AUGUST, 1961
Vol. 24 No. 8

Golden Anniversary

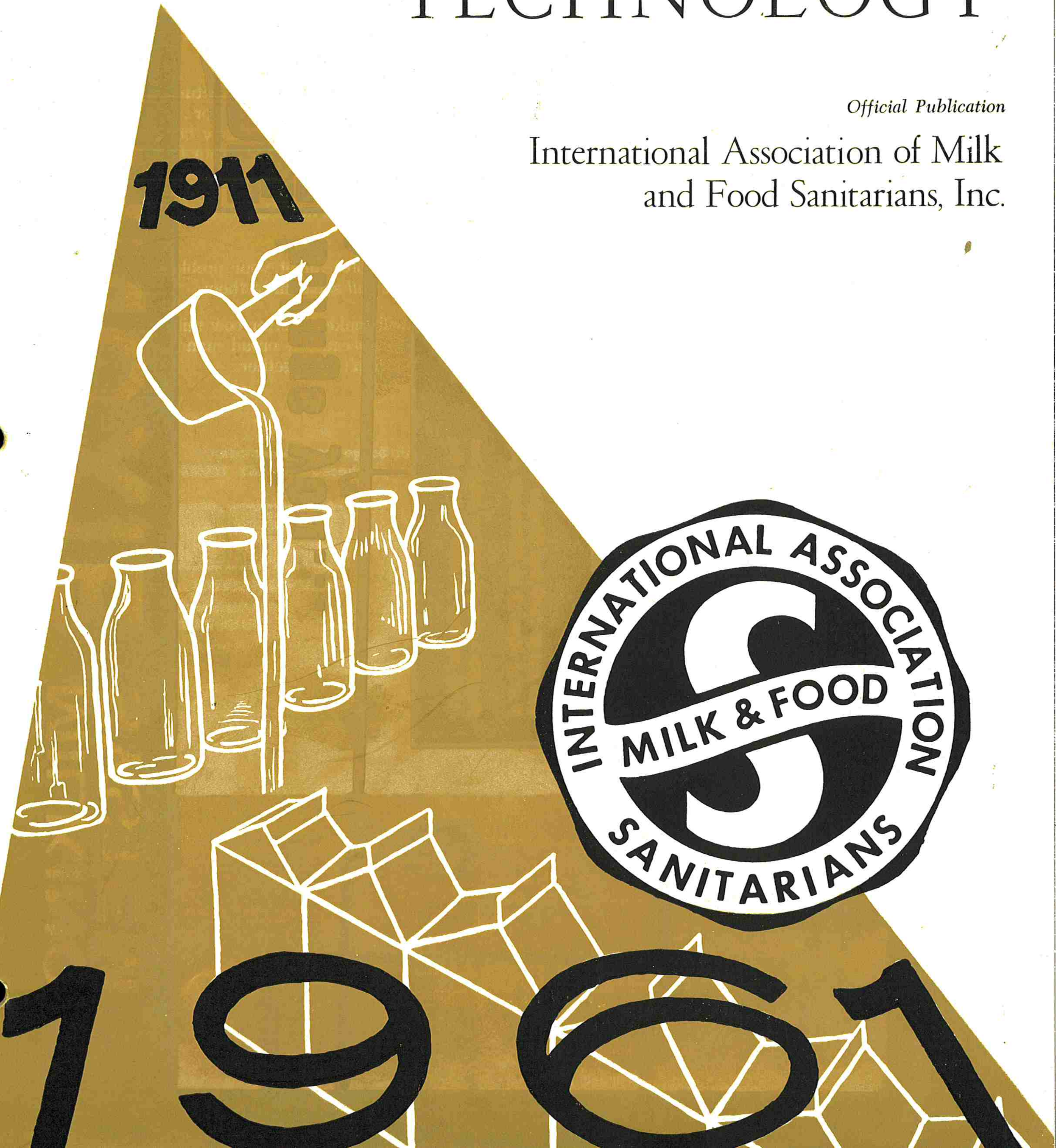
50 YEARS
OF GROWING LEADERSHIP

Journal of

MILK and FOOD TECHNOLOGY

Official Publication

International Association of Milk and Food Sanitarians, Inc.



Pictured below are three of the operators of CREEK AYR FARMS; Mr. and Mrs. Harris S. Horn and son, Ronald, and two of their Champion Ayrshire cattle.

"OUR COMPLETELY-AUTOMATIC ZERO TANK WITH ITS BUILT-IN TIME-CYCLE SPATTER-SPRAY CLEANING ENABLED US TO PRODUCE BLUE RIBBON MILK!"

—*SAYS* **HARRIS S. HORN of CREEK AYR FARMS**
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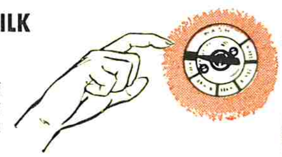

Cleanliness is the secret of high-quality milk — according to Harris S. Horn. He says: "We have found that having healthy cows, clean surroundings and consistently clean equipment assures us top quality milk.

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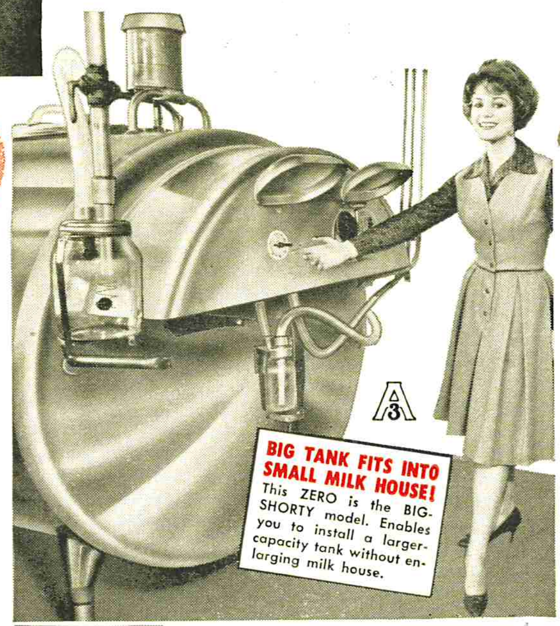

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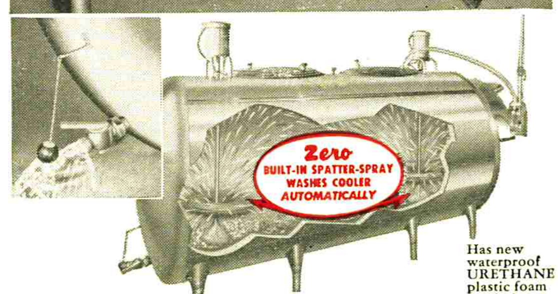

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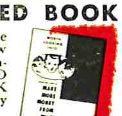

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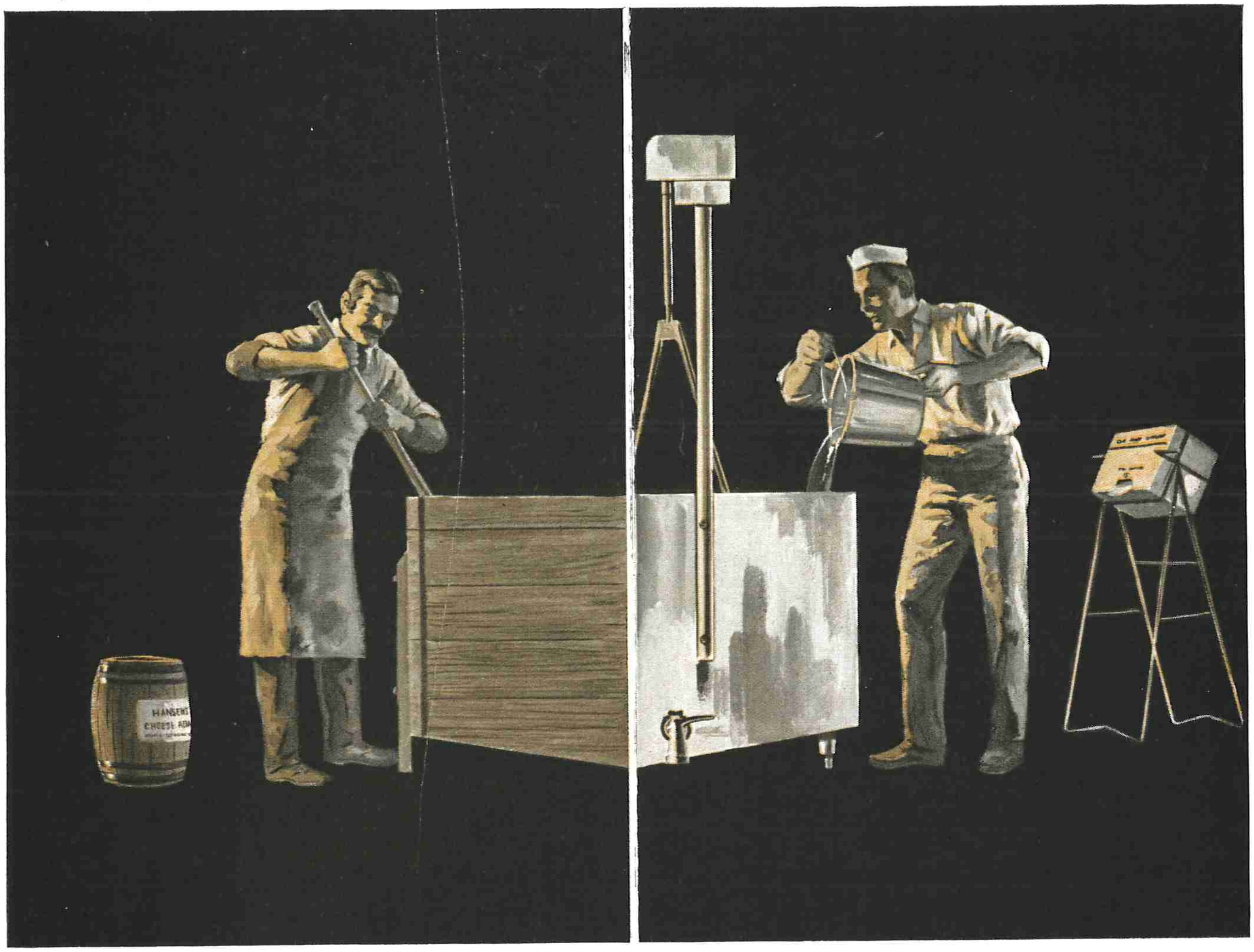

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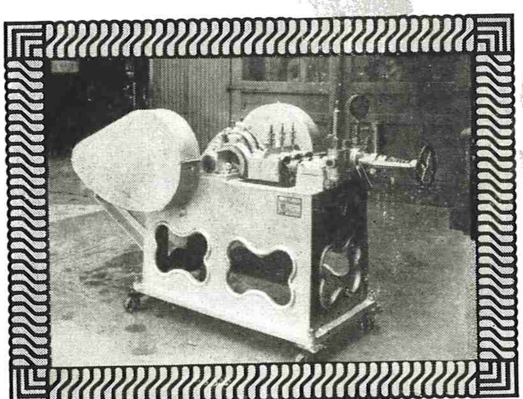

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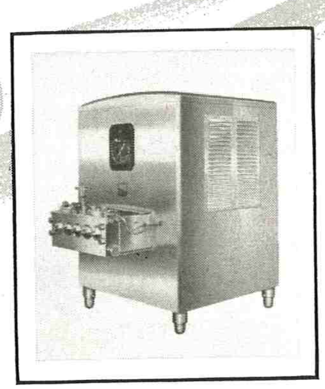

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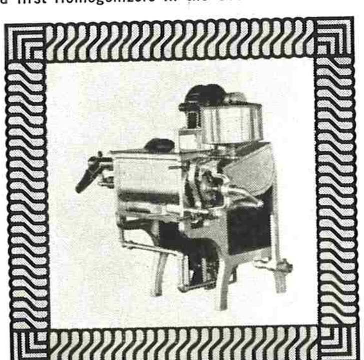

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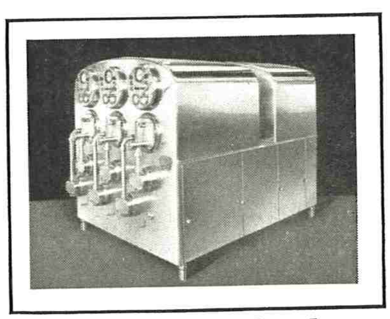

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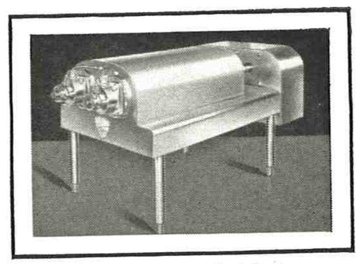

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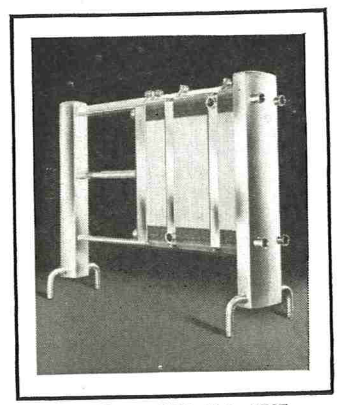

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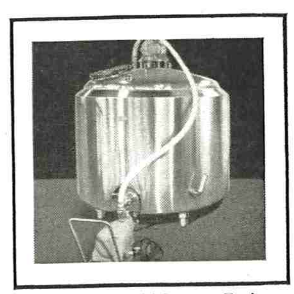

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EDITORIAL

Fifty Years of Leadership

Our Association has now reached the half century mark. It is fifty years old this year. International was born in 1911 when thirty-five dedicated men met in Milwaukee to form this, *The International Association.* Two of the original thirty-five were from other countries, namely Australia and Canada.

Taking root from this early leadership, the Association has grown and prospered until today its membership numbers over four thousand and its official Journal goes to some fifty-four foreign countries. It is the largest Association of its kind in existence. These facts alone stand as a tribute but accomplishment and leadership does not stop here.

In 1911, the founding fathers were concerned with problems that persist even today. At their Milwaukee meeting fifty years ago they were seriously concerned with . . . "necessary and proper steps to be taken to give maximum safety to the milk supply; standardization of requirements and procedures and the quality of personnel engaged in milk inspection." While much has been done in the intervening years to solve these pressing problems, our Association in 1961 is ever mindful that these do still remain as problems for which entirely satisfactory solutions have as yet not been found.

Fifty years ago the milk control picture was quite different, in many respects, from that experienced today. That was the era of raw milk. It was an era when milk inspection was looked upon with ridicule and even with disrespect. There was hardly a vestige of organized animal disease control. Milk was milk and all too often it was handled with little regard for sanitary quality and safety. In 1911, the science of bacteriology was just beginning to come of age and relatively few recognized nor comprehended the potential of milk as a vehicle of disease transmission.

The thirty-five men in Milwaukee fifty years ago stood almost alone. Their recognition of a problem in milk control both nationally and internationally placed them in a group apart. Viewed in the light of their day they were reformers, do gooders and even agitators. It was they who would meddle in the affairs of private enterprise. They advocated regulations and requirements which, to the uninformed – and in that day there were many – would be restrictive, unneeded and wholly uncalled for.

But the early pioneering done fifty years ago has paid rewarding dividends. Leadership has not lagged. Could these men view the progress that has been made over the years they would be justly proud. They would be proud of a long list of milk sanitarians and specialists who have played a prominent role in the excellence of our milk supply today. In the annals of milk control the names of Kelly, Hollingsworth, Supplee, Shoults, Hiscock, Estes, Irwin, Palmer, Parker, Johns, Grim, Ehlers, Brooks, Frank, Abele, Ross, Tiedeman and Fuchs stand out as men who carried on the tradition of leadership and made important contributions to the whole field of dairy science and milk control. All of these men rose to the office of President and through their acumen and dedication, International can lay claim to its unquestioned position of leadership.

While leadership on the part of men who served the Association has been outstanding, it has been the effort of many working in a community of interest which has led to progress. And progress has been made in the several phases which were mentioned and recognized as urgent by the early founders.

Beginning about 1924, the work of Abele and Frank in laying the ground work for the Milk Ordinance and Code recommended by the Public Health Service has helped to accomplish one objective with which the founders were concerned, namely, *how to provide adequate safeguards for the milk supply.* But the Code, as it is presently known, is the outgrowth of mature judgment and the experience of many of our members, both past and present. Revised many times and constantly subject to evaluation and change as dictated by need and technological advances, this document stands as the most complete and authoritative manual for milk control in the world today. International has always had a prominent part in the formulation of these standards and requirements. It is justly proud of its role in charting a well laid course in the fundamentals of milk control.

Expressed as an other early objective, the thirty-five men in Milwaukee wanted to . . . "standardize and make uniform our work." Here again, International has shown outstanding leadership. At least two developments toward this objective have been realized. The first involves standardization of processing equipment through the work of the 3-A Sanitary Standards Committees. Embodied in these Committees we see a unique example of cooperation between dairy manufacturers, processors and official control agencies. No industry today has advanced as far in the standardization of processing equipment for precision, safety and sanitation as is true of the dairy industry. Again International has and is playing a vital role.

The second development geared to the promotion of *standardization and uniformity* relates to the National Conference on Interstate Milk Shipments. Less than a decade old, much has been accomplished toward mutual cooperation among the several states and municipalities who both ship and receive milk from outside their immediate jurisdiction. While this is a voluntary movement with only token financial backing, it has made cerditable advances toward the elimination of jurisdictional overlapping and inspection duplication. Here a recognized need for standardization and uniformity of regulatory action has been the motivating force which has advanced this highly commendable program.

Again, in the early days leaders in milk sanitation expressed anxiety about the caliber of personnel selected to do the milk inspection job. In the intervening years, marked improvement has been made, but there are still all too many weak spots, especially at the local level. While it is true that merit systems have become operative wherein qualifications have been established for education and experience, a great deal of tightening is still needed. This is one objective where more work is needed and where the voice of International should be more distinctly heard.

As one reviews the past fifty years of International, it can be proudly said, *these have been good years.* We believe our founders would be proud of what has been done. Our current measure of milk quality and safety is a far cry from the pioneering days a half century ago. On the other hand, we can not assume a self satisfied attitude for the job is not finished and it probably never will be. However, there is real satisfaction in knowing that in 1961, our people, almost universally, can enjoy a safe and wholesome milk supply. In this, International has played a prominent and significant part. We who are now active in the field need remember that some day we too will be considered pioneers and a half century hence we hope our successors will think of us as vigorous, intelligent and dedicated workers who rendered meritorious service in improving the safety and dietary qualities of our Nation's milk supply.

H. S. Adams,
Indiana University School of Medicine
Indianapolis 7, Indiana

A COMPARISON OF COOLING PERFORMANCES OF FARM BULK MILK TANKS[1, 2]

L. F. Charity
Department of Agricultural Engineering, Iowa State University, Ames

L. B. Altman
Farm Electrification Research Branch, Agricultural Research Service
U. S. Department of Agriculture

and

R. A. Belknap
Division of Public Health Engineering, Iowa State Department of Health,
Des Moines, Iowa

Milk temperatures in 35 ice-bank and 23 direct-expansion (58 total) farm bulk milk tanks of atmospheric design were measured during the summers of 1958 and 1960. Additional information was obtained by a questionnaire.

