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Editorials

The opinions and ideas expressed in papers and editorials are those of the respective authors. The expressions of the Association are completely recorded in its transactions.

A New Streamlined Milk Ordinance

HOWEVER great may be the need for the abatement of some evil, we cannot expect a remedy until somebody does something about it. We look back at the literature, at programs of conventions of milk sanitarians and dealers, at the accumulation of trouble from conflicting milk control procedures, and from overdeveloped regulatory ordinances, and wonder why John (or that convenient "they") does not correct the evil. Well, one man in New England took the initiative, and at long last, we are beginning to see some fruits.

For several years, the milk regulatory officials of the New England states have realized the plight of the milk producer. The latter can be compared to the dilemma of the chameleon which found itself to be sitting on a Scotch plaid. It tried to adjust itself to the color of its background—and died in the attempt. In an effort to alleviate the difficulty of the milk producer who had to ship milk to several states and numerous municipalities, the northeastern men held several informal conferences to find a common ground for sanitary requirements. They have progressed far in drawing up a series of requirements to which all in that area can subscribe. Its provisions are intended for permanent application, even when the present war emergency has passed.

While this measure was developing (and probably stimulated by it) the United States Public Health Service Sanitation Advisory Board met in Washington in December, 1942, and formulated the Emergency Sanitation Standards for Raw Milk for Pasteurization, purely a temporary measure to relieve milk shortage difficulties attendant on the present war emergency. It is printed in full on page 101 of this issue. It makes no attempt to cover any other phase of milk control than production of raw milk for pasteurization.

As in all compromises, we can be quite sure that the new ordinance will not please everyone, and in all probability, it will not be completely satisfactory to anyone. However, we believe it to be a laudable attempt to prepare an ordinance that should go a long way toward making available milk from any one section of the country for use in any other—after all, the great desideratum.

There are several provisions which would seem to be hurdles to general acceptance namely: the requirement that bacteria counts should not exceed two hundred thousand per milliliter, the requirement of cooling to only 60° F., the requirement for rating farms by the USPHS rating procedures and forms, the

necessity for washing the udders with chlorine solution, and the washing of milkers' hands before milking. It is not likely that these provisions will objected to because of their inherent irrelevancy, but on account of the inadv bility of increasing the farmer's labor now when the labor situation is so ac

Milk regulatory officials just have got to come to agreement on sani requirements. When conflicting provisions are enforced, such procedure ad tises to the world that milk sanitarians do not know what are the real essenti Truth is not in conflict with itself. When contradiction in requirement encountered, then we can be quite sure that somebody is either ill-informe has an axe to grind. Either situation is intolerable. Milk sanitarians must their own house in order before they can convincingly tell industry how it ou to carry on. Unless they do, the public looks on and says, Bah!

J. H. S.

Milk Sanitation—Where Is It Going?

IN our last issue, we discussed editorially the position of the trained m sanitarian as determined by the military. We are in receipt of a letter wh we present herewith:

"For the sake of the record I might say that I was graduated from the University of California, College of Agriculture, in dairy science work in 1932. Since that time I have worked for the largest certified dairy in the west; one of the largest milk plants; the Los Angeles City Health Department (as Laboratory Technician and Milk Inspector); the Orange County Health Department (in charge of milk inspection); and I am now with the State of California, Bureau of Dairy Service.

About a year ago I wrote Washington, D. C., and offered my services to the armed forces with the request that I be placed in work for which I was qualified. I was finally told that they were badly in need of veterinarians and sanitary engineers, but that they had no place for me; however, they would file my name with ten million others and if they ever had cause to need me I would be notified. I then decided to contact some of the local officers who were in charge of milk work for their district or camp. Time after time I received the same answer, 'Yes, we could use a man with your qualifications, but—you are not a veterinarian.'

"Finally I contacted one Colonel and offered my services as an enlisted man with the thought that I might do the work and let someone else get the credit. After some correspondence it was my understanding that the Colonel had sent in a request for my services in the Veterinary Corps, and I was to report to San Francisco (a round trip of better than 100 miles) for some routine examinations. The examinations were taken and I returned home expecting a call any day. First one month went by and then another. I had just about forgotten the whole thing when I received a letter that read, 'This is to advise that authority for your immediate enlistment in the *Army Air Forces* has been received from the Adjutant General, Washington, D. C.'

"After some more correspondence it finally developed that the Colonel had asked for me in the Veterinary Corps and his request, by the time it had gone through the governmental 'red tape' mill, was so twisted and changed that I was about to be put in the Air Corps.

"By that time I was so disgusted with the whole affair that I decided if the army wanted me *they* could do the requesting for a change. I am now in a deferred classification until the middle of May, so perhaps I will not have long to wait, though no doubt I will end doing something I know nothing about. It is good, however, to know that the House has passed a bill * giving us some recognition and I hope that the boys who are left at home will keep up the good work."

In other instances, milk sanitarians have asked the same question: "What is the future for milk sanitarians? What is the use of planning a career in this field and taking college training in it if at the end we are are afforded no professional recognition?"

Do not blame the military. The fault is our own. The milk sanitarian, devoted to his work, has been assiduously developing the fields of milk sanitation and technology without paying too much attention to their public (and professional) relations. He now wakes up to find that he is a maverick—if you please. Well, shall we take a brand? What brand? It looks as if the military are "sold" on a certain brand. Milk sanitarians, what do you say? Will you take it lying down?—"it" being the brand and the let-down and the frustration and the discouragement. If you don't like it, then say so, and say it LOUD.

J. H. S.

Meat Inspection Removed From B. A. I.

THE transfer of the Meat Inspection Division from the Bureau of Animal industry to the Livestock and Meats Branch, Food Distribution Administration, comes as a shock to the old timers in food control. After the first surprise, we think that maybe the risk attendant on the transfer from a successful performance to an untried one (in these difficult times) might work out for the better after all. We are reminded of our perturbation when the inspection part of the former Bureau of Chemistry was separated from the investigatory and research parts. Our experience shows that food inspection must be integrated with food investigation and even research. However, the new Food and Drug Administration is doing an excellent job. In view of this showing, we are inclined to think that maybe the powers-that-be in Washington are doing a wise thing in removing administrative matters from the highly investigative ones. The two constitute entirely different lines of thought, although the success of both depends on their intimate integration. Unless we advance in our knowledge, we are likely to slip backward in the quality of our food control (or in anything else, for that matter). If the meat inspection service can do actually a better job in its new setup, then the transfer is advisable. In doing this, it will be paced by the excellent performance of its sister organization in the food and drug work.

J. H. S.

* The House bill he refers to deals with dieticians.—Editor.

Reported Food and Water Poisoning In 1941

THE new compilation of disease outbreaks in 1941, conveyed by food and water, as reported to the Public Health Service by the state and territorial authorities, continues its rate of increase of both outbreaks and deaths. Milk and milk products dropped back a little but other foods forged ahead. The net result is that the number of outbreaks has now reached 316, as against 249 in 1939, and the number of deaths were 106 as compared with 28 then.

The data in Table 3 shows that dairy products still constitute our most potent source of food-borne outbreaks (except water). Note how pies and pastry now almost equal the number of cases from dairy products. Of the six outbreaks traced to pasteurized milk, four revealed faulty procedure in the plant. In spite of all that has been said and done to insure proper plant performance, milk plant operators still seem inspired by Satan to do the most assinine acts. In one case, the operator left continuously open the valve between the pasteurizing tank and the bottle filler. However, in two of the outbreaks due to pasteurized milk, the means of infection or character of the faulty pasteurization could not be shown. None of the six ice cream outbreaks incriminated any commercial ice cream but were traced to products that were unpasteurized or infected by the manufacturer. The canned milk was evidently infected in the home. The cheese outbreak was caused by a locally manufactured product.

We are accustomed to see botulism traced to home-canned products, but here we note two outbreaks attributed to commercially canned mushroom sauce and to corn. The notes in the present compilation are too meager to be convincing as to the vehicle. These reports are being checked further for later report in these columns. Most of the "food poisoning" outbreaks in which the causative organism was identified were caused by the *Staphylococcus albus* or *aureus*. About as many of these were associated with meat as with pastry vehicles.

Trichinosis reportings are on the increase. Particularly noteworthy are the large mortality rate and the wide distribution of the cases.

And still people are dying from eating insecticides—instead of the roaches.

The notes accompanying this compilation of the USPHS make interesting reading to the food control official as well as to the social worker and to the nutritionist. In spite of all that has been said and written on how to handle foods, here is ample evidence that the task still demands more lines upon lines, more precepts upon precepts.

The epidemiological evidence which attributes many of the outbreaks to certain food products is about as uncertain, to say the least, as the normal situa-

TABLE 1

COMPARATIVE NUMBER OF OUTBREAKS IN 1941, 1939, 1938

	1941			1939			1938		
	O	C	D	O	C	D	O	C	D
Water Supplies	60	1,190	24	43	2,254	3	48	31,693	17
Milk and Milk Products	37	935	4	41	2,509	7	42	1,685	27
Foods Other than Milk	223	4,110	53	148	3,782	12	70	2,247	25
Undetermined Vehicles	20	505	24	17	1,203	6	8	882	3
Total	340	6,848	105	249	9,748	28	168	36,507	72

O = Outbreaks. C = Cases. D = Deaths.

TABLE 2

FOOD POISONING OUTBREAKS

Disease	Water			Milk and Milk Products			Other Foods			Unidentified Vehicles			All Vehicles		
	Outbreaks	Cases	Deaths	Outbreaks	Cases	Deaths	Outbreaks	Cases	Deaths	Outbreaks	Cases	Deaths	Outbreaks	Cases	Deaths
Botulism	..	...	..	..	...	..	6	20	12	..	...	..	6	20	12
Diphtheria	..	...	..	1	5	..	..	...	..	..	...	..	1	5	..
Dysentery	11	235	4	3	70	..	6	57	3	5	41	19	25	403	26
Chemical Food Poisoning	..	...	..	..	...	..	5	29	14	1	11	1	6	40	15
Food Poisoning	..	...	..	11	199	..	147	2,476	6	1	26	..	159	2,701	6
Gastroenteris	27	703	..	4	288	..	35	1,300	..	6	378	..	72	2,669	..
Paratyphoid Fever	..	...	..	..	...	..	3	47	..	1	8	..	4	55	..
Scarlet Fever	..	...	..	1	33	..	1	96	..	..	...	..	2	129	..
Septic Sore Throat	..	...	..	2	127	..	..	...	..	..	...	..	2	127	..
Trichinosis	..	...	..	..	...	..	9	73	9	..	...	..	9	73	9
Typhoid Fever	22	252	20	12	120	4	11	112	9	6	41	4	51	525	37
Undulant Fever	..	...	..	3	93	..	..	...	..	..	...	..	3	93	..
Total	60	1,190	24	37	935	4	223	4,210	53	20	505	24	340	6,840	105

tion which prevails in food poisoning studies. However, it is probable that some of the uncertainties in the present compilation are no greater than in previous ones so that the relative significance of the numbers should be useful to all food control officials. One might ask: How can there be any value to figures which contain so many inaccuracies?

In the first place, we reply that the first result should be the stimulation of food control officials to take the subject of food poisoning seriously and to get some facts. In ordinary life, we know that a person never calls in a doctor until he first recognizes that he is ill. The very unreliability of our food epidemiological data should stimulate us to organize our procedure in order to learn what our local situation really is. Several communities have done this with notable success, particularly Baltimore, New York, and San Francisco.

TABLE 3

OUTBREAKS ATTRIBUTED TO DAIRY PRODUCTS

Milk	Number of Outbreaks	Number of Cases	Number of Deaths
Raw	21	562	3
Pasteurized	7	273	0
Canned	1	4	0
Frozen Desserts	6	67	0
Cheese	2	29	1
Total	37	935	4

The second fact we learn is that the increase in the number of these outbreaks is increasing or we are seeing them better reported. In either case, the situation is arresting. If food poisoning is increasing, then it behooves us to improve our local food control practices. If the situation merely reflects an improved report, then we must recognize that food poisoning is prevalent throughout our community to a degree that is disconcertingly large—and we see no signs of it decreasing. If the rate were decreasing, then we should know that we were in control of the situation (or at any rate, some favorable factor is working for us) but when the reverse is true, we should become concerned.

TABLE 4

INCRIMINATED FOODS IN FOOD-BORNE OUTBREAKS IN 1941

Kind of Food	Number of Outbreaks	Number of Cases	Number of Deaths
Canned Food			
Commercial	2	6	1
Home	5	17	11
Fowl	18	242	0
Meat and Products	12	569	3
Miscellaneous	7	222	0
Pies and Pastry	62	846	16
Pork and Products	41	601	12
Salads and Cocktails	22	635	1
Sandwiches	12	373	0
Sauces, Soups, Escalloped Products	11	226	1
Seafood	6	68	5
Not Known	25	305	
Total	223	4,110	53

In this connection it will be interesting to food control officials to learn the result of the new procedure that is being inaugurated in New York City. There the Health Department is undertaking the education of food manufacturers and food handlers in the important matters of food sanitation. This places the responsibility of proper food handling squarely on the dealer. It is a procedure that has worked well in milk control. Health officers have found that the milk companies themselves could do a better job in the sanitary handling of their milk when the Health Department held them responsible and cooperated with them, than when the Health Department tried to police an enlarging shed in the face of increasing technical intricacies in milk producing and handling. What has been so successful in one branch of the food industry might well be applied over the whole. New York is trying it. We wish them Godspeed.

J. H. S.

Associated Illinois Milk Sanitarians

WHEN the Illinois Public Health Association was formed, slightly more than two years ago, milk sanitarians connected with city (other than Chicago) and county or district health departments organized a section in that organization. But this limited the membership to milk control officials.

On October 29, 1942 (during the American Public Health Association meeting in St. Louis), a group of milk sanitarians met in East St. Louis, and laid plans for a state-wide organization of Illinois milk sanitarians. At that same hour the Executive Board of the I.A.M.S. was formulating the procedure—subsequently officially approved—for the affiliation of such organizations with the I.A.M.S.

In December, an organization meeting was arranged for in Chicago on January 18. A constitution and by-laws were adopted, and the JOURNAL OF MILK TECHNOLOGY was designated as the official organ. This new group is the first to apply for affiliation status. Action on its request is now pending.

This great north central territory needs such an active organization. We commend the initiative of its leaders in bringing into being such a potentially powerful factor for the advancement of milk sanitation.

J. H. S.

DAIRY SCIENTISTS GO TO CENTRAL AMERICA

Dr. Dahlberg of Geneva Experiment Station One of Party to Study Dairy Industry in Americas

Dr. A. C. Dahlberg, head of the Dairy Division at the New York State Experiment Station at Geneva, has been granted leave of absence by Cornell University in order to carry out a special mission in Central America and the northern part of South America for the United States Department of Agriculture and the Office of the Counsellor on Inter-American Affairs of the State Department.

The request for Doctor Dahlberg's services came from the Department of Agriculture, and the undertaking has to do with the better nutrition program of the Americas to help the war effort. Doctor Dahlberg went to Washington for instructions and left for Central America the last of February. He will return to Geneva in July.

In making the request, Department of Agriculture officials stated that the plan is to make available to Latin America the knowledge and experience available in this country on milk processing and dairy manufactures. Doctor Dahlberg's duties will consist of surveys of the dairy industries of the countries he visits and of counsel with government and educational officials, farmers, and dairy plant operators as an aid to stimulating milk production, increasing dairy manufactures, and improving dairy practices.

Dr. R. E. Hodgson, an authority on dairy cattle formerly with the Washington State College and now with the U. S. Department of Agriculture, will accompany Doctor Dahlberg. Most of the travel will be by plane.

In 1937, Doctor Dahlberg attended the World's Dairy Congress in Berlin as an official delegate from the United States.

LAYSON GOES TO WASHINGTON

S. V. Layson has resigned as Milk Sanitarian in the Illinois Department of Public Health, Springfield, to accept a position in the Priorities Section, Dairy Branch, Food Distribution Administration, Washington, D. C.

During the fifteen years that Layson has been head of the Milk Sanitation Section in Illinois, and responsible for the administration of the Milk Pasteurization Plant Act and the Grade A Milk Act, no milk-borne disease epidemics have been caused by pasteurized milk. The consumption of pasteurized milk has increased from a relatively small amount until at the present time 85 percent of the urban milk supply in the State is pasteurized. He has gained a national reputation in the field of public health milk sanitation. He is Chairman of The Dairy Farm Methods Committee of the INTERNATIONAL ASSOCIATION OF MILK SANITARIANS, Secretary-Treasurer of the newly formed Associated Illinois Milk Sanitarians, a member of the Executive Council of the Illinois Public Health Association, a member of The American Dairy Science Association, and of Gamma Sigma Delta, the Honor Society of Agriculture.

Layson is a graduate of South Dakota State College and the University of Illinois. His wide and varied experience in the dairy field fits him admirably for his new post. Close personal contact with nearly six hundred milk pasteurization plants in Illinois for many years has familiarized him with the problems and needs of the industry.

An Epidemic of Food Poisoning Due to Pasteurized Milk

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AND

MELVIN A. MEYER
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ON May 11th an investigation was made of an unusual illness, chiefly among children, that was occurring in a town of 8,000 population in Central Kentucky. All affected had nausea, vomiting, varying degrees of prostration, and a few had diarrhea. For the most part, the attacks were mild, varying in duration from one to three or four hours. A hasty survey, made at the time that the illnesses were occurring, indicated that all who were sick were obtaining milk from one supply. A few days later, a more complete investigation of the outbreak was made. Not only the milk route of the suspected dairy, but the routes of two other large distributors in the community, were made the subject of study. The suspected dairy will hereafter be referred to as dairy A, the other 2 dairies being referred to as B and C, respectively. Time did not permit investigation of each customer on the routes of each of these 3 dairies; hence, a sample was taken from among the customers on each of the 3 routes. A sample was taken from the routes of dairies A and C by obtaining a list of the customers and taking every fourth customer on the list. A sample was taken from the route of dairy B by obtaining the loose leaf account book, in which the account of each customer was on one side of the page, and opening at random the book 21 times, thereby obtaining 21 customers. Thus, 33 customers were taken from the route of dairy A, 21 from the route of dairy B and 11 from the route of dairy C, each of these customers representing a family. An epidemiological investigation was made of each of these 65 families, recording the name, age, sex, and color of each individual in each of the family circles. Recorded also were the date and hour of onset of symptoms, if any. A record was also made of the time at which milk was last taken before onset, the water supply, the economic status, and the groceries from which foods, other than milk, were obtained. Under groceries was recorded the source of meats, green vegetables and fruits, butter, cheese and other products, and staple groceries such as canned foods.

In the 33 families on the route of dairy A were 112 persons, 32 of whom had been sick. This gives an attack rate among these persons of 28.6 per hundred. In contrast were the 21 families on the route of dairy B, in which were 80 persons among whom there were no illnesses, and the 11 families on the route of dairy C in which were 41 people among whom there were no illnesses. This data is summarized in Table 1.

TABLE 1

ATTACK RATE PER 100 BY DAIRY

	Number Families	*Total Persons in Families*	*Number Sick*	*Attack Rate per 100*
Dairy A	33	112	32	28.6
Dairy B	21	80	0	0
Dairy C	11	41	0	0

In the families obtaining milk from dairy A were 32 children under 10 years of age and 80 individuals above this age. Of the 32 children, 23 were sick, giving an attack rate of 71.9 per hundred in this age group. Among the persons in these families over 10 years of age only 9 cases occurred giving an attack rate of 11.2 per hundred. From this it is obvious that the disease attacked young children much more frequently than it did older children and adults. The high rate in children under 10 would seem to be due to the fact that children of this age are the regular milk drinkers in families purchasing milk. This data is summarized in Table 2.

TABLE 2

ATTACK RATE BY AGE—DAIRY A

Age	*Total Persons in Families*	*Number Sick*	*Attack Rate per 100*
0–9	32	23	71.9
10	80	9	11.2

The families on the route of dairy A obtained their food supplies, other than milk, from 10 different groceries. Families living in one section of the town naturally purchased foods, other than milk, from their neighborhood grocery, while those living in another and separate section of town just as naturally purchased their foods, other than milk, from the grocery nearest to them, there rarely being any source of food supply common to two such groups of families. The only two items common to both such family groups were milk and water. Water is easily ruled out as the medium of transmission by the fact that the illnesses were limited entirely to families obtaining milk from dairy A, no cases occurring in the families obtaining milk from dairies B and C, although the families on all these routes were using a common water supply. Further, some of the 33 families obtained their food supplies, other than milk, from as many as 4 entirely different groceries. These facts make it unlikely that any food other than milk from dairy A was the medium through which the causative agent was transmitted.

Of the 32 people who were sick, 25 were able to furnish quite accurate information as to the time of day when the suspected milk was last taken and the time of day when onset occurred. The interval of time between last taking the suspected milk and the onset of illness ranged from 1 to 7 hours, with an average of 4 hours. This short incubation period strongly suggests that the etiological agent was a preformed toxin. If the etiological agent had been an organism the incubation period would likely have been longer.

SUMMARY OF INVESTIGATION OF PLANT

The investigation of the pasteurization plant and dairy farms of dairy A was made by the State Milk Sanitarian. This investigation revealed that, at the time of the outbreak, the milk of dairy A was being taken, according to the best information obtainable, from 102 cows; of these, 98, distributed into 4 different herds and milked in as many different barns by different people, were examined; 4 had been sold for slaughter subsequent to the outbreak because of admitted difficulties with udders. Approximately 300 gallons of milk were being taken daily from these herds and pasteurized at a central pasteurization plant. Two hundred quarts of this milk were being labeled Grade A raw milk, in spite of the fact that it was pasteurized. All four barns showed gross lack of attention to proper sanitation. Two of them had no milk houses at all; two had milk houses in poor state of repair. The water supplies of all were considered poorly safeguarded. Milk was being strained in the barn at all four places. A milking machine was being used at only one and this machine was in a very dirty condition. Milk stools were dirty at all four barns. Manure was plentiful around each of the barns, permitting fly breeding. In one instance, hogs were running loose in and around the barn. All milking utensils were dirty. At all, screens either did not exist or were in a poor state of repair providing little protection against flies. These and many other sanitary defects were found to exist at all of the barns in which the milk was being produced.

The pasteurization plant, where the milk from all of these barns was being pasteurized, was generally unkempt and badly maintained. Screens were in a poor state of repair and the water used for utensils and bottle washing was not being properly sterilized. Waste from the plant was being run out onto the surface of the ground, about 20 yards in front of the pasteurization plant, creating an unsightly nuisance. Considerable amounts of milkstone was present on utensils, particularly the pasteurizing vat, showing evidence of lack of attention to proper cleaning. Bottle caps were stored in such a way that they were not protected from dust and contamination. Cooling of milk, following pasteurization, was wholly inadequate. The pasteurized milk, about 45 minutes after being bottled, showed a temperature of 78° F. The afternoon milk was being run over the cooler into the pasteurization vat, where it was allowed to stand over night being pasteurized about 9:00 A.M. the following morning. The temperature record from the pasteurizing vat revealed that the temperature of the milk, being so held, was rising during the night to as high as 76° F. These and other defects were found to exist in the pasteurization plant.

The Sanitarian took strip-cup tests from the udders of 98 cows. While making these tests he found physical evidence of 9 infected quarters among the cattle from which the milk of dairy A was being taken. From bacteriological examination of strip cup specimens, hay bacilli, along with staphylococci, and streptococci, were found. Neither the staphylococci nor streptococci were hemolytic. Only hay bacilli were found in the milk after it had been pasteurized. Forty-two of the 98 cows from which tests were taken, showed non-hemolytic staphylococci, on blood agar. Three of these gave abundant growth in mannitol broth, and 2 of the 3 were toxin-formers according to the coagulase test.

The evidence is deemed sufficient to warrant the conclusion that staphylococci, which were toxin formers, were finding their way from the udders of cows into the milk supply and that these organisms had ample time to multiply and produce their toxin when the milk was left in the pasteurization vat over night at a temperature ranging as high as 76° F. Pasteurization of such milk on the following morning would have killed the organisms but would not likely have destroyed the toxin. Pasteurization would account for the fact that no staphylococci could be isolated from the pasteurized specimens obtained on the day the illnesses occurred.

SUMMARY AND CONCLUSIONS

1. Epidemiological investigation revealed that all cases of illness occurring in individuals making up the 65 families investigated, obtaining milk from 3 dairies, were in 33 families that obtained milk from dairy A.

2. The attack rate among individuals obtaining milk from dairy A was 28.6 per 100.

3. The disease attacked children under 10 years of age more frequently than older children and adults. This is probably attributable to the fact that children of this age are more regular milk drinkers.

4. The barns and pasteurization plant of dairy A were found inadequate and in poor sanitary condition.

5. Nine of 98 milk producing cows were found to have physical evidence of udder infection. Four cows had been sold from the herd because of admitted udder difficulty.

6. Forty-two of the 98 specimens of milk taken on strip-cup tests from the 98 cows showed non-hemolytic staphylococci. Three of the 42 specimens gave abundant growth of non-hemolytic staphylococci. The organisms from 2 of these 3 specimens were found to be toxin-producers by the coagulase test.

7. No staphylococci were isolated from the pasteurized specimens taken from the milk route on the day that most of the illnesses occurred. This was probably due to the fact that the organisms were killed by pasteurization after the milk had been allowed to remain in the vat over night at temperature as high as 76° F. It is not likely that the heat of pasteurization would, however, have destroyed toxin produced by these organisms.

Two-Stain Method for Direct Bacteria Count

P. H. H. GRAY

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A TWO-STAIN solution has recently been developed, with especial reference to differentiating capsules on bacteria. The solution has also been found to be applicable to staining milk films. The solution is prepared as follows:

A. 1% aqueous methylene blue.....	50
Methyl hydrate.....	50
B. 1% aqueous basic fuchsin.....	25
Methyl hydrate.....	25

Mix A and B.

Milk films, either of raw milk, or of pure cultures of bacteria in sterilized milk, are dried and treated (if not skim milk cultures) with xylene, which is washed off with methyl alcohol; the film is again dried and stained for a few seconds with the two-stain solution. Pre-treatment with xylene and methyl alcohol is not necessary with pure cultures in skim milk. A mixture of ethyl alcohol and tetrachlorethane in equal volumes may be used in place of the xylene and methyl alcohol. Bacteria and other cells are stained blue, serum solids and casein pink.

The stain has not been tested in routine bacterial milk counts. It has an apparent advantage over the Breed and Newman-Lampert stain in that there is no eye-strain in picking out the cells; it may be considered to have an advantage over the Broadhurst-Paley stain in that it is easier to prepare.

The solution has given good results with raw market milk, both fresh and sour, and with pure cultures of acid-forming and inert bacteria in milk, e.g., *Streptococcus lactis, Str. salivarius, Lactobacillus bulgaricus, L. casei*, and acid fast bacteria of the genus *Mycobacterium*.

Report of the Committee on Sanitary Procedure

C. A. ABELE, *Chairman*

City Health Department, Chicago, Illinois

YOUR committee has operated under serious handicaps during 1942. The construction of milk pasteurizing equipment has virtually been discontinued; consequently, new departures in equipment are not being designed. The only real activity in this line is the search for alternative materials to replace critical metals.

Because of these circumstances the committee was called upon during the year to consider only one subject—glass tubing, one type of substitute for metal milk piping.

The nature of this product, the design of the connections needed, and the manner of its use, have been described in the JOURNAL OF MILK TECHNOLOGY (1), and by a speaker on the program of this meeting (2).

Although a number of experimental installations of sections of this type of glass milk piping have been made about the country, only a few members of your committee have been in position to make a critical study of operations; and there has been no opportunity to study, except perfunctorily, those parts of the connections which differ from approved standard fittings, because the nature of their composition is still in a state of flux.

Members of the committee who have had an opportunity to study glass tubing in operation desire, however, to amplify the account of advantages of glass piping in the JOURNAL description, and also to call attention to certain disadvantages which should be made known to prospective users.

In addition to ease of cleaning and ready visibility of the inner surface, listed in the JOURNAL description, visibility of the rate or condition of the flow through the section constitutes a very practical advantage in certain specialized situations. When a section of glass piping is placed on the suction side of a regenerator, leakage which permits the incorporation of air is readily detected. When a section of this piping is placed in the flow-diversion line of a flow diversion valve, incomplete drainage of the line is revealed. The installation of a section of this piping in any horizontal milk pipeline will reveal incomplete filling of the line with bactericidal solution, which is a frequent cause of inefficiency or failure of this type of bactericidal treatment.

It has been claimed that leakage at the joints of glass piping is minimized by the resiliency of the gaskets used, and that a high degree of flexibility of the pipeline results. The use of connections of a similar type would undoubtedly have the same effect upon metal piping; consequently, reduction of leakage at joints, and increased flexibility of the line, can hardly be claimed as advantages inherent to glass piping.

Some of the disadvantages of glass piping are inescapable; others are less obvious.

1. Susceptibility to breakage is the main disadvantage. A section of this piping cannot be carelessly dropped into the wash-vat or swung around without regard to the proximity of a column or massive stationary equipment, nor can fittings be tossed into a vat into which such pipes have been placed, without dire consequences. The connections of a metal pipe line in which a section of glass piping is to be inserted must all be tightened before the glass-metal connections are made, else the torque or shock caused by the application of a wrench or the striking of a blow may—and probably will—crack the glass section or chip the bead at an end.

2. Glass piping is not suited for use in lines connecting equipment which is not firmly fixed in position; that is, which is subject to jars or slight movement, such as suspended drop-tanks or movable pumps. Lines including glass sections should preferably be suspended from hangers, unless quite short.
3. The danger of chipping the beaded ends of glass pipe sections in wash-vats encourages the practice of leaving the gaskets in place, which might result in a tendency to neglect cleaning under the gaskets.
4. Fracture of the end bead, and chipping thereof after assembly, might result in the appearance of particles of glass in the bottled product. It has been pointed out that a distributor in whose product particles of glass have been found is in a less defensible position when he has one or more sections of glass piping in his milk line assembly. But, if his product is distributed in glass bottles, it is presumptuous to charge that the glass piping is the sole potential source of the particles of glass.
5. Because of the added care necessary in the handling of glass piping which is regularly dismantled for washing, more time is required for dismantling, washing, and assembling such pipe lines.

These potential disadvantages—singly or in the aggregate—do not, in the opinion of the members of the committee who have studied the matter, constitute justification for opposition by milk sanitarians to the use of glass piping as an alternate for metal milk piping, in the light of existing knowledge on the subject.

Members of your committee have undertaken to canvass the situation with respect to dairy farm equipment, for the purpose of ascertaining the possibilities for substitutes for the metals currently used in their manufacture; but without striking success.

The use of plastic materials for such parts of equipment as milking machine teat-cup holders is familiar to most milk sanitarians; their use for making milk piping is under experiment and test. The substitution of glass for metal in the construction of milking machine pails is awaiting only the granting of priorities for and the construction of the necessary molds and dies.

The committee deems itself compelled, because of the current and increasing degree of inability to obtain replacements or additional milk plant equipment, to impress upon all milk sanitarians their responsibility to insist that processors of milk exercise the greatest care in the operation and maintenance of plant equipment, in order that it may continue in satisfactory service for as long a period as possible.

The committee has completed an action initiated by the 1941 committee. This has consisted of the notification of the Howell Electric Motors Company, of Howell, Michigan, that Howell Sanitary Motors, built in frames Nos. 204, 224, 225, and 254 meet the 3 A specifications for sanitary motors, as published in the JOURNAL OF MILK TECHNOLOGY, January–February, 1942, pp. 32–34. The Dairy Industries Supply Association, and the International Association of Milk Dealers, have been notified of this action.

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Serious Flaws in Milk Control Policy Which Impair Our War Effort*

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TODAY, more than ever before in our history, there is growing public disapproval of the manner in which the American city milk supply is being administered. It can scarcely be looked upon as a matter that has been precipitated entirely as a result of the present National Emergency, although it is a problem which concerns it enormously. Many years before Pearl Harbor, it was evident to some that there was mounting a tide of criticism in this country of the high price of milk. And before the war, a large number of the more alert public officials, including milk officials, conscious of public opinion, had already braced themselves to face a most searching investigation into the question of the city milk supply.

With America's entrance into the war, it seemed at first as though the milk issue would be postponed indefinitely. People had more pressing matters to concern them. The price of most all foodstuffs began to spiral upward, and milk, in this regard, was not unduly conspicuous. And, besides, the public seemed almost overnight to become more conscious than ever of the importance of the nutritional aspects of milk and its products.

But, with the same economic impediments present as before the war, which obstructed then as they do now the free action of the very heart of market milk production, it was naturally not to be expected that the milk question could remain for long out of the public eye. You cannot cure a disease, which requires a surgical operation, by ignoring it. And so, we recognize now the same old trouble breaking out once more, but this time in another spot, in the form of an acute milk shortage.

Before casting any reflections upon others, it behooves us first to take stock of our own responsibilities as milk sanitarians and look for anything that we are doing, or have done, that may affect the present serious problem in regard to the procurement of an adequate supply of palatable, safe milk at a reasonable price to meet the ever pressing needs of the Army and our many large centers of industrial population.

THE NUTRITIONAL ANGLE

Unquestionably, the most serious defect at the core of administrative control of city milk supplies in America today, is the manner in which the nutritional angle of the problem is being either overlooked, or totally ignored by the vast majority of Boards of Health. This seems true, with but a few illuminating exceptions, all the way from the United States Public Health Service, right on down to the board of health in our smallest town.

This is a pitiful situation. For twenty long years we have been in possession of scientific facts pertaining to newer knowledge of nutrition, and have understood the important relationship of increased consumption of

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milk and its products to the public health. And yet, with the exception of a few health departments there has been very little, if anything, done about it, and many seem to have completely closed their eyes to the question of whether this advice is even practical, economically speaking, of attainment. That is, of course, until we have radically changed our present conception of the aims and purposes of public health milk control. Obviously, the poor man with a large family cannot even hope, at present, to comply with this one-pint-one-quart-sort-of-talk until we do something about the economics of the milk question.

If I were asked to express an opinion as to the most necessary single amendment to the Standard Milk Ordinance, or to any of the other nearly two thousand conflicting milk ordinances in America at the present time, I would venture this suggestion: Make clause one of every milk ordinance read as follows: "'It shall be the duty of the health officer not only to insure a safe, unadulterated milk supply for the community, but it shall be also his responsibility to at all times perform such duty in a manner that will in no way obstruct or hinder the procurement of a plentiful supply of milk, at a price that is within the reach of all classes of people."

In the absence of much needed unification of milk regulations in this country, this thought is not submitted in the belief that it is either practical, or that it could be made effective, pending much closer coordination of our entire public health milk control system than we have today. It is presented rather to illustrate what our public health policy in milk control ought to be, if we are to get in line with our over-all modern day knowledge on the milk question. And such knowledge seems to present two fundamental public health truths of the city milk supply which unfortunately have not yet been fully assimilated by all concerned. These are:

SOLVED: Milk Safety! There is no longer any great or mysterious problem to be considered in providing a safe city milk supply. Indeed, science solved this angle of the milk question long ago. It is now only a matter of applying such technical knowledge as we have in a practical, realistic manner.

UNSOLVED: Milk Nutritional Angle! The real public health milk problem of today is clearly linked to nutrition. And it seems that our present tragic disregard of this fact is not only seriously impairing, but actually threatening, our entire national nutrition program which is, of course, so vital to our War Effort.

So many things happened in 1939, including the march of Nazi Germany into Poland, and the plunging of Europe into a sea of flames, that it is rather difficult to recall a number of important events of that year, particularly in respect to science. But in 1939 there were two great pieces of technical work made available, which, if carefully reviewed and weighed together, present a most complete and comprehensive summary of correlated facts, or should I say, a birds-eye-view of the sum-total of our modern day technical knowledge over the past twenty years, in respect to the entire question of food in relation to human life. I refer to Shrader's extensive work, *Food Technology,*[1] which embraces the entire field of the subject and where the milk question never loses its true significance, and to *Food and Life,*[2] a wonderful contribution by the United States Department of Agriculture, devoted completely to a discussion of all angles of the nutritional side of the food problem, in relation to both humans and animals. And it is the complete picture so clearly presented through these two timely and forceful works of science that has caused me to have a completely new conception of what should constitute the aims and purposes of official milk control, and this could not be accomplished until my older views on the subject were re-examined and modified where necessary.

Let us consider a quotation from McLester's *Nutrition and the Future of Man*[3]: "In the past, science has conferred on those people who avail themselves of a newer knowledge of infectious diseases, better health and a greater average length of life. In the future, it promises to those races who are taking advantage of the newer knowledge of nutrition, a larger stature, greater vigor, increased longevity, and a higher level of cultural attainment. To a measurable degree, man is now master of his own destiny, where once he was subject only to the grim hand of Fate."

The point to be made, of course, in respect to McLester's quotation, is that the truth he so eloquently expresses in regard to nutrition, is unfortunately not one that is embraced as a part of the philosophy which underlies our public health milk control policy in America today.

THE QUESTION OF AESTHETICS

Let us look a little deeper into this question of aesthetics in relation to curtailment of the flow of milk for market purposes.

It is often said that the terms "aesthetics" and "milk quality" are used loosely and mean different things to different people. This, of course, is only a half-truth. The whole truth is that the confusion lies in the term "aesthetics" meaning something different to one and the same person, particularly in public health circles.

Take some sanitary engineers, for example. Their aesthetic tastes are not in the least offended as they watch polluted water flow into a water treatment plant, yet their vivid imaginations immediately jump into action on all four cylinders as they watch and "suspect" milk as it arrives from the average honest farmer at a pasteurization plant.

May it be inquired: Just what does this same sanitary engineer believe a farmer or a cow may put into the milk supply, that he may not find a thousand-fold in the Mississippi River? Do we shudder as we drink a good glass of water in St. Louis? Do we stop to consider the aesthetics of the Mississippi River? Why, certainly not!

May it also be asked: Just what has a water treatment plant got that a pasteurization plant hasn't? And to cope with our ever-increasing growth of population now so densely settled in America, just what has the ingenuity of the engineer done to get around this problem that Pasteur, Rosenau and others have not done to enable us to free ourselves of milk shortages, if we but have common-sense enough to apply, in a practical way, the knowledge that they have placed into our hands.

The beauty, however, of the positive control over a milk supply as received at a pasteurization plant, as contrasted with the inflow of water at its treatment plant is this: Water cannot be rejected as a rule, no matter how bad it is, whereas we can actually stand on the platform at a pasteurization plant with our acidimeter, sediment tester, our simple equipment for the methylene blue test, and with our microscope and the various other technical devices that laboratory research has placed into our hands, we can determine to within more than ninety-nine percent of accuracy, whether or not milk is free from adulteration, free from sediment, carries no more than a reasonable bacterial content, possesses good taste, and otherwise whether or not it is a pure, decent, wholesome product fit to be pasteurized. We may reject it if it is not. We can do all this without even having ever set foot on the dairy farm from which such milk may be derived, very much in the same manner as science has now enabled a pilot to fly blindly to any part of the earth, if he will but use the technical instruments with which he is blessed. We may overcome many difficulties in our milk work, if we will but stop being antiquated in this fast moving world.

The experiment of trying to obtain aesthetically pure Certified Milk has produced no positive results in approximately half a century. Indeed, many practical-minded eminent physicians today recommend pasteurizing this product. Moreover, other equally eminent physicians prescribe evaporated milk now for infant feeding, which, of course, has no *official* aesthetic requirements whatsoever. And since the price of fluid milk at this time is practically beyond the poorer classes, the question presents itself as to whether health departments are still justified in expending so much time and effort in continuing our present day follow-your-nose dairy farm inspection system in an idle search for aesthetically clean milk for pasteurization purposes.

This is not to argue that farm inspection is entirely unnecessary, but rather to emphasize that the value of farm inspection is to be derived from concentration on education in respect to methods, rather than focusing so much attention on expensive premises and equipment. It seems clear too that in many of our fast growing milk sheds, where sources of milk production are scattered over a vast area, local boards of health with limited finances, inadequate and frequently inexperienced personnel cannot expect to conduct such education in a worthwhile manner, and that where they try to do so, it is often at the expense of more important activities—particularly, adequate platform inspection and proper constant supervision over the pasteurization process and subsequent handling of milk.

In cities where milk is permitted by law to be sold in its raw state, farm inspection, of course, is necessarily a responsibility of the board of health which should not be relinquished. But, in the presence of pasteurization of the product it would seem that farm inspection may be considered the definite responsibility of industry. Indeed, in the face of rigid platform inspection it would undoubtedly pay industry to assume such responsibility, and we may be sure that a pretty thorough job would be made of the undertaking as a safeguard against instant rejection of inferior milk on the spot (which unfortunately our official plate count system at present does not enable) at the platform of the pasteurization plant. And, there is also every reason to believe that in taking up such slack, in regard to farm inspection, industry would quickly find all the technical guidance needed through competent milk specialists of the department of agriculture.

The phosphatase test has revealed numerous instances of improperly pasteurized milk in this country which would never have occurred under more appropriate and adequate official supervision at the plant. With our limited appropriations, therefore, many of us now are prompted to the wisdom of placing less weight upon farm inspection, and a great deal more emphasis upon pasteurized milk supervision both on the platform and in the plant. Indeed, my personal feeling is that every milk pasteurization plant in this country should have at least one thorough inspection per day, while at the larger plants, there should be one or two honest-to-God milk specialists assigned in constant attendance—in very much the same manner as the Bureau of Animal Industry, and some cities, now exercise control over the meat supply.

Organization and Personnel

Certain of the powers that be have seen fit in some instances of late to demote milk hygiene from its former high plane as one of the most important bureaus of the whole health department, to a subordinate unit of the Bureau of Sanitation, where now our most nearly perfect food is frequently confused with such public nuisances as mosquitoes, flies, and vermin problems, insanitary toilets, sewage disposal, polluted water supplies, and not infrequently — the garbage question. If official milk control is not to be a distinct bureau responsible only to the health officer, then by all means, its activities are such that it should be relegated to the Bureau of Laboratories, with which it has so many technical matters in common. This is one of the most unfortunate situations that exists in official public health milk control today, and plays no small part in the deplorable delay on the part of many state and city health officers in becoming conversant with the present critical market milk problem. In many instances, even sanitary engineers at the head of milk control, after many years experience as milk specialists, have no alternative but to report their intricate problems indirectly, if you please, through another, and often uninformed engineer, in order to have them appropriately considered by the health officer.

It seems only proper to refer to the fact that such administrative policy is handed down to state and city boards of health frequently from the United States Public Health Service, which itself has such organization in respect to milk control. Indeed, through its own limited organization, with no nicely balanced technical milk personnel, it has no alternative but to extend its advisory milk service through its corps of sanitary engineers, many of whom do not even pretend to be milk specialists. The said Service, as we all know, possesses several highly esteemed milk specialists, but for the scope of the job it undertakes, the organization for the work is neither balanced nor adequate. This serious handicap in organization on the part of the United States Public Health Service is a matter that is felt directly and indirectly in milk control matters throughout the country.

Bearing in mind that experience has demonstrated that it takes practically a lifetime to make a dairyman, it is rather undignified and disturbing to see milk specialists with little or no technical qualifications or experience in dairy science, trying to spring up like mushrooms overnight. I think it is only appropriate to quote in part, three most amazing statements from reprint #2051 of the *Public Health Reports* dated March 31, 1939, of the Public Health Service[4]: First the admission that "Practically none of the graduate sanitary engineers in the field today included a study of milk sanitation in their undergraduate courses," (this is still true). Yet, irrespective of this fact the advice follows: second, "where possible, milk control work should be a function of the State sanitary engineering division," and to make up for shortcomings, so to speak, the final word of advice is: third, "those sanitary engineers who have already graduated and who are now engaged in or may in the future wish to undertake milk sanitation work should either attend post-graduate courses in milk sanitation or one or more of the milk sanitation short courses or seminars which are being conducted by various State boards of health and the Public Health Service." In other words, get wise, even though through a short-cut. Again may the question be asked: Is there any wonder we have a public health milk problem wherein the nutritional angle of the consumer, and the economics of the dairy industry are lost sight of? Those of us who appreciate the splendid activities (insofar as they go) of the Public Health Service, both past and present, in many spheres of endeavor, particularly in research, public health nursing, epidemiology, et cetera, must naturally conclude that official milk control is just not one of the long suits of this high ranking federal agency. But despite this conclusion, the fact remains that anything that the Public Health Service says or does, in respect to the milk question, is apt to be magnified in the eyes of many, merely because it is from the United States Public Health Service. It seems highly probable that the Public Health Service itself is not truly conscious of this, or

otherwise it would, we may be sure, exercise more appropriate safeguards in this respect.

I do not propose to touch here upon the delicate question in official milk control of the merits and demerits of sanitary engineers, veterinarians, and dairy graduates or even laymen, many of whom (I refer to the laymen) occasionally make more useful practical application of their experience in milk control work than do those with academic training. The truth is, all are necessary. And on the other hand, it seems folly to speak of which of these professions have contributed most to the solution of the milk question thus far, since the answer to that argument is self-evident. The reply is that it is not the sanitary engineer, veterinarian, or the dairy graduate in the true sense of the term, but on the contrary, none other than the laboratory bacteriologist and chemist in research. This is not an opinion; this is history.

Another self-evident fact that seems worthy of note is that milk control is not a matter or a field which lends itself to courting a fraternal organization of engineers, veterinarians, or any other profession. Such a policy is comparable to trying to run a hospital with a medical personnel comprised entirely of specialists in obstetrics. It would seem that it cannot be too strongly emphasized that merely because a man is a sanitary engineer or a veterinarian or a dairy graduate, he becomes thereby de facto a public health milk specialist. This, naturally, applies as much to the Army Veterinary Corps as it does to the Public Health Service.

FEDERAL INFLUENCE

Firstly, the sphere of influence of the United States Department of Agriculture is perhaps not felt to the extent it should be, in framing public health policy. This is to be regretted because of its great breadth of experience in the fields of nutrition and dairy economics.

Secondly, the influence of the United States Public Health Service in milk control matters is considerable, and probably much beyond the scope this organization actually desires or can do justice to, due to inadequate organization and facilities.

Thirdly, the influence of the Office of the Surgeon General of the United States Army, through its Veterinary Corps, is felt in a positive and most unmistakable manner. The average Army milk specialist actually does not want to tear things up or to disturb the atmosphere, but, no less, he is comparable rather to a very kindly, good-natured sort of a bull, who finds himself unexpectedly in a china shop. What to do about the matter he is still not quite sure, but until he makes up his mind, it would be well if we all kept our fingers crossed.

To return to the United States Public Health Service, Rosenau[5] states: "Public health administration in the United States is a police power which rests with the states. The federal government, however, plays an important part in coordinating, cooperating, demonstrating, investigating and educating. This is the function of the Public Health Service."

It will always remain a very deep mystery to some of us, how anything of such a controversial nature as the Standard Milk Ordinance ever escaped past the proverbial watch dog of this august organization, with all of its lofty ideals as to aims and purposes; originally intended, of course, to promote public health coordination of the forty-eight states rather than to split the majority of these states wide apart on a purely debatable issue.

The Standard Milk Ordinance has been with us for practically twenty long years. It has had a fair trial, and it comes no nearer unifying milk control in America today than a decade ago. Throughout this prolonged period of time, approximately only one-third of the municipalities in this country have adopted it, whereas there seems no longer any likelihood that the majority ever will, within our time, or within the period of this grave National Emergency, unless the Public Health Service makes a realistic approach, as we trust it will, toward the entire problem.

Because it is the United States Public Health Service, however, my feeling is that despite all else we should endeavor to find ways and means of retaining the Standard Milk Ordinance in some modified form for sentimental reasons, out of our respect, if for nothing else, for the prestige of this important federal agency. After all, I trust we are almost all agreed that we need uniform regulations, and with a wholesome degree of compromise on all sides, I see no reason why the Standard Milk Ordinance should not be utilized as the framework about which this end may be attained.

CONCLUSIONS

It is with considerable reluctance that I place myself in the position of being critical of our present day system of public health milk control. Like many of you, I have been associated with this particular system for a long period of time, and have had an opportunity over these years to study its virtues and its faults. Our present uncoordinated system of milk control constitutes not only a serious blot upon the enlightenment and prestige of public health authorities throughout America, but in addition, it is jeopardizing the economics of the dairy industry, is seriously impairing public welfare, and is, without doubt, dangerously undermining our War Effort.

It is with such thoughts in mind, therefore, that I present for consideration the following conclusions:

1. That the present lack of uniform milk regulations, and closer coordination of our entire milk control system in America is largely responsible for trade barriers, which handicap the much needed free flow of milk; that this situation is an important factor involved in the question of the high price of milk and of low milk consumption; and that delay in solving the problem is seriously undermining our War Effort, since there is now a growing shortage of fluid milk for our Army and civilian population alike.

2. That our present system of official milk control policy trespasses too far into the purely aesthetical and economical side of farm dairy control, often with no true public health purpose to be served, while losing sight of the growing public health need of more adequate supervision and control of milk as received at the plant, and of its subsequent processing and handling.

3. That due to faulty administrative policy on the part of many state and city boards of health, official milk control is at present improperly organized, and the technical personnel engaged is frequently lacking in well-rounded experience, with a result that both the economical and nutritional angles of the milk problem are being seriously mishandled.

4. That many of the obstacles delaying adoption of unified regulation and a more coordinated system of milk control, in this country, may be attributed to the same faulty organization of milk control as referred to in conclusion number three.

5. That while it would seem important for control over all final milk safeguards to remain in the hands of city departments of health, including determination at the plant of the fitness of milk for pasteurization purposes, that is, pending the creation of some appropriate state system of milk control, economical considerations, otherwise, point to the advisability of divorcing farm inspection entirely from the scope of activities of local health departments and consideration being given to the wisdom of placing it in some way under the broader experience and influence of the United States Department of Agriculture, through a new form of organization to be studied and set up.

(Continued on page 100)

The Relationship Between the Temperature of Pasteurization (holding method) and the Appearance of Cooked Flavor in Homogenized Milk

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HOMOGENIZATION not only introduces into milk a new "creamy" or special "homogenized" flavor element, which to most people makes the milk more palatable, but also tends to suppress or counteract any developed cooked flavor from over-pasteurization. In other words, homogenization of milk could make possible pasteurization by the holding process at a slightly higher temperature than the usual one without danger of developing a cooked flavor. This property could prove useful in the sanitary safeguarding of milk, since the bacterial count tends to fall in proportion as the heat treatment of pasteurization becomes progressively increased.

The problem of flavors in milk has always been difficult because of the individual factors involved. Even when evaluations are confined solely to the so-called cooked flavor, the problem of obtaining complete uniformity of judgment is almost insuperable. The reason is that every person has his own idea about flavor and no two persons have the same sensitivity towards change in flavors. Nevertheless, a trained person can develop a rather stable and fine sense for milk flavors. Experts, as a rule, will be able to agree on off-flavors within a certain not-too-wide range. If a sound judgment is to be obtained, it is particularly important to state at what temperature the milk sample was tested, as the tasting temperature is a dominating factor in the detection of off-flavor. Too often the value of flavor experiments has been greatly reduced because of neglect of this fact.

As change in milk flavor is connected with chemical processes, it might be possible to replace the unstable human taste with a chemical test. Such a test has been developed for the cooked flavor (1)—depending on the creation of sulfhydryl in milk during the heating process. The sulfhydryl compounds seem to be responsible for the cooked flavor and can be detected by help of a special reagent. But as the final judgment is to be given by the consumers, the public, who rely entirely on their individual tastes, it is easy to see the limited value of a chemical test, which in the last instance has to be compared with the human taste to determine its range of usefulness.

Since the following experiments were carried out by a person experienced in milk testing, they may be of interest in contributing to the problem of how much heat treatment can be applied to homogenized milk during pasteurization if cooked flavor is to be avoided.

To study the flavor problem, a number of experiments have been carried out on market homogenized milk in Philadelphia.

In the first set of experiments, typical samples of market milk were selected from twelve dairies using different holding pasteurizing temperatures (Table 1). In all the cases, pasteurization preceded homogenization of the milk. The samples were investigated for cooked flavor. To prevent any influence on the test from advance knowledge about the temperature to which the milks had been exposed, the pasteurizing temperatures used were not revealed to the flavor investigator until the whole experiment was finished. The heating temperatures are those applied by the dairies, and have the exactness possible to obtain in a commercial dairy plant. The milk was tasted at a temperature of 70° F.

TABLE 1

DEVELOPMENT OF COOKED FLAVOR IN HOMOGENIZED MILK (PRELIMINARY TESTS)

(July–August 1940)

Dairies	*No. of tests*	*Pasteurizing temperature*	*Homogenizing temperature*	*% Samples with cooked flavor*
1–2–3–4	48	144–150° F.	150–156° F.	0
5–6–7–8–9	60	150–152° F.	156–158° F.	4
10–11	48	155° F.	161° F.	14
12	18	160° F.	166° F.	33
Total	174			

Since the milk is cooled down immediately after leaving the homogenizer and hence exposed to the higher temperature here only a short time, the heating effect from the pasteurizer must be regarded as the dominating factor in the production of a cooked flavor. With increasing pasteurizing temperature there is a clear tendency toward increased numbers of tests with cooked flavor. But the observations show that a pasteurizing temperature up to 150° F. is satisfactory for homogenized milk even if the milk now and then should reach the temperature of 156° F. during later passage through the homogenizer.

To obtain a confirmation of this preliminary test, samples of homogenized milk were flavor-tested over a long period of time (Table 2). One dairy performed the pasteurization of the milk after the homogenization in one of its plants (A1), and pasteurization of the milk before homogenization in another plant (A2). It is an interesting fact that 3 percent of the samples showed cooked flavor in the homogenized-pasteurized milk while no cooked flavor was detected in the pasteurized-homogenized milk. Although these few tests are not enough for any generalization, they indicate that with constant time and temperature of holding there is less tendency for the

TABLE 2

DEVELOPMENT OF COOKED FLAVOR IN HOMOGENIZED MILK

(Oct. 1940–July 1941)

Dairy	*No. of tests*	*Pasteurizing temperature*	*Homogenizing temperature*	*% Tests cooked flavor*	*Pasteurized before or after homogenization*
A_1	130	143° F.	150° F.	3	after
A_2	10	143° F.	150° F.	0	before
B	47	145° F.	152° F.	2	before
C	116	148° F.	156° F.	2	before
D	48	148° F.	156° F.	4	before
E	96	150° F.	154° F.	4	after
F	24	150° F.	156° F.	0	before
G	98	150°–155° F.	156°–161° F.	7	before
H	119	155° F.	161° F.	6	before
Total	688				

appearance of a cooked flavor when pasteurization preceded homogenization. Some confirmation may be found when Dairy E and Dairy F are compared. Each used the same pasteurizing temperature. In homogenized-pasteurized milk, 4 percent of the samples showed cooked flavor while no cooked flavor samples were recorded in pasturized-homogenized milk.

But on the other hand, Dairy C showed 2 samples and Dairy D showed 4 samples with cooked flavor although their pasteurizing temperatures were recorded as 148° F. and the pasteurization was performed before homogenization. It is possible that the holding temperature in these few cases accidentally might have exceeded the customary pasteurizing temperatures, or error may have been introduced by virtue of the relatively inexact flavor test even though performed by one and the same individual. Tables 1 and 2 taken together show a clear tendency toward increasing cooked flavor samples when higher pasteurization temperatures are applied. It must be stated that the extensive experiments recorded in Table 2 show a much more favorable picture than the limited experiments recorded in Table 1. The maximum cooked flavor samples for a pasteurizing temperature of 155° F. is recorded as 14 percent in Table 1. and only 7 percent in Table 2.

SUMMARY

Experiments indicate that homogenization of milk makes it possible to apply pasteurizing temperatures by the holding method up to 150° F. without any danger of developing a cooked flavor in commercial market milks.

Furthermore, there is a slight indication that at this temperature there is less danger of the appearance of a cooked flavor when pasteurization precedes homogenization rather than when homogenization precedes pasteurization.

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HOLM SUCCEEDS ROGERS

Dr. George E. Holm, biochemist in the U. S. Bureau of Dairy Industry since 1920, has been appointed chief of the Division of Dairy Research Laboratories to succeed Dr. Lore A. Rogers, who retired in August, having completed more than forty years in dairy rsearch work in the U. S. Department of Agriculture.

From *Science*, February 19, 1943, page 181.

Report of the Committee on Dairy Farm Methods, International Association of Milk Sanitarians, 1942

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MEMBERSHIP in the committee has been increased this year in the attempt to have the principal milk-producing areas represented. In this way the best conception of the problems that milk producers meet would be brought up for consideration. This report is based on the replies from letters that were sent to the several members for suggestions. It appears that no new problems concerned them but that some old problems have become of marked importance. The report may be divided into two parts, one dealing with sanitation problems, and the other with problems arising from ailing cows.

SANITATION

Milking Machines. Practically all the members of the committee find the milking machine something to wrestle with. The war has created a dearth of farm labor, consequently milking machines have been widely adopted as a partial solution of this difficulty. Getting them cleaned is a serious problem. The milking machine that is not kept clean is a source of milk contamination. In this committee's report of last year, methods for cleaning and care of these machines were discussed, and interested persons are referred to that report. Since this report appeared, some milking machine manufacturers have put on campaigns to get the users of their machines to clean them properly, but there is still complaint that certain manufacturers are selling their machines without sufficient instruction as to cleaning them. In some cases salesmen give the impression that the machines may be cleaned only occasionally. However, manufacturers in general have cooperated in improving their machines and their use.

In December, 1941, the Michigan Association of Dairy and Milk Inspectors held a milking machine clinic, at which manufacturers of milking machines were invited to demonstrate how their machines should be used, and to make recommendations for their care. H. J. Barnum, Secretary-Treasurer of the Association, has kindly put at the disposal of your committee a report of the clinics. The following table taken from the report gives the procedure recommended by representatives of different machines for cleaning them.

Various methods of cleaning milking machines have been proposed, the object being to clean thoroughly and sanitize the rubber parts with least injury to them. Henderson, Roadhouse, and Folger found that liners treated with chlorine (220 ppm)., or lye (0.3 percent) lasted nearly half as long again as did heat-treated liners. Johns, of the Central Experimental Farm, Ottawa, advises cold water rinse—lye solution method of cleaning, the machines being disassembled for brushing and inspection about every ten days, and says that if the directions given by the farm are followed, liners last 4 to 5 months. Those using chlorine to sanitize their machines should remember that both milk and butterfat quickly reduce its sterilizing power.

The steaming of rubbers has been used in Jacksonville with good results. One dairyman has worked out the following method of handling his milking

TABLE 1

PROCEDURES AS RECOMMENDED BY MILKING MACHINES REPRESENTATIVES

Operations Step by Step Starting Immediately After Milking	1 After Milking Rinse		2 Disassemble and Scrub All Parts Contacting Milk					3 Sterilization After Washing			4 Holding Between Milkings					5 Sterilization Before Using			6 Air Lines Cleaned	
						Inflation Tubes *					Racks		Submerged							
	Cool H_2O	Hot H_2O	Once Daily	Twice Daily	Once Wkly.	Daily	Wkly.	Cool H_2O	180° H_2O	Cl.	Cl.	Lye	Cl.	Lye	Dry	Cl.	180° H_2O	Cool H_2O	Yes	?
1. Surge	x	..	..	x	..	x	..	x	..	..	..	..	..	..	x	x	..	..	x	
2. Hinman	x	x	x	..	..	..	x	x	..	..	x	..	..	..	..	..	..	..	..	x
3. Chore Boy	x	..	x	..	..	0	..	x	..	..	..	x	..	..	..	..	..	..	..	Did not mention air hose
4. Clean Easy	x	x	..	x	..	0	..	..	..	x	..	..	..	x	..	x	..	..	x	
5. International	x	x	..	x	..	x	..	..	..	..	x	..	..	..	..	..	..	..	x	
6. McCartney	x	..	x	..	..	..	0	..	..	..	..	..	x	..	..	..	..	..	..	Does not recommend cleaning
7. DeLaval	x	..	..	x	..	..	x	x	x	..	x or	x	..	..	..	..	..	..	x	
8. Universal	x	..	..	x	..	x	..	..	x	..	..	..	..	..	x	..	x or	x	x	
9. Ford	x	..	..	x	..	x	..	..	..	..	..	..	x	..	..	..	..	..	..	Cleaned daily
10. Page	x	..	..	..	x	..	..	..	..	..	..	x	..	..	..	..	..	x	..	No
11. Perfection	x	x	..	..	x	..	..	..	..	..	..	x	..	..	..	x	..	x	..	Occasionally
12. Rite Way	x	x	..	x	..	..	..	..	..	..	..	x	..	..	..	x	..	x	x	
13. Conde	x	..	..	x	..	..	..	..	..	..	x or	x	..	..	..	..	x	..	x	

* Inflation tubes removed from teat cups.

machine parts. They are given a cold rinse right after milking, then taken apart and scrubbed, after which they are put in a bucket with washing powder and boiled one minute, they are then steamed for 4 minutes and stored dry. The pulsator is washed in vat, put on a steam jet for 5 minutes, and oiled once a week. The hose is steamed for 4 minutes. Before adopting this practice the dairyman's liners lasted 5 to 6 weeks. His liners last for 90 days under his new method for cleaning.

It has been suggested that the Committee on Standardization of Technological Procedure of our Association should make a study of milking machines, and should set standards of easy cleaning so that machines which are so constructed that they cannot be cleaned easily may be disbarred from the market.

Thermophilic and Thermoduric Bacteria. The presence of these organisms in pasteurized milk is a matter of concern; the problem presented by them has been ably discussed before this Association in several different papers. No new facts can be added to those already developed, however, it seems pertinent to recapitulate the points that have been brought out in regard to these bacteria and their control.

In the first place the difference between thermophilic and thermoduric germs should be clearly kept in mind. Thermophilic organisms are lactobacilli, streptococci, and spore bearers, and originate from the soil, bedding, and feeds; they are likely to be prevalent in winter when animals are housed and their coats become dusty. They not only survive pasteurization at the temperatures usually employed, but they multiply at these temperatures, consequently they are distinctly a plant problem and their presence in large numbers in pasteurized milk indicates faulty processing. They are prone to develop in milk pasteurized by the holding process when the milk is held too long in the vat, or when vats are refilled for pasteurization without first cleaning them, for the foam left over from the preceding pasteurization is likely to seed the milk with these organisms. While it is true that the responsibility for their appearance in pasteurized milk in large numbers is the fault of the plant operators, it is also true that they come originally from the farm. It is easy for milk to be contaminated with feed or with dirt where strict cleanliness is not observed.

Thermophilic organisms have no public health significance other than that they may develop to such an extent that the legal limit of bacteria may be exceeded. However, they may produce abnormal flavors in milk, and in severe cases may even cause it to sour, but flavors and odors do not occur until thermophiles reach millions per milliliter. Small numbers of thermophiles in pasteurized milk, that is less than 10,000 per milliliter, are not a cause for concern because a large percentage die off in storage at low temperatures.

Thermoduric organisms grow over a wide range of temperature; in contradistinction to the thermophiles, they do not multiply at normal pasteurization temperatures, but they do survive pasteurization. They represent a mixed bacterial flora; the commonest thermodurics are micrococci. The next most common are the streptococci, after them come the sarcinae, and least common of all are certain spore-bearing bacilli.

The micrococci are regarded as coming from the normal cow's udder. Gibson and Abdal-Malek report that pasteurization tests indicate that the micrococci in aseptically drawn milk are destroyed by heating at 63° C. (145° F.) for 30 minutes which would lead one to expect them to be greatly reduced in numbers by pasteurization by the holding method. Hileman, Leber, and Speck find that "the higher bacteria counts in milk pasteurized by the high-temperature short-hold method

as compared with the low-temperature long-hold method are largely due to the ability of certain species of micrococci to survive the former method of pasteurization in greater numbers. The most common species of micrococci among those found in milk pasteurized at high temperature are *M. candidis, M. epidermis, M. luteus,* and *M. varians* although five other species were encountered less frequently. These micrococci make up the predominant flora of dirty milking machines, strainers, and pails on farms, and about half of the thermoduric flora isolated from milk cans. The work of Harding and Wilson, and of Alice Breed indicates that micrococci make up about 75 percent of the flora of the normal cow's udder. They studied 226 cultures and found that six of the seven species encountered in commercially pasteurized milk in the work reported here made up about 60 percent of the micrococci of the udder, or over 45 percent of the total flora of normal udders. The principal source of the bacterial contamination of the rubber tubes of a milking machine is probably the milk itself. Moreover, many of these species of micrococci can survive inefficient hot water sterilization just as they can survive pasteurization. Robertson reports that many of them apparently also can survive sterilization by chlorine sterilizers and by salt brine. All this explains well the source of thermoduric micrococci in milk. They originate in the udder and grow in improperly cleaned dairy farm utensils.

These thermoduric organisms not only survive pasteurization, but as Mack and Prucha have shown, are resistant to chlorine. They require 100 ppm. for 2 minutes, or 20 ppm. for 5 minutes for their destruction. Merely swashing pails and cans with disinfectant solution does not sterilize them; time is required for the disinfectant to act. Unlike thermophilic organisms, the thermodurics are the farmer's responsibility for his milk may become contaminated with these organisms by contact with poorly cleaned moist equipment on which these organisms develop in enormous numbers. Also, unclean moist milk cans, particularly those kept with lids on in warm places, are likely to furnish thermodurics abundantly. It has been found that cooling waters at 58° to 60° F. in which stirring rods have been rinsed are one of the commonest sources of thermodurics. Their presence in pasteurized milk indicates that the raw milk came from farms where sanitation was poor. Macy and Erickson made an extensive study, covering four seasons, of thermodurics in milk from the St. Paul-Minneapolis milk shed. They found that thermodurics varied in numbers in relation to the season and the quality of raw milk. They will be found in both low and high count raw milk, but a greater proportion of the poorer quality milk will be difficult to pasteurize. In summer 40.5 percent of the samples showed less than 5,000 bacteria per milliliter whereas in winter this figure rose to 80.1 percent. These data indicate larger numbers of thermoduric bacteria in summer milk, usually because of contamination of utensils or faulty cooling. Therefore, when these organisms occur in pasteurized milk the source of the trouble must be sought on the farm. The inspector who is endeavoring to apply corrective measures should pay particular attention to milking machine parts, different pieces of dairy farm equipment, split seams, cracks, crevices, broken solder, milk stone, and unclean milk cans. Careful producers will clean and sterilize plant-washed cans, especially if they have stood some time under warm humid conditions.

While the source of thermodurics is the farm, the number of these organisms in milk is greatly affected by milk plant operations. Prolonged heating of milk at temperatures below that of pasteurization gives them opportunity to multiply. A preheater may increase their number, or a clarifier at the end of a three hour run at 130°–135° F. may show millions of thermodurics in the milk remaining in the bowl. It appears that prompt cooling of the milk is of importance in keeping down thermoduric organisms. Also, it should be noted that they are more likely to cause trouble in high-temperature, short-time pasteurized milk, than in vat pasteurized milk, because they can withstand higher temperatures with shorter holding better than they can lower temperatures with longer holding. Prucha says the remedy to eliminate or reduce the number of these organisms in milk to a point at which they will not be a problem is very simple:

1. Have good equipment and utensils with smooth surfaces and no crevices, open seams, or other hiding places.
2. Wash the utensils and equipment properly so that their surfaces are shiny, and free from bacterial food.
3. Give utensils satisfactory bactericidal treatment.
4. Avoid prolonged heating of milk at temperatures above 100° F. and below 145° F.

Thermoduric organisms are of little public health significance in pasteurized milk. Their presence usually indicates milk contaminated by contact with unclean equipment on the farm, or milk heated in the plant for some time at sub-pasteurization temperatures. They may survive pasteurization in numbers great enough to prevent the milk staying within legal bacterial limits. Therefore, when thermodurics are found in the pasteurized milk, farm and plant conditions should be investigated immediately.

The importance of the thermoduric and thermophilic bacteria from the standpoint of their effect on the phosphatase test has been pointed out by several investigators. Leahy and others have shown that certain bacteria produce phosphatase and have emphasized the need of caution in interpreting the results of phosphatase tests where excessive numbers of bacteria are present. Buck reports that a false positive phosphatase test was obtained from properly pasteurized commercially bottled milk. The bacterial phosphatase was produced by a non-pathogenic organism, *Lactobacillus enzmothermophilus.* It was isolated from the products of four Baltimore dairies and was found in pasteurized milk, cream, and skim milk. The organisms grow rapidly in skim milk and other media at temperatures of 112° to 126° F. (45° to 53° C.) within 1½ hours. Skim milk obtained from a dairy plant and used for standardizing, produced a false positive phosphatase test when the thermophilic organisms were in sufficient numbers. Raw milk heated for separating may be a contributing factor for promoting the growth of this and other thermophiles. "The practice of separating route return pasteurized milk for standardizing, with thermoduric or thermophilic organisms present, may be considered as a continuous reinoculation process which may explain many positive phosphatase tests attributed to manual and mechanical defects in the dairy plants, when actually the false positive phosphatase has been produced by a bacterial phosphatase enzyme from a thermophilic organism."

Barber and Frazier found that good cream correctly pasteurized and stored at 39°–50° F. after 3 or 4 days gave a positive phosphatase reaction due to the development of bacterial phosphatase by bacteria that survive pasteurization and grow slowly in the stored cream. They point out that milk phosphatase may be distinguished from bacterial phosphatase because it is inactivated by pasteurization at 145° F. for 30 minutes whereas bacterial phosphatase may withstand temperatures as high as 170° F. for the same time.

Difficulties with milking machines, and difficulties in controlling thermoduric organisms are the principal complaints presented to your committee. Other items of sanitation were mentioned. These will be briefly taken up as follows:

The care of milk utensils is important. It is emphasized that bacteria grow fast on moist surfaces, and that consequently prompt drying of cleaned equipment is indicated. In this connection, two members of the committee have questioned the wisdom of requiring cleaned utensils to be kept in the milk house; they point out that the air in the milk house is generally nearly saturated with moisture which gives little opportunity for utensils to dry thoroughly after cleaning. They favor keeping washed equipment where it can be dried by the sun and wind, and they maintain that it and all moist equipment should be sanitized before being used. The cleaning and sterilization of milk cans is doubtless the most important problem of dairy sanitation. There is no sense in taking the utmost care to produce clean milk on the farm or to process it painstakingly in the plant and then to contaminate it by putting it in a foul can. Yet this is done daily on all milk sheds. The problem is an involved, difficult one which has been studied by bacteriologists, chemists, detergent manufacturers, and from the angle of costs. The latest solution offered is the "Conservation Method" which promises among other things, cleaner and more sterile cans, reduction of thermoduric, thermophilic, lipolytic, and proteolytic organisms, and enormous reduction in costs.

Other members of the committee urge careful attention to the tinned farm equipment which under present conditions is likely to need repair or retinning. In fact, since dairy equipment is now difficult to replace or repair it should be handled with the utmost care.

Other members are concerned about the cooling of milk. Some would not permit the acceptance of uncooled morning's milk at milk plants. Others emphasized the necessity of cooling milk promptly, particularly at the end of summer when ice supplies in some communities are apt to be depleted. Others report trouble in winter with high count milk of farmers having insulated tanks or electric refrigeration, for the reason that some dairymen do not then use these conveniences but rely on cooling their warm milk by setting the cans in water which soon warms up and never reduces the temperature below 65° or 75° F., or they rely on cold air to cool their milk. Air is a poor conductor; at 30° F. it will not cool milk to less than 65° F. in less than 6 to 8 hours, even when it is stirred.

Another member of the committee is concerned with the pouring of milk in the barn. He points out that if the milk house is some distance away, or even if it is near by and the passage from the barn to the milk house is not covered, there is danger of the milk becoming contaminated with dust or rain in transporting it. He advocates putting the milk house close to the barn and providing a covered passage way, or to have a milk room in the barn itself. This question of forbidding the pouring the milk in the barn deserves some consideration. Probably all inspectors would be inclined to hold a provision of this sort is necessary, otherwise milk is likely to be exposed to serious fly contamination in summer time, and if the milk is long exposed in a barn reeking with odors the milk is likely to become off flavor. On the other hand, it seems foolish to require those using milking machines in sanitary surroundings to carry each milk container to the milk house as it becomes filled. In a clean barn it would seem that the producer ought to be permitted to keep a covered can handy to receive milk from the machines; this can should be taken to the milk house as soon as it is filled. In fact, this is common practice.

Another member of the committee advocates the insulation of milk houses so that they will be comfortable and useful in cold climates in winter. He also believes that attention should be given to the possibility of back syphoning of water at drinking fountains. He emphasizes the importance of inspecting dairies at milking time.

Apparently chlorine will be available to dairymen for disinfection, but it has been suggested that some consideration should be given to the use of substitutes for it in case it is not.

Other committee members advocate the standardization of dairy farm methods and of technological procedure. Some of them feel that the Standard Ordinance of the United States Public Health Service offers the best promise of standardization of methods, but they feel the ordinance needs severe pruning to cut out everything that cannot be demonstrated to concern milk quality and milk safety.

As was noted in last year's committee report, dairy farm inspection is being criticized in certain quarters as being unproductive of important results, as being concerned with aesthetics instead of with milk quality, and as having added materially to the cost of milk. Apparently the terms "aesthetics" and "milk quality" are used loosely and mean different things to different people. One of the committee (Brew) gives his conception of quality of milk as "A clean, wholesome product, normal in food value, and appearance, free from disease or infection and a product which has been produced and handled under clean, sanitary conditions. By way of comparison, a lunch freshly prepared, containing proper nutritional value, palatable, and served attractively in clean surroundings, represents high quality. That same lunch served in unclean, filthy surroundings loses very definitely its quality from the point of view of aesthetics and this is an important consideration especially as applied to the production and handling of any food."

M. J. Prucha by letter says that the definition of quality of milk given some 20 years ago by H. A. Harding, R. S. Breed, and E. G. Hastings, is fairly good, viz.: Milk must be rich, safe, clean, and have good keeping quality, but he would add that it should have good flavor. He points out that the milk producer, the plant manager, the salesman, and the sanitarian, who is responsible for safe milk for the community, each has his own opinion about milk, and that these opinions do not always agree. He might have added that the milk consumer also has notions about milk. Prucha says we need health departments and inspectors. Milk ordinances should have plenty of teeth. Sanitarians should know the dairy business; they should educate wherever they can, and persuade, but they should carry the big stick to apply where necessary. Prucha believes that the word "aesthetics" does not express what those interested in farmer's problems have in mind. It is held that there are requirements that may not add much to milk production and hence to the quality of milk but may be annoying and costly to the producer. The real difficulty is found in the contradictory requirements of different ordinances which may apply to the same milk shed and produce confusion and dissatisfaction.

The most specific criticism of dairy farm inspection is found in a book by R. W. Bartlett, entitled "The Price of Milk." Therein he compares the cost of milk production in St. Louis when little attention was paid to milk sanitation, to the cost of milk since the United States Public Health Service Ordinance was adopted. He comments favorably on the Rockford, Illinois, method of control, which is essentially platform control. This he maintains is sufficient, and has resulted in giving Rockford a good milk supply at reasonable price.

Fisher (St. Louis) does not believe that milk inspection is responsible for the increased retail prices in St. Louis. The inside labor of the milk plants was unionized and pay increased. Prices paid labor in general in St. Louis has advanced. As shown by auditor's audit of the dairies' books, the demand

for milk has increased since the standard ordinance was adopted.

A member of this committee (Bulmer) has written the committee at length in regard to the necessity of cutting out items of milk inspection which cannot be shown to affect milk quality and safety. He maintains that the inspection of milk should be conducted in a manner that will not add unnecessary cost to milk production. We have before us a difficult problem. It is easy to say that milk inspection has added to the cost of milk to consumers, but it is difficult to say how much it has added, and still more difficult to agree on what may be regarded as unessential in milk inspection as now being conducted.

EVAPORATED MILK INDUSTRY FARM QUALITY PROGRAM

The Evaporated Milk Association has been active in improving the quality of milk accepted for manufacture by its members. A member of this committee (Parfitt) outlines the procedure as follows:

Foreword

In discussing this question of milk quality for manufactured milk and its relation to fluid milk this point must not be overlooked—that much of the supervision that has been placed over fluid milk has been done because fluid milk when used by the consumer has a greater possibility of containing disease organisms than does the product prepared from what is termed manufactured milk. For example, the possibility of disease organisms in evaporated milk is nil; the number of epidemics that have been due to the ingestion of cheese (except fresh cheese), butter (except in some cases of farm butter), and in powdered milk are, according to the literature, very, very few. The introduction of the phosphatase test as a measure of pasteurization has shown in the case of fluid milk and ice cream that because of the nature of the product we cannot depend upon the commercial application in all cases to render milk free of disease organisms. Thus, the control of fluid milk and milk for ice cream because of the nature of the manufacturing process and the finished product must be more carefully controlled from a disease standpoint.

1. Within the dairy industry everyone will concur that milk should be produced in a clean manner, maintained in a clean condition and in a condition of minimum deterioration. In the program inaugurated by the Evaporated Milk Industry which I am administering, that is our definite objective. To do this we are following a prescribed program throughout the United States. Incorporated into the program are in the opinion of the Sanitary Standards Committee of the Evaporated Milk Industry, the good qualities of many of the federal, state, and city milk regulations.

2. Details of compliance to the Evaporated Milk Industry quality program have been set forth in the code which has been adopted as the method of procedure by over 90 percent, according to volume, of the manufacturers of evaporated milk. The program is directed by an administrator and field assistants. The administrator is assisted by a Sanitary Standards Committee that represents the industry. The program is voluntary, but the administrator is empowered to cooperate with federal, state, and city regulatory authorities.

3. In brief, the details of the actual working of the program are as follows:

Each evaporated milk plant, depending upon the number of producers, maintains a number of fieldmen and quality men. The responsibility of these men is to—

A. Inspect producers' farms and determine if the following practices are in continuous use,
   (1) Cleaned cows.
   (2) A clean milking barn, parlor, or place where milking is regularly done.
   (3) Cleaned milking utensils of proper construction so that they can be maintained in a clean condition.
   (4) Milk of each cow strained through a single service filtering pad exclusively.
   (5) Milk cooled and stored in a tank supplied for this purpose.

If the above practices are not found the fieldman is required to make a re-inspection within a definite time period. On re-inspection the fieldman is empowered to shut off the producer from the given market.

B. Every can of milk on receipt at the plant is checked for appearance and odor.

C. At least once a month a methylene blue test is run on a mixed sample secured from each producer and at least once a month an off-bottom sediment test is run on each can of milk produced.
   (1) Methylene blue test. Those patrons who have less than a two-hour reduction time are informed of the condition. Their milk is tested weekly with field visits to correct the causes of the high bacterial count. If the patron, with the aid of the fieldman or quality man, has been unable to correct the cause, the patron is rejected from our market.
   (2) Sediment test. If, in off-bottom can sampling, the milk is found in Class 3 or 4 it is considered substandard; if in Class 3 the shipper is put on probation; if in Class 4, the milk is rejected and returned to the producer. Any milk from a patron that falls into Class 3 or 4 at the time of sediment testing is retested on the following shipments. If within the seven tests that are made the patron has been unable, with the help of the fieldman, to demonstrate that he can maintain his milk in Class 1 or 2, such a producer is rejected from our market.

D. A uniform system of records pertaining to conditions existing on the farm and the results of platform inspection is maintained at each plant. The validity of these records is checked by men operating from the Evaporated Milk Association Office as well as authorized regulatory officials.

The administrator of the Sanitary Standards Code of the Evaporated Milk Industry passes on the work and the programs of each individual company and employs assistants that are constantly in the field judging the methods and progress that each company is making. It is his duty to direct the companies thinking along lines of sanitation and to inform the companies as to improvements that should be made as well as factors which may affect their sanitary programs. It would appear that an industry such as the Evaporated Milk Industry is capable through sanitary standards that they have set up within the industry to police its own industry. By doing so the industry has inaugurated the first country-wide, industry-wide, sanitary program that involves over 90 percent of the commodity manufactured.

Bovine Diseases

Tuberculosis. The tuberculosis eradication campaign of the Bureau of Animal Industry has been successful, and the amount of bovine tuberculosis has been reduced to a point where it is not of grave concern in those areas that are maintaining regular tuberculin testing, and that are pasteurizing milk.

Bang's Disease. Bang's disease is caused by the bacterium *Brucella abortus* which is pathogenic to man and animals. In cattle the infection is called Bang's disease, in man Brucellosis or Undulant fever. The Bureau of Animal Industry inaugurated a program of testing herds for Bang's disease, with the view of utimately getting rid of this ailment, which is infectious, which reduces reproduction, and which reduces production in herds infected with it. As in the case of tuberculosis, the inauguration of the program has met with opposition from some, but it seems to have been in the main successful. Most herds have a few Bang cows, some proved to be 50 percent or more infected so that the losses by slaughter in these herds was severe. In some areas farmers have succeeded in having testing of their herds made optional, but in others the program is being carried on without interruption. It seems to have been demonstrated that where hearty cooperation has been

given to the bureau, the disease has been greatly reduced. Many herds are Bang free and those that still have reactors find them only intermittently. In every area there are some farmers who have not cooperated and their herds seem to be as badly infected as when the program was started. Naturally, there has been some criticism of the way the Bureau of Animal Industry has conducted the campaign. The chief complaint seems to be that the bureau is conducting a campaign of slaughter, and that its veterinarians do not spend the time with the individual dairyman necessary to get him to adopt and maintain proper methods of ridding his herd of the disease. This disease is infectious to man, and has its public health significance. Ordinances requiring raw milk sold for consumption to come from Bang free herds are becoming increasingly common. Some health officers are inclined to rely on pasteurization to protect their communities from infection with Brucellosis, whereas others feel it necessary to require all herds supplying milk to their communities to be Bang tested, and all milk served the public pasteurized.

Mastitis. Infectious mastitis is usually caused by *Streptococcus agalactiae* and much less frequently is caused by staphylococci, and by *B. coli.* So far as known these organisms are not causative of disease in man. Another form of mastitis is caused by an organism that has been called *Streptococcus epidemicus* that is the cause of epidemics of septic sore throat, and it is believed of scarlet fever. These streptococci are of human origin, the germs of which may be transferred on the hands of an infected milker to the cow. They may produce mastitis unaccompanied by caking of the udder which so may escape detection and engender severe epidemics.

Infectious mastitis occurs in both acute and chronic forms and is very common in dairy herds. In fact it causes enormous financial loss to dairymen because it usually impairs or destroys one or more of the quarters of the udder, and the chronic form of the disease indurates the secretory tissue thus decreasing milk production markedly. The disease is spread from cow to cow by the hands of milkers, by milking machines and occasionally by flies. So wiping cows udders with a cloth dipped in a chlorine solution, disinfecting milker's hands, and immersing teat cups of milking machines in such solution, after milking each cow, are all indicated. It is customary to put infected cows at the end of the milking line; particular care is taken as to disinfection of the hands of milkers attending them and to sterilizing the milking machines. The milk from these ailing cows should be discarded but very often it is not.

In recent years concern has developed as to whether milk of herds in which streptococci are prevalent should be approved by boards of health for public consumption. It is held that such milk is of inferior quality, and that while, unless infected by *St. epidemicus,* it is not known to be disease producing in man, it is not normal milk and should not be used as such. The fact that streptococci are commonly present in all herds is one of the reasons why only pasteurized milk should be sold. Apparently boards of health are to be compelled by public opinion to deal with this mastitis problem. They will have to examine the milk sold in their communities for streptococci, using any or all of several methods for the determination of these organisms. With regard to the standard plate count of milk it should be noted that Plastridge finds that *Streptococcus agalactiae* may be responsible for a large proportion of the colonies in low count milk but for only a small percentage in high count milk. He finds too a very significant relationship between the percentage of quarters infected, and the numbers of *Streptococcus agalactiae.* It would seem that milk containing few streptococci and few leucocytes should be accepted but that milk showing many of either should be rejected.

One member of the committee (Brew) doubts the wisdom of putting great emphasis on the term "streptococci" because there are pathogenic and non-pathogenic streptococci. Buttermilk is soured by *Streptococcus lactis* which is normally found in milk even in long chains. Streptococci may be found in milk even in large numbers where none can be demonstrated in milk taken from the udders of the cows in the herd supplying the milk. He would emphasize other evidences of mastitis, notably the presence of numerous leucocytes.

Since cows are often amenable to treatment, the question arises as to what cows health authorities would be justified in removing from infected herds for slaughter. Such cows would be those with chronic mastitis discharging pus. There is the further question as to whether boards of health should help clean up infected herds or should merely notify the owner of the presence of mastitis and require him to call a veterinarian to clean up. Ridding a badly infected herd of mastitis is expensive and requires a thorough knowledge of the disease and its treatment; so without doubt it is the job of the veterinarian. Finally there is the question whether boards of health should allow mastitic milk to be pasteurized. The whole mastitis problem is a pressing one and undoubtedly will compel action.

Anaplasmosis. This disease does not infect man but it does cattle in which it has a mortality of about 60 percent, and so causes severe losses to stockmen, particularly in the South where it is prevalent. It is transmitted by biting flies and perhaps by mosquitos.

As has been indicated in this report, certain ones are criticizing dairy farm inspection as having added materially to the cost of milk but nothing has been said as to the effect the several campaigns that have been waged to eliminate diseased cows from herds have had on milk prices. When it is remembered that there have been campaigns to eradicate tuberculosis, and Bang's disease, both of which involve slaughter of valuable animals for which the farmer was only partially reimbursed, and that in the South there has been a campaign to get rid of the Texas cattle tick, which was also costly to the farmer, and that in the South anaplasmosis is not uncommon, we cannot escape the feeling that these expensive campaigns, which were necessary, and which were of ultimate benefit to the farmer, were certainly a potent factor in maintaining high milk prices. Now we are confronted with the possibility of a campaign to get rid of mastitis, which also will involve the slaughter of cows. The wonder is that the dairy farmer has been able to sustain the financial loss caused by these campaigns.

Your committee has thus attempted to bring to you a discussion of the problems that confront the milk inspector and the dairy industry. They are not new problems but with better understanding of their significance they have come to have increased importance which has not been lessened by the tremendous demand for milk that has developed. Dairy herds have been increased to the point of overcrowding, dairy plants are operated beyond the capacity for which they were designed both of which tend to lower the quality of market milk. The dairy inspector is going to be a very busy man.

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SERIOUS FLAWS IN MILK CONTROL POLICY WHICH IMPAIR OUR WAR EFFORT

(Continued from page 85)

6. That a stage has been reached where the situation points to the necessity of the immediate appointment of a National Technical Commission embracing milk sanitarians, dairy economists, and nutritionists to study the entire field of milk control, including the whole question of trade barriers, and with powers to act. This step should not be for the purpose of setting up just one more agency, but rather with a view of eliminating many agencies, and dove-tailing others now in the field—many of which at present with widely conflicting interests, some of them selfish.

Finally, it is my firm belief that if boards of health and milk sanitarians concerned fail to examine frankly evident truths pertaining to factors that are in any way responsible for the present market milk situation in this country, it is to court disaster, and to speed the inevitable economic consequences involved directly and headlong into the arms of Congress. I would be as regretful as other milk sanitarians to see this happen, especially, if it should come precipitately and without guidance, which may be the case in the event that boards of health are unable to find ways and means of presiding appropriately over the matter and find a solution.

And, in the absence of our ability to do the job ourselves, the fact is inescapable that anything which threatens the welfare or proper maintenance of the nation's milk supply, particularly in war-time, is actually a matter that gravely concerns the Congress of the United States.

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Emergency Sanitation Standards for Raw Milk for Pasteurization

FOREWORD

THESE Standards were approved by the U. S. Public Health Service Sanitation Advisory Board December 4, 1942, and are recommended by the U. S. Public Health Service as a basis for the acceptance of interstate shipments of milk for pasteurization during the war emergency. The Standards are similar to those for grade A raw milk for pasteurization of the Milk Ordinance and Code Recommended by the U. S. Public Health Service (*Public Health Bulletin* No. 220, 1939 edition), with such modifications as were considered necessary to render them applicable to different climatic conditions and to reduce the use of critical materials.

The term "health officer" as used herein shall mean the health authority having jurisdiction, or his authorized representative. Where the health officer is not the milk sanitation official the term "health officer" should be changed accordingly wherever it appears in the following text.

A convenient summary of the following sanitation standards for producing farms may be found in the Emergency Milk Plant-Producer Inspection Form prepared by the U. S. Public Health Service for use with these Emergency Standards. For a summary of the receiving station requirements of these Standards, see inspection form 8978-C which may be purchased from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 40 cents per 100.

ITEM 1R. COWS, TUBERCULOSIS, AND OTHER DISEASES

Except as provided hereinafter, a tuberculin test of all herds and additions thereto shall be made before any milk therefrom is sold, and at least once every 12 months thereafter, by a licensed veterinarian approved by the State livestock sanitary authority. Said tests shall be made and any reactors disposed of in accordance with the requirements approved by the United States Department of Agriculture, Bureau of Animal Industry, for accredited herds. A certificate signed by the veterinarian or attested to by the health officer and filed with the health officer shall be evidence of the above test: Provided, That in modified accredited counties in which the modified accredited area plan is applied to the dairy herds, the modified accredited area system approved by the United States Bureau of Animal Industry shall be accepted in lieu of annual testing.

Cows which show an extensive or entire induration of one or more quarters of the udder upon physical examination, whether secreting abnormal milk or not, shall be permanently excluded from the milking herd. Cows giving bloody, stringy, or otherwise abnormal milk, but with only slight induration of the udder, shall be excluded from the herd until reexamination shows that the milk has become normal.

For other diseases such tests and examinations as the health officer may require shall be made at intervals and by methods prescribed by him, and any

diseased animals or reactors shall be disposed of as he may require.

Public-health reason. This item is important because tuberculosis is one of the most important diseases of cows transmitted through milk supplies. Park and Krumwiede's figures indicate that in some regions about one-fourth of all cases of tuberculosis in children under 16 years of age were of bovine origin (Park and Krumwiede, *The Relative Importance of the Bovine and Human Types of Tubercle Bacilli in the Different Forms of Tuberculosis,* collected studies from the research laboratory, Department of Health of New York City, vol. 7, pp. 88–92, 1912–13). Rosenau states that it is estimated that perhaps 7 percent of all tuberculosis in man is of bovine origin (Rosenau, *Preventive Medicine and Hygiene*).

The organisms of tuberculosis get into the milk either directly from the udder or indirectly through cow manure. Manure may become a source of infection directly in the case of active intestinal tuberculosis, or indirectly in the case of respiratory tuberculosis as a result of coughing up the organisms and swallowing them. The infected manure then reaches the milk by dropping into it from the udder, etc., during milking or otherwise.

In addition to the transmission of tuberculosis, it is generally considered that milk supplies may transmit infection to man from infected udders, contagious abortion, running sores, "lumpy jaw," etc.

Bovine mastitis is an inflammatory and, usually, contagious disease of the bovine milk secreting organ. Ordinarily the inciting organism is a streptococcus of bovine origin, but the condition may be caused by staphylococci or other organisms. Occasionally cows' udders become infected with hemolytic streptococci of human origin. When epidemics of scarlet fever or septic sore throat are traced to milk, the inciting organism is of human origin. The toxins of staphylococci and possibly other organisms in milk may cause severe gastroenteritis. Milk from badly inflamed udders is practically always of unsatisfactory sanitary quality.

Satisfactory compliance. The herd must have been tested with tuberculin by a United States accredited veterinarian, or one approved by the State livestock sanitary authority, within 12 months if no reactors were found on the last test, or within 6 months if reactors were found on the last test, except as noted above for modified accredited counties. Reactors must have been immediately excluded from the premises and must have been disposed of in accordance with accredited herd requirements. A certificate signed by the veterinarian and filed with the health officer is valid evidence of the T B test. The veterinarian must furnish the health officer with a copy of the test charts, describing every animal and giving ear-tag numbers. Additions to the herd, as well as bulls and heifers, must be tested and reported as required above. Certificates signed by the local inspector to the effect that he has seen an original certificate, and giving the date of the original certificate and the name of the veterinarian who made the test, shall be valid.

The Bureau of Animal Industry of the United States Department of Agriculture and the State livestock board or the State veterinarian will cooperate with the city or county boards of health in testing dairy cattle, provided certain requirements are met. The nature of these requirements can be ascertained from the State veterinarian. The health officer should file his request for cooperative testing with the State veterinarian. He may strengthen his appeal for the testing by enlisting the support of the county agent, farm bureau, board of trade, and civic clubs.

Evidence of satisfactory compliance with respect to diseases other than tuberculosis shall be based upon such physical examinations supported by such clinical or laboratory tests as may be deemed necessary by the control officials. Diseased animals found at any time shall be removed from the herd and no milk therefrom offered for sale. (Local inspectors should in the regular line of duty be on the lookout for diseased udder conditions.)

"Indurations of the udder" means replacement of the normal glandular tissue with fibrous tissue.

Item 2r. Dairy Barn, Lighting

A dairy or milking barn shall be required and used, and in such sections thereof where cows are milked, windows shall be provided and kept clean and so arranged as to insure adequate light properly distributed, and when necessary shall be provided with adequate supplementary artificial light.

Public-health reason. Adequate light makes it more likely that the barn will be clean, and that the cows will be milked in a cleanly manner.

Satisfactory compliance. The milking portion of the barn must be provided with windows or other openings sufficient in area and so arranged as to insure adequate light properly distributed. If glazed windows are used, they shall be kept clean.

Adequate artificial lighting must be provided for night milking. The inspector shall consider the requirement of adequate artificial light to be satisfied if the milking portion of the barn is so lighted that cleaning and milking operations can be efficiently performed.

Item 3r. Dairy Barn, Air Space and Ventilation

Such sections of all dairy barns where cows are kept or milked shall be well ventilated and shall be so arranged as to avoid overcrowding.

Public-health reason. This item is required in order to avoid overcrowding and to insure proper ventilation.

Satisfactory compliance. This item shall be deemed to have been satisfied, when, in the judgment of the inspector, conditions are such as to result in sufficient fresh air at all times and no overcrowding.

Item 4r. Dairy Barn, Floors

The floors and gutters of such parts of all dairy barns in which cows are milked shall be constructed of concrete, tight wood, or approved impervious and easily cleaned material. The floors shall be graded to drain properly. Floors and gutters shall be kept clean and in good repair. No pigs or fowl shall be permitted in the barn used for milking. Horses and calves shall be separated from the milking part of the barn by stalls or pens.

4r(a). Floor Construction

Public-health reason. Floors constructed of concrete, tight wood, or impervious materials can be kept clean more easily than floors constructed of porous materials, and are therefore more apt to be kept clean.

Satisfactory compliance. Plans and directions for laying dairy-barn floors may be found in *Dairy Farm Improvements,* published by the Portland Cement Association, Chicago, Ill., or in United States Department of Agriculture Farmers' Bulletin No. 1342.

The floors should preferably be of concrete, but may be of other similarly impervious material. Cork bricks or creosoted wood blocks, so long as these are impervious to water and permit no pooling of liquids or wash-water, are approved. Tight wooden floors and gutters may be permitted.

Only such portions of milking-barn floors to which cows have access shall be required to be surfaced with impervious material. Feed alleys are included in this exemption, provided that they are floored with tight wood or its equivalent and protected from washings or drainage from other parts of the barn floor. No portion of the barn floor shall be of earth unless it is separated from the milking portion by tight partitions.

It is recommended, but not required, that feed troughs be of smooth-surfaced concrete in order to facilitate bactericidal treatment when necessary.

Although it has become general practice among modern dairymen to build milking-barn floors of concrete, some dairymen still hesitate to take this step because of the fear of possible injury to their cattle. This objection is answered by the experience of the great number of dairymen who milk on concrete floors. The danger of injuries is not great enough to counterbalance the many advantages of a well-drained, impervious barn floor. The floor should have an untroweled surface in order to prevent slipping. When necessary to keep the cattle in the milking barn the floors may be bedded in order to prevent discomfort.

Concrete floors in barns under construction or reconstruction should have curbs where the floor joins the walls. These are desirable in order to promote cleanliness in the angles of the floor and walls and to avoid rotting of wall sills and studs.

4R (B). FLOOR CLEANLINESS

Public-health reason. A clean floor reduces the chances of contamination of the milk or milk pails during milking. The presence of other animals increases uncleanliness.

Satisfactory compliance. This item shall be deemed to have been satisfied if the milking-barn floor is free of accumulations of filth or litter except such as have accumulated since the beginning of the last milking period; provided that the floor must be reasonably clean at the beginning of each milking period; and provided that gutters shall be cleaned at least daily. Pigs and fowl must be kept out of the milking barn. If horses and calves are kept in the barn, they shall be separated from the milking portion by stalls or pens which shall be cleaned daily.

When floors of milking barns are bedded, bedding containing more than one milking's collection of manure shall be considered as equivalent to unclean floors.

The method of cleaning is immaterial. It is recommended that dairymen whose barns are provided with water under pressure scrub the floors after each milking with a stiff-bristled brush. In barns in which water under pressure is not available, the floors may be brushed dry and limed. In the latter event care should be exercised to prevent caking of the lime.

ITEM 5R. DAIRY BARN, WALLS, AND CEILINGS

The walls and ceilings of all dairy barns shall be whitewashed once each year or painted once every 2 years, or oftener if necessary, or finished in an approved manner, and shall be kept clean and in good repair. In case there is a second story above that part of the barn in which cows are milked, the ceiling shall be tight. No feed shall be mixed in the milking portion of the barn.

Public-health reason. Whitewashed, painted, or properly finished walls and ceilings encourage cleanliness. Tight ceilings and avoidance of feed mixing reduce the likelihood of dust and trash getting into the milk and thus increasing its bacterial count.

Satisfactory compliance. This item shall be deemed to have been satisfied if the walls and ceilings—

(1) Have been whitewashed or finished with cold-water paint once every year or oftener if necessary; or

(2) Have been painted once every 2 years or oftener if necessary; or

(3) Have interior finished surfaces of concrete, concrete block, brick, tile, galvanized iron, plaster, or similar material, which may be accepted without painting; joints and rafters of the roof structure shall not be required to be whitewashed or painted, but must be kept clean; the use of wallboard attached to the rafters to make the ceiling tight shall be accepted; and

(4) Are in good condition, with ceiling tight if there is a second story above the milking portion of the barn. No feed shall be mixed in the milking portion of the barn. Feeds which attract flies, if stored in the milking barn, shall be kept in fly-tight enclosures.

It is not required that the barn have four walls extending from the floor to the roof. A shed-type barn shall be approved, provided the requirements of Item 4r as to animals entering the barn is satisfied.

Barns newly constructed of wood shall be required to be painted or whitewashed soon after completion.

Whitewash formula. The following formula for whitewash has given satisfaction:

Unslaked lime	2 pks.
Spanish whiting (barium sulphate)	½ lb.
Salt	1 pk.
Powdered glue	1 lb.
Rice flour	3 lbs.

Add water so that it can be applied easily and thoroughly. For full painting and whitewashing instructions, see United States Department of Agriculture *Farmers' Bulletin* No. 1452.

ITEM 6R. DAIRY BARN, COW YARD

All cow yards shall be graded and drained as well as is practicable; and kept clean.

6R (A). GRADING AND DRAINING OF THE COW YARD

Public-health reason. The cow yard is interpreted to be that enclosed or unenclosed area in which the cows are apt to congregate, approximately adjacent to the barn. This area is, therefore, particularly apt to become filthy with manure droppings, and being nearest the barn, may be a public health menace through the breeding of flies. The grading and drainage of the cow yard as far as is practicable are required because wet conditions are conducive to fly breeding, make it difficult to keep manure removed, and make it difficult to keep the cows clean.

Satisfactory compliance. This item shall be deemed to have been satisfied—

(1) When the cow yard has been graded and drained as well as local conditions will permit. Low places must in all cases be filled in.

(2) When the wastes from the barn and milk room are not allowed to pool in the cow yard. Cow yards which are muddy due to recent rains should not be considered as defective.

6R (B). CLEANLINESS OF THE COW YARD

Public-health reason. If manure and barn sweepings are allowed to accumulate in the cow yard, fly breeding will be promoted, and the cows will, because of their habit of lying down, be more apt to have manure-soiled udders.

Satisfactory compliance. This item shall be deemed to have been satisfied if the cow yard is kept clean. Swine shall not be permitted in the cow yard.

"Resting barns" used in connection with milking parlors shall be considered part of the cow yard, and this item as applied to "resting barns" shall be deemed to have been satisfied if the manure droppings are removed or clean bedding is added at sufficiently frequent intervals to prevent the soiling of cows' udders and flanks and the breeding of flies.

ITEM 7R. MANURE DISPOSAL

All manure shall be removed and stored or disposed of in such manner as to reduce the breeding of flies therein and prevent the access of cows to piles thereof.

Public-health reason. Improper manure disposal induces the breeding of flies, which are considered capable of transmitting infection to milk or milk utensils. Cows should not have access to manure piles in order to avoid soiling of udders and flanks.

Satisfactory compliance. This item shall be deemed to have been satisfied when the manure is—

(1) Stored or disposed of so as to reduce fly breeding as far as is practicable.

(2) If stored outside the barn, it shall not be in contact with the barn.

(3) So stored as to be inaccessible to the cows.

Fly breeding may be minimized by methods equivalent to the following recommendations of the United States Department of Agriculture, Bureau of Dairying, Milk Inspector Letter No. 104, May, 1926:

Any program to eradicate flies from dairies should begin with the elimination of breeding places. The premises should be cleared of piles of manure and other refuse, such as spoiled silage and accumulations of wet and decaying hay and straw. Even with the utmost care, flies cannot be entirely prevented from breeding, and it is necessary to destroy those which do appear from undetected breeding places and the premises of neighbors. In carrying on this work, traps properly constructed and baited and the judicious use of sprays will be found helpful and not exorbitantly expensive.

The baited traps are used for catching the flies which do not bite, but get their nourishment from foods they can suck through their elongated mouth parts. Most of these are the common houseflies. The spray is used to kill or repel the biting type of flies that live on blood, which they obtain by piercing the skins of animals. Stable and horn flies are examples of this type.

Last year the Bureau of Dairying, on its experimental farm at Beltsville, Md., with the cooperation of the Bureau of Entomology, made effective use of the fly-fighting measures outlined above. The premises were kept as free as possible from accumulations of manure. Box stalls were cleaned and scraped regularly. As a rule, manure was not allowed to accumulate near the buildings for more than 3 or 4 days, and an effort was made to have the immediate premises entirely freed from accumulations of manure at least once each week. Cylindrical traps

like those described in Farmers' Bulletin 734 were set as soon as the first flies appeared. They were baited with blackstrap molasses from sugar cane diluted with 3 or 4 parts of water. The bait was removed once a week and the traps emptied when the accumulation of dead flies was so great as to reduce seriously the light under the trap. Before emptying the traps, the living flies were killed by steaming the traps for about a minute in a steam sterilizer. During the season the 10 traps used caught 86 gallons, or approximately a half billion flies. The milk room was practically free from flies throughout the whole season.

In order to protect the cattle as much as possible from horn and stable flies, a spray was used. It was thought best to apply a spray which would kill the flies rather than merely repel them.

A good killing spray may be made by suspending 5–10 pounds of unground, half-closed pyrethrum flowers (inclosed in a double-thickness cheesecloth bag) in a mixture of 9 gallons of kerosene and 4 quarts of fuel oil of 28–32 gravity. The mixture should stand 24 hours before being used. It may not kill all the flies immediately, but many flies that are hit will fly away and eventually die. Fuel oil is the ordinary low-grade oil that is burned in furnaces for heating, and usually can be bought from fuel dealers. The "28–32 gravity" does not mean "specific gravity," but is a commercial term used in the oil business. If 28–32 oil is not available, use any furnace oil. Lubricating oils, including waste oils from engines, should not be used. When only small quantities of spray are required, concentrated pyrethrum extracts may be bought. These need only the addition of kerosene and fuel oil to make them effective.

To apply this extract, an air-pressure sprayer was used which held about 1 gallon and could easily be operated with one hand. In spraying for horn flies, an attempt was made to catch them in a cloud of vapor as they swarmed up after the first spray struck them, and this was very effective. They were easily killed by the pyrethrum extract. In applying this spray, a nozzle which will produce a very fine vapor should be used. This is facilitated by using plenty of pressure.

In spraying for stable flies, which are in most cases found sucking blood from the cows' legs, the spray was shot directly on them, usually with telling effect. Since the major part of the spray is kerosene, care was taken not to cover the cattle with it unnecessarily, and they were not curried or brushed, or turned out in the hot sun immediately after being sprayed. By observing these precautions, no trouble was experienced from blistering.

Although in both seasons the horn flies had appeared in considerable numbers before the spray was used, their numbers were appreciably reduced after a week of daily spraying, and they were easily kept under control the rest of the season.

Item 8r. Milk House or Room, Construction

There shall be provided a milk house or milk room in which the cooling, handling, and storing of milk and milk products and the storing of milk containers and utensils shall be done. (a) The milk house or room shall be provided with a tight floor constructed of concrete or other impervious material, in good repair, and graded to provide proper drainage. (b) It shall have walls and ceilings of such construction as to permit easy cleaning, and shall be well painted or finished in an approved manner. (c) It shall be well lighted and ventilated. (d) It shall have self-closing doors which, in the case of screen doors, shall open outward, and all other openings shall be effectively screened, unless other effective means are provided to prevent the entrance of flies. (e) It shall be used for no other purposes than those incident to the handling of milk, and shall not open directly into a stable or into any room used for domestic purposes.

8r (a). Floors

Public-health reason. A well-drained concrete or other impervious floor promotes cleanliness.

Satisfactory compliance. This item shall be deemed to have been satisfied when the floor consists of concrete, brick, tile, asphalt-macadam, or other composition material laid so as to be impervious and to drain properly.

If drain pipes are to be provided, they should be carefully set before the floor is laid. A grade of one-fourth to one-half inch per foot gives ample floor drainage. The finish of the floor should be as smooth as possible, and the junction of the floors and walls should be curbed, and the joints rounded to avoid angles for collecting and holding dirt. If the milk house is of frame construction, all walls (including partitions) should be made of impervious material up to a height of 10 or 12 inches.

If the milk house, including the floor, was in existence when these standards were adopted, a tight floor of tongue-and-groove flooring, rubber composition, or sheet metal which has been painted or otherwise treated to make it waterproof, may be taken by the inspector to comply with these specifications until it needs repairs, at which time it must be covered or replaced with surfacing satisfying the previous specifications of this item.

Milk-house floors of brick or concrete in which depressions have been worn so that liquids stand in them are unsatisfactory. Smooth floors, the drainage of which is poor, are unsatisfactory. Such conditions can usually be remedied by a new covering of rich cement or fine-aggregate concrete, preferably at least 2 inches thick to avoid frequent repairs.

8r (b). Walls and Ceiling

Public-health reason. Construction which permits easy cleaning promotes cleanliness.

Satisfactory compliance. This item shall be deemed to have been satisfied when all parts of the walls and ceiling are in good repair and, except for light openings, are composed of—

(1) Smooth-dressed lumber, sheet metal, or plaster board, well painted with washable paint; or

(2) Tile, cement blocks, bricks, concrete, or cement plaster, provided that the surfaces and joints are smooth.

The milk room should not be required to be ceiled overhead unless flies cannot otherwise be kept out, as in the case of corrugated-metal roofing, where openings under corrugations cannot easily be fly-proofed, or unless the roof construction is such that the underside cannot easily be kept clean and free of cobwebs.

The inside walls of the milk room may be approved unsheathed, provided the inside surfaces of the outer sheathing and all framing surfaces are smooth-dressed and painted. This interpretation applies to partitions also.

8r (c). Lighting and Ventilation

Public-health reason. Ample light promotes cleanliness, and proper ventilation reduces likelihood of odors.

Satisfactory compliance. This item shall be deemed to have been satisfied if adequate natural or artificial light, reasonably evenly distributed, is provided and if the milk house is adequately ventilated.

8r (d). Screening

Public-health reason. Effective screening tends to prevent the presence of flies, which are a public-health menace. Flies may infect the milk with disease germs, which may multiply and become sufficiently numerous to spread disease to the consumers.

Satisfactory compliance. This item shall be deemed to have been satisfied if all doors are self-closing and all screen doors open outward, and all other openings are effectively screened wherever flies are evident, unless other effective means are provided to prevent the entrance of flies.

Broken, torn, or poorly fitted screens shall not be accepted as satisfactory compliance. Fly exclusion can be made more effective when screen doors open outward and all doors are provided with closing devices, such as spring hinge, pulley and weight, coil spring, or similar measures. Poorly fitting doors can be provided with flaps of canvas, linoleum, or other material.

A frequently overlooked entrance for the flies is an open drain through the wall of the milk house. All such openings need to be properly screened or provided with flaps.

Screen cloth tacked on the outside of the window frames, so as to cover the openings completely, shall be approved. If the screens are exposed to stress of any kind, light bars of wood across them will prevent breaks or

tears. Screen cloth coarser than 16-mesh to the inch shall not be used.

The screen cloth of screen doors should be protected by strips of wood or by a piece of hardware cloth placed across the bottom panel, and at the level where the hands or elbows are generally placed in opening the door.

Screened milk-house extensions used for storage of utensils shall be approved as part of the milk house, if provided with a tight roof and not exposed to dust. If such extensions are exposed to dust, they shall be made dust proof.

8R (E). MISCELLANEOUS REQUIREMENTS

The milk house or room must, in order to comply with this item, be a separate room used for no other purpose than the cooling, handling, and storage of milk and milk products, and the cleaning, storage, and bactericidal treatment of equipment.

The milk barn is usually infested with some flies. If the milk room opens directly into the barn, so that a door is the only barrier between it and the barn, flies are certain to enter the milk room in larger numbers. When the milk house or straining room is a part of or attached to the barn or dwelling, this part of item 8r shall be deemed to have been satisfied if there is an outside entrance, but no entrance through the partition wall; or, if entered from the barn, the entrance is through self-closing doors having a vestibule between them, and so arranged that both doors will not be open at the same time. Pouring milk into conductors which are protected, or passing the pails of milk through self-closing openings not exceeding 4 square feet into the milk house will be considered satisfactory compliance.

The waste water from the washing of utensils and the scrubbing of the milk house must be led away, and the surroundings of the milk room should be clean and dry. For these reasons the milk house should preferably be located where the natural drainage is good. Wastes from the milk room shall be disposed of as indicated for barn wastes under items 6r (*a*).

ITEM 9R. MILK HOUSE OR ROOM, CLEANLINESS AND FLIES

The floors, walls, ceilings, and equipment of the milk house or room shall be kept clean at all times. All means necessary for the elimination of flies shall be used.

Public-health reason. Cleanliness and freedom from flies in the milk room reduce the likelihood of contamination of the milk.

Satisfactory compliance. This item shall be deemed to have been satisfied if—

(1) The floors, walls, windows, shelves, tables, and equipment are clean.

(2) The milk room is free of trash and articles not used in milk-room work, such as empty cartons, pasteboard boxes, old papers, feed sacks, etc.

(3) Very few or no flies are present.

ITEM 10R. TOILET

Every dairy farm shall be provided with one or more sanitary toilets conveniently located and properly constructed, operated, and maintained, so that the waste is inaccessible to flies and does not pollute the surface soil or contaminate any water supply.

Public-health reason. The organisms of typhoid fever, dysentery, and colitis are present in the body wastes of persons sick with these diseases. In the case of typhoid fever, well persons (carriers) may discharge the organisms in their body wastes. If a toilet is not fly tight and so constructed as to prevent overflow, infection may be carried from the excreta to the milk by flies or through the pollution of water supplies or streams in which the cows wade.

Satisfactory compliance. This item shall be deemed to have been satisfied if—

(1) There is one or more flush toilets connected to a sewer system or to a residential sewage-disposal plant, and constructed and operated in accordance with plans and instructions of the State board of health; or

(2) A chemical toilet or pit privy or other type of privy is provided, constructed and operated in accordance with plans and instructions of the State board of health in those States permitting the use of these types of toilets; and

(3) There is no evidence of human defecation or urination about the dairy premises except in the toilets provided for these purposes; and

(4) The following defects are not found in pit-toilet installations: (*a*) Evidence of caving around the edges of the pit; (*b*) signs of overflow or other evidence that the pit is full; (*c*) seat covers open; (*d*) broken, perforated, or unscreened vent pipe, if used; (*e*) uncleanliness of any kind in the toilet building; (*f*) toilet room opening directly into milk room; and (*g*) evidence of light entering pit except through seat when seat cover is raised.

For details of recommended construction and operation of toilets, see the Milk Ordinance and Code Recommended by the U. S. Public Health Service (Public Health Bulletin No. 220).

ITEM 11R. WATER SUPPLY

The water supply for the milk room and dairy barn shall be properly located, constructed, and operated, and shall be easily accessible, adequate, and of a safe, sanitary quality.

Public-health reason. A dairy farm water supply should be accessible so as to encourage its use in cleansing operations; it should be adequate so that cleansing and rinsing will be thorough; and it should be of safe, sanitary quality in order to avoid the infection of milk utensils.

A slightly polluted water supply used in the rinsing of dairy utensils and containers may be far more dangerous than a similar water supply used for drinking purposes only. Bacteria grow much faster in milk than in water, and the severity of an attack of a given disease depends largely upon the size of the dose of disease germs taken into the system. Therefore, a small number of disease organisms consumed in a glass of water from a slightly polluted well may possibly result in no harm, but if left in a milk vessel which has been rinsed with the water may, after several hours growth in the milk, result in a case of disease.

Satisfactory compliance. This item shall be deemed to have been satisfied—

(1) When the water supply is easily accessible to the milk house and the dairy barn.

(2) When the water supply is, in the judgment of the inspector, adequate in quantity to promote cleanliness.

(3) When no surface or cistern water supply is used except under conditions approved by the State board of health.

(4) When the source of water supply is a public water supply approved by the State board of health, or a spring, dug well, driven well, bored well, or drilled well which complies with the requirements of the State board of health.

(5) When there is no connection between the safe water supply and an unsafe water source through which it is possible to contaminate the safe water supply.

For details of recommended construction and operation of water supplies, see the Milk Ordinance and Code Recommended by the U. S. Public Health Service (Public Health Bulletin No. 220).

ITEM 12R. UTENSILS, CONSTRUCTION

All multi-use containers or other utensils used in the handling, storage, or transportation of milk or milk products must be made of smooth nonabsorbent material and of such construction as to be easily cleaned, and must be in good repair. Joints and seams shall be soldered flush. Woven wire cloth shall not be used for straining milk.

Public-health reason. Milk containers and other utensils not having flush joints and seams, smooth, easily cleaned, and accessible surfaces, and not made of durable, not readily corrodible material are apt to harbor accumulations in which undesirable bacterial growth is produced.

Satisfactory compliance. This item shall be deemed to have been satisfied if—

(1) All multi-use containers, utensils, and other equipment are constructed of smooth heavy-gauge material with a not readily corrodible surface, of a shape that will make cleaning easy, and with all joints and seams soldered flush.

The use of agateware or unsubstantial milking pails is not acceptable. The enamel of agateware is subject to chipping, and many unsubstantial pails rarely have the seams filled with solder, and in addition rust easily.

(2) All multi-use containers, utensils, and other equipment are in good repair, free of breaks, and corroded places.

(3) Woven wire cloth milk strainers are not used.

(4) Single-service filters are used where available.

ITEM 13R. UTENSILS, CLEANING

All multi-use containers, equipment, and other utensils used in the handling, storage, or transportation of milk and milk products must be thoroughly cleaned after each usage.

Public-health reason. Milk cannot be kept clean in contact with unclean milk vessels and utensils.

Satisfactory compliance. This item shall be deemed to have been satisfied when all multi-use containers, utensils, milking-machine pails and tubing, and other equipment used in the cooling, handling, storage, or transportation of milk and milk products are thoroughly cleaned after each milking. Unless equipment and utensils are clean to the sight and touch, this item shall be deemed to have been violated.

ITEM 14R. UTENSILS, BACTERICIDAL TREATMENT

All multi-use containers, equipment, and other utensils used in the handling, storage, or transportation of milk or milk products shall, between each usage, be subjected to an approved bactericidal process with steam, hot water, chlorine, or hot air.

Public-health reason. Mere cleansing of containers, equipment, and utensils does not insure that all disease organisms which may have been present will have been removed or destroyed. Even very small numbers thus remaining may grow to dangerous proportions in the milk, since many kinds of disease bacteria grow rapidly in milk.

For this reason all milk containers, equipment, and utensils must be treated with a bactericidal agent between each usage.

Satisfactory compliance. A bactericidal process is the application of any method or substance for the destruction of bacteria which, in the opinion of the health officer, does not adversely affect the equipment or the milk or milk products, or the health of the consumer, and which is effective.

This item shall be deemed to have been satisfied if all milk containers, utensils, strainer cloths, and other equipment have been:

(1) Exposed for at least 15 minutes to at least 170° F. or for at least 5 minutes to at least 200° F. in a steam cabinet equipped with an indicating thermometer located in the coldest zone; or

(2) Exposed to a jet of steam for at least 1 minute; or

(3) Immersed in, or exposed to a flow of, a chlorine solution of approved strength for at least 2 minutes, or rinsed with a chlorine solution of twice the approved strength. (For *Approved strength of chlorine solutions* see below); or

(4) Immersed in hot water at 170° F. or more for at least 2 minutes, or exposed to a flow of hot water at 170° F. or more (at the outlet) for at least 5 minutes, or scalded with boiling water; or

(5) Exposed to hot air at a temperature of at least 180° F. for at least 20 minutes in a properly designed oven or hot-air cabinet equipped with an indicating thermometer located in the coldest zone; or

(6) Milking machine rubber parts have been treated with an 0.5 percent lye solution; and

(7) If the washing is done elsewhere than in the milk house, utensils are rinsed in the milk house, before use, with a chlorine solution of twice the strength approved for immersion.

The inspector should satisfy himself that the efficiency of the process is such as to produce cans having a residual bacterial plate count of not more than one per cc. of capacity.

Any equipment touched by the inspector shall be again subjected to bactericidal treatment before being used.

Approved strength of chlorine solutions. Sodium or calcium hypochlorite solutions used as bactericidal rinses on dairy farms and at milk plants must be discarded when the strength is reduced to 50 parts per million of available chlorine. Hypochlorite solutions employed as bactericidal sprays must be made up to an initial concentration of sufficient strength so that the excess which runs off or collects in the equipment contains at least 50 parts per million.

Solutions made from compounds containing chloramine or chloramine-T have a slower bactericidal action than hypochlorites containing equal concentrations of available chlorine. The former must, therefore, be made up to a sufficiently greater strength to produce a bactericidal effect within the required exposure period equivalent to that of the above hypochlorite concentration. The chloramine and chloramine-T concentration necessary will vary with the different compounds.

Chlorine solutions once used shall not be reused for bactericidal treatment on any succeeding day, but may be reused for other purposes.

The health officer shall satisfy himself by frequent test that the chlorine solutions being used are of the required strength. For a suitable test for chlorine strength and for details of applicable requirements on steam cabinets, steam jets, and treatment with chlorine solutions, see the Milk Ordinance and Code Recommended by the U. S. Public Health Service (Public Health Bulletin No. 220).

ITEM 15R. UTENSILS, STORAGE

All containers and other utensils used in the handling, storage, or transportation of milk or milk products shall be stored so as not to become contaminated before being used.

Public-health reason. Careless storage of milk utensils which have previously been properly treated is apt to result in recontamination by flies and dust and thus to render them unsafe.

Satisfactory compliance. This item shall be deemed to have been satisfied when all utensils and vessels, including strainer cloths, are—

(1) Left in the treating chamber until used; or

(2) Stored in the milk house in a place protected from contamination, inverting such articles as can be inverted. Storage racks shall preferably be constructed of metal protected against rusting.

Single-service filters shall be kept, until used, in the original package, protected from contamination by storage in a suitable box or cabinet.

ITEM 16R. UTENSILS, HANDLING

After bactericidal treatment no container or other milk or milk product utensil shall be handled in such manner as to permit any part of any person or his clothing to come in contact with any surface with which milk or milk products come in contact.

Public-health reason. Carrying milk pails by inserting the fingers under the hood, carrying an armful of milk-can covers against a soiled shirt or jacket, carrying a strainer cloth over the shoulder or in a pocket, and similar handling of vessels and utensils, undo the effect of bactericidal treatment.

Satisfactory compliance. This item shall be deemed to have been satisfied when none of the above or similar practices is in evidence.

Item 17r. Milking, Udders and Teats, Abnormal Milk

The udders and teats of all milking cows shall be clean and rinsed with a bactericidal solution at the time of milking. Abnormal milk shall be kept out of the milk supply and shall be so handled and disposed of as to preclude the infection of the cows and the contamination of milk utensils.

Public-health reason. Cows frequently contaminate their udders by standing in polluted water or lying down in the pasture or barnyard. Unless the udders and teats are carefully cleaned just before milking, particles of filth are apt to drop into the milk. Such contamination of the milk is particularly dangerous because cow manure may contain the organisms of tuberculosis, and polluted water may contain the organisms of typhoid fever and other intestinal diseases. Rinsing the udders and teats with a chlorine solution has the advantage of giving an additional factor of safety with reference to such disease organisms as are not removed by ordinary cleansing. It is valuable in the control of mastitis.

Abnormal milk may indicate mastitis or other diseased condition, and should therefore be kept out of the milk supply and away from the cows and the milk utensils.

Satisfactory compliance. This item shall be deemed to have been satisfied when the cows' udders look and feel clean and have been rinsed with a bactericidal solution (see item 14r) at the time of milking, and if any abnormal milk is detected it is kept out of the milk supply and, so handled and disposed of as to preclude the infection of the cows and the contamination of milk utensils.

A number of states and cities have for years required that the udders and teats must, in addition to being clean, be treated with the previously described chlorine solution. Some authorities in cold climates fear that the use of water in extremely cold weather will, whether or not it contains chlorine, cause chapping. Long experience has proven that this objection does not hold for warm climates. The measure is best carried out by following the preliminary cleansing by scrubbing the udders and teats with a large cloth saturated with the chlorine solution. The cloth is then wrung as dry as possible and the bag mopped free of excess solution. After thus treating 6 or 8 cows, a fresh pail of solution should be prepared. Tests made by the Public Health Service gave quicker and more complete bacterial removal of udder contamination by means of a chlorine solution than with plain water or with soap and water.

It is recommended that the strip cup be used once each week and the fore milk examined and discarded. An additional precaution not required by the ordinance, but which inspectors should encourage, is the discarding of the first several streams of milk from each teat. They can be discarded into a calf bucket and wasting the milk or soiling the floor thereby avoided. This precaution will help keep the bacterial count of the milk low, as it is the first few streams of milk which contain most of the bacteria in fresh milk.

Item 18r. Milking, Flanks

The flanks, bellies, and tails of all milking cows shall be free from visible dirt at the time of milking.

Public-health reason. Cleanliness of the cows is one of the most important factors affecting the bacterial count of the milk. Under usual farm conditions cows accumulate on their bodies quantities of manure, caked mud, dust, chaff, loose hairs, etc. Practically all of these materials carry bacteria and are apt to fall into the milking pail during the process of milking. This may result in contaminating the milk with bacteria.

Satisfactory compliance. This item shall be deemed to have been satisfied when the flanks, bellies, and tails look and feel clean at the time of milking.

A satisfactory method of cleaning the cows is to go over each one with a stiff brush, preferably using water freely at the same time to assist in the cleansing and to prevent dust. Grooming is facilitated by clipping the flanks, belly, and bag, and by cutting the brush of the tail so that it does not drag. The brushing of part of the herd while other cows are being milked is undesirable because of the dust which may be raised. Therefore all brushing should be completed before milking is begun.

Item 19r. Milkers' Hands

Milkers' hands shall be clean, rinsed with a bactericidal solution, and dried with a clean towel immediately before milking and following any interruption in the milking operation. Wet-hand milking is prohibited.

Public-health reason. The reasons for bactericidal treatment of the hands of milkers are similar to those for bactericidal treatment of the udders. In the course of the preparation for milking, the hands of the milkers have come into contact with almost identically the same kind of materials as may have contaminated the udders. During the course of his duties and natural habits outside of the milking barn, the dairyman's hands must be assumed to have been exposed to body discharges.

Wet-hand milking increases the likelihood of contaminating the milk.

Satisfactory compliance. This item shall be deemed to have been satisfied when:

(1) The milkers' hands have been rinsed with water to which an approved bactericide has been added. (See item 14r.)

(2) Hands are clean and dry at the time of milking. Hands may be considered dry when they have been wiped with a wrung-out cloth that has been used for applying the bactericidal solution.

(3) Hand-washing facilities are available.

The hands of all milkers must be dipped and rinsed in a standard bactericidal solution and wiped dry before milking is begun. This applies to the person who handles the milking machines and applies and removes them from the cows, and to the stripper.

A bucketful of bactericidal solution should be handy in the barn during milking. Every time a milker has finished milking a cow, has carried out and strained the milk, has removed his stool to the next cow, and has applied the cow hobblers or anti-kickers (if used), he should rinse his hands in the solution. The first rinsing in the solution does not afford subsequent protection against recontamination from the cow's flanks, or even from the clothes and person of the milker.

Item 20r. Clean Clothing

Milkers and milk handlers shall wear clean outer garments while milking or handling milk, milk products, containers, utensils, or equipment.

Public-health reason. Because of the fact that the hands of all workers frequently come into contact with their clothing, it is important that the clothes worn during the milking and handling of the milk be clean.

Satisfactory compliance. This item shall be deemed to have been satisfied when milkers are found wearing outer garments that are not excessively soiled.

Washable overgarments are not required, but milkers should be urged to have one suit of overalls for milking and another for general work. The suits are changed just before milking. If milkers wear clean aprons this shall be considered as satisfactory.

Item 21r. Milk Stools

Milk stools shall be kept clean.

Public-health reason. Clean milk stools reduce the likelihood of contamination of milkers' hands between the milking of individual cows.

Satisfactory compliance. This item shall be deemed to have been satisfied when the milk stools are so constructed as to be easily kept clean, look and feel clean, and are stored above the floor when not in use.

The usual practice is to scrub the stools several times a week and keep them on hooks or pegs when not in use. Otherwise they are inevitably kicked around on the floor or in the gutters, or thrown into a corner, and quickly become soiled. Many dairies have for years used metal milk stools, which are easy to wash and keep clean.

Milk stools are frequently padded with old carpet or sacking for the comfort of the milkers. Such stools cannot be washed and cannot be kept clean. Their use does not comply with the requirements of these Standards.

Item 22r. Removal of Milk

Each pail or can of milk shall be removed immediately to the milk house or straining room. No milk shall be strained in the dairy barn.

Public-health reason. Keeping the milk in the barn until all or a large part of the herd has been milked is apt to expose it to flies and dust, and to delay cooling. Straining milk in the barn likewise exposes it to dust and flies.

Satisfactory compliance. To comply with this item,

(1) Each pail of milk shall be re-

moved, as soon as it is filled, to the milk house or straining room; or

(2) Milk may be poured from the milk pails or milking machine units into a 5 or 10 gallon milk can which shall be removed, as soon as it is filled, to the milk house or straining room. The can shall be provided with a cover which shall be removed only during pouring and which shall be protected from contamination while so removed. The can shall be placed at such distance from the cows or sufficiently raised above the floor (as in a cart) as to be protected from manure and splash.

(3) No milk shall be strained elsewhere than in the milk house or in a straining room provided for this purpose.

If the milk house and barn are too widely separated to make practicable the straining of milk in the milk house, the construction of a small screened straining room in or near the barn, but not opening directly into it, is satisfactory. This method still has the disadvantage of delaying cooling, though this can be reduced by taking every can full of milk to the milk house as soon as filled. Dairymen sometimes use the feed room or a similar enclosure for a straining room. This is not approved unless all feedstuffs or other materials are removed and the room is so located that it does not open directly into the milking barn.

Pouring milk into conductors which are protected, as provided under item 8r (e), shall be permitted.

Item 23r. Cooling

Milk must be cooled immediately after completion of milking to 60° F. or less, and maintained at that temperature until delivered and dumped, except morning's milk delivered before 9 A.M. Standard Time and night's milk delivered before 8 P.M.: Provided, That cooling to 70° F. or less shall be accepted when adequate facilities for the washing and bactericidal treatment of utensils are provided and used in the milk house.

Public-health reason. Milk produced under cleanly conditions usually contains from 1,000 to 10,000 bacteria per cc. immediately after milking. These multiply to enormous numbers in time if the milk is not cooled. When the milk is quickly cooled, however, the increase in numbers of bacteria is retarded. In order to understand this, it is merely necessary to recall that bacteria are very small plants, and that most plants do not grow in cold weather. The "germicidal" property of fresh milk will ordinarily prevent excessive bacterial growth in uncooled milk if it is delivered within a few hours and then cooled or pasteurized.

Usually the bacteria in milk are harmless, and if this were always true there would be no reason to cool milk except to delay souring. There is, however, no way for the dairyman or health officer to make absolutely sure that no disease bacteria have entered the milk (even though observance of the other items of this ordinance will much reduce this likelihood), and frequent epidemics among milk consumers prove without question that this happens. The likelihood of contracting disease is much increased when the milk contains large numbers of disease bacteria, and for this reason it is extremely important that milk be quickly cooled on delivered so that any small numbers of disease bacteria which may have entered shall not be permitted to multiply.

When adequate facilities for the washing and bactericidal treatment of utensils, including water-heating facilities and wash and rinse vats, are provided and used in the milk house, the treated utensils are likely to contain fewer bacteria, including disease types, than when washed in the kitchen. The bacterial content of milk placed in such utensils is therefore likely to be lower, hence the result is similar to that obtained by cooling the milk to a lower temperature.

Satisfactory compliance. To comply with this item,

(1) Uncooled morning's milk delivered to a milk plant or one of its receiving stations for pasteurization or separation shall be delivered and dumped before 9 A.M. Standard Time (10 A.M. War Time), and uncooled night's milk before 8 P.M. Standard Time (9 P.M. War Time); or

(2) Milk not delivered before these time limits shall have been cooled immediately after completion of milking to 60° F. or less and maintained at that temperature until delivered and dumped: Provided, That

(3) Cooling to 70° F. or less shall be accepted when facilities for the washing and bactericidal treatment of utensils, including adequate facilities for the heating of water and two-compartment stationary wash and rinse vats, are provided and used in the milk house.

Under these Standards, milk received at a receiving station or pasteurization plant must immediately be cooled to 50°F. or less and maintained at that temperature until it is pasteurized.

For details of cooling methods, see the Milk Ordinance and Code recommended by the U. S. Public Health Service (*Public Health Bulletin* No. 220).

Item 26r. Miscellaneous

All vehicles used for the transportation of milk or milk products shall be so constructed and operated as to protect their contents from the sun and from contamination. All vehicles shall be kept clean, and no substance capable of contaminating milk or milk products shall be transported with milk or milk products in such manner as to permit contamination.

The immediate surroundings of the dairy shall be kept clean and free of health nuisance.

Public-health reason. If milk is transported in vehicles which are not clean or which do not protect it from the sun and from contamination by dust, etc., its bacterial content may be increased.

Unclean dairy surroundings may affect the milk directly or indirectly.

Satisfactory compliance. This item shall be deemed to have been satisfied if all of the above requirements have been met.

Bacterial Standards

The plate count or the direct microscopic count of clumps of raw milk for pasteurization as delivered from the farm shall not exceed 200,000 per milliliter, or the methylene blue reduction time shall be not less than 6 hours, in more than one sample out of the last four samples taken on separate days. The corresponding limits for milk received at a pasteurization plant from a receiving station not over 200 miles distant shall be 300,000 per milliliter and 5 1/2 hours, respectively; and if over 200 miles distant, 400,000 per milliliter and 5 hours, respectively. The count of raw cream for pasteurization shall not exceed 400,000 per milliliter at the place of separation, nor 600,000 per milliliter at the pasteurization plant if shipped from the place of separation. Counts and reduction times shall be determined in accordