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Contents *Page*

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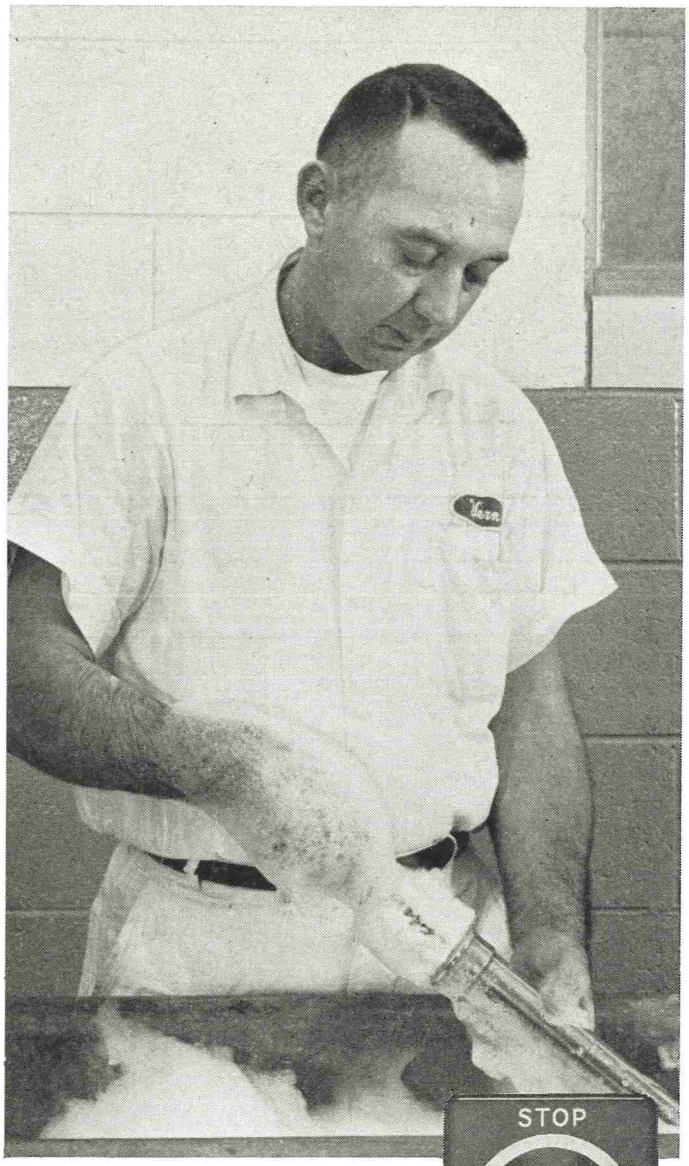

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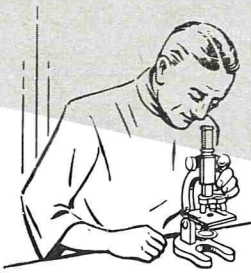

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EDITORIAL

TO FEE OR NOT TO FEE?

The milk and food industry has had to pay wholly or partially for food sanitation programs in many communities on a "take it and like it" basis, operated by health departments or other official agencies. Increasing demand for other public health services and increased operating costs have resulted in serious problems of financing the total public health program. In an effort to provide adequate financing for milk and food programs, we have come to rely on licensing and fee systems.

The philosophy of the advocates of the fee system seems to be that the cost of enforcing laws and regulations should be borne by the licensee since he benefits most by the service and can pass the costs along to his customers. This method is said to be more fair than supporting the program with public tax funds. Occasionally industry spokesmen protest this system, but their cries usually go unheeded.

Let us examine the fee for service system closely and see if the public is really getting the most out of this method of financing. The primary objective of any food sanitation program is to provide a sanitary, high quality food supply at the lowest possible cost. The health department is established and maintained for the welfare of the public – not for the good health and benefit of the food processor or for the welfare of his employees.

Due to many circumstances and prevailing conditions, health agencies have found it necessary to assume many responsibilities in the area of qualtiy control. During the past decade, the food industry has experienced rapid technological changes which make it difficult for a health agency to maintain facilities and personnel qualified to provide a complete and adequate sanitation program without duplicating the efforts of the industry.

Too many public health people are reluctant to admit that the modern food processing plant, and particularly the modern milk plant, employs quality control measures far in excess of those provided by a health agency. Industry employs qualified, well-trained people to do this work because competition makes it necessary to assure the good quality of its products. In many instances health agencies duplicate the efforts of industry instead of attempting to coordinate the activities of both groups.

The fee system becomes more complicated as we attempt to adjust it to reciprocity with other agencies which have sanitary control over food plants whose products are received in interstate or intrastate commerce. There may be a lack of uniformity in programs and interpretation of sanitation requirements as well as duplication of efforts by the different agencies. This is confusing to all concerned and increases the cost of regulation. Most businessmen say that the same type of service can be provided more efficiently by private industry than by a governmental agency.

Perhaps it is time for us to let the food industry assume its appropriate responsibility for the quality and safety of its products. This might be accomplished by re-evaluating the fee system and requiring industry to employ its own professional and laboratory services.

In such a situation the health department could maintain a relatively small well-qualified staff to evaluate and guide the activities of their industry-employed counterparts. The health service staff would also be available for consultation to industry. Penalties for failure to do an adequate job by industry must still be provided.

Food sanitation is a job which must be done cooperatively by the food industry and the regulatory agency involved in such a manner that each has certain prescribed responsibilities. Let the food industry support the program through "doing" instead of just "paying." Health agencies can shift from being policemen over industry and still accomplish the primary objective of providing the public a safe sanitary food supply at the lowest possible cost. In this role the public health worker performs a true public service, the cost of which may justifiably be charged to the public. Placing the responsibility for sanitary quality on industry implies a trust and a mature relationship similar to the honor system.

The honor system builds on the characteristics of maturity, honesty, self-reliance, and mutual trust. Two questions occur simultaneously, first, can food sanitation programs be practiced effectively through the honor system and second, can they really be effective any other way?

If the answer is "yes" to the first question, then it is time to consider seriously, with the milk and food industry, a change in the present system of financing and administering milk and food sanitation programs in many areas of the United States.

Harold J. Barnum and Frank B. Clack, V.M.D.

CHEMICAL METHODS FOR THE DETERMINATION OF THE FRESHNESS OF FISH[1] [2]

DARDJO SOMAATMADJA[3], JOHN J. POWERS, AND
DAN E. PRATT

Department of Food Technology,
University of Georgia, Athens, Georgia

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Various objective methods to estimate the degree of freshness of fish and fishery products were compared. The total volatile nitrogen (TVN) and ammonia-nitrogen of carp flesh reached values of 30-33 mg% when carp stored at 0-4°C. and 25-27°C. began to have a bad odor. For catfish stored at 0-4°C. and 25-27°C. these values reached 20-30 mg%. Trimethylamine was not found in fresh and spoiled carp and catfish. The determination of trimethylamine as an index of spoilage cannot be used for these fresh-water fish. The determinations of tyrosine and volatile reducing substances (VRS) cannot be used to estimate the degree of freshness of fish if the temperature at which the fish had been stored is not known. If these two methods were combined with TVN and ammonia-nitrogen one could determine the degree of freshness of fish and the temperature at which the fish were stored. The determination of tyrosine combined with TVN and ammonia-nitrogen can give further support as to whether fish are absolutely fresh. If the temperature under which fish have been stored is known each of the tests used in this study can be applied individually to determine the degree of freshness of fish.

Since fish are nutritious and are eaten by many peoples in the World, the freshness of fish intended for human consumption is important. Many objective methods have been proposed as aids in estimating the freshness of fish, but most of these methods have been applied to fish iced or otherwise chilled to retard spoilage. In areas of the World where refrigeration is not common, fish may be kept alive until sale, or, if they die, they may be held at ambient temperature until sale. In Indonesia, for example, fish are kept alive in bamboo vessels — made waterproof with coal tar — but sometimes dead fish may be left in the vessel to facilitate sale.

The objectives of the present study were to determine: (a) whether some of the methods used or suggested for refrigerated fish would apply to fish held at ambient temperatures, (b) whether such methods would be applicable to more than one species of fish, and (c) whether a combination of objective tests would yield a significantly higher correlation with sensory appraisal than use of any one test alone.

REVIEW OF LITERATURE

Numerous methods of estimating the degree of freshness of fish have been reported in the literature (*2, 4, 5, 6, 7, 9, 10, 12, 13, 19, 20 24*). Tarr (*27*) has reviewed many of the methods and biochemical changes known to occur in fish during decomposition. The temperature at which fish have been stored has been reported to influence the reliability of certain tests (*14, 15 23*). Since the components of fish vary with species and geographic area (*25*), the application of certain chemical methods is limited by these factors. Farber (*7*) stated that the determination of indole, volatile nitrogenous compounds, H_2S, and pH were of no significance for evaluating the early stages of spoilage of certain species of fish. Reay and Shewan (*21*) reported that the determinations of trimethylamine and dimethylamine are the best methods to determine the freshness of marine fish, but Castel (*3*) and Anderson and Fellers (*1*) were not able to detect the presence of trimethylamine in spoiled fresh-water fish.

EXPERIMENTAL PROCEDURES

Fish Samples.

Three different kinds of fresh-water fish were used in this study: carp, catfish, and bream. The carp were not less than 16 inches long with an average weight of one pound. The catfish were not less than 12 inches long with an average weight of 12 ounces. The bream were not classified according to size. All fresh-water fish were taken from a local fish pond and were kept alive in the laboratory until used. Two kinds of salt water fish were used, these were mullet and mackerel, and were obtained from a local fish market.

At the beginning of the experiment, some of the fresh-water fish were killed and eviscerated. The sample was divided into two batches; one was stored

[1]Data reported herein are from the M. S. thesis of Dardjo Somaatmadja, Univ. of Georgia, 1959.

[2]Contribution from College Experiment Station, Univ. of Georgia, Athens, Ga. Approved as Journal Paper No. 131.

[3]On leave from the Laboratory for Chemical Research, Indonesian Department of Industry, Bogor, Indonesia.

at 0-4°C. and the other at 25-27°C. in an unsealed jar. Some of the remaining fish were kept alive (*a*) until each of the test periods to provide fresh (control) fish for the sensory appraisal and chemical tests and (*b*) to provide fish for each of the different experimental storage periods.

At each test period, after evaluation of the odor, the fish were used for the tetrazolium tests. For this test the fish were not ground, but the test paper containing 2-P-iodophenyl-3-P-nitrophenyl-5-phenyl tetrazolium chloride (INTC) was placed in contact with the skin of the fish for five minutes after which the extracted red color was read at 550 mμ. Afterward, the entrails and bones were removed and the flesh blended in a Waring blendor. The blended flesh was used for the determination of volatile nitrogenous constituents, volatile reducing substances, tyrosine, and volatile acid number.

Determination of Nitrogen Constituents.

The methods reported by Winton and Winton (*28*) was used for total volatile nitrogen (TVN), ammonia nitrogen, and trimethylamine. In this study the suspension of the sample was not stored in the refrigerator before analysis as reported originally but was analysed immediately. Preliminary experiments showed that both procedures gave the same results. The method of Ottaway (*18*) was used for tyrosine.

Determination of Total Volatile Acid Number.

The method of the Association of Official Agricultural Chemists (*16*) was employed.

Determination of Reducing Substances.

The authors employed the method reported by Shewan and Liston (*22*) for tetrazolium reduction tests. Two different methods were used to determine the amount of reduction by volatile substances. The method reported by Lang, Farber, Yerman, and Beck (*11*) was slightly modified by using iodometric titration.

The second method was to measure the reducing substances volatilized by steam. In this method, a 5-g. ground sample was weighed into a 500-ml. distillation flask, followed by 200 ml. of water. The suspension was distilled for 30 minutes into an iodine flask containing 10 ml. of 0.05 *N* alkaline potassium permanganate solution. After cooling, 2 g. of KI were added followed by 15 ml. of 6 *N* sulfuric acid solution. The liberated iodine was titrated with 0.05 *N* sodium thiosulfate solution. The amount of reduction is reported as milliequivalent reduction per 100 gram of sample.

Organoleptic Evaluation.

For the odor evaluation of samples, scores ranged from 5 to 1. A score of 5 represented fresh fish and 1 represented decomposed fish. A score of 3 or below was considered to be organoleptically unacceptable.

RESULTS AND DISCUSSION

Both fresh carp and catfish contained volatile nitrogenous constituents. When carp were stored at 0-4°C. the TVN and ammonia nitrogen content reached approximately 32 mg% and 30 mg%, respectively, as carp started to possess an undesirable odor. The same values of TVN and ammonia nitrogen were found when carp were stored at 25-27°C. as may be seen in Table 1. When catfish were stored at 0-4°C. the

TABLE 1 — EFFECT OF STORAGE OF CARP AT 0-4°C AND 25-27°C ON ORGANOLEPTIC SCORES, TOTAL VOLATILE NITROGEN, (TVA), AMMONIA-NITROGEN, TRIMETHYLAMINE NITROGEN (TMA), VOLATILE REDUCING SUBSTANCES (VRS), AND TYROSINE

Days of storage	0		1		2		3	4	5	6
Temp. of storage, (°C)	0-4	25-27	0-4	25-27	0-4	25-27	0-4	0-4	0-4	0-4
Score	5	5	5	3	4	1	4	3	2	1
TVN, mg%	9.4-10.9	10.6-11.2	14.3-14.3	31.9-33.1	14.4-19.4	193.2-196.0	20.8-23.1	32.1-32.3	47.2-53.5	83.1-110.1
Ammonia-N mg%	8.1-11.7	7.6-10.7	12.1-12.8	32.4-32.9	14.0-15.1	193.5-183.6	18.1-24.6	29.0-31.4	39.9-44.8	73.8-101.8
TMA, mg%	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-0
Micro-equiv. reduction/ 5 ml. fish juice	1.0-2.0	6.1-7.9	9.3-11.0	171.8-173.2	120.0-12.7	214.5-222.2	14.2-17.5	29.3-32.2	43.3-44.7	104.6-110.4
Tyrosine mg%	0-0	0-0	3.3	11.5-25.5	4.3	35.4-66.0	6.3	8.0	9.5	10.6

TABLE 2 — EFFECT OF STORAGE OF CATFISH AT 0-4°C AND 25-27°C ON ORGANOLEPTIC SCORES, TOTAL VOLATILE NITROGEN (TVN), AMMONIA-NITROGEN, TRIMETHYLAMINE NITROGEN (TMA), VOLATILE REDUCING SUBSTANCES (VRS), TYROSINE, TETRAZOLIUM TEST (INTC), AND TOTAL VOLATILE ACID NUMBER (TVA)

Days of storage	0		1		2		3	4	5	6
Temp. of storage, (°C))	0-4	25-27	0-4	25-27	0-4	25-27	0-4	0-4	0-4	0-4
Score	5	5	5	3	5	1	5	4	3	2
TVN, mg%	8.1-9.4	7.2-9.3	9.9-13.4	29.1-30.1	10.2-19.4	102.3-107.4	11.9-17.0	14.6-15.6	22.1-26.1	39.3-43.1
Amm.-N, mg%	9.2-9.0	6.3-8.6	8.1-12.7	26.2.-28.2	9.3-18.0	98.5-102.5	12.9-16.8	18.1-15.1	19.8-20.4	24.1-37.3
TMA, mg%	0-0		0-0		0-0		0-0	0-0	0-0	0-0
Micro-equiv. reduction/ 5 ml. fish juice	0.0-2.0	3.9-7.8	0.9-2.3	119.0-134.0	0.1-1.1	236.0-263.0	0.0-1.2	9.5-26.0	61.7-81.8	83.3-119.8
Tyrosine, mg%		0.0-1.5		8.2-15.7		52.6-56.5				
INTC, O. D.		0.002-0.021		0.205-0.255		O.235-0.390				
TVA		23.9-26.6		57.4-62.2		105.0-107.5				

TVN and ammonia nitrogen reached 22-26 mg% as the fish gave off a putrid odor. Approximately the same values were found when catfish were stored at 25-27°C. as may be seen in Table 2.

These results agreed with those of Tagawa, Yoshimo, and Miyauchi (*26*). They found in four species of fish that the ammonia nitrogen exceeded 30 mg% when the fish began to possess a putrid odor.

Trimethylamine values remained nil when both carp and catfish became completely unaccepatble. Castel (*3*) reported that fresh-water fish did not contain trimethylamine oxide which compound was reduced into trimethylamine during spoilage. Anderson and Fellers (*1*) reported that the presence of trimethylamine was hardly detectable in spoiled fresh-water fish although they were able to observe the presence of trimethylamine oxide. In this study ammonia nitrogen accounted for nearly all of the volatile nitrogenous constituents. The correlation coefficient between the two constituents was 0.994.

The volatile reducing substances (VRS) of fresh carp ranges from 1 to 18 units of reduction. When carp were stored at 0-4°C. the VRS values reached 29 to 32 units as the fish gave off a definite off-odor. The VRS values increased rapidly when the carp were stored at 25-27°C. and they reached 172 to 173 units when the fish were assigned the score of 3, as may be seen in Table 1. The data in Table 2 indicate that the VRS of catfish stored at 0-4°C. did not increase until the fourth day of storage, and the values reached 10-26 units as the fish started to possess an undesirable odor. When the fish were stored at 25-27°C. the VRS values increased at the same rate as those of carp stored at the same temperatures, and they reached 119 to 134 units when odor became bad. In this study ammonia nitrogen accounted for nearly all the VRS in carp and in catfish. The correlation coefficient between the two was 0.967.

These results agreed with those of Farber (*7*) and Farber and Peter (*8*) who reported that fresh fish contained small amounts of VRS, and the values in decomposed fish varied with the kind of fish. The results, however, contradict the findings of Wittfogel and Bighardt (*29*) who reported that fresh fish was devoid of VRS.

The volatile reducing substances obtained by distillation of mullet muscles reported as milliequivalent reduction per 100 g. of flesh is shown in Table 5. The values increased as the fish became putrid. Using this method, not only were the volatile substances produced during spoilage volatilized, but also substances which were liberated by boiling fresh tissues.

No tyrosine could be detected in freshly killed carp. When carp were stored at 0-4°C. the values reached 8 mg% as the fish became putrid. When the carp were stored at 25-27°C. the tyrosine content reached 11.5 to 25.5 mg% when the fish were assigned the score of 3, as may be seen in Table 1. Extremely low tyrosine content was found in freshly killed catfish and bream as may be seen in Tables 2 and 5, respectively. It seems that the determination of tyrosine was very useful to estimate whether the fish was absolutely fresh. The amount of tyrosine in fish which spoiled at 0-4°C. was lower than that of fish

which spoiled at 25-27°C. The amount of tyrosine found in carp and catfish stored at 25-27°C. varied with the individual fish ($P < 0.01$).

Bradley and Bailey (*2*) reported that determination of tyrosine was not of any value in determining the degree of freshness of fish which were stored at 0°C. Luijpen (*14*) stated that the formation of tyrosine in fish muscles was inhibited by low temperature and by the presence of salt. He also reported that the determination of tyrosine was inadequate for the objective evaluation of the freshness of cod fillets which had been held at temperatures between -1.25 and 4°C. (*15*).

The total volatile acids number (TVA) of mackerel stored at 25-27°C. is shown in Table 4. The values of TVA of fresh mackerel ranged from 13 to 29, and increased as the fish became putrid. The TVA numbers of fresh and spoiled fish varied with the individual fish due to the fact that hydrolysis depends on the type of spoilage organisms predominant on fish during the spoilage process, confirming results reported by Farber (*7*).

Positive INTC tests were observed in freshly killed catfish and bream, as may be seen in Tables 2 and 5. Slight differences in the intensity of the red color of formazan were obtained from the skin of the fish next to the surface of the container and that from the surface of the skin exposed to the air. The authors felt that high INTC values were more closely related to aerobic growth than to spoilage produced by all types of organisms. Moorjani, Iyenjar, Bhatia, and Subrahmanjan (*17*), who used a different tetrazolium salt as indicator, stated that their method was especially useful for estimating the freshness of fish which was heavily contaminated with bacteria.

The determination of TVN and ammonia-nitrogen yielded values within the range of 30 to 33 mg% irrespective of whether the fish were stored at 0-4°C. or at 25-27°C. when the fish became putrid. Catfish acted similarly at both temperatures except that the values were lower (20-30 mg%). Without knowing the temperature at which fish had been stored, the determinations of tyrosine and VRS could not be applied to estimate the degree of freshness of fish. The determination of tyrosine could be used to estimate whether fish were absolutely fresh.

By applying the TVN or ammonia determination combined with VRS determination, one could determine with reasonable certainty whether or not carp or catfish was spoiled and the temperature at which the fish had been stored. By combining the two methods with tyrosine determination further support could be obtained on whether the fish was absolutely fresh. If the temperature at which the fish were stored was known each test (TVN, ammonia-nitrogen, VRS, and tyrosine determinations) could be applied to estimate the freshness of fish.

TABLE 3 — EFFECT OF STORAGE OF MULLET AT 25°-27°C ON ORGANOLEPTIC SCORES AND STEAM VOLATILE REDUCING SUBSTANCES (VRS)

Days of storage	Score	VRS[a]
0	5	2.1-4.4
1	3	6.2-8.2
2	1	8.7-12.3

[a]Results reported as milliequivalent reduction per 100 gram of flesh.

TABLE 4 — EFFECT OF STORAGE OF MACKEREL AT 25-27°C ON ORGANOLEPTIC SCORES AND TOTAL VOLATILE ACID NUMBER (TVA)

Days of storage	Score	TVA[a]
0	5	12.6-28.8
1	3	39.0-82.4
2	1	128.0-209.0

[a]Results reported as ml. of 0.01 NaOH per 100 g. fish flesh

TABLE 5 — EFFECT OF STORAGE OF BREAM AT 25-27°C ON ORGANOLEPTIC SCORES, TETRAZOLIUM REDUCTION TEST, (INTC), TYROSINE, AND VOLATILE REDUCING SUBSTANCES (VRS)

Days of storage	Score	INTC O. D.	Tyrosine mg%	VRS μ eq./5 ml. juice
0	5	0.011-0.017	1.9-2.7	5.8-8.7
1	2	0.130-0.245	39.2-41.1	113.0-132.0

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PENICILLIN LEVELS IN MILK FOLLOWING PARENTERAL ADMINISTERATION OF PROCAINE PENICILLIN G[1]

M. Yusaf Vaid[2], C. C. Prouty, A. O. Shaw
and R. E. Watts

Department of Dairy Science and Department of Clinical Medicine, College of Veterinary Medicine
Washington State University, Pullman

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Penicillin levels in milk were determined following the intramuscular administration of two types of procaine penicillin G, the aqueous suspension and the oil base with aluminum monostearate. Three injections of the aqueous suspension type were administered, at intervals of 24 hours, to each of twelve cows. A single injection of the oil base type was given to each of twelve cows. In all instances the dose administered was at the approximate level of 5000 u/lb. of body weight.

Higher concentrations of penicillin were found in the milk from cows receiving the aqueous suspension type. The highest levels for the two types were 0.52 and 0.15 units per ml. respectively. However, penicillin persisted longer in the milk from cows to which the oil base type was administered. Following the use of each type of procaine penicillin G the levels of this drug in the milk from the different cows of the same series varied considerably.

The results of this study indicate a withholding period of at least 60 hours following the last intramuscular injection of procaine penicillin G, aqueous suspension and 108 hours after procaine penicillin G, oil base with aluminum stearate.

The intramuscular injection of dairy cows with antibiotics for the treatment of various infections, including mastitis, is a common veterinary practice. However, only a limited amount of information is available relative to the levels of these drugs in the milk following this method of treatment.

Soon after the introduction of penicillin for veterinary use, several investigators (*2, 11, 12*) reported that this antibiotic did not appear in the milk following intravenous and intramuscular administration. Dosages, in these studies, ranged from 80,000 to 2,681,000 units, the highest being a penicillin preparation in a carrier of beeswax and oil.

Welch *et al.* (*13*) were the first to show the presence of penicillin in milk following intramuscular injection. They used sodium penicillin and sodium penicillin G at a dosage level of 12,500 u/lb. of body weight. Edwards and Haskins (*3*) detected penicillin, aureomycin, and streptomycin in the milk of lactating cows after parenteral injection. They used penicillin at the rate of 11.0 mg/lb. of body weight. Sadek, (*10*) using crystalline penicillin G and procaine penicillin G, at the rate of 5000 u/lb. of body weight, confirmed the observation of Welch *et al.* and Edwards and Haskins. He pointed out the advantages of treating mastitis of the dairy cow by the intramuscular administration of the antibiotic.

Randall *et al.* (*9*) administered procaine penicillin G, aqueous suspension and oil base types, at the rate of 5000 u/lb. of body weight. Milk from the cow receiving the aqueous suspension showed measurable amounts of penicillin up to 72 hours as compared with 120 hours for the milk from the cow that was given the oil base procaine penicillin G. Hollister *et al.* (*6*) administered procaine penicillin G, aqueous suspension to a cow at the rate of 3,000,000 units. Detectable penicillin was present in the milk after 24 but not after 48 hours. Hollister *et al.* (*7*) used benzathine penicillin V aqueous at the rate of 6,000,000 units per cow administered in a single dose. They found the drug to persist in the milk up to 144 hours.

The Food and Drug Administration (*4*) on September 22, 1959 certified benzathine penicillin V aqueous for injection of dairy cows. Preparations of this antibiotic are required to carry the following statement: "Warning—Milk taken from cows seven days after the latest treatment must not be used for human consumption." According to McFarland (*8*) this is the only antibiotic product for injection for which the Food and Drug Administration has issued a specific regulation with respect to withholding the milk following its use.

Methods

Procaine penicillin G, in aqueous suspension and oil base with aluminum monostearate was used in this study. Three injections of the aqueous suspension were given at 0, 24, and 48 hours. Dosages ranged from 4316 to 5725 u/lb. of body weight and averaged 5176 units. The oil base type was administered in a single dose, ranging from 4667 to 5600 u/lb. of body weight and averaged 5146 units.

A series of twelve cows was employed in the study

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[1]Scientific paper No. 1987, Washington Agricultural Experiment Stations, Pullman, Project 1499.

[2]Present address: College of Animal Husbandry, Lahore, West Pakistan.

of each type of procaine penicillin G. None was a clinical case of mastitis. The daily production of milk ranged from 9 to 74 pounds. Only one cow produced less than 22 pounds per day.

A sample of milk was collected from each cow before the injection was given to insure that no antibiotic was being excreted in the milk prior to the intramuscular injection. After the injection, samples of milk were collected at every milking period up to and including 108 hours. The samples were held in a frozen state until they were analyzed for penicillin.

The plate-cylinder bio-assay method (5) was employed, using *Sarcina lutea* ATCC strain 9341, as the test organism.

RESULTS AND DISCUSSION

Data showing penicillin levels in the milk from the series of 12 cows that received intramuscular injections of the aqueous suspension type of procaine penicillin G are in Table 1 and Figure 1. The horizontal broken line in figure 1 at the 0.05 level represents the minimum working level of the 2-1/2 hour Food and Drug Administration method as described by Arret and Kirshbaum (*1*). The broken line at the 0.10 level represents the approximate penicillin concentration at which the activity of lactic dairy starters is retarded.

An average concentration of 0.145 units of penicillin per ml. of milk was observed after 12 hours. This fell to 0.054 units per ml. at 24 hours, at which time the second injection was given. At the 36-hour period a second peak was observed at a concentration of 0.154 units per milliliter. This again fell to 0.056 units per ml. at 48 hours, at which time the third and last injection was given. At the 60-hour period a lower peak was observed at a concentration of 0.113 units per milliliter. This gradually declined to 96 hours and the milk was negative for penicillin at 108 hours.

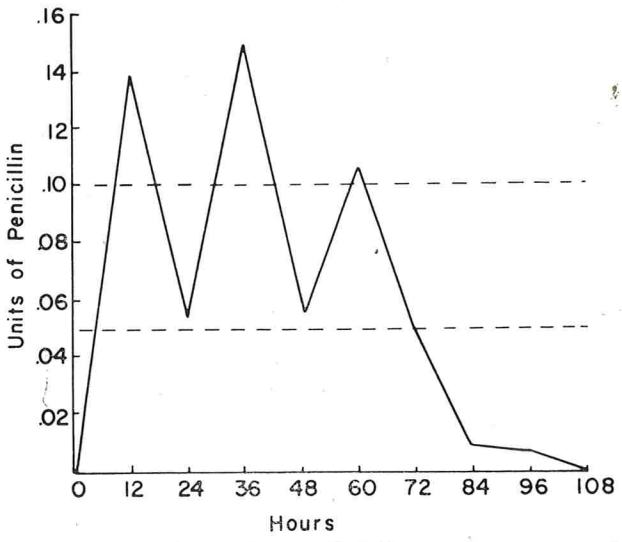

Figure 1. Penicillin levels in milk following the intramuscular injections of procaine penicillin G, aqueous suspension. Three injections of approximately 5000 u/lb. of body weight. Average of 12 cows.

TABLE 1 — PROCAINE PENICILLIN G, AQUEOUS SUSPENSION, UNITS PER MILLILITER OF MILK

Cow No.	Units/lb body wt.	Milk lbs/day	Hours									
			0[a]	12	24[a]	36	48[a]	60	72	84	96	108
506	4316	46	0	0.10	0.076	0.215	0.088	0.185	0.064	0	0	0
401	5421	23	0	0.14	0.084	0.255	0.032	0.135	0.045	0	0	0
2162	4873	24	0	0.085	0.060	0.115	0.062	0.096	0.044	0	0	0
455	4845	74	0	0.52	0.04	0.086	0.047	0.08	0.044	0	0	0
451	5522	64	0	0.185	0.055	0.041	0.082	0.11	0.052	0.032	0.021	0
480	5444	59	0	0.245	0.062	0.142	0.041	0.087	0.032	0.021	0.016	0
461	5106	59	0	0.09	0.050	0.08	0.042	0.13	0.046	0	0	0
437	4922	56	0	0.042	0.042	0.067	0.031	0.095	0.029	0	0	0
490	5297	53	0	0.13	0.064	0.165	0.045	0.149	0.027	0	0	0
2208	5725	34	0	0.073	0.048	0.330	0.073	0.048	0.039	0.021	0.024	0
2203	5504	22	0	0.048	0.031	0.145	0.033	0.066	0.036	0.022	0.018	0
2234	5335	38	0	0.079	0.043	0.207	0.10	0.18	0.155	0.043	0.018	0
Ave.	5176		0	0.145	0.054	0.154	0.056	0.113	0.051	0.012	0.008	0

[a]Three injections — time of injection.

TABLE 2 — PROCAINE PENICILLIN G IN OIL, UNITS PER MILLILITER OF MILK

Cow No.	Units/lb. body wt.	Milk lbs/day	Hours 0[a]	12	24	36	48	60	72	84	96	108
460	5501	65	0	0.017	0.012	0.006	0	0	0	0	0	0
2167	5497	45	0	0.018	0.019	0.019	0.017	0.008	0.007	0	0	0
380	4791	58	0	0.042	0.057	0.048	0.018	0.016	0.014	0	0	0
309	4740	9	0	0.15	0.05	0.013	0.014	0	0	0	0	0
459	4734		0	0.085	0.033	0.032	0.030	0.028	0.026	0.021	0.021	0
403	4667	59	0	0.027	0.045	0.020	0.026	0.021	0.018	0	0	0
429	5471	63	0	0.036	0.039	0.029	0.023	0.021	0.017	0	0	0
459	5083	52	0	0.046	0.052	0.031	0.029	0.033	0.021	0	0	0
463	5201	63	0	0.045	0.036	0.028	0.020	0.018	0.017	0	0	0
514	5429	48	0	0.039	0.031	0.035	0.035	0.041	0.026	0.023	0.021	0
440	5600	56	0	0.035	0.025	0.035	0.029	0.035	0.028	0.029	0.026	0
2168	4922	40	0	0.033	0.026	0.018	0.023	0.025	0.023	0.022	0.022	0
Ave.	5136		0	0.048	0.035	0.026	0.022	0.020	0.016	0.008	0.007	0

[a]Single injection

The response of the individual cows to the administration of penicillin, as shown by the concentration of this drug in the milk, varied considerably. The milk from 7 of 12 cows of this series was free from penicillin 36 hours after the last injection, whereas the milk from the 5 remaining cows required 60 hours to reach this stage. On an average basis the antibiotic could be detected in the milk 48 hours after the last injection.

Maximum concentrations of penicillin occurred in the milk from the cows of this series as follows: three, after the first injection; seven, after the second injection; and two, after the third injection.

The highest concentration of penicillin, 0.52 units per milliliter, occurred in the milk from cow 455, 12 hours after the initial injection. This was much higher than observed in the milk from any other animal. Penicillin concentrations that followed the second and third injections were relatively low, 0.086 and 0.08 units respectively.

The next higher concentration of penicillin, 0.33 units per milliliter, occurred in the milk from cow 2208 following the second injection. The penicillin curve of the milk from this animal declined rather than increased following the third injection.

The penicillin concentrations of the milk from cows 2162, 461 and 437 were relatively low throughout the period of observation. Maximum concentrations observed were 0.115, 0.013 and 0.095 units per milliliter respectively.

The Food and Drug Administration method of Arret and Kirschbaum (*1*) would have detected penicillin in the milk from the individual cows of this series most of the time during the period of observation. However, with only a few cows undergoing treatment within a herd, the influence of dilution would greatly increase the probability of negative tests on composite samples, such as farm tank samples.

To meet a zero tolerance for penicillin the results of this study indicate a withholding period of at least 60 hours following the last treatment when procaine penicillin G, aqueous suspension is administered intramuscularly at the level of 5000 u/lb. of body weight.

Data in Table 2 and Figure 2 show penicillin levels in the milk from the 12 cows that received the oil base type of procaine penicillin G.

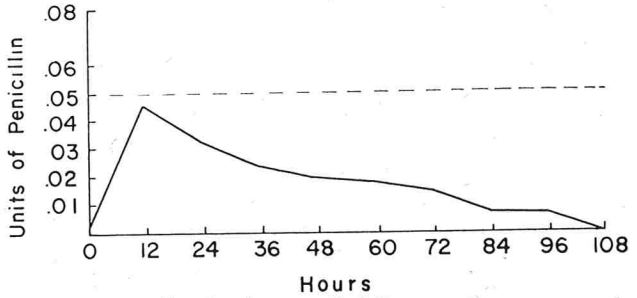

Figure 2. Penicillin levels in milk following the intramuscular injection of procaine penicillin G in oil with aluminum monostearate. Single injection of approximately 5000 u/lb. of body weight. Average of 12 cows.

The highest average level of 0.048 units of penicillin per ml. of milk was observed twelve hours after the injection of the antibiotic. This concentration gradually declined and penicillin was not detectable at the 108-hour period. The cows varied in their response to the drug. However, most penicillin levels of the milk were of the same general pattern, with a maximum concentration in 12 hours followed by a steady decline up to 84 to 96 hours. Variations in concentrations and duration of time that penicillin was present occurred in the milk from the respective cows of this series.

The penicillin concentration of the milk from cow 460 was very low at all times, and it persisted in the milk for only 36 hours. This cow was the heaviest producing cow of the series, with a daily average of 65 pounds during the observation period. Cows 429 and 463 produced almost as much milk, 63 pounds each. The milk from these animals, however, retained measurable amounts of penicillin for a period of 72 hours.

Cow 459 served as a test animal twice in this series, immediately after freshening and again 4 weeks later. Penicillin persisted in the milk of the first trial up to 96 hours as compared with 72 hours for the second trial.

The greatest concentration of penicillin was found in the milk from cow 309. However, measurable amounts of penicillin were not present after 48 hours. The milk production level of this cow was low, only ten pounds per day.

The penicillin concentration of the milk from cows 514, 440 and 2168 remained at rather constant levels up to 96 hours after the injection. Then it dropped to negative values.

Only 4 of 12 cows of this series produced milk in which the penicillin content was high enough to be detected by use of the F.D.A. 2-1/2 hour test. However, in order to meet a zero tolerance for penicillin in the milk from individual cows the results of this study indicate a withholding period of at least 108 hours following the intramuscular injection of procaine penicillin G, oil base with aluminum monostearate.

Figure 3, constructed from the data of Hollister *et al.* (7) illustrates the average penicillin curve in the milk from a series of cows, each of which was given a single intramuscular inejction of benzathine penicillin V at the rate of 6,000,000 units. Average penicillin levels at all observation periods were too low for detection with the Food and Drug Administration 2-1/2 hour method (*1*). This is the penicillin preparation for which the Food and Drug Administration (*4*) has designated a 7-day withholding period of the milk following the intramuscular injection of the antibiotic.

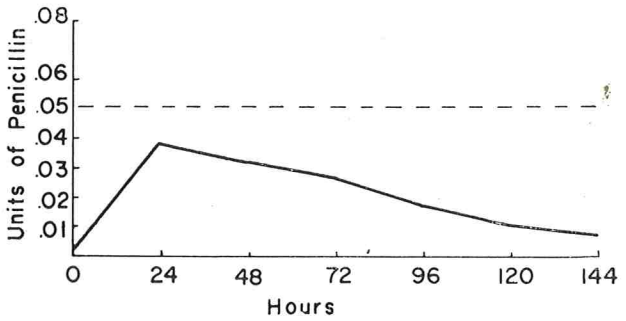

Figure 3. Penicillin levels in milk following the intramuscular injection of benzathine penicillin V. Single injection of 6,000,000 u/cow. Average of 6 cows. From data of Hollister *et al.* (7).

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VISUAL ACUITY OF LABORATORY WORKERS – A PREREQUISITE TO ACCURACY IN COUNTING[1]

MORRIS C. MATT

Abbotts Dairies, Inc., Philadelphia, Pennsylvania

Eyes are among the most delicate and important parts of the human body. They are used daily for a thousand and one seeing tasks. With the new concept of "eyes right for the job," the old standard of "good eyes" or "poor eyes" does not apply. Some jobs require exacting vision at close range; in others, color discrimination is important. In many occupations, inadequate depth perception is a hindrance to work. Of all the human skills that the individual brings to his work station, the only skill that can be improved quickly and easily, if it is found to be deficient, is his vision.

The routine of a bacteriological laboratory, especially of those tests relating to colony counts by the standard plate methods, microscopic examinations, etc., requires good vision on the part of laboratory workers. Dr. Albert C. Snell (*1*) described good vision as "that degree of visual functional ability which is adequate to perform the visual task presented."

Standard Methods for the Examination of Dairy Products (*2*) states that laboratory workers assigned to counting bacteria by the standard plate method should avoid inaccurate counting due to carelessness, impaired vision, or failure to recognize colonies. Technicians who cannot duplicate their own counts on the same petri plate within 5%, and those of other technicians within 10%, should discover the cause(s) and correct such disagreements.

The purpose of this paper is twofold. One is to bring to the attention of the personnel director, or that person charged with hiring laboratory workers, the importance of including, in addition to a general evaluation of the applicant's aptitudes, also his visual skills (performance). The other purpose—an equally important one—is to remind the laboratory director to check periodically the visual performance of those workers already employed, and to apply corrective measures whenever indicated.

Very few eyes without correction, either of their inherent defects or of those acquired with advancing years, are able to function at their maximum potential efficiency and with comfort at all epochs of life. In studies made by the United States Public Health Service covering nearly one million persons, it was revealed that up to age 20, 23% of the population had defective vision; up to age 40, the percentage reached 48%; up to age 60, the percentage reached 82%; and over age 60, the percentage reached 95%. Thus, whenever a program is planned for checking visual performance of laboratory workers, it is quite obvious that the director of the laboratory, or that person assigned to the task, should periodically check *his own* visual skills, especially if he sets himself up as the "standard for comparison" in such a program.

IMPORTANCE OF CHECKING VISUAL ACUITY OF LABORATORY WORKERS

Let us return to the first purpose of this paper, namely, the importance of thoroughly checking visual acuity of applicants for laboratory work, whose duties may include bacteria counting. A review of literature relating to industrial vision-testing programs (*3*) reveals that many industries have long recognized that adequate visual requirements are related to job performance. Recognition of the critical role of vision led management to seek some means of determining the adequacy of an employee's vision for the job demands. It became apparent that the traditional wall chart was of but limited value as a measure of the essential skills—limited not only in accuracy but also in comprehensiveness. Accurate recordings of visual acuity are practically impossible because of the difficulty in controlling factors such as lighting, memorizing, clever cheating, etc. At best the wall chart measures only a few of the requisite visual skills, giving no indication of *near acuity*, which is of basic importance in many industrial jobs. (This is certainly true in the bacteriological laboratory, making agar plate counts, microscopic counts, etc.).

Just as modern production accuracies necessitate the use of fine measuring devices, such as micrometers, so the measurement of visual performance requires a scientifically accurate visual testing instrument. The search for more adequate techniques for measuring visual skills has resulted in the adoption of mass testing by instrumentation, which includes other necessary tests, in addition to a more exact visual acuity determination. Actually, twelve tests of visual functions were found to be important in industrial work.

The tests fall under four basic classifications:

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[1]Presented before the Laboratory Section of the American Public Health Association, at the 87th Annual Meeting in Atlantic City, Wednesday, October 21, 1959.

1. *Phoria*—Vertical and lateral, at two distances—13 inches and 20 feet—four tests. The phoria or muscle balance tests show the relative posture of the eyes in relation to each other—binocularly—under conditions of controlled accommodation. The importance of the phoria tests is in identifying individuals who are likely to tire easily.

2. *Acuity*—Both eyes, right and left, at both testing distances —six tests. The acuity test measures fineness of visual discrimination, *in terms of true retinal resolution, not ability to read letters.*

3. *Stereopsis*—At distance only—one test. The purpose of this test is twofold: first as a measure of binocular poise, and second as a measure of one of the important factors of *depth perception.* It permits the identification of individuals with superior stereopsis, as well as those who score *average* or *below average.*

4. *Color Test*—At distance only—one test. The color test is a quick, reliable method of identifying persons with color weakness in three general classifications. The test is very effective and easy to administer.

Although not diagnostic, in the clinical sense, these tests do identify employees whose visual skills are inadequate for the job. Once identified, these individuals are referred to local eye specialists for professional examination to determine the causes of the condition and to prescribe correction or treatment, *if possible.* (A definite proportion of eyes cannot be made to function on a standard of high efficiency by any correction, aid, or treatment. Many persons with such eyes are congenitally defective in one or possibly in both eyes. An example is Amblyopia, a dimness of vision without detectable organic lesion of the eye. There is no known cure or correction. There are said to be over half a million persons in this country with this defect.)

A program utilizing a systematic evaluation of an applicant's or an employee's visual skills has proven itself beneficial to both management and employees. It is effective not only in the rehabilitation and conservation of eyesight, but also in revealing unusual visual qualifications. Proper placement of new employees has resulted in reduced training time and better job performance. A valuable by-product has been a generally increased awareness of visual problems. The benefits to employees included reduction in eye fatigue, improved health, better morale, and greater job satisfaction.

The *relatively few* dairy scientists who have made statistical comparisons of methods for determining the bacteria count of milk and milk products were definitely aware of the *personal equation of the operator* and emphasized, in their studies, the importance of laboratory workers to duplicate more closely their own results as well as the results of others, on the same or on duplicate samples under test.

Conversation with a large number of laboratory directors and dairy bacteriologists revealed that while many were aware of the reference in Standard Methods to accuracy in counting, many others did not recall the references, *per se,* or the details thereof; others admitted that while they recalled the reference, they did not treat it perhaps as seriously as they should. Others assumed that an operator who has been engaged in making plate counts over a long period of time (years), does—or should do—a satisfactory job; certainly there should be no need questioning that operator. It was further revealed that many laboratory directors failed to check *their own* efficiency at counting.

In a recent check of the visual performance of a number of technicians in his several laboratories, the author recognized the need for corrective measures for some of the workers under test. Strangely enough several of those with poor visual performance had their glasses corrected only a short time prior to these tests—yet there was no material improvement in counting. It soon became apparent that those workers whose visual performance was not improved, even with glasses or a correction of the latter, would have to be given other assignments, with emphasis on manual rather than on optical duties; or else, some kind of a "crutch," perhaps a change or modification of the counting devices presently in use, might help these "problem" operators. Aware of the importance of maintaining proper morale among our laboratory workers, it was considered more expedient, for the time being, to find that "crutch" rather than give new assignments.

RESULTS FROM TESTING PERSONNEL

Pursuing further the second purpose of this paper, namely checking the visual acuity of laboratory workers and applying corrective measures when indicated, the author undertook a more comprehensive study of visual performance. Taking a cue from other industries and with the assistance of the Bausch and Lomb Optical Company, the group of laboratory workers were again checked for visual skills, this time using the Ortho-rater[2], an instrument of the type referred to earlier in this paper. The workers under test were classified as (*a*) those able to count colonies within the range stipulated in Standard Methods and (*b*) those whose performance was borderline or fell below the satisfactory range. The Ortho-ratings were analyzed and compared with the quality of visual counting performances. All colony counts were made with the Quebec Counter, Dark-field Model (American Optical Company). Fastened to the in-

[2]An instrument of the same general principle, called the Sight Screener, is available from the American Optical Company.

strument was a Veeder tally counter, hand operated.

Eleven persons were given the instrument tests. Six showed satisfactory performance, *viz.* "within the standards set for the job." And yet, for three of the six workers, the Ortho-rater indicated slight muscle weakness in one or both eyes. While these same three workers had been giving satisfactory performance in counting, nevertheless the very indication of muscle weakness should be a warning that (*a*) the operator's efficiency is apt to drop at some time in the future, and (*b*) a visit to the eye doctor is advisable.

Of the other five Ortho-rated, two wore trifocals. At times these two showed borderline counting, and at other times their performance dropped below the desired range. It was concluded that such vacillating could result from a subconscious or deliberate shifting of the eyes above or below the trifocal and/or bifocal segments of the lens during the counting procedure. It is definitely advisable that such operators obtain a pair of reading glasses for counting, and for close work in general. Reading glasses utilize, as a rule, only the prescription of the bifocal segment of the original glasses.

Of the remaining three workers, two gave borderline performance in counting at times, while at other times the performance was well within the desired range. Ortho-rating, however, revealed several weaknesses. In discussing the instrument ratings with these two workers, it was revealed that while both had glasses, they had taken the test without wearing them. Actually, one had left the glasses at home, while the other had them in her purse, remarking that she wore them only when she had headaches. The test was promptly repeated for this worker, with her glasses. This time her performance was markedly improved. Both workers were then told to *always* wear their glasses when making bacteria counts.

The eleventh person is a very able research chemist. However, he is highly Myopic (nearsighted). While his activities very seldom include bacteria counting, he asked to be included in the Ortho-ratings. His rating proved very poor in those visual skills pertinent to the job of bacteria counting.

While these are the author's first experiences at Ortho-rating laboratory workers for bacteriological routine, the value of this type instrument for checking visual skills has been well demonstrated.

CORRECTIVE MEASURES SUGGESTED

As mentioned earlier, it was thought that perhaps some change or changes in the design of the counting device(s) commonly used in the bacteriological laboratory might contribute some measure of correction, in improving or facilitating visual performance of the operator. Glare and fatigue were the common complaints from laboratory workers, usually after 45 to 60 minutes of continual counting. In many instances, accuracy in the counts dropped steadily after that period of time. Experiments with electric bulbs of various wattage and color, as well as with glass plates of different color, were part of a study to determine whether the efficiency of the counting device could be improved upon. Most promising thus far has been the use of a Wolffheugel plate of a special shade of blue, designated as Dr. Simon Gage's "day-light blue." This replaces the plain glass presently standard in the Quebec Colony Counter. Used with the blue plate is a *75-watt white bulb*, replacing the 50-watt bulb in the standard equipment. The changes appear to give greater contrast between colonies and background; also reduces glare and fatigue. These improvements effect greater accuracy in counting.

The author was further encouraged in this study, especially in his choice of the *blue* plate, by the following quotation relative to color therapy (*4*):

"Color Therapy may become an important and useful addition in treating anxiety states, depression, hypertension, and nervous tension. Results from an 18-month study indicate that blue may act as a relaxant and tranquilizer for anxious, tense persons, while red tends to disturb them. Blood pressure, respiration rate, number of eyeblinks, and muscle tension were significantly lower during blue rather than red illumination. Blue colors also brought significantly less arousal of the brain as measured by electroencephalograms. The studies were conducted on normal persons, and future research is being expanded to patients, including those in mental hospitals, reports Dr. Robert Gerard, Clinical Psychologist, Veterans' Administration Center, Los Angeles."

The special blue glass was obtained by the author, on specification, from a Philadelphia firm and ruled by the American Optical Company and cut to fit their Quebec Colony Counter. The special plates were then installed in several of the counting machines. The laboratory workers were then asked to make colony counts using the modified counter and then read the same plates with the standard instrument. Almost without exception, the operators remarked that the blue plate was much easier on the eyes; and they could count for a longer period of time with less fatigue. But more importantly, it was soon observed in the case of some of the workers, a pattern of higher counts was obtained when readings were made with the blue plate.

Realizing by now the potentials of the new plate and desiring confirmation from other workers in the field, the author had several more of the special plates requisitioned and distributed to other laboratory directors who expressed a willingness to collaborate in the study. The reports thus far are very grat-

ifying in that they confirm the observations made by the author.

In the course of this study with the Quebec Counters, several interesting, and novel, comments and suggestions were made by the collaborators as well as by the author. Following are a few that might have genuine merit:

1. A 75-watt bulb does increase further the benefits of the blue Wolffheugel plate.

2. Rulings on the standard as well as on the special blue plate are too wide, tending to conceal small colonies. Narrower lines are desirable for greater accuracy.

3. Reversing the present plates reveals some of the colonies concealed by the wide rulings referred to in 2.

4. To help synchronize the Veeder tally counter with the visual count, silently count in the cadence "1, 2, 3, 4, 5" and stop momentarily with the eye as well as with the hand. This brief pause prevents one count from running ahead of the other, and thereby reduces the chance for an erroneous count.

5. Of several suggestions offered to facilitate counting, the following is an interesting one and is worth trying. The eye starts scanning at the very top of the petri dish; the reading is from the extreme left to the extreme right, taking one horizontal sector at a time, with the synchronized cadence of eye and hand counter as described in 4. In the trek across the plate, however, the eye moves in an up and down path between the upper and lower boundaries of the horizontal sector. This procedure is said to have the effect of placing a barrier between colonies already counted and those yet to be counted.

6. Beginners in colony counting or those who find it difficult to (*a*) recognize the very small or so-called "pin-point" colonies or (*b*) to distinguish them from debris, are advised to encircle several of the questionable spots with a yellow or red glass-marking crayon and return the covered petri dish for 24 to 48 additional hours of incubation. If the encircled objects are true colonies, the prolonged incubation usually increases their diameter to the extent that they can now be recognized as such. A few such trials are usually sufficient to accomplish the purpose.

7. A very valuable aid for checking the accuracy of colony counts (whether made by the director or the laboratory worker) would be a glass or plastic standard. This could be in the form of a petri dish made entirely of glass or plastic with simulated light amber medium (agar). Embedded in the agar, and distributed at several levels, would be a number of simulated colonies (perhaps 150 to 200) varying in size from pin-point to pin-head. Accompanying each standard dish would be a factory certificate indicating the total number of colonies present.

SUMMARY

Standard Methods for the Examination of Dairy Products establishes a standard for accuracy in making bacteria counts. Visual acuity of the laboratory worker is a prerequisite to such accuracy.

Visual acuity entails good vision—that degree of visual functional ability which is adequate to perform the visual task presented.

All epochs of life being considered, most pairs of eyes, *unaided,* cannot function at their best. While many inherent imperfections of vision can be overcome with proper correction and suitable training, yet a definite proportion of eyes cannot be made to function on a standard of high efficiency by any correction, aid, or treatment.

The desire of some directors to teach workers all the jobs in the laboratory, for the obvious reasoning of making them more useful, could meet with disappointment should any of the workers lack the visual skills required for a particular job.

The personnel director, or that person charged with hiring laboratory workers, should include in addition to a general evaluation of the applicant's aptitudes, also his visual skills. Visual testing programs have already been established in many industries. It is quite evident that a machine test of visual skills can be used to predict clinical factors with a fair degree of accuracy and consistency.

The laboratory director must check *periodically* the visual performance of all workers, as well as his own, and apply corrective measures whenever indicated. Those operators who do not have visual acuity adequate for the task presented, should be given other assignments. Continual counting by those qualified should be limited to definite periods of time, say 45 to 60 minutes, with a rest period between, to reduce the incidence of fatigue and resultant inaccuracies. Periodic rotation from optical to manual routine is also advisable.

A critical study of the design of counting devices presently in use is under way to determine whether proposed changes might contribute some measure of correction and enhance the visual performance of laboratory workers.

Novel, but worthwhile, suggestions for facilitating the counting technique in bacteriological laboratories have been presented—"with an eye toward better performance."

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REPORT OF THE PROCEEDINGS OF THE MASTITIS ACTION CONFERENCE

MORRISON HOTEL, CHICAGO, ILLINOIS, OCTOBER 29, 1960

ORIGIN OF THE CONFERENCE

The Mastitis Action Conference was developed as the result of consideration by the Executive Board of the International Association of Milk and Food Sanitarians. A number of problems have arisen dealing with policy in regulatory, as well as public health aspects of mastitis, that implied necessity of action. The problems may be cited, briefly, as follows:

(*a*) Regulatory definitions provide milk shall be procured from disease free animals; mastitis is a physiologic disorder transmissible from animal to animal, and potentially, to man. The incidence of mastitis is extremely high; strict enforcement of existing regulations would have drastic effect on available acceptable milk supplies. Unlike certain other diseases the causative agent of which is more specifically known and controlled, mastitis has multicharacter and form, and is less readily controlled.

(*b*) In more recent periods, it has become apparent mastitis has potential far reaching hazards of public health significance. It is apparent also that extensive use of antibiotics has not solved, though it may have affected the mastitis picture, and has created problems relative to acceptability of milk. The regulatory sanitarian has had congnizance too of the failure of existing procedures, whatever they may be, over a period of years to satisfactorily correct a problem of long standing.

In the light of these, and other factors, the Executive Board of the Association (IAMFS) after a series of meetings with interested individuals and organizations, decided more effective action on a collective basis was possible. Accordingly, it appointed, through its Committee on Farm Methods, an *ad hoc* Mastitis Action Committee, with representation of various disciplines and organizations, consisting of the following persons:

Dr. Ned Bayley—U. S. Department of Agriculture
Richard Burleson—U. S. Department of Agriculture
M. G. Van Buskirk—Dairy Trade Executives Association
R. H. Dastrup—Livestock Conservation, Inc.
Dr. A. C. Fay—Past President, American Dairy Science Association
Dr. J. C. Flake—Farm Methods Committee (IAMFS)
Donald Hirsch—American Farm Bureau Federation
Dr. R. G. Hodges—New York State Veterinary College
Richard Hoyt—National Milk Producers Federation
W. D. Knox—*Hoard's Dairyman*
Dr. C. A. Manthei—U. S. Department of Agriculture
Dr. Robert Metzger—Farm Methods Committee (IAMFS)
Dr. John Sheuring—University of Georgia
Ed Thom—Olsen Publications
Dr. K. G. Weckel—University of Wisconsin
George Willits—Johnson and Johnson

The Mastitis Action Committee held several meetings, and reached the conclusion that the problem of mastitis could best be evaluated by the meeting of several disciplines, including producers, processors, regulatory officials, extension workers, veterinarians, and research workers. Accordingly, a program was developed to establish the background of knowledge by people engaged in various disciplines within the dairy industry, and which was destined to serve as the basis of discussion for subsequent group task meetings.

The program as eventually developed was as follows:

MORNING SESSION *WHERE DO WE STAND?*

1. ORIGIN, PROCEDURE, OBJECTIVES OF THE CONFERENCE.
   General chairman, Dr. K. G. Weckel, University of Wisconsin.
2. KEYNOTE – MASTITIS – WHERE DO WE STAND – WHAT CAN WE DO?
   W. D. Knox, Editor, *Hoard's Dairyman.*
3. ECONOMIC EFFECTS OF THE DISEASE ON THE DAIRY FARMER.
   Dr. H. G. Hodges, Supervising Veterinarian, New York State Mastitis Control Program, Cornell University.
4. ECONOMIC EFFECTS OF THE DISEASE ON THE DAIRY PROCESSOR.
   Dr. A. C. Fay, North Miami, Florida.

5. BACTERIOLOGICAL ASPECTS OF THE DISEASE AS RELATED TO PUBLIC HEALTH.
   Dr. Elizabeth McCoy, Department of Bacteriology, University of Wisconsin.
6. EPIDEMIOLOGICAL ASPECTS OF THE DISEASE AS RELATED TO PUBLIC HEALTH.
   Dr. James H. Steele, Chief, Veterinary Public Health, Communicable Disease Center, P.H.S., Atlanta.
7. THE STATUS OF RESEARCH PROGRESS ON MASTITIS.
   Dr. James M. Murphy, School of Veterinary Medicine, University of Pennsylvania.
8. THE REQUIREMENTS OF AN EFFECTIVE ORGANIZED MASTITIS CONTROL PROGRAM.
   Dr. W. A. Hagan, Director, National Animal Disease Laboratory, U. S. Dept. of Agriculture, Ames, Iowa.
9. HOW THE PRACTICING VETERINARIAN CAN HELP DAIRY FARMERS CONTROL MASTITIS.
   Dr. C. J. Haller, Veterinary Practitioner, Avon, New York.
10. THE REGULATORY AGENCIES PROBLEMS IN MASTITIS CONTROL.
    Paul Corash, Chief, Milk Division, Bureau Food and Drugs, City of New York.

AFTERNOON SESSION *WHAT CAN WE DO!*

TASK GROUP MEETINGS

General Chairman, Dr. James Hay, American Veterinary Medical Association, Chicago.

Group 1. *Research Needs.* To State the Major Needs Related to Mastitis and its Control.
Chairman, Dr. C. A. Manthei, Animal Disease and Parasite Research Division, U. S. Department of Agriculture, Washington, D. C.
Secretary, Dr. Keith I. Loken, Dept. of Veterinary Bacteriology & Public Health, College of Veterinary Medicine, University of Minnesota, St. Paul.

Group 2. *Education in Mastitis Control.* To develop a plan for organized national effort on education for mastitis control.
Chairman, Dr. James Crowley, Department of Dairy Husbandry, University of Wisconsin, Madison.
Secretary, Dr. O. W. Schalm, Dept. of Veterinary Medicine, University of California, Davis.

Group 3. *Regulatory Aspects of Mastitis.* To decide on need and direction of regulatory action in mastitis control.
Chairman, James A. Meany, Chief of Dairy Inspection, Chicago Board of Health, Chicago.
Secretary, Harold Barnum, Chief, Dairy Division, Bureau of Health and Hospitals, Denver, Colorado.

Group 4. *Organization of National Effort Toward Mastitis Control.* To develop Plans for a continuing organization to foster national effort in mastitis control.
Chairman, Dr. Robert Metzger, *Chairman,* Farm Methods Committee, International Association of Milk & Food Sanitarians; Dairymen's League Cooperative Association, Syracuse, New York.
Secretary, Dr. J. C. Flake, Farm Methods Committee, I.A.M.F.S., Chicago.

Group 5. *Organization Support for Mastitis Control.* To develop plans for obtaining support and participation of dairymen, farm organizations, industry groups, and government agencies in a national effort.
Chairman, George Willits, Johnson & Johnson, Chicago.
Secretary, Ed Thom, Olsen Publications, Milwaukee.

Business Meeting. Reports of Task Groups — Action on Recommendations.
Chairman, Dr. Robert Metzger
Secretary, Dr. Ned Bayley
Adjournment.

The Conference was attended by approximately 225 persons representing research, regulatory, publications, educational, producer and processor groups. The participation in the task groups was essentially evenly distributed, and the discussions in each case were forthright and incisive.

The minutes of the business meeting of the Mastitis Action Conference are as follows:

MINUTES OF BUSINESS MEETING OF
MASTITIS ACTION CONFERENCE
Morrison Hotel, October 29, 1960

The purpose of this meeting was to hear and take action on the reports of the five task groups. Dr. Robert Metzger, Chairman of the Farm Methods Committee, International Association of Milk & Food Sanitarians, Inc. presided.

Dr. J. C. Flake presented the report of Task Group 4, Organization of National Effort Toward Mastitis Control. He moved that this report be adopted. The motion was passed.

Mr. Ed Thom presented the report of Task Group 5, Organization Support for Mastitis Control, and moved adoption of the report. The motion was carried.

Dr. C. A. Manthei read the report of Task Group 1, Research Needs, and moved that the report be adopted. The motion was carried.

Dr. O. W. Schalm read the report of Task Group 2, Education in Mastitis Control. He made a motion that the report be adopted. The motion was passed.

Mr. James A. Meany presented the report of Task Group 3, Regulatory Aspects of Mastitis. He moved that the report be adopted. The motion was passed.

Dr. John Sheuring asked if participants in the conference would receive proceedings of the meetings. Mr. George Willits replied that copies of the Proceedings would be mailed as soon as they were compiled, to all registered participants. Additional copies would be available at $10.00 each to all interested persons.

Dr. K. G. Weckel asked what action was planned to initiate the organization. Dr. Metzger replied that, as Chairman of the Farm Methods Committee, IAMFS, he would in the very near future call an organization meeting of the National Committee for Mastitis Action by contacting the agencies mentioned in the report of Task Group 4. He stated that the Farm Methods Committee would relinquish its organizational functions as soon as the National Committee for Mastitis Action was formed. IAMFS would then participate with the same status as other agencies which become members of the National Committee.

Dr. Weckel asked that the following acknowledgement be included in the minutes of the meeting:

The Mastitis Action Conference wishes to acknowledge the very gracious and helpful assistance of certain individuals and organizations in conducting the meeting of the conference. The Conference thanks Mr. Henry Ellsworth, the Lazarus

Company, for his handling of the arrangements and facilities at the hotel before and during the meeting; Mr. George Willits and Johnson & Johnson for the preparation and mailing of the programs and proceedings of the Conference; and Mr. M. G. Van Buskirk and the Illinois Dairy Products Association for handling the Conference reservations and funds.

DR. N. D. BAYLEY, *Secretary*

TASK GROUP REPORTS

REPORT OF TASK GROUP 1 — RESEARCH NEEDS

Twenty-five years ago Munch-Petersen presented in his review on bovine mastitis the following points on which adequate and reliable data were required:

1. The normal udder and its secretion, including studies of cell content and flora. These studies will require normal herds under full control of the research workers.

2. The path or paths by which infection gains entrance to the udder. This point concerns transmission of udder infections.

3. Predisposing factors which may (*a*) render the udder more susceptible to infection, and (*b*) influence the course of infection once it is established. These include such factors as genetics, nutrition, milking procedures and equipment, temperature, etc.

4. Further studies of the causal organisms as (*a*) bacteria, (*b*) as pathogens, and (*c*) as antigens. Studies on the pathogenicity, immunogenicity, and public health aspects of bacteria, fungi, and viruses should be included.

5. The further evaluation of the various mastitis tests or groups of tests in the light of data forthcoming from a detailed study of normal udders.

6. Further large-scale and adequately controlled trials of preventive and curative measures.

In the last 25 years research has resulted in a method of control of *Streptococcus agalactiae* mastitis. This knowledge has not been fully exploited nor has its economic feasibility been determined. The introduction of antibiotics has resulted in the alleviation of clinical signs of mastitis; however the incidence of mastitis has not decreased.

The undertaking of the research needed for any type of control program will require far greater funds, facilities, and personnel than are employed at the present time. Assuming that $500 million is the annual loss resulting from bovine mastitis, it is not unreasonable to consider 1 percent of this loss or $5 million to be spent annually for research throughout the nation. However, these funds should be placed where the potential for progressive research exists and in individual amounts large enough to insure sound, controlled studies.

Last but not least, solution of the mastitis problem will require the team effort of Veterinary Medicine, Husbandry, Chemistry, Microbiology, Agriculture, Engineering, etc.

DR. C. A. MANTHEI, *Chairman*
DR. KEITH I. LOKEN, *Secretary*

REPORT OF TASK GROUP 2 — EDUCATION IN MASTITIS CONTROL

1. Information on "*what is known about mastitis* and *how to use this knowledge*" must be distributed to the grass roots; *the farmer-milker level.*

2. The material should be presented in language that will be understood by the farmer. Periodic distribution of useful knowledge in small doses on a national scale was suggested. It should be borne in mind that material that can be read between the mail box and the barn is most apt to be read.

3. Several good State programs may serve as a source of experience of the type of educational material that has stimulated greatest interest at farm level.

4. This group proposes that the National Committee on Mastitis Action appoint a sub-committee to develop basic subject matter that is not controversial for distribution on a National basis for use by all groups on State, county or local level desiring to educate the producer and develop mastitis control programs.

5. It is recommended that each State be encouraged by the National Committee on Mastitis Action to develop a State Mastitis Advisory Committee comprised of representatives of all groups interested in the dairy industry. A basic plan developed in Pennsylvania was looked upon with favor; groups mentioned specifically were:

Veterinary Medical Association.	Vocational Agricultural Teachers.
Dairymen's Association.	Agricultural Extension Service
Dairy Equipment Suppliers.	Veterinary Schools when Applicable.
Milk Dealer's Association.	State Farm Organizations.
Public Health.	Breed Associations.
Dairy Sanitarians.	

This group should develop a program suited to the special needs of the State and would make use of the basic educational material developed by the National Mastitis Action Sub-Committee.

6. Finally it is pointed out that we need to motivate the farmer to become interested in mastitis prevention by methods that influence his pocketbook.

Education can only be as good as the basic information supplied through controlled research. Therefore we encourage expanding controlled research activities throughout the Nation.

DR. JAMES CROWLEY, *Chairman*
DR. O. W. SCHALM, *Secretary*

REPORT OF TASK GROUP 3
REGULATORY ASPECTS OF MASTITIS

The Task Group had two objectives. The first was to determine if a need existed for mastitis control at the regulatory level. The Task Group was in unanimous agreement that there is a need for uniform regulatory action in mastitis control.

Our Task Group was then requested to indicate the direction of mastitis control.

The Task Group recommends:

1. That regulations be developed which will require that herds qualifying for the production of milk to be sold for human consumption shall be under an approved mastitis control program. In order to implement the development of this program the following are necessary:

   a. An effective test procedure to detect the presence of mastitic milk.
   b. Progressive compliance for the interpretation of these results.
   c. An effective regulatory program will require active industry participation.

3. This task group recommends that adequate educational material pertaining to physical facilities, proper herd management and veterinary services be made available.

4. This Task Group recognizes that the mastitis control program is both an economic and public health problem, therefore the State and Federal Bureaus of Animal Industry should participate.

JAMES A. MEANY, *Chairman*
HAROLD BARNUM, *Secretary*

REPORT OF TASK GROUP 4
ORGANIZATION OF NATIONAL EFFORT TOWARD MASTITIS CONTROL

This group recommends:

1. That a National Committee on Mastitis Action be established composed of from 1 to 3 representatives from a list of appropriate interested organizations.
2. The function of this Committee will be:
   a. To develop a continuing body to attack the problem of mastitis on a Nation-wide basis.
   b. To coordinate, advise and foster various efforts in the field of mastitis.
   c. To coordinate and promote research in mastitis.
   d. To promote educational programs on mastitis.
3. Membership in the National Committee on Mastitis Action will be open to official representatives of any appropriate organization interested in the program.
4. The Farm Methods Committee of International Association of Milk and Food Sanitarians will serve as an *ad hoc committee* to contact a preliminary group of appropriate organizations to get the initial organization started.
5. The National Committee on Mastitis Action will—
   a. Set up its own organization.
   b. Formulate its own plan and methods of action.
   c. Develop its own plan for financing.
6. The initial list of organizations to be contacted is as follows—with the understanding that the list is submitted merely as illustrative of the types of probable cooperating organizations and that it is not a limiting group.

American Dairy Science Association
American Farm Bureau Federation
American Veterinary Medical Association
Assoc. of State and Territorial Health Officers
Conference of State Secretaries
Dairy Industry Committee (or constituent associations)
Farm Methods Committee—IAMFS
Livestock Conservation, Inc.
National Association of State Departments of Agriculture
National Grange
National Milk Producers Federation
U. S. Department of Agriculture—FES, ARS, AMS.
Dept. of Health, Education and Welfare—PHS and FDA.
Farm Equipment Institute

DR. ROBERT METZGER, *Chairman*
DR. J. C. FLAKE, *Secretary*

REPORT OF TASK GROUP 5
ORGANIZATION SUPPORT FOR MASTITIC CONTROL

It was the unanimous recommendation of Task Group V that the Mastitis Action Program be a voluntary program to be financed by producer groups, processor groups, equipment and supply groups, and any other interested groups.

Representatives present at the Group V meeting of producer, processor, supply firms, and other interested groups, although not pledging their own organizations at this time, did express confidence of whole hearted support for raising from within the industry the funds necessary to get the program underway.

Group V representatives present further volunteered their services to work with the coordinating committee on the program adopted, and their work specifically on the details of fund raising for a continuing program.

GEORGE WILLITS, *Chairman*
ED THOM, *Secretary*

Copies of the proceedings of the Conference, including the papers presented at the Conference, and the minutes of the meeting of the Conference, are available at $10.00 per issue, and can be procured from the office of the Executive Secretary, International Association of Milk and Food Sanitarians, P. O. Box 437, Shelbyville, Indiana.

K. G. WECKEL, *General Chairman*
Mastitis Action Conference,
Mastitis Action Committee, IAMFS

DETERMINATION OF THE PROTEIN CONTENT OF MILK BY A MODIFICATION OF THE STEAM DISTILLATION METHOD OF KOFRANYI[1]

C. VANDERZANT, M. A. BROWN AND I. W. RUPEL

Texas Agricultural Experiment Station

College Station

A method is described for the determination of the protein content of milk by steam distillation following addition of NaOH and $BaCl_2$. Excellent agreement was obtained between the protein values as determined by this method and the Official Macro-Kjeldahl procedure.

In recent years increased interest has been shown in procedures suitable for the routine determination of the solids-not-fat constituents of milk. A rapid and simple method for the determination of the protein content of large numbers of milk samples would be useful in obtaining more extensive information on the influence of environmental and genetic factors on the composition of milk. According to Politiek (*3*) the protein level in milk is heritable with heritability estimates ranging from 0.70 to 0.75. He also reported that fat and protein content were to a high degree inherited independently of each other. Some of the methods that may be used for the routine determination of the protein content of milk are (*a*) direct steam-distillation, (*b*) dye-binding with dyes such as Orange G or Buffalo Black and (*c*) formol titration.

In 1950 Kofranyi (*2*) reported on a direct steam distillation method for the determination of the protein content of milk. In this method a sample of milk made strongly alkaline with NaOH is submitted directly without previous digestion, to steam distillation in a Parnas-Wagner micro-nitrogen distillation apparatus. The experimental conditions were arranged such that a consistent amount (approx. 11%) of protein nitrogen was released. This nitrogen is mainly amide-nitrogen and a small amount is derived from alkaline hydrolysis of certain amino acids. The ammonia was received in 0.025 *N* H_2SO_4 and the excess standard acid was determined by titration with 0.025 *N* NaOH with a mixed indicator (methylene blue-methyl red). A factor then was used to convert the amount of standard acid into terms of total protein. This factor was established by comparing the results (ml. standard acid) obtained with the Kofranyi method with those (% protein) obtained on the same samples with the Kjeldahl procedure. Preliminary data on modified Kofranyi steam-distillation techniques applicable for large scale determinations of the total protein content of milk were reported independently by Vanderzant *et al.* (*5*) and Stone *et al.* (*4*). The present paper describes a modification of the Kofranyi technique which yielded the same precision as the Official Macro-Kjeldahl procedure.

EXPERIMENTAL METHODS

Milk samples were obtained from (*a*) individual Holstein and Jersey cows in the herd of the Dairy Science Department at Texas A and M College, and (*b*) mixed herd milks from individual producers in Brazos County. The samples represented two complete milkings from animals in good health. The samples were collected in half-pint glass bottles, placed in an ice chest, transported to the laboratory and were stored in a refrigerator at 40° to 45°F. The protein contents of these samples were determined within two to three days.

Procedure

The milk samples were placed in a waterbath and warmed to 70°F. Each sample then was mixed thoroughly to mix the cream and the serum portion of the milk. To 10 g. of milk delivered with a special pipette into a 250-ml. Soxhlet extraction flask were added 10 ml. of a 10 *N* NaOH solution and 10 ml. of a 10% $BaCl_2$ solution with automatic burettes. This mixture then was steam distilled for 9 minutes. The 9-minute distillation period was started as soon as the first drop of distillate turned the color of the indicator from purple to green. The released ammonia was received in a 250-ml. beaker containing 20 ml. of a 3% boric acid solution to which 5 drops of a mixed indicator were added. This indicator consisted of a mixture of 0.026% ethanolic methyl red and 0.013% ethanolic methylene blue. The amount of nitrogen released was determined by titration with 0.05 *N* HCL. A conversion factor then was used to convert milliliters of 0.05 *N* HCL into percent protein.

The apparatus (Figure 1) consisted of a steam generator (A), steam trap (B), 2 Kjeldahl connecting bulbs (D) and 2 Liebig condensers (E, length 300 mm., jacket 35 mm., tube 12 mm.). The steam gen-

[1]Journal Paper No. 3607 of the Texas Agricultural Experiment Station, College Station.

TABLE 1 — COMPARISON OF MILK PROTEIN VALUES AS DETERMINED BY THE MACRO-KJELDAHL AND STEAM-DISTILLATION METHODS

Breed	No. of samples	Kjeldahl protein mean	Steam-dist. protein mean	Conversion factor		Correlation coef.
				Range	Mean	
Holstein	35	3.18	3.19	.382-.410	.395	.99
Jersey	35	3.92	3.93	.382-.406	.395	.98
Mixed Herd	20	3.18	3.19	.383-.410	.393	.97
Total	90	3.47	3.48	.382-.410	.394	.99

erator consisted of a 2-liter resin flask and was electrically heated. The heat was controlled by a variable autotransformer which was kept at a certain setting. Approximately one liter of distilled water was kept in the steam generator. The steam generator was also connected with a supply of distilled water for the purpose of adjusting the water level after each run. In this arrangement each steam generator supplied steam through one steam trap to two extraction flasks (C). Two distillation units were available so that four single determinations or two in duplicate could be run by one technician. Kjeldahl determinations were made according to the Official Macro Kjeldahl Method (*1*).

RESULTS AND DISCUSSIONS

In Figure 2 are presented data on the amount of ammonia (expressed as ml. 0.05 *N* HCL) distilled over at various times of steam-distillation. Other milk samples showed a similar pattern. After 9 minutes of steam distillation very little additional nitrogen was released.

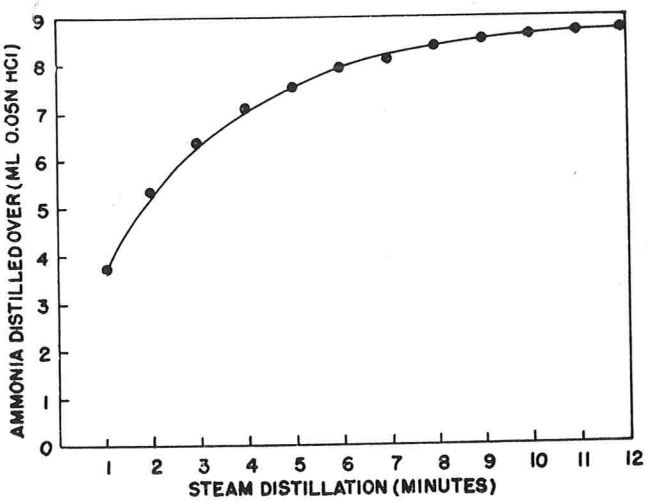

Figure 2. Amount of nitrogen released at various lengths of the steam-distillation period.

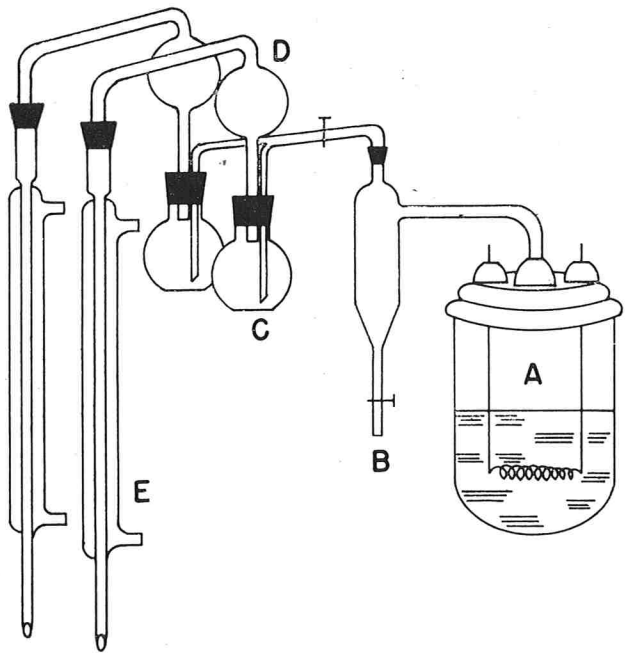

Figure 1. Steam distillation apparatus

The amount of Kjeldahl protein nitrogen and steam distilled nitrogen was determined in duplicate on a total of 90 samples of raw milk (Table 1). An analysis of the data indicates that the steam distillation method of determining protein in milk is as accurate as the macro-Kjeldahl method. The amount of steam distilled N expressed as percent of total protein N in the 90 samples ranged from 10.89 to 11.69 percent, with a mean value of 11.33 percent. The conversion factors were established by dividing the Kjeldahl protein values by the ml. of standard (0.05 *N*) acid used in titrating the steam-distilled N. The steam-distillation protein values were obtained by multiplying the ml. of standard acid used by 0.394.

A comparison of the steam distillation and Kjeldahl protein values of each of the 90 samples showed that these values differed by more than 0.1% (0.11% and 0.13%) in only two of these samples. In six samples the steam distillation protein values differed by 0.1% from the Kjeldahl protein values. In subsequent experiments, milk samples were stored at 40° to 45°F. for 7 days prior to testing with and without preservative. A commercial preparation of bichromate in

tablet form was used as preservative. Samples were withdrawn daily for protein determinations by the steam distillation method. Very little if any difference was found in the protein values of the samples stored for different periods (up to 7 days) at 40° to 45°F. with or without preservative. The data reported in the present study and those of Stone *et al.* (*4*) indicate that the steam distillation method can be used successfully to determine the protein content of milk. The average amount of steam distilled N expressed as percent of total protein N reported by Stone *et al.* (*4*) was 11.88 percent and slightly higher than the value reported in this study (11.33%). On the basis of the same standard acid (0.05 *N*) the conversion factors reported by Kofranyi (*2*), Stone *et al.* (*4*) and in this study would have been 0.382, 0.367, and 0.394 respectively. The small differences in these values can be explained by minor differences in the distillation procedure (equipment, distillation time etc.). However, they all reported excellent agreement between the protein values obtained with the two methods.

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COMMITTEES OF THE INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, INC., FOR 1961

COMMITTEE ON APPLIED LABORATORY METHODS

Objectives

To study new laboratory procedures and bacteriological problems to evaluate both published and unpublished data, and to present conclusions which will be helpful to the sanitarian in the conduct of his work.

Members

O. W. Kaufman, *Chairman,* Dept. of Microbiology and Public Health, Michigan State University, East Lansing, Michigan.

Dr. F. W. Barber, National Dairy Res. Labs., Inc., Oakdale, Long Island, N. Y.

B. M. Barney, Midwest Dairy Products Corp., 1681 University Ave., Memphis, Tennessee.

Dr. W. E. Glenn, Dairy Section, U. of Kentucky, Lexington, Kentucky.

Dr. J. J. Jezeski, Dept. of Dairy Industries, U. of Minnesota, St. Paul, Minnesota.

Dr. O. W. Kaufman, Dept. of Bacteriology, Michigan State University, E. Lansing, Michigan.

Mrs. Harriet Kennedy, Evanston Health Dept., 1806 Maple Ave., Evanston, Illinois.

Dr. J. C. Olson, Jr., Dept. of Dairy Industries, University of Minnesota, St. Paul, Minnesota.

Dr. W. C. Lawton, Minneapolis, & St. Paul Quality Control Lab., 2274 Como Ave., St. Paul, Minnesota.

Dr. W. S. Mueller, Dept. of Dairying, U. of Massachusetts, Amherst, Massachusetts.

H. B. Richie, Swift & Co., Research Labs., Union Stock Yards, Chicago 9, Illinois.

Mrs. Gwen Stewart, Chico Dairy, 331 Beechurst Ave., Morgantown, W. Virginia.

Dr. Harry H. Weiser, Dept. of Bacteriology, Ohio State University, Columbus 10, Ohio.

Mrs. Betty Woods, Beatrice Foods Co., Decatur, Illinois.

Mike Purko, State Dept. of Agriculture, Laramie, Wyoming.

COMMITTEE ON BAKING INDUSTRY EQUIPMENT

Objectives

The objectives of this committee are to provide consultative assistance to the Baking Industry Sanitation Standards Committee in the development of standards for items in the Baking Industry.

Members

Vincent T. Foley, *Chairman,* Chief of Food, City Health Department, Kansas City 6, Missouri.

A. E. Abrahamson, Chief, Wholesale Division, City Health Dept., 125 Worth St., New York 13, N. Y.

James H. Burrows, Health Officer, City Dept. of Health, Niles, Michigan.

W. R. McLean, Regional Director, U. S. Public Health Service, Dept. H.E.W., Region IV, 50 Seventh St., Atlanta 23, Georgia.

Louis W. Pickles, Director, Division of Sanitation, City Dept. of Health, Room 202, City Hall, Peoria, Illinois.

Armin A. Roth, Health Department Relations, Wyandotte Chemical Corp., Wyandotte, Michigan.

Louis A. King, Jr., Director, Department of Bakery Sanitation, American Institute of Baking, 400 E. Ontario St., Chicago 11, Illinois.

COMMITTEE ON COMMUNICABLE DISEASE AFFECTING MAN

Objectives

To study problems related to those diseases communicable to man through the consumption of foods, including milk and milk products, meat, poultry, and shellfish, and to recommend specific measures that can be taken by the sanitarian to control such diseases.

Members

John H. Fritz, *Chairman,* Sanitarian, Food Section, Milk and Food Program, Div. of Engr. Services, Room 4117, HEW Building South, Washington 25, D. C.

John Andrews, Chief, Sanitation Section, Sanitary Engr. Sec. State Board of Health, Raleigh, North Carolina.

Dr. H. L. Bryson, Director, Environmental Sanitation Div. Vancouver Health Department, 456 W. Broadway, Vancouver, British Columbia, Canada.

Dr. F. B. Clack, Chief, Milk and Food Division, Department of Health, County of Allegheny, 620 City-County Bldg., Pittsburgh 19, Pennsylvania.

Dr. Stanley L. Hendricks, Ass't Director, Preventable Disease Div., State Department of Health, State Office Bldg., Des Moines 19, Iowa.

Dr. Dwight D. Lickty, Public Health Veterinarian, Palm Beach Health Department, West Palm Beach, Florida.

Dr. E. R. Price, Director, Bureau of Veterinary Public Health, Missouri Dept. of Public Health & Welfare, State Office Building, Jefferson City, Missouri.

Mr. T. E. Sullivan, Director, Div. of Food and Drugs Indiana State Board of Health, 1330 W. Michigan St., Indianapolis, Indiana.

COMMITTEE ON DAIRY FARM METHODS

Objectives

To study dairy farm methods and procedures, to determine the sanitary problems involved, and to make recommendations for the solution of such sanitary problems, and for the improvement of dairy farm methods which have a relationship to the sanitary quality of milk.

Members

Dr. R. W. Metzger, *Chairman,* Director of Quality Control Dairymen's League Coop. Ass'n., Inc., 402 Park St., Syracuse 8, N. Y.

Mr. Chester F. Bletch, Maryland & Virginia Milk Prod. Ass'n., Inc., 1530 Wilson Blvd., Arlington 9, Virginia.

Dr. Max W. Decker, Veterinary Consultant Milk & Food Program, Public Health Service, Washington, D. C.

Mr. J. C. Flake, Sanitary Standards, Evaporated Milk Association, 228 N. LaSalle St., Chicago 1, Illinois.

Dr. Richard S. Guthrie, Veterinary-at-large, State Mastitis Control Program, Cornell University, Ithaca, N. Y.

Mr. Milton E. Held, Regional Milk and Food Consultant, Engineering Services, U. S. Public Health Service Dept. Health, Education & Welfare, 447 Federal Office Bldg., Civic Center, San Francisco 2, California.

Mr. M. W. Jefferson, Chief, Dairy Products, Sanitation Section, 1308 E. Franklin St., Richmond 19, Virginia.

Mr. Robert M. Keown, Milk Sanitarian, Inter-City Milk Control Council, Inc., Municipal Bldg., Elkhorn, Wisconsin.

Mr. Elmer Kihlstrum, Johnson & Johnson Filter Products Division, 4949 W. 65th St., Chicago 38, Illinois.

William Knutzen, 125 Ferry Terminal, Seattle, Washington.

Mr. R. P. March, Association Professor, Dairy Industry Dept., New York State College of Agriculture, Cornell University, Ithaca, N. Y.

Mr. Richard M. Martin, Sanitarian in Charge of Milk Sanitation, Ohio Department of Health, 306 Ohio Departments Bldg., Columbus 15, Ohio.

Mr. Mike O'Conner, Seattle-king County Milk Division, 425 South Garden, Bellingham, Washington.

Mr. Alexander A. Pais, Division of Food Control, State of Maryland Dept. of Health, 2411 N. Charles St., Baltimore 18, Maryland.

Mr. Russell R. Palmer, Head Health Inspector (Milk), Detroit Department of Health, Detroit 26, Michigan.

Mr. I. E. Parkin, Dairy Specialist, Div. of Agriculture Ext., College of Agriculture, The Pennsylvania State University, University Park, Pennsylvania.

Dr. R. M. Parry, Chief, Dairy Division, Dept. of Agriculture, State of Connecticut, Hartford 15, Connecticut.

Mr. A. K. Saunders, Manager, Farm Products Div.-The Diversey Corp., 1820 Roscoe St., Chicago 13, Illinois.

Mr. Alex G. Shaw, Director, Milk & Cream Division, State Dept. of Agriculture, P. O. Box 163, Gainesville, Florida.

Mr. Harry F. Stone, Milk Control Section, Dept. of Public Welfare, St. Louis 3, Missouri.

Mr. William Trobaugh, Milk Sanitation Section, City & County Dept. of Health & Hospitals, W. 6th Avenue & Cherokee St., Denver 4, Colorado.

COMMITTEE ON EDUCATIONAL AND PROFESSIONAL DEVELOPMENT

OBJECTIVES

First, to develop plans and to devise methods whereby the Sanitarian can more fully gain recognition as a professional worker in public health, and secondly, to recommend standards of education, training and experience designed to establish desirable professional qualifications to the end that the title Sanitarian will denote adequate preparation for professional work and attainment.

MEMBERS

W. Howard Brown, *Chairman*, Director, Food & Laboratory Div., Department of Public Health, 940 Main St., Jacksonville, Florida.

Russell B. Cunningham, Department of Public Health, La Porte, Indiana.

Garnet DeHart, State Health Dept., Atlanta, Georgia.

Karl K. Jones, Retail Food Section, Div. of Foods & Drugs, State Board of Health, 1330 W. Michigan St., Indianapolis, Indiana.

Gilbert L. Kelso, University of North Carolina, School of Public Health, Chapel Hill, North Carolina.

Dr. Samuel A. Lear, Associate Professor, Department of Dairy Industry, Agriculture Experiment Station, Rutgers University, Nichol Avenue, New Brunswick, New Jersey.

Richard Mansfield, 125 Woodmont Circle, Clinton, Tennessee.

Thomas McLaughlin, Manager, Institutions Division, Klenzade Products, Inc., P. O. Box 1020, Beloit, Wisconsin.

Dr. Sumner Morrison, Department of Pathology and Bacteriology, Colorado State University, Fort Collins, Colorado.

Guy P. Stephens, Supervisor of Dairying, State Dept. of Agriculture, Salt Lake City, Utah.

Raymond Summerlin, 3141 Toney Drive, Decatur, Georgia.

Haynes Wright, City Health Department, Bristol, Virginia.

John Faulkner, Ex-officio, U. S. Public Health Service, Washington, D. C.

Harold Adams, Ex-officio, U. of Indiana Medical School, Indianapolis, Indiana.

COMMITTEE ON FOOD EQUIPMENT

OBJECTIVES

To participate with other health organizations and industries in the formulation of sanitary standards for food equipment. Specifically, the functions of this committee include: (1) cooperation with other health agencies and industry, under the auspices of the National Sanitation Foundation, in the joint development of NSF Standards for Food Service Equipment; (2) when directed by the Executive Board, to cooperate with other health groups and industry in the development of sanitary standards for food equipment; and (3) to present to the membership at the annual meeting those standards which the Committee recommends be endorsed or approved by the Association.

MEMBERS

Karl K. Jones, *Chairman*, Chief of Retail Food Section, Division of Food & Drugs, Indiana State Board of Health, 1330 West Michigan St., Indianapolis 7, Indiana.

James W. Bell, National Canners Association, 133-20th St., N.W., Washington 6, D. C.

Col. F. H. Downs, Jr., 2802 South Colonial Drive, Montgomery 6, Alabama.

D. R. Gooden, LCDR, MSC, USN, Retired, Los Angeles Health Department, 111 East First St., Los Angeles 12, California.

Gene McElyea, Ass't. Chief of Food Section, Bureau of Food & Drugs, Missouri State Health Department, Jefferson City, Missouri.

J. Schoenberger, Supervisor of Equipment Section, City Department of Health, 125 Worth St., New York 13, N. Y.

Eaton E. Smith, Food Division, Department of Consumer Protection, Food and Drug Commission, State Office Bldg., Hartford 15, Connecticut.

James W. Smith, Tourist Establishment Sanitation, State Department of Health, Richmond 19, Virginia.

Jerome Trichter, Ass't. Commissioner, City Health Department, 125 Worth St., New York 13, N. Y.

James A. Westbrook, Milk and Food Consultant, Public Health Service, U. S. Dept. of Health, Education and Welfare, Region III, 700 East Jefferson St., Charlottesville, Virginia.

COMMITTEE ON FROZEN FOOD SANITATION

OBJECTIVES

To study conditions and practices within the frozen food industry, to determine the sanitary problems involved which might contribute to a public health hazard, and to make recommendations for the solution of such problems.

MEMBERS

Frank E. Fisher, *Chairman,* Division of Food and Drugs, Indiana State Board of Health, 1330 West Michigan St., Indianapolis, Indiana.

O. A. Ghiggoile, Bureau of Dairy Service, State Dept. of Agriculture, 1220 N St., Sacramento 14, California.

G. L. Hays, Bacteriological Group, American Can Company Central Division, 11th Ave., and St. Charles Road, Maywood, Illinois.

Wm. C. Miller, Jr., Milk and Food Program, Division of Sanitary Engineering Services, U. S. Public Health Service, Washington 25, D. C.

Eaton Smith, Connecticut State Health Department, Hartford 15, Connecticut.

Raymond Summerlin, 3141 Toney Drive Decatur, Georgia.

Dr. K. G. Weckel, Dept. of Dairy & Food Industries, University of Wisconsin, Madison 6, Wisconsin.

COMMITTEE ON MEMBERSHIP

OBJECTIVES

To make every effort to increase the membership of the organization by bringing to the attention of all qualified persons the advantages of belonging to the International Association of Milk and Food Sanitarians, Inc., and to interest State milk and food sanitarians' organizations in the advantages of affiliation with the Association.

MEMBERS

Harold Wainess, *Chairman,* Wainess and Associates, 510 N. Dearborn St., Chicago 10, Illinois.

D. C. Cleveland, Director, Sanitation Section, Oklahoma City-County Board of Health, 505 Municipal Bldg., Oklahoma City, Oklahoma.

Dr. L. K. Crowe, Professor, Dept. of Dairy Husbandry, University of Nebraska, College of Agriculture, Lincoln 3, Nebraska.

David E. Hartley, Public Health Counselor, NAMA, 1303 59th St., Downer's Grove, Illinois.

Dr. C. K. Johns, Officer-in-Charge, Dairy Technology Research Institute Canada Dept. of Agriculture, Ottawa, Ontario, Canada.

Howard H. Johnston, Division of Milk Sanitation, Bureau of Foods and Chemistry, State Dept. of Agriculture, Harrisburg, Pennsylvania.

Kenneth L. Pool, State Sanitation Supervisor, Engineering and Sanitation Section, Idaho Dept. of Health, Statehouse, Boise, Idaho.

L. O. Tucker, State Dept. of Health Smith Tower, Seattle 4, Washington.

COMMITTEE ON RECOGNITION AND AWARDS

OBJECTIVES

This committee is charged with the responsibility of implementing those objectives of the Association concerned with (1) recognition of individual milk and food sanitarians whose achievements have contributed greatly to the public health and welfare of their communities, and (2) recognition of those members of the Association who have, through distinguished service, contributed greatly to the professional advancement and growth and reputation of the International Association of Milk and Food Sanitarians, Inc.

The Committee receives and reviews nominations for the annual Sanitarian's Award, and has full responsibility for the selection of the recipient. The Committee also receives and reviews recommendations on candidates for the annual Citation Awards, and counsels with the Executive Board relative to the selection of the recipients. It is also responsible for handling all matters pertaining to the presentation of awards, publicity and other related items.

MEMBERS

Dr. Franklin Barber, Chairman, National Dairy Products Corporation, 260 Madison Avenue, New York City.

William V. Hickey, Paper Cup and Container Institute, 250 Park Ave., New York 17, N. Y.

Cameron S. Adams, State Department of Agriculture, Old Capital Building, Olympia, Washington.

Dr. Robert Holland, Department of Dairy Industry, Cornell University, Ithaca, N. Y.

Larry Gordon, Albuquerque Health Dept. Albuquerque, N. Mexico.

Faegen Parrish, State Health Dept., Atlanta, Georgia.

COMMITTEE ON ORDINANCES AND REGULATIONS PERTAINING TO MILK AND DAIRY PRODUCTS

OBJECTIVES

To review and study the provision of sanitary ordinances and regulations pertaining to milk, milk products, and frozen desserts, to evaluate data on research findings relative to the sanitary and public health significance of the specific requirements of ordinances and regulations, and to prepare for submission to the members of the Association recommendations for changes in existing ordinances and regulations.

MEMBERS

Donald H. Race, *Chairman,* Dairymen's League Cooperative Association, Inc., Quality Control, 402 Park St., Syracuse, N. Y.

Harold J. Barnum, Chief, Milk Sanitation Services, Dept. Health & Hospitals, City & County of Denver, 659 Cherokee St., Denver 4, Colorado.

C. V. Christiansen, Dir. of Laboratories, Bowman Dairy Co., 140 W. Ontario St., Chicago, Illinois.

J. C. Flake, Sanitary Standards, Evaporated Milk Ass'n., 228 N. LaSalle St., Chicago 1, Illinois.

A. B. Freeman, Milk & Food Consult., Public Health Service, U. S. Dept. of Health, Education and Welfare, Region II, 42 Broadway, New York 5, N. Y.

O. A. Ghiggoile, Bur. Dairy Service, State Dept. Agr. 1220 N St., Sacramento, California.

K. A. Harvey, Dist. Supvsg. Sanitarian, South Central District Health Dept., 309 Second Ave., East, Twin Falls, Idaho.

C. H. Holcombe, Agricultural Products Inspection, State Dept. Agriculture, 515 State Office Bldg., St. Paul, Minnesota.

Dr. Howard K. Johnston, Principal Sanitarian, Div. of Milk Sanitation, Bur. of Foods & Chemistry, Dept. of Agriculture Commonwealth of Pennsylvania, P. O. Box, Harrisburg, Penn.

Dr. R. M. Parry, Chief, Dairy Div., Dept. of Agriculture, State of Connecticut, Hartford 15, Connecticut.

Livingston Jennings, National Dairy Products Corp., 260 Madison Ave., New York 16, N. Y.

Ed. Small, Standardization & Program Development Br., Agriculture Marketing Service, U. S. Dept. of Agriculture, Washington 25, D. C.

John F. Speer, Jr., International Ass'n. of Ice Cream Mfgrs., 1105 Barr Building, 810-17th St., N.W., Washington 6, D. C.

Stephen J. Wolff, Pevely Dairy Co., 1001 S. Grand Blvd., St. Louis 4, Missouri.

COMMITTEE ON RESEARCH NEEDS AND APPLICATIONS

OBJECTIVES

The objectives of this committee are: (1) to serve the field sanitarian as a clearing house for new ideas and practices which would enable a more efficient discharge of their duties: (2) to coordinate its activities with those of a similar committee of the American Public Health Association (Engineering & Sanitation Section); (3) to ascertain the needs of the membership for specific information on given problems and to find the best method of disseminating information obtained by the committee.

MEMBERS

Fred C. Baselt, *Chairman,* American Can Company, 100 Park Ave., New York 17, N. Y.

Dr. Samuel H. Hopper, Dept. of Public Health, Indiana University Medical Center, 1100 West Michigan St., Indianapolis 7, Indiana.

H. J. Barnum, Chief, Milk Sanitation Services, Dept. of Health & Hospitals, City & County of Denver, Denver 4, Colorado.

Howard Froiland, City Health Dept., City Hall, Aberdeen, South Dakota.

Dr. Glen L. Hays, Research & Technical Dept., American Can Company, 11th Ave., and St. Charles Road, Maywood, Illinois.

Dr. C. K. Johns, Officer-in-Charge, Dairy Technology, Dept. of Agriculture, Experimental Farm & Science Service, Ottawa, Canada.

W. C. Lawton, Twin City Milk Producers Assoc., 2424 Territorial Rd., St. Paul, Minnesota.

Dr. Keith H. Lewis, Chief, Milk & Food Research, PHS Robert A. Taft Sanitary Engineering Center, 4676 Columbia Parkway, Cincinnati 26, Ohio.

Dr. Warren Litsky, Dept. Bacteriology & Public Health, University of Massachusetts, Amherst, Massachusetts.

W. K. Moseley, 3862 East Washington St., Indianapolis 1, Indiana.

Ivan E. Parkin, Cooperative Extension Service, Penn State University, University Park, Pennsylvania.

COMMITTEE ON SANITARY PROCEDURES

OBJECTIVES

To participate jointly with the Sanitary Standards Subcommittee of the Dairy Industry Committee and the Milk and Food Branch, U. S. Public Health Service, in the formulation of 3A Sanitary Standards for Dairy Equipment. Specifically, the functions of this committee are: (1) to receive, consider, and comment on proposed sanitation standards for dairy equipment submitted by the Sanitary Standards Subcommittee; (2) to bring to the attention of the Sanitary Standards Subcommittee items of dairy industry equipment and methods for which formulation of sanitary standards appear desirable; and (3) to cooperate with the Dairy Industry Committee, the U. S. Public Health Service, and health officials in attaining universal acceptance of the sanitary standards upon which mutual agreement has been reached.

MEMBERS

C. A. Abele, *Chairman,* 2617 Hartzell St., Evanston, Illinois.

D. C. Cleveland, Director, Dairy & Food Div., Oklahoma City-County Board of Health, Rm. 505, Municipal Bldg., Oklahoma City, Oklahoma.

Paul Corash, Chief, Milk Section, Dept. of Health, 125 Worth St., New York 13, N. Y.

Dr. M. R. Fisher, Director, Milk Section, Dept. of Health, Rm. 11, Municipal Courts Bldg., St. Louis, Missouri.

Mark D. Howlett, Jr., 2461 Coniston Place, San Marino 7, California.

Dr. W. K. Jordan, Associate Prof., Dept. of Dairy Industry, Cornell University, Ithaca, New York.

C. K. Luchterhand, Milk Sanitarian, Div. of Engineering State Health Dept., Rm. 453, State Office Bldg., Madison 2, Wisconsin.

James A. Meany, 8948 So. Laflin St., Chicago 20, Illinois.

Samuel O. Noles, State Milk Consultant, State Board of Health, P. O. Box 210, Jacksonville, Florida.

Ivan E. Parkin, Dairy Extension Specialist, Rm. 213, Dairy Bldg., Penn State University, University Park, Pennsylvania.

Wilbur C. Parkinson, Chief Sanitarian, City Board of Health, 115 South State St., Salt Lake City 11, Utah.

Dr. Richard M. Parry, Chief, Dairy Division, State Dept. of Agriculture, State Office Building, Hartford 15, Conn.

George H. Steele, Ass't. Director, Agriculture Products Inspection, Dept. of Agriculture, 515 State Office Bldg., St. Paul, Minnesota.

D. B. Whitehead, 4886 Woodmont Drive, Jackson, Mississippi.

H. L. Thomasson, Ex-officio, Box 437, Shelbyville, Indiana.

AFFILIATES OF
International Association of Milk and Food Sanitarians

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Sec., Karl K. Jones, 1330 W. Michigan St., Indiana State Board of Health, Indianapolis.
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Sec.-Treas., Robert Lyons --- Lansing-Ingham County Health Dept., City Hall, Room 207, Lansing.
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Pres., Chester A. Ness ----- Litchfield
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NEWS AND EVENTS

WIDE SCOPE OF NEW PRODUCTS SEEN AT 1960 DAIRY SHOW

More and better automation—integrated processing systems — simplified instrumentation — packaging and handling innovations — more convenient and flexible cleaning systems — all of these and more were featured at the 22nd Dairy Industries Exposition in Chicago, October 31-November 5.

Observers found renewed emphasis on continuous product movement and a trend toward the integration of automated components into continuous processing systems. Progress in the area of making automation feasible for the small processor appeared in such new items as minaturized instrument units and "packaged" control devices. Self-contained programming and timing units were also on display.

Emphasis in dairy processing equipment at the show was on methods and systems — ways of processing — rather than presenting the equipment without application. The processing line in dairy plants was demonstrated as a system, the C-I-P wash-up operation another system, with the packaging line still a separate cycle.

Possibly indicative of a new trend in bulk handling, single-use bulk milk containers for bulk milk dispensers were prominently displayed. Fillers for these containers were also demonstrated, as well as methods of dispenser servicing. At least three different types of containers and filling devices, each

having its own design of corrugated shipping container, made their debuts at the show, possibly indicating an impact on future resale mix distribution for soft ice cream freezers.

Also notable among new developments was equipment for handling the product after packaging. Ice cream particularly was the subject of automatic boxing machines and devices for handling and wrapping. Automatic loading and unloading hardening chambers appeared to offer a fresh approach to product handling on freshly packaged ice cream, because such a device, synchronized to freezing equipment, offers a continuous process up to the point of shipment.

The packaging field, as usual, displayed many new tools for the ice cream trade, with the appearance of cup boxers and high speed fillers and sealers. One machine displayed automatically opens, fills and seals, cylindrical half-gallons. A novelty stacker and a box former and sealer also was displayed. Reclosable square ice cream cartons were widely shown.

Among other packaging and handling features were a cartoning machine for cottage cheese containers, as well as half-gallon milk casers and other new casing, cartoning, wrapping and bundling devices. Also evident was increased use of plastics in merchandising and delivery devices, such as carriers and cases.

Disposable plastic milk cartons and new types of flat-top half-gallon paper milk cartons designed to permit better stacking for retail outlets also made appearances at the show. Gallon paper milk cartons also were introduced this year.

Machines for producing individually wrapped butter pats were featured, as well as laminated plastic film releasing-type food wrappers, with particular attention to the prevention of light-induced off-flavors.

In the area of equipment, in addition to the electronic load cell, an alternative method of measuring material was introduced at the show. A totalizing meter and metering pump, both of which have application to metered flow control, made their debut. Observers found this significant because the keys to the continuous automatic process appear to be continuous measurement, which may be achieved either through the load cell or the meter, and the automatic valve, which lends itself to remote control.

Exhibits also included a new design for batch processors for heavy-bodied products providing pressure operation and unloading. Also shown was mechanical curd-handling equipment for cheese.

Other innovations included fiber glass covered milk storage tanks with readily removable sight glasses; a source of clean steam; centrifugal pumps with a new impeller designed especially for circulation cleaning; a new evaporator design incorporating automatic cleaning; closed-top processors of increased capacities with built-in cleaning devices and ;portable storage tank cleaners.

A possibly new trend in the sanitation chemical industry is the movement toward emphasis on engineering services for providing flexibility in the installation and operation of automatic cleaning of dairy processing plants. One new aspect of the cleaning environment this year was the appearance of electronic concentration control for maintaining chemical strength in washing solutions. Other new cleaning devices included non-absorbent brush bristles set in plastic handles.

New portable point-of-sale merchandising aids, as well as point-of-sale dispensing mixers for soft ice cream and fountain preparations were displayed, as were fast drink machines using hard ice cream.

New aids to distribution displayed included truck loading equipment for wholesale ice cream distribution and truck-powered refrigeration for retail milk trucks. A diesel-powered over-the-road refrigeration unit was also displayed.

Ingredient exhibitors introduced sweetened chocolate products for ice cream and other new flavoring preparations for ice cream manufacture and soda fountain use. Devices for continuous feeding of stabilizers in HTST pasteurization also were displayed.

Additions to the line of milk protein derivatives for ice cream stabiliaztion and dairy drink bases were exhibited.

Another feature at this Dairy Show was nutritive supplements for dietary weight control.

Taken as a whole, the scope of new products introduced at the 22nd Dairy Industries Exposition was probably the widest in 14 years — since the first post-war show in 1946. Observers appeared in agreement that the Exposition demonstrated vividly the constant urge to progress and change which has characterized the post-war dairy industries of North America.

MINUTES OF THE MEETING OF THE COUNCIL OF AFFILIATES
47TH ANNUAL MEETING
INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, INC.

Record of Attendance

Affiliate Name	Name of Delegate Present
American Indian Sanitarians Associations	Not represented
Arizona Association of Milk and Food Sanitarians	Not represented
Associated Illinois Milk Sanitarians	James A. Meany
California Association of Dairy and Milk Sanitarians	Not represented
Central Ontario Milk Sanitarians Association	Not represented
Connecticut Association of Dairy and Food Sanitarians	R. M. Parry
Dairy Sanitarians Association of The Del-Mar-Va Penninsula	Not represented
Florida Association of Milk and Food Sanitarians	W. Harvey Jordan
Georgia Society of Sanitarians	John J. Sheuring
Idaho Sanitarians Association	Not represented
Indiana Association of Milk and Food Sanitarians	Karl K. Jones
Iowa Association of Milk Sanitarians	R. A. Belnap
Kansas Association of Public Health Sanitarians	Frank L. Kelley
Kentucky Association of Milk and Food Sanitarians	Louis E. Smith
Michigan Association of Sanitarians	Not represented
Minnesota Sanitarians Association	O. M. Oston
Missouri Association of Milk and Food Sanitarians	Not represented
New York State Association of Milk Sanitarians	Walter H. Grunge
North Dakota Association of Sanitarians	Not represented
Oregon Association of Milk Sanitarians	Not represented
Pennsylvania Dairy Sanitarians Association	I. E. Parkin
Rhode Island Association of Dairy and Food Sanitarians	Sidney Shepherd
Rocky Mountain Association of Milk and Food Sanitarians	Charley Walton
South Carolina Association of Sanitarians, Inc.	E. M. Causey, Jr.
South Dakota Association of Sanitarians	Everett Lobb
Tennessee Association of Sanitarians	Eddie H. Abernathy
Virginia Association of Milk and Food Sanitarians	M. H. Jefferson
Washington Milk Sanitarians Association	W. R. Knutzon
Wisconsin Association of Milk and Food Sanitarians	L. Wayne Brown

Association Officers	Represented By
Executive Secretary Int. Assn. Milk & Food Sanitarians	H. L. "Red" Thomasson-Ind.
Assoc. Editor, Journal of Milk & Food Technology	Joseph C. Olsen, Jr., Minnesota
Executive Board, Int. Assn. Milk & Food Sanitarians	Franklin W. Barber, New York
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Executive Board, Int. Assn. Milk & Food Sanitarians	Harold Robinson, Washington, D. C.

Guests	Represented By
Connecticut	Curtis W. Chaffee
Connecticut	Russell W. Waldo
Florida	Tony Damanda
Iowa	R. L. Sanders
Minnesota	G. H. Steele
Missouri	Vernon D. Mikel
New York	Paul Corash
New York	Don Race
Rhode Island	Norman Taylor

1. Each person present was asked to identify himself and his affiliate.
2. Minutes of the previous meeting were approved as submitted.
3. The Secretary reported no old or unfinished business.
4. President Riley pointed out that the Constitution and By-laws do not definitely define who is eligible to serve as an officer in the Council of Affiliates. Following a short discussion a motion was made that the Secretary of an affiliate would be the only person eligible to serve as President or Secretary of the Council of Affiliates, and once elected would serve until their successor had been duly elected and installed. Motion passed.
5. A discussion and explanation of the reason the minutes of the 1959 Council of Affiliates meeting were not printed in the Journal of Milk and Food Technology was given, the reason being due to the absence of the Editor from the country at the time; they were inadvertently overlooked.
6. A motion was made to have abstracts of each committee report prepared and made available for the members of the Council of Affiliates prior to the meeting of the Council of Affiliates. Motion lost.
7. It was pointed out by John Sheuring that only a few affiliates were contributing annually to the Scholarship Fund and few applicants were applying for this scholarship. It did not appear to be advisable to continue with the Scholarship Program. Motion made that the Council of Affiliates recommend to the Executive Board the discontinuance of the Scholarship Program. Motion passed.
8. Harold Wainess, Chairman of the Membership Committee, gave a report on the activities of his committee pointing out that there were a number of forms made available for the solicitation of new members in the International Association of Milk and Food Sanitarians and urged that these forms be used more extensively. From this discussion it developed that a great many Secretaries of Affiliates had never received these forms and consequently only a few had been used. However, a new effort will be made by this committee to use these forms hoping to increase our membership in the Association.
9. A motion was made that we recommend to the Executive Board an appropriation of sufficient money for the Membership Committee to prepare a brochure for soliciting membership. Motion passed.
10. Walter Grunge, delegate from the New York Affiliate, presented a resolution encouraging the International Association of Milk and Food Sanitarians and the American Veterinary Medical Association to work jointly on a committee for the Control of Mastitis. Motion was made that this resolution properly be referred to the Committee on Resolutions. Motion passed.
11. Election of Officers: The vote was made by the show of hands. President: R. M. Parry of Connecticut; Secretary: Karl Jones of Indiana.
12. Meeting adjourned at 12:30 P. M.

DR. R. M. PARRY, *Secretary*

SCHOLARSHIP AWARD PRESENTED BY RHODE ISLAND ASSOCIATION

The annual $200 scholarship presented by the Rhode Island Association of Dairy and Food Sanitarians was presented at a recent dinner meeting to Miss Barbara Hicks of 341 River Avenue, Providence, a sophomore in the University of Rhode Island's College of Agriculture. In the photo, Miss Hicks receives her check from Norman M. Taylor, association president. Looking on are Sidney Shepard, left, secretary-treasurer, and Arthur C. Frink, right, vice president. The scholarship goes annually to a University of Rhode Island agriculture student.

SAMUEL J. CRUMBINE AWARDS COMPETITION ANNOUNCED

Invitations have just been extended to all full-time local health departments in the United States to submit entries in the 1961 competition for the national Samuel J. Crumbine Awards. Two awards are presented each year—one for outstanding achievement in the development of a comprehensive program of environmental health, and the other for outstanding achievement in the development of a program of public food and drink sanitation.

Selections are based on progress during the preced-

ing year and the present level of attainment. Entries in the year's competition must be submitted on or before March 1.

The Awards Jury consists of public health experts from the United States Public Health Service, state health departments, and schools of public health. This year's chairman is Ralph T. Fisher, Director, Division of Special Consultation Services, New Jersey State Department of Health.

The awards are sponsored by the Public Health Committee of the Paper Cup and Container Institute, Inc., to give recognition to local health departments for their accomplishments in program development and to stimulate others to greater effort to perfect their programs.

Further information about the competition may be obtained by writing to Crumbine Awards Jury, 250 Park Avenue, Room 1020, New York 17, New York.

"TIRED BLOOD" CLAIM EXPOSED BY NOTED SCIENTIST

Science has tendered a University of Cincinnati researcher, Dr. Richard W. Vilter, one of its top awards, for a long-term study of what causes *anemia* among the American people. The Award, jointly presented each year by the American Medical Association and the Nutrition Foundation, honors the memory of pioneer nutritionist Joseph Goldberger and carries a $1,000 honorarium.

The upshot of his study, Dr. Vilter said in accepting the Goldberger Award at a recent AMA conclave, is that "oft repeated and deftly worded advertising" notwithstanding, most of the anemia suffered in the U. S. is *not* caused by vitamin deficiencies. "The public has come to believe that the surest way to re-energize 'tired blood' is a vitamin-mineral mixture," he said. "Unfortunately," he added, "many physicians tend to take this short cut in lieu of time-consuming diagnosis."

Despite the impression created by patent medicine advertising, Dr. Vilter's investigation indicates that only about 4% of U. S. anemia is caused by deficiencies of vitamin B_{12}, folic acid (another part of the vitamin B complex) or vitamin C. A more important cause — prompting 18% of the anemia observed at Cincinnati General Hospital, the site of the three-

year survey — was iron deficiency due to chronic blood loss. An additional 78%, Dr. Vilter noted, was caused by other factors "unrelated" to nutrition.

As a result, Dr. Vilter contended, it is medically wrong to prescribe vitamins routinely for anemia. He insisted that an exhaustive diagnostic investigation should be made to see if the trouble really stems from nutritive deficiency. The survey data shows that in well-fed America the source of the problem is most often quite separate from nutrition. "A mixture of essential nutrients," he said, "is by no means a panacea for (the types of) anemia" with which U. S. sufferers are afflicted. In fact, he said, the great danger is that "much precious time may be wasted with fruitless vitamin therapy."

Diagnostic precision is also a "must," Dr. Vilter said, even when the evidence points to vitamin deficiency as cause of anemia. For example, "folic acid treatment of vitamin B_{12} deficiency may cause temporary improvement," he noted, "but the ultimate result is likely to be rapid progression of neurological degeneration and relapse of the anemia." This danger also applies to multiple vitamin therapy. As Dr. Vilter puts it: "Shotguns can be dangerous."

Dr. Vilter does not, of course, rule out the possibility of genuine deficiency-anemia. But, he says, the alert doctor will make sure of such a diagnosis by searching for "symptoms of nutritional inadequacy such as burning of the tongue and mouth; irritation of the eyes; numbness of the hands and feet; pigmented, scaling dermatitis; bleeding gums; diarrhea, etc." Just as importantly, however, the physician must during the diagnostic investigation carefully check for the other, more prevalent causes of anemia, including "any suggestion of chronic loss of blood."

Vitamin C, which is so plentifully provided by citrus fruits, tomatoes and a wide variety of fresh, frozen and canned vegetables, also figures in the anemia problem. Those suffering an extreme deficiency of the vitamin (this disease, scurvy, has virtually been eradicated in the U. S.) are sometimes anemic, too. The reason is that vitamin C deficiency is one of the factors than can impede the marrow of the bones from manufacturing red blood cells.

Other vitamin B components, niacin and riboflavin, probably do not play a part in precipitating human anemia, even though deficiencies in these parts of the vitamin B complex have created anemia problems in laboratory animals.

Dr. Vilter agrees that "dietary deficiency is a common cause of anemia in some of the underdeveloped areas of the world." That is not the case in the U. S., however, thanks to the general excellence of the American diet.

NEW ICE CREAM STANDARDS MEET OBJECTIONS

The Food and Drug Administration, postponed on November 3 the effective date of certain requirements of the new Federal standards for ice cream and other frozen desserts. The other requirements of the standards became effective on October 25 following FDA's public announcement on July 26.

Current postponements apply to the following:

1. Certain provisions specifying the manner of label declaration of flavors.

2. Provisions prohibiting the use of whey in ice cream, frozen custard, and ice milk.

3. Provisions requiring label declaration of any whey used in fruit sherbets.

4. Provisions prohibiting the use in ice cream of skim milk products prepared by a treatment with mild alkalies.

FDA said that suits have been filed in the Courts of Appeals for the District of Columbia and in the Second and Ninth Circuits objecting to these provisions. Requirements of the standards on these points will therefore be held in abeyance until the courts have ruled on these questions, the agency said.

5. The effective date for provisions requiring a minimum of 10 percent butterfat in ice cream, and the entire standard as it relates to ice milk, is postponed until July 1, 1961.

FDA said that these provisions of the Federal standard conflict with corresponding requirements of a number of States, and may create a hardship for small manufacturers within those States. The extension was agreed to at the urging of State regulatory officials in view of the probability that several of the States will amend their laws during their legislative sessions scheduled for early 1961 to make them uniform with the Federal standard.

Another suit filed in the Court of Appeals for the District of Columbia protests the exclusion of certain neutralizing and buffering chemicals previously used to adjust the acidity of ice cream mix. FDA said it is not postponing the standard requirements on this point because it believes allowing use of these agents would make it possible to use sour dairy ingredients. This would be contrary to FDA's policy that ice cream should be made from fresh dairy ingredients, the agency said.

The petitioner has asked the court to grant a stay of the order to permit the use of the neutralizers until a final court ruling has been made. No action on this request has yet been taken by the court.

Other provisions of the standards which are now effective include a minimum weight per gallon and a minimum milk solids content for ice cream, and similar requirements for other frozen desserts to protect the integrity of the products, FDA said.

FOOD SCIENCE ADDED BY CORNELL

Cornell University's dairy industry department in the New York State College of Agriculture has changed its name to the Department of Dairy and Food Science.

Reason for the change is to indicate that the department is not only concerned with instruction and research in the processing of milk and dairy products, but also in the processing of other food products, according to Prof. R. F. Holland, head of the department.

Holland explained that a food science curriculum was introduced in the College of Agriculture a few years ago as the result of the need for college trained personnel in the food processing industry, one of the largest industries in New York State.

Profs. Joseph Nowery and Paul Buck are the two food science specialists now actively working in the Dairy and Food Science department.

NOTICE TO IAMFS MEMBERS

The Program for the 48th Annual Meeting is now being prepared. Members are urged to make suggestions for topics and speakers. Send suggestions to:

Mr. C. E. Walton, CHAIRMAN, IAMFS Program Committee Health Department, Laramie, Wyoming.

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Authors should make every effort to present their material accurately and in a clear and concise form. In preparing manuscripts use of the first person should be avoided. Manuscripts should be proofread carefully before they are submitted. Each manuscript will be reviewed by one or more Associate Editors. Anonymity of reviewers will be preserved.

Manuscripts reporting the results of experimental work, generally, should be divided into sections, for example: Introduction; Experimental; Results; Discussion; Summary and Conclusions; References.

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Sample of Book citation: Adams, H. S. *Milk and Food Sanitation Practice.* The Commonwealth Fund. New York, New York. 1947.

Sample of Experiment Station publication citation: Watrous, G. H., Doan, F. J. and Josephson, D. V. Some Bacteriological Studies on Refrigerated Milk and Cream. Penn. Agr. Exp. Sta. Bull. 551. 1952.

Publications should be abbreviated according to the form given in CHEMICAL ABSTRACTS, vol. 45. no. 24, part 2. 1951.

Abbreviations.—Common abbreviations to be used in the text are: cm., centimeter(s); cc., cubic centimeter(s); C., Centigrade; F., Fahrenheit; g., gram(s); log., logarithm; lb., pound(s); μ, micron(s); μg., microgram(s); mg., milligram(s); ml., milliliter(s); oz., ounce(s); sp. gr., specific gravity.

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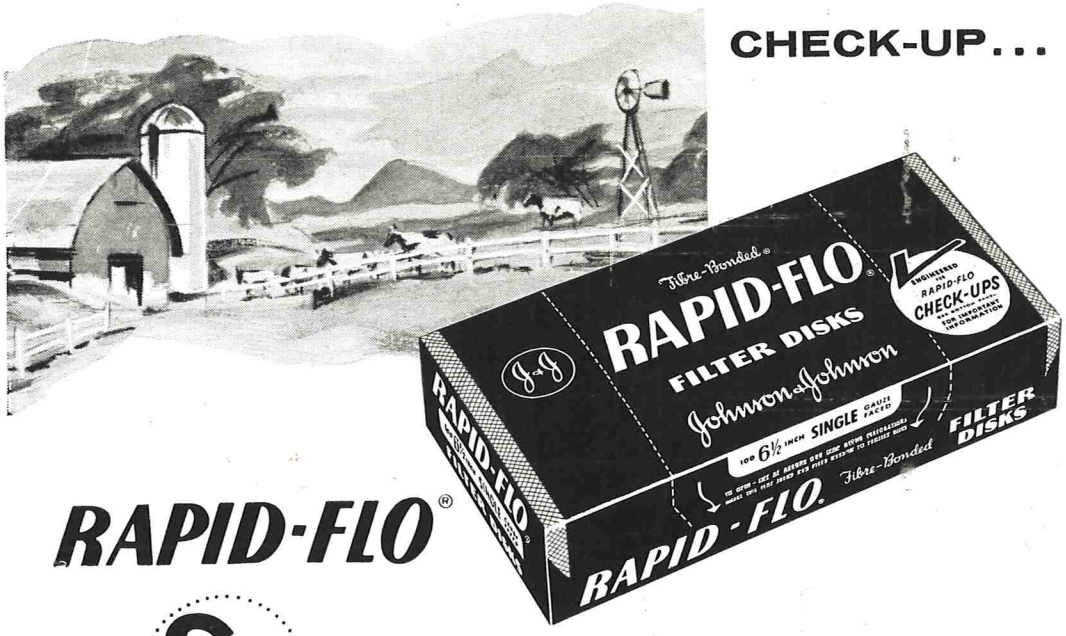

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