claborn, *et al. (13)* sprayed dairy cows with different insecticides and periodically examined milk from these cows for presence of insecticides. Results of the studies are summarized in Table 1. Two days after spraying, higher levels were found of DDT and dieldrin than of methoxychlor or toxaphene. Methoxychlor disappeared from milk between 14 and 21 days after spraying while others persisted for 21 days or longer.

Additional work on methoxychlor was done recently by Cheng, *et al. (11)*. They found an average of 0.03 ppm insecticide in milk during a 68-day period during which cows were treated daily with a 1-% methoxychlor spray.

Four dairy animals were sprayed with a solution of 1.5 lb of 25-% lindane powder per 100 gal of water. A household detergent, at the rate of two lb per 100 gal, was added to the insecticide solution and applied to two of the cows *(93)*. The highest level of lindane was found in milk one day after spraying and it decreased logarithmically with time. Milk from all treated cows contained lindane 17 days after spraying. Addition of detergent did not affect presence of lindane in milk.

Radeleff, *et al. (75)* sprayed dairy cows with a 0.5-% solution of dieldrin. When a xylene emulsion was used, 5.7 ppm of insecticide appeared in milk after one day, 8.3 ppm after 2 days, 5.5 ppm after 4 days, 2.7 ppm after 14 days and 1.0 ppm after 28 days. Slightly lower residues were detected when a wettable powder suspension was used.

The literature is abundant with studies on residues of different chlorinated hydrocarbons in milk after their ingestion by dairy cows. Only those that seem especially pertinent will be reviewed. DDT residues in the range of 0.5 to 15 ppm were found when cows were fed previously treated alfalfa hay, pea vine or sweet corn silage *(67)*. Other studies showed that 5 to 30% of DDT ingested by cows was recovered in milk. The insecticide appeared in milk 3 days after ingestion of contaminated feeds started and persisted for 160 to 170 days after feeding stopped.

Dairy cows consumed forage from DDT-contaminated pastures and DDT-contaminated hay which resulted from aerial application of insecticide in studies by Huddleston, *et al. (43)* described earlier in this paper. DDT in milk after 7 days ranged from 0.17 to 3.77 ppm; after 30 days, 0.26 to 3.60 ppm; after 60 days, up to 2.20 ppm; after 210 days, 0.26 to 2.90 ppm; and after 325 days, 0.05 to 0.40 ppm.

Different levels of methoxychlor were fed to cows by Gannon, *et al. (29)*. When feed contaminated with 7,000 ppm was fed continuously, 7 days later milk contained 0.83 ppm and after 112 days, 2.14 ppm. Residues in milk dropped to 0.17 ppm after 7 days of feeding and 0.13 ppm after 112 days when

Table 1—Average Levels (ppm) of Insecticides in Milk Before and at Different Intervals After a Single Spray Treatment[a b]

Time (days)	DDT	Dieldrin	Methoxychlor (*Emulsion*)	Toxaphene (*Emulsion*)
Before spraying	0.2	0.0	0.0	0.0
After spraying				
2	2.8	5.5	0.48	0.61
7	1.4	1.7	0.09	0.16
14	0.7	1.3	0.06	0.07
21	0.6	0.4[c]	0.00	0.08

[a]From data by Claborn, *et al. (13)*.
[b]A 0.5 per cent concentration of each insecticide was used in the spray.
[c]Sampled at 22 days.

[1]Second in a series of three review papers on this subject. For the first of the series see, J. Milk and Food Technol., **25**:36. 1962.

feed contained 800 ppm of insecticide. Other work *(67)* indicated that methoxychlor did not contaminate milk when previously treated alfalfa was fed. Methoxychlor, when added to milk, was found to be stable for at least 5 days at room temperature.

Dieldrin levels of 0.8 to 1.8 ppm were found in milk when cows were fed previously sprayed alfalfa hay *(67)*. When pastures were treated with the insecticide, milk produced by grazing cows contained 0.04 to 0.96 ppm. Recently studies were conducted in which dieldrin was incorporated into feeds at rates of 75, 50 and 10 ppm *(29)*. After each was consumed by cows for 12 days, milk contained 13.36, 10.96 and 1.78 ppm respectively.

Gannon, *et al.* *(30)* fed dairy cows with levels of dieldrin ranging from 0.1 to 2.25 ppm of the diet. Appreciable levels of dieldrin were detected in milk from cows fed 2.25 ppm in their diet. The concentration in milk increased from 0.16 ppm after one week of feeding to 0.28 ppm after 12 weeks. Six weeks after insecticide feeding was stopped, milk contained only 0.04 ppm dieldrin.

Aldrin appeared in milk at the rates of 16.1, 3.42 and 0.41 ppm after cows had ingested the insecticide for 112 days in feed contaminated with 40, 10 or one ppm respectively *(29)*. After 7 days of feeding, milk contained 5.22, 1.18 or 0.12 ppm aldrin respectively. Other studies showed milk to be free from aldrin when cows consumed previously sprayed forage for a period of 91 days *(67)*.

Relatively low levels of endrin (0.1 to 1.7 ppm) were found in milk produced by cows which consumed previously treated hay. It was noted that at least 20 mg of endrin had to be ingested daily before the insecticide appeared in milk. No endrin was found in butter made from milk produced by cows that consumed corn stover which, as corn, had been treated with the insecticide *(48)*.

Dairy cows were fed mixtures of heptachlor and heptachlor epoxide at 5 and 10 ppm levels in their diet. Heptachlor epoxide appeared in milk 3 days after feeding started. Maximum accumulations of the epoxide in milk after 15 days of feeding were 0.72 ppm at the 5-ppm level and 1.59 ppm at the 10-ppm level *(83)*. Heptachlor was not detected in milk from cows pastured on corn stover which, as corn, had been treated with the insecticide to control the European corn borer *(49)*. Butterfat from cows exposed to a range treated with 2 oz per acre of heptachlor contained 13.3 ppm heptachlor epoxide after 28 days and 1.0 ppm after 165 days *(3)*.

Table 2 summarizes data obtained by Claborn, *et al.* *(13)* on levels of toxaphene in milk from cows which received different levels of insecticide in their feed. Increases in oral intake were accompanied by increases in milk contamination. Feeding the insecticide for periods longer than two weeks did not seem to increase residues appreciably. Residues continued to appear in milk for two to three weeks or longer after feeding of the insecticide had discontinued.

TABLE 2—AVERAGE LEVELS (PPM) OF TOXAPHENE IN MILK FROM COWS DURING AND AFTER FEEDING OF DIFFERENT CONCENTRATIONS[a]

Dosage	After feeding (weeks) 2	4	6	8	After feeding ceased (weeks) 1	2	3
(ppm)							
Control	0.01	0.06	0.16	0.00	0.00	0.00	0.00
20	0.26	0.36	0.37	0.23	0.07	0.02	-
60	0.61	0.68	0.71	0.48	0.13	0.10	0.07
100	1.01	1.15	0.96	0.91	0.15	0.13	0.12
140	1.67	1.89	1.64	1.82	0.32	0.40	0.20

[a]From data by Claborn, *et al.* *(13)*.

A series of tests were conducted by Gannon and Decker *(28)* in which pastures were treated with 0.5, 3.0 and 0.5 lb per acre of dieldrin, DDT and heptachlor. When cows were allowed to graze treated pastures immediately afterward, the chemicals reached their maximum concentration in milk within 3 to 7 days (dieldrin - 3.0 to 4.0 ppm, DDT - 7.0 to 8.0 ppm, heptachlor epoxide - 0.22 ppm) and declined steadily thereafter.

A limited amount of published data is available on residues of insecticides in dairy products made from contaminated milk *(68)*. One study indicated that butter with 65 ppm DDT was made from milk which contained 2.3 to 3 ppm of insecticide. Other investigations reported still higher DDT levels in butter. Original milk contained 26 ppm and butter made from it had 456 to 534 ppm. A variety of dairy products made from DDT-contaminated milk were tested and the following DDT levels found: pasteurized cream, 70.2 ppm; buttermilk, 1.9 ppm; whey, 0.5 ppm; butter, 100 ppm and Cheddar cheese, 47.0 ppm. Highest DDT levels were observed in high-fat dairy products. One investigation demonstrated that benzene hexachloride appeared in butter after

TABLE 3—AVERAGE LEVELS (PPM) OF INSECTICIDES DEPOSITED IN FAT OF STEERS AND HEIFERS AT DIFFERENT TIMES AFTER A SINGLE SPRAY TREATMENT[a]

Insecticide and concentration used	Time after spraying in weeks 2	6	10	16	22	27
DDT (0.5%)	11.2	8.1	5.3	2.3	2.8	1.7
TDE (0.5%)	11.0	5.2	3.9	1.1	0.7	0.5
Methoxychlor (0.5%)	2.8	1.7	0.0	-[b]	-	-
Lindane (0.075%)	6.2	0.9	-	-	-	-

[a]Data from Claborn, *et al.* *(13)*.
[b]No results reported.

cows had grazed on pastures previously sprayed with the insecticide.

BEEF TISSUES

Chlorinated hydrocarbons may be deposited in tissues of certain animals after exposure to the insecticide through a spray treatment or after oral ingestion.

Table 3 summarizes data gathered by Claborn, *et al. (13)* on levels of different insecticides deposited in fat of steers and heifers after a single spray treatment. A DDT residue of 11.2 ppm was found after 2 weeks. This gradually decreased so that 27 weeks after spraying, 1.7 ppm was present. Similar results were obtained with TDE although depletion was more rapid than DDT. The level of methoxychlor was 2.8 ppm after 2 weeks but was completely depleted after 10 weeks. Lindane was present at a level of 6.2 ppm after 2, and 0.9 ppm after six weeks. The same authors *(13)* also studied effects of repeated spray treatments on depostion of insecticides in fat of steers and heifers. Results of this work are summarized in Table 4. After the first spray treatment, fat contained 18 ppm DDT. This increased to 35.2 ppm after the sixth spraying. The insecticide persisted so that 36 weeks after the last spraying fat still contained 2.2 ppm. Similar results were noted when TDE was used. Levels of methoxychlor never exceeded 2.4 ppm during the spray treatment and were reduced to zero 12 weeks after the last treatment. Lindane was never found during the treatment period. When dieldrin was used, fat contained 7 ppm after the first spray treatment, 24.0 ppm after the fourth and 6 ppm 28 weeks after the last spraying. Use of heptachlor caused deposition in fat of 11.2 ppm after the first treatment, 19.3 ppm after the sixth and 2 ppm 16 weeks after the final spraying. Similar results were obtained with gamma chlordane while levels of toxaphene reached 4 ppm after the sixth treatment, 14.0 ppm after the 12th spraying and 3 ppm six weeks after the final spray.

Several studies have been reported on deposition of chlorinated hydrocarbons in fat and other tissues of cattle after oral ingestion. Claborn, *et al. (13)* investigated effects of feeding 10 different insecticides at several concentrations for up to 16 weeks on levels deposited in fat. Results are summarized in Table 5. In general it can be said that concentration of insecticide in fat increased as the dosage and length of feeding increased. Methoxychlor failed to accumulate in fatty tissue while lindane, toxaphene, chlordane, heptachlor and endrin were deposited to a lesser degree than aldrin, BHC, DDT or dieldrin. Fat levels as high at 250 ppm BHC, 40 ppm aldrin, 44 ppm endrin, 40 ppm DDT and 50 ppm lindane were observed after feeding insecticides for 16 weeks.

Gyrisco, *et al. (40)* studied deposition of DDT, lindane and aldrin in various tissues of dairy cattle. After a cow was fed DDT (2-10 ppm) for 3 months, 0.6 ppm was recovered from kidney tissue, 6.6 ppm from omental fat and 0.13 to 0.18 ppm from manure. A similar experiment with lindane resulted in an accumulation of 0.25 ppm of this insecticide in omental fat and 0.08 ppm in the kidney. No insecticide was found in manure. When aldrin was fed at the rate of 10 ppm, none was detected in the pancreas, kidney, liver, spleen, brain or omental fat. A trace was noted in manure.

Dieldrin accumulation in tissues of steers and cows was investigated by Gannon, *et al. (30, 31)*. The insecticide was fed at levels of 0.1 to 2.25 ppm in the diet for 12 weeks. After 12 weeks of feeding, brain and kidney tissue were free from contamination regardless of dosage levels. Other tissues studied showed increasing levels. Highest levels attained were 0.6 ppm in the heart, 0.7 ppm in the liver, 6.2 ppm in renal fat, 4.8 ppm in body fat, 7.0 ppm in heart fat, 5.6 ppm in udder fat, 1.3 ppm in steak and

TABLE 4—AVERAGE LEVELS (PPM) OF INSECTICIDES DEPOSITED IN FAT OF STEERS AND HEIFERS AT DIFFERENT TIMES AFTER REPEATED SPRAY TREATMENTS[a]

Insecticide and concentration used	Spray interval	After indicated spray application				After last spraying (weeks)				
		1	2	4	6	8	12	16	24	36
	(weeks)									
DDT (0.5%)	3	18.0	31.2	32.8	35.2		7.7		4.7	2.2
TDE (0.5%)	3	13.2	32.7	36.5	28.4		13.6		1.3	0.8
Methoxychlor (0.5%)	3	1.5	1.5	0.8	2.4		0.0			
Lindane (0.03%)	3	NONE AFTER ANY SPRAYING								
Dieldrin (0.05%)	3	7.0	10.0	24.0[b]						
Heptachlor (0.5%)	2	11.2	13.6	19.1	19.3	15.5		2.0		
Gamma Chlordane (0.5%)	2	8.7	10.0	17.1	24.0	15.6		0.3		
Toxaphene (0.5%)	2	0.0	0.0	6.0	4.0[c]					

[a]Data from Claborn, *et al. (13)*.

[b]Residue of dieldrin 11 wks. after last spray: 17.0 ppm; 28 wks. after last spray: 6.0 ppm.

[c]Residue of toxaphene after 12th spraying: 14.0 ppm; 4 wks. after last spray: 5.0 ppg; 6 wks. after last spray: 3.0 ppm.

TABLE 5—AVERAGE LEVELS (PPM) OF INSECTICIDES DEPOSITED IN FAT OF CATTLE AFTER ORAL ADMINISTRATION[a]

Insecticide	Dosage	After feeding to cattle for weeks 4	8	12	16
	ppm				
Aldrin	10	35	41	44	49
	25	50	78		
BHC	100	159	223	230	250
Chlordane	10	11	13	10	11
	25	12	18		
DDT	10	6.8			
	25	22	3.4	42	40
Dieldrin	1.0	1.8	3.9	2.0	2.6
	2.5	7.0	11.4	10.2	14.3
	10	16	26	35	44
	25	75	74		
Endrin	2.5	1.2	2.6	0.8	0.8
	5.0	1.3	1.5	2.4	2.3
Heptachlor	2.5	1.4	0.7	0.7	0.2
	10.0	4	8	3.5	7.5
Methoxychlor	25	0	0	-	0
Toxaphene	25	2	4	10	12
	100	26	34	33	38
Lindane[b]	1	0.3	0.9	1.7	1.0
	10	3.5	6.8	8.0	3.1
	100	65.0	76.0	99.0	50.0

[a]From data by Claborn, *et. al (13).*
[b]From data by Radeleff, *et al. (74).*

1.2 ppm in roast. Six weeks after feeding of the insecticide had ceased, levels in different tissues had decreased by 50% or more in most instances.

Additional work on accumulation of dieldrin in tissues of steers was reported by Claborn, *et al. (13)* and is summarized in Table 6. Highest levels of deposition were noted in body and renal fat while less was detected in muscle tissue.

Radeleff, *et al. (75)* studied residues of dieldrin in omental fat of Hereford cattle after they were sprayed 3 times in 5 days with 0.5% insecticide. Tests on four animals showed residues of 8 to 70 ppm 6 days after the third spray. After 15 days, 4 to 11 ppm dieldrin was found and after 19 days the range was 4 to 10 ppm. Less than 1.0 ppm insecticide was found after 24 days.

Studies on deposition of a variety of insecticides in the fat of cattle were conducted when the chemicals were used to control grasshoppers on rangeland *(3).* In 1956 cattle exposed to rangeland treated with 2 oz per acre of aldrin averaged 1.4 to 10.9 ppm dieldrin in their fat at slaughter. In 1957 steers were exposed for 58 to 90 days to rangeland treated with 2 oz aldrin, 3 oz heptachlor or 0.75 oz dieldrin per acre after which they were confined in a feed

TABLE 6—DIELDRIN (PPM) IN DIFFERENT TISSUES OF STEERS FED VARYING LEVELS FOR 12 WEEKS[a]

Dosage	Dieldrin in Body fat	Renal fat	Liver	Kidney	Muscle
(ppm)	*(ppm)*	*(ppm)*	*(ppm)*	*(ppm)*	*(ppm)*
0	0	0	0	0	0
0.25	0.84	0.73	0.05	0.01	0
0.75	2.75	2.35	0.18	0.32	0.04
2.00	6.80	6.00	0.50	0.45	0.13
10.00	23.50	31.90	2.39	2.41	0.45

[a]Data from Claborn, *et al. (13).*

lot for 93 or 100 days. Dieldrin residues from the aldrin treatment were about 4 ppm in fat when cattle were removed from the range and about 0.9 ppm when slaughtered. Heptachlor epoxide residues from heptachlor treatment were of the same magnitude. Residues of dieldrin were about 7 ppm when animals were removed from the range and 1.4 ppm when slaughtered. In 1958 cattle were grazed for 96 or 103 days on ranges treated with 2 oz of aldrin or heptachlor per acre in diesel oil or emulsion or 1.5 lb toxaphene in diesel oil after which they were confined to a feed lot for 120 days before slaughter. Dieldrin and heptachlor epoxide residues were about the same as in 1957. Samples taken at time of slaughter showed that aldrin residues were only slightly affected by formulation but heptachlor epoxide residues were lowest in animals on emulsion treated range. In animals exposed to toxaphene, residues were less than 0.5 ppm.

SWINE TISSUE

Deposition of aldrin, heptachlor and toxaphene in fat of swine grazing on Ladino clover pastures previously treated with these insecticides has been reported *(15).* When heptachlor was applied at a rate of 3.6 lbs per acre and toxaphene at a rate of 16.0 lbs per acre, residues of 0.9 and one ppm respectively accumulated in swine fat. Gannon, *et al. (31)* added from 0.1 to 2.25 ppm dieldrin to the diet of swine. Highest insecticide residues, after 12 weeks of feeding were observed in renal fat and body fat. After 12 weeks on a diet with 2.25 ppm dieldrin, renal fat contained 5.2 ppm; body fat, 3.5 ppm; liver, 0.2 ppm; kidney 0.5 ppm; chops, 1.9 ppm and roast 1.2 ppm. Six weeks after feeding of the insecticide had been stopped, residues in tissues decreased in all instances and in some by 50% or more. Results from other studies on feeding dieldrin to swine are summarized in Table 7 *(13).* Highest levels accumulated in body and renal fat.

SHEEP TISSUE

Limited studies have been conducted on deposition

TABLE 7—DIELDRIN (PPM) IN DIFFERENT TISSUES OF SWINE FED VARYING LEVELS FOR 12 WEEKS[a]

Dosage	Dieldrin in Body fat	Renal fat	Liver	Kidney
(ppm)	*(ppm)*	*(ppm)*	*(ppm)*	*(ppm)*
0	0	0	0	0
0.25	0.34	0.32	0.02	0
0.75	1.08	0.98	0.03	0.03
10.00	10.80	11.90	0.48	0.59

[a]Data from Claborn, *et al. (13).*

of dieldrin in tissues of sheep after oral ingestion *(31)*. One investigation showed no residues present in liver, kidney, or chops when 2.25 ppm insecticide in the diet was fed for 12 weeks. Residues were only 1.9 ppm in renal fat, 1.5 ppm in body fat and 0.2 ppm in roast. Table 8 summarizes results of other studies on sheep. Highest levels of insecticide were observed in body and renal fat of sheep.

Long, *et al. (64)* treated a pasture with 0.25 lb endrin per acre on May 19, June 10, June 16, June 23 and June 29, 1958. Lambs were placed on the pasture on May 19 and allowed to graze for 55 days. After removal of lambs from this pasture to an untreated one, fat samples were analyzed periodically for endrin residues. Immediately after removal, internal fat (from around the stomach and thoracic cavity) contained 20.8 ppm and external fat (from external surfaces of the carcass and fat pockets in meat) contained 12.8 ppm. Fourteen days later residues in internal and external fats were 22.0 and 17.4 ppm respectively. When lambs had not grazed on the treated pasture for 42 days, internal fat contained 11.4 and external fat 8.7 ppm of endrin.

Sheep were dipped in a 0.025 per cent lindane solution in experiment by Jackson, *et al. (46)*. Two weeks after treatment, fat from the animals contained 4.23 ppm of insecticide. This dropped to 1.75 ppm after 4 weeks and to 0.27 after 10 weeks. No lindane was recovered from fat of treated sheep 12 weeks after they were dipped.

TABLE 8—DIELDRIN (PPM) IN DIFFERENT TISSUES OF SHEEP FED VARYING LEVELS FOR 12 WEEKS[a]

Dosage	Dieldrin in Body fat	Renal fat	Liver	Kidney	Muscle
(ppm)	*(ppm)*	*(ppm)*	*(ppm)*	*(ppm)*	*(ppm)*
0	0	0	0	0	0
0.25	0.45	0.49	0.07	0.03	0.01
0.75	1.84	1.70	0.14	0.12	0.03
10.00	30.70	28.9	2.22	0.98	0.50

[a]Data from Claborn, *et al. (13).*

POULTRY TISSUE

Experiments on deposition of DDT in tissues of growing turkeys were described by Marsden and Bird *(65)* in 1947. When the diet contained 0.15 ppm DDT and was fed for 7 weeks, residues of insecticide in mg per g of tissue were 0.18 for muscle, 0.17 for kidney and 6.24 for fat. A study with dieldrin indicated that fat of hens contained 35.7 ppm after ingesting a diet with 0.75 ppm for 12 weeks *(31)*. Endrin was found in fat at a level of 1.07 ppm after hens had consumed a diet with 0.75 ppm for 4 weeks *(88)*. The skin and flesh of chickens were found contaminated with 3.20 and 0.17 ppm of BHC respectively after birds had been exposed for 21 days to roosts treated with a 1.2 per cent suspension of insecticide *(24)*. Dusting chickens with 10 g of a 1-% dieldrin preparation resulted in the presence of 0.8 ppm insecticide in their fat one week later and one ppm after 12 weeks *(22)*. One report indicated that flesh of broilers became contaminated with chlordane after birds inhaled a mist of the insecticide *(70)*.

Ivey, *et al. (45)* found 131 ppm lindane in the fat of poultry one week after their quarters were sprayed with one gallon of a 1-% lindane suspension, per 100 square feet. The residue level increased to 133 ppm after 4 weeks, 140 ppm after 6 weeks and 225 ppm after 8 weeks. A decline started then and after 16 weeks, 97 ppm remained. When the same spray was applied to 1,000 square feet, 4.2 ppm insecticide was found in fat one week later. This increased to 6.6 ppm after 2 weeks and then gradually decreased so that after 20 weeks, 1.0 ppm remained.

EGGS

Chlorinated hydrocarbons may also be deposited in eggs produced by hens exposed to the insecticides. A mash prepared with 15 per cent alfalfa meal made from hay previously treated with one, 2, or 4 pounds DDT per acre was fed to White Leghorn hens *(17)*. DDT content of eggs produced when the different alfalfa meals were used was 2.5, 2.8 and 6.4 ppm respectively. When 50, 100 and 200 ppm DDT were added directly to mash, the average insecticide content of all eggs produced during a 17-month period was 18, 34 or 46 ppm respectively. The DDT content, on a dry basis, of whole egg was an average of 171 ppm when mash consumed by hens contained 100 ppm insecticide. The albumin of these eggs contained an average of 15 ppm DDT (dry basis) while yolks contained an average of 323 ppm (dry basis) *(17)*.

When DDT was used an an aerial spray to control the gypsy moth in the study described previously *(43)*, it was noted that 0.57 ppm insecticide appeared in eggs on the day after application. After one month 0.12 ppm was still present.

Eggs produced by hens which were fed 0.75 ppm endrin in their diet for 4 weeks contained 0.17 ppm of insecticide *(88)*. When a diet containing 0.75 ppm dieldrin was fed to hens for 6 weeks, eggs contained 0.2 ppm insecticide. After 12 weeks of feeding the level in eggs was 1.2 ppm *(31)*.

A study was conducted by Ivey *et al.* *(45)* to determine if lindane residues appeared in eggs produced by hens confined in houses sprayed with the insecticide. A 1-% suspension of lindane was used and, in one test, one gal treated 100 square feet while in the other, one gal was applied to 1000 square feet. When the heavier application was used, one week after spraying, eggs contained 13 ppm insecticide. This increased to 16 ppm at 3 weeks, to 20 ppm at 8 weeks and dropped to 15 ppm after 12 weeks. Insecticide residues in eggs were considerably lower when the light spray application was used. After one week, 0.53 ppm was noted. This increased to 0.81 ppm and then gradually declined so that after 16 weeks only 0.08 ppm remained and after 20 weeks no residue could be detected.

REFERENCES

The complete list of references cited will be included with the third paper of this series.

AUTOMATIC MERCHANDISING – 75 YEARS OF PROGRESS[1]

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The Vending Industry this year is celebrating its 75th anniversary. This is also the 50th anniversary of IAMFS and the 25th anniversary of the vending industry's National Automatic Merchandising Association (NAMA). It might, therefore, be fitting to offer a reciprocal "Happy Anniversary" with the fond hope that all three groups will be going strong and continuing to serve the public effectively at the next quarter century milestone.

Patent Office records show that the first coin operated vending machine was patented in the United States in 1886. It was designed to sell postal cards and cigarettes. Perhaps this rather unusual combination was occasioned by the fact that the gay young blade of the 80's sometimes ventured his first smoke away from home. The machine would allow him to buy his favorite brand and write to Ma at the same time. Whatever the reason, this original vending machine never got into production, and it took another 30 years for the first cigarette vender to appear.

The history of vending's growth and its recent diversification in the food and beverage field have been discussed by the writer in a previous Journal article (J. Milk and Food Technol., **21**:7. 1958). In deference to those who are familiar with most of the history of vending, this paper reports primarily on those "Years of Progress" which are most meaningful to public health people–the Post War II years and particularly the past 4 which have seen the Vending Industry launch a full time public health program of its own.

The first vending machine actually operated on location was our childhood friend, the ball gum vender–on New York City's subway platforms. Early records show that gum, candy and nuts were the industry's economic mainstay for the first 20 years. The first cigarette machines, as previously noted, were placed on location in 1920. It is interesting to note that 5 years later, all vended products sold in the United States totaled $30,000,000. Last year alone, the cigarette sales in this country were just under $1,000,000,000, or 1 in every 7 packs.

The development of small mechanical refrigeration units in 1930 made possible the first bottled soft drink machines. This was a major step forward in the merchandising of soft drinks which in 1960 came to over 7,000,000,000 cups and bottles.

Fifteen years ago the first hot beverage and cup soft drink machines appeared on the market. These two machines mark the entry of the vending industry into the type of equipment and products which created public health interest. One city immediately developed a proposed regulation for the design and construction of cup soft drink venders. This regulation was the "handwriting on the wall" for every machine manufacturer to see. The vending industry immediately began a long series of meetings, research projects and introspection which culminated in the adoption by the U. S. Public Health Service of its 1957 Ordinance and Code entitled "The Vending of Foods and Beverages". NAMA is proud to have participated in its development and to endorse it on behalf of its machine manufacturer, operator and product supplier members.

Regulation and Standardization

Industry reaction to the first proposed cup drink machine regulation in 1947 was, "We Can't Do It!". There was more than a little truth to the opinion at that time. Machine manufacturer reaction to the same proposals in the Public Health Service Code 10 years later was almost unanimously, "We *Can* Do It". It is pleasing to note that the manufacturers were not just paying lip service to the new Code. After 4 years of evaluation experience, we can report that "They *Are* Doing It".

What caused this apparent about-face in a matter of 10 years? Admittedly, when engineers from any food equipment industry get acquainted with public health people and their goals, it contributes greatly to a change in attitude and to a better understanding of the problems of both groups. There was a second factor involved in improving the vending industry's ability to meet elevated standards. This has been the vastly improved technology in plastic tubing, plastic molding and the availability of miniature electrical relays and other components. These advancements now make it possible to build into a cabinet smaller than the average home refrigerator all of the items we now find in a typical batch-type coffee vender. Here are some of the most important components:

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[1]Presented at the 48th annual meeting of the International Association of Milk and Food Sanitarians, Inc., at Des Moines, Iowa, August 14-17, 1961.

1. Complete refrigeration system.
2. Refrigerated compartment for perishable ingredients.
3. 6-quart-11 gallon water heater plus controls.
4. Automatic coffee brewer and coffee pot.
5. Automatic chocolate whipper and blending compartment (optional).
6. Ground coffee hopper and metering device.
7. Dry ingredient canisters and dispensing motors.
8. 18 inches-15 feet of water, black coffee and liquid waste tubing.
9. Automatic controls for water temperature and refrigeration; automatic controls for brewing, cycling and dumping.
10. Sold out controls for cups, ingredients and the waste container.
11. A spray head rinsing device for sanitation.
12. Cup well, cup dispenser and a turret for up to 1,000 cups.
13. Liquid waste containers for empty tapes, cans or loose coffee grounds.

All of these items cannot just be crammed into the machine cabinet. They must be readily accessible, if necessary for cleaning and servicing, and in many cases, removable instantly for commissary exchange or on-location cleaning.

During the past 4 years, we have found that practically all design and construction requirements of the Vending Code can be met with today's available materials and engineering know-how. Experience has shown that there is need to reconsider a few minor details in the Code, but this was anticipated at the time of its writing. An example of such a change is the 16-mesh screening requirement for condenser compartments which are already divorced from the product and container compartments of the machine. A slightly larger screen would permit better air circulation and effective refrigeration without creating any new health problems.

In another area there have been new types of equipment developed which were not envisaged when the Code was planned. For example, there are small coffee machines (usually operated in offices) which utilize pre-brewed coffee brought to the machine in insulated containers. Other similar units have restaurant-type coffee urns which brew at the machine. The Code requires that "Water used as a product ingredient must be piped into the vending machine under pressure". It can be met by the machines which are supplied with pre-brewed coffee, but it can not be met if the same containers contain water and ground coffee when placed in or on the machine. Since there is no public health distinction involved, there should be little objection to a revision of this wording. (It should be pointed out that industry has not yet taken these suggestions to the Public Health Service. They are mentioned here, not in criticism, but to make this reporting complete.)

STANDARDIZATION

So that manufacturers can have a spelled-out set of guidelines in planning new equipment at the drawing board stage, our Automatic Merchandising Health-Industry Council, (AMHIC) on which IAMFS has been represented since December, 1956, has been working for 2 years to develop a Machine Evaluation Manual. The Manual is now ready for distribution to various committee members in its 6th Draft and we feel it will be finalized at our October AMHIC meeting.[2] It follows faithfully the requirements of the Vending Code, but explains the basic requirements in greater detail for the design engineer and production staff.

Figure 1. An attractive automatic restaurant is created by placing harmonizing pieces of equipment side-by-side, as in this installation. The coin-operated venders operate around the clock, providing equal service for workers on all shifts.

MACHINE EVALUATION

As many readers know, NAMA set up the mechanics of a machine evaluation program at Michigan State University and Indiana University Departments of Public Health before the Code was published so that all machine manufacturers could have access to evaluations based on the design and construction requirements of the Code.

Since many manufacturers had reviewed various drafts of the Code beginning in 1954, some machines in production from 1954-57 were built to anticipate the new design and construction requirements. In late 1957 the first machine was issued a Letter of Compliance by one of the two retained NAMA Evaluating Agencies. Since that time over 200 models from 35 manufacturers have been evaluated, and

[2]Since this paper was prepared the proposed Manual was approved by AMHIC at their meeting in October, 1961. The Manual soon will be available for distribution to official agencies, vending industry, vending machine evaluating agencies, and other interested organizations and persons.

Figure 2. Vending is going to college with gleaming, attractive dispensers available around-the-clock for bull sessions as well as between study periods. Today's students get fresh beverages, fruits and dairy products through such units, both in the dormitory and in student union snack rooms. This one is at the University of Kansas, Lawrence.

machines from 5 more manufacturers have recently been submitted for the first time. Each certified model is listed in the annual published "Listing of Letters of Compliance" made available by NAMA to all health officials on request. All of the policies, checklists and other administrative controls used in the program are, of course, also available.

The National Sanitation Foundation during the past 4 years also has carried out evaluations under its Criteria C-1, and annually lists machines meeting its standards. The essential uniformity of the standards used by the NSF and NAMA laboratories is illustrated by the listing of the same models by both agencies on several occasions. This uniformity of the end results of testing under both programs is reassuring to the field sanitarian and adds further to the impressive list of manufacturers who subscribe in fact as well as theory to the upgrading program.

The acceptance of Regulation and Evaluation by manufacturers proves the point that uniform guidelines are welcomed when the manufacturer has a reasonable hope that the program will promote national acceptance of his equipment. Conversely, when everyone has different rules, no one cooperates and no one gains.

LEGISLATION

No industry likes to be regulated for the pure joy of regulation. There were undoubtedly many people in our industry who did not approve of NAMA pressing for a national regulation back in 1953. The advantages resulting from having a Code in the past 4 years have justified the foresight of our industry leaders in this important decision.

It was expected that the states would adopt uniform vending regulations as necessitated by the size and scope of vending in each area. This has generally held true. Seven states have adopted regulations based on the PHS Ordinance and Code. These are Nevada, Montana, Indiana, Ohio, North Carolina, Connecticut and California. Several more are now working on drafts.

Since vending is increasingly a multi-jurisdictional operation, it is felt that initial regulation is best done at the state level. However, the industry has worked cooperatively with local agencies too in developing new programs, and it is gratifying to see the uniformity with which the basic Code requirements are accepted. Among the major jurisdictions with uniform local programs are Los Angeles, Salt Lake City, Denver, Phoenix and Maricopa County, Arizona, Clayton, Missouri, Indianapolis and Marion County, Ft. Wayne, Detroit, Flint, Grand Rapids, Kalamazoo County, Waukegan, Philadelphia and Jacksonville, Florida.

To this list should be added those states already named whose new laws or regulations are automatically enforceable by local agencies. Of major importance too, in attaining national uniformity, is the promulgation of regulations by the 3 military services patterned after the PHS Code. This achievement allows the operating company with both civil and military vending locations to develop one sanitation program acceptable to both.

The adoption of reasonable state regulations and local ordinances has been carried out in practically all of these areas in cooperation with members of the local vending industry. The programs under way tend to support the opinion that machine inspection in the field, after the initial go-around, can be done effectively by random sampling inspections on a route basis, focusing primarily on the types of equipment which have the most sanitation significance, namely, cup beverage and perishable product machines.

The greatest fear of our industry, legislatively, is that of revenue taxation or public health licensing on a "per machine" basis. It is administratively burdensome and expensive to both parties and is inequitable in that it can not assess an accurate cost of inspection. When we note that the 47 legislatures meeting this year considered 1354 bills which affected vending—mostly in an economic way—the fear of adverse legislation is not without foundation.

The Vending Industry health legislation experiences to date have been largely favorable. Local vending operators have exhibited an honest desire to pay their fair share—or a bit more—of the cost of inspection where inspection programs are supported on this basis. The health agencies which are manned by professional personnel have, across-the-board, worked out good regulations and fair fee schedules. In the relatively few areas where the health agency is primarily a fee-collecting department, we find some "sanitation" ordinances where public health is given one sentence and the licensing requirements preempt the balance of the document. An industry sanitarian has no conflict of interest in contesting these alleged health rules, particularly when such words as "clean" and "sanitary" are often forgotten by the city attorney who develops this type of legislation.

EDUCATION AND TRAINING

The automatic food or beverage machine has many advantages in that many of the perennial "human element" problems of manual food service are avoided. The properly constructed and serviced machine can offer a compact, controlled environment which affords maximum protection to the consumer on a 24-hour-a-day basis. We have come a long way in automating cleaning-in-place and reducing other sanitation problems. But to the extent that products and containers must still be handled and machines cleaned, there will always be a need for trained route personnel.

In-service training has been one of the services most widely demanded by our operator membership. There is still much to be accomplished. Sanitation clinics and demonstrations are featured at each national convention and at dozens of regional meetings each year. Individual training schools have been taken to selected routeman groups, but this degree of service obviously can not be offered nationally for over 1400 member companies. An effective alternate has been found in Do-It-Yourself training materials. Color slide sequences with narration cards are now available so that our operators can conduct employee meetings on sanitation without outside assistance. Training slide series for various special types of equipment offer endless possibilities—not to mention almost endless preparation. We have made a good start in this area up to now.

Schools for orienting health officials in vending have met with great success, particularly where meetings are held in operating company shops where equipment is available for examination and discussion. Meetings of this type will, no doubt, be in great demand in the future and NAMA welcomes

Figrure 3. Here, at a service station near Cleveland, a new automatic restaurant offers travelers fast, attractive service at modest prices. Diners select precooked items from glass-front, refrigerated machines. Food is then heated in seconds in microwave ovens, right. At left is a Currency Changer, which provides change automatically for \$1 and \$5 bills.

requests to arrange such schools with state associations or local departments.

On the other side of the coin, it is hoped that local departments will invite vending people to their food sanitation training schools where the local operating companies are involved in food operations which may be covered, at least in part, in the program content. Since food vending is a relative newcomer, the individual operator and employee tend to be young, aggressive and receptive to suggestions and advice. The percentage of "old dogs" who refuse to learn "new tricks" in this industry is very small.

RESEARCH

Many of the requirements of the PHS Code are based on research sponsored by NAMA or its individual manufacturer members between 1948 and 1957. Much of it was conducted at Michigan State University under the direction of Dr. W. L. Mallmann and has been reported through the years in this Journal. As new products and new theories of vending are brought forward, it is incumbent on the industry to ascertain that these new concepts can be employed safely, before machines are offered for public use. With so many new trends being suggested in recent years, studies have been under way at either Michigan State University or Indiana University Departments of Public Health. Through a research agreement made with each university Board of Trustees, NAMA has available expert advice whenever its Research Committee may propose new projects or a review of established procedures.

Studies on copper toxicology at Indiana University (Pub. Health Rep., **73**:910. 1958) have substantially supported the carbonation backflow requirements of the Code. They have been further supported by the 4 billion cup drinks a year which have been vended each year since 1947 without a known toxic poisoning *or* carbonation backflow in machines built to Code requirements.

Hot foods—entrees and full meals—are in increasing demand in industrial and institutional vending. Long-term shelf-life is a problem at 150°F holding temperature, so "cold hold"—"quick heat" will probably be used in future hot food equipment. For over 18 months, cold and hot meal research studies which include the use of pathogenic organisms and foods in packaged form have been under way at Michigan State University. There is presently no doubt that cold-hot machines can store these products cold and elevate batch servings to above 150°F quickly and safely. The same can be done with individual orders. The question is, can unsold packages in a batch-type unit be quickly returned to about 36°F for a subsequent reheating? The outlook is hopeful, based on preliminary returns, but all of the answers are not yet available.

The new bill changers have created a new horizon in the sale of higher priced pre-sold items and also multiple items in automatic restaurants and groceries. As the work-week shortens, we can expect to see more "after hours" vending of staples and specialty items in storefront banks or self-contained vending installations.

Individually brewed cups of coffee and soft drink machines with miniature ice makers have appeared during the past two years or so. The future will see a continuing parade of new and different vending equipment, making products available where they are most convenient. All of the advances will be made within the framework of our public health program guidelines.

Seventy-five years ago, the inventor of that first cigarette-postcard vender might have scoffed at the thought of his industry cooperating with health officials in a program of mutual benefit. Seventy-five years later, his successors assuredly would scoff at any suggestion to drop our cooperative program. What could better acclaim the program's success?

AN EVALUATION OF EXISTING AND PROPOSED MASTITIS CONTROL PROGRAMS AND PROPOSALS OF THE NATIONAL MASTITIS COUNCIL[1]

PREPARED BY THE COMMITTEE ON CONTROL PROGRAMS
AND PROCEDURES OF THE NATIONAL
MASTITIS COUNCIL

ORGANIZATION

In the spring of 1960, the executive board of the International Association of Milk and Food Sanitarians (IAMFS) appointed a special committee to organize an invitational meeting for the purpose of presenting a review of the problem of bovine mastitis to interested leaders in the dairy industry, to health and agriculture agencies of Federal, State, and local government, and to certain professional groups in the hope of initiating a uniform national effort for the control of this disease.

This special committee, known as the Mastitis Action Committee, was composed of representatives of the Farm Methods Committee of the IAMFS, the American Veterinary Medical Association, the American Farm Bureau Federation, the National Milk Producer's Federation, the U. S. Department of Agriculture, the U. S. Public Health Service, dairy trade publications, and dairy trade associations. This committee developed a conference which was held on October 29, 1960, in Chicago with over 200 people present, representing producers, processors, public health and regulatory agencies, and educational institutions. The conference program considered four areas:

1. The Public Health Problem
2. The Economic Problem
3. The Status of Research
4. The Regulatory Problem

From this meeting on October 29 came a directive to the IAMFS Farm Methods Committee to develop a continuing organization to serve as a national force in furthering mastitis research and control. The conference recommended that a national committee for mastitis action should be established composed of one to three representatives of appropriate organizations interested in the program.

Following the conference, the Farm Methods Committee of IAMFS took steps as directed to create a continuing national organization. A document of incorporation was established. Over a dozen organizations indicated a desire for membership. Officers were elected and standing committees established to begin the work of the new organization.

The National Mastitis Council is now incorporated in Illinois as a non-profit corporation. Its work is being done by representatives of its member organizations. Representatives of the U. S. Department of Agriculture and the U. S. Department of Health, Education, and Welfare serve as consultants without vote rather than as a part of the policy making body. The National Mastitis Council now has a President, Executive Secretary, and Treasurer. Standing committees have been appointed on finance, research, education, and programs and procedures.

THE PROBLEM

The problem caused by mastitis is one of many facets involving public health and economic considerations and unique requirements for the development of control programs.

Consider the public health problem. Human infection may result from the consumption of raw milk containing the organisms which are often involved in bovine mastitis. This group of organisms includes *Escherichia coli, Corynebacterium pyogenes, Pasteurella multocida, Salmonella* species, and certain streptococci. Food poisoning may result from enterotoxin which may be present as a result of the growth of *Staphylococcus aureus.* Such food poisoning outbreaks have been reported among people who have consumed foods made with spray-dried skim milk powder. These instances have occurred in England and Puerto Rico. Staphylococcus enterotoxin food poisoning has been reported in several midwestern States due to eating chedder cheese containing the enterotoxin. Still another public health problem (although now under apparent control) is the presence of antibiotic residues in milk. Persons who develop sensitivities to certain antibiotics may experience severe allergic reactions after consuming milk or milk products containing antibiotic residues.

Consider the economic problem. Mastitis is the most costly disease affecting the dairy industry. Yet it may not be very dramatic or even particularly apparent to the individual dairyman. Although it may be constantly leaching away a dairyman's profits, it does not alert him in a dramatic way to the serious losses which he is constantly suffering as would the loss of a total herd from a positive tuberculin test or a positive blood agglutination test for Brucellosis. The U. S. Department of Agriculture publication, *Losses in Agriculture, 1954,* reported an estimated

[1]Presented at the annual meeting of the INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, INC., Des Moines, Iowa, August 14-17, 1961.

loss due to mastitis of $225,805,000 per year. This figure represents only the loss of animals and milk. When you consider the cost of therapy, milk withheld following mastitis treatment, and the value of unsalable milk discarded because of untreated mastitis, the total annual loss will approach one-half billion dollars per year. This figure would be considerably higher if the time spent by the dairy farmer in feeding, raising feed, and other activities were given a dollar value and included in the total losses. The cost of therapy has been increasing. Bulk antibiotics increased 1.3 million dollars from 1958 to 1959. This may indicate an increased usage of antibiotics as well as an increase in the incidence of mastitis. It may also indicate that with greater availability, antibiotics have been used more freely and probably without the benefit of an accurate diagnosis.

Consider the control problem. Bovine tuberculosis and bovine brucellosis are diseases caused by specific organisms and lend themselves quite readily to specific test and elimination procedures. They can both be controlled primarily by the action of State and Federal government agencies. Control of these diseases is dependent upon a single test and upon elimination of the animals found to be infected on any given test. Mastitis is a disease caused by a variety of microorganisms and aggrevated by a multitude of stress factors. The control of mastitis will depend primarily upon the dairyman and his management practices and, secondarily, upon the professional assistance he may be able to obtain.

PROGRAMS

The Committee on Programs and Procedures of the National Mastitis Council has attempted to make a study of what is currently being done in the field of mastitis control. In making this study, the Committee sent questionnaires to several potential sources of information in each State. These sources included the State Health Department, the State Department of Agriculture, Agriculture Experiment Station or Agriculture Extension Service, College of Agriculture, and College of Veterinary Medicine (17 States). The return from these questionnaires was very gratifying and shows a significant effort being made and widespread planning for further control activities. One must remember that this report is a strict evaluation of the information given in the replies to the questionnaire.

Most States have some type of educational program. These programs consist mainly of distributing educational literature containing information on suggested mastitis control measures. Many States conduct courses for county agricultural agents or agricultural leaders instructing them in control methods. States having schools of veterinary medicine periodically hold refresher courses for veterinarians.

Seven States have proposed programs. In these States committees have been formed, procedures outlined, and in some cases studies have been made of active programs in other States.

Ten States indicate that they have an active control program. However, none of these is capable of providing complete service to even the Grade A milk producers. These programs vary from a Statewide effort to research and control projects limited to small areas of the State. Just two States have what could be called a full-fledged program offering service to the entire State.

Eleven States reported funds available for mastitis control activities. Two of these did not indicate the amount of money. The remaining nine had funds ranging from $1500 to $235,000 per year.

Thirty-five States reported a total of 86 laboratories equipped to conduct mastitis diagnostic work. Sixty-three of these are State laboratories, 7 are operated by the dairy industry, and 16 are privately owned laboratories. Several of the States reporting active programs did not indicate that laboratory facilities were available. The existance of more facilities is possible.

Judging from the reports, two States have what the National Mastitis Council considers to be a State mastitis control program. Connecticut was the first State to develop a program having had State funds appropriated each year since 1940. The present budget is approximately $75,000 per year. One laboratory at the University of Connecticut conducts the laboratory examinations on the quarter samples collected by trained field technicians. *Streptococcus agalactiae* is eliminated first and other organisms dealt with as they appear. The participating dairyman must work with a veterinarian to assure effective treatment and elimination of the disease. Educational activities are conducted through leaflets sent to dairymen.

New York's program organized in 1956 is quite similar to that of Connecticut, except that New York State may pay more attention to abnormal secretions or abnormal milk than does Connecticut. Both states have developed an impressive number of *Streptococcus agalactiae* free herds. Indication of the value of elimination of S. *agalactiae* is found in reports from Connecticut as well as New York State. Reports from Connecticut, a few years ago, revealed that a group of herds free of S. *agalactiae* produced an average of 10% more milk than they did when infected. The 1960 Annual Report of the New York State Veterinary College shows that in herds where 35% of the cows were infected with S. *agalactiae*, there was an incidence of 13% abnormal secretion; whereas, in the herds free of S. *agalactiae* the incidence of abnormal secretions was 6%. This is a very good example of the effect that the elimination of S. *agalactiae* can have on milk quality.

Another indication of milk quality in relation to mastitis conrtol also appears in the 1960 New York State report. In 111 herds not under an organized mastitis control program, 70% delivered milk with 1 million or more leucocytes, whereas, 94 herds under a mastitis control program revealed 23% with a count of 1 million or more cells.

Some other States have programs that are not as extensive as those in Connecticut and New York. California has a mastitis control project involving 35 counties under the direction of the School of Veterinary Medicine and the Extension Service. This project provides services to 540 herds containing about 85,000 cattle. In this project the California Mastitis Test is used for screening purposes. Seventeen laboratories furnish the laboratory support for the project. Much attention is directed toward the milking equipment as the major source of stress predisposing the cow to mastitis. Funds for the project are obtained from fees charged for the California Mastitis Test. Training courses are available to veterinarians, extension personnel, and dairymen.

Florida has a mastitis prevention and control program stressing good herd management, milking techniques, and proper milking machine installation. This program is operated on a $95,000 annual budget. One laboratory services the project.

Maine conducts surveys on milk as received at the dairy plant. Dairymen having positive samples are notified and advised to contact their local veterinarians. Dairymen with unusual problems may seek assistance from the State.

Michigan is beginning a State program consisting primarily of educational activity.

New Hampshire operates a small service program on a budget of $11,000 per year, making a small charge for tests. Dairymen are currently demanding more service.

Vermont has a prevention and control program operated by the State extension service. Training sessions and deminstrations are provided which explain the California Mastitis Test, proper milking equipment operation, and good herd management practices. This work is conducted on a budget of $3,500 per year.

Wisconsin has a program which is an extension of an experimental project originating at the University of Wisconsin. Consideration is currently being given to extending this project into a statewide program which will include checking milking equipment and milking procedures, along with the laboratory examination of quarter samples and providing advice to dairymen. This is a cooperative effort of the University of Wisconsin, the State dairy industry, and practicing veterinarians.

Puerto Rico does not have a program but it is interesting to note that in recent field surveys using the California Mastitis Test as many as 72% of the cattle in one area were positive.

In addition to State programs, several local attempts are being made. For instance, the New York City Department of Health, in cooperation with the New York State Mastitis Control Program and the New York State Veterinary Medical Society, has inaugurated a "screening" test for detection of inferior quality of milk due to mastitis or abnormal udder secretions. Modified Whiteside Tests were conducted on milk collected from bulk or weigh tanks delivered to six plants supplied by 640 farms. It was found that about 8% of the milk contained markedly abnormal secretions. Milk plant sanitarians are visiting farms where abnormal or high cell count is indicated. The dairyman is given 72 hours to correct the condition. If it is not cleared up in that time, he is then required to employ a veterinarian to make a mastitis examination of his herd and introduce such therapeutic and corrective measures as indicated. Repeat offenders or those with a very serious mastitis condition are required to utilize the New York State mastitis control program. This project is still in the experimental stage. However, the number of grossly abnormal samples were reduced during the 4-month test period.

It appears that a workable test which would identify mastitis through poor quality milk due to mastitis, followed by farm visits by the milk sanitarian, together with the dairyman's knowing that such a test is being used, creates a strong educational and psychological incentive that will lead to improved milk quality.

Saginaw, Michigan, also has what appears to be an excellent screening program having high potential. Milk samples are taken monthly from each producer's delivery. A microscopic examination of the milk is made for presence of leucocytes. Dairymen producing milk with a count in excess of 1,000,000 cells are notified that there is evidence of mastitis in their milk. They hope to reduce this eventually to a standard of 500,000 per ml. Farmers exceeding the one million count receive a written notice and, if repetition occurs during the following month, the producer receives a second notice together with a form for his veterinarian to use for reporting the results and action taken when he checks the herd. There is also provision for a third notice, but this is apparently seldom necessary. In addition to examining deliveries of milk at Saginaw, they also use the California Mastitis Test for examination of cows in herds showing an indication of mastitis.

As a comparison of work in the United States with other countries, Dr. Hodges has made a personal inspection of control activities in Sweden, Denmark, and England. Mastitis workers in Sweden and Denmark also utilize a screening test for detecting abnormal milk. They use the California Mastitis Test on individual can samples. Presently, they are running these checks four times a year on a research basis. Dairymen producing abnormal or mastitic milk are given an opportunity to take advantage of a mastitis control service that is available through veterinary personnel of disease control laboratories. At the present, this is a voluntary program. However, within the next couple of years it will be mandatory that mastitis corrective procedures be taken, and in Denmark a financial penalty will be imposed. A reduction of as much as 15c per cwt. of milk when quality is inferior has been indicated.

Data obtained at the Royal Veterinary College at Stockholm covering examination of over 3000 cans of milk at three to six month intervals, delivered by farmers revealed 14-16% of the milk in the cell count range of 480,000 to 9 million per ml. This study, when classified according to dairies instead of cows, revealed 8% of the farms having poor quality milk. This is very similar to the results shown on the preliminary tests in the New York City milk supply.

In England, also, serious consideration is being given to the problem of inferior milk quality due to hemolytic staphylococci. Dr. C. D. Wilson at Weybridge, a very eminent mastitis researcher, stated that the Milk Marketing Board[2] in England is very much concerned about hemolytic staphylococcal mastitis and that as soon as the Ministry of Agriculture Veterinary Laboratory at Weybridge can develop a satisfactory approach to the problem, the Marketing Board will make it mandatory that dairymen put forth efforts to control this infection. Dairymen who fail will, according to Dr. Wilson, lose their milk market.

During the past several years there has been an increased interest by all segments of the dairy industry in mastitis control. The lack of similarity in existing programs and varying degrees of effectiveness indicates a very great need of serious consideration being given to development of uniform and practical approaches to the problem. It is recognized that certain areas of dairying have their own peculiarities, but basically the cow is the same and the disease mastitis is quite similar wherever we find it in the United States. No great success would have been achieved with tuberculosis or brucellosis had we not had a uniform and standard procedure of control and elimination. Bovine mastitis as a disease is, to be sure, a much different condition but without a well designed and properly organized approach, we will not get far in combatting this disease.

Since the Mastitis Action Committee held its first meeting in Chicago in October 1960, there seems to have been a marked increase in the interest in mastitis programs in several States. This is an excellent and healthy development. However, there are certain points that we believe to be imperative when organizing a mastitis control program in any State. If we restrict a program to any one phase of the problem without giving attention to the over-all picture, definite limitations will occur.

A well balanced program should be based on several different factors or phases such as:

1. A well developed education program.
2. Screening tests through examination of milk supplies as an indication of the existance of mastitis in individual herds.
3. Diagnosis of mastitis either physically or bacteriologically in the herds indicated to have problems.
4. Installation of an over-all good management program to include regular inspection of the milking equipment by qualified technicians.

An approach which ignores any one of the above mentioned phases will have little success. If we should follow the diagnostic approach without any recognition given to management and prevention, our success would be nullified, because it takes something more than diagnosis and treatment to control bovine mastitis. On the other hand, if we approach it from management alone without giving recognition to the fact that bovine mastitis is a disease of the cow's udder and associated with many different types of bacteria, again our success will be limited. These organisms within the udder will continue to cause trouble unless they are recognized and dealt with in the manner indicated.

Furthermore, should we introduce an educational program without any attention given to recommendations for control programs, no great success can be expected.

The most practical approach to the problem is one of the well organized program no matter how small. At a meeting of the National Mastitis Council, the following recommendation was made:

> "The States should establish committees with representatives of milk producers, milk processors, public health and agricultural agencies, veterinary medical associations, educational, and other allied groups to evaluate the extent of the mastitis problem; evaluate resources for mastitis control and research; actively encourage and support research in mastitis control; and perform such other functions as are recommended by the National Mastitis Council."

Here is a very definite need for an organiaztion with aggressive leadership. One key participant is,

[2] This in effect is a compulsory cooperative society of dairy farmers. It incidentally is quite apparent that adequate milk volumes are now being produced in England.

of course, the dairyman. Without his cooperation, participation and assistance, no program can be a success. There are great potentialities with proper leadership, proper organization, and a good relationship among these various groups, combined with a well organized approach to mastitis control.

No group is in a better position to assist with a mastitis control program than are milk sanitation agencies. Location of the herds with serious trouble with mastitis can best be accomplished through screening tests, such as the California Mastitis Test, or modified Whiteside Test, on bulk or weigh-tank milk samples. A mastitis program which combines physical examination, diagnosis and treatment has value; but bacteriological examination of carefully collected milk samples provides information on infection that gives the veterinarian a good indication of the most satisfactory control procedures. This approach must be preceeded by a good educational program to teach dairy farmers better sanitation, management, and attention to the care of the cow's udder. Here is a wonderful opportunity for sanitarians to work in close cooperation with the Extension Service in teaching dairy farmers these important methods.

The use of demonstration herds has been one of the best educational tools in several programs. Herds are used in demanstrations and meetings to point out to other dairy farmers the potential of mastitis control. For example, New York in the beginning of their program had very few demonstration herds, but today it is not difficult to find one in any neighborhood within the State.

We know that we do not have all the answers to the problems of mastitis, and there is a great need of more research activity than now exists. We not only need new research projects, but coordination of existing research. In this area, the Committee on Research of the National Mastitis Council will prove to be an invaluable tool to researchers in the field of mastitis.

The National Mastitis Council is a young organization struggling to give people in the United States a better concept of practical, workable mastitis control programs and such assistance as may be needed by States wishing to organize such programs. One pertinent activity is the preparation of information about successful programs and procedures for the benefit of States, organizations and individuals who wish to do something about the problem of bovine mastitis.

The National Mastitis Council stands ready to help you.

STATE MASTITIS PROGRAMS AND THE NATIONAL MASTITIS COUNCIL[1]

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I have been asked to talk to you a few minutes this evening on some of the successes and failures of the Colorado Mastitis Prevention Committee. I will also discuss some ways and means in which the National Council can be of assistance to State organizations and how the State organizations can, in turn, be of assistance to the National Council. I feel very strongly about this subject. I hope my thoughts and observations may be of some value to you in the development of your program.

Perhaps some background on the organization and early objectives of the Colorado group should be explained first. Nearly four years ago a small group of dairy industry and regulatory people saw the need for a representative committee to study and advise on ways and means of attacking what is considered by many as the number one problem in the dairy industry. It was apparent that the problem of the promiscuous use of antibiotics in the treatment of mastitis would have to be faced and that no progress was being made in any manner to develop a program of education or help for producers or regulatory people. The need for such a group was recognized by all interested parties. Its purpose was simply to attempt to provide a service which was not available. The committee was made up of the following:

The Milk Producers Association	2 members
The Colorado Veterinary Medical Society	2 members
The Dairy Industry	2 members
Practicing Veterinarians	1 member
State Health Department	1 member
Local Health Departments	1 member
The State University Extension Veterinarian	1 member
The State University Dairy Specialist	1 member
The State Dairy Products Association	1 member

Our objectives were to take first things first. At the moment, the antibiotic problem seemed of uppermost importance. Our first efforts were directed toward the lessening of this problem through in-

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[1]Presented at the meeting of the National Mastitis Council, September 21, 1961 at Chicago, Illinois.

tensive testing and advice to dairy farmers. When the Food and Drug Administration issued their requirement of no tolerance of penicillin in milk in late 1959, our work had paid dividends. We could show a low rate of penicillin positive milk. We had anticipated the problem and had done something about it. Since we had no funds and our members served on a voluntary basis, it was necessary that we confine our efforts to advisory and educational pursuits.

Earlier, regulatory agencies with the aid of Colorado State University and the dairy group, had done considerable work on the elimination of environmental factors on dairy farms which could cause stresses contributing to mastitis. These efforts were in the area of improved barnyards, better housing facilities, etc. The committee felt that there was need to study the milking machine problem and its relation to mastitis. A survey was conducted to get an idea of the extent of malfunctioning milking machines. This survey indicated a high percentage of improperly installed and operated machines. It was our opinion that mastitis control called for the use of a total program and that if we were ever to make any progress in controlling this disease, an all-out effort must be made in controlling the stresses on the cow herself. It was our feeling that unless we do all we can to reduce these basic stresses, all our efforts in the way of treatment, isolation, and sanitation practices will go for naught. The milking machine was then projected as our next effort and study.

We had no trained persons or equipment to carry out a testing program. Our practicing veterinarian member expressed the feeling of many members when he said, "There is just as great a need for milking machine inspectors as there is for barn and milk house inspectors. Milking machine inspection should be a required routine." Our modest beginning consisted of sending the Farm Extension Engineer and the Extension Dairyman of Colorado State University to a neighboring University to learn from them the techniques and equipment necessary to check milking machines. These men then conducted clinics and demonstrations throughout the State in cooperation with County Agents. Since the middle of 1960, these men have checked 166 machines. The story of the defects found is an interesting one and bears out our earlier contention that this equipment should be checked routinely.

In February, 1960, a full day was set aside for the subject of milking machines and their operation at the Annual Dairy Fieldmen's Conference at Colorado State University. All of the major milking machine manufacturers were invited to send representatives and participate in a panel discussion. We concerned ourselves entirely with the problem of vacuum and the need for routine checking. The least we can say of our efforts to stimulate interest in mastitis control is that most of our people have become interested in at least two phases of the problem; namely, antibiotics and milking machines. We have recently learned that one of the leading milking machine manufacturers has developed the equipment and a full scale program of checking and maintenance of their equipment through their dealers and agents. The Colorado meeting is credited with providing the incentive for the development of this project.

As a committee, we now find ourselves stuck on dead center. We have explored the possibility of setting up a full-time veterinarian in connection with the Colorado State University, whose job it would be to carry out an intensive program. We are completely aware of the inadequacies of a voluntary program. We have no State funds and know the philosophy of "let George do it" will never succeed. We confess that we have been cooling our heels since your organization came into existence. Our hopes are that we may be able to hitch our star to yours. We have a committee working on educational material and we have flirted with the idea of making the "California Mastitis Test" a routine test for all Grade A supplies. We can point to a number of milk producers who have had marked success in reducing the incidence of mastitis in their herds. These successes came after they followed the recommended procedures of managed milking, routine testing, and proper medical treatment. In general, we are not over-enthused with our successes. Among other things, we have not been able to stir up the interest of the majority of the dairy industry and the veterinary profession that is needed.

We now come to the question of how and in what way the National Council can help and serve the Colorado committee and other State committees. My personal feeling is that the National Council can be our salvation — the star to which we fasten our wagon. We live in a small world. Our problems in the several states are for the most part the same. Save for a few environmental factors and weather conditions, one area is much the same as another and our *basic* problems are identical. I know of no other area in our endeavors that requires uniformity and concentration of efforts as does mastitis control. My personal feeling is that our reluctance to standardize or unify our approaches and attack toward mastitis can be credited to our failures to get a job done. We can cite hundreds of examples of success in the dairy business and the public health field where the success of the job is directly attributed to a united attack on a national front. Each of us here knows the tremendous success of the 3A Sanitary Standards work in dairy equipment. The dairy industry found out a long time ago that by pooling their advertising efforts through their American Dairy Association and the National Dairy Council, that their efforts and money were most effective. In the area of animal disease control, as well as with many of our human diseases, very little was accomplished until the know-how and the resources of all concerned were brought together. Tuberculosis and Brucellosis eradication, polio, smallpox, diptheria vaccination, and many others are examples of what has and can be done.

First, I would say we need *basic* educational material which is not controversial and which can be used on a state and local level. We know of nothing that will do more toward reducing confusion than agreement on educational material and control measures. We feel that this material when developed on a national level will be more factual and carry more prestige than that developed on a state level. We cannot conceive of a local dairy council or a state dairy group developing their own information on nutrition and publishing it. It is our belief that this needed material developed by the national group would be far superior in content, more attractive, and less expensive. We need this material and we need it badly.

Probably next, we need access to the information collected by your committee on research. I need not elaborate on the objectives of this committee since they are well known to each of you. We understand that the committee will make recommendations on future needs in mastitis research and will promote sound research on the various phases of the mastitis complex. An evaluation of the various diagnostic tests which are now used for mastitis detection is sadly needed. At the moment we are desperately in need of a sound, uniform means of detecting mastitis in the field. We need to have the role of the milking machine clarified. We need to know the proper methods of checking milking machine installations and their efficiency. Our state programs need this type of help.

Continuing with the areas in which you, on a national level can be of assistance, it would seem that the need for uniform regulatory action in mastitis control is self-evident. This area is in utter confusion. We might also suggest that the job of bringing the practicing veterinarian into the fold and interesting him in a total job as well as his state organization and local affiliates, could be accomplished much easier were we able to take advantage of the prestige and help of a national group. Certainly it would be much easier to interest producer groups and dealer associations in supporting a uniform national movement than under the present crazy quilt pattern.

Confidence by milk producers and dairymen is gained only through the development of uniform regulations and enforcement, and practical application of a sound program. Our confusion, indecision, and lack of standard procedures does nothing to gain this needed confidence. The important thing is that we get on a program — make a start — show our constituents that this business of mastitis control is everybody's business. No one can afford to stick his head in the sand and hope the problem will go away. By this time, we should know that it never will go away of its own accord.

There are a number of states in which no mastitis committee or organizations are in existence. The National Council can be of immeasurable assistance in supplying material and other help in the organization of state committees.

It is suggested that since so many areas are asking for help that your program be geared to those who are desirous of this assistance. We are dealing with an economic and public health problem that affects directly a great industry and the entire population. A positive and united action is long overdue. Having a national voluntary group to give us moral and factual support could very well mean the difference between success and failure in this venture. Certainly, independent action in the past has not resulted in progress.

Our next consideration is what can the state groups do to help the National Council. The situation here is much the same as the National Federation of Milk Producers and local associations of milk producers. Our social and service clubs like Rotary, Kiwanis, and many other similar groups may be likened in this respect to the National Council and proposed state councils. The state and local groups are the foundation of the National Council. The local or state groups cannot survive or reach their objectives or purposes without the help, prestige and weight of the National Council. In addition to supplying morale and numbers, the state group can spread the philosophy and objectives of the National Council. The state group can supply the national group with research problems and results of research in their own area. They can supply the information on successes and failures, together with the diagnosis of these successes and failures. Each is dependent upon the other and the success of each depends upon the other.

One final message I would like to leave with you tonight is my idea of how the National Mastitis Council can be of assistance to local health departmenth or enforcement agencies. It is presumed that the policies and programs of the National Council will filter down to the local level from the State Council. For more years than I like to admit, I have been a local Sanitarian. I have been stationed at the grass roots level on the firing line where there is no place to pass the buck. Like most persons in my position, I am groping for help and assistance on mastitis. Those who work with me are continuously pointing out the seriousness of the conditions they find. It is most frustrating to admit that these conditions do exist—that we are making very little, if any, progress and that there is no one to whom we can turn. Some day we must face up to some hard cold facts. Some of these facts may be that mastitic milk is unfit for human consumption and that the public will demand that it be kept out of their food supply.

As a public health worker, I have a selfish interest in an effective control of the disease itself. It is my sincere belief that because of the importance of sanitation in a mastitis control program that when an effective program is carried out most of the items of sanitation which are necessary in a quality control program will be carried out. We are sure that a far better milk sanitation program will automatically result. Most public health people believe that the quality of milk products will be improved in many ways under an effective and uniform mastitis control program. The improvement will not be limited by any means to the removal of mastitis milk alone. Cleaner, better flavored, higher quality milk will result. This is our objective and the goal of our efforts.

The democratic peoples of the world are facing grave crises today. We cannot afford waste and extravagance and inefficiency. These things make us weak. We have a real responsibility to the milk producers and milk consumers of America. The waste and confusion caused by this disease is almost a national disgrace.

You men who are gathered here tonight are to be congratulated for your foresight and willingness to attack a most difficult problem. Independent action over the years has failed us. You did not volunteer for personal glory or selfish ego. You are volunteering to do what you feel must be done. There are those who wish to throw road blocks in your way. In our work it seems that some of us spend more time pointing out to ourselves and each other why a different way of doing things will not work than we do in an honest effort to make it work. Habits, time worn methods, and lethargic thinking are difficult to change. Our responsibility is clear cut. We must use the tools at hand and the facilities available in order that we may do the best job possible. I often wonder what this nation of ours would be like today if our forefathers had been content to take the easy way out—if they had been unwilling to compromise—if such leaders as Franklin, Jefferson, and others had not set the ideals and foundation for freedom and liberty. Certainly, our lives would be a great deal different today were it not for their great work. Let me assure you that the rank and file of those on the firing line, be they public health workers, milk producers, milk distributors, or any branch of this great industry, are behind you. It is ours hope that you will not settle for less than a total program and that steps will be made as soon as possible to eliminate abnormal milk from our milk supplies.