Cooling requirements specified in 3-A Sanitary Standards were used as the basis for determining performance. Twenty-two percent of the DE tanks failed during the first milking to properly cool the milk to 40°F, and 26% failed during the second milking. IB tanks had 34% fail for the first milking and 17% for the second milking.

For the second milking 35% of the DE tanks permitted the milk to exceed a 50°F blend temperature. The average time above 50°F was 45 minutes. IB tanks had 23% fail to meet this requirement for an average time of 20 minutes. About 75% of the producers poured milk into the tanks in quantities of 3 to 5 gallons. Average milk temperature rise was 11°F for both types of tanks.

Maximum stratification temperatures for the DE tanks averaged 2.6°F and for the IB tank 3.2°F. The stratification temperature patterns were different for the two types of tanks.

Some of the faulty tanks were rechecked in 1960. Mechanical and refrigeration problems along with operator neglect were responsible for most of the tanks not cooling to 40°F in the specified time.

When loadings are heavy and air temperatures are high, second-milking blend temperatures will exceed 50°F in many farm tanks as they are now designed and operated. Faster rates of milking will also tend to cause high blend temperatures.

A systematic routine check of all tanks would reduce considerably the numbers not meeting 3-A Standards. An inspection system should involve the hauler, fieldman, sanitarian, tank dealer, and the producer.

Reports that some bulk milk tanks were not meeting recognized standards of cooling led to a study of the performances of bulk milk tanks on farms with representatives of the Iowa State Department of Health, U. S. Department of Agriculture, and Iowa State University cooperating. During the summers of 1958 and 1960, eight milk sanitarians located in seven different areas of Iowa with the assistance of milk plant fieldmen metered milk temperatures in 58 tanks of the atmospheric type. Some of the information obtained will be presented in this paper.

Procedure and Instrumentation

Temperatures were measured and recorded with 16-point recorders. Sensing elements were 24 AWG copper-constantan thermocouples housed in low-thermal conductivity rods.

The thermocouple junctions were located just below the surface of the rod. Fifteen 2-in spacings of junctions were used with the bottom junction one-eighth inch from the end of the rod. Components for one of the two instrumentation sets are shown in Figure 1.

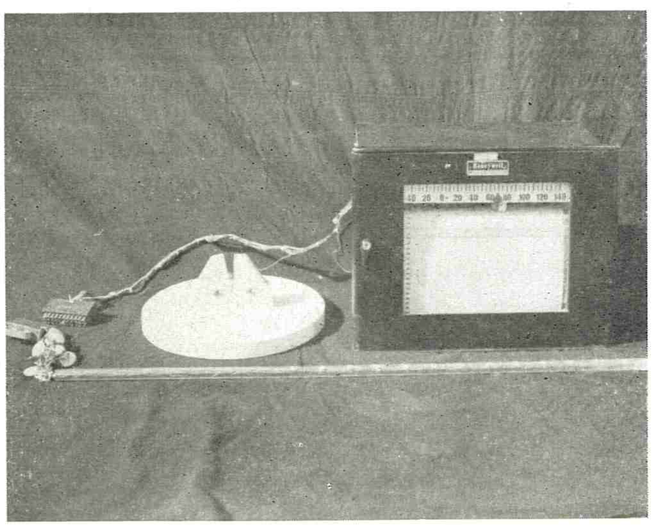

Figure 1. Thermocouple rod and rod clamp shown with recording instrument.

Milk temperatures in each tank were metered for 48-hour periods between May 15 and September 15, 1958, and August 1 and September 1, 1960. There were two exceptions in which the temperature was recorded through only three rather than four milkings. A tank with the temperature-measuring equipment in place is shown in Figure 2.

[1]Presented at the 47th Annual Meeting of the International Association of Milk and Food Sanitarians, Inc., Oct. 26-29, 1960 at Chicago, Illinois.

[2]Journal Paper J-3997, Iowa Agricultural and Home Economics Experiment Station, Ames, Iowa; Project 1282.

TABLE 1—DESCRIPTION AND OPERATING CHARACTERISTICS OF THE TANKS STUDIED-IOWA 1958

Brand	Number of tanks	Average tank capacity (gal)	Average capacity at pickup %	Average compressor motor size (hp)	Maximum quantity per milking EOD[a] (gal)	Hp. per 50 gal cooled per milking	Type of condenser cooling[b]
			DIRECT EXPANSION				
A	9	292	68	1.67	73	1.15	5-A 3-A & W 1-W
B	9	248	84	2.11	62	1.70	8-A 1-A & W
C	5	400	60	2.00	100	1.00	1-A & W 1-W
	23						
Average		298	73	1.91	75	1.27	
			ICE BANK				
D	16	312	80	1.03	78	0.66	16-A
E	10	335	75	1.25	84	0.74	4-A
F	5	355	57	1.20	89	0.67	10-A
G	4	345	75	1.06	86	0.62	4-A
	35						
Average		331	75	1.04	83	0.63	

[a]EOD=Every other day. [b]A=air; A & W=air and water; W=water

When installing the thermocouple rod in the tank cover, a fill opening was selected opposite to the end usually used by the farmer for pouring milk, or receiving milk from the pipelines. These cover openings were invariably located off the center line of the tank. Therefore, the thermocouple rod was never located over the lowest part of any tank. Permitting the rod to slope to the center line of the tank was inadvisable considering the locations of many agitators. The rod in its vertical position was permitted, however, to touch the bottom of the tank in all cases.

Thermocouple temperatures were recorded at the rate of one per 30 seconds. Any given thermocouple of the 16 had its temperature recorded once every 8 minutes. Therefore, the temperatures recorded are not necessarily the highest or lowest milk temperatures at the thermocouple locations.

Pouring of warm milk near the rod about the time the temperature of a thermocouple was being recorded could give a higher than normal temperature reading for that 8-minute period. Any temperature maintained at about the same level for several periods, however, was considered as a representative temperature.

To represent the cooling performances of the tanks with curves having a reasonable number of points, one location per tank was plotted at 32-minute intervals from the start of milking. As the lowest thermocouple, 1/8 inch from the bottom of the rod, was influenced by the evaporator temperatures on tanks, the next thermocouple, located 2 1/8 inches from the bottom, was selected as the one sensing the coldest milk temperatures.

DATA ON THE TANKS

Descriptions and operating characteristics of the seven different brands of tanks studied are shown in Table 1. Three of the brands were of the DE (direct expansion) and four of the IB (ice bank) types.

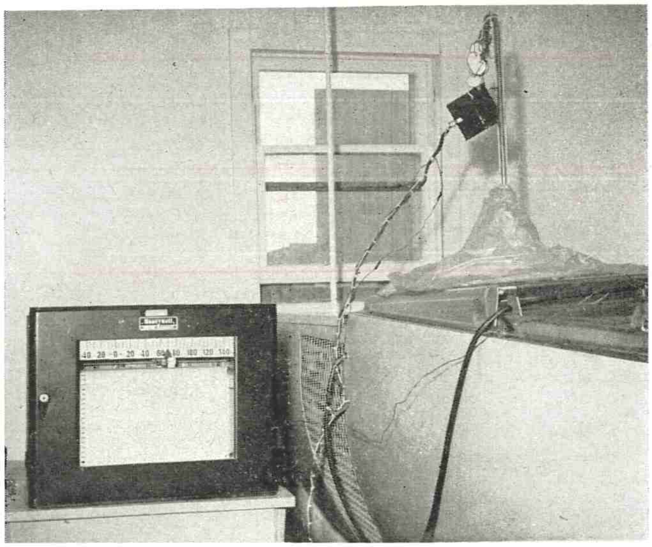

Figure 2. A bulk milk tank with instrumentation equipment in place.

The average DE tank had a capacity of 298 gallons, was filled to 73% capacity with four milkings, and had a compressor motor calculated to be 1.91 hp. Condensers on 13 of the 23 tanks were air-cooled, 8 were air-and-water-cooled, and 2 were water-cooled.

The average tank capacity of the IB group was 331 gallons. It was filled to 75% of its maximum capacity at the end of four milkings. The compressor motor size was 1.04 hp. All 34 tanks had air-cooled condensers.

COOLING PERFORMANCE—1958

The cooling performances for the first and second milkings of the seven brands studied are represented in Figures 3 through 9. The solid line of each figure represents the performance of the average tank. The broken lines show the extreme variations in performance and do not necessarily represent the cooling rate for a particular tank.

In the following discussions on cooling performance, references will be made to "3-A Sanitary Standards for Farm Milk Cooling and Holding Tanks" *(1)* (hereafter referred to as 3-A Sanitary Standards). Included in its functional standards for cooling performances are the following:

A tank designed for every-other-day pickup shall cool 25% of the rated volume of the tank containing raw milk from 90° to 50°F within 1 hour after the tank has been filled to 25% of its rated capacity, with cooling system in operation during the filling period. The cooling system shall then cool the above volume from 50°F to 40°F within the next hour.

Second or subsqeuent milkings: The cooling systems of tanks*** shall be capable of preventing the blend temperature of the milk in the tank from rising above 50°F. **** Before the addition of the second or subsequent***milkings, the*** milk in the tank shall be cooled to 37°F.

Brand A (DE)

Figure 3 represents the cooling performances of nine brand A tanks. Three of these tanks failed to cool both the first and second milkings to 40°F within the time allowed by the 3-A Sanitary Standards. It was evident that the cut-out settings of the thermostats on these three tanks were too high. Two of the three tanks also had blend temperatures above 50°F. Two other tanks with milk temperatures between 32 and 34°F at the start of the second milking also exceeded 50°F. One of these had a water-cooled condenser and was loaded to 93% of its capacity at pickup. The other was air cooled, operating in an ambient of 84° F and was 84% loaded.

The second-milking time for the four tanks exceeding a 50°F blend temperature averaged 1 hour 4

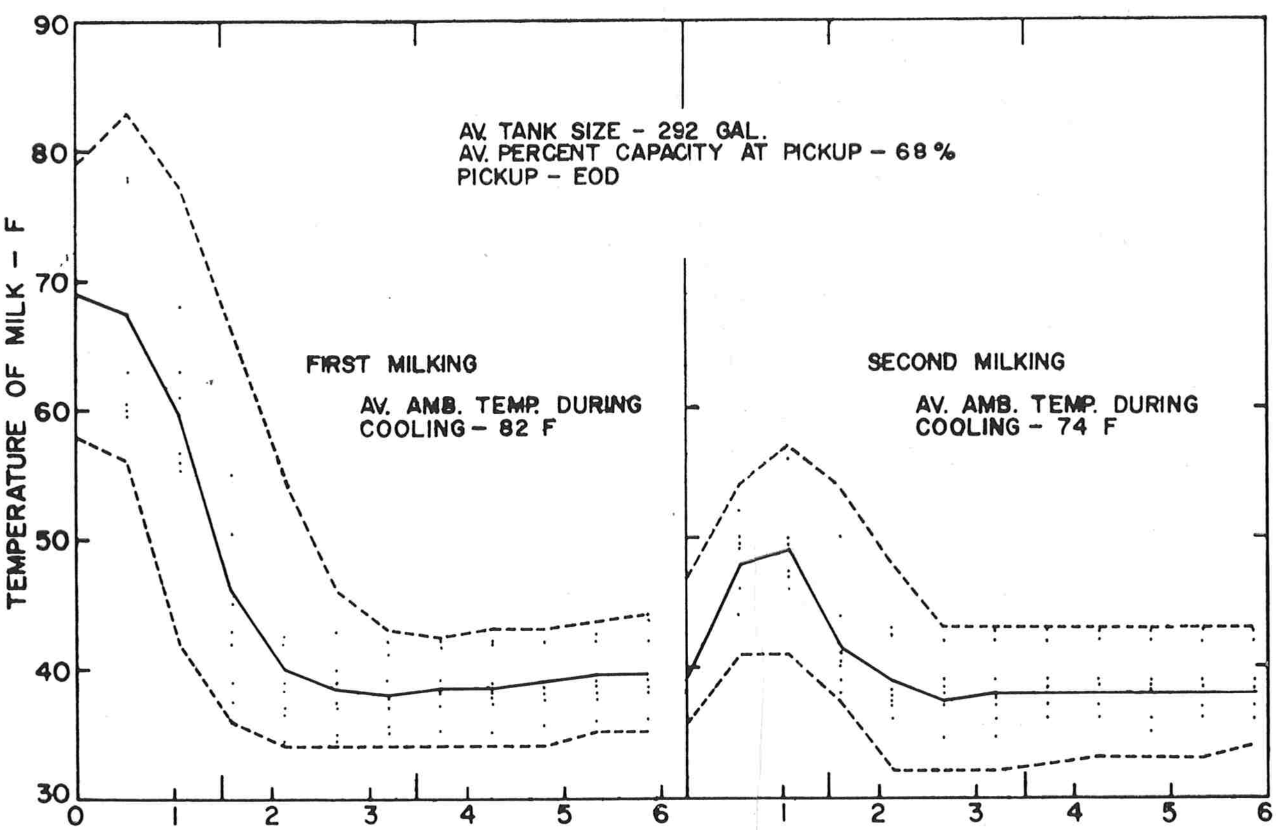

FIGURE 3 - COOLING PERFORMANCE OF 9 BRAND A DIRECT-EXPANSION BULK MILK TANKS - IOWA 1958

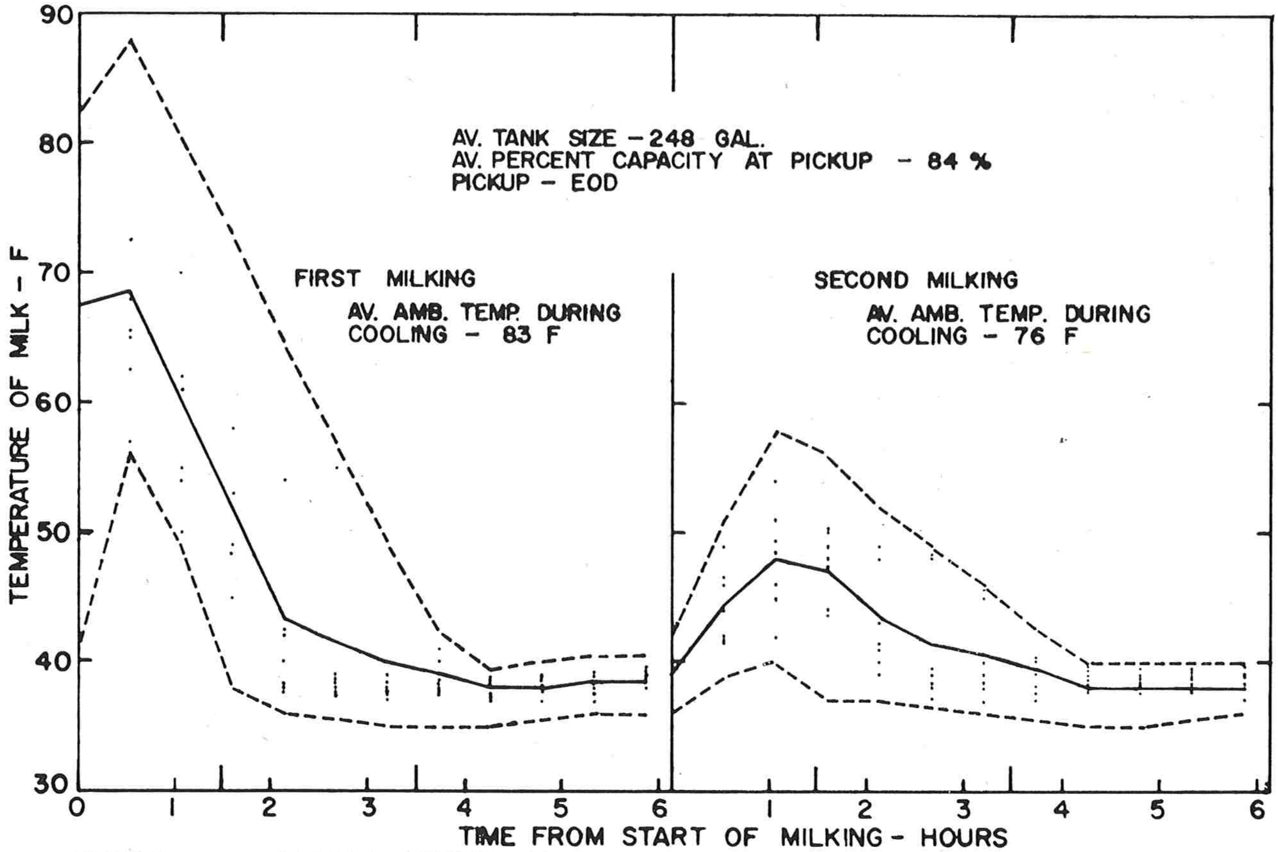

FIGURE 4 - COOLING PERFORMANCE OF 9 BRAND B DIRECT-EXPANSION BULK MILK TANKS - IOWA 1958

minutes. The average milking time for the five tanks of Brand A which did not exceed the 50°F blend temperature was 1 hour. Loadings in these latter tanks, however, averaged only 56% of capacity.

Brand B (DE)

Temperatures in nine brand B tanks are represented in the curves of Figure 4. Average second-milking time was 1 hour 15 minutes.

Two of these tanks were unable to meet 3-A Standards for cooling to 40°F for the first and second milkings and a third tank failed to meet requirements during the second milking. The shapes of the curves indicate that thermostat settings were low enough to be nonrestrictive to the cooling process. One of these tanks utilized only 64% of the tank capacity and operated during the second milking in an average ambient temperature of 75°F. The other two tanks were 80% and 93% loaded and operated in average ambients of 85°F and 80°F, respectively, for the second milkings.

Four tanks with air-cooled condensers failed to meet the 3-A Standards blend temperature requirement of 50°F. One of these was the 93% loaded tank referred to in the group that failed to meet 3-A Standards cooling time. The other three tanks were loaded to 95, 86, and 69% and were operated during the second milking in average ambient temperatures less than 70°F.

Brand C (DE)

Figure 5 represents five brand C tanks with condensers cooled as follows: three air and water; one water; and one air. Data show that three tanks had milk temperatures of 32°F and lower during both the first and second-milking periods. The reader is reminded that the location of the thermocouple from which these temperatures were taken was 2 1/8 inches from the bottom of the rod. Such low temperatures indicate that some icing of the milk occurred in these tanks.

All five tanks cooled the milk within the time periods specified by 3-A Standards. The average second-milking period was 1 hour 18 minutes. One tank operating in an average ambient temperature of 76°F permitted the blend temperature during the second milking to exceed 50°F. This 600-gallon tank with a 3-hp air-cooled condensing unit was loaded to 74% of its rated capacity.

Brand D (IB)

Figure 6 represents the cooling performances of 16 brand D tanks. Average time for the second milking was 1 hour 18 minutes.

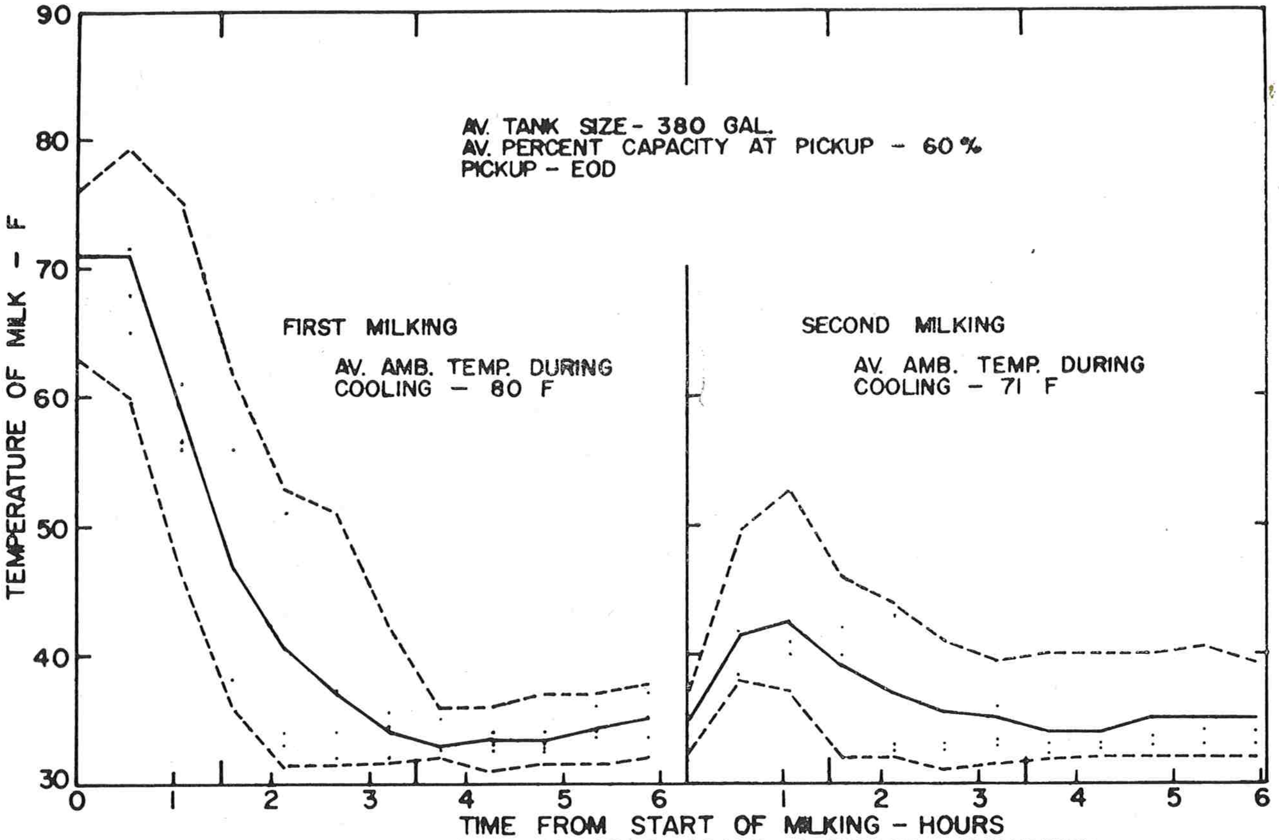

FIGURE 5 - COOLING PERFORMANCE OF 5 BRAND C DIRECT - EXPANSION BULK MILK TANKS - IOWA 1958

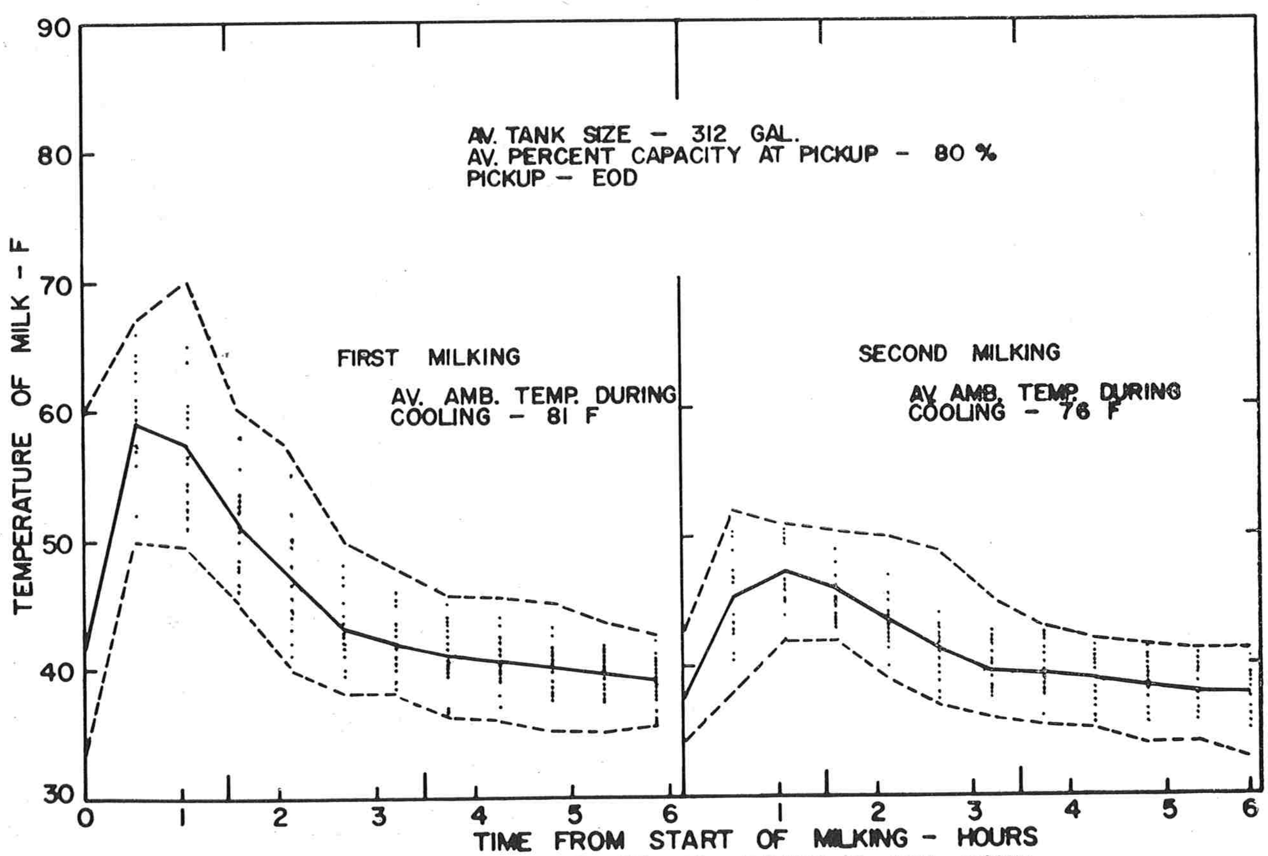

FIGURE 6 - COOLING PERFORMANCE OF 16 BRAND D ICE-BANK BULK MILK TANKS - IOWA 1958

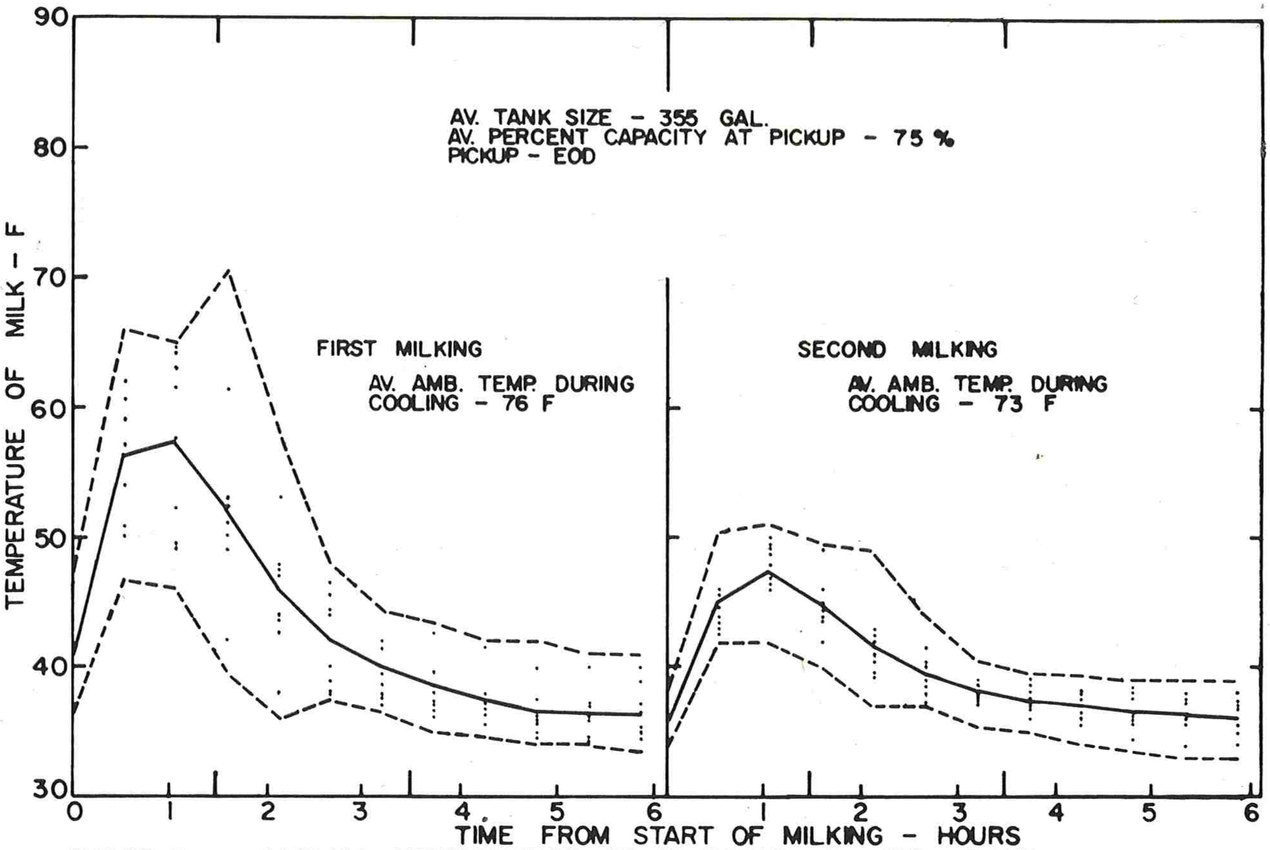

FIGURE 7 — COOLING PERFORMANCE OF 10 BRAND E ICE – BANK BULK MILK TANKS — IOWA 1958

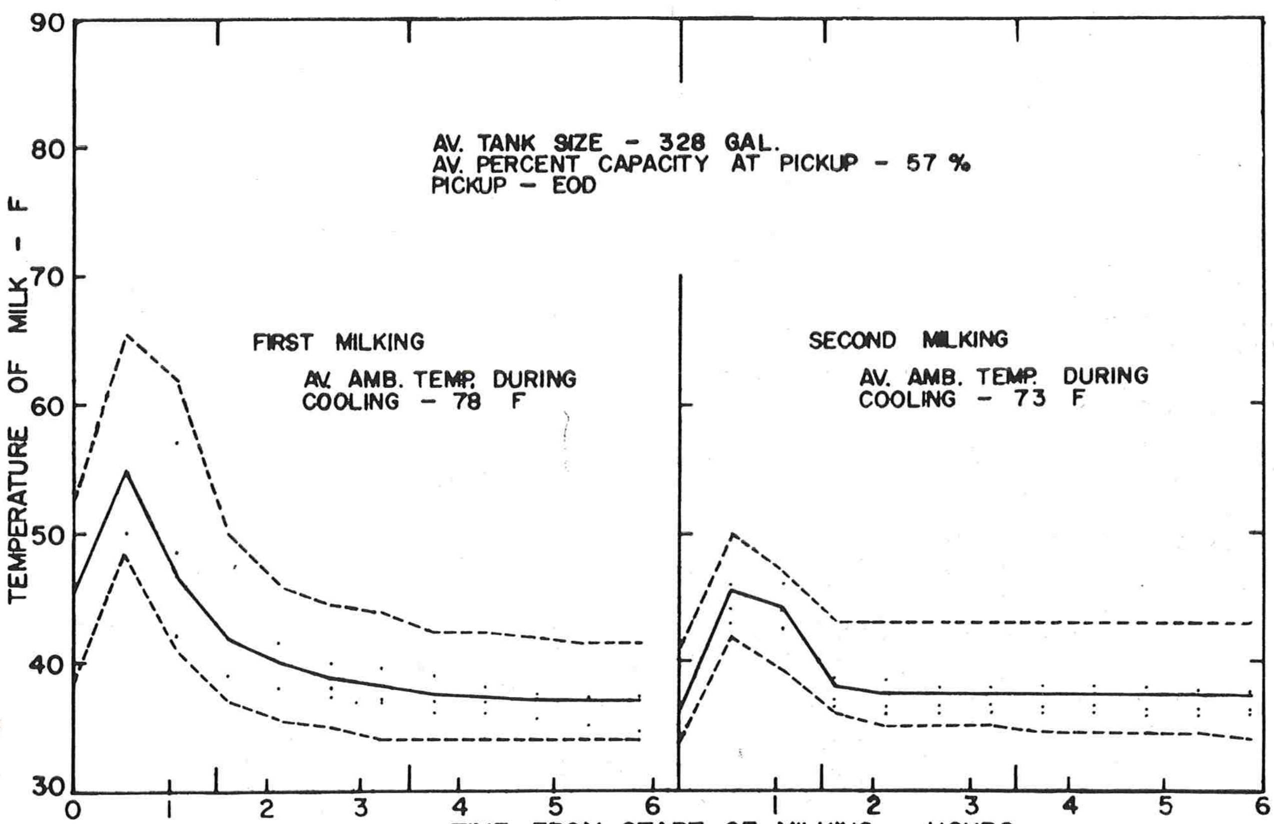

FIGURE 8 — COOLING PERFORMANCE OF 5 BRAND F ICE – BANK BULK MILK TANKS - IOWA 1958

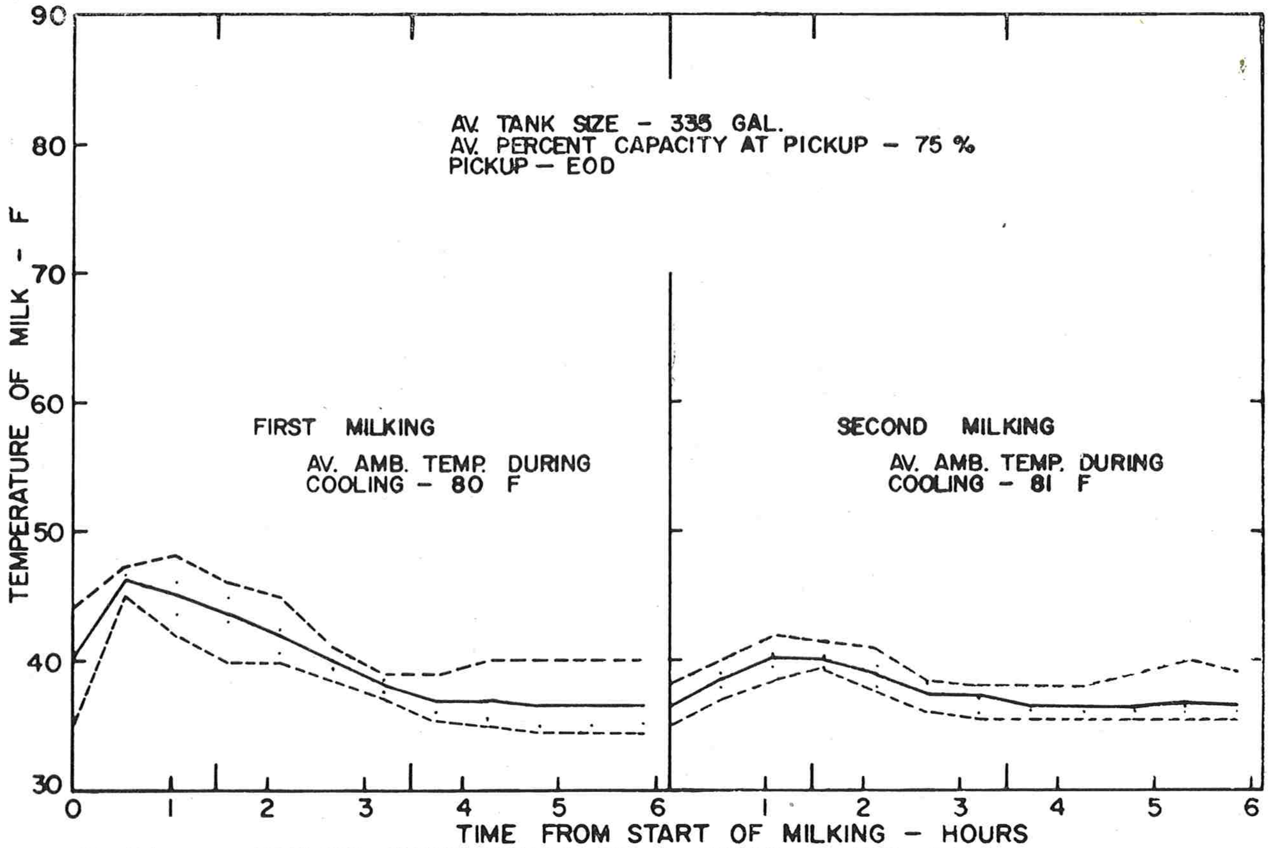

FIGURE 9 - COOLING PERFORMANCE OF 4 BRAND G ICE - BANK BULK MILK TANKS - IOWA 1958

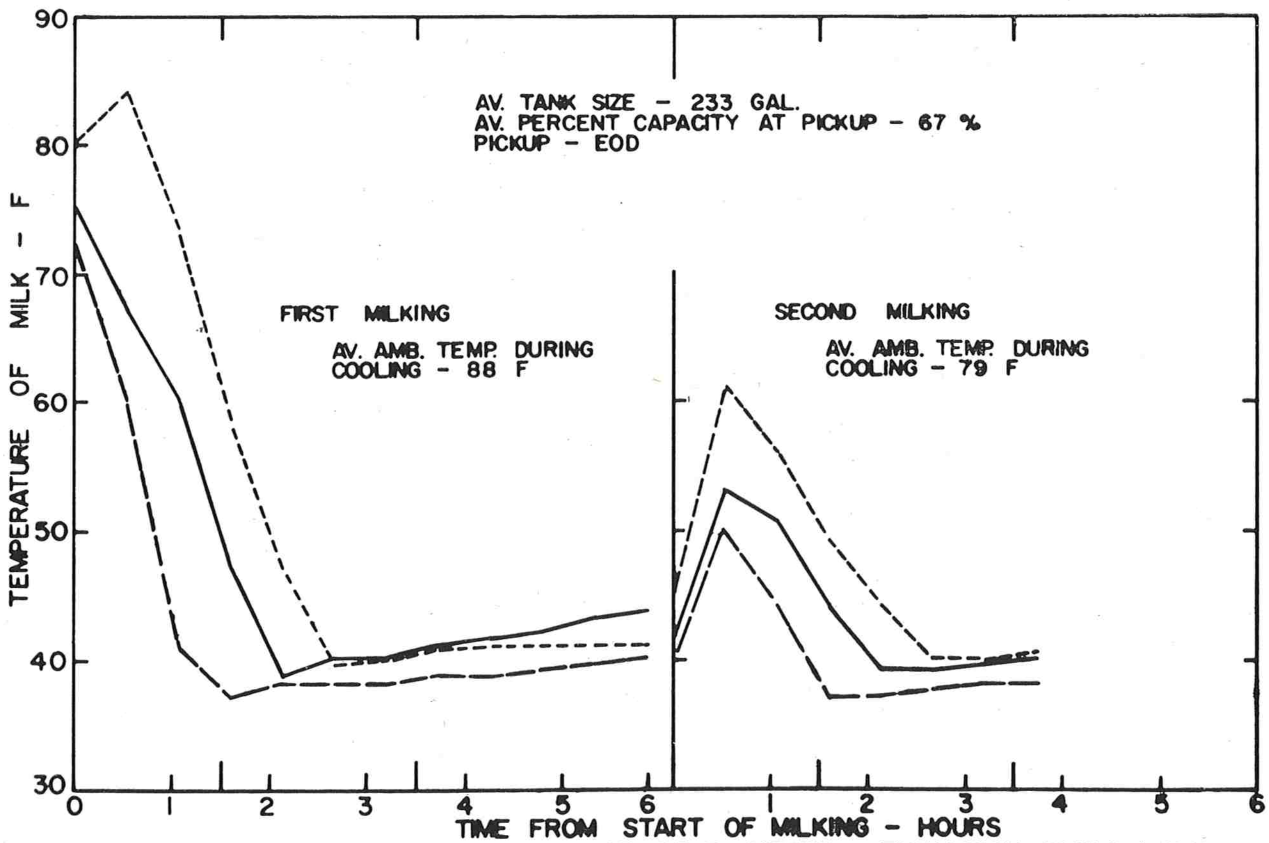

FIGURE 10 - RECHECKED PERFORMANCE OF 3 DIRECT - EXPANSION TANKS WHICH PERFORMED UNSATISFACTORILY IN INITIAL STUDY - IOWA 1960

TABLE 2—SECOND-MILKING BLEND TEMPERATURES IN BULK MILK TANKS—IOWA 1958

Brand	Number of tanks	Number exceeding 50°F, 2nd milking	Average time above 50°F (min)	Average rise during 2nd milking (°F)	Range of rise during 2nd milking (°F)
			DIRECT EXPANSION		
A	9	4	48	11	6 to 20
B	9	4	45	12	3 to 21
C	5	1	34	9	3 to 13
	23	9			
		Av.	45	11	
			ICE BANK		
D	16	6	23	12	9 to 14
E	10	2	11	13	10 to 17
F	5	0	0	11	10 to 16
G	4	0	0	4	3 to 6
	35	8			
		Av.	20	11	

The agitator on each of these tanks was operated with a timer, which means that the operation of the agitator depended upon the tank operator. More recent models of brand D have the agitator electrically connected to operate with the water pump. This inter-connection is necessary to insure fast cooling. These newer models were not available for this study.

Ten of the 16 tanks did not meet 3-A Standards of cooling to 40°F for the first milking and five failed for the second milking. Thermostats on four tanks were not set low enough to permit cooling of the milk to 40°F.

Six tanks exceeded a 50°F blend temperature during the second milking when the average milking time was 1 hour 25 minutes and the ambient temperature was under 75°F. The continuous but slow rate of cooling of some of these tanks indicates that agitation of the milk was not maintained throughout the cooling period.

Brand E (IB)

Ten tanks of brand E are represented in the curves of Figure 7. Average second-milking time was 1 hour 19 minutes.

Two tanks during the first milking did not meet 3-A Standards time of cooling to 40°F. During the second milking all tanks cooled the milk within the allotted time.

Two of the 10 tanks exceeded 50°F blend temperature during the second milking. Both of these two tanks were 70% loaded and the milking times for the second milkings were 55 minutes and 1 hour 50 minutes, respectively. Average ambient temperatures during the milking and cooling periods were less than 75°F. The operator of one tank reported that the condensing unit ran continuously which suggests that the unit was low on refrigerant.

Brand F (IB)

Figure 8 represents the cooling performances of five brand F tanks. Milking time averaged 1 hour for the second milking.

One tank failed to cool both the first and second milkings to 40°F within the time allowed by the 3-A Standards. During the second milking it was evident that the cut-out setting of the thermostat controlling the water pump and agitator was too high.

Blend temperatures in all five tanks were within the limit of 50°F set by 3-A Standards. Average loading was 57%.

TABLE 3—MAXIMUM TEMPERATURE STRATIFICATION OF MILK IN BULK TANKS—IOWA 1958

Brand	Average temperature (°F)	Temperature range (°F)	Average ambient temperature (°F)	Average capacity at pickup %
		DIRECT EXPANSION		
A	2.3	2 to 4	68	74
B	2.8	1 to 4	84	76
C	2.9	1 to 4	60	73
Average	2.6		73	75
		ICE BANK		
D	3.6	1 to 5	80	78
E	3.4	1 to 5	75	79
F	2.0	1 to 2	57	75
G	2.7	1 to 4	75	81
Average	3.2		75	79

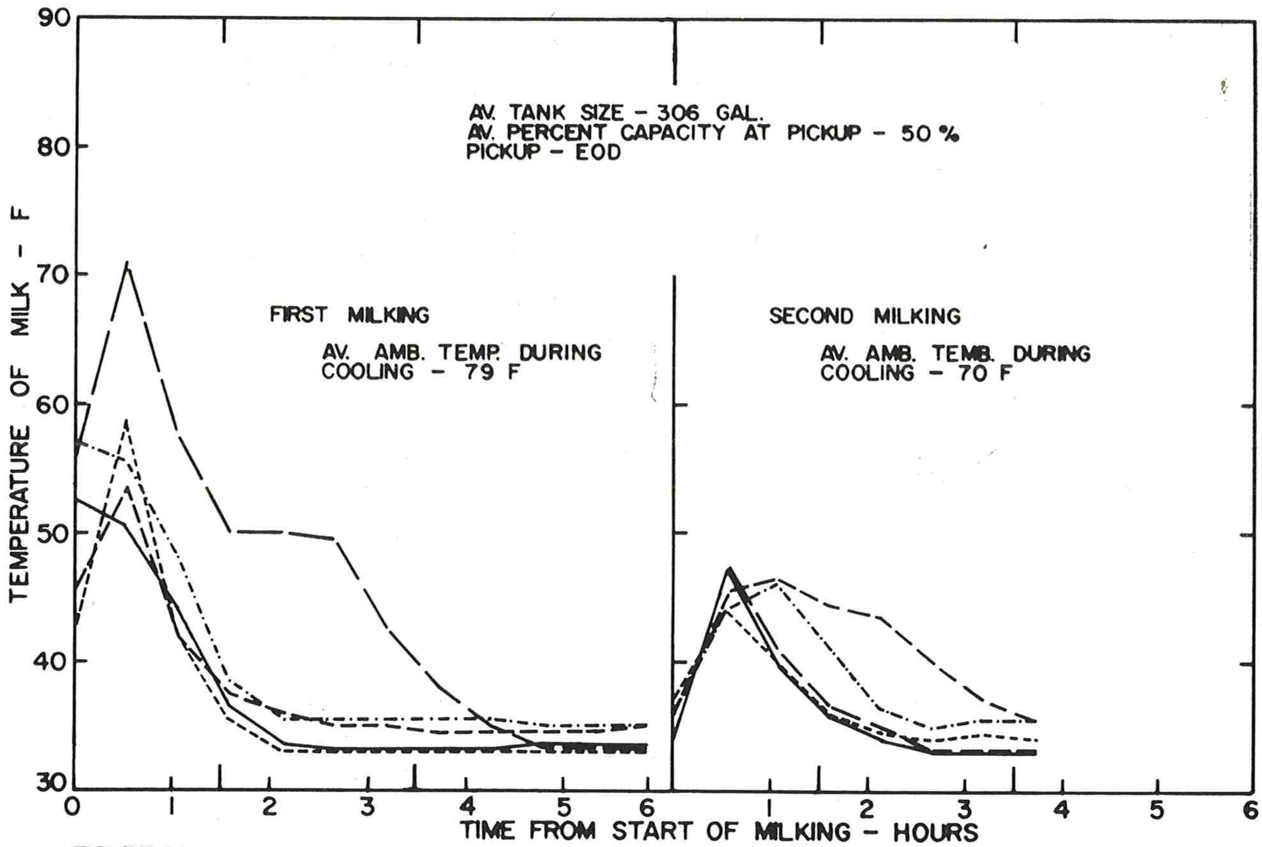

FIGURE 11 - RECHECKED PERFORMANCE OF 5 ICE - BANK TANKS WHICH PERFORMED UNSATISFACTORILY IN INITIAL STUDY - IOWA 1960

Brand G (IB)

The cooling performances of four brand G tanks are represented in Figure 9.

The average tank of 335 gallons was 75% loaded. A different feature of this brand was that milk being added to the tank was distributed over a refrigerated wall. The trough for distributing the milk was attached to the tank sidewall.

These four tanks met 3-A Standards of cooling and easily kept the blend temperature below 50°F. The average milking time during the second milking was 1 hour 23 minutes.

BLEND TEMPERATURES

Second-milking blend temperatures are good indicators of how well a tank is performing. As shown in Table 2, nine of the 23 DE and eight of the 35 IB tanks permitted the milk to rise above 50°F during the second milking. The average temperature rise for both types of tanks was 11°F. Brand G had a considerably lower average rise than the other tanks, but the small number of tanks did not affect greatly the average temperature rise of the IB tanks. For those tanks failing to meet blend temperature requirements, the time that the milk was above 50°F averaged 45 minutes for the nine direct-expansion tanks and 20 minutes for the eight ice bank tanks.

Compressor horsepowers for the air-cooled condenser DE tanks averaged 1.47 hp. for each 50 gallons of milk that could be cooled per milking. This ratio is very close to the minimum value of 1.5 hp. recommended by Turner *(2)*.

As shown in Table 1, the average horsepower for all types of condenser cooling on the basis of 50 gallons of milk cooled per milking was 1.27 hp. This ratio again is in the range recommended.

Ice bank tanks averaged 0.63 hp. per 50-gallon unit of milk cooled per milking as shown in Table 1. This is almost twice the minimum value recommended by Turner *(2)*. However, the capacity of the condensing units for these tanks has relatively little influence on the rate of cooling the milk. Cooling is primarily dependent upon the ice bank and water-circulating features.

Fifty-five of the 58 producers in the study responded to a question concerning whether pails or a pipeline was used in getting the milk into the tank. Forty-two of the 55 producers used pails. The type of tank had no influence on whether pails or pipelines were used.

Thirty-three of the 42 producers estimated that milk quantities in the range of 3 to 5 gallons were poured at one time into the tanks. Six producers reported quantities of 8 gallons, and three producers stated that 10-gallon cans were used.

Stratification Temperatures

Temperature stratification refers to the temperature difference that occurs when the milk is not agitated. As milk often is picked up shortly after the fourth milking, maximum temperature stratification is likely to occur either during the period after milk from the third milking is cooled, or during this period for the second milking if this is a morning milking.

Values of temperature in Table 3 are averages of those recorded for the second or third milkings, depending upon which were the highest. Maximum stratification in the DE tanks averaged 2.6°F, with the average tank filled to 73% of capacity and the average milkhouse air temperature at 75°F. These corresponding values for the IB tanks were 3.2°F, 75% and 79°F.

During stratification, the DE tanks had a different characteristic temperature profile than most of the IB tanks. Temperatures in the former were higher in the bottom and top layers of milk than in the center. This accounts for the lower stratification temperatures of this type of tank.

Ice bank tanks with the exception of brand G showed a progressive temperature rise from bottom to top. Part of the bottom surfaces of brand G are like DE tanks in that heat losses from the milk go directly to the outside. The pattern of profile temperatures in brand G was similar to that of the DE tanks but less pronounced.

Cooling Performance—1960

Figures 10 and 11 represent the cooling performances of three DE and five IB tanks that were rechecked during the summer of 1960. All of these tanks had failed to meet the 3-A Standards rate of cooling to 40°F during the initial study. Yet, in this later study, all tanks met this rate of cooling.

A partial and perhaps in some cases a complete explanation of these improved performances was the service given to the eight tanks in the period between the two studies. The kinds of work and adjustments required as reported by the farmers concerned were as follows:

Item	Number of Tanks
Compressor repairs	2
Refrigerant added	5
Thermostats adjusted	5
Condenser fan repairs	2
Agitator wired to pump	4
Agitator repairs	1
Condenser cleaned	2

The broad curve shown in Figure 11 for one tank was partly the result of the milking period extending over 2 hours 30 minutes.

References

1. 3-A Sanitary Standards For Farm Milk Cooling and Holding Tanks—Revised, J. of Milk and Food Technol., **23**: 172-178. 1960.

2. Turner, C. N., 1955 Progress Report, New York Farm Electrification Council, Cornell University, Department of Agricultural Engineering, Ithaca, N. Y. April 1960.

VIRUSES AND MAN[1]

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The activities of the Sanitarian are as broad as the field of public health. Since he is expected to know the answers to a wide variety of problems, he must try to keep up with the rapidly increasing amount of information arising from scientific research. One of the basic areas within the scope of his activities is the control of communicable diseases. To be effective in this area he must have information concerning the cause of disease, where it has occurred, when it occurred, the humans or animals involved, how it was transmitted, and other epidemiological data. The youngest member of the microbiological family, and one with which sanitarians should have a working knowledge is the group comprising the viruses.

Sizes of Viruses

At the outset, it is very difficult to describe the viruses because events have happened so quickly that when we say they are the "smallest living things" we must qualify each word with a definition. Facts are needed before conclusions are drawn or statements made. For example, the story is told about an Oxford medical student who dug up an ancient university regulation which said he was entitled to a pint of beer while he crammed for his final exams. He was so persistent that the authorities provided him with his pint, but they also searched through the regulations and fined him five pounds for not wearing a sword! This was a case where a little bit of knowledge was dangerous, and the sort of situation to be studiously avoided.

The "smallest" means that it is measured in millimicrons. A millimicron is one one-thousandth of a millimeter, and Influenza A (PR8) for example, is about 100 millimicrons, while polio virus has an average diameter of 10 millimicrons. They appear to be "living" in that they reproduce. Recent scientific advances, however, require some reflection on the meaning of this term, since viruses have been crystallized and fractionated by biochemical procedures. Thus, ribonucleic acid obtained from polio virus, *(1)* was changed by phenol into an infective unit. The enzyme ribonuclease is capable of destroying it, and various inorganic substances assist the process of infection by depletion of calcium in the infected cells. Thus, a chemical has caused infection; this may indicate an expansion or perhaps a restatement of the germ theory of disease.

To reflect for a moment longer on the concept of size, have you ever calculated the number of staphylococci which theoretically would fit in one cubic centimeter? Assume that the organism is one micron in diameter. Since it is spherical, its volume then becomes approximately 0.5 cubic microns. A cubic centimeter is equivalent to 10^{12} or one million million cubic microns, and it would therefore accommodate 2×10^{12}, or two million million staphylococci. On this basis one cubic centimeter could house 2×10^{20} polio viruses. These astronomical numbers tax the imagination and they do give some meaning to the tremendous infectious potential of small amounts of material.

Nature of Viruses

The viruses not only are parasites, but they are strictly so, since they multiply only within living cells. The bacterial viruses, known as bacteriophages *(2)* cause the bacteria to disintegrate or undergo lysis. During this process the phages reproduce in large numbers. Extensive research with the bacteriophages has shown that they enter the genetic apparatus of the cell and may change it. Ribonucleic acid (RNA) stores a great variety of biological information. The molecule of nucleic acid consists of about 1,000 building blocks known as nucleotides. Each of these contains phosphoric acid, sugar, and one of four bases: adenine, guanine, cytosine and uracil, in the case of RNA; or adenine guanine, cytosine and thymine in the case of deoxyribonucleic acid (DNA). It has been estimated by W. M. Stanley, the Nobel laureate who crystallized tobacco mosaic virus, that a 1000-unit nucleotide chain containing a coded repeat of these four bases could form about 10^{590} different arrangements. A 100-unit chain could exist in 10^{57} arrangements. He points out that these galactic numbers could carry the code for every bit of life on earth and in the sea.

Another property of viruses is that they may remain dormant or latent in the host cell. If these same characteristics should apply to humans, then changes in metabolism might give a hidden virus the chance to manifest itself. This could result when the bio-

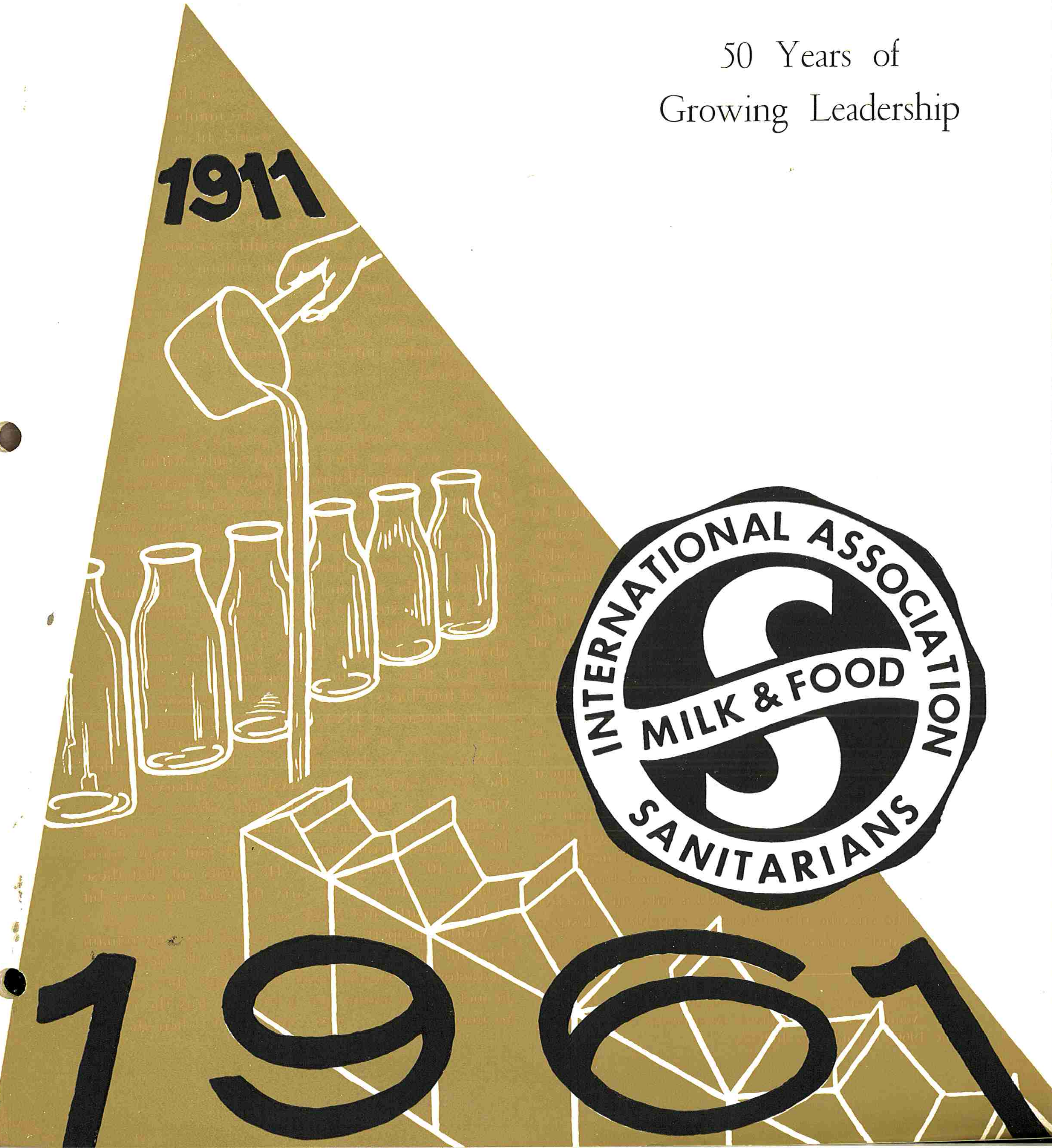
(Cont. on page 259)

[1]Based on a paper given as part of the Education Program, 10th Annual Meeting, Indiana Association of Sanitarians, June 1960, Indianapolis, Indiana.

Introduction . . .

1911 Golden Anniversary 1961

50 Years of
Growing Leadership



A HALF CENTURY OF SANITATION PROGRESS

H. S. Adams

Director, Sanitary Science Courses
Indiana University School of Medicine
Indianapolis, Indiana

This, the year 1961, is our Golden Anniversary. For fifty years International has been a potent force working toward its dedicated objective to improve environmental health and sanitation. It has long been identified with the milk and dairy field, but one must not overlook the fact that other phases of health protection have been closely woven into the fabric of its total program.

International was born at a time when the whole complex of foods were coming under closer scrutiny. The first federal pure food and drug law took effect in 1907. Chicago passed a city ordinance requiring either pasteurized milk, or milk from tuberculosis free cows in 1908. Pasteurization was in its infancy. Dr. Charles North's studies on time and temperature for pasteurization were being completed. Elementary laboratory procedures for the bacteriological examination of milk were just being developed. Milk processing equipment was crude, mechanical refrigeration on producing farms nonexistent and outbreaks of disease from infected milk supplies all too numerous. There was little uniformity in milk regulations, but the early founders recognized the need for uniformity and the proceedings of early International meetings give abundant evidence that there was a strong desire for standardization.

Thus, from this small but noteworthy beginning the influence of International began to be felt. Proceedings of the annual meetings were published and widely disseminated. Health officers, dairy scientists, bacteriologists, sanitarians and representatives of the dairy industry looked upon the proceedings as authoritative pronouncements heralding the newer knowledge of environmental hygiene.

In 1924 one of the most significant developments towards uniformity of milk regulations became a reality. It was in that year that the first draft of the Standard Milk Ordinance and Code was assembled. Prior to this states and communities had devised, what were considered at that time, sanitary milk regulations. Based on available information as well as reflecting the viewpoint of the author, considerable variation was evident. Due to this lack of uniformity the State Health Commissioner of Alabama requested the Public Health Service to send one of its milk specialists to that state to lend assistance in drafting an ordinance which could be applied state wide and would represent the most up-to-date thinking in the field. Assigned to this task was the late Leslie C. Frank, whose knowledge of the field was profound and whose dedication to the cause of milk safety unsurpassed. Working closely with Leslie Frank at the time was C. A. Abele who is a past president of International and a stalwart who has devoted a life time to sanitation.

It is hardly necessary to point out that the Standard Milk Ordinance and Code has had a great and lasting influence on milk sanitation specifically and on public health procedures generally. It is the most universally used code of its kind in existence, but its influence has extended far beyond the single field of milk control. Its format, inclusiveness and technical excellence has been a model which has been closely followed in drafting other kinds of regulations. The Ordinance and Code Regulating Eating and Drinking Establishments, the Ordinance for Frozen Desserts, Shellfish, Poultry and Automatic Vending, to give some examples, have been developed and promulgated as an outgrowth of the original and monumental work on the Milk Ordinance and Code.

International's leadership has been demonstrated again and again as these ordinances, codes and regulations have been developed. Serving in advisory and consultant capacities individual members have rendered valuable service through wide knowledge of the problems involved and through extensive practical field experience.

As ordinance specifications became more detailed and definitive and as technological changes evolved it became evident that there should be a mechanism developed whereby industry and control agencies could meet together for a discussion of mutual problems. Significant advances were being made in processing equipment. New machinery, new methods and new materials were rapidly being introduced. The critical question arose, "*Would these new devices comply with public health requirements?*"

The solution to these problems called for joint action by all parties concerned. This led to the creation of the 3-A Sanitary Standards Committees whose composition included representatives from three different groups as follows: The Dairy Industries Supply Association, The International Association of Milk and Food Sanitarians, and the Milk and Food Branch of the Public Health Service. Particularly in the case of the Dairy Industries Supply Association, their representation is broken down into task groups composed of specialists, engineers and technicians who have intimate knowledge of the equipment under consideration. The work of 3-A is characterized by meticulous care exercised in its deliberations where sanitary compliance is foremost in the minds of the conferees. Care is also exercised to see that designers and fabricators of equipment understand the full public health significance of the sanitary safeguards stipulated. 3-A is an outstanding example of close cooperation and mutual respect among industry members and milk sanitarians. 3-A Sanitary Standards are highly regarded throughout the dairy industry and by milk and dairy specialists. When pronouncements are made and standards published, it is well known that they have been promulgated only after careful and objective analysis of the matter under consideration.

While the 3-A organization has restricted its work almost wholly to equipment and materials used in the dairy field, its influence has overlapped into other phases of environmental sanitation. Other agencies have been created to do similar work in the food equipment, baking and automatic vending industries. Experience has demonstrated the feasibility of bringing industry and health together for frank discussions of mutual problems. Here again, International has demonstrated leadership by being prominently represented in the membership of other organizations modeled after the 3-A Committee.

International has been instrumental in another progressive movement which has brought sanitation considerations into sharper focus. This relates to the National Conference on Interstate Milk Shipments. While the basic purpose of the conference is to facilitate the free flow of sanitary milk between regulatory jurisdictions, a more lasting and far reaching purpose has been attained. This is the encouragement and promotion of cooperation among sanitarians. The conference meetings, held annually, have permitted free discussion among officials from the several states and municipalities. Agreements on administrative and other procedures have been made which have eliminated inspection duplication, fostered mutual understanding and expedited the free flow of high quality milk nationally.

Still another contribution to sanitation leadership has been manifest by International. In the development of bacteriological standards and procedures under the aegis of the American Public Health Association, our members have and are still serving on the Standard Methods Committee. *Standard Methods for the Examination of Dairy Products* is now in its eleventh edition. A review of older editions as well as the current one discloses the names of many prominent bacteriologists whose membership in our Association has been long standing. The technical competence of these members is well recognized and the commendable work in making Standard Methods such an accurately compiled manual is a tribute to their perseverance and dedication. And further, the procedures outlined in other laboratory manuals regularly follow *Standard Methods* as a guide.

Unquestionably much more could be written concerning International's outstanding role in sanitation progress throughout the world. Much could be written concerning the good relationships that have been built with industry and commercial interests. Members of International are called upon frequently to consult and advise with dairy and food trade associations, with the Federal Government, with institutions of higher learning and with research laboratories. It is well recognized, in the broad field of environmental sanitation, that a person well versed in the principles of milk control, can and does apply these same fundamental concepts to many other facets of sanitation.

In the final analysis, leadership embodies accomplishment. And the accomplishments of the last fifty years toward the improvement of man's physical environment have been outstanding. International is proud that it has played such a prominent part in helping to bring them about. There is every reason to believe these contributions to progress will continue. Our Association is composed of men with many and varied interests in environmental health. But perhaps more important, our membership is made up of highly skilled knowledgeable people with a firm dedication to advance the safety of man's environment. We have a firm conviction that the years ahead will equal and perchance surpass the demonstrated leadership of the fifty just closed. Our heritage is filled with accomplishments. The future ahead is challenging, but International is prepared for it and will continue its enviable position of PROGRESS and LEADERSHIP.

BENEFITS OF YOUR MEMBERSHIP IN IAMFS

H. L. THOMASSON, *Executive Secretary*

Periodically, almost everyone gets out the old billfold and takes inventory of the membership cards which he carries. Most people are surprised at the number of organizations to which they belong. It is at this time that the benefits of membership weighed against interest, value and cost are carefully studied. Usually, only those organizations offering the most benefits survive this inventory.

Over the past fifty years, it is evident that the benefits of membership in IAMFS have been held in high regard since turnover in membership from all causes, has averaged only ten per cent, and the last decade has shown a healthy growth. Roughly, benefits of membership in IAMFS can be divided into two categories, (1) concrete and, (2) abstract.

CONCRETE BENEFITS

While there are some overlapping areas of concrete benefits, generally we can list the following as being something that are real and tangible, (1) The Journal of Milk and Food Technology, (2) Procedure for the Investigation of Foodborne Disease Outbreaks, (3) 3-A Sanitary Standards, (4) Committee Reports, (5) A Reprint Service and Technical Articles, (6) Annual Sanitarian Award, (7) Complete file of 26 Annual Reports and 24 Volumes of the Journal of Milk and Food Technology, (8) Central Office, well equipped and ready to provide many services.

The Journal of Milk and Food Technology

The monthly publication of which IAMFS is justly proud, has grown and improved since its beginning in 1937, until it is accepted all over the world as the most authoritative and outstanding publication in the field of sanitation. As an example of this a survey of the mailing list, which includes membership and subscribers, shows that the Journal goes to the following countries: Guatemala, Costa Rica, Argentina, Brazil, Chile, Peru, Uruguay, Venezuela, Canada, Australia, South Africa, Ghana Africa, Belgium, Bulgaria, Burma, China, Czechoslovakia, Denmark, British West Indies, Egypt, England, Finland, France, W. Germany, Guam, Greece, Holland, Hungary, Iceland, India, Indonesia, Iraq, Ireland, Israel, Italy, Japan, Korea, Lebanon, Nicaragua, Norway, E. Pakistan, Pakistan, Philippines, Poland, Portugal, Russia, Scotland, Spain, Sudan, Sweden, Switzerland, Thailand, Turkey, Yugoslavia, and of course all of the United States and possessions. Plans are now in the making which it is hoped will improve the Journal even more. Most members consider the Journal to be well worth the total cost of the membership dues. Any sanitarian who is sincerely interested in his profession can not afford to be without the Journal. It is a highly respected publication containing timely articles of scientific interest contributed by men well respected in their fields.

Procedure for the Investigation of Foodborne Disease Outbreaks

This publication is the outgrowth of work by our Committee on Communicable Disease Effecting Man. This Committee worked most diligently and with extreme care over a period of some three years to compile the material contained in this publication. Health officers, epidemiologists, food scientists, sanitarians and other experts were consulted so that the latest and best information could be assembled for publication.

The response has been gratifying. To date, 14,000 copies have been distributed. This publication has served as an excellent source of information in this particular field and has greatly aided in setting a uniform pattern for foodborne disease investigations.

3-A Sanitary Standards

This is a joint project participated in by the U. S. Public Health Service, Dairy Industry Committee and the Sanitary Procedures Committee of IAMFS. Most of the outstanding accomplishments of the dairy industry in sanitary design of equipment, have been due to the cooperative effort of this group. The 3-A Sanitary Standards approved by these three groups have universal acceptance and the process through which these standards are developed is one of the finest examples of great accomplishment through voluntary democratic procedure. These standards are accepted by milk sanitarians and the industry as authoritative and technically sound. This has been a great stabilizing influence for all groups concerned.

Reprint Service

During any given year, the Journal of Milk and Food Technology carries many articles which are the culmination of long hours of careful research, experimentation or study. Frequently, a wider distribution of such articles is desired by the author, or by the sponsoring agency. Through the facilities of the Association reprints are readily available to research laboratories, universities and commercial groups who desire to use these for special study or as reference materials. Thus, in this way, the influence of the Association is extended beyond its regular membership.

Sanitarian's Award

Each year, since 1952, the Association through its Committee on Recognition and Awards, has had the singular distinction of recognizing the outstanding sanitarian of the year and presenting him with an appropriate plaque and a tax free check in the amount of $1,000.00. The recipient so honored must be an employee of a local health department and must have made a distinguished and outstanding contribution to the improvement of milk and food sanitation in his community. This award is sponsored by five chemical companies, namely, Pennsalt Chemicals, Klenzade Products, Inc., Olin Mathieson Chemical Corporation, Diversey Corporation, and Oakite Products, Inc. Not only does this award bring recognition and distinction to the recipient, it serves an even more important function. It announces to the recipient's community that his work is of a caliber to win National recognition. To the several distinguished sanitarians who have won this coveted award there comes more than monetary gain. Rather, the gain is in satisfaction of a job well done along with the acknowledgement that sincerity of purpose and accomplishment has been recognized by his fellows.

Any member of IAMFS or its affiliates may make nominations but the nominee does not have to hold membership in our Association.

Committee Work and Reports

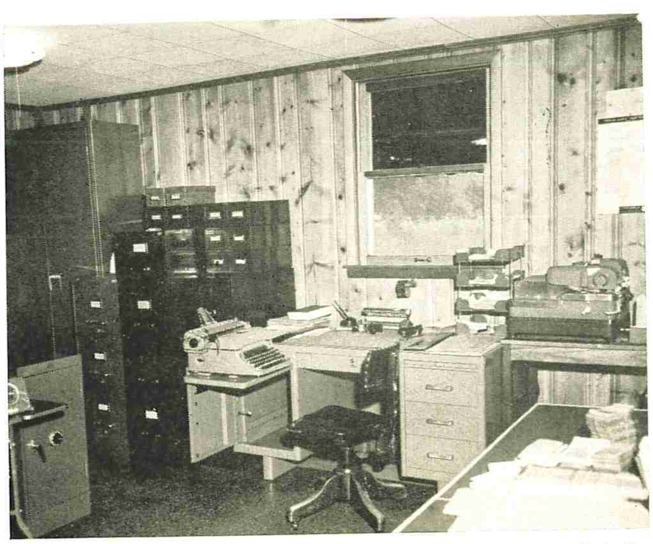
One of the great contributions to the membership and to the whole field of sanitation has been the work of committees, some of which span the fifty year history of our Association. As new problems have arisen, new materials introduced or new methodology proposed, committees have taken on the task of studying and evaluating them. Here groups of our members have given generously of their time to find answers to pressing problems. Because IAMFS numbers among its members outstanding scientists and specialists in many phases of sanitation, it has been possible through committee activity to carefully appraise new developments and to make recommendations useful to the membership and to others. In IAMFS, committee work is a very important phase of our activities - it is doing collectively what is quite difficult to do individually.

Complete File of 26 Annual Reports and 24 Volumes of the Journal of Milk and Food Technology

No group ever reaches professional status without a long history of specialized educational material and research relating to their work. IAMFS has contributed more to this background than any other organization in existence. The IAMFS library contains a comprehensive collection of material on the subject of sanitation.

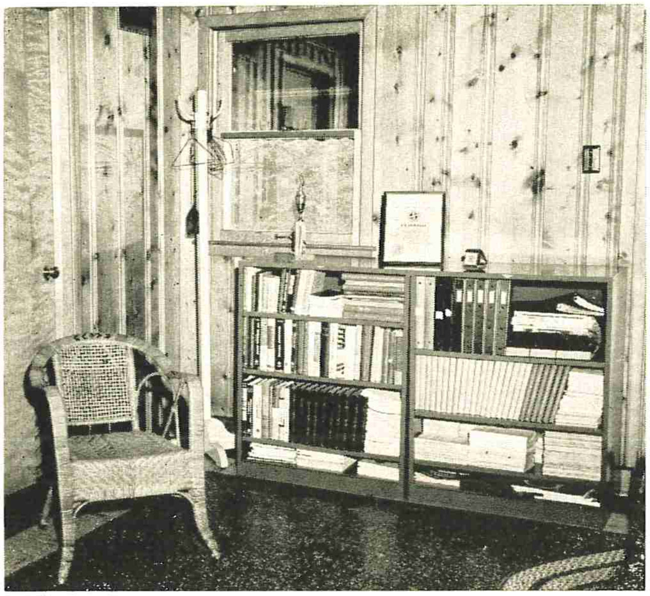
Central Office, Well Equipped and Ready to Provide Many Services

In 1951, in order to provide more adequate services and to concentrate the affairs of the organization, a central office was established in Shelbyville, Indiana. Staffed by an executive secretary and managing editor of the Journal, and two secretaries, all of the infinite details of operating an organization as large as IAMFS, are handled. All business records, membership files, mailing list, subscriptions, back Journals, etc., pertaining to the Association are kept in the central office.



Secretarie's Desk, File Cabinets, Postal Meter and Steel Safe.

Executive Secretary's Desk, Photo Electric Copier And Back Journal Rack.



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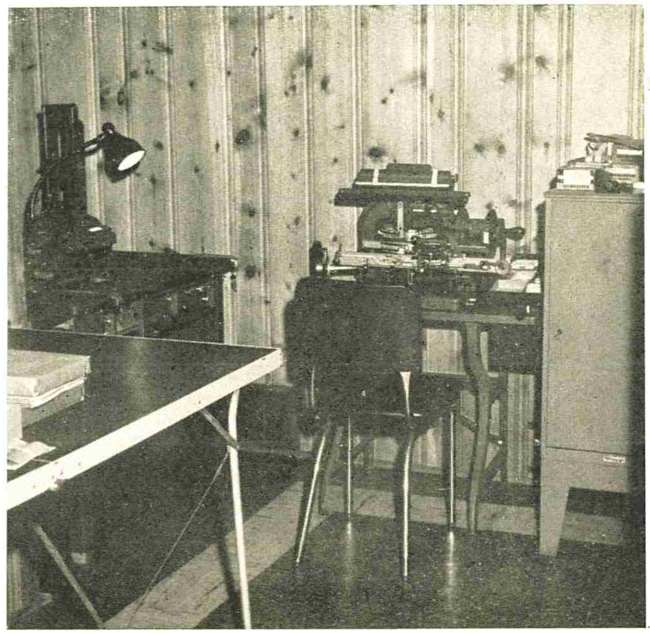


Work Table, Addressograph, Graphotype Machine, Mailing Plate File Cabinet.

Abstract Benefits

Many benefits accrue to the membership of IAMFS which, while none-the-less real, are harder to define. Some of these are: the annual meeting, exchange of experiences and ideas, representation in national affairs, keeping members informed concerning new developments and occurrences in other areas, promoting educational and professional development, presenting majority opinions on sanitation problems, promoting or establishing groups for unified action on a national scale, and participation with other groups in programs of national importance.

