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Official Publication

International Association of Milk, Food and
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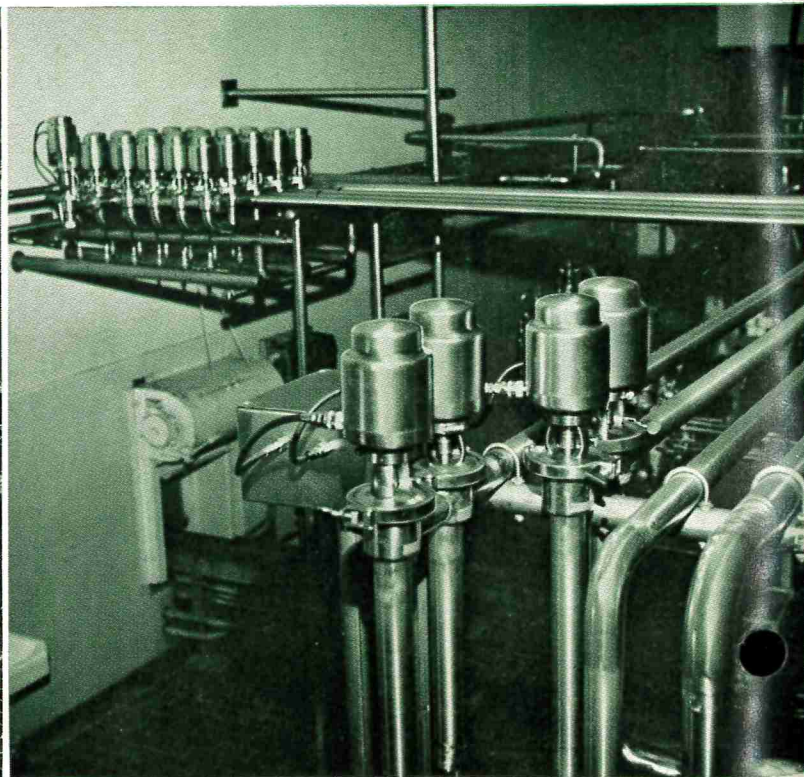
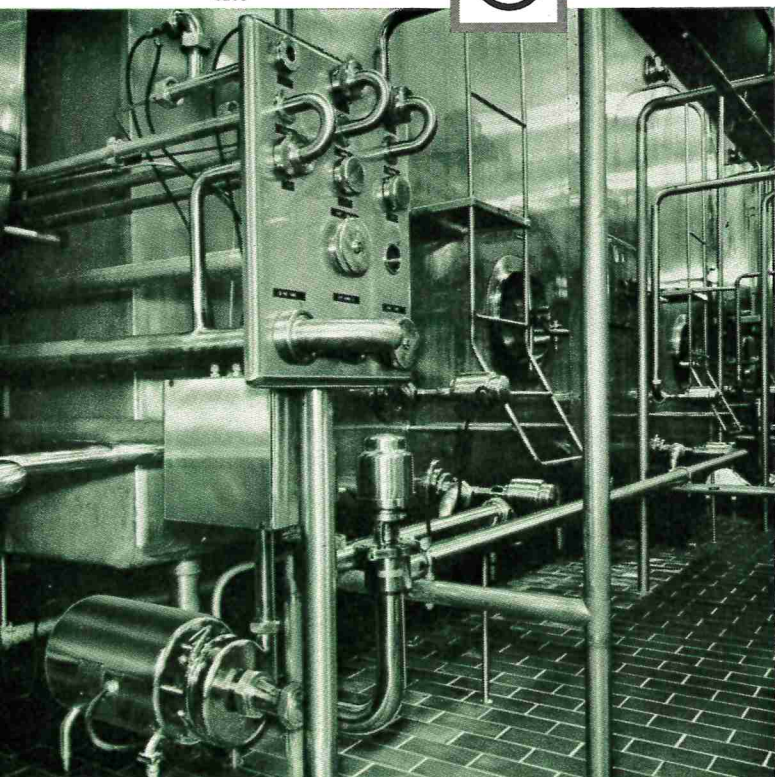


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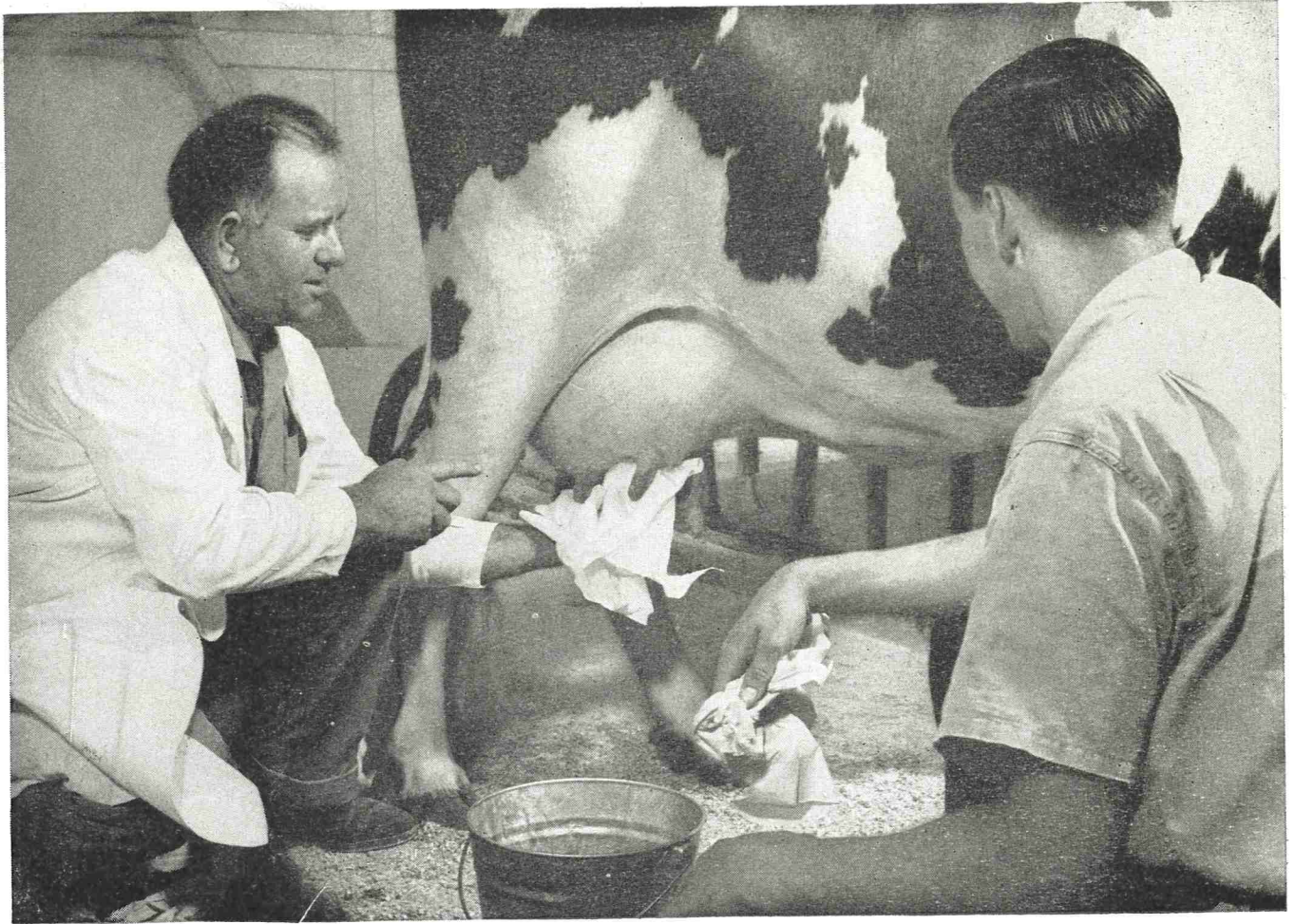
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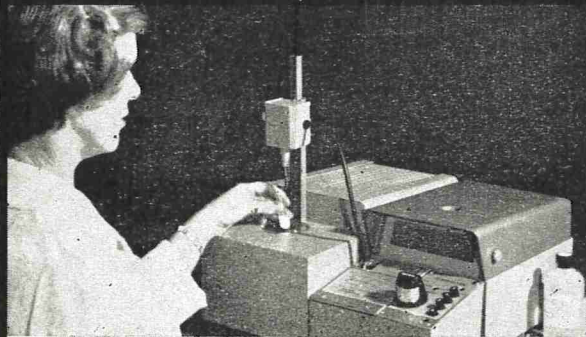
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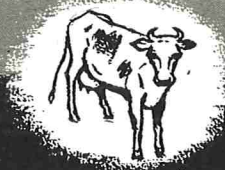


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Volume 26 September, 1963 Number 9

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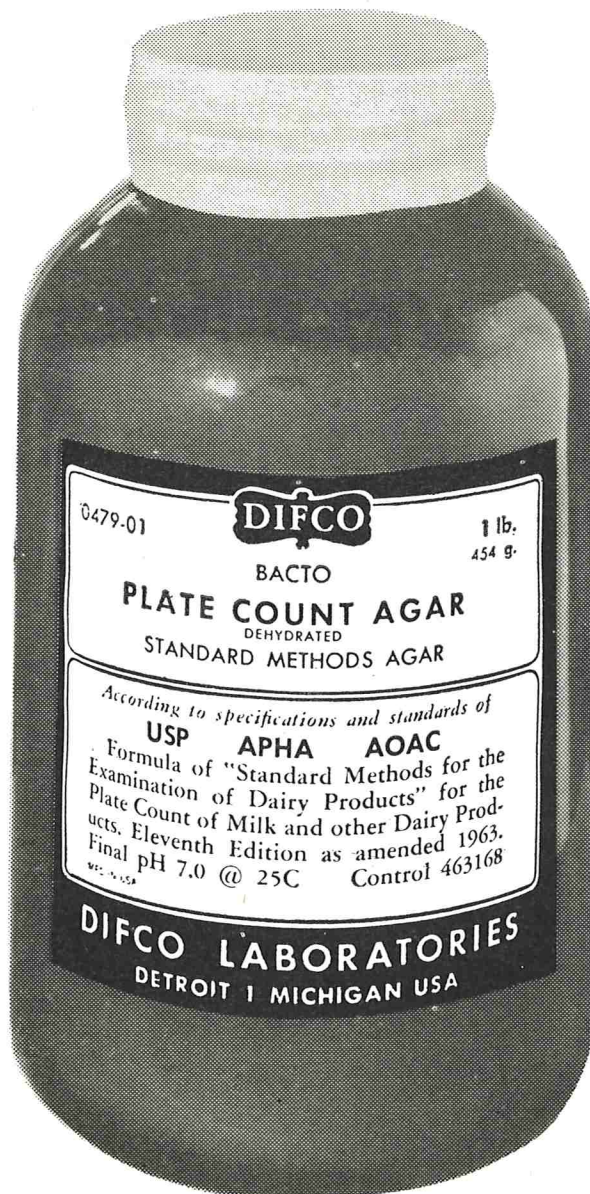
STANDARDIZATION OF MILK PLATING MEDIA

Report of the Coordinating Committee on Laboratory Methods

VOL. 53, NO. 8, A.J.P.H. 1305-1310, AUGUST, 1963

"It is recommended that media be used which has been tested by the APHA methods and bearing a label indicating that it has met the prescribed standards of the APHA."

This report of the Coordinating Committee on Laboratory Methods of the Committee on Evaluation and Standards (APHA) was approved by the Executive Board of the American Public Health Association on June 27, 1963.



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RECOMMENDED PRACTICES FOR PRODUCING CULINARY STEAM FOR PROCESSING MILK AND MILK PRODUCTS¹

(REVISED APRIL 1963)

The following procedures for providing steam of culinary quality are recommended which clarify current methods suitable for the production and transmission of steam satisfactory for use in steam-vacuum treatment or for pasteurization by the direct introduction of steam into milk and milk products. Steam produced in accordance with these recommended practices should be acceptable under provisions of the Milk Ordinance and Code, 1953 Recommendations of the Public Health Service, for use in properly constructed and operated milk processing equipment.

SOURCE OF BOILER FEED WATER

Potable water or water supplies acceptable to the regulatory agency having jurisdiction shall be used. Water containing organic materials such as leaves, algae, detergents, etc., should not be used for boiler feed water without adequate pretreatment.

FEED WATER TREATMENT

Feed waters must be treated if necessary for proper boiler care and operation. Boiler feed water treatment and control should be under the supervision of trained personnel or a firm specializing in industrial water conditioning. Such personnel should be informed that the steam is to be used for culinary purposes. Pre-treatment of feed waters for boilers or steam generating systems to reduce water hardness before entering the boiler or steam generator by ion exchange or other acceptable procedures is preferable to addition of conditioning compounds to boiler waters.

A number of compounds are used to prevent corrosion and scale in boilers or to facilitate sludge removal. On February 6, 1963, a list of boiler water additives for the preparation of steam in contact with food was published in the Federal Register which conform to the Food Additives Amendment of the Food, Drug and Cosmetic Act. The substances listed are:

Ammonium alginate	Sodium humate
Cobalt sulfate (as catalyst)	Sodium hydroxide
Lignosulfonic acid	Sodium lignosulfonate
Monobutyl ether of polyoxyethylene glycol ²	Sodium metasilicate
	Sodium nitrate

¹Prepared by the National Association of Dairy Equipment Manufacturers, 1012 Fourteenth St., N. W., Washington, D. C. for reprints enclose stamped, self addressed envelope with request to above address.

Monobutyl ether of polyoxypropylene glycol ²	Sodium phosphate (mono-, di-, tri-)
Polyoxyethylene glycol ³	Sodium silicate
Polyoxypropylene glycol ³	Sodium sulfate
Potassium carbonate	Sodium sulfite (neutral or alkaline)
Sodium acetate	Sodium tripolyphosphate
Sodium alginate	Tannin (including quebracho extract)
Sodium aluminate	Tetrasodium pyrophosphate
Sodium carbonate	
Sodium hexametaphosphate	

No greater amount of the above boiler water treatment compounds should be used than the minimum necessary for controlling boiler scale or for other boiler water treatment purposes and no greater amount of steam should be used for the treatment and/or pasteurization of the milk and milk products than necessary.

Tannin is also frequently added to boiler water to facilitate sludge removal during boiler blow-down. This product, although included in the above list of approved boiler additives, has been reported to give rise to odor problems, and for this reason should be used with caution.

Boiler compounds containing cyclohexylamine, morpholine, octadecylamine, chromium and hydrazine are *not permitted* for use in steam in contact with milk and milk products.

BOILER OPERATION

A supply of clean, dry and saturated steam is necessary for proper equipment operation, therefore, boilers and steam generation equipment should be operated in such a manner as to prevent foaming, priming, carry-over and excessive entrainment of boiler water into the steam. Carry-over of boiler water additives can result in the production of milk off-flavors. Manufacturers instructions regarding recommended water level and blow-down should be consulted and rigorously followed. The blow-down of the boiler should be carefully watched, so that over-concentration of the boiler water solids and foaming are avoided. It is recommended that periodic analyses be made of condensate samples. Such samples should be taken from the line between the final steam separating equipment and the point of the introduction of steam into the product.

²Minimum molecular weight 1,500.

³Minimum molecular weight 1,000.

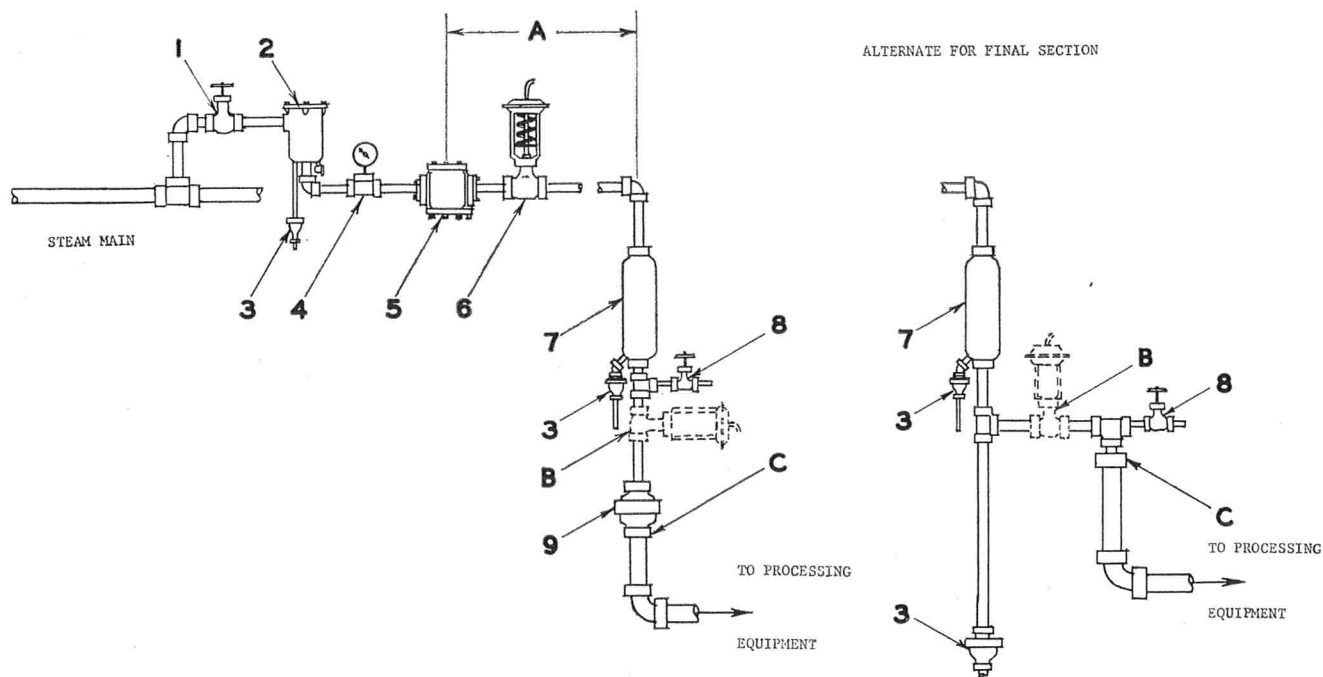


Figure 1. Units and flow chart for production of culinary steam.

CULINARY STEAM SUPPLY LINE

The steam pipe line between the steam main and the point of introduction of steam into the milk should be equipped with units of adequate size for control and safety purposes. Suggested units and a flow diagram are presented in Figure 1.

Legend:

- A. Desuperheater or sufficient length of piping to desuperheat steam shall be incorporated between the pressure regulating (reducing) valve and the steam purifier.
- B. Acceptable alternate location for steam throttling valve.

C. Sanitary tubing and fittings shall be used between the point indicated and the processing equipment.

- 1. Stop valve off steam main; 2. Separator, Adams carbon or equivalent; 3. Condensate trap; 4. Pressure gauge; 5. Steam pressure regulating (reducing) valve; 6. Steam throttling valve (automatic or manual); an alternate location is shown at B;
- 7. Steam purifier, Anderson Hi-eF or equivalent; 8. Steam sampling valve and connection; 9. Spring loaded sanitary check valve.

Note:

Additional valves, strainers, traps, gauges and piping may be used for control and convenience in operation. The location of the steam throttling valve is not restricted to the positions indicated on the drawing.

CALIBRATION OF THERMISTOR CRYOSCOPE

EMANUEL KAPLAN AND TODD M. FRAZIER

Bureaus of Laboratories and Biostatistics,
The Baltimore City Health Department,
Baltimore, Maryland

(Received for publication January 11, 1963)

It is customary in the calibration of the thermistor cryoscope for the determination of added water in milk by the freezing point method (1) to attempt to make the instrument direct reading (knob readings require no correction). This is done by tedious adjustment to -0.422 C (422) with a 7% sucrose solution or equivalent salt standard and to -0.621 C (621) with a 10% sucrose solution or equivalent salt standard. The difference (span) is 199. If knob readings for standard solutions deviate from these values, calibration curves may be prepared (Figure 1).

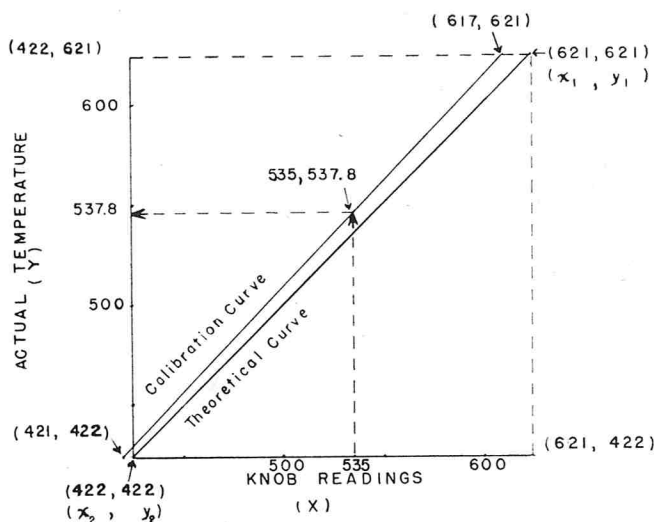


Figure 1. Graph of equation for theoretical standardization and use of a calibration curve.

In order to obviate the need for a calibration curve, and to eliminate the necessity for adjustment to exact knob readings, a mathematical expression has been derived for the cryoscope calibration. From this, a correction table has been prepared (Table 1).

The theoretical curve for the cryoscope standardization shown in Figure 1 is a straight line joining two points. The coordinates of the 7 per cent point are 422, 422 and the 10% point coordinates are 621, 621. The equation for this line is $Y = bX + a$ where "b" is the slope of the line and "a" its intercept on the Y axis. This theoretical curve is actually the diagonal of a square and has a slope of 1.

In standardization where knob readings differ from

theoretical readings, the equation for correction may be derived as follows:

I. 10% point coordinates = x_1 (knob reading), y_1 (621)

7% point coordinates = x_2 , (knob reading), y_2 (422)

II. Slope $b = \frac{y_1 - y_2}{x_1 - x_2} = \frac{199}{x_1 - x_2}$

The slope is the theoretical span (621 - 422) divided by the observed span.

III. Intercept $a = y_1 - bx_1 = 621 - bx_1$ (the value of the equation where $x_2 = 0$)

IV. Equation for corrected curve is therefore

$Y = bX + a$ (where X is dial reading of milk sample)

Example:

After a particular standardization with 7% and 10% solutions, the 7% reading was 421, the 10% was 617, and a milk sample had a knob reading of 535. What is the corrected value for the milk sample?

1. 10% point (x_1) = 617 y_1 = 621

7% point (x_2) = 421 y_2 = 422

2. The slope $b = 1.0153$.

$b = \frac{y_1 - y_2}{x_1 - x_2} = \frac{199}{617 - 421} = 1.0153$

3. Intercept $a = 621 - (1.0153)(617) = -5.4$

4. The knob reading X for milk was 535

The corrected knob reading Y is therefore:

$Y = (1.0153)(535) - 5.4 = 537.8$ (calculated correction + 2.8)

The theoretical value at which there is no correction for any knob reading is at span 199 derived from 621 (10% standard) minus 422 (7% standard). The only span value at which the correction is the same for the entire range of milk freezing points is 199 derived from any combination of 10% and 7% readings other than 621, 422; i.e., 618, 419. Plotted curves for the latter coordinates would be parallel to the theoretical curve of Figure 1.

As one deviates from span 199, in theory a correction should be calculated for each freezing point reading. As a practical matter, however, corrections based on knob reading 535 (Table 1) may be employed for all samples testing in the limits of 520 to 550 where most milk freezing points occur. Beyond

TABLE 1.—CALCULATED THERMISTOR CRYSCOPE CORRECTIONS TO BE APPLIED TO KNOB READING 535 OVER SPAN RANGE 193-206
EXAMPLE: STANDARDS 424, 623; CORRECTED READING 535 - 2.0 = 533

7% Standard	10% Standard										
	616	617	618	619	620	621	622	623	624	625	626
427					-1.6	-2.2	-2.8	-3.3	-3.9	-4.5	-5.0
426				-0.6	-1.2	-1.8	-2.3	-2.9	-3.5	-4.0	-4.6
425			+0.4	-0.2	-0.7	-1.3	-1.9	-2.5	-3.0	-3.6	-4.1
424		+1.5	+0.9	+0.3	-0.3	-0.9	-1.4	-2.0	-2.5	-3.1	-3.6
423	+2.5	+1.9	+1.3	+0.7	+0.1	-0.4	-1.0	-1.6	-2.1	-2.6	-3.2
422	+2.9	+2.3	+1.7	+1.2	+0.6	0.0	-0.6	-1.0	-1.6	-2.2	-2.8
421	+3.3	+2.8	+2.2	+1.6	+1.0	+0.4	-0.1	-0.6	-1.2	-1.8	-2.4
420	+3.8	+3.2	+2.6	+2.0	+1.4	+0.9	+0.3	-0.3	-0.8	-1.4	-1.9
419	+4.2	+3.6	+3.0	+2.4	+1.9	+1.3	+0.7	+0.2	-0.4	-1.0	
418	+4.6	+4.0	+3.4	+2.9	+2.3	+1.7	+1.2	+0.6	0.0		
417	+5.0	+4.4	+3.9	+3.3	+2.7	+2.1	+1.5	+1.0			
416	+5.4	+4.9	+4.3	+3.7	+3.1	+2.5	+2.0				

TABLE 2.—EFFECT OF SPAN ON KNOB READING CORRECTION

10%	7%	Span (10%-7%)	Calculated correction for knob reading			Difference between 520 or 550 correction and 535 correction
			520	535	550	
621	422	199	0.0 (520.0) ^a	0.0 (535.0)	0.0 (550.0)	0.0
618	419	199	+3.0 (523.0)	+3.0 (538.0)	+3.0 (553.0)	0.0
616	421	195	+3.0 (523.0)	+3.3 (538.3)	+3.6 (553.6)	0.3
619	416	203	+4.0 (524.0)	+3.7 (538.7)	+3.4 (553.4)	0.3
618	425	193	-0.1 (519.9)	+0.4 (535.4)	+0.9 (550.9)	0.5
623	417	206	+1.5 (521.5)	+1.0 (536.0)	+0.5 (550.5)	0.5
613	427	186	+1.5 (521.5)	+2.6 (537.6)	+3.6 (553.6)	1.0
624	411	213	+3.8 (523.8)	+2.8 (537.8)	+1.9 (551.9)	1.0

^aCorrected reading in parenthesis.

this 520-550 range, corrections should be calculated individually. The error involved in the use of a 535 correction chart (Table 1) for other knob readings would vary with the span. The maximum difference (Table 2) would be 0.3 (0.0003 C) in the span range 195-203, 0.5 (0.0005 C) in span range 193-206, and 1.0 (0.001 C) in span range 186-213.

The mathematically derived correction table for

the thermistor cryscope calibration has been found extremely useful in the routine examination of milk for added water by the freezing point method.

REFERENCE

1. American Public Health Association. *Standard Methods for the Examination of Dairy Products*. 11th Edition, p 302. 1960.

STATE ACTIVITIES IN MILK LABORATORY CERTIFICATION¹

In preparation for a progress report at the Ninth National Conference on Interstate Milk Shipments, in January, 1963, the Laboratory Committee wrote to state health department laboratory directors or state department of agriculture laboratory and administrative officials of 49 states and the District of Columbia to request up-to-date information on their laboratory approval programs. To secure uniform records officials were requested to tabulate their data under specified headings on an accompanying questionnaire similar to that used in 1961. Again the response was excellent, with 100 percent returns. All 42 of the states and the District of Columbia having shipping stations or plants listed in the January 1963 Sanitation Compliance Ratings of Interstate Milk Shippers² have programs for regulation of local milk laboratories, as did 5 of the 8 remaining states.

Table 1 lists the states in which local milk laboratories were under state regulation on January 1, 1963. To provide additional information, data were requested on the number of official, commercial, and dairy industry or private milk laboratories under state regulation. These figures for each state are shown, followed by a similar tabulation showing the number of each type of milk laboratory reported by the states as utilized for interstate milk shipment. As of January 1, 1963, the ratings of interstate milk shippers were based on the use of 546 laboratories consisting of 283 official, 60 commercial, and 203 industrial (or private) milk laboratories. Officials of 49 states receiving the questionnaire had approved 1431 milk laboratories (508 official, 199 commercial, and 724 industrial).

As shown in Figure 1 the use of state approved local laboratories in analysis of milk for interstate shipment at the end of 1962 showed some increase over that reported at the Eighth National Conference in 1961 (as of December 31, 1960). This figure also charts data reported at the Seventh and Sixth National Conferences on total laboratories under state regulation and the number utilized for interstate milk shipment.

Detailed data for each state were entered by code number under the appropriate PHS Region on several tables. Table 2 lists the laboratory tests approved

in each state for examinations of raw and pasteurized milk. Plate counts were used by 383 of the local laboratories examining raw milk for interstate shipment. Oval tube counts were used by 9 laboratories, plate loop counts by 51 and 90 utilized direct microscopic counts as of January 1, 1963. Two states reported that methylene blue reduction tests were used by 87 laboratories. Information was also requested on whether "Standard Methods" or screening tests were used for antibiotics, and 42 states reported that 670 laboratories used a Standard Methods procedure. In six of the above states 58 laboratories used a screening test as did 13 laboratories in two additional states.

Data in Table 3 shows that 44 states and the District of Columbia reported sending split milk samples to 879 laboratories, of which 704, 710, and 624 examined pasteurized milk respectively by standard plate count, coliform, and phosphatase tests, and 679, 669, and 606 so examined cream or other milk products. Split samples of raw milk were examined by 677 laboratories using standard plate counts, 12 by oval tube and 59 by plate loop counts, 167 by direct microscopic counts, and 75 in 2 states by methylene blue reduction. Liquid split samples were shipped by 38 states, and frozen samples by 10 states. Four states reported that samples were also split at the time state milk laboratory certifying officials visited local laboratories. All states shipped samples at least twice each year and the number of samples sent are tabulated for each state.

STATE ADMINISTRATIVE PRACTICES

The Laboratory Committee also obtained information, by means of the questionnaire, on state administrative practices in approval of milk laboratories, as detailed in Table 4. This table shows that 23 states surveyed laboratories annually, while 27 surveyed them at more or less frequent periods. Fifteen states issued certificates annually to locally approved laboratories and 8 states issued such at some other period of time. With reference to the recommendation of the Fourth National Conference in 1953 that the state laboratory agency publish annually or semiannually a list of approved laboratories including the date and test or tests for which approved, as of January 1, 1963, 18 states reported issuing such a list annually, and 12 states issued lists at other more or less frequent periods. Thus 30 states now issue such certificates as compared with 23 two years ago.

Twenty-one states reported having requirements for laboratory personnel, whereas 29 reported no requirements, although 7 had plans to establish minimum

¹Based on the Report of the Laboratory Committee, National Conference on Interstate Milk Shipments, April 16, 1963. Committee Members: L. A. Black, *Chairman*; E. K. Borman, E. W. Cook, W. J. Noble, P. Patrick.

²Issued quarterly by Milk and Food Branch, Division of Environmental Engineering and Food Protection, DHEW, PHS, Washington, D. C.

TABLE 1. MILK LABORATORIES UNDER STATE REGULATION

State	Total under regulation			Used for inter-state shipment			State	Total under regulation			Used for inter-state shipment		
	O ^a	C ^b	I ^c	O	C	I		O	C	I	O	C	I
Alabama	9			9			New Jersey	7	1				
Arizona	4			1			New Mexico	3			2		
Arkansas	4		2	3			New York	33	67	254	1		2
California	34	3	106	10			North Carolina	22		5	22		5
Colorado	8	2	1	7	2	1	North Dakota	7			4		
Connecticut	6	4	17				Ohio	24	14	13	14	5	14
Delaware	1						Oklahoma	6		1	4		1
Florida	8	1	19	8			Oregon	2			1		
Georgia	9			2			Pennsylvania	18	25	45	4	16	21
Idaho	5		1	5		1	Rhode Island	2	3				
Illinois	34	13	48	16	5	23	South Carolina	6		6	4		
Indiana	15	5	16	13	2	5	South Dakota	4		4	3		
Iowa	19	4		15	2		Tennessee	6	2	12	6	2	8
Kansas	3			3			Texas	22			17		
Kentucky	8	1	1	6	1		Utah	5	2		5	2	
Louisiana	7			7			Vermont	1	1	13			
Maryland	9	4	8	7	4	6	Virginia	19			12		
Massachusetts	31	15	17	16	2		Washington	14	1	15	7	1	15
Michigan	17	5	6	4	2	2	West Virginia	9		4	9		4
Minnesota	10	5	14	8	5	12	Wisconsin	22	7	82	14	4	78
Mississippi	7			7			Wyoming		1	1			
Missouri	8	2	14	8	2		D. C.		3	3		3	3
Montana	7		1	7		1	Alaska		4				
Nebraska	7	2	1	5		1							
Nevada	2			1			TOTAL	508	199	724	283	60	203

^aLaboratories of official agencies;
^bCommercial laboratories;
^cDairy industry (or private) milk laboratories.

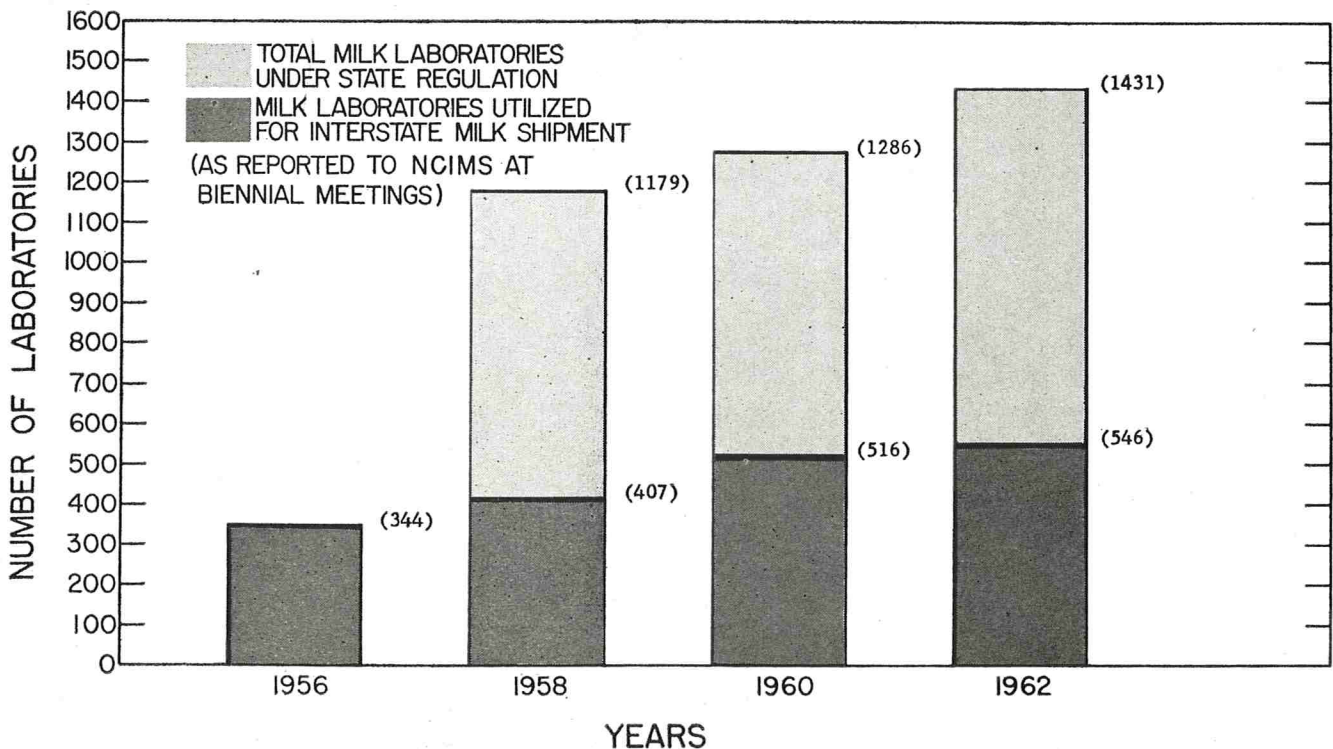


Figure 1. Use of State Approved Local Laboratories in Analysis of Milk for Interstate Shipment

LABORATORY CERTIFICATION

TABLE 3. STATE SPLIT SAMPLE PRACTICES
January 1, 1963

Region	State	Number	Local laboratories examining split milk samples															
			Pasteurized milk			Cream or other milk products			Antibiotics		Raw milk					Samples shipped		
			SPC	Coli	Phos	SPC	Coli	Phos	SM	Scr	SPC	OTC	PLC	DMC	MB	Liq	Fro	No
I	1																	
	2	63	63	59	51	63	59	51			29						X	8
	3	9															X	10
	4	4	4	4	4	4	4	4	4		4						X	8
	5	12	12	8	1	12	8	1	12		12						X*	10
II	6																	
	7	8	8	8	4	8	8	4									X	10
	8	8	8	8	8	8	8	8			8		8				X	14
	9	85	85	83	80	85	83	80	65		85		10				X	10
III	10	6	5	6	6	5	6	6	3	3	5	1	5				X	20
	11	7	7	7	7	7	7	7	7		3		4				X	15
	12	23	19	19	20	19	19	20	13	2	17	1	8				X*	5-6
	13	27	27	27	27	27	27	27	27		14		2	12			X	10
	14	19	15	15	15	15	15	15	18		7						X	10
	15	13	13	13	13	13	13	13	13		13		2	8			X	12
IV	16	9	9	9	9	9	9	9	9								X	12
	17	28	28	28	22	28	28	22	23		27		1	22			X	5
	18	9	9	9	9	9	9	9	8		9						X	10
	19	7	7	7	7	7	7	7		7	7						X	12-15
	20	12	12	12	12	12	12	12	12		12						X	10
	21	16	8	8	6	8	8	6	16		16						X	10
V	22	87	80	80	57	80	80	57	51		80		40	14			X	8
	23	34	34	33	26	34	33	26	20	14	34						X	10
	24	28	17	17	17	17	17	17	22		20	3	10	12			X	10
	25	33	24	24	24	24	24	24	32		7		3	14			X	12
	26	96	9	9	8	9	9	8	70	16	50		22	2	61		X*	10
VI	27	23	23	23	23	23	23	23	23		23		2				X	11
	28	3	3	3	3	3	3	3	3		3						X	12
	29	29	14	14	14	14	14	14	28		27		4	11			X	10
	30	10	8	8	8	8	8	8	9		10						X	5
	31	9	9	9	8	9	9	8	7		9		1				X	8
	32	4	4	4	4	4	4	4	4								X	12
	33	6	6	6	3						6						X	12-15
VII	34	6	5	5	5	5	5	5		5	5		1				X	13
	35	7	7	7	7	7	7	7	7				7				X	8
	36	3	3	3	3	3	3	3	3		3						X	10
	37	7	6	6	6	6	6	6	2	3	6						X	10-12
	38	22	22	22	22	22	22	22	22		22						X	13
VIII	39	11	11	11	11				11		11		11				X	10
	40	6	6	6	6	6	6	6	6		6						X	10-12
	41	8	8	8	4				3		8						X	8
	42	7	7	7	7	7	7	7	7		7		2				X	10
	43	2	2	2	2	2	2	2	1		1						X	2
IX	44	3	3	3	3	3	3	3	2		3						X	
	45	37	37	37	37	37	37	37	36		35		2				X	10
	46	1	1	1	1	1	1	1	1		1						X*	10
	47	2	2	2	2	2	2	2	2		2						X	12
	48	30	14	30	14	14	14	14	15		30		1	6			X	18
Total:		879	704	710	624	679	669	606	615	50	677	12	59	167	75	38	10	

*Also splits samples at time of visit;

SPC = Standard plate counts; Coli = Coliform tests; Phos = Phosphatase tests; SM = Standard methods test; Scr = Screening test; OTC = Oval tube counts; PLC = Plate loop counts; DMC = Direct microscopic counts; MB = Methylene blue reduction; Liq = Liquid; Fro = Frozen; No = Number.

TABLE 4. STATE ADMINISTRATIVE PRACTICES IN APPROVAL OF MILK LABORATORIES

Region	State	Surveys laboratories		Issues certificates		Approved list issued		Personnel requirements		Reciprocity		Lab ^a official receives PHS Form 1659 ^b		Official completing sampling form	
		Annual	Other	Annual	Other	Annual	Other	Yes	No	Yes	No	Yes	No	Lab	Other
I	1	X		X			X	X		X			NA ^d	X	
	2	X	X	X		X		X		1			NA		X
	3								X ^c	X			NA		
	4	X		X		X			X ^c	X			NA	X	
	5	X						X		X				X	X
II	6	X				X			X	X			X		X
	7		X						X	X			X		
	8		X		X			X			X		X		X
	9		X		X	X		X		X		X		X	
III	10		X				X		X		X		X		X
	11		X		X		X		X	X			X		X
	12	X		X		X			X ^c	X		X			X
	13	X		X				X			X			X	
	14		X			X		X		X			X		X
15		X					X		X			X		X	
IV	16	X				X		X		X			X	X	
	17	X		X				X		X			X		
	18	X		X				X		X		X			X
	19		X				X	X		X		X			X
	20		X				X		X	X			X	X	
	21		X		X				X	X		X		X	
V	22		X		X		X	X		X		X			X
	23	X		X			X		X ^c	X			X	X	
	24		X		X		X	X		X	X		X	X	
	25		X			X			X	X			X		X
	26	X		X			X		X	X			X		X
VI	27	X		X		X			X	X		X		X	
	28	X		X				X		X			X		X
	29		X		X	X			X	X		X		X	X
	30		X			X			X	X			X		X
	31	X							X	X			X	X	
	32	X							X ^c	X		X			X
	33	X		X					X	X			X		X
VII	34	X				X			X	X		X		X	
	35		X	X		X		X		X			X		X
	36		X					X		X			X		X
	37		X				X		X	X		X			X
	38		X						X	X		X			X
VIII	39		X			X			X	X			X		X
	40		X						X ^c	X		X			X
	41		X			X			X	X		X			X
	42		X						X	X		X			X
	43		X		X			X		X			NA		
IX	44	X		X					X	X			X	X	
	45	X	X			X	X	X		X		X			X
	46	X				X		X		X			X		X
	47		X						X	X		X		X	
	48	X		X		X	X	X		X		X		X	
49	X							X ^c	X			NA			
Total:		23	27	15	8	18	12	21	29	44	4	22	20	17	29
									7 ^c				6 NA		

^aLaboratory; ^bPHS Form 1659 is Interstate Milk Shipper Report; ^cPlans to establish minimum qualifications; ^dNA = Not applicable (not Interstate Milk Shipper).

LABORATORY CERTIFICATION

TABLE 5. OTHER STATE LABORATORY PRACTICES

Region	State	Milk tested for pesticides in 1962 using:					Local water laboratories surveyed				Survey agency
		Schechter-Haller	Paper chromatography	Gas chromatography	Electron affinity	Other method	Yes	No	Annual	Other	
I	1						X		X		Health
	2		X				X		X		Health
	3	X									
	4						X	S ^a	X		Health
	5										
II	6							S			
	7		X							X	Health
	8	X	X		X		X				Health
III	9						X			X	Health
	10		X					S			
	11					X	X		X		Health
	12	X					X			X	Health
	13		X				X				Health
IV	14			X			X			X	Health
	15						X				Health
	16						X		X		Health
	17							S			
	18							S			
V	19		X					S			
	20		X	X			X			X	Health
	21							X			
	22						X		X		Health
VI	23	X	X				X		X		Health
	24	X						S			
	25						X			X	Health
	26	X				X	X		X		Health
VII	27						X		X		Agr ^b -Health
	28							X			
	29						X	X			Health
	30		X				X			X	Health
	31						X			X	Health
	32							S			
VIII	33						X		X		Health
	34							X			
	35		X				X				Health
	36						X			X	Health
	37						X			X	Health
IX	38		X				X			X	Health
	39		X				X			X	Health
	40		X	X			X			X	Health
	41							S			
	42		X					S			
IX	43		X					S			
	44		X				X		X		Health
	45	X	X	X	X		X			X	Agr ^b -Health
	46							S			
	47	X	X		X		X		X		Health
	48		X	X			X		X		Health
	49			X			X		X		Health
Total:		8	19	5	3	2	32	4	14	14	
								12 ^a			

^aOfficial analyses made in central or branch laboratory; ^bState Agriculture Department.

qualifications. Forty-four states reported reciprocity in laboratory surveys and analyses, whereas 4 have no reciprocity (usually due to conflicting state laws). State milk laboratory certifying officials in 22 states reported receiving copies of the Interstate Milk Shipper Report (PHS Form 1659) from state milk sanitation authorities, although 20 interstate milk shipment states reported they did not, as did 6 states not participating in the interstate milk shipment program. In 17 states milk laboratory certifying officials reported that they completed the Survey Form on Sampling, whereas 29 reported that such forms were completed by milk control officials.

OTHER STATE LABORATORY PRACTICES

In reply to a request for information on state laboratory activities in 1962 in determination of pesticides, as shown in Table 5, eight states used the Schecter-Haller method, 19 states reported using paper chromatography, five used gas chromatography, three states used an electron affinity method, and two reported use of another method.

An item in the questionnaire relative to state activities in certification of water laboratories was for in-

formational purposes only. As shown in Table 5 thirty-two states reported they made surveys of local water laboratories, 14 making these annually and 14 at other intervals. Only one of the states not currently surveying water laboratories had plans to do so.

Information was also requested on the availability in central state laboratories of several items of specialized equipment. Twenty-five states reported they had a thermistor cryoscope for detecting added water. Similarly 13 states reported they had Gerber milk fat testing equipment. Forty-five states reported having bacteriological incubators operated at 35 C, and 23 of these also reported having 32 C incubators, whereas 4 states had 32 C incubators only. With regard to the availability of gas chromatography equipment suitable for tests of pesticide residues, 14 states reported such equipment was available. Thirty-three states reported having one or more spectrophotometers for use in the visible light range, and 19 of these (and one other state) had instruments for the ultraviolet range. This suggests that two-thirds of the states should be in a position to undertake a wide variety of analytical procedures applicable to milk and other foods.

FECAL STREPTOCOCCI IN FOODS TIME-TEMPERATURE EFFECTS ON I. BEHAVIOR IN REFRIGERATED FOODS AND AT WARM-HOLDING TEMPERATURES

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Available evidence indicates that enterococci¹ may, on occasion, be associated with food poisoning; however, their role as etiological agents of gastroenteritis is not universally accepted. In those instances in which they have been incriminated, they have usually represented the predominant flora, and other types of food-poisoning organisms were present in small numbers or undetected (1-3). In view of the inconclusive results of feeding experiments conducted by various investigators (3-9), their role is unknown. Nevertheless, until additional information is provided, which unequivocally demonstrates that this group is or is not pathogenic, the entry or development of large numbers of enterococci in foods should be avoided.

Of the various procedures by which microbial development may be prevented in food, the control of time and temperature is achieved most easily and is, therefore, most widely used. In practice, temperature control is often based on operational experience rather than the results of experimental time-temperature data on the behavior of microbial pathogens in perishable foods. Due to the fairly recent and rapid technological development of the food industry, many products and processes are available today that did not exist a few years ago. Pre-cooked ready-to-serve foods, perishable meals vend- ed from machines, pressure- or vacuum-packed items packaged in unique and newly developed forms and containers, and dehydro-frozen foods are a few samples of modern food processing. Knowledge relative to the precautions necessary to safeguard the public health has not kept pace with rapidly advancing technological developments, and the problem of insuring adequate time-temperature control over perishable foods has become vastly complicated. For this reason, our laboratories have undertaken to develop an organized body of information on the effects of time and temperature upon the response of various food-poisoning bacteria in potentially haz-

ardous foods. This information is intended to serve as a guide in the formulation of safe food-handling practices.

Our previous reports (10-12) dealt with the response of salmonellae and staphylococci in potentially hazardous foods held in the temperature range of 40 F through 150 F and revealed that these organisms do not multiply at temperatures of 42 F and below or at 116 F and above. The data also revealed that heating perishable foods to 150 F and holding every particle of the food at this temperature for at least 12 min reduced 10,000,000 salmonellae or staphylococci per g to non-detectable levels. Comparable effects were achieved in similarly contaminated foods when held at 140 F for 78 to 83 min.

The present report is an extension of our previous work, and is specifically directed toward determining the temperature limits of growth for fecal streptococci and toward defining the "incubation danger zone" for these organisms in ham salad, chicken à la king, and custard—foods frequently implicated in disease outbreaks.

METHODS

Test Cultures

The selection of test cultures was based on previous investigations conducted in our laboratory in which the response of 17 strains of various enterococci was determined in brain heart infusion broth at temperatures in the range of 40 F through 158 F. The enterococci were isolated from the following sources: river water, pig feces, raw municipal sewage, sewerage lagoon water, and foods in which enterococci were implicated as the etiological agents of gastroenteritis. Twelve of the cultures were identified as enterococci according to the classification of Sherman (13). The remaining five cultures, in addition to meeting Sherman's criteria as enterococci, did not reduce tetrazolium, failed to grow in the presence of 0.04% potassium tellurite, were not beta hemolytic but did ferment mannitol and were, therefore, identified as *Streptococcus faecium*. No appreciable difference between the 17 strains was noted in their ability to survive or multiply in the cold

¹For purposes of brevity, the term enterococci as applied in this report includes the species *S. faecalis*, *S. faecalis* var. *zymogenes*, *S. faecalis* var. *liquefaciens*, *S. durans*, and *S. faecium*, though it is recognized that the latter species is not universally accepted as an enterococcus.

(40 to 50 F). Their individual responses to higher temperatures, however, were related primarily to strain differences rather than species. For example, of three strains of *S. faecalis* var. *liquefaciens*, two died off slowly during 24 hours of incubation at 122 F. The third strain displayed a three-fold increase in numbers under the same test conditions. Though variation in response to temperature was observed among the 12 strains of enterococci, as a group they were not as heat resistant as the remaining five strains of *S. faecium*.

To obtain data representative of the general temperature response of enterococci in foods, we employed mixtures of the enterococci. On the basis of their behavior in brain heart infusion broth incubated at temperatures in the range of 113 F through 158 F, the following five strains were selected for study in food: *S. faecalis* (low heat resistance); *S. faecalis* var. *liquefaciens*, *S. faecalis* var. *zymogenes*, and *S. durans* (intermediate heat resistance); and *S. faecium* (high heat resistance).

The enterococci selected were lyophilized and prepared for inocula in a manner similar to that described previously for salmonellae and staphylococci (12). One-ml volumes of each of the appropriately diluted cultures were pooled to obtain a mixed culture containing approximately equal numbers of each of the five organisms. The mixed-culture inoculum so obtained for each experiment consistently yielded approximately 5,000,000,000 viable cells per ml, as determined by plate count.

Preparation of Food

Custard, ham salad, and chicken à la king were prepared according to the recipes of Angelotti, et al (12). They were weighed out in 100-g aliquots, placed in 6-oz, screw-capped jars, sterilized, and tested for sterility, as previously described (12). Each jar of food to be inoculated was allowed to equilibrate to the desired test temperature, as follows. Upon removal from refrigerated storage, duplicate jars were placed in 4-in. x 9-in. plastic bags. The air was evacuated from the plastic bags, which were twisted and closed with a rubber band, then suspended in a water bath adjusted to the desired temperature. The bags were so suspended that the hand-closed end of the bag was above the water surface, but the jars of food were completely submerged. This prevented seepage of water into the jars. Depending upon the temperature, the jars of food usually equilibrated within 1 to 2 hours.

Inoculation, Test Temperatures, and Bacteriological Examination

Aliquots of 0.2 ml of the mixed suspension of enterococcal culture were inoculated into duplicate jars of each of the test foods. This volume of sus-

pension added to the 100 g of food in each jar resulted in a final inoculum of approximately 10,000,000 cells per g. (See last paragraph of "Test Cultures" above.) After the test foods were inoculated, the screw caps were replaced and the jars returned to their plastic bags and closed as described. The jars were vigorously shaken for 50 return strokes to distribute the inoculum and were then re-suspended in their respective water baths. Temperatures in the baths (plus or minus 0.18 F) were determined with dual-scale Centigrade-Fahrenheit thermometers, checked for accuracy against a Bureau of Standards thermometer, throughout the experiments. Growth responses of the mixed enterococcal culture in the foods were determined as follows: (a) 40 F through 50 F at 2 F intervals - bacteriological analyses were performed every 24 hr for five days; (b) 60 F - bacteriological analyses were performed every 24 hr for five days; (c) 70 F - bacteriological analyses were performed every 12 hr for three days; (d) 80, 95, 105, and 115 F - bacteriological analyses were performed at 6-hr intervals for 36 hr; and (e) 118 F through 128 F at 2 F intervals - bacteriological analyses were performed at 6-hr intervals for 24 hr. At each sampling interval, 10 g of food was removed aseptically from each of the duplicate test jars and placed in a sterile mechanical-blendor cup containing 90 ml of phosphate buffered dilution water (14). The resulting 1-10 food blend was homogenized for 2 min at approximately 8,000 rpm, and further serial 10-fold dilutions were prepared. Duplicate plates of each dilution were poured in Bacto plate count agar and incubated at 95 F for 24 hrs. To determine the number of organisms added per g, duplicate jars of inoculated food were similarly tested immediately after distribution of the inoculum. A single jar of sterile food was incubated in each of the water baths to serve as a "leak" control and was bacteriologically examined as above at the end of the incubation period.

RESULTS

The growth response of the enterococci in ham salad, chicken à la king, and custard incubated at 40 F through 70 F are shown in Figures 1, 2, and 3. Curves depicting the growth response at 80 F through 128 F are shown in Figures 4, 5, and 6. Each point on these growth curves represents the mean of duplicate plate counts obtained from each of the paired jars of food.

In ham salad (Figure 1) the number of enterococci slowly declined throughout the 5-day incubation period at temperatures of 40 F through 46 F. The population density remained unchanged at 48 F but increased after four days' incubation at 50 F. An additional slight increase in numbers occurred after

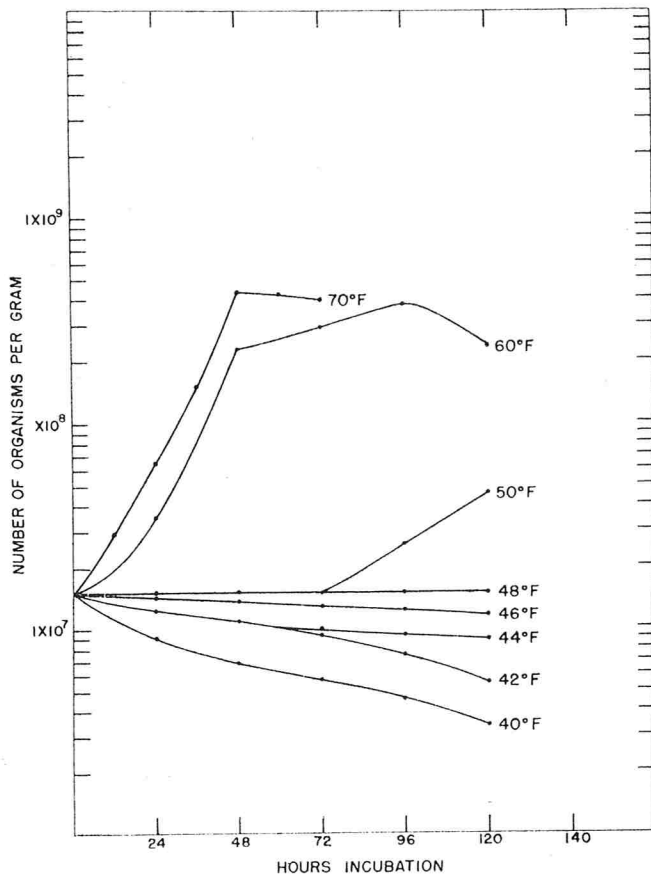


Figure 1. Growth of fecal streptococci in ham salad temperature 40-70 F.

five days at 50 F. Good growth occurred at 60 F, and a significant increase in numbers was noted after 48 hr of incubation. At 70 F the maximum stationary phase of growth was achieved (4.3×10^9 organisms per gram) after 48 hr of incubation.

In chicken à la king (Figure 2), the growth of the enterococci declined at 40 F, whereas no change was noted at 42 F. Temperatures of 44 F through 50 F produced growth, but several days of incubation were required before significant increases occurred. Rapid multiplication occurred at 60 F and 70 F; significant increases were noted after 48 hr at 60 F and in less than 24 hr at 70 F.

Custard (Figure 3) permitted more rapid multiplication of the enterococci than did either ham salad or chicken à la king. No detectable change occurred at 40 F, and a decrease in numbers, followed by a slight increase after 3 days of incubation, occurred at 42 and 44 F. Growth was poor at 46 F and good at 48 through 70 F. Though the maximum concentration of cells attained in both chicken à la king and custard incubated at 70 F were approximately equal (2.4×10^9 and 2.0×10^9 per g, respectively), the former concentration was achieved in less than 48 hr, whereas the latter required 72 hr.

Data collected to determine the highest incubation temperature at which the enterococci were capable of multiplying in these foods revealed that in all cases some multiplication occurred in the first few hours of incubation at 126 F, followed by a gradual decline in numbers. At 128 F, however, a fairly rapid rate of death was observed in all three foods. (See Figures 4, 5, and 6.) In chicken à la king (Figure 5) and custard (Figure 6) the organisms displayed a progressively increasing rate of multiplication at 80 F, 95 F, and 105 F, and the final concentration of organisms per g was quite similar in both foods at all three temperatures. Rapid multiplication occurred in ham salad (Figure 4) during the first 18 hr of incubation at 105 F; however, the final cellular concentration was considerably below that achieved at 95 F and 80 F.

Reproduction was fairly rapid in all three foods held at 115 F and the maximum cellular concentration was achieved in approximately 12 hr. Though the stationary phase of growth was attained early, the numbers of organisms developed per g were considerably less than those recorded at 80 F through 105 F.

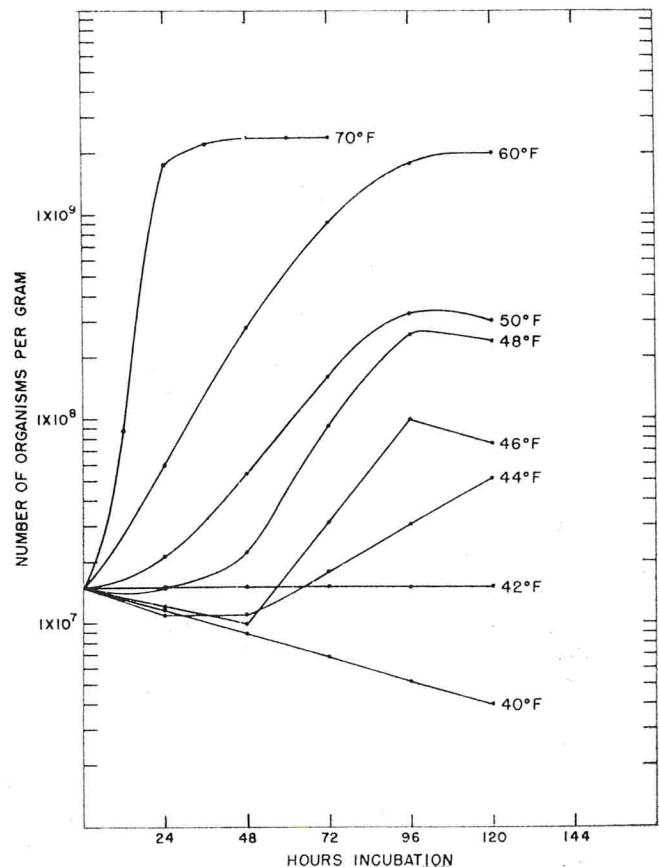


Figure 2. Growth of fecal streptococci in chicken à la king temperature 40-70 F.

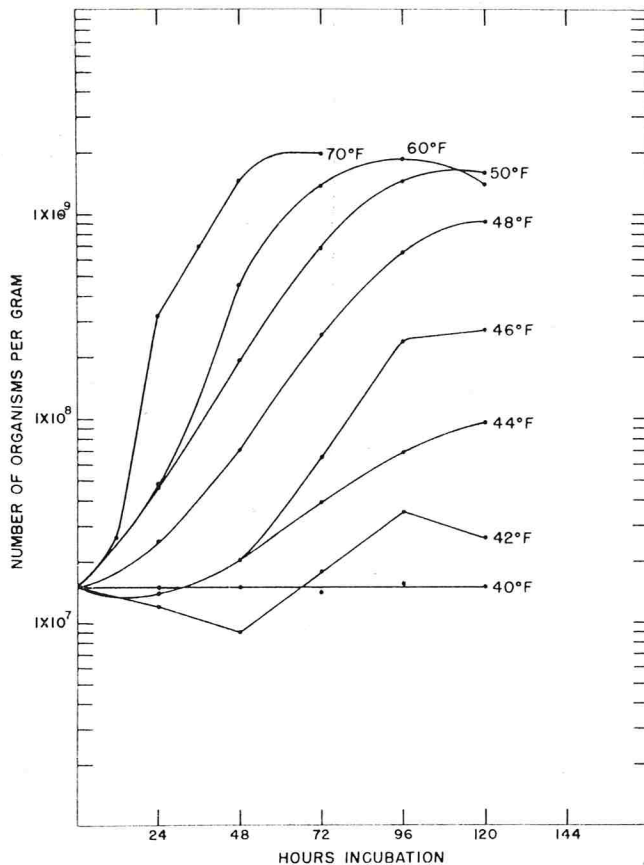


Figure 3. Growth of fecal streptococci in custard temperature 40-70 F.

DISCUSSION

In comparing the data presented above to the data on salmonellae and staphylococci (10, 11) it is readily apparent that the enterococcal species are capable of growing in chicken à la king and custard at both lower and higher temperatures than are salmonellae and staphylococci. In no instance did the salmonellae or staphylococci multiply during a five-day period at 42 F or below (10, 11). By contrast, the enterococci grew slowly in custard incubated at 42 F; an approximately two-fold increase developed during the five-day period. The rate of multiplication and the final concentrations of the enterococci were significantly greater in custard and chicken à la king at temperatures of 44 F through 50 F than those of salmonellae and staphylococci.

In view of the most recent recommendation of the Public Health Service as set forth in the "Food Service Sanitation Manual, 1962 Recommendations of the Public Health Service" (15) it may be well to review these data in light of this Public Health Service recommendation. The Food Service Manual states that "All potentially hazardous food shall be maintained at safe temperatures (45 F or below, or 140 F or above), except during necessary periods of preparation and service." Potentially hazardous

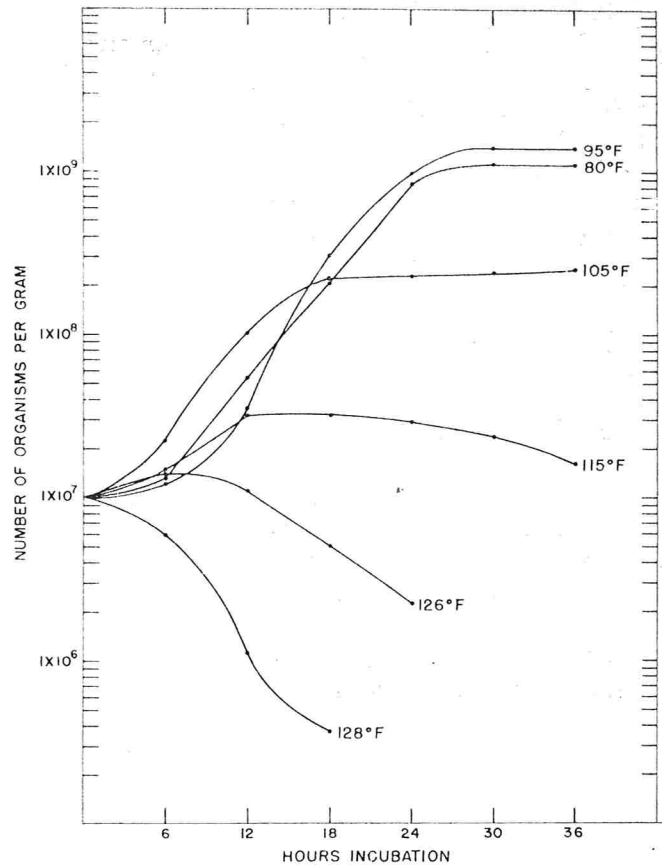


Figure 4. Growth of fecal streptococci in ham salad temperature 80-128 F.

food is defined as "any perishable food which consists in whole or in part of milk or milk products, eggs, meat, poultry, fish, shellfish, or other ingredients capable of supporting rapid and progressive growth of infectious or toxigenic microorganisms."

The data presented above for enterococci and that reported earlier for salmonellae and staphylococci (10) reveal that growth of food-poisoning organisms occurs very slowly or not at all in potentially hazardous foods stored at 46 F and below. Thus, foods with an internal temperature of 45 F may be stored safely for short periods. In order to chill foods rapidly to this temperature, it is desirable to operate the refrigerator at a lower temperature. In view of the cold-temperature tolerance of the enterococci, the time-temperature relationships shown in Table 1 should be observed to ensure that no significant increases of the enterococci occur. In comparing the data presented in Table 1 for enterococci to that for salmonellae and staphylococci similarly presented in a former report (10), it should be noted that the enterococci are capable of slightly better growth at the lower temperatures than either salmonellae or staphylococci.

The response of the enterococci to intermediate and warm holding temperatures indicates that some

growth of these organisms is possible at 126 F. A significant observation relative to the enterococci is that they typically displayed a very rapid rate of multiplication within the mid-portion of the temperature range investigated (70 F through 115 F) and may be expected to multiply rapidly in foods passing through this range during "heat-up" and "cool-down" intervals in food preparation and service operations.

The very rapid rate of multiplication displayed by the enterococci in the range of 95 to 115 F points up the fact that cooling foods slowly at room temperature is an unsatisfactory practice. The introduction of inadvertent contamination to heated foods passing slowly through this range in the cooling cycle may permit rapid proliferation and marked deterioration of an otherwise excellent product. Because of the increased rate of multiplication at the upper temperature limits that permit growth, it is essential that potentially hazardous foods be refrigerated immediately after cooking, or at least before they cool below 140 F.

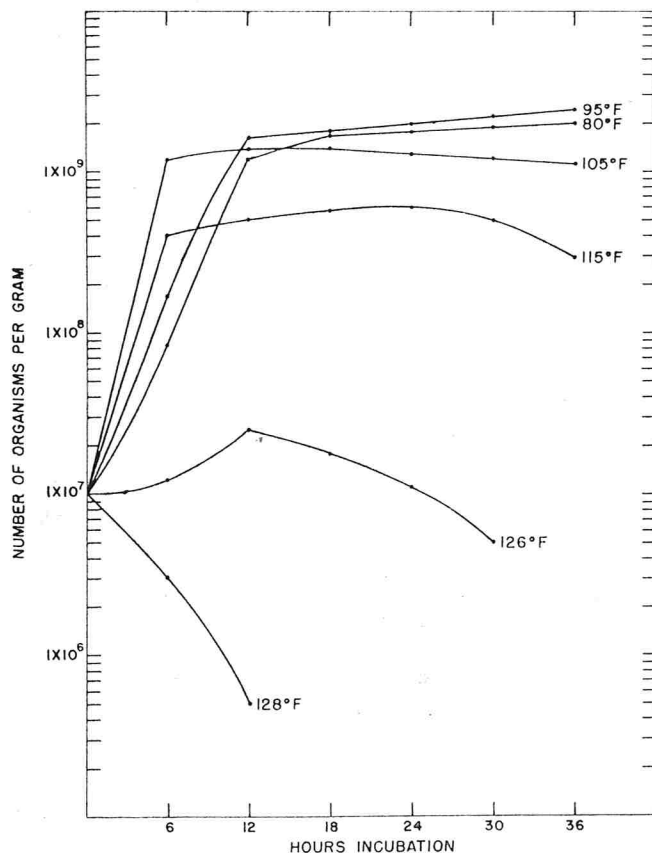


Figure 5. Growth of fecal streptococci in chicken a la king temperature 80-128 F.

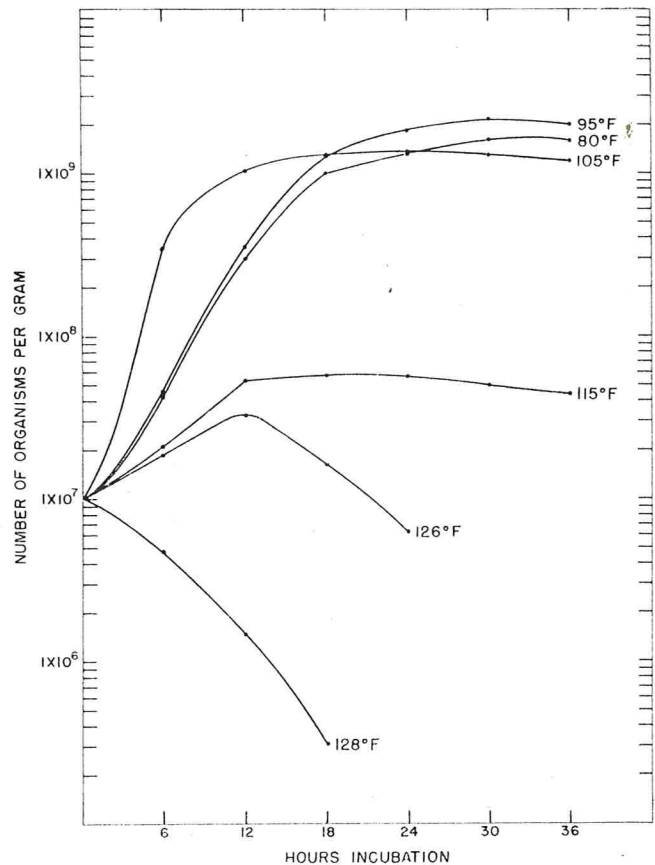


Figure 6. Growth of fecal streptococci in custard temperature 80-128 F.

SUMMARY

Mixtures of enterococcal species were cultured in ham salad, chicken a la king, and custard at temperatures ranging from 40 F through 128 F. In ham salad, no growth occurred at temperatures of 40 F through 48 F, whereas slight growth occurred after 4 to 5 days at 50 F and good growth occurred at 60 F through 115 F. In chicken a la king, no growth occurred at 42 F or below, and good growth developed at 48 F through 115 F. In custard, poor growth was observed at 42 F and rapid growth was noted at temperatures of 48 through 115 F. In all three foods, some

TABLE 1.—TIME-TEMPERATURE RELATIONSHIP NECESSARY TO PREVENT GROWTH OF ENTEROCOCCI IN POTENTIALLY HAZARDOUS FOODS

Storage temperature in °F	Longest storage interval of food without growth
50	< 1 day
48	1 day
46	2 days
44	3 days
42	4 days
40	5 days +

multiplication occurred in the first few hr of incubation at 126 F, followed by a gradual decrease in numbers. A rapid rate of decline in numbers was observed in all three foods at 128 F.

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Plan To Attend The Fiftieth ANNUAL MEETING

OF

The International Association of Milk, Food and
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BACTERIOLOGICAL SURVEY OF FILLETING PROCESSES IN THE PACIFIC NORTHWEST

I. COMPARISON OF METHODS OF SAMPLING FISH FOR BACTERIAL COUNTS

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SUMMARY

Lots of incoming commercial cod were sampled by six different methods to determine the best one for measuring the bacterial load on the fish. Rinses of similar whole cod gave bacterial counts that were relatively low and quite variable, whereas spraying a rinse against the surface resulted both in higher and in more uniform counts. When similar 5-cm² areas were sampled, bacterial counts obtained by swabbing represented 35% and scraping represented 46% of that obtained from the excised surface.

Counts differed more between the lots of fish than between fish or between portions of the same fish. Swabbing appears to be a practical method of sampling in-line processing of fish, as it is non-destructive and relatively efficient in removing large and fairly uniform numbers of bacteria.

Sampling is a primary problem in bacteriological studies of the fish-filleting process. The sampling method used should be practical for sampling the incoming fish, the equipment, and the final product; and it should give results that permit each step of the process to be evaluated.

Bacteria commonly are found in great numbers in the slime on the surface of the fish (1) and in the visceral tract. Although the flesh of sound fish is free from bacteria (2, 5), it becomes contaminated either directly or indirectly, during filleting (2). To control bacterial contamination, the processing procedures that cause the difficulty must be identified. Bacterial counts of excised flesh, or fillets, (7, 10, 15) have been used to evaluate the cleanliness of the processing procedures.

Techniques for sampling surfaces with low bacterial loads and surfaces made of impervious materials were reviewed by Walter (16) and by Green and Herman (4).

Swab and excised-surface methods have been used in sampling surfaces of fish (14). Dyer (3) and Wood (19) collected material from the surfaces of cod and of shark, respectively, and determined the bacterial counts per g of scraped material.

Patch and media contact techniques (8), which are commonly used for sampling surfaces containing only a few bacteria cells or isolated cells, have been used on meat (13) and poultry (9). Greene's (5) "swab-pressure" method was developed for sampling surfaces of relatively low counts. In our own work,

both solidified and melted gelatin were applied to fish surfaces. The bacteria were so abundant that colony enumeration was not possible without further dilution, yet the pick-up of bacteria from the surface of the fish was so inefficient that the technique was discontinued as being impractical.

Rinse waters have been used for determining microbial counts on the following whole products: prawns (18), fruits (12), vegetables, eggs, and dressed poultry (9, 11). Wells (17) developed a unique device for obtaining a rinse sample from a 1-sq in. area. He reported that with the device, higher counts were obtained from the skin of poultry than by swabbing.

No comparison of these techniques for the bacteriological sampling of fish was found in the literature. The work reported in this paper therefore was undertaken to determine which of the sampling methods described is best for use in the bacteriological sampling of fish along the processing line.

EXPERIMENTAL

The following six methods of sampling were investigated: (a) Rinse of whole fish; (b) rinse of 5-cm² area; (c) swab method; (d) scraped-surface method; (e) excised-surface method; (f) excised-flesh method.

General Procedure

Six lots of commercial cod (*Gadus macrocephalus*) were used to compare the sampling procedures. Each lot consisted of four similar, unwashed fish obtained from the same weighing cart at the dock. Each fish was placed in a separate, new, polyethylene bag 12" x 36" and was taken directly to the laboratory. At the laboratory two of the fish were sampled by rinsing the whole fish; one fish was sampled by rinsing three 5-cm² areas on one side; and one fish was sampled at the head, middle, and tail-end portions on one side of the body by the swab, scraped-surface, excised-surface, and excised-flesh methods. Sterile instruments and materials and aseptic techniques were used, and standard aerobic plate counts were made on all samples. Refrigerated diluent consisting of 0.003 M phosphate (KH₂PO₄) buffer solution adjusted to pH 7.1 with NaOH was used for

making all dilutions. The media consisted of nutrient agar (Difco) with added NaCl (1.5%) adjusted to pH 7.1 with NaOH. Care was taken to control the melted agar to 43 C, and plates were poured in duplicate within 20 min of sampling. Plates were incubated at 20 C for 5 days, and the average count was expressed as the logarithm per sample unit.

Specific Procedure

Rinse of whole fish. Cold water, equivalent to the weight of the fish, was added to the bag containing a whole fish, the bag was agitated for 1 min, and a portion of the liquid was withdrawn for further dilution and plating. The bacterial count was expressed as per ml of rinse water, per g of fish, and as per unit area (each fish had a surface area of about 1,100 cm²).

Rinse of 5-cm² area. Rinse samples were obtained from three different areas on each side of each fish. A sterile rigid template having a square opening 2.24 x 2.24 cm (5-cm²) was held against the side of a fish suspended by its head. The head and the tail were not sampled, but the lower portion (tail end of the body) was sampled first, followed by the middle portion and finally the upper portion (head end of the body). One hundred ml of cold diluent were sprayed against the exposed surface by means of a pipette. The rinsings were collected from the lower edge of the template in a bottle and were shaken for 30 sec. Further dilutions were made before plating.

Swab method. Sterile, dry, cotton-tipped applicator sticks were used as swabs. Metal templates with square holes 2.24 x 2.24 cm were used to limit the swab area to 5-cm². The swabs were stroked once from each of four directions (at right angles to each other) across the swab area to pick up the material from the exposed fish surface. After the fish had been swabbed, the cotton tip of the swab was broken off into a bottle with 100 ml of cold diluent and shaken rapidly for 30 sec to dislodge material from the cotton. Further dilutions were made before plating.

Scraped surface method. Small hoe-like metal scrapers having a sharp blade 2.24 cm wide were made for scraping the surface. They were held by means of duckbill pliers and were flamed before each use. A 2.24-cm wide surface was scraped in one direction, toward the head of the fish, for a distance of approximately 2 cm (Figure 1). The blade was then placed along one edge of the previously scraped surface and pulled at right angles to the previous direction to the opposite edge of the scraped surface (Figure 2). In so doing, a 5-cm² area was scraped without using other measuring devices. More material (scales and slime) was obtained by scraping toward the head rather than in any other direction.

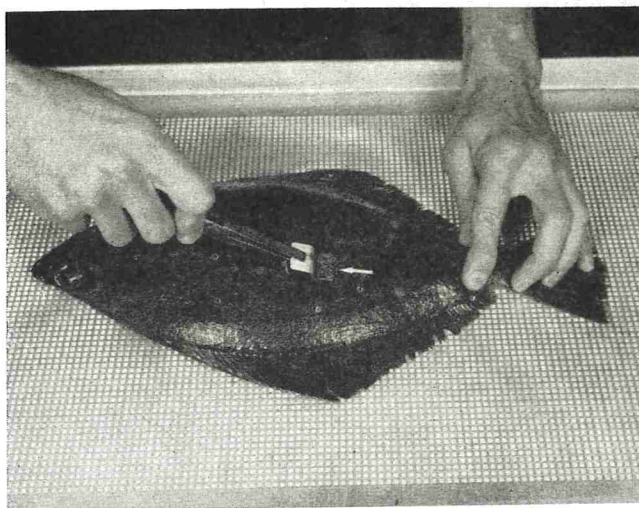


Figure 1. Obtaining a scrape sample from a 5-cm² area on the surface of sole.

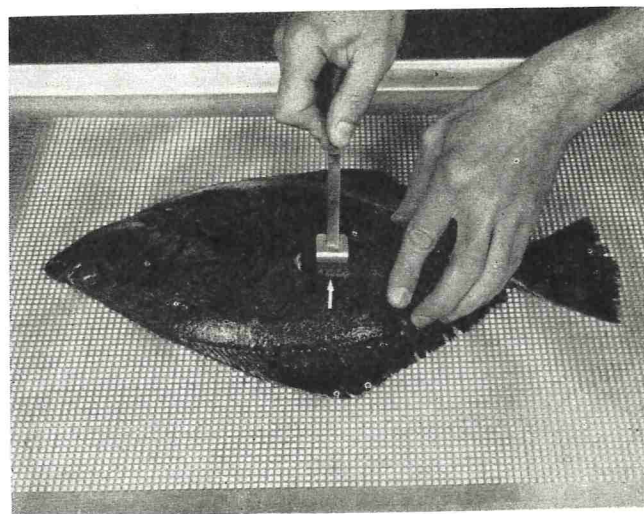


Figure 2. Obtaining scrape sample from a 5-cm² area on the surface of sole.

This was the reason for the order of scraping indicated. The scraper was placed into 100 ml of cold diluent and was shaken for 30 sec to dislodge and distribute the scraped material. Further dilutions were made before plating.

Excised surface method. Skin at three different areas on one side of the fish was excised. Sterile aluminum on one side of the fish was excised. Sterile aluminum templates having a square opening 2.24 x 2.24 cm were used to outline the areas, and sterile scalpel and forceps were used to excise a 5-cm² surface approximately 0.1 - 0.2 cm in thickness. The excised surface was placed in 49 g of cold, sterile, diluent, blended at 22,000 rpm for 3 min, and diluted further before plating.

Excised flesh method. After the 5-cm² surface had been excised, 1 g of the inner flesh was excised and weighed directly into a tared, cold, blender jar, 49

TABLE 1. BACTERIAL COUNTS OF RINSINGS FROM WHOLE FISH (COD)

Sample		Standard plate count	(Av)
Lot	Fish		
No.	No.	Log. of count ^a	
1	1	6.68	7.08
	2	7.48	
2	1	5.88	5.39
	2	4.90	
3	1	7.00	6.91
	2	6.82	
4	1	4.83	5.65
	2	6.48	
5	1	7.18	7.48
	2	7.78	
6	1	6.23	5.89
	2	5.56	
Mean		6.40 = (2.5 x 10 ⁶) ^b	

^acount per ml. of rinsings (or as per g of fish)

^bEquivalent to 11,400 per 5-cm².

g of cold diluent was added, and the mixture was blended at 22,000 rpm for 3 min. Further dilutions were made before plating.

RESULTS

Rinse of Whole Fish

The bacterial counts of the rinse waters from the whole fish (Table 1) ranged from 68,000 to 60,000,000 with a mean of 2,500,000 per ml of rinse water, or per g of fish. This is equivalent to 11,000 per 5-cm² of surface. These rinse waters also varied in appearance; some were quite clear; some were bloody; and some were dirty from feces, blood, scales, and debris.

Rinse of 5-cm² Area

Rinsings from 5-cm² areas on fish had a mean bacterial count of 440,000 (Table 2). There was less variation in counts from the different areas on the fish than there was between the lots of fish. There was little difference in the mean counts obtained from the three portions of the fish sampled.

Swab, Scraped and Excised Surface, and Excised Flesh

Results of sampling adjacent 5-cm² areas on one side of six fish by the swab, scrape, and excised-

surface methods are shown in Table 3. Counts of the excised-flesh were so low that they were considered to be nil.

High counts were obtained by all methods from fish comprising lots 1 and 5, whereas low counts were obtained from lot 2.

DISCUSSION AND CONCLUSIONS

In general, the sampling of the fish by the six methods turned out as expected; however, the great variation in the counts of rinses of whole fish was not anticipated. Material other than that on the skin of the fish, such as fecal matter and food and blood from within the head, probably was the source of much of the bacteria in the rinse water.

The average of the counts obtained by each of the four methods used for sampling 5-cm² areas was affected by the load on and in the surface portion and the efficiency of the removal of bacteria from the surface. As the excised-surface sample contained all the bacteria on and within the 5-cm² surface, it was used as a standard, and the other methods of sampling were compared with it. The average count obtained by rinsing whole fish (calculated, per 5-

TABLE 2. BACTERIA COUNTS OBTAINED BY RINSING 5-CM² AREAS ON ONE SIDE OF CODE

Lot no.	Body portion	Standard plate counts	
		Log. of count per 5-cm ²	(Av)
1	Head end	6.11	6.06
	Middle	5.89	
	Tail end	6.20	
2	Head end	5.04	4.99
	Middle	4.60	
	Tail end	5.34	
3	Head end	5.60	5.87
	Middle	5.98	
	Tail end	6.04	
4	Head end	5.45	5.42
	Middle	5.51	
	Tail end	5.30	
5	Head end	6.08	5.96
	Middle	5.43	
	Tail end	6.36	
6	Head end	5.38	5.53
	Middle	5.82	
	Tail end	5.40	
Mean	(Total)	5.64 = 4.4 x 10 ⁴	
Mean	Head end	5.61 = 4.1 x 10 ⁴	
Mean	Middle	5.54 = 3.5 x 10 ⁴	
Mean	Tail end	5.77 = 5.9 x 10 ⁴	

TABLE 3. BACTERIA COUNTS OBTAINED FROM DIFFERENT PORTIONS ON ONE SIDE OF COD BY THE SWAB, SCRAPE, EXCISED-SURFACE, AND EXCISED-FLESH METHODS OF SAMPLING

Lot No.	Body portion	Standard plate count					
		Swab		Scrape (Log count per 5-cm ²)		Excised-surface (Log count per g)	
1	Head-end	6.76		6.54		7.03	nil
	Middle	6.60	6.68	6.85	6.74	6.94	6.77
	Tail-end	6.68		6.82		6.65	nil
2	Head-end	5.08		5.04		6.08	nil
	Middle	5.30	5.13	5.18	5.21	6.18	6.28
	Tail-end	5.00		5.40		6.57	nil
3	Head-end	7.04		7.38		7.60	nil
	Middle	7.36	7.18	6.80	7.16	7.00	7.30
	Tail-end	7.13		7.30		7.30	nil
4	Head-end	5.59		5.84		6.14	nil
	Middle	4.90	5.29	5.61	5.88	6.65	6.22
	Tail-end	5.40		6.18		5.86	nil
5	Head-end	7.23		7.85		7.90	4.85
	Middle	7.78	7.57	7.30	7.67	7.18	7.86
	Tail-end	7.70		7.85		8.40	nil
6	Head-end	5.24		5.64		5.48	nil
	Middle	6.04	5.99	6.09	5.85	6.63	6.10
	Tail-end	6.63		5.83		6.30	nil
Mean	Head-end	6.16		6.35		6.70	
	Middle	6.33		6.30		6.76	
	Tail-end	6.42		6.56		6.83	
	Mean	6.30		6.42		6.76	
Equivalent count		2 x 10 ⁵		2.6 x 10 ⁵		5.7 x 10 ⁵	nil
Percent to total count		35.0		45.5		(100)	

cm² surface) represents 0.2% of that obtained by the excised-surface method. Rinse of 5-cm² area method represented 8%, swab method, 35%, and scrape method, 46% of that obtained by the excised-surface method. Undoubtedly, the percentage recovery of bacteria by each of these methods could vary because of other factors.

Early in this study, it became apparent that the mechanics of sampling in the field is probably the most important problem. We selected the swab method for sampling both fish and equipment because it is practical and nondestructive, and the results can be compared directly. Its limitations and refinements will be reported in a later paper.

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SPECIAL FEATURE

ARE YOU "PUTTING" MILKSTONE ON YOUR EQUIPMENT

RAYMOND E. KASTENDIEK
TECHNICAL SERVICE DEPARTMENT
MONARCH CHEMICALS, INC.
MINNEAPOLIS, MINNESOTA

Some are taking a lot for granted when they use just any "washing powder" for their milk equipment. Can one tell by looking whether it is good, or just another powder? Dairymen have standards set up over the years for judging a good dairy cow, but how do they judge a good dairy detergent?

All dairymen want a dairy cow to show good breed type, good confirmation, and most important, produce milk. He wants a dairy detergent as specialized or its job as the cow.

He wants a dairy cow to produce milk, and wants a dairy detergent that will clean. First, what is necessary to brush clean with a washing powder?

1. It must take care of the water hardness.
2. It must have wetting power.
3. It must have the ability to clean.

How can we judge whether the cleaner we are using possesses these qualities. It's easy to find out—follow this simple procedure:

1. Take a small glass jar filled three-fourths full with water.
2. Take one-fourth to one-half teaspoonful of the detergent you are now using and sprinkle in the jar.

If cleaning is to be successful, the water-detergent solution should be clear. The more cloudy it is the

more brushing has to be done and the more often "milkstone" remover has to be used. Some users will see a floating scum, some will have a sediment in the bottom of the jar, and a few will wonder "who poured the milk in?" It will all depend on what kind of cleaner is being used and the hardness of the water. *Only a perfectly clear water and detergent mixture is acceptable.*

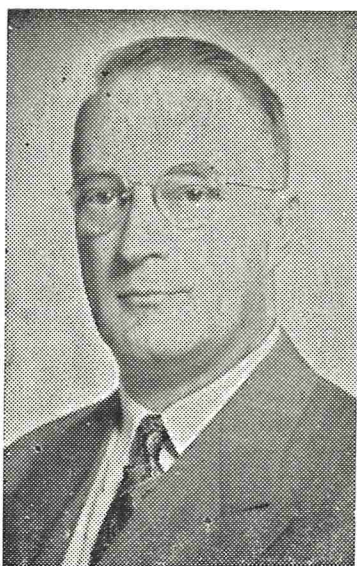
Next, how about the wetting power? After the cleaner has dissolved and the water hardness is taken care of, take a piece of wool yarn, one inch long, and lay on the surface of the water in the jar. It should sink immediately. If it does not sink to the bottom, the water has little "lift-off" power and all soil will have to be loosened with a brush.

The cleaning power of a detergent is best demonstrated in actual use. After washing pails, strainers, bulk tank, etc., they should dry off spotlessly after rinsing with cool water. If they do not, it will help to use the brush when rinsing. It takes very little effort to keep equipment spotless.

If the cleaner being used does not produce a clear wash solution and the equipment is not spotless, ask your neighbor what he is using, see your fieldman and your inspector; they are out to help you. There are detergents available that can solve the problem.

News and Events

After 41 Years at Cornell, Dairy Professor Retiring



Prof. Arthur C. Dahlberg

Prof. Arthur C. Dahlberg, nationally recognized for his research in dairy manufacturing, will retire July 1 after 41 years on the staff of Cornell University.

In 1921 Professor Dahlberg became chief in research at the N. Y. State Agricultural Experiment Station at Geneva and transferred to the New York State College of Agriculture in 1943 as professor of dairy industry.

Born in Curtiss, Wisc., Dahlberg grew up on a dairy farm in Minnesota. He holds degrees from the Universities of Minnesota and Illinois and has served on the staffs of the University of Wisconsin and North Dakota State College. In 1918 he was an inspector of butter for the U. S. Navy and for two years was superintendent of a cooperative creamery in Fargo, North Dakota.

Many of the present-day methods of handling milk are the result of the Cornell scientist's research. Working with the Hersey herd at Geneva, he contributed

to a better understanding of blood lines in breeding of dairy cattle. In early experiments in management practices he learned that a shorter time interval of machine milking prevents injury to the cow, saves labor, and produces more milk. This practice has now been adopted throughout the country.

His research led to building an electric refrigerator for cooling milk on the farm, a practice that is now mandatory in most milk markets. His studies have also led to the use of improved milk strainers on the farm.

In manufacturing of dairy products, work initiated by Professor Dahlberg includes research on the creaming of milk, viscosity of milk and cream, properties of gelatin related to their use in ice cream and ices, ice cream texture, the relative sweetness of different kinds of sugars, and improvements of pasteurization techniques.

The uniformly high quality of cream cheese spreads is due in part to a manufacturing process worked out by him. After this process was disclosed, the volume of cream cheese made in this country increased rapidly. He has also made studies of quality and flavor of Cheddar cheese and cheese canning.

Five patents have been issued to the dairy specialist for manufacturing processes or discoveries he has made. Three of them have been assigned to the "people of the United States" or to Cornell University and two were assigned jointly to him and Prof. Robert F. Holland of the dairy and food science department.

Professor Dahlberg directed a study for the National Research Council of the National Academy of Sciences on milk regulations and milk quality. Many of his findings in this study were immediately included in the sanitary milk code of the U. S. Public Health Service and have influenced local, state, and national sanitation regulations. In 1960, he was elected a Fellow in the American Public Health Association.

The professor is author or joint author of 179 research articles. He has served as director, vice-president, and president of the American Dairy Science Association and for 10 years was editor of its publication, "Journal of Dairy Science." In 1944 he received the Borden Award from the ADSA and was cited for distinguished research in dairy manufacturing. In 1958 he was made an honorary member by its board and in 1961 received its first Distinguished Service Award.

He has been a member for many years of International Association of Milk, Food and Environmental Sanitarians.

Professor and Mrs. Dahlberg have resided in Ithaca, but plan to make their home at 11537 S.W. 81 Road, Miami 56, Florida.

Publication, "How To Serve Food at the Fair" Available for Health Department Distribution

A new, comprehensive and detailed guide for every one concerned with planning and handling temporary food services that are efficient, sanitary and profitable is now available to assist managers of such operations in solving all problems connected with their activities.

Written as a result of a survey of health departments that showed a need for such material it is expected that many municipalities will distribute the book to all applicants for temporary food service permits.

Entitled "How to Serve FOOD AT THE FAIR," the study gives particular emphasis to the maintenance of sanitary conditions in every phase of food handling from start to finish. Its recommendations follow those made in the 1962 Food Service Sanitation Manual of the U. S. Public Health Service which is currently being adopted by many state and local health departments.

Written by Ned Greene, a nationally recognized authority on public food service and technology, and published by Pyramid Books under a grant of funds from The Paper Cup and Container Institute, the book is the first such study of its kind to take a realistic approach to solving the many difficulties faced by temporary food operators in planning the best equipment arrangements and in the buying, storage, preparation and service of food and beverages.

A major portion of the book is devoted to a detailed review of all factors affecting health and sanitation, of vital importance to all food service managers. It covers the causes of food poisoning, temperature control for both hot and cold foods, bacteria growth and transmission to food, problems of contamination and proper procedures for waste disposal.

A "Sanitation Check List" points out the Why's and How's of Personal Care involving personnel and the facilities to be provided for them. Also included is a similar "check list" on all aspects of food sanitation involving preparation, storage, protection and serving.

A virtual primer, "FOOD AT THE FAIR" helps the operator plan a sanitary food service from first steps to last. It focuses on all the essentials of volume food operations: how to select the limited number of menu items necessary for success, how to concentrate on specialties, and what is required in the way of a thoroughly sanitary service building, its equipment and supplies.

There are complete instructions for handling all cold and hot drinks. These cover soda and fruit drinks, milk, milk shakes, milk shakes with ice cream, and a full discussion of "How to Make a Good Cup

of Coffee"—one of the most important items in building food sales according to customer surveys.

The most healthful ways to prepare French fries, hamburgers, hot dogs, sandwiches, soups and other prepared foods are described in full detail. Methods of sanitation control through the use of portion cups are fully explained, together with a discussion of how the system of pre-portioning can also aid in cost accounting. Special tables provide a complete guide to the use of sanitary paper portion cups for hot and cold foods, appetizers, relishes, salads, frozen desserts, dressings and toppings, jams, jellies, preserves and spreads, vegetables, and every other item likely to be included in a menu.

A special section is devoted to a complete summary of the most commonly used paper items, which are indispensable to meet required sanitation standards as well as speed and efficiency in temporary food service. This covers cold drink cups, big drink cups, water cups, hot drink cups, portion cups, hot and cold food containers, dishes, paper tubs, paper plates, bowls, straws and eating utensils, place mats and doilies, and paper napkins—all the essentials for a sanitary, yet economical and attractive service for patrons.

The 112-page book is fully illustrated. It is available for the handling cost of 10-cents per copy, or in cartons of 50 at a cost of \$4.00 per carton. Copies may be obtained from the Public Health Committee, Paper Cup and Container Institute, Inc., 250 Park Avenue, New York, N. Y., 10017.

Dairy Conference At University of Kentucky

The future of the dairy industry will be under the spotlight at the Eleventh Annual Dairy Manufacturing Conference at the University of Kentucky.

Sponsored jointly by the University's Department of Dairy Science and the Dairy Products Association of Kentucky, the two day meeting will start November 19, 1963. It will feature present and future possibilities in technology, marketing, and quality control methods.

Speakers will be brought to the University from Minnesota, Connecticut, Missouri, Georgia, and a number of other states to present their views to those attending. Kentucky's dairy industry will also be well represented on the program.

The meeting will be divided into areas of interest and cover ice cream, fluid milk, cheese and concentrated milks. Assisting with the program will be a number of industry leaders who will serve as chair-

men of the various sessions. An industry member also will be asked to assist with the cultured products clinic. Planning of the program was aided by suggestions of a large number of Kentucky dairy manufacturing leaders.

A dinner will be held the evening of the first day of the program, as requested by the industry.

Research on Ultra High Temperature Pasteurization

Prof. William K. Jordan, dairy and food science, N. Y. State College of Agriculture, is conducting research on the temperature of milk as it is pasteurized under very high temperatures. He is checking to make sure all milk reaches the maximum temperature during the process.

Jordan says this new system, developed during the past five years, requires the injection of steam, which pasteurizes instantaneously, with instant cooling by evaporation. The process gives more complete destruction of bacteria so milk remains sweet for a longer time and has better flavor, he explains.

The U. S. Public Health Service wants to make sure milk pasteurized by this instant method is safe to drink. They have given \$7,120 to Jordan to carry out temperature studies.

Jordan says it involves the use of tiny temperature probes that make several thousand readings per second. In this way he can determine the extent of any variation in temperature of the milk as the steam is injected during the pasteurization process. Tests, so far, show little temperature variation.

Few changes have been made in the pasteurization method since it was first adopted. The first method, still in use in many small plants, requires the milk to be held at a temperature of 143 degrees for one-half hour.

In the last 20 years a faster method was devised in which the milk is held at 161 degrees for 16 seconds. This is the method commonly used in large milk plants today that may be replaced with the faster method being studied by Jordan where the milk is brought to very high temperatures instantaneously.

Johnson & Johnson Enters Animal Health Field

Johnson & Johnson, long a leader in the human health field, has announced its entry into the animal

health field with Animal Antiseptic Ointment, a tested product for the relief of cuts, bruises, scratches, sunburn and windburn on both farm animals and pets.

Johnson & Johnson research, after two years of testing, has stated that the ointment is superior to several other like products, being particularly effective in the presence of blood and other body fluids.

Modern packaging design offers another positive in the new product. Packaged in 8 ounce polyethylene tubes, the ointment is easily applied, stays clean and fresh when not in use.

Free samples are available from the manufacturer. Write to: Filter Products Division, Johnson & Johnson, 4949 West 65th Street, Chicago 38, Illinois.

Dallas Picked As Site For Fall Dairy Meetings

The autumn conventions of International Association of Ice Cream Manufacturers and Milk Industry Foundation will occur during the week of November 3-8, 1963, in Dallas, Texas.

The IAICM's convention will open the week and continue until November 6, when it closes with a joint general session with MIF members. MIF's convention will start on November 6.

Dairy Industries Supply Association will hold stand-by sessions throughout the week, although no formal DISA program is anticipated.

DISA will co-sponsor, jointly with American Dairy Science Association, the 29th Collegiate Students' International Contest in Judging Dairy Products, which is traditionally a feature of dairy conventions week.

Quality Standards for Manufacturing Milk Now Available for State Adoption

A stride forward was taken last June toward encouraging production of higher quality in manufacturing milk and assuring the efficient and sanitary manufacture of better, more dependable quality dairy foods.

After several years of development, quality standards for manufacturing milk were made available by USDA's Agricultural Marketing Service for voluntary adoption by the States.

The work was undertaken by the Dairy Division of the Agricultural Marketing Service to encourage a uniform approach to quality improvement of manufacturing milk over the Nation.

The standards were developed in close collaboration with the National Association of State Depart-

ments of Agriculture.

The first draft of the standards was distributed to industry, colleges, State Departments of Agriculture and similar State agencies for review and comments in the summer of 1959. Following this, several revisions were prepared and distributed, based on correspondence and meetings with industry groups, State agencies, and others interested.

The final standards represent a combination of the many ideas and suggestions received. Supervision of the program, once adopted by a State, rests entirely with that State.

The milk quality and production requirements of the program, combined with the plant specifications, are high enough to challenge the capabilities of the dairy industry and to provide an incentive for progress—yet they're realistic enough to be attainable. The standards have been prepared so they can be met by small as well as large dairy farmers, with a minimum financial outlay. The standards provide for farm inspection and certification, platform inspection of the raw milk supply, and plant quality control service.

Farm Certification

Farm certification requires compliance with five fundamental factors of good quality milk production:

- (1) Health of the herd
- (2) Milking facilities and housing
- (3) Milking procedure
- (4) Design, construction, and sanitation of the utensils and equipment, and
- (5) Water supply.

Minimum facilities are required at the farm, but the *main* emphasis is on sanitary methods and practices. Each farm is rated in terms of specific factors based on an appropriate farm score card.

Primary responsibility for certifying a farm rests with a qualified fieldman. But suspension, revocation, or reinstatement of a farm is made only by State-employed inspectors.

Each farm producing and selling milk for the manufacture of dairy foods must be inspected and certified within 24 months of the time a State adopts the standards, and again each year after the initial certification.

Quality of Raw Milk

Second aspect of the program deals with platform inspection of the raw milk. Milk delivered to plants must comply with certain quality specifications as to odor, physical appearance, bacteria, and sediment content.

Testing for bacteria and sediment content is done each month, and a routine sight and odor examination is made as milk is received at the plant. To be acceptable, milk must be fresh and sweet.

If a producer has not met the bacteria and sediment requirements, the fieldman visits his farm within seven days from the date of the second consecutive substandard test. The visit is made to correct any deficiencies in the producer's facilities or milk handling practices.

Plant Licensing

Plant licensing, the third aspect of the program, requires compliance with essential elements relating to: (1) premises, buildings, and facilities; (2) equipment and utensils; and (3) plant operations.

Included are such checks as maintenance of buildings, sanitation, laboratory control, water supply, employee cleanliness and health, waste disposal, transportation of raw milk, cooling, storage, and packaging of the finished products.

All plants are inspected by the State agency administering the standards. Plants must qualify for licensing within 12 months following the effective date of the standards.

Due to wide variations in the quality of manufacturing milk in various areas of the country, adoption of the recommended standards will require more time for some areas than for others.

To facilitate its adoption of the standards, a State may provide for a delay of up to five years, where necessary, in requiring can milk producers to meet the milkhouse and milk cooling standards.

Issuance of the standards is one of the first steps toward achieving uniformly higher quality milk for the manufacture of dairy foods.

The next step toward this achievement rests with milk producers, dairy products manufacturers, and State Departments of Agriculture or other appropriate State agencies.

All have complementary roles to play.

Copies of the "Minimum Standards for Milk for Manufacturing Purposes and Its Production and Processing" may be obtained by writing to the Dairy Division, Agricultural Marketing Service, U. S. Department of Agriculture, Washington, D. C., 20250.

Minutes of the Farm Practices Committee at the Kyana Cooperative Milk Producers Ass'n.

Meeting was called to order by Chairman A. K. Saunders, July 8, at 9:15 A.M. The following were present: E. E. Kihlstrum, A. K. Saunders, Harry F. Stone, Lyman C. Knierem, Burdette Fisher and Robert Conners.

Chairman Saunders indicated that the Louisville, Kentucky, meeting was held so that it would be more convenient for a greater change of information. Most of the local meetings have been held in Chicago and it is not practical for all members to attend.

Chairman Saunders also indicated that the Farm Practices Committee is a working committee and that all final reports should be in his hands by September 1, 1963. Prior to that date a notice will be sent out calling to the attention of the Committee this deadline.

The Active Sub-committees of the Farm Practices Committee are as follows:

- (1) Sediment — E. E. Kihlstrum
- (2) Antibiotics, Pesticides and Adulterants — Milton Held
- (3) CIP and Transfer Systems — Harry Stone
- (4) Bulk Tanks — M. W. Jefferson
A. K. Saunders — alternate
- (5) Relation of Dairy Cow Housing to Mastitis — Jim Smathers
- (6) Compatibility of Detergents — John Dean
- (7) Education — Vernon Nichols

Sediment

E. E. Kihlstrum brought the Committee up to date as to the work which had been done in 1963. Over 6,400 controlled sediment tests made on bulk tanks which were graded and correlated as to bucket and pipeline type operations. A meeting was held at the United States Department of Agriculture in Washington, D. C. to set up standards on bulk tank sediment testing. It was indicated that further education is needed with the producers as to proper methods and to indicate what he is presently doing wrong which is creating the exceptionally high number of 3 & 4's sediment test grades in pipeline milking operations. It was also suggested that milking time calls be made by sanitarians.

CIP and Transfer Systems

Harry Stone read the various member's reports from his committee. There is indication that plastic tubing, when used in portable transfer systems, is not generally accepted by Grade A, although, indications are that it has been used in some areas for manufacturing milk. His committee members feel that stainless or glass tubing is cheaper than plastic tubing in the long run. Members also indicated that plastic tubing does constitute a cleaning problem. The committee present felt that re-evaluation and possible re-editing of the previous report on installation of CIP be brought up to date as to known cleaning methods with special emphasis as to the length of time and temperature of the water. Re-evaluation also applies to plastic tubing as indications are that it is going to be used by the dairymen and suggestions should be made as to how to clean, dry and to keep in a sanitary manner.

Bulk Tanks

A. K. Saunders will re-evaluate and re-edit report on bulk tanks plus recommendations for installation

and use of spray balls. Also recommendations as to uniform milk temperature with or without agitation so that the temperature of the milk when in the tank will remain consistent.

Compatibility of Detergents to Farm Water Supplies

Lyman Knierem stressed the importance of cleaning tanks and pipelines because of the difference in water in various areas, the various brands of detergents used and the difference in stainless steel piping, glass and tubing. He indicated that the program in the Louisville area has been underway for about 60 days. Two farms were selected, three detergents used and each detergent used for 30 days with varying temperatures. They are now into the third period. Knierem indicated that they are endeavoring to wash at less than 135 to 140°. Temperatures above those seem to create problems. Because this is the age of specialization, it seems that it's necessary as to detergents that products should be designed to fit the need of the individual farmer and his specific water problems. The findings to date are tentative and will be summarized later.

Education

Chairman Saunders indicated in the absence of Vern Nichols the need for education of the dairyman and his hired hands in the proper preparation of the cows as indications are that an excessive amount of sediment is finding its way into the bulk tank as indicated earlier by the report. The incidence of milk abnormality is also evident and more education is needed in this area as well.

Although a considerable amount of work has been done by the National Mastitis Council as to research and correlation, information has not as yet been sent to the producers.

Meeting was adjourned at 12:15 P. M.

Annual Meeting Well Be Held By American Cottage Cheese Institute

The annual meeting of the American Cottage Cheese Institute will be held October 15-16, at the University of Illinois, Urbana, Ill.

The meeting will be held in conjunction with a Cottage Cheese and Sour Cream Conference, to be conducted jointly by the Institute and the University's Department of Food Technology.

Following registration on the morning of October 15, the first session will get under way at 1 p.m. with J. H. Peterson, of the Borden Company's Central Division, Chicago, presiding. Those attending will be welcomed by Dr. R. T. Milner, head of the University's Food and Technology Department, with Mr. Bandler responding in behalf of the Institute. Then the following papers will be presented:

"Starter Activity and Bacteriophage Detection", Dr. Fred Babel, professor of dairy bacteriology, Purdue University, Lafayette, Ind.; "Response of Starter Cultures to Heat Treatment of Milk", Dr. H. C. Olson, professor of dairy manufacturing, Oklahoma State University, Stillwater, Okla.; "Properties of Casein That Determine Processing Procedures for Cottage Cheese", Professor S. L. Tuckey, University of Illinois.

The afternoon's activities will be concluded with the Institute's annual business meeting at 4 p.m. Presiding will be the Institute's president, Neil C. Angevine, of the products division, Meyer-Blanke Company, St. Louis, Mo. The annual banquet will follow the business session.

A judging clinic — devoted to cottage cheese, sour cream and dips — will be held after the banquet that evening. Dr. Joseph Tobias, associate professor in the Food Technology Department, University of Illinois, will be the chairman. He will be assisted by Norman Cree, of Sidney Wanzer & Sons, Inc., Chicago; George Dammann, of Sealtest Foods, Peoria, Ill.; and George Reeder, of Beatrice Foods, Chicago.

Presentation of five more papers and a question-and-answer period will take place at the second morning's session, October 16. Robert Erickson, of Prairie Farms Dairy, Springfield, Ill., will preside. Papers will be presented as follows:

"Acidified Curd Cottage Cheese", Dr. C. A. Ernstrom, associate professor of dairy industry, University of Wisconsin, Madison, Wisc.; "Curd-O-Matic Cottage Cheese Manufacturing", Don Brick, the Borden Company, Rock Island, Ill.; "Why Should Whey and Wash Water Be Clarified", M. W. Pinckney, DeLaval Separator Company, Poughkeepsie; "Sour Cream by HTST Processing", W. J. Corbett, Dean Milk Company, Rockford, Ill.; "New Uses for Cottage Cheese Curd", C. J. Honer, Otto Milk Company, Pittsburg, Pa.

Bruce Morgan, of the Continental Can Company, Chicago, will be the speaker at a luncheon being held that day. His topic will be "Your Package — Your Profits — Your Future".

At the concluding session that afternoon, C. V. Christiansen, of the Bowman Dairy Company, Chicago, will preside. Papers will be presented as follows:

"Improving the Keeping Quality of Cottage Cheese", Dr. L. G. Harmon, professor of food science, Michigan State University, East Lansing, Mich.; "Survival of Staphylococcus Aureus During Cooking of Cottage Cheese Curd", Associate Professor L. D. Witter, University of Illinois. "Flavor Control in Cottage Cheese", Dr. Babel.

Mr. Angevine will close the meeting with remarks directed to the topic, "Looking Ahead."

Further information about the meeting arrangements can be obtained by writing to Mr. Bandler at Box 393, Ithaca, N. Y. or Dr. R. T. Milner, Head, Food Technology Department, 213 Mumford Hall, University of Illinois, Urbana, Illinois.

BROCHURE BY STERWIN INVESTIGATES ANTIMICROBIAL AGENTS

Sterwin Chemicals Inc. has made available a brochure describing the properties and uses of its expanding line of antimicrobial agents according to a recent announcement by the technical director, Dr. J. K. Krum.

The brochure provides technical information on quaternary ammonium compounds, bis-phenols and new bis-biguanide compounds.

The agents described in the new brochure are used in the pharmaceutical and cosmetic industries, and in detergent-sanitation areas for restaurant dairy, food processing, household and industrial products. Other uses for the agents are as algaecides, paint and paper preservatives, and as biocides in the textile and oil industries, as well as others.

Included in the information in the brochure is the antimicrobial activity of the agents against a number of common bacterial and fungal organisms. Copies of the brochure may be obtained by writing to: Industrial Chemicals Division, Sterwin Chemicals Inc., 1450 Broadway, New York 18, New York.

\$5 Billion Milk Harvest

Milking machines are responsible for harvesting a crop which returns to American dairymen an annual income of around \$5 billion annually—more than any other segment of agriculture. Since the chief income from the entire investment on dairy farms comes through the cows' udders, it is essential that equipments be operated and maintained at a high degree of efficiency, states the Milking Machine Manufacturers Council of the Farm Equipment Institute.

A good milking program requires a mechanically correct milking system capable of milking each cow according to her inherent ability as well as an operator who understands his job and does it correctly. To aid this program members of the Council are writing a booklet on the best procedures for desirable milking machine operation.

Milking Machine Manufacturers Council believe it necessary that periodic checking of equipment be done by authorized service people who are familiar with the particular machine involved.

OUTSTANDING ACHIEVEMENT AWARD¹

by
The Minnesota Sanitarians Association
to

H. MACY
Dean, Institute of Agriculture
University of Minnesota

Dean Macy who was presented the Minnesota Sanitarians Outstanding Achievement Award was born in Hudson, New York. He received the B. S. degree from Cornell University in 1917.

Before coming to Minnesota he served as bacteriologist for the City of Geneva, New York, and as bacteriologist and Chief Sanitary Inspector for the American Red Cross. He also served nearly a year with the U. S. Army during World War I.

In 1919 he joined the staff of the University of Minnesota as an Assistant Professor of Dairy Bacteriology and progressed in rank to that of Professor to which he was promoted in 1935 — the highest academic rank attainable.

During these years the dairy industry of Minnesota flourished and entered the technological revolution the industry was to experience beginning in the early 1940's and which it is still experiencing.

It can be safely said that the recipient of this award had by 1935 personally visited every dairy manufacturing plant in the State of Minnesota and knew the manager and many of the employees of these plants on a "first name" basis. Such was his interest in the industry and the people with that industry to which his professional and much of his personal life was devoted. During this period and the years that followed, he made many outstanding contributions to the fundamental knowledge of the relationships of microbiology to the dairy industry and to the application of much of such knowledge to the industry.

Among those which might be mentioned are the bacteriological changes which take place during the manufacture and storage of butter and the determination of the many factors which affect the growth of microorganisms in dairy products. His work in assisting various organizations in improving the quality of products produced has been particularly noteworthy. For example, he was primarily responsible for the organization of the present Quality Control Committee of Minneapolis and St. Paul. This or-

¹The Award was presented to Dean Macy on behalf of the Minnesota Sanitarians Association by J. C. Olson, Jr., on the occasion of the Association's Annual Banquet at the President Restaurant, Minneapolis, Minnesota, Thursday Evening, September 13, 1962.

ganization is unique in its operation in that the sanitary production of all milk produced in this area for consumption as fluid milk and cream is supervised by the efforts of the Minneapolis and St. Paul Health Departments, producers associations, and the Minneapolis and St. Paul Milk Distributors, with the University serving in an advisory capacity, but all working cooperatively through this Quality Control Committee. Back in 1920 he assisted greatly in the writing of the City of Duluth Milk Ordinance. Again in 1947-48 he served with various other individuals and groups who were assisting the Minneapolis Health Department in the revision of their milk ordinance.

Research and its application in the field of milk processing and milk sanitation has been only one phase of his activity. During this period he taught the courses in Dairy Bacteriology and Market Milk which are given in the Department of Dairy Industries. He is the co-author with the late Professors W. B. Combs and C. H. Eckles of the textbook "Milk and Milk Products" which is widely used in the agricultural colleges throughout the United States. In addition, he has published many scientific papers

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and other miscellaneous publications pertaining to the field of dairy bacteriology and the dairy industry in general. The number totals some 150.

It was mentioned previously that he served his country in military service during World War I. This he did also during World War II and with great distinction. Since World War I he had served in the U. S. Army Reserve and in 1943 was called back to active duty and served until the end of the war, being discharged late in 1945, having attained the rank of Lt. Col., Medical Service Corps, Army Medical Department.

During those war years he was a member of the SHAEF and the USFET missions to France. His work largely in the Public Health field during this service contributed much to the bringing of order out of the chaos which existed in France after her liberation. So grateful was the French Government for the service this man performed that the rank Chevalier in the National Order of the Legion of Honor of France was awarded to him — a coveted honor indeed. He also holds the same rank in the National Order of Public Health of France. On return to civilian life again he continued his affiliation with the active Reserve of the U. S. Army attaining the rank of Colonel during this time and finally retired in January 1955 after some 36 years of distinguished service.

After military service he again came back to his position as Professor of Dairy Bacteriology at the University but shortly thereafter in March 1946, he was appointed Associate Director of the Agricultural Experiment Station and in 1950 he became Director of the Experiment Station. Three years later he became Dean of the Institute of Agriculture, the position he now holds.

It is obvious that this man's interests and activities transcend many boundaries and among these many activities we find many which are directly related to the field of sanitation and, more broadly, the area of public health. To illustrate a few: He belongs or has belonged to and has been active in numerous professional societies such as:

Institute of Food Technologists, charter member
 American Dairy Science Association, member
 1934 — Chairman of Dairy Products Section
 1938-39 — Member of Board of Directors
 1962 — Received Certificate of Life Membership
 Society of American Bacteriologists, member
 1939-40 — President, North Central Branch
 Commission on Standardization of Biological Stains
 (resigned from membership 1960)
 Fellow of the American Public Health Association
 Minnesota Academy of Science, member

International Association of Milk and Food Sanitarians, member

Representative of the American Association of Land Grant Colleges and State Universities,
 1956-61 to the Agricultural Research Institute
 (National Research Council)
 1956-57 — Member of Recruitment Committee
 1957 — Member of Committee on Future Manpower
 1958-61 — Member of Governing Board

Minnesota State Veterinary Medical Society, Honorary Membership in recognition of his service to Veterinary Medicine. Awarded January 21, 1958.

Among his many other activities are the following:
 Associate member of the Minnesota Dairy Industry Committee from 1936 to 1952

Interviewer for the Civil Service Dept., State of Minnesota

Member of the Executive Committee, National Conference on Interstate Milk Shipments — 1951-52

Member of the Advisory Committee on Grain Sanitation established jointly by the Secretaries of the U. S. Dept. of Agr. and the Dept. of Health, Education and Welfare

President of the Dairy Council of the Twin Cities — 1956-to present

Governor's Committee on Water Resources — 1959-60
 And in 1959-60 was President of the St. Paul Rotary Club.

In connection with his position as Dean of the Institute of Agriculture, he has held many offices and has been a member of numerous committees concerned with the functions of State Universities and Land Grant Colleges. The list fills several pages. Only a few will be mentioned. He was a member of the Executive Committee of the Association of State Universities and Land Grant Colleges from 1953-1955. Also in 1952 he went to many Latin American countries on a mission sponsored by the Technical Cooperation Administration of the Department of State to survey agricultural institutions. One could go on and on.

Not only has he been honored by the military but likewise as a result of his civilian attainments. He is a member of Phi Kappa Phi, an honorary scholastic society; Alpha Zeta, a professional fraternity for agriculture; Gamma Sigma Delta, the honorary society for Agriculture; and recently was made an honorary member of the honorary society for Veterinary Medicine, Phi Zeta.

And now Dean Macy is honored by the Minnesota Sanitarians Association, an organization in which he was a charter member and an organization in which he has always had great interest.

CONNECTICUT DAIRY AND FOOD SANITARIANS HOLD ANNUAL OUTING

The Connecticut Dairy and Food Sanitarians held their Annual Outing at Restland Farms, Northford, Conn., August 28, 1963. Prior to the outing on August 27, the officers of the Connecticut Association held their Interstate Conference with representatives of the New York and Rhode Island Association.

Representatives were (Conn.) Pres., Dr. Arnold C. Smith, Secretary, R. M. Parry, Assistant Treasurer, Ray Anderson, Board of Governors — Herbert Messenger, W. W. Buckingham and "Cliff" Gosless former Secretary; New York, D. H. Race; Rhode Island, Secretary-Treasurer, Sidney Sheppard and Raymond Crandall, H. L. Thomasson, Executive Secretary, IAMFES.

A very beneficial discussion was held concerning, (1) recent change in name of International, (2) material published in Journal of Milk and Food Technology, (3) election of officers by mail ballot, (4) financial affairs of IAMFES and publication of Journal.

Over 500 attended the outing which was climaxed by a fine banquet at which special awards and prizes to winners of the various sport contests were awarded.

BRUCELLOSIS DECLINES IN HUMANS

The number of reported brucellosis cases affecting humans dropped to a record low of less than 600 in 1961, a 90% decrease since 1950, latest figures compiled by the National Brucellosis Committee reveal.

These figures are reported in the current issue (Sept. 1) of the *Journal of the American Veterinary Medical Association*. They were originally published in the Proceedings of the National Brucellosis Committee's 1962 annual meeting, held in Chicago, Ill.

Brucellosis is a disease which can be transmitted from cattle, swine and goats to man, causing such symptoms as chills, headache, and fluctuating fever.

According to the Committee, the annual incidence of human brucellosis decreased from 6,321 cases in 1947 to 580 cases in 1961.

Figures also revealed that the decline in human brucellosis has been halted somewhat in recent years (1957-1961) because of the high incidence among swine. "The incidence of brucellosis infection in man will probably continue at the present level until the disease in swine is brought under control and eventually eradicated," the Committee report stated.

The Committee estimated that approximately 880,000 "Brucella-infected" swine were handled and processed in the United States during 1961. Estimates

revealed that approximately 131,000 herds in this country are infected with brucellosis annually, and that more than 570,000 people risk exposure to infection each year.

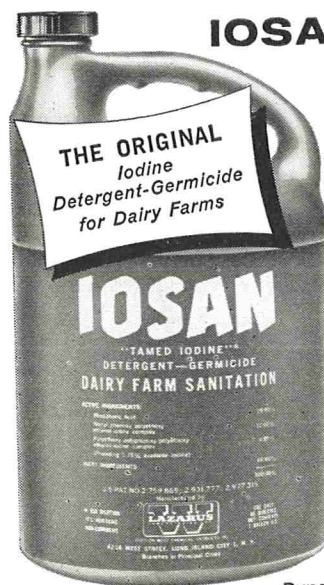
The report pointed out that the distribution of human brucellosis cases is highest in the upper Midwest. Iowa reported the greatest number of cases, followed by Illinois and Kansas.

The Committee said that the majority of cases reported in the North and Northwest sections of the country affected packing house workers and butchers. Cases reported in the South mainly affected persons handling infected animals or consuming milk products obtained from diseased animals.

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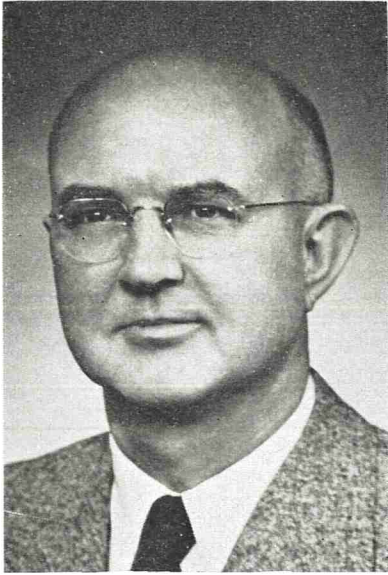
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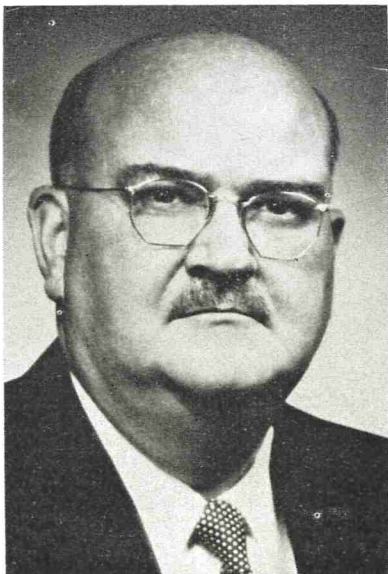


Arthur Shogren

Two well known figures in the sanitation chemical manufacturing business have retired after a lifetime of significant contributions to the advancement of sanitation techniques.

Arthur Shogren, founder of Klenzade in 1931, and "C.B." Shogren, a brother, who joined him shortly after, built a small local enterprise into one of America's leading organizations devoted to improved sanitation chemicals and practices in the dairy, food, and related industries.

Arthur was successively president and board chairman and "C.B." director of sales and president of Klenzade Products, Inc., before the company merged with Economics Laboratory, Inc. Both men then



C. B. Shogren

became vice-presidents of Economics.

Through the years Arthur devoted his time to production and Claire ("C.B.") to sales and marketing. Many "firsts" were originated by the company such as the first comprehensive farm quality program which has been largely instrumental in substantially improving America's milk supplies at the farm level.

Other innovations included the early use of wetting agents to improve dairy sanitation products; the development of organic acid detergents to solve the milkstone problem; the use of acid detergents in the Klenzade Alternate System of Cleaning followed by the later development of the acidified rinse. The Shogrens also early foresaw the need for improved chemical applying equipment and were among the first to offer C.I.P. Systems and liquid detergents later followed by completely automated cleaning systems.

Probably both brothers are best known for their appearances through the years at Klenzade Educational Seminars which have contributed a wealth of sanitation technology to all industries concerned with the handling and processing of milk and food. These Seminars were natural outgrowths of the original Klenzade training schools instituted by "C. B." for company salesmen in 1936. Since then the Seminars have grown into international prominence with guest speakers representing the country's top levels of achievements in sanitation education, scientific research, sanitation chemistry, microbiology, and public health.

We salute Arthur and Claire Shogren for their years of fruitful service to International Association, the industry and the field of sanitation.

U. S. PUBLIC HEALTH SERVICE TRAINING PROGRAM

The Public Health Service, through the Division of Environmental Engineering and Food Protection, will conduct a one-week training course, Microbiological Examination of Milk and Milk Products, October 14-18, at the Robert A. Taft Sanitary Engineering Center in Cincinnati. It is offered for professional personnel in responsible positions in state, municipal, and other laboratories engaged in milk analysis and dairy products examination. Instruction is designed to enable the trainees to select the proper tests for measuring the sanitary quality of milk supplies and to interpret the laboratory results.

For more complete information concerning the course, see the *Training Program Bulletin*, which is available on request. Applications or requests for information should be sent to the Director, Training Program, Robert A. Taft Engineering Center, Cincinnati 26, Ohio, or to the appropriate PHS Regional Office. No tuition or registration fee is required.

Coming Events

September 30-October 2: New York State Association of Milk Sanitarians and Cornell University Department of Dairy and Food Science, Annual Conference, Hotel Syracuse, Syracuse, N. Y. Write: R. P. March, 118 Stocking Hall, Cornell University, Ithaca, New York.

October 14-16: Annual Conference, Institute of Sanitation Management, Cleveland, Ohio. Write: Executive Officer, Institute of Sanitation Management, 55 W. 42nd Street, New York 36, N. Y.

October 14-18: Two PHS Training Courses (1 week), Control of Gaseous Emissions, and Microbiological Examination of Milk and Milk Products. Taft Engineering Center. Write: Director, Training Program, Robert A. Taft Engineering Center, 4676 Columbia Parkway, Cincinnati, Ohio. (No regis. fee charged.)

October 22-25: International Association of Milk, Food and Environmental Sanitarians, Inc., 50th Annual Meeting, Royal York Hotel, Toronto, Ontario, Canada. Write: H. L. Thomasson, P. O. Box 437, Shelbyville, Indiana.

October 30-31: 1963 Nutrition Conference for Feed Manufacturers, Cornell University, Ithaca, New York. Write: Professor William G. Merrill, Department of Animal Husbandry, Cornell University, Ithaca, New York. (Conference held in cooperation with the American Feed Manufacturers Association).

November 3: Dairy Society International Annual Meeting, Statler-Hilton Hotel, Dallas, Texas. Write: George W. Weigold, 1145 19th Street, N. W., Washington, D. C.

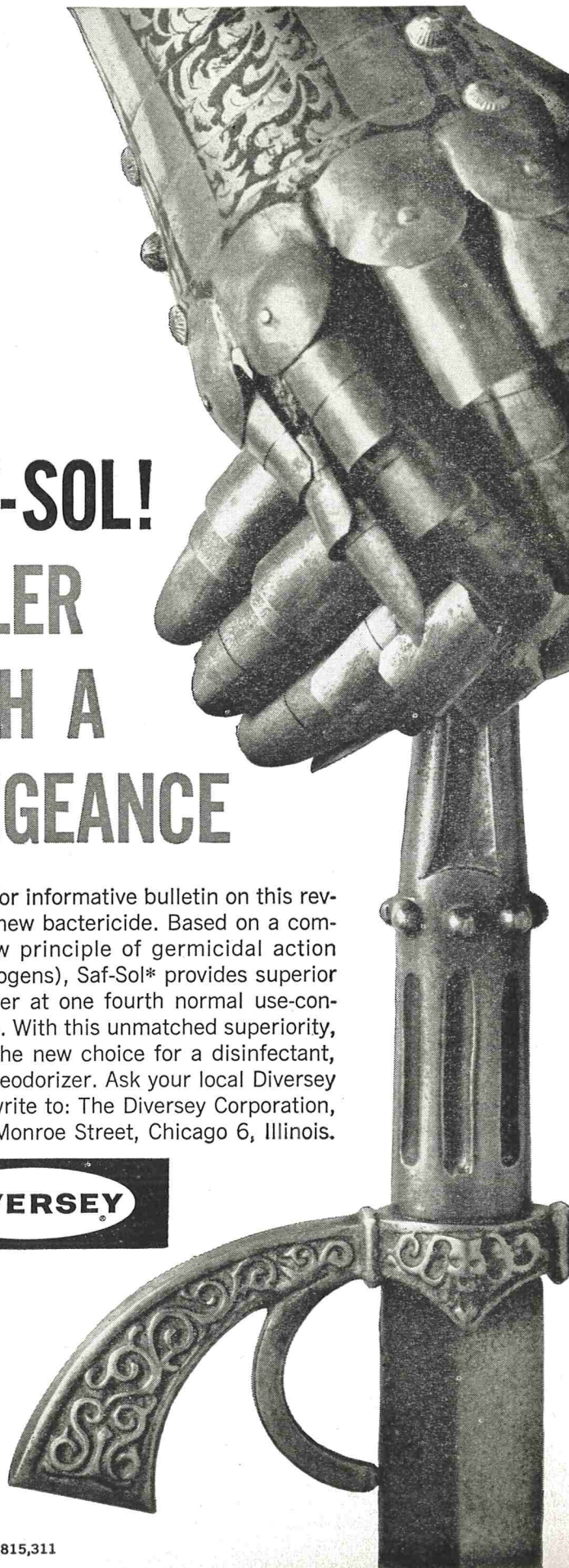
November 3-6: International Association of Ice Cream Manufacturers, 59th Annual Convention, Sheraton-Dallas Hotel, Dallas, Texas. Write: Robert H. North, 910 17th Street, N. W., Washington, D. C. 20006.

November 18-22: PHS Training Course Chemical Analysis of Milk and Milk Products, Taft Engineering Center. Write: Director, Training Program, Robert A. Taft Engineering Center, 4676 Columbia Parkway, Cincinnati, Ohio. (No regis. fee charged.)

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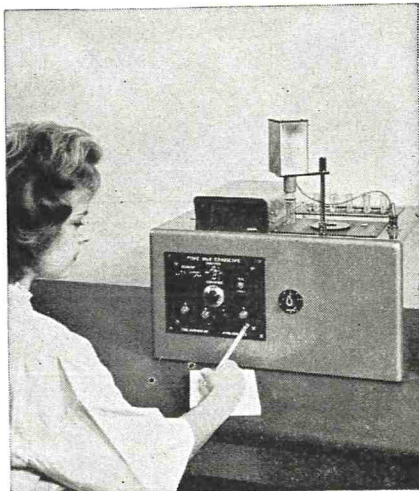
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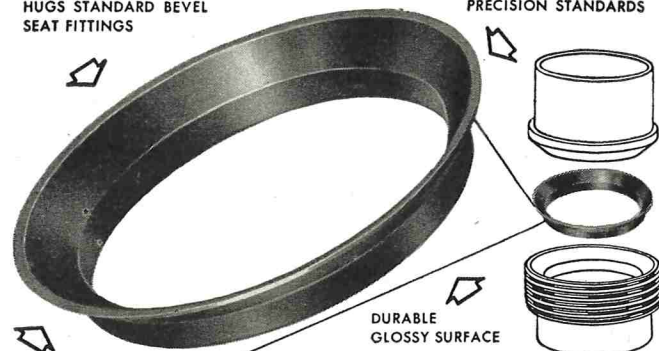
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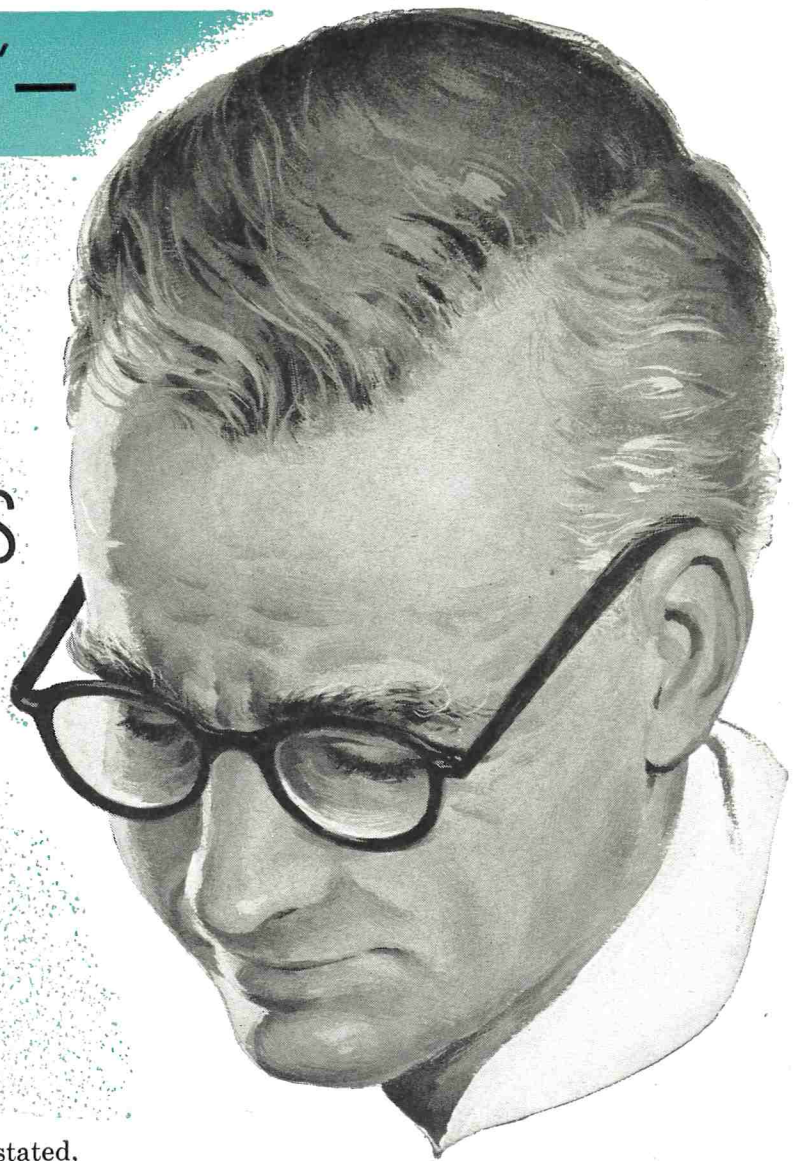
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