Nearly two years ago I had the honor and pleasure of being on a program with one of your members, Bill Knox of Hoard's Dairyman. My topic was "Team Work in the Dairy Industry". Bill very graciously printed an excerpt from my talk on his editorial page. With your permission, I would like to leave you with the thoughts expressed in this excerpt; it is as follows:

"During all our years of struggle with mastitis and the millions of words and thousands of scientific experiments costing untold millions of dollars, we still do not have a national plan. There is no unity of thought, no real meeting of the minds. We are crying out for help. Will our leaders in this phase of animal and dairy science provide the team work we need or will we continue to play a losing game? If ever the American farmer needs team work help, it is with mastitis."

WHAT SANITARIANS SHOULD KNOW ABOUT STAINLESS STEELS[1]

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Stainless steels are very important metals in the food processing and handling industries for product contacting surfaces of equipment not only for their sanitary characteristics, but also for strength, durability and appearance. Stainless steels are so esteemed that 3-A Sanitary Standards, various sanitary codes, users' specifications and equipment manufactures demand their use. Yet, there is considerable misunderstanding about stainless steels, and especially about those characteristics such as surface finish, composition, corrosion resistance and cleanability, which are generally regarded as affecting sanitation. It is the purpose of this paper to discuss some of these aspects from a background of experience in the manufacture of processing equipment.

Types of Stainless Steels

Stainless steels are alloys of three main groups: Martensitic, Ferritic and Austenitic. These are metallurgical terms decriptive of the characistic solid solutions and crystalline structure of the alloys.

While the metallurgy, history and manufacturing procedures may be very interesting, such knowledge is not essential to the sanitarian. The important features to be associated with the three groups of stainless steels are these:

1. Martensitic stainless steels are chromium steels which are hardenable by heat treatment, have great strength under load and shock and are the lowest of the three groups in corrosion resistance. The most important of the stainless steels in this group in food equipment is Type 410. It is used for blades, knives, mill parts, nuts, bolts and other heat-hardened parts.

2. Ferritic stainless steels are also chromium steels, but contain higher amounts of chromium and are not hardened appreciably by heat treatment. Type 430 is probably the most important of this group used in food equipment. It is used for trim, mouldings, counters, exteriors, etc.

3. Austenitic stainless steels are chromium-nickel alloys. They are non-hardenable by heat treatment, have a very high corrosion resistance and are well suited to product contact use. The 300 series of 18-8 stainless steels are in this group.

4. A fourth group which might be added is the precipitation hardenable stainless steels which have corrosion resistance equal to types 302 and 304 and the ability to be hardened by heat treatment. There are several members of this group. In composition, they are chromium-nickel-copper, chromium-nickel-aluminum and chromium-nickel-molybdenum alloys. Of these, the chromium-nickel-copper is most useful in food equipment. It can be hardened throughout by a single heat treatment at temperatures varying from 850° to 1150°F for 1 to 4 hours. This low temperature heat treatment causes so little distortion and dimensional change that all machine work and most of the surface finishing can be done prior to hardening.

The copper in the steels of the fourth group, unlike that in the copper-bearing "white metals", is stable and not extracted by food products or sanitizing chemicals. Upon heat treating, the supersaturated solid solution of copper is precipitated giving a hard metal possessing a Martensitic-like structure interspersed with Ferrite stringers.

The corrosion resistance of 17-4-PH, a typical precipitation hardenable stainless steel of the chromium-nickel-copper type, is equal to that of Types 302 and 304 stainless steel. With dairy and food application environments, there is no tendency toward preferential corrosion when 18-8 and precipitation hardenable stainless steels are in contact with each other.

The precipitation hardenable stainless steels are used in food processing equipment where high strength and great hardness are required. Applications include shafts, pistons, bearings, bolts and nuts.

Table 1 gives standard compositions of several commonly used stainless steels and a precipitation hardening type. The compositions listed in Table 1 are from the *Steel Products Manual, Stainless and Heat Resisting Steels (10),* except that for 17-4-PH which is from an Armco Steel Corporation Manual *(1).*

Identification of Stainless Steel

Often, the sanitarian believes he has need to identify a specific type of stainless steel or to distinguish stainless steel from another metal. Such identification is no simple matter, and the means are not suitable for the amateur metallurgist. If a positive identification of a certain type is necessary, a sample should be sent to a metallurgical laboratory for identification and analysis.

[1]Presented at the 48th Annual Meeting of the International Association of Milk and Food Sanitarians, Inc., at Des Moines, Iowa, August 14-17, 1961.

TABLE 1—COMPOSITIONS OF STAINLESS STEELS[a]

Type	C	Mn (Max.)	P (Max.)	S (Max.)	Si (Max.)	Cr	Ni	Others
302	0.15 Max.	2.00	0.045	0.030	1.00	17.00/ 19.00	8.00/ 10.00	
303	0.15 Max.	2.00	0.20	0.15 Min.	1.00	17.00/ 19.00	8.00/ 10.00	Mo 0.60 Max.[b] Zr 0.60 Max.[b]
304	0.08 Max.	2.00	0.045	0.030	1.00	18.00/ 20.00	8.00/ 12.00	
305	0.12 Max.	2.00	0.045	0.030	1.00	17.00/ 19.00	10.00/ 13.00	
316	0.08 Max.	2.00	0.045	0.030	1.00	16.00/ 18.00	10.00/ 14.00	2.00/3.00 Mo.
410	0.15 Max.	1.00	0.040	0.030	1.00	11.50/ 13.50	-	
430	0.12 Max.	1.00	0.040	0.030	1.00	14.00/ 18.00	-	
17-4-PH[c]	0.07 Max.	1.00	0.040	0.030	1.00	15.50/ 17.50	3.00/ 5.00	3.00/5.00 Cu 0.15/0.45 Ta

[a]Composition shown does not include iron which makes up remainder.
[b]Added at producer's option; reported only when added intentionally.
[c]17-4-PH is not an AISI designation, but a designation of Armco Steel Corporation.

For rough identifications, there are a number of quick tests which can be made by almost any technician. Results from these tests should be used as guides only and not regarded as positive. A number of these tests are given in a booklet called *Working Data* published by the Carpenter Steel Company *(11)*.

Among these quick tests is the nitric acid test which identifies stainless steels from non-ferrous alloys and ordinary steels. The testing solution is made by mixing equal parts of concentrated nitric acid and water. A drop of the solution is placed on a freshly ground spot on the specimen. Boiling action indicates attack. Stainless steels of the 18-8, 300 series are not attacked, but annealed forms of certain of the 400 series are, and further identification tests must be made.

Also among these tests is one which has been the favorite of sanitarians—the magnet test. The 18-8 or Austenitic stainless steels are non-magnetic in the annealed condition, but they are slightly magnetic when cold worked. This may occur during machining, spinning, bending and forming, and during use through vibrations and repeated impacts. Further, Type 316 stainless steel is slightly magnetic. Often stainless sheets are used as cladding over heavy structural steel. In this case the test is useless, for the strong magnetic pull of the structural member is felt through the stainless steel. With modern fabricating methods and with stainless clad processing equipment, the test for magnetism is of little value.

Other quick tests for the refinement of identification probably have little value to the sanitarian.

Reliable equipment manufacturers make every effort to use the material best suited to the application. Inventory records of the various stainless steels are rigorously controlled to prevent the mixing of types. Many equipment manufacturers require a certified report of analysis for each lot of stainless steel purchased or have an independent analysis run.

SURFACE FINISH

Surface finish may be the most misunderstood of sanitary specifications for stainless steels. The various 3-A Sanitary Standards for Milk equipment nearly all require, "All product contact surfaces shall be at least as smooth as a No. 4 mill finish on stainless steel sheets, or 120 grit finish properly applied". Bakery Industry Sanitation Standards require, "To be smooth, a stainless steel, nickel alloy or similar corrosion-resistant surface shall be finished to at least a No. 2B mill finish", and for product contact surfaces of these metals "at least a No. 2B mill finish or 120 grit finish properly applied", is the requirement.

Mill finishes are *defined finishes* for sheets with the definition describing the steps to be taken and means to be employed in producing the finished surface. There is a considerable range of smoothness, sheen, color, light reflectivity, etc. within any finish. The range is normal, and is influenced by such factors as the type of stainless steel, the gage or thickness of the sheet, the condition of the belts carrying the abrasive grit, the lubrication used during finishing, and others.

The finish designations are standards of the steel industry and may be found in the *Steel Products Manual, Stainless and Heat Resisting Steels (10).* The finishes are distinguished by an arbitrary system of numbers. The unpolished finishes are No. 1, No. 2D and No. 2B, and the polished finishes are No. 3, No. 4, No. 6, No. 7 and No. 8. These are the only mill finishes defined. There is no No. 5 in this scheme. Since each finish contains a rather broad range and is, in fact, a category of finishes within itself, such terms as "No. 5" and "better than a No. 4", which are often used by sanitarians are meaningless.

The finishes most often used for food processing equipment are No. 2B and No. 4. The No. 7 is required by some.

No. 2B

This is a bright cold rolled finish produced by cold rolling to a specified thickness, annealing and descaling. The descaled sheet receives a final light cold rolled pass on polished rolls. No. 2B finish may be used for all but deep drawing operations and is readily polished. No. 2B surfaces have a gray appearance, have a low reflectivity, and readily show up hand prints and soil.

No. 4

This finish is the result of following initial grinding with successively coarser abrasives, with sheets generally finished last with abrasives of approximately 120 to 150 mesh size. No. 4 is probably the most widely used finish for product contact surfaces in food and dairy equipment. Surfaces having a No. 4 finish are bright, have a relatively high light reflectivity, and maintain a good appearance through considerable use.

No. 7

This finish is produced by buffing a finely ground surface. Grit lines are not removed. No. 7 has a high degree of reflectivity. It is easily scratched and marred.

CLEANABILITY

There has been considerable attention given to the cleanability of the various finishes of stainless steel, for this is the factor which is most directly related to sanitation. The most recent series of researches on cleanability is that by Kaufmann *et al. (5, 6, 7, 8).* The experiments were based on bacteriological methods. The results, in general, indicated that there was no significant difference in the cleanability of stainless steels with No. 2B, No. 3, No. 4 and No. 7 finishes. In another study using radioactive isotopes, Masurovsky and Jordan *(9)* found no significant difference in cleanability between No. 4 and No. 7 finishes.

These studies used standardized detergent solutions and, so far as possible, standardized procedures for applying the soiling medium and the cleaners. This is the way to get a scientific comparison of cleanability of finishes. Care should be exercised in the interpretation of results, if the conclusions are to be applied practically, for even though there were no significant differences under the conditions of the experiments, it does not follow that with actual processing conditions, a given cleaning procedure and detergent will give equally satisfactory results for each item of equipment and type of soiling medium. If there had been significant differences, it would not have meant that other detergents and other methods would fail to produce clean surfaces. The practical approach when encountering unsatisfactory sanitizing is to change the detergent, the temperatures and the procedures until proper sanitation is obtained.

GAGE OF STAINLESS STEEL

It is not uncommon for sanitarians and users to be concerned about the thickness of the stainless steel in certain applications, and the minimum gage or thickness is written into some of the sanitary standards and codes — nearly always without regard to other construction features.

While it is true that very thin metal walls which are only lightly supported may, under conditions of use, become damaged so as to interfere with proper sanitation, it is also true that various construction features may permit a greater margin of safety than afforded by an unsupported wall of greater thickness.

Sheet thickness is often stated in gage numbers, a system that is often confusing, even to those familiar with it. Table 2 relates sheet thickness in inches to the old U. S. Standard Gage Equivalent Thicknesses. The use of thickness in inches is being encouraged over gage number, and *The Steel Products Manual (10)* states, "It is common practice to specify sheets to the following thicknesses rather than to gage numbers:" (this is followed by a full table from 8 gage to 32 gage).

GALLING OF STAINLESS STEEL

One of the characteristics of stainless steel which limits its use in certain applications is its tendency to

TABLE 2—STAINLESS STEEL SHEET THICKNESS IN INCHES AND GAGE NO.[a]

Inches	Equivalent gage number
0.172	8
0.141	10
0.109	12
0.078	14
0.062	16
0.050	18
0.037	20
0.031	22
0.025	24
0.019	26
0.016	28

[a]Taken from *Steel Products Manual (10)*

gall or seize when two parts are under pressure and moving relative to one another. This tendency is accentuated when lubrication is inadequate.

The tendency to gall often makes it imperative for the designer to use another alloy, either harder or softer than the stainless steel and with a different crystalline structure, for one of the parts. Where turning stainless steel shafts must be supported within the product zone, it is often necessary to resort to white metal, nylon, or other material for the bearing.

CORROSION OF STAINLESS STEELS

Stainless steels of the 18-8 series have often been called the life-time metals, and claims are still being made in advertisements and trade paper articles that 18-8 stainless steel is corrosion proof. These are over optimistic statements.

Corrosion is a natural process whereby metals and their alloys tend to revert to one or more forms in which they are found in their ores. Man prolongs the process by metallurgical skills and the control of the corrosive environment, but he cannot completely prevent corrosion. Stainless steels of the 300 series are the most corrosion resistant of the metals which are commonly used for food processing equipment. Luckily, these stainless steels are also very strong, quite hard, and can be welded, machined and formed. They are truly outstanding, but they have limits, and are readily attacked by certain corrosive environments.

Corrosion of the Austenitic stainless steels usually causes pits to form which makes the surface more difficult to clean. If the pitting can be halted while the pits are very shallow no real harm to sanitation is caused, but if pits are allowed to progress until they are steep-sided cavities penetrating deep into the metal, they may constitute a sanitation problem. It behooves the in-plant sanitarian to be alert to the beginning of accelerated corrosion and to take steps to prevent its effects.

In the food industries excessive corrosion of stainless steel originates most often from improperly cleaned surfaces and the misuse of chlorine sanitizers.

Corrosion of stainless steel is often the result of a Galvanic cell where dissimilar metals are connected by a metallic bridge on one hand and by an electrolyte on the other. Stainless steel is peculiar in that under certain conditions it possesses the characteristics of two dissimilar metals. The passive stainless steel at the cathodic end represents one and the active at the annodic end represents the other. Passivity of stainless steel is caused by a very thin protective oxide film on its surfaces. This film forms quickly when clean, dry stainless steel surfaces are exposed to air. When this film is interrupted by too severe scrubbing, scratching or pitting, and moisture is present at the point of discontinuity, an electrical potential exists between the active and passive areas. Current will flow through the stainless steel from the passive area to the active and back through the electrolyte to the passive (cathodic) area. At the same time, metal ions may be dissolved from the annode. This starts the pit. As more metal ions are removed, more active stainless is exposed. This is a type of Galvanic cell peculiar to stainless steel.

There are several forms of "cells" which cause corrosion. One, called an oxygen cell is very common. In this instance a particle of soil (it may be a food particle) may adhere to the surface. If moisture surrounds the particle, there will be a difference in the concentration of the dissolved oxygen at the surfaces beneath the soil particle and in the moisture surrounding it. This is enough to set up an electrical potential, and accelerated corrosion may result. Another type of cell, called a concentration cell, exists when an electrolytic solution flows over a soil particle which is adhering to the stainless. Because of the difference in the concentration of ions in the electrolyte in the main stream and that which wets the soil, an electrical potential exists and, again, a cell is formed which accelerates corrosion.

Chlorine and chlorides in general are extremely corrosive to stainless steels. Chlorine is a very active element which readily combines with many other elements. When freed from sanitizing solutions, chlorine gas is readily dissolved by moisture droplets and attacks the stainless steel to which these droplets adhere. The attack is accelerated if acid conditions exist and slowed if alkaline. Brines of sodium chloride and calcium chloride are also extremely corrosive and should not be used in contact with stainless steel unless absolutely necessary.

Other halogen sanitizers have corrosive characteristics similar to chlorine when their formulations are similar.

Sanitarians and equipment operators should be aware of the extreme corrosiveness of chlorine sanitizers when making recommendations for use-solution concentrations. The available chlorine is dissipated quickly in the presence of organic material. If equipment is first cleaned, very low concentrations of chlorine will constitute effective germicides. On the other hand, if the equipment is not clean, concentrated solutions of chlorine will have little germicidal effect. In the latter case the chlorides formed can accelerate corrosion greatly.

It is very difficult to determine an exact cause for some occurances of excessive corrosion, and it is difficult to predict whether or not corrosion will take place. A cautious observer will state only that conditions either favor or do not favor accelerated corrosion.

While an extensive discussion of the corrosion of stainless steels is not within the limits of this paper, a few comments concerning the relative corrosion resistance of the various stainless steels are in order.

There are a great number of tables outlining the corrosion resistance of the stainless steels to various environments. These are often misleading because they are very specific and based on standard tests which may not be related to environments found in food processing applications. One of the best guides, in the author's opinion, is one published by the International Nickel Company, Inc. *(2)*. It includes a discussion of corrosion resistance to organic compounds including acetic acid, formic acid, lactic acid and foods.

It is not uncommon for Type 316 to be regarded as a "wonder metal". While it does have more corrosion resistance in most environments and to certain acids and chlorides, it is not enough better for many food equipment applications to off-set its greater costs. In the Galvanic series of metals, Type 316 stainless steel is next to Type 304 on the least corroded side for both the passive and active states. The potential between the active and the passive states of Type 316 is almost the same as that between the active and the passive states of Type 304. If the passive film is penetrated on either type, and a corrosive environment exists, both may pit or corrode. Except for foods containing active acids or salts or both of these, Type 316 stainless steel is not usually necessary.

Frequently, after pitted areas in processing equipment are cleaned and polished out, there is a desire to passivate the surface. A method outlined by United States Steel Corporation *(3)* uses a 20-30% (by volume) solution of nitric acid at 140 to 160°F. The surface is immersed for about 30 minutes, then thoroughly rinsed with clean hot water. Nitric acid is an oxidizing agent and aids in producing the passive oxide film, but its most important function is to dissolve any free iron contamination that may be on the surface of the stainless steel. Such contamination may originate from some machine tools, shot blasting and mechanical cleaning with ordinary wire brushes, steel wool or abrasives containing iron.

A warning on in-the-field passivating should be observed. Nitric acid is dangerous to handle, surfaces are often difficult to completely submerge, and nitric acid, itself, may corrode the stainless steel. Passivation of stainless steel by nitric acid is seldom successful when done in the field by inexperienced personnel. If surfaces are refinished with materials which are free of iron, then cleaned carefully with standard detergents, and dried, the stainless steel will be passivated quickly by exposure to the air. This is a surer, safer and less costly means of passivating.

The Care of Stainless Steel Processing Equipment

Stainless steel manufacturers, processing equipment manufacturers, detergent manufacturers, plant sanitarians and others issue instructions for the care and cleaning of stainless steel equipment. A little booklet, *How to Protect Stainless Steel Dairy Equipment from Corrosion (4)*, published by the National Association of Dairy Equipment Manufacturers is a guide which should be useful to sanitarians as well as to users of equipment. It not only gives instructions, but also lists reasons for them.

Summary

Sanitarians should know that stainless steel is the best material available at present for the majority of applications as product contact surfaces in food processing equipment. There are many types of stainless steels with varying degrees of corrosion resistance and characteristics. Because of processing demands peculiar to a given application, some of the hardenable, straight chromium stainless steels must be used even though they are not as resistant to corrosion as the 18-8, Austenitic types.

The identification of specific types of stainless steel in equipment is difficult for the amateur metallurgist and quick tests are of limilted value. While Austenitic stainless steels are non-magnetic in the annealed condtion, they are often slightly magnetic after fabricating due to cold working. For positive identification, samples should be sent to a metallurgical laboratory for analysis.

Stainless steel sheet finishes are defined, rather than measureable finishes. There is no significant difference in the cleanability of stainless steels having No. 2B, No. 3, No. 4 and No. 7 finishes.

Although stainless steels are highly corrosion-resistant when compared to most other metals, they do corrode in certain environments, usually with the formation of pits. Various corrosive cells are involved in pit corrosion, but the mechanism is similar to that of the Galvanic cell. To prevent accelerated corrosion, surfaces should be kept clean and dry when not in use. Chemical detergents and bactericides should be used with care. Chlorine bearing materials are especially corrosive and should be used at as low a temperature and concentration for the minimum exposure as compatible with bactericidal results required.

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NEWS AND EVENTS

USE OF ELECTRONICS EXPANDING IN FOOD FIELD

After more than a decade of experiments, scientists in many laboratories the world over are finding an increasing number of successful applications of ultrasonics in the food field.

That was the highlight of a report made here recently to the Market Milk Conference, meeting at Rutgers University, by Dr. Alfred Lachmann, food industry consultant to the Electronic Assistance Corporation. The firm has several research projects under way looking to more uses of high frequency sound waves in the food field. One of them is being conducted by the food department of Rutgers – a two-year study into the promise of ultrasonics in the freeze drying technique of food preservation.

Dr. Lachmann reported that, although ultrasonic cleaning is widely used in many dairy plants, scientists are still working on the challenge of "in place" cleaning of pipes in dairy plants by ultrasonic techniques. After the conference, he showed attendants how to clean dairy pipes in EAC's new ultrasonic tank.

Dr. Lachmann reported that, as a result of work started at the University of Wisconsin in 1949, three scientists – A. W. Fitzgerald, W. C. Winder and G. R. Ringo – had just developed a patented method of determining the solid non-fat and butter-fat content of fluid raw or pasteurized milk by measuring the velocity of sound in milk ultrasonically at various temperatures. He said that the technique permitted fast determination of the composition of milk.

Dr. Lachmann also observed that since the price structure of milk is based on its composition, the improved anayltical method promises real economic advantage to milk producers.

Other Wisconsin dairy scientists have used ultrasonic sound waves for the de-aeration of milk on the theory that removal of the oxygen would improve the milk's keeping quality. A project to speed up the aging of cheese by means of ultrasonic sound waves was also reported from that school.

Meanwhile, in England, a technique has been perfected to stabilize frozen milk through the application of ultrosonic energy. Dr. Lachmann said that when the milk is treated ultrasonically before freezing, it can be kept for 18 to 24 months with no separation or stratification of its components, such as occurs when it is frozen without ultrasonic treatment. Known as "Frosconic Milk," the product is widely used on ships at sea. The process is also in use in other parts of the Commonwealth and in Europe.

German experiments have shown two successful techniques, Dr. Lachmann said. One group demonstrated that the use of ultrasonics permits the use of cream with a lower fat content in the making of butter. Another group showed that ultrasonic sound waves could disperse the moisture in butter in droplets so fine that micro-organisms could not grow on them, thus improving the keeping quality of butter.

Dr. Lachmann also observed that, in another area of agricultural research, Dr. James R. Stouffer of Cornell's Department of Animal Husbandry, had shown that ultrasonic waves can be utilized to help judges determine the quality of championship livestock. He observed that when ultrasonic waves are transmitted into an animal's body by means of a small probe held to its back, the waves form a pattern on a cathode ray tube, permitting judges to trace layers of fat and lean.

BLACK RECEIVES HONOR

Dr. Luther A. Black, chief of milk sanitation at the Taft Sanitary Engineering center, has received a Department of Health, Education and Welfare, *Superior Service Award* for his work in the development and unification of laboratory methods and standards in the field of milk and food sanitation. In 1960, Dr. Black received the Annual Citation Award from *International* for his technical and professional contributions to the progress and advancement of that *Association.*

BILL INTRODUCED IN NEW YORK LEGISLATURE DEALS WITH RADIOACTIVITY IN MILK

Symptomatic of the feeling around the country is a bill introduced last week in the Assembly and Senate of the New York State Legislature. The proposal would *require that all milk be filtered so as to remove radiostrontium before sale.*

It is probably safe to say that a measure like this will not be given really very serious consideration in the Legislature, but the fact that it was introduced at all is indicative of the attitude that exists in some areas. We understand that the Women's March for Peace was largely instrumental in getting this measure introduced.

The U. S. Public Health Service has prepared a statement, for use in answering consumer correspondence, on the ion exchange process for removing radiostrontium from milk. The statement says in part:

"When the strontium removal process was initiated it was not expected to have practical application at the levels of radioactive strontium then resulting from nuclear tests conducted prior to the 1958 moratorium. At its present stage of development and at present and foreseeable levels of radioactive strontium the process would not provide sufficient benefit to counter-balance the health risks inherent in a major disruption of milk production and distribution . . .

"It should be remembered that milk is an essential source of calcium for the bones and teeth of growing infants and children. Any widespread disruption of the production and distribution of this nutritionally essential commodity is likely to create individual and public health hazards far more widespread and serious than will be created by the small amounts of radioactive exposure involved at the levels of strontium 89 and 90 anticipated in the year ahead.

"Additionally, attempts by individuals to reduce milk consumption of their children, without competent medical supervision, could not only result in nutritional imbalance but might actually increase exposure, since milk has a lower strontium-to-calcium ratio than many other foods."

WHEN IS A FOOD ADDITIVE NOT A FOOD ADDITIVE?

A simple answer to this riddle is "when a lawyer talks to a scientist." But the fact that the riddle does exist and does have an answer may be one reason for some of the confusion concerning "food additives." Therefore, perhaps a more explicit answer is in order.

The scientist's definition of a food additive is also the one most common in popular usage. Yet, most of the substances included in this definition are specifically *excluded* from the strictly "legal" definition. Thus, the scientist and the lawyer often have a different understanding of the term, food additive.

To scientists and food technologists — and, practically speaking, to the general public — a food additive is "a substance or a mixture of substances, other than a basic foodstuff, which is present in a food as a result of any aspect of production, processing, storage or packaging."[1] These substances are frequently divided into two classes — 1) intentional additives, which are added on purpose to perform specific functions, and 2) incidental additives which, though they have no function in the finished food, become part of a food through some phase of production, processing, storage or packaging.

According to this definition, chemicals such as sodium bicarbonate, citric acid, ascorbic acid (vitamin C), thiamine, gelatin and even common spices are considered additives, along with many more formidable-sounding, but equally safe, chemicals.

On the other hand, a lawyer must view the food additive as defined in the Food Additives Amendment to the Federal Food, Drug and Cosmetic Act.

[1]From: Food Protection Committee, Food and Nutrition Board. *The Use of Chemicals in Food Productions, Processing, Storage, and Distribution.* Publication 887. Washington, D. C.: National Academy of Sciences—National Research Council, 1961.

This is the definition of a food additive from the legislative point of view:

"any substance the intended use of which results or may reasonably be expected to result, directly or indirectly, in its becoming a component or otherwise affecting the characteristics of any food (including any substance intended for use in producing, manufacturing, packing, processing, preparing, treating, packaging, transporting, or holding food; and including any source of radiation intended for any such use), if such substance is not generally recognized, among experts qualified by scientific training and experience to evaluate its safety, as having been adequately shown through scientific procedures (or, in the case of a substance used in food prior to January 1, 1958, through either scientific procedures or experience based on common use in food) to be safe under the condition of its intended use."

In other words, a lawyer excludes from his definition of food additives most additives in common use because they are "generally recognized as safe" or because they have been previously approved for use. Other substances, such as pesticides and colors, are excluded because they are covered under other sections of the law.

Thus, a food additive (to scientists and laymen) is *not* a food additive (to lawyers and legislators) when its use in a food has been approved according to the specifications of the Food Additives Amendment.

Fortunately, these opposing definitions need not set up barriers to understanding the subject. It is suggested that the definition of the Food Protection Committee be used in all educational work with students and consumers and that the legal definition be left for the exclusive use of legislative and legal lights.

GHIGGOILE RETIRES FROM CALIFORNIA SERVICE

After over thirty-eight years of distinguished and progressive service to the California State Department of Agriculture, Oliver A. Ghiggoile has retired from his position as Chief, Bureau of Dairy Service. His retirement became effective on January 6, 1962.

Jiggs, as he is effectionately known to his many friends and associates, has devoted a life time of work to the quality of California dairy products, has been most successful at it and has won the respect and admiration of industry and the public for his dedication and leadership.

He is a charter member of the California Dairy Industries Association; past president (1933) of the California Milk and Dairy Sanitarians Association, which is an affiliate of *International;* past president of the Western Division of the U. S. Food, Drug and Dairy Association and, Director of the California Dairy Council. Presently, he is a director of the California Cheese and Butter Association.

He is a long time member of *International* and has served faithfully and well on these committees: Milk Ordinances and Regulation; Sanitary Procedures; Frozen Desserts and Frozen Food Sanitation.

His wife, Gail, has also served with the Department of Agriculture for thirty six years and has retired from her position also.

International is proud to have *Jiggs* as a valued active member and our thanks go out to him for the constructive work he did through his own California affiliate and on to the parent *Association*.

He and his wife have many plans for their retirement of which foreign travel is high on the list. In between times, duck hunting and fly fishing for trout will occupy some of *Jigg's* time.

International conveys congratulations for a job well done and extends very best wishes for pleasant, interesting and enjoyable years ahead.

PHAMPHLET PRESENTS SUGGESTED RESEARCH PROBLEMS

100 Problems in Environmental Health: A Collection of Promising Research Problems represents the suggestions and cooperative efforts of more than 80 scientists, engineers, and physicians in educational institutions, governmental agencies, professional practice, technical associations, and commercial enterprises.

The major fields covered include air pollution, food science and technology, occupational health, water supply and pollution control, solid waste disposal, and other related areas.

There has never been a time when so much research money was available. Nearly every area of environmental control has funds for this purpose. If the reader has a problem upon which sound scientific answers are lacking and needed, a well presented project should be presented.

Copies are being widely distributed to deans and other faculty members. A limited supply of single copies are available and can be secured by writing Research Grants Branch, Office of Resource Development (Environmental Health), Bureau of State Services, U. S. Public Health Service, Washington 25, D. C.

CALLIS H. ATKINS CHIEF ENGINEER FOR PHS

Callis H. Atkins assumed his duties as Chief Sanitary Engineering Officer of the Public Health Service on January 2 following the retirement of Mark

D. Hollis, the former chief. Mr. Atkins reported for active duty in the Commissioned Corps in March 1942, and has served since 1955 as Associate Regional Health Director for Environmental Health Services, in charge of sanitary engineering activities of the Public Health Service in Maryland, Virginia, North Carolina, West Virginia, the District of Columbia, the Virgin Islands, and Puerto Rico. From 1952 to 1955 he was with the U. S. Technical Cooperation Mission to India as an advisor in public health engineering to the Indian Government. Prior to that he held various assignments in the PHS including Assistant to Chief Engineer (Hoskins) and Regional Engineer in Kansas City, Missouri, for the States of North and South Dakota, Nebraska, Minnesota, Missouri, Kansas, Oklahoma, Iowa and Arkansas.

Mr. Atkins is a charter member of the Inter-American Society of Sanitary Engineers, and a member of the American Public Health Association, the American Society of Sanitary Engineers, the American Water Works Association, the Conference of State Sanitary Engineers, and the Conference of Federal Sanitary Engineers. He is a Diplomate in the Academy of Sanitary Engineers, Fellow in American Society of Civil Engineers, and a registered professional engineer in the District of Columbia and Virginia.

DESALINIZATION—A HOPE AND A CHALLENGE

It has taunted man for over two thousand years that he can find no way of using plentiful salt water (71% of the earth's surface) to improve his standard of living and make the world's deserts bloom. With adequate fresh water, there will be food in years to come for the world's increasing millions. Without it, countries may go to war, as they have in the past, to grab greater supplies of the earth's most vital natural resource.

Much is currently being done by different countries to augment fresh water supplies. Where political or economic necessity demands it, fresh water is already being produced from the sea—at a price. With the Suez Canal closed to its ships, Israel needs the port of Elath as its only sea outlet to Asia and the Far East. The port at the southern tip of the Negev Desert has grown by necessity. And its desalinized water comes, at considerable cost, from the Red Sea, simply because there is no other water available.

The U.S.A. has up to now not faced such a hard economic choice. With ample room, populations tended to go where water was available . . . leave the arid areas sparsely inhabited.

California has been the first area to buck this trend. The state with the lush weather and vegetation has become the country's second most populous. But the urban sprawl of Los Angeles sits on the edge of the Mojave Desert, and water must now be piped in from hundreds of miles away.

California's — and the world's — problem has received plenty of attention and funds from Congress. Various pilot plants have been built . . . at least seven desalinization processes considered. Most are based on the physical fact that the salt in salt water can be removed either by boiling or freezing.

One process is being used at a Freeport, Texas, plant. Residents of the town have been drinking its 1 mgd output for some months. This plant uses multiple-effect, long-tube vertical distillation. Up to 12 giant evaporators each contain hundreds of tubes 24 feet long. Sea water is passed through the tubes in the first evaporator, some of it being vaporized as fresh water by circulating steam. The remainder passes to the second evaporator, where the heat generated in the first evaporator vaporizes more. So the sea water passes through all twelve evaporators, each time producing a smaller quantity of fresh water.

A second process, used at a San Diego plant, uses multi-stage flash distillation. Sea water is heated to about 200°F, then "flashed" into an evaporator at a lower pressure. The resulting steam becomes fresh water; the remaining brine is flashed through a total of 36 evaporators, each at a lower pressure than the previous one. Each produces more fresh water.

Another process uses a reverse technique—freezing sea water instead of boiling it. To freeze water takes only one-sixth the energy needed to boil it, and this process may prove to be the most economical. One big problem remains. Salt must be washed from the ice crystals formed in the freezing process. The problem: to find a washing process efficient enough to remove salt without wasting too much fresh water.

With still another approach, a pilot plant in Webster, S. D., uses the electrodialysis process to produce fresh water. This process electrically separates sodium and chlorine ions with the help of plastic membranes through which either sodium or chlorine, but not both, can pass. Thus, in a three-compartment cell, separated by two membranes, one cell holds fresh water, the other two, brine. This process is more suitable for brackish than salt water.

A Roswell, N. Mex., plant uses vapor-compression distillation. Hot salt water is pumped into the bottom of an evaporator and moves up through a series of steam heated pipes to vaporize as fresh water at the top of the evaporator. Some of this vapor is compressed, thus heated, and used to heat more salt water, thus constantly producing more fresh water. An advantage of this system is its low fuel cost. Once the cycle is going, new salt water needs no heating, and only pumping power is necessary.