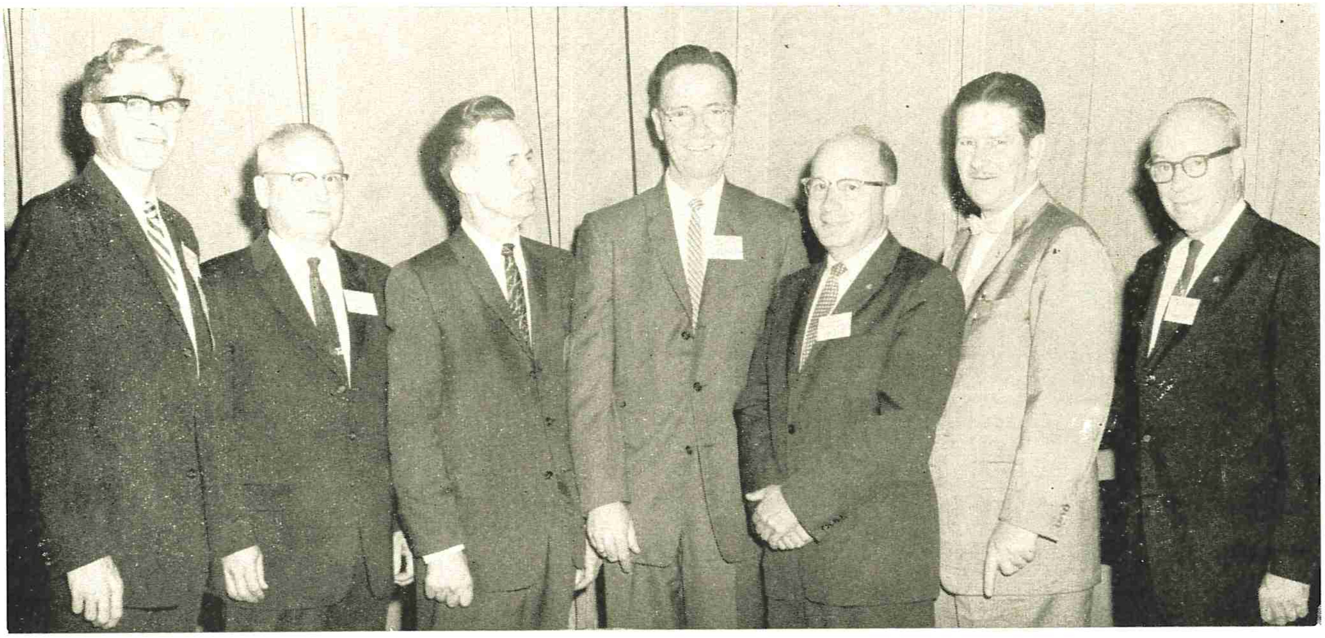
IAMFS in the past year has started the development of the National Mastitis Council and the National Committee on the Uniform Labeling of all Dairy Products. Through participation with the National Sanitation Foundation, Sanitarian's Joint Council, Baking Industry Committee, 3-A Sanitary Standards Committee, Food Law Institute, American Association for the Advancement of Science, and the American Public Health Association, the sanitarian holds a place of importance which is only possible on a national level through the efforts of a national organization.

Thus are derived, through the active effort of the group, multiple benefits which are enjoyed by each individual member. But these combined benefits go futher. As our total membership improves in proficiency this in turn is translated into better public service. And better public service helps insure a higher level of health protection for the citizens we serve.

Sanitation is a broad field and problems in the control of man's complex environment are increasing. One of the best ways for a professional person to keep abreast of new developments is to join an organization that is professional in scope and interest. In its fifty years of service IAMFS has been and continues to be an organization devoted to technical and professional advancement.

SCENES AT PAST ANNUAL MEETINGS

1961 Officers of IAMFS

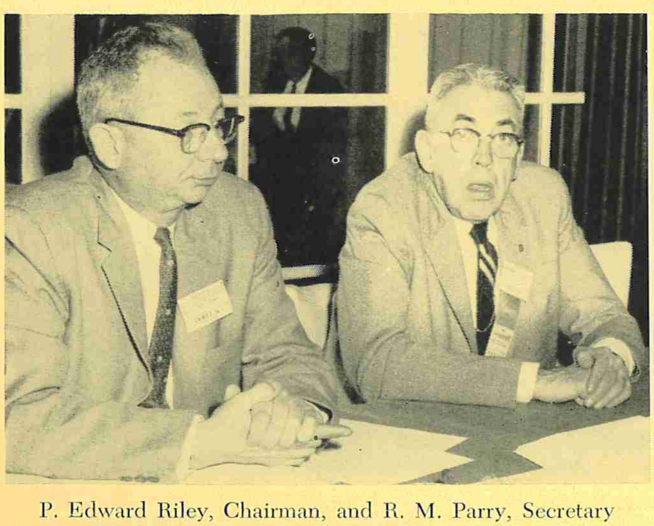


Left to Right: Franklin Barber, Senior Past Pres.; John J. Sheuring, Pres.; Karl K. Jones, Sec.-Treas.; John H. Fritz, 2nd Vice-Pres.; Ray Belknap, 1st Vice-pres.; Charles E. Walton, Pres.-Elect; W. V. Hickey, Jr. Past Pres.

Cross-section of Members Attending an Annual Meeting.

Typical Annual Banquet Scene

Past Presidents Table in Center Foreground shows left to right: John D. Faulkner, Paul Kreuger, Milton Fisher, Paul Corash, Ivan Parkin, C. A. Abele and Mrs. Abele, Harold S. Adams, Harold J. Barnum and H. L. Thomasson.



P. Edward Riley, Chairman, and R. M. Parry, Secretary Conducting an Affiliate Council Meeting.

The Registration Committee works At One of the Annual Meetings.

(Cont. from page 250)
logical balance between host and parasite is upset and sickness could occur without any apparent immediate cause. The epidemiological implications are quite significant.

VACCINES, PHYSICAL AND CHEMICAL AGENTS

Among other properties of viruses of interest to the sanitarian are those relating to vaccines, the effects of physical and chemical agents, and how viruses are classified. The virus, being protein in nature, can be used as an antigen and will elicit the formation of antibodies. This means that one can build an immunity to virus diseases such as smallpox, yellow fever, and poliomyelitis. Most viruses can be inactivated by ultra violet light or by heating to 140°F for 30 minutes. They can withstand freezing and may be stored at the temperature of dry ice (-76°F). Some are quite resistant to dessication and will remain viable in dust or mucous. Generally speaking, the antibiotics are not virucidal, but there are some exceptions. Viruses may be inactivated by chemicals and in general, are a little more resistant than vegetative bacteria to halogens, phenols and peroxides. However, they are less resistant than spores.

RELATION TO WATER SUPPLIES

With respect to water supplies, viruses have been studied extensively *(3)*. Slightly turbid water which was artifically contaminated with poliomyelitis virus wan rendered noninfectious after 24 hours by 4 ppm of chlorine, while 0.4 ppm sufficed in clear water. In tap water, 1.5 ppm chlorine inactivated the virus in 20 minutes, but a concentration of 0.55 ppm required 1 hour. These experiments tell little about what the usual water purification methods would do if virus were present in small concentration. To date there is no evidence that poliomyelitis is transmitted by drinking water.

CLASSIFICATION

There are many methods of classification varying from the name of the place, (Colorado tick fever) to the name of an animal, (Equine encephalitis), or a particular tissue, (acute anteriòr poliomyelitis). Some are known as ECHO, meaning enteric cytopathogenic human orphan viruses, while ECMO would pertain to monkeys, ECBO to cattle, and ECSO to swine. These abbreviated designations are a part of the jargon of virologists and may present some difficulties to the uninitiated.

CONCLUSION

What does all of this mean to sanitarians? Briefly, we should continue to emphasize the measures now in use for the control of communicable diseases, since they apply to viruses as well as bacteria. The usual rules for maintenance of good health should keep the biological balance in favor of man. Environmental sanitation is still a foundation stone in public health practice, whether as Dr. Rosenau used to say, "one speaks of the hygiene of the alimentary canal or the sanitation of the Panama canal."

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PROCESSING PROBLEMS IN THE FROZEN FOOD INDUSTRY[1]

E. L. Morin

Seabrook Farms Co., Bridgeton, New Jersey

The frozen food industry, as we know it today, had its start only 30 years ago. That is when frozen foods first were offered for retail sale. Today, the retail value of frozen foods exceeds 2½ billion dollars annually. Today, the frozen food cabinet holds a great variety of foods including fruits, vegetables, seafood, poultry, meat, citrus concentrates, bakery goods, prepared food specialties, and pre-cooked foods. Fruits and vegetables were the first items to appear and are still the backbone of the frozen food business. The following will be confined mainly to those items.

Our industry came into being, and has enjoyed strong growth because it has been able to offer the consumer a wide variety of foods of high quality and great convenience at prices which are competitive with similar foods in other forms. Through the quick freezing process, we are able to preserve foods with the least possible alteration of the physical structure, nutritive value and flavor. This has not been done without solving many problems. In fact, it is now evident that the retailing of frozen foods was launched when the problem of enzyme control in frozen vegetables was solved about 33 years ago.

In these basic items, such as fruits, vegetables, and citrus the area of raw material has presented and continues to present major problems. To bring about quality as we know it today we had to breed and select strains of seed that produces crops capable of retaining a fresh-like quality through the freezing process. As an example of the magnitude of this work, I can report that at our Seabrook research farm, we test from 500 to 1000 new strains each year. Not every year do we find improved strains, but over a long period of time we have improved the inherent quality factors of our crops. This is the type of work that must continue as it is a basic source of progress.

In plants, as in animals and men, there is a continuous development of new diseases. Some of these, such as asparagus blight, pea wilt, and lima bean mildew, are devastating diseases which can practically wipe out the crop throughout the area of attack. Many of the minor diseases can be controlled by chemicals, but the serious diseases have been best controlled through genetics by breeding resistant varieties.

[1]Presented at the meeting of the Connecticut Association of Dairy and Food Sanitarians, January 13, 1961 at Cheshire, Connecticut.

As any backyard gardener knows, insects are a constant threat to all crops. The processor's problems, however, are much more acute than are the backyard gardener's. We cannot discount the unsightliness of insect damage on our products simply because we grow them ourselves. We have the consumer to please, and above all to protect. We must produce products that are free from insect damage or infestation and at the same time are completely wholesome, which means they do not contain harmful residues of insecticides. This is a serious responsibility and not an easy problem to control. As you may well know, there have been hundreds of new insecticides developed during the past twelve years. Many of them have had a short term of effectiveness because insects develop resistant strains. This all adds up to a big and complicated job for the processor. He must select from the approved insecticides the effective one for his needs. He must determine how it can be used with regard to dosage and timing of application to get results and have a product free from harmful residues. About ten years ago we attacked this problem by installing a simple bioassay laboratory. We use the Drosophila, or fruit fly, as the test animal. The test procedure is quick and simple as compared to the chemical analytical techniques. The results are accurate to about 1 part per 10 million.

I believe the agricultural side of our business is the most complicated and interesting side. Of course, there have been many other problems and achievements in this field. By the use of climate data, we can control the flow of product into process by planting crops to meet a predetermined harvest date. We can determine when and how much irrigation to apply by measuring plant evapo-transpiration rates. It is a highly scientific business in that many of the physical and biological sciences are involved, yet, we still find conditions or problems which seem to respond best to the intuitive "green thumb" treatment of our highly experienced farmers.

The processing side of our business involves procedures which are more readily controlled. But rigid control throughout the process is necessary for quality results. Blanching, a key step in process, must be closely controlled as to time and temperature. Water blanching has been found to give better results with some products, while steam is better for others. Color and vitamin retention is improved by increasing the cooling rate following blanching. By reducing the cooling water temperature to 50°F and providing gentle agitation in the cooling tanks, we have increased color and Vitamin C retention by as much as 12%. Washing techniques using combinations of soaking, flooding, agitation or jet sprays have been developed for each product. In some cases detergents can be used. In all cases, great quantities of water must be used. This is a problem that is not yet solved from the economic point of view. This past year, we used about 10 gals. of water for each pound of product produced. When we produce up to a million pounds a day, you can see we create a real problem of waste water disposal without polluting the natural water shed of the area. We are fortunate in having near-by woodlands with soil and forest mat structure capable of soaking up over 1000 inches of water a year.

Scheduling the flow of prime maturity raw material through a freezing plant is a major economic problem to the processor. The production season for most crops is a relatively short time of from 4 to 10 weeks. Specialized equipment, representing a high capital investment, must be on hand to process each crop. Economics dictate that this equipment be scheduled for maximum use. Crop yields vary from year to year. These are some of the important factors of the scheduling problem. We have developed production schedules which give us uniform flow of product from day to day through use of planting schedules based on climate data. We have not been able to control variations in yield per acre. Though we have improved on this situation, we have much more to do. Hour to hour fluctuation in raw product deliveries have been effectively brought under control by the installation of hydro-coolers and cold storage. Hourly excesses are immediately cooled and held under refrigeration to be fed into process during slack hours.

As this is a meeting of sanitarians, it is only fair that I mention that we have problems in the field of sanitation too. While we know of no case of food-borne illness or food poisoning having been attributed to frozen fruits or vegetables, the processor agrees that the control of bacteria is a most important facet of processing. Large numbers of microorganisms are found on our raw products. Vegetables grown in or in contact with the soil may be seeded with fecal organisms, especially if grown in manured soil. After washing and blanching, however, the total count is reduced to a few hundred per gram. Unfortunately, we cannot pack or freeze our products directly following blanching. Final inspection and in some cases trimming must be done before packaging. This means exposure to conveyor belts and handling. Conveyor belts become soiled with juices and the bacteria are given a happy environment in which to multiply and contaminate the food product. Any handling of food exposes it to contamination by fecal organisms. Obviously, without good sanitation procedures, our finished products could very well carry higher counts than the raw product from which it came.

Our sanitation program includes:

1. Consideration of equipment design for ease of cleaning and self-cleaning features.
2. Cleanliness and sanitary habits of personnel.
3. Provision of adequate time, materials, and facilities for line clean-up and sanitizing.
4. Use of wash or rinse of product just prior to packing or freezing.
5. Application of heat or refrigeration to product at critical point in process.
6. The use of in-plant chlorination.
7. Prevention of delay in flow of product from line end to freezer.
8. Routine bacteria counts on product and equipment.

Some of our most difficult problems lie in the area of equipment design. We have purchased heat exchangers which were supposed to be of sanitary construction only to find they were bacteria generators. Many fillers must be re-worked in our shops to eliminate product "cling spots." Other pieces may have dead spots which will collect food particles. Yet, we are making good progress. Equipment suppliers are doing a better sanitary design job with each new model. The recent AFDOUS deliberations on these problems are sure to stimulate further improvements.

PROBLEMS ASSOCIATED WITH SURFACE SAMPLING TECHNIQUES AND APPARATUS IN THE INSTITUTIONAL ENVIRONMENT[1 2]

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and

L. G. HERMAN

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Several techniques and apparatus for surface sampling are critically discussed. The worker in institutional sanitation is often handicapped when he attempts to use sampling techniques commonly used in other fields. Efforts should be expanded in basic research in this field. The most important challenges lie in the areas of sampling technology, sampling statistics, epidemiological significance, and fundamental aspects of solid surface bacteriology.

The determination of microbial contamination of surfaces in institutional environments depends upon techniques and apparatus borrowed both from the dairy and food sciences and from the diagnostic bacteriology laboratory. The food and dairy laboratories are interested primarily in bacterial counts of nonporous surfaces designed to be disinfected by a rather limited spectrum of treatments. Diagnostic bacteriology on the other hand, is almost entirely a qualitative enterprise, and the bacteriological techniques available to routine medical laboratories are not designed to deal with bacterial enumeration. The investigator in the institutional sanitation field, therefore, has available to him a variety of methods, some having some application to his problem, but none being *specifically* designed to answer the *specific* questions with which he is confronted.

As a consequence of this marriage between two disciplines, each with its own tradition, technology and problems, the worker in institutional sanitation is often handicapped when he attempts to use borrowed surface sampling techniques in his unique environment. First of all, he is dealing with a wide variety of surfaces, including such diverse materials as terrazo, plastics, rubber, stainless steel, leather, textiles, wood and plaster. Secondly, many critical surfaces in the hospital environment do not permit the use of classic sampling techniques. Thirdly, these surfaces may be disinfected by a variety of chemical and physical agents at irregular and unpredictable intervals *(4)*. Above all, perhaps, the worker in institutional sanitation is frequently untrained in bacteriological and statistical theory. Consequently, invalid sampling techniques may be employed and data from these samples may be interpreted without appreciation of their drawbacks and limitations.

TECHNIQUES AND APPARATUS

The surface sampling techniques in current use can be grouped into four general categories:

1. Swabbing a known area and enumerating the organisms which adhered to the swab.
2. Rinsing a surface with a sterile liquid and culturing the dislodged contaminants.
3. Direct contact of surface with culture medium.
4. Combinations and adaptations of the above.

The principles underlying these tests are self-explanatory and do not require elaboration. However, a brief word might be in order to evaluate the various specific methods commonly employed.

Swab method

This involves the use of a sterile cotton swab usually moistened in sterile saline or water. Contaminants are picked up and transferred either directly to a nutrient medium or to an intermediate diluent which can be quantitatively assayed. This method is basic and is probably the most common single technique employed in institutions.

Unfortunately this test has many variables which are difficult to control. Some of these are: *(a)* the area of the surface to be tested; *(b)* the pressure applied during swab manipulation; *(c)* the precision and reproducibility of the swabbing technique; *(d)* the removal of all organisms from the swab to the nutrient medium.

However, even when all of these variables are controlled, the recovery of organisms by this method

[1]Presented at the Seminar on Environmental Aspects of Institutional Infections, Communicable Disease Center, Atlanta, Georgia, November 21-22, 1960.

[2]Studies referred to in this report are being supported, in part, by a Public Health Service Research grant (E-3019) from the National Institute of Allergy and Infectious Disease.

ranges from 52-90 percent, and the reproducibility of results leaves much to be desired *(2)*.

Soluble swab

To overcome objection (d) above, some investigators have used a swab composed of calcium alginate. This dissolves in the diluent and releases all the adhering organisms. Enthusiasm for this method has been expressed in some circles, but critical work by Angelloti *et al (2)*, and by Walter *et al (6)* indicate that this imaginative approach is not yet the panacea for all of our sampling problems.

Membrane filter

Workers in the meat industry apply a nutrient soaked filter to the surface to be tested, and then either incubate the filters *per se*, or disintegrate them and plate the suspending fluid. This method is essentially a static swab test, using a filter in place of a swab.

Rinse method

This system involves dislodging of surface contaminants into a sterile diluent by some type of mechanical agitation and subsequently enumerating the contaminants in the diluent. When the variables in this method are minimized *(3)*, it becomes a very useful tool, yielding both high recovery of contaminants (70%) and fair precision (71-97%). Its obvious drawback in the institutional field is its strict limitation to level, horizontal impervious surfaces.

Among the great drawbacks of both the swabbing and rinse methods are the work and the problems involved in plating the contaminated diluents. To those who work in water and dairy bacteriology, the inherent errors associated with standard plate counts are self-evident. In essence, then, we compound the experimental error of the latter technique with the errors introduced by inadequate and haphazard transfer of organisms from solid surfaces to liquids. This combination of errors often is greater than the precision of the test, thus limiting its application. The adaptation of membrane filter techniques for analysis of swab and rinse diluents has done much to minimized these errors and has improved the accuracy and precision of surface sampling.

Direct surface agar plate

This technique involves pouring a liquified agar medium onto a circumscribed area of the surface to be tested, covering the agar, and incubating the test object at appropriate humidity and temperature. It is necessary to control the temperature of the agar used in this test. Obviously, if the agar is too hot, microorganisms on the surface will be destroyed. Similarly, if the agar is too cool, it will solidify and will not cover the surface uniformly. The temperature of the agar should therefore be between 43°-50° C., a condition which might be difficult to observe when testing surfaces at any distance from a laboratory tempering bath.

The system has the obvious advantage of eliminating intermediate steps such as swabs and diluents, and has demonstrated high recovery (80%) and high precision (87-98%) on non-porous surfaces *(1)*. The drawbacks to its use in institutional environment studies, however, lie in the multiplicity of textures that must be evaluated in the latter circumstances, as well as the difficulties encountered in incubating floors, walls, mattresses and bedframes!

Agar syringe method

An ingenious technique suggested by Litzky involves a syringe-like apparatus of large diameter filled with sterile agar medium *(7)*. A plunger pushes the column of medium to the end of the barrel where it comes in contact with the surface to be tested. After contact, a layer of medium is cut off by a knife or wire and is incubated in a petri dish. The advantages of this method include a constant test area, elimination of bulky and awkward equipment, and reduction in testing expense. The major drawback of this technique thus far is the difficulty of obtaining a flat smooth surface on the agar after cutting, but this disadvantage should be overcome with further testing.

Textile method

Several modifications of the direct contact method have been proposed for blanket and bed linen sampling. One involves pressing the surface of a blanket or sheet onto the sterile surface of a poured and hardened agar plate by means of a flask or beaker. The others consist of sweeping an inverted plate over a blanket, or scratching a blanket stretched over an exposed plate with a tongue blade, thereby dislodging contaminated particles onto the agar surface. Those who have used these methods report satisfaction but the quantitative aspects of these techniques leave much to be desired. Furthermore, their application is limited to flat bedclothes, and cannot be used on mattresses, pillows, clothing, and the like.

Summary of methods

As yet, no satisfactory, quantitative, bacteriological technique is available which can be used universally for the examination of various surfaces in institutions. Very little systematic work has been done outside of the food and dairy fields to evaluate the efficiency and precision of the methods now being employed. Above all, the science of institutional sanitation is in great need of technological advances in the quantitative aspects of surface sampling.

PROBLEMS ASSOCIATED WITH QUANTITATION

A discussion of surface sampling techniques would be incomplete without some consideration of the basic problems associated with bacterial quantitation in general. Mention already has been made that the institutional sanitarian has had to rely in the past on techniques borrowed from other fields. It was further pointed out that even the best of these borrowed techniques have only limited application in the institutional environment. The simple facts that institutional surfaces are of different shape, size and orientation from those in other fields; that institutional surfaces include a diverse array of textures and porosites not encountered in other fields; that institutional surfaces are treated with cleaning and disinfecting agents completely foreign to those used in other fields – these discrepancies alone preclude the simple application of borrowed techniques in the institutional environment.

Although a considerable amount of excellent work has been carried out in this field, investigators have been handicapped by the paucity of information related to basic studies. In particular, there is a great need for more serious attention to the fundamental technology of surface sampling. We do not believe that enough is known about our methodology to place excessive confidence in techniques which may be regarded as arbitrary. The field of surface contamination and disinfection has enough problems without compounding them by inadequate and semi-quantitative techniques, wherein each worker relies only on his own favorite method. This only adds to the confusion which already exists.

In which direction should our research efforts be applied? We submit that four major areas are worthy of investigation now. These are discussed below.

Basic bacteriology of surfaces

Radioisotopes have been used to measure bacterial and soil contamination. Armbruster and Ridenour *(5)* were able to demonstrate that different organisms adhere to the same surface with different tenacities and are not removed or sampled with the same ease. Furthermore, they showed that the same organisms would adhere to different surfaces with different tenacities. Pertinent to the problem of sampling was the observation that monomolecular grease films on surfaces influenced the efficiency of bacterial removal by cotton swabs. Much more attention to these phenomena and to the question of how bacteria stick to surfaces would simplify and facilitate surface sampling.

Along the same theme of basic bacteriology, studies should be made of the nutrient media and incubation conditions used for surface contaminants. The use of blood agar was borrowed from the diagnostic laboratory, and milk plate agar from the dairy people. Do we really know which media are best for floor contaminants and blanket bacteria? Is there general agreement on a proper incubation temperature? These questions deserve careful study and experimentation.

Quantitative technology

Efforts should be made by several laboratories working cooperatively to evaluate quantitatively and qualitatively the several surface sampling techniques commonly used in institutions today. Studies should be made on artificially contaminated surfaces in the laboratory and in the field to determine the actual efficiency and precision of these methods and their applicability for the many surfaces that must be tested.

Attempts should be made to develop new techniques. Perhaps it will be possible to evolve a universal method, suitable for testing all surfaces with comparable precision. Perhaps more attention should be focused on specific methods for specific surfaces. Certainly adaptations should be made of those methods which show promise in the food sanitation field, such as the rinse method and the direct contact method.

At the University of Minnesota, we have been experimenting with an impression plate method that shows promise. Essentially it consists of aluminum milk bottle covers filled with agar. These plates can be applied directly to a surface, removed, and incubated. It is similar in principle to Litsky's wafer, but has the advantage of a larger area, and a consistently uniform flat surface. Furthermore, the aluminum caps are inexpensive and in plentiful supply. The technique is applicable to horizontal and vertical surfaces, textiles, skin, plastics, as well as to floors, walls, and furniture. It combines the advantages of the swab method and the direct surface agar plate, provides a picture of contamination *in situ* and is easy to use. Unfortunately, it is still in the experimental stage and we know very little about its recovery efficiency and precision.

Some further approaches that have engaged our attention are the use of moistened replicate discs and pressure sensitive tape. The discs consist of a cardboard backing to which is attached a piling of thousands of perpendicularly oriented fibres. Preliminary work with these discs shows excellent precision, but poor recovery.

The pressure tape method might also be suitable, but involves the preparation of soluble tape with a bacteriologically compatible adhesive. This is still in the research stage of development.

Ultimately, the problems condense into attempts to develop sampling methods specifically designed for the environment under study.

Statistics of surface sampling

Perhaps the statistical problems of surface sampling have been our greatest frustration. Here again we have been guilty of borrowing assumptions and methods from other fields and trying to apply them without serious consideration as to their applicability. In fact, the statistics of surface sampling should be one of our greatest challenges. Where should a sample be taken from a floor in a 100 square foot room? How many samples should be taken to yield a representative picture? How often should these samples be taken? How can we justify a bacteriological standard for an area in which the contamination exists as discrete, non-uniform and dynamic entities?

In the laboratory we can contaminate a surface in a fairly uniform manner. In the field we dare not assume that we are studying similar phenomena until enough work is done and enough data are analyzed to support these assumptions.

Epidemiological significance of contaminated surfaces

This problem is broad enough to merit a discussion of its own. It is well beyond the scope of this brief presentation. It is nonetheless of fundamental importance to all of us, and is decidedly a fruitful area of future research. It needs the interdisciplinary approach of bacteriologists, medical and surgical staff, and sanitation technologists. We must ultimately, in an honest and objective manner, establish the significance of fomite borne contamination. Perhaps we are already doing too much in surface decontamination and should spend our funds and resources in other endeavors. On the other hand, perhaps we should be redoubling our efforts in this field and attempt to establish standards. But above all, we must know in which direction we are heading.

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NEWS AND EVENTS

COURSE GIVEN IN ENVIRONMENTAL HEALTH ASPECTS OF HEALTH MOBILIZATION

Fifty-five members of environmental health professions attended the first training course in "Environmental Health Aspects of Health Mobilization" held April 23-28 in Battle Creek, Michigan. The course was given by the U. S. Public Health Service's Division of Health Mobilization in cooperation with the Office of Civil and Defense Mobilization at the Staff College of the latter organization.

Students came from 34 different States, including Hawaii, and from the District of Columbia and Virgin Islands. The majority were officials of various State and local health departments and faculty members from several universities.

The week's course included lectures on: basic orientation to civil defense; the Public Health Service program being conducted to carry out the medical and health services aspects of civil defense; special problems of modern day warfare; the role of environmental health personnel in disaster and problems aggravated by disaster; community health services in disaster. A special field exercise was held one morning to demonstrate expedient water treatment, membrane filter and test kit operation, water disinfection, pressure filters, pumps and distillation units. Other demonstrations included food contamination and decontamination and a field exercise in a simulated operation of the Civil Defense Emergency Hospital.

Attendees of note include: Harold S. Adams, Director, Sanitary Science Courses, Indiana University School of Medicine; Ralph H. Boatman, Professor of Health Education, University of North Carolina; Charles E. Corley, Chief of Sanitation, South Carolina State Department of Health, Julian R. Fleming, Director, Division of Sanitary Engineering, Tennessee State Department of Health; Pedrito Francois, Director of Environmental Health, Government of Virgin Island; Milton T. Hill, Assistant Director of Professional Education, New York State Department of Health; Charles M. Kenealy, President of the Maryland Association of Sanitarians; Clark M. Richardson, M. D., Director of Public Health, Tulare County, California, and Chairman, Environmental Health Committee, California Local Health Officers Association: Meredith H. Thompson, Assistant Commissioner, New York State Department of Health; Earle W. Tibbetts, Chief, Sanitary Engineering Services, Maine State Department of Health.

NEW BEVERAGE LABELING REQUIREMENT

All nonalcoholic carbonated beverages will be required to bear a label declaration of ingredients after June 15, 1962, the Food and Drug Administration announced today.

These soft drinks have been exempted from the requirement since January 21, 1941, when an order was issued exempting a number of foods on the assumption that official standards specifying the ingredients for these products could be established within a reasonable time.

FDA said the standards of the program have been delayed far beyond original expectations, for a number of reasons. On September 17, 1957, all of the remaining unstandardized foods given the exemption were removed from the exempt list with the exception of nonalcoholic carbonated beverages and vanilla extract.

Commissioner of Food and Drugs George P. Larrick said that a proposal for the promulgation of a standard of identity for vanilla extract is now under consideration in the FDA.

"There is no proposal for the standardization of nonalcoholic carbonated beverages and none is contemplated in the foreseeable future," he said. "There have been a number of consumer complaints because of the failure of carbonated beverages to bear a statement of ingredients.

"It has now been concluded that it is in the public interest that the exemption from label declaration of the ingredients requirement of the Federal Food, Drug and Cosmetic Act should be terminated for nonalcoholic carbonated beverages," he concluded.

EMULSIFIER ALLEGED CAUSE OF MARGARINE POISONING

An explosive outbreak of a disease accompanied by extensive rashes, enanthema, fever, leukocytosis, and eosinophilia occurred in the Netherlands during the months of August and September, 1960. The 16,250 cases reported to the Public Health authorities were probably only a fraction of the total number of cases. Epidemiological investigations showed that the illness respected geographical borders rigidly, and that practically all patients could be shown to have eaten a recently changed brand of margarine containing "a.o.," a new emulsifier. Virological investigations did not reveal a specific agent. The clinical picture seemed identical with that of the epidemic of "Bläschenkrankheit" in Germany, in 1958, which appeared to have followed the introduction of the same emulsifier into margarine in Germany. The withdrawal of the emulsifier-containing margarine was followed by the prompt disappearance of the epidemic.

Reprinted from J.A.M.A. Vol. 176:7.

BOOSTER HEATING OF PIPELINES STUDIED

Pipeline milking systems probably don't need booster heaters to keep detergent rinsing solutions hot. Proper cleaning with new type chlorinated detergents may be enough to keep bacterial levels down.

University of Wisconsin bacteriologists Birdell Snudden and W. C. Frazier, working in cooperation with H. E. Calbert, dairy and food scientist, and L. A. Brooks, farm engineer, ran a series of tests over a two year period on a 160-foot stainless steel pipeline system on a farm. They sought the temperature at which new chlorinated detergent solutions must enter the line to do a good cleaning job. A big question was whether booster heating was necessary to keep the washing solutions hot. The tests were made on warm summer and cold winter days as well as on moderate spring and fall days.

In one test, chlorinated detergent solution was put into the pipeline at approximately 160 degrees F. and, by means of booster heating, was kept at temperatures that never dropped below 140 degrees F. Bacteria count was less than 20 bacteria per 8 square inches inside the pipeline.

In another test, chlorinated detergent solution was put into the pipeline at approximately 160 degrees F. The solution was allowed to cool naturally as it moved through the line without booster heating. The temperature dropped to about 100 degrees F. by the end of the washing cycle, yet the bacterial count was less than 100 per 8 square inches. That meets the requirements of the dairy sanitation code for a washed and chlorinated pipeline surface.

When chlorinated detergent solution entered the pipeline at 120 to 130 degrees F. and was allowed to cool normally during the washing cycle, it came out at 90 to 95 degrees. Out of 37 such samples examined after chlorination, all but one met the requirements of less than 100 bacteria per 8 square inches.

With the pipeline system used in these tests, the research men got adequate cleaning by starting the chlorinated detergent off at 120 to 130 degrees F. without booster heating, followed by chlorination. Higher temperatures did a still more thorough job.

The washing procedure throughout the experiment included a 6 to 8 minute pre-rinse, a 20 to 24 minute wash, a 2 minute cold rinse and a 5 to 6 minute chlorination.

The research men point out that these tests do not mean that all farmers with pipeline systems can do away with booster heaters. A long pipeline, with much of it outside or in an unheated part of the barn, may cool too much in winter. The rate the cleaning solution flows through the line will also have some effect on how many bacteria remain. In some cases it might be an advantage to start the cleaning solutions at a higher temperature.

"DIABETIC" AND "DIETETIC" ICE CREAMS

The Committee on Food and Nutrition of the American Diabetes Association has received numerour reports and inquiries from individual physicans, as well as the Director of the Bureau of Nutrition of the City of New York, concerning the composition and advertising claims being made for certain brands of "diabetic" or "dietetic" ice creams. In some instances the patients' interpretation of the advertising statements about these products was to assume that they could eat as much as they pleased. Physicians have reported 3 consequences: an initial gain in weight by many patients, provocation of glycosuria, and continuous gastrointestinal upsets.

A comparison of the food value of standard ice cream and so-called diabetic ice creams may often reveal that the differences are so small as to challenge the usefulness of the product. Small variations in portion size easily could eliminate any difference. In one specific instance, a comparison of standard ice cream and a "special formula" disclosed that there were only minor differences in ½ cup portions, the calories for the special formulas being 125 and those of the standard typical 146, while the carbohydrate contents were 11.6 gm. and 15.5 gm. respectively. Frequently the major difference in the standard and special formula ice creams will be in the substitution of an artificial sweetener for the sugar used in the standard. These are usually saccharin, sodium cyclamate, or sorbitol. The latter, through its conversion to fructose, is not without its own direct contribution to the caloric pool, and its intake in excess of about 40 gm. daily may result in gastrointestinal disturbances.

The Committee on Food and Nutrition has been authorized by the Council of the American Diabetes Association to present this summary. The Committee expressed its disapproval of advertising these products as being especially made for diabetics or those on a restricted sugar diet without, at the same time, taking the rest of the diet into consideration.

A Statement by the Committee on Food and Nutrition of the American Diabetes Association.
Reprinted from J.A.M.A. June 24, 1961.

INTERSTATE SANITATION SEMINAR SCHEDULED FOR SEPTEMBER

The 1961 Interstate Sanitation Seminar is scheduled to be held at the Commander Hotel, Ocean City, Maryland, September 11-14. States participating are as follows: Maryland, District of Columbia, Virginia and W. Virginia, North and South Carolina, and Kentucky. Meetings are rotated among the several states listed with Maryland the sponsor for this year's Seminar.

A number of timely topics are on the program agenda, such as: Waste Stabilization Ponds, Sanitation Standards for Salads and other Retail Foods, Pesticides in Milk and Milk Products, Training Programs in Environmental Sanitation, Migrant Labor Camp Sanitation and Vector Control.

The keynote address, opening the Seminar, will be given by Martin B. Marx, D.V.M., Public Health Veterinarian of the Virginia State Health Department. Dr. Marx will speak on the subject, *Veterinary Public Health.*

Chairman of the Registration Committee for the Seminar is, A. J. Fletcher, Talbot County Health Department, Easton, Maryland.

AUTOMATIC MERCHANDISING CONVENTION IN OCTOBER

An outstanding business program, the largest vending equipment exhibit of all time, Chicago's exciting McCormick Place and the First International Symposium of Automatic Merchandising are just a few of the reasons why vending executives throughout the world are keeping their fall business calendar open.

A total of 96 companies already have secured exhibit space for the 75th Anniversary Convention and

Exhibit of Automatic Merchandising scheduled for October 28-November 1 at Chicago's gigantic McCormick Place.

Managed by National Automatic Merchandising Association, national trade group of the automatic merchandising industry, the 1961 conclave is expected to break all existing association records for attendance as well as exhibit space utilized.

Convention General Chairman, Sidney S. Rudin, Automatic Merchandising Company, Division of Automatic Retailers of America, Inc., Chicago, pointed out that this year's show will encompass 52,800 square feet of exhibit space compared with the previous record high of 46,000 square feet needed for the 1960 N. A. M. A. Convention-Exhibit at Miami Beach.

As a special feature of this year's Convention-Exhibit, N. A. M. A., is also sponsoring the *First International Symposium of Automatic Merchandising*, October 31-November 1. Originally planned as part of the year-long observance of the 75th Anniversary of Automatic Merchandising (1886-1961), the International Symposium is expected to draw upwards of 500 vending executives from all parts of the world.

COMPREHENSIVE AIR POLLUTION CONTROL PROGRAM OUTLINED IN JOHN WOOD COMPANY BOOKLET

A practical program for combating the critical problem of air pollution has been outlined in a booklet recently issued by the Air Pollution Control Division of the John Wood Company, whose Superior Metalware Division is a leading manufacturer of milk handling equipment for the Dairy Industry.

Entitled "Together We Can Check the Blight of Air Pollution," the booklet has already received high praise from all levels of government—congressmen, governors, mayors and community leaders.

Rural and suburban areas are as effected by air pollution as are cities. The importance of Public Health and sanitation to everyone demands prompt action to control and eliminate this blight. Industrial expansion, population growth and increased urbanization have contributed to and aggravated this problem. John Wood Company officials have felt that the problem of air pollution — which has reached critical proportions in some areas of the country — deserves the attention of the Dairy Industry.

It has therefore prepared a comprehensive program whereby industry and local authorities may engage in a joint effort to control and eventually eliminate this blight. These recommendations are summarized in the new booklet which may be obtained from Geyer, Morey, Madden, Ballard, 595 Madison Ave., New York City.

QUESTIONS AND ANSWERS

Note: Questions of technical nature may be submitted to the Editorial Office of the Journal. A Question in your mind may be in the minds of many others. Send in your questions and we will attempt to answer them.

QUESTION:
What is the effect on the bacterial count of a milk sample when it is frozen?

ANSWER:
The following is a summary of opinions on this subject:

1. (J. Milk and Food Technol., 18: 297. 1955) State, "The findings in these studies indicate that where milk or cream samples must be shipped long distances to laboratories, partial or complete freezing, before or during shipment, is unlikely to cause an appreciable change in the bacterial content."
2. Additional information may be obtained from Miss Marie Mulhern, Director of Laboratories, Seattle-King County Department of Public Health, Room 1500 Public Safety Building, Seattle 4, Washington. Miss Mulhern found a remarkable agreement between counts before and after freezing in a series of 66 paired samples.
3. It is my opinion that freezing and thawing of milk will tend to break up the bacterial clump and long chained cocci thereby resulting in a higher plate count. Although I favor such means of transportation for these samples additional research is necessary to determine the effect of freezing on the bacterial population in milk, taking into consideration high and low densities, psychrophiles, as well as meso and thermophiles. Although I have no extensive data to prove it, it has been my experience that bacterial counts are increased after freezing.
4. General bacteriological considerations indicate that freezing of samples would be a better method of maintaining the status quo than shipping under wet ice conditions. The only time a drop in bacterial count has been observed on frozen samples, seems to be tied up with the sharp freezing of samples. However, when these are given a few hours incubation, the count again seems to check within 10%.
5. The suggestion of freezing samples does not appear to be practicable. There are many references in the literature reporting the destructive effect of freezing and thawing on bacteria. In contrast to those reports are the suggestions that stock cultures be held in the frozen state to avoid the necessity of frequent transfers. Both lines of thought are completely valid. In the latter instance we do get destruction of some of the bacterial cells, the degree depending not only upon the species and age of the culture, but also upon the nature of the medium, the rate of freezing and thawing, and many other factors. Qualitatively the culture remains viable; quantitatively there may or may not be a high percentage loss in total numbers of the original culture.

   Since the bacterial analysis of milk for official purposes is largely quantitative in nature; since the flora of milk samples is highly variable, depending on whether it is raw or pasteurized and also on the source of contamination; and since it would be difficult to prescribe and control all of the physical factors involved in the freezing and thawing of the samples, the results from such frozen samples would frequently have little relationship to the actual condition of the milk at the moment of taking the sample.

   I would strongly recommend against the adoption of the practice of freezing milk samples for bacteriological examination.

Two publications are:

R. W. Squires and S. E. Hartsell. Survival and Growth Initiation of Defrosted *Escherichia coli* as Affected by Frozen Storage Menstrua. Applied Microbiol., **3**: 40-45. 1955.

Peter Mazur. Physical Factors Implicated in the Death of Microorganisms at Subzero Temperatures. Annals of The New York Academy of Sciences, **85**: Art. 2: 610-629. 1960.

6. We think there are many opinions and relatively little factual information regarding the effects of freezing on bacteria in milk.
7. Split sampling is being used by many states in their laboratory certification projects but no method of handling samples seems to be completely adequate. Probably the main reason for the lack of uniformity is due to lack of information on the subject. According to Johns and Berzins (see ref., para. 1) fast freezing has little effect in reducing the bacterial count of milk and cream and suggest that it would have little effect on samples during shipment. This would indicate that the method of freezing may be important.

   I have no first hand knowledge of whether or not freezing affects counts but would suspect that the effect would probably be less than the error in the method of making plate counts.

MARYLAND AND VIRGINIA DAIRY FARMERS DONATE YEAR'S MILK SUPPLY TO DR. SCHWEITZER'S VILLAGE

Maryland and Virginia dairy farmers are extending a helping hand across the seas to Dr. Albert Schweitzer's world-famed leper colony in Lambarene, Gabon, Africa.

This practical application of an industry's voluntary effort to help bolster the ties of friendship between the United States and the new-born nations of Africa is being undertaken by the Maryland and Virginia Milk Producers Association, composed of nearly 1,700 dairy farmers in the two States.

The helping hand, in this case, will be in the form of the one commodity which the 86-year-old Dr. Schweitzer's African colony needs most — milk for the children of Lambarene.

William B. Hooper, secretary-treasurer and general manager of the Maryland-Virginia Milk Producers Association recently disclosed that the Association is donating a year's supply of ultra-pasteurized milk to the leper village which Dr. Schweitzer has maintained deep in the African jungles for the past 47 years.

The sterilized milk supply — produced at the Association's modern plant at Laurel, Md. — is scheduled to be shipped to Africa this summer, free of charge.

The sterilized milk — produced in a newly-improved high-temperature treating and packiging process developed during a three-year research program at the Association's plant — will keep without refrigeration for several years.

This process, based primarily on a Swiss process known as *Uperisation*, enables the production of a sterile milk, while requiring no refrigeration, maintains a high level of taste and nutritional food values and is comparable in every respect to the fresh milk used by American consumers.

The Association stated, "This gift of milk goes to Dr. Schweitzer and the people of Lambarene with the sincere hope of the dairy farmers of Maryland and Virginia that it will be of value to his dedicated work."

"We are grateful that we have a surplus of this most-perfect and needed food with which we can help bring nourishment to the children of Lambarene."

SPECIAL PROGRAM FOR RESEARCH GRANTS IN RADIOLOGICAL HEALTH

In view of the rapid expansion which is forecast in the use of nuclear energy, X-rays, and other sources of radiation, a greatly expanded program for research grants in the field of radiological health has been developed. These grants are offered to support research by individuals, universities, hospitals, laboratories, and other public or private institutions in the assessment and control of manmade and natural radiation exposures to the individual, no matter how the separate components may originate. The knowledge and skills of many professional disciplines and specialties - physicians, engineers, physicists, chemists, educators, statisticians among them - are needed to find answers to the many challenging questions in radiological health.

Research proposals should contribute to the determination of the extent and character of the radiation problem, as well as the mechanisms by which radiation produces damage. Studies aimed at the elucidation of the radiation damage "cause and effect" relationship are essential if low-level and long-term radiation exposure effects are to be accurately assessed and general control programs organized. Therefore, basic studies relating to critical body organs and systems, preferred metabolic pathways for specific radioactive contaminants, and an understanding of the radiosensitizing and modifying effects of various materials are encouraged.

Broad epidemiological studies aimed at a scientific evaluation of the long term effects such as aging, congenital malformations, genetic effects, behavorial patterns, and cancer induction are also of primary concern. Field studies of the movement of radioactive contaminants in biota and human food chains are of special interest, since we know the physical environment may be greatly altered by biological activity, as for example, the concentration of waterborne radionuclides in microorganisms and fish.

Purely physical studies, such as chemical mechanisms in radiation chemistry, the design of equipment and the development of techniques to accurately assess or reduce the population dosages are mandatory for a successful research program.

Studies aimed at directing scientific findings toward control devices or procedures are necessary in a "total view" of man's ecological system, as are studies that attempt to assess the relationship between health hazards created and possible benefits derived by radiation usage. The determination of the consequences of radiation exposure for present and future generations will require intensive investigation.

For information and/or application forms please contact: Dr. Paul F. Hahn, Chief, Office of Extramural Grants, Division of Radiological Health, U. S. Public Health Service, Washington 25, D. C.

NATIONAL FOOD CHEMICALS CODEX IN PREPARATION

Safety in the use of food additives requires an authoritive reference work (comparable to the *U. S. Pharmacopeia* and *National Formulary*) as a source of information on methods of analysis and standards of identity and purity of chemicals used as intentional additives in foods. In response to this need, the Food Protection Committee of the National Academy of Sciences — National Research Council and the Toxicology Study Section of the National Institutes of Health jointly proposed a project to prepare such a compendium.

The Academy —, Research Council, a private organization of distinguished scientists, announced that it has received a Public Health Service research grant in partial support of the project under which the Food Protection Committee will prepare, over an estimated 5-year period, a *National Food Chemicals Codex.* Fifty thousand dollars has been granted by the Service for the first year of this work. The Committee receives additional support for the project from contributions from industrial concerns.

Chairman of the Food Protection Committee is William J. Darby, Professor of Biochemistry and Director of the Division of Nutrition at Vanderbilt University School of Medicine, Nashville, Tennessee. Dr. Justin L. Powers, who recently retired as director of revision of the *National Formulary,* will direct the *Codex* project.

HELPFUL INFORMATION

Editorial Note: Listed below are sources of information on a variety of subjects. Requests for any of the material listed should be sent by letter or postcard to the source indicated.

Impact of Antibiotics on Medicine and Society. Monograph 11. Iago Gladston. International University Press, 227 W. 13th Street, New York, N. Y.

Veternary Hand ook for Cattlemen. J. *W. Bailey.* Springer Publication Co. Inc., New York, N. Y. 389 pages. $5.00. 1958.

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Factors That Influence the Accuracy of Weight in Tank Sampling. Bul. 603. Dec. 1957. Vermont Agric. Exp. Station, Burlington, Vt.

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Bacterial Food Poisoning and Its Control. Bul. 493. Bulletin Dept., College of Agric., Univ. of Massachusetts, Amherst, Mass.

Methods of Milk Solids Determinations. Fred Stein. U. S. Dept. of Agric., A. M. S., Washington, D. C. July 1957.

Science and Technology of Food Preservation By Ionizing Radiations. Chemical Publishing Co., 212 Fifth Ave., New York 10, N. Y. 192 pages. $4.50.

Food Yields Summarized By Different Stages of Preparation. Agricultural Handbook 102. Supt. of Documents, Gov't. Printing Office, Washington, D. C. 93 pages. 50c.

Clinical Memoranda on Economic Poisons. Catalog No. FS 2.60/2:P 75/2. Supt. of Documents, Gov't. Printing Office, Washington, D. C. 1956. 78 pages 30c.

Egg Grading Manual. Catalog No. A 1.76:75/2. Supt. of Documents, Gov't. Printing Office, Washington, D. C. Revised 1956. 48 pages. 35c.

CLEANER MILK

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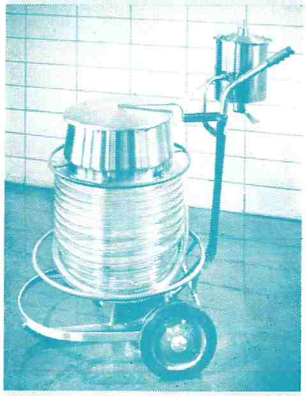

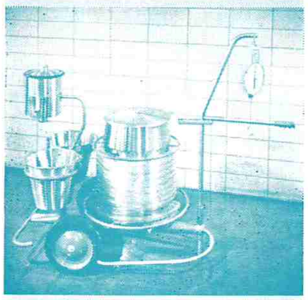

Aside from the fact that carrying milk to the cooler is costly in time and labor, it exposes milk to a wider range of contamination . . . lowering the milk value as a result of a higher bacteria count.

To provide an economical, practical means of transporting milk directly from the stalls to the bulk cooler, Weco Milk-Veyors were created. They were tested, proved efficient. Engineered to be practically "foolproof" in operation so that their low cost and low maintenance would be added incentives to the dairy farmer.

Weco Milk-Veyors are designed to keep MILK CLEANER—to speed milk directly to the bulk cooler for continual chilling. The stainless steel receiver unit which rolls along the milking line has a foot operated cover that closes automatically when milk has been poured into the receiver. Milk flows through seamless, heavy-duty M34R Transflow tubing—is released air and foam-free by the stainless steel releaser unit which fits tightly atop the bulk tank inlet.

Because the Weco greatly exceeds the minimum CIP velocity, cleaning and sanitation is most thorough—a fact that's been proved in the field with over 1000 units. Milk is not once exposed to air-borne contamination (dust, insects, spray residue, lint, hair, etc.) from the time it is poured into the Weco receiver! This means cleaner milk—proved by over a thousand successful dairy farmers who report LOWER BACTERIA COUNT since using a Weco Milk-Veyor!

REG. T.M. Weco MILK-VEYOR

3 MODELS TO MEET EVERY DAIRY FARM REQUIREMENT

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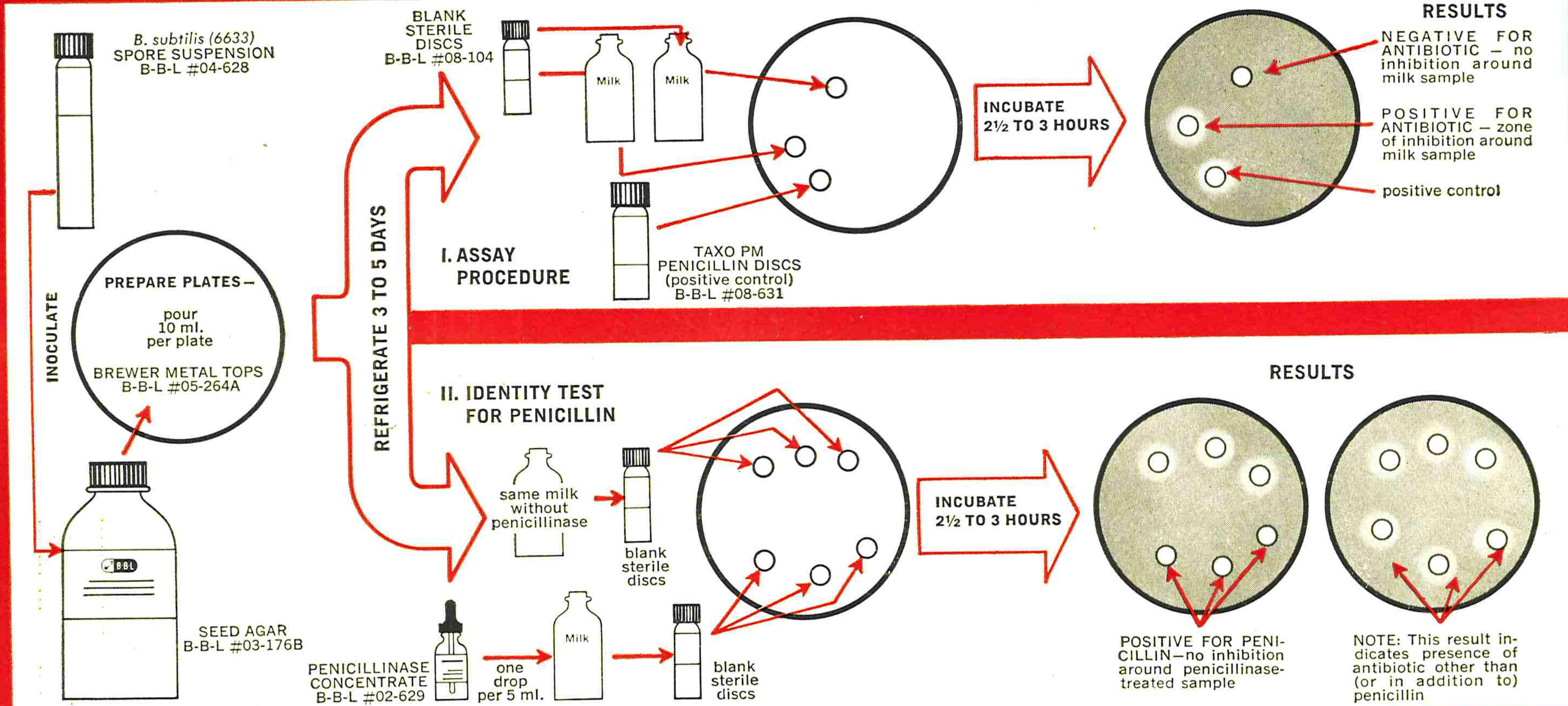
DETECTION OF PENICILLIN IN MILK



The presence of antibiotics in milk following mastitis therapy in cows has created serious public health problems and caused technical difficulties within the dairy industry. A rapid, practical laboratory procedure to assist regulatory agencies and the dairy industry in solving these problems was described by Arret and Kirshbaum.* This procedure employs rapid growth of a sensitive strain of *B. subtilis* for assaying the presence of antibiotics in milk and for determining its identity with penicillin. Inhibition of growth by the presence of as little as 0.05 unit of penicillin per ml. of milk sample is detectable within 2½ hours.

In answer to many requests for information about the availability of B-B-L products for this simplified procedure, the B-B-L Development Laboratory has prepared this TECHNICHART. It graphically illustrates the basic procedure, showing the materials necessary—**all of which are available from B-B-L.** A complete brochure with detailed technique and product listing is available upon request.

*Arret, B., and Kirshbaum, A.: J. Milk and Food Technol. **22**:329, 1959.

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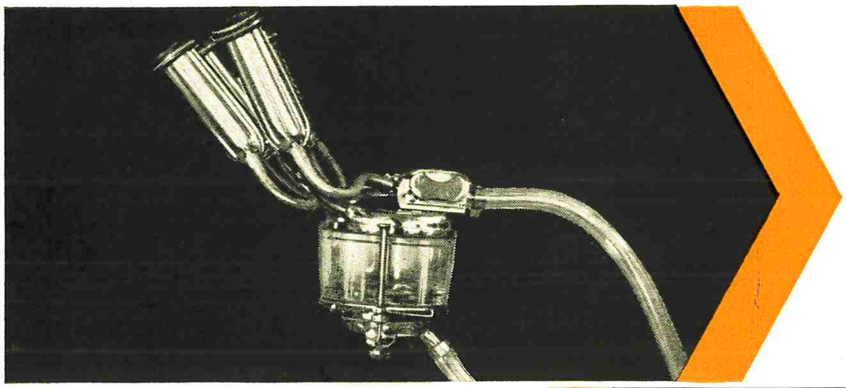

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with separate vacuum systems — one for operating the pulsators, one for the milk line — this insures against variations of vacuum in the milk line caused by the pulsators.

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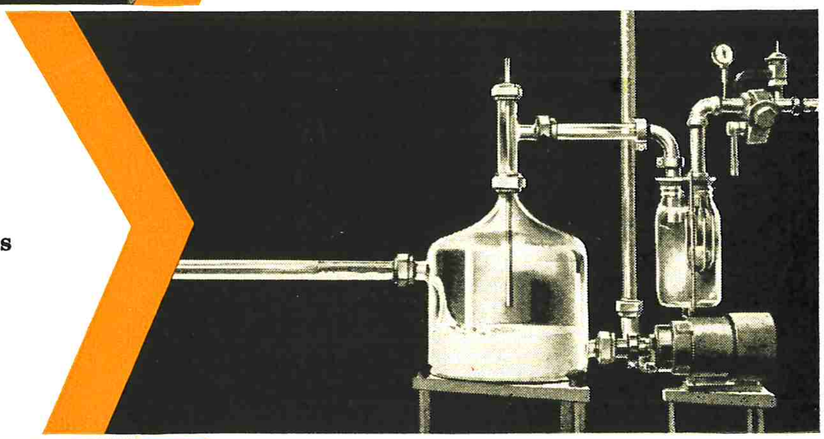

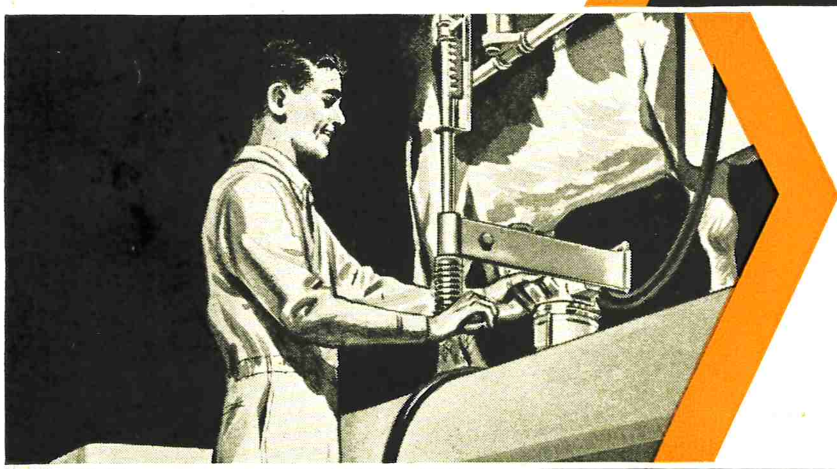

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