The newest process vaporizes water without boiling or bubbling. Salt water is fed into vertical tubes. Revolving blades inside the tubes spread the water into an ultra-thin film. Steam heats the film and causes evaporation and, once again, separation of salt and water. This process is claimed to give a purer yield than any other.

Finally, the simplest process of all. Evaporation of the salt water is caused by the sun's heat on a trough with a transparent cover. The condensed vapor on the underside of the cover flows off as fresh water. Two big problems remain. One is to make the condensed drops flow to the collection troughs rather than drop back into the sea water. The other is to find a cheap enough material to construct such an evaporation device. The area needed is huge, as it takes 10 square feet of sun-collecting area to give 1 gallon of water per day.

These seven processes are estimated to range in cost from a low of about 40c to $2 per 1000 gallons of fresh water produced, before distribution, as against the 25c-30c that delivered conventional water supplies cost. Where water is scarce, this price—or any price—will seem a bargain. To others, the cost seems prohibitively high. Farmers, for instance, measure irrigation water by the amount needed to cover 1 acre 1 foot deep—325,900 gallons. Where irrigation is used at present, 1 acre-foot of untreated water usually costs less than $5. Even at only 25c per 1000 gallons for desalted water, 1 acre-foot would cost over $80.

Desalinization offers both hope and problems for the future. At the present a sure means of producing more pure water already exists, though it is often ignored—the reclamation of waste waters. Chlorides are difficult to remove from water. But both industrial and domestic wastes contain a far smaller proportion of chlorides than sea water . . . represent for the predictable future an economical source of fresh water.

Reprinted from Topics, a publication of Wallace and Tierman, Vol. 15:3.

FDA ISSUES WARNING

Restaurant operators were warned yesterday by the Food and Drug Administration to immediately stop all use of a potato bleaching compound called "Whitex." Some of this product is contaminated by a deadly poison—sodium fluosilicate.

It is not known how widely the toxic product has been distributed. Illnesses, not fatal, have so far been reported from Williston, North Dakota, and Horseheads, New York. Small shipments are known to be widely scattered throughout the United States.

Whitex is manufactured by The Bond Co., Kingsport, Tenn. It is a white powder packed in 1 oz. 1 pound and 5 pound containers. One tablespoon per gallon of water is used by restaurants as a dip to preserve the fresh color of peeled potatoes for use as French fries. There is no sale of the product for home use, and no other manufacturer of potato dip is involved, FDA said.

The Whitex product normally contains sodium bisulfite, sodium bicarbonate, citric acid, sugar and ascorbic acid. All these ingredients are safe and legally permitted. Accidental substitution of the poison sodium fluosilicate in place of sodium bissulfite apparently caused the contamination.

Symptoms of the illness are nausea and vomiting. All persons reported ill so far have recovered within a few hours, FDA said. It is believed that the dilution of the product on the treated potatoes is sufficient to prevent more serious effects.

FDA first learned of the contamination of the potato dip through North Dakota State health officials who reported illness of a Williston family after eating French fries at a restaurant. Other reports of illness have just been received from Williston, North Dakota, and Horseheads, N. Y., FDA said.

A nationwide effort to locate and recall all stocks of the contaminated product is under way. Seizure proceedings have been filed in the Federal Court at Fargo, North Dakota, against approximately 85 jars retrieved from restaurants by a wholesale dealer at Williston, North Dakota.

FREEBAIRN ASSUMES NEW DUTIES

Paul A. Freebairn, former sales representative in Michigan has been appointed supervisor in the Midwest region. He will supervise B-K sales activities in Michigan, Illinois, Wisconsin, Nebraska, North and South Dakota, Minnesota, Iowa, Missouri, and Kansas.

Mr. Freebairn was employed by the Salt Lake City Health Department prior to his association with Pennsalt Chemicals. He was past-president of the Rocky Mountain Association of Milk and Food Sanitarians and a member of *International.*

CALENDAR OF MEETINGS

1962

April 2-13—Urban Planning for Environmental Health, Robert A. Taft Engineering Center, Cincinnati, Ohio. Contact: Chief, Training Program, Robert A. Taft Engineering Center, 4676 Columbia Pkwy., Cincinnati 26, Ohio.

April 3-4—University of Nebraska, Annual Dairy Industry Conference, Nebraska Center for Continuing Education College of Agriculture Campus, Lincoln, Nebraska. Administrative Officer, T. A. Evans, 101 Dairy Building, Lincoln 3, Nebraska.

April 9-10—American Butter Institute, Inc., National Cheese Institute, Inc., Annual Meeting, LaSalle Hotel, Chicago, Illinois. Administrative Officer, E. W. Gaumnitz, 110 N. Franklin Street, Chicago 6, Illinois.

April-9-12—United States-Mexico Border Public Health Association, Twentieth Annual Meeting, Nuevo Lardo, Tamaulipas, Mexico. Secretary, Ulpiano Blanco, M. D., 501 U. S. Court House, El Paso, Texas.

April 9-14—Sales Training Course for Ice Cream Salesman, Executive House, Washington, D. C. Administrative Officer, John F. Speer, Jr., 1105 Barr Bldg., Washington, D. C.

April 10-11—Iowa Milk and Ice Cream Mfgrs. Assns., Annual Convention, Hotel Savery, Des Moines, Iowa. Administrative Officer, John H. Brockway, 710 Fifth Avenue, Des Moines, Iowa.

April 11-13—Institute of Environmental Sciences, Annual Technical Meeting and Equipment Exposition, Sheraton-Chicago Hotel, Chicago, Ill. Contact: J. P. Monroe, Lear, Inc., Grand Rapids, Mich.

April 12-13—American Dry Milk Institute, Inc., National Meeting, Edgewater Beach Hotel, Chicago, Illinois. Administrative Officer, John Walsh, 221 North LaSalle Street, Chicago 1, Illinois.

April 15-17—Indiana Dairy Products Ass'n., Inc., Business and Social Meeting, French Lick-Sheraton Hotel, French Lick, Indiana. Administrative Officer, Ward K. Holm, 603 Union Title Bldg., Indianapolis 4, Ind.

April 26—Evaporated Milk Association, bi-monthly meeting of the Industry, Builders Club, Chicago, Illinois. Administrative Officer, E. H. Parfitt, 228 N. LaSalle Street, Chicago 1, Illinois.

April 26-27—Milk and Ice Cream Accounting Conference, Sheraton Hotel, Buffalo, N. Y. Administrative Officer, E. B. Kellogg, Milk Industry Foundation, 1145 19th St., N. W. Washington, D. C.

Apr. 28-May 3—IAICM-ICMI Board of Directors Spring Meeting, Mountain Shadows, Scottsdale, Arizona. Administrative Officer, R. H. North, 1105 Barr Building, Washington 6, D. C.

Apr. 30-May 1-2—National Assn. of Dairy Equipment Mfgrs. Annual Spring Meeting, The Diplomat, Hollywood, Florida. Administrative Officer, John Marshall, 1012 Fourteenth St., N. W., Washington, D. C.

May 1-2—Pennsylvania Association of Milk Dealers, Annual Convention, Penn Harris Hotel, Harrisburg, Pennsylvania. Administrative Officer, Henry R. Geisinger, 303 Telegraph Building, Harrisburg, Pennsylvania.

May 9-10—National Dairy Council, Board of Directors Meeting, Sheraton-Chicago Hotel, Chicago, Illinois. Administrative Officer, Milton Hult, 111 North Canal Street, Chicago 6, Illinois.

May 9-10—New England Association of Ice Cream Manufacturers, Annual Convention, Sheraton Plaza, Boston, Mass. Administrative Officer, Malcolm D. MacLeod, 70 Franklin Street, Worchester, Massachusetts.

May 10-11—Milk and Ice Cream Accounting Conference, Sheraton-Oklahoma Hotel, Oklahoma City, Okla. Administrative Officer, Wm. L. Carter, IAICM, 1105 Barr Bldg., Washington 6, D. C.

May 12-14—Georgia Dairy Association, Annual Convention, Buccaneer Motel, Jekyll Island, Ga. Administrative Officer, T. Charles Allen, 2434 Bank of Georgia Bldg., Atlanta 3, Ga.

May 14-15—Illinois Dairy Products Association, Annual Round-Up, Soangetaha Country Club, Galesburg, Illinois. Administrative Officer, M. G. Van Buskirk, 309 W. Jackson Blvd., Chicago 6, Ill.

May 14-15—Milk and Ice Cream Accounting Conference, Sheraton Hotel, Portland, Oregon. Administrative Officer, Wm. L. Carter, IAICM, 1105 Barr Bldg., Washington 6, D. C.

May 14-16—Iowa Milk and Ice Cream Mfgrs. Association, Annual Convention, Blackhawk Hotel, Davenport, Iowa. Administrative Officer, John H. Brockway, 710 Fifth Avenue, Des Moines 9, Iowa.

May 15-17—Annual Meeting South Dakota Association of Sanitarians, Rapid City, South Dakota. Curtis Anderson, Secretary, PHS Indian Hospital, Sioux Sanitorium, Rapid City, South Dakota.

May 17-18—Milk and Ice Cream Accounting Conference, Monterey, Calif. Administrative Officer, E. B. Kellogg, Milk Industry Foundation, 1145 19th Street, N. W. Washington, D. C.

May 20-22—New York State Milk Distributors, Inc., Annual Meeting, Sheraton Ten Eyck Hotel, Albany, N. Y. Administrative Officer, J. Russell Fox, 74 Chapel Street, Albany 7, N. Y.

May 21-22—Milk and Ice Cream Accounting Conference, Milwaukee Inn, Milwaukee, Wisc. Administrative Officer, E. B. Kellogg, 1145 19th St., N. W., Washington, D. C.

May 21-23—Assn. of Ice Cream Mfgrs. of Pa., New Jersey & Delaware, Inc., Annual Meeting, Pocono Manor Inn, Pocono Manor, Pennsylvania. Administrative Officer, Peter F. Rossi, 405 Lexington Avenue, New York 17, N. Y.

May 22-25—National Restaurant Association, Mc Cormick Place, Chicago, Ill.

May 24-26—Dairy Institute of California, Annual Spring Meeting, Yosemite National Park. Administrative Officer, R. J. Beckus, 11th and L Building, Sacramento, Calif.

June 6—The Holstein-Friesian Association of America, Annual Convention, Hotel Roanoke, Roanoke, Virginia. Administrative Officer, Robert H. Rumler, Brattleboro, Vermont.

June 7-9—Annual Meeting Rocky Mountain Association of Milk and Food Sanitarians and the Wyoming Dairy Association, University of Wyoming, Laramie, Wyo. Administrative Officer, William R. Thomas, Dairy Section, Univ. of Wyo.

June 10-15—VIII Congress of the Inter-American Assn. of Sanitary Engineering, Washington, D. C. Administrative Officer, Edmund G. Wagner, c/o Officer of Public Health, I.C.A., Washington 25, D. C.

June 11-12—Milk and Ice Cream Accounting Conference, Sheraton Hotel, Louisville, Kentucky. Administrative Officer, Wm. L. Carter, IAICM, 1105 Barr Bldg., Washington 6, D. C.

June 12-14—Wisconsin Dairy Foods Association, Inc., Summer Conference, Dell View Hotel, Lake Delton, Wisc. Administrative Officer, A. E. Van Thullenar, 222 S. Hamilton St., Madison 3, Wisc.

June 12-14—Indiana Association of Sanitarians, Annual Meeting, Rice Hall, Indiana State Board of Health, 1330 W. Michigan St., Indianapolis, Ind. Secretary Karl K. Jones, Indiana State Board of Health.

June 17-21—The American Dairy Science Association, Annual Meeting, University of Maryland, College Park, Maryland. Administrative Officer, H. F. Judkins, 32 Ridgeway Circle, White Plains, New York.

June 17-21—National Association of Retail Grocers, Annual Convention, Auditorium, San Francisco, California. Administrative Officer, Marie Kiefer, 360 North Michigan Ave., Chicago 1, Illinois.

June 17-22—American Association of Food and Drug Officials of the U. S., Hollywood, Fla.

June 18-20—Grocery Manufacturers of America, Inc., Mid-Year Meeting, Greenbrier, White Sulphur Springs, West Virginia. Administrative Officer, Paul S. Willis, 205 E. 42nd Street, New York 17, N. Y.

June 18-21—National Dairy Council, Summer Conference, Sheraton-Chicago Hotel, Chicago, Illinois. Administrative Officer, Milton Hult, 111 North Canal Street, Chicago 6, Illinois.

June 28—Evaporated Milk Association, bi-monthly meeting of the Industry, Builders Club, Chicago, Illinois. Administrative Officer, E. H. Parfitt, 228 N. LaSalle Street, Chicago, Illinois.

July 12-13—Pennsylvania Dairy Fieldmen's Conference, Annual Meeting, Pennsylvania State University, University Park, Pa. Administrative Officer, Dr. F. J. Doan, Pennsylvania State Univ., University Park, Pa.

August 5-8—West Virginia Dairy Products Association, Annual Meeting, Greenbrier Hotel, White Sulphur Springs, West Virginia. Administrative Officer, S. J. Weese, West Va. University Dairy, Morgantown, W. Va.

Sept. 10-12—Association of Ice Cream Mfgrs. of New York State, Annual Meeting, Whiteface Inn, Whiteface, N. Y. Administrative Officer, Peter F. Rossi, 405 Lexington Ave., New York 17, N. Y.

Sept. 11-13—University of Minnesota, Dept. of Dairy Industries, Dairy Products Institute Meeting, Dairy Industries Bldg., St. Paul Minnesota. Administrative Officer, S. T. Coulter, Head, Dept. of Dairy Industries, University of Minnesota, St. Paul 1, Minn.

Sept. 12-13—National Dairy Council Board of Directors Meeting, Sheraton-Chicago Hotel, Chicago, Illinois. Administrative Officer, Milton Hult, 111 North Canal Street, Chicago 6, Illinois.

Sept. 17—Wisconsin Creameries Association, Annual Convention, Whiting Hotel, Stevens Point, Wisconsin. Administrative Officer, Oscar Christianson, 1 West Main Street, Madison, Wisconsin.

Sept. 18-20—American Dairy Association Board of Directors & State Managers Meeting, Olympic Hotel, Seattle, Washington. Administrative Officer. M. J. Framberger, 20 N. Wacker Drive, Chicago, Illinois.

Sept. 24—Dairy Mixers, Inc., of Philadelphia, Annual Outing, Aronimink Country Club, Philadelphia, Pa. Administrative Officer, Ernst J. C. Fischer, 2809 W. Queen Lane, Philadelphia 29, Pa.

Sept. 24-26—American Dairy Association, Board of Directors & State Managers Meeting, Olympic Hotel, Seattle, Washington. Administrative Officer, M. J. Framberger, 20 N. Wacker Drive, Chicago 6, Ill.

Sept. 27—Evaporated Milk Association, bi-monthly meeting of the Industry, Builders Club, Chicago, Illinois. Administrative Officer, E. H. Parfitt, 228 N. LaSalle Street, Chicago 1, Illinois.

Oct. 2-3—Minnesota Creamery Operators' and Managers' Association, Annual Convention and Business Sessions, Hotel Lowry, St. Paul, Minnesota. Administrative Officer, Floyd Thompson, 416 New York Building, St. Paul 1, Minnesota.

Oct. 10-11—Vermont Dairy Industry Association, Annual Meeting and Educational Conference, University of Vermont, Burlington, Vt. Administrative Officer, Henry V. Atherton, Dairy Bldg., Burlington, Vt.

Oct. 10-11—Washington State Dairy Foundation, Statewide Convention, Chinook Hotel, Yakima, Wash. Administrative Officer, Robert J. Keyser, 550 Skinner Bldg., Seattle 1, Wash.

Oct. 13-16—National Automatic Merchandising Association, Brooks Hall, San Francisco, Calif.

Oct. 19-20—Iowa Creameries Association, Iowa Milk Producers Federation, Iowa Milk Driers Ass'n., State Convention, Hotel Roosevelt, Cedar Rapids, Iowa. Administrative Officer, Arthur Kirchhoff, P. O. Box 377, Ames, Iowa.

Oct. 21-24—National Association of Food Chains, Annual Convention, Denver Hilton & Brown Palace Hotels, Denver, Colo. Administrative Officer, Clarence Adamy, 1725 Eye Street, N. W., Washington 6, D. C.

Oct. 24-27—International Association of Milk and Food Sanitarians, Inc. Annual Meeting, Ben Franklin Hotel, Philadelphia, Pennsylvania. Administrative Officer, H. L. Thomasson, P. O. Box 437, Shelbyville, Indiana.

Oct. 28-30—International Association of Ice Cream Mfgrs., Annual Convention, Chalfonte-Haddon Hall Hotel, Atlantic City, N. J. Administrative Officer, Robert H. North, 1105 Barr Building, Washington 6, D. C.

Oct. 28-Nov. 2—Dairy Exposition, Atlantic City, New Jersey. Administrative Officer, Joseph Cunningham, Dairy Industry Supply Association, 1145 - 19th St. N. W., Washington, D. C.

Oct. 29-31—National Association of Retail Ice Cream Mfgrs., Inc., Annual National Convention, Hotel Haddon Hall, Atlantic City, N. J. Administrative Officer, E. M. Warder, 2223 Detroit Ave., Toledo 6, Ohio.

Nov. 7-8—Wisconsin Cheese Makers' Association, 71st Annual Meeting and 1962 Worlds Championship Cheddar Contest, Northland Hotel, Green Bay, Wisc. Administrative Officer, Joseph J. Bauer, 115 W. Main St., Madison 3, Wisc.

Nov. 12-14—Grocery Manufacturers of America, Inc., Annual Meeting, Waldorf Hotel, New York, New York. Administrative Officer, Paul S. Willis, 205 E. 42nd Street, New York 17, N. Y.

Nov. 19-20—South Dakota State Dairy Association, Annual Convention, Sheraton Cataract Hotel, Sioux Falls, S. Dakota. Administrative Officer, Ervin Kurtz, Brookings, S. Dakota.

Nov. 26-29—Southern Association of Ice Cream Manufacturers, 48th Annual Convention, Americana Hotel, Bal Harbor, Fla. Administrative Officer, Edward J. Koontz, Box 5107, Biltmore, N. Carolina.

Nov. 27-28—Northwest Association of Ice Cream Manufacturers and Minnesota Milk Council, Annual Convention, St. Paul Hotel, St. Paul, Minn. Administrative Officer, D. T. Carlson, P. O. Box 72, Willmar, Minn.

Dec. 6—Evaporated Milk Association, bi-monthly meeting of the Industry, Builders Club, Chicago, Illinois. Administrative Officer, E. H. Parfitt, 228 N. LaSalle Street, Chicago, Illinois.

Dec. 12-14—Wisconsin Dairy Foods Association, Inc., Annual Convention, Schroeder Hotel, Milwaukee, Wisc. Administrative Officer, A. E. Van Thullenar, 222 S. Hamilton St., Madison 3, Wisc.

MARK D. HOLLIS SELECTED AS W.H.O. CHIEF ENGINEER

Assistant Surgeon General Mark D. Hollis retired recently from the Public Health Service and was then appointed Director of the Division of Environmental Health of the World Health Organization. He reported to duty at WHO headquarters in Geneva, Switzerland, on November 20, 1961. Upon leaving PHS, Mr. Hollis received the Commission Corps' highest award, the Distinguished Service Medal. The Medal is given for an exceedingly high level of achievement, a genuine sense of public service, and outstanding contributions to the mission of the Public Health Service.

The citation for Mr. Hollis stated that the award was given "in recognition of his outstanding performance, his sense of dedication and his demonstrated broad and farsighted thinking over a span of 25 years of service. He has been primarily responsible for the steady growth of sanitary engineering in health programs of the Service and in an interdisciplinary approach to the health problems of the future.

His accomplishments as the Chief Sanitary Engineering Officer of the Service and as a delegate to the World Health Assembly and a member of the committee that formulated the Third International Report on Sanitary Engineering have established him as a leader on a national and international basis in the field of sanitary engineering."

GOOD PROMOTIONAL PAMPHLET ISSUED

A description of the unsung heroes of public health —scientists, engineers, and sanitarians—who constitute the front line of man's fight against disease is contained in a new 25-cent pamphlet, QUIET GUARDIANS OF THE PEOPLE'S HEALTH[1], just published by the Public Affairs Committee, 22 East 38th Street, New York 16, New York.

Written by Nettie Kline, the pamphlet emphasizes such things as the need for "detailed attention to the design and operation of the water supply and sewage systems, incinerators, dairies, ships, trailers, trailer parks, school buildings, hospitals, restaurants," and many other public facilities.

"No civilization can thrive," Miss Kline points out, "which does not take steps to protect its people from natural stresses, from inhaling . . . or absorbing the parasites that travel from man to man."

[1]Pamphlet has good promotional value explaining field of environmental sanitation.

PACKAGE EDUCATIONAL PROGRAM AVAILABLE

New "package" educational programs on sanitation for different industries are now offered by Klenzade Products. Each program is based on practical procedures tailored to individual group needs. Programs are available for presentation to milk producers, dairy and food plant personnel, sanitarians, dietitians, institution departmental personnel, management-supervisory staffs and other groups responsible for proper sanitation.

These programs are given by experienced Klenzade sanitation consultants. Demonstrations of cleaning and sanitizing procedures are made in addition to discussion of technical fundamentals. Visual aids including slides, films, posters and supporting literature are used liberally. Group participation is encouraged in all programs.

A typical program outlines the need for sanitation, gives a background on practical bacteriology, treats various cleaning problems and offers suggested procedures.

For further information about "package" educational programs on sanitation, write Klenzade Products, Beloit, Wisconsin, giving details concerning the interests of your group.

INDEX TO ADVERTISERS

PAPERS PRESENTED AT AFFILIATE ASSOCIATION MEETINGS

Editorial Note: The following is a listing of subjects presented at recent meetings of Affiliate Associations. Copies of papers presented may be available through the Secretary of the respective Affiliate Association.

IOWA ASSOCIATION OF MILK SANITARIANS

21st Annual Meeting
Iowa State Univ.—Ames, Iowa
March 27, 1962

(*Secretary*: Richard E. Stedman, State Office Bldg., Des Moines 19, Iowa)

Feeding vs. Milk Production, Ventilation, Lighting, Drainage, Clean-up in Barns and Milking Parlors - Clay Equipment Corp., Cedar Falls.

Fly Control on Dairy Farms - Harold Stockdale, Extension Entomologist, Dept. of Entomology, Iowa State Univ.

Quality Testing for Bulk Tank Milk - Earl Wright, Extension Dairyman, Iowa State Univ.

Psychrophilic Bacteria - Their Effect on Quality - M. P. Baker, Dairy and Food Industry, Iowa State Univ.

Farm Sewage Disposal Systems (Public Health Reasons and Satisfactory Compliance) - H. E. Thompson, U.S.P.H.S. Kansas City, Mo.

Design and Layout of Farm Sewage Disposal Systems - Ted Willrick, Extension Engineer, Iowa State Univ.

MILK AND FOOD SANITARIANS AND INSPECTORS CONFERENCE

University of Idaho—Moscow, Idaho
March 6, 7, 8, 1962

(*Secretary*: Wayne R. Heiskari, Latah County Health Unit, Moscow, Idaho)

Restaurant Seminar, Proposed Ordinance and Code Regulating Eating and Drinking Establishments (1962 Recommendations USPHS) - E. D. Moore, Chief, Milk and Food Section, Region VIII, Denver, Colorado.

Automation and Sanitation - R. B. Douglas, Klenzade Co.

Significance of Coliform in Food Processing and Handling Operations - R. A. Hibbs, Hibbs Laboratories, Boise.

Costs Involved in Upgrading Idaho's Milk Supply - Dr. J. L. Barnhart, Dept. of Dairy Sciences, University of Idaho.

Mastitis Control Program in Idaho - Prof. E. A. Wilson, Dept. of Agricultural Engineering, University of Idaho.

Requirements for Grade "A" Dried Milk - Dr. John E. Montoure, Dept. of Dairy Science, University of Idaho.

Food Plant Waste Disposal Problems - Dr. R. A. Hibbs, Hibbs Laboratories, Boise.

Idaho's Farm Bulk Milk Tank Law - Duard Campbell, Director of Dairying, Idaho Dept. of Agriculture, Boise.

Use of Iodine Products in Sanitation - Cliff Miller, Supervisor, Lazarus Laboratories.

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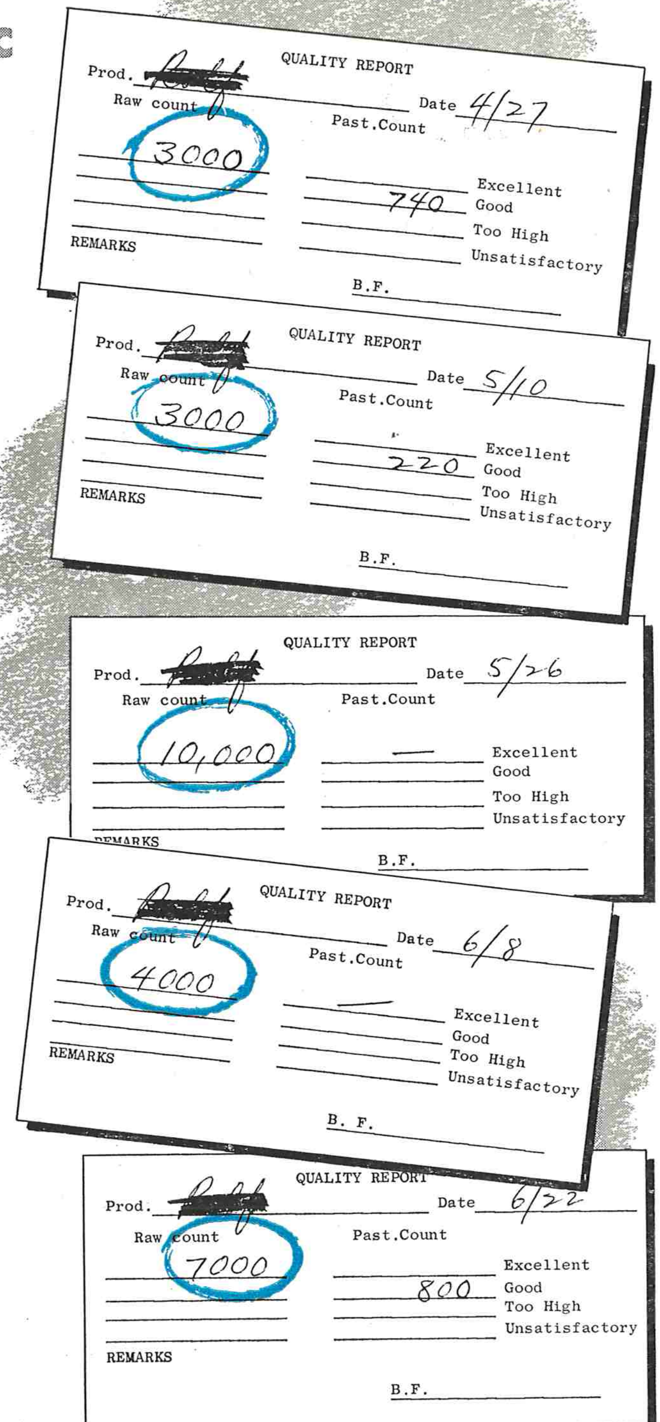
QUALITY REPORT
Prod. [redacted] Date 4/27
Raw count Past.Count
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740
Excellent
Good
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REMARKS
B.F.

QUALITY REPORT
Prod. [redacted] Date 5/10
Raw count Past.Count
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220
Excellent
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REMARKS
B.F.

QUALITY REPORT
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Unsatisfactory
REMARKS
B.F.

QUALITY REPORT
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Too High
Unsatisfactory
REMARKS
B. F.

QUALITY REPORT
Prod. [redacted] Date 6/22
Raw count Past.Count
7000
800
Excellent
Good
Too High
Unsatisfactory
REMARKS
B.F.

ANY DAIRY FARMER CAN EQUAL THIS RECORD!

We're purposely showing here a *typical* record* made with a 3-year-old length of TRANSFLOW, because it is one that any dairy farmer should be able to equal. *It has been surpassed by thousands of TRANSFLOW users*, like the Michigan dairy farmer who reports that his counts have been 5,000 or less for over a year.

Why is sanitation improved by the use of TRANSFLOW and equipment incorporating TRANSFLOW —Milking Machines, Portable Transfer Systems, Dumping Stations, "Cleaned-In-Place" Cleaning Units and Tank Trucks? There are several principal reasons:

TRANSFLOW'S SMOOTH, DENSE SURFACE can't trap tiny particles, virtually eliminates interior build-up;

TRANSFLOW'S LOW SURFACE TENSION assures complete drainage, so that no residual liquids remain in the tubing as a source of contamination such as bacteria growth;

TRANSFLOW'S NON-AGING, NON-OXIDIZING PROPERTIES prevent the development of bacteria-harboring cracks and pits;

TRANSFLOW REQUIRES FEWER FITTINGS AND COUPLINGS — which are difficult to clean and therefore always potential trouble spots—because its flexibility permits snaking it around corners and obstructions;

TRANSFLOW'S LOW HEAT LOSS and fine insulating properties serve to maintain the temperature of cleaning and sanitizing solutions, so important when tubing is cleaned in place.

TRANSFLOW'S CLARITY provides a quick, easy, *sure* check on cleanliness.

*Name on request.

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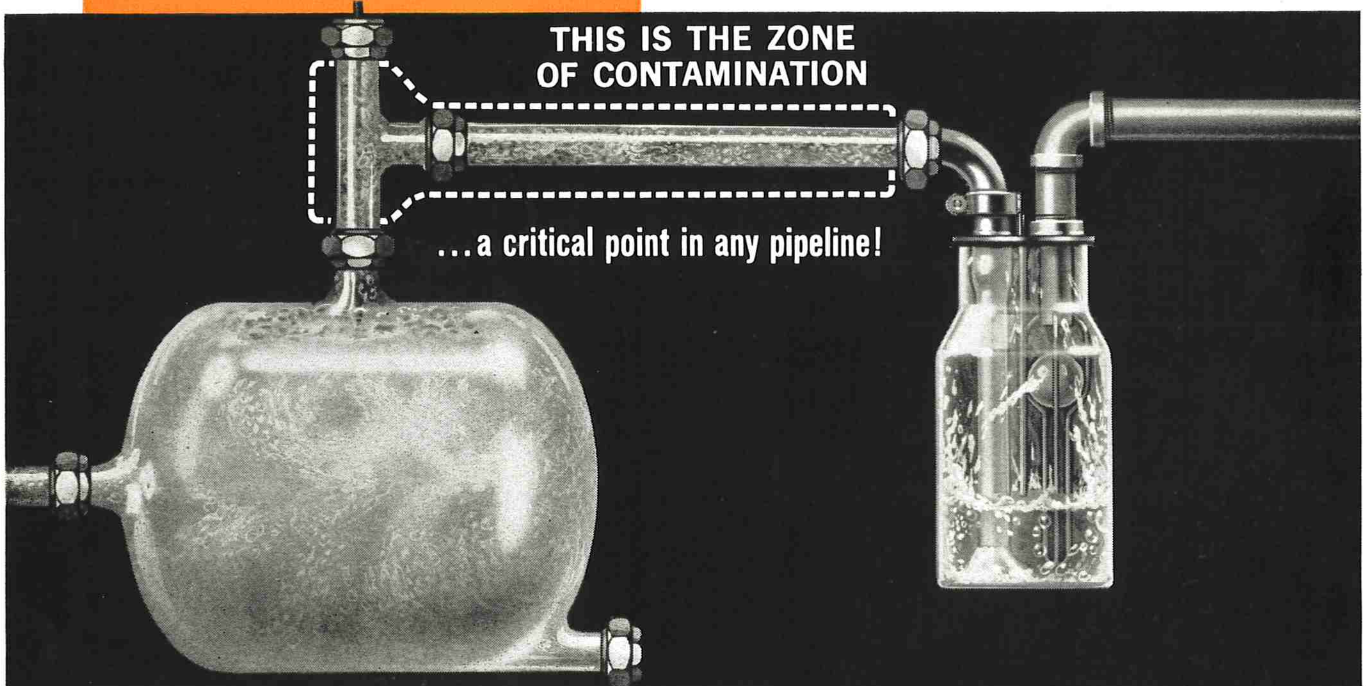
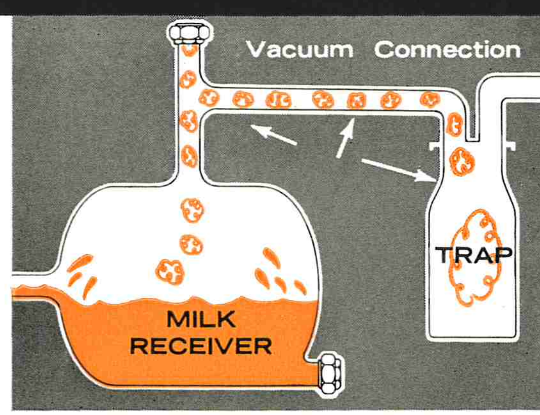
AKRON 9, OHIO

SURGE C.I.P. cleans the "Zone of Contamination"

Absolute sanitation is as essential in the milk house as in a modern hospital. Human life and health depend upon it. A halfway cleaning job may leave deposits to serve as breeding places for bacteria, a "ZONE OF CONTAMINATION" at the next milking. SURGE insists on a "clean-in-place" design that actually cleans the entire system including the "ZONE OF CONTAMINATION." Not just a quick splash in main areas, but a thorough 20-minute, turbulent cleaning of every square inch of milk line in the system, using the most effective combination of cleaning agents. *(Vacuum line is cleaned too, in TONGANOXIE Milking System.)*



Arrows point to "ZONE OF CONTAMINATION" . . . an area that must be cleaned. This vacuum connection and trap, located between the vacuum pump and the milk receiver, is subjected to both milk and milk vapor during the milking operation. After a good hot SURGE bath, this area is really clean and dairymen may rest assured their entire milking system is sanitized and ready to go for the next milking.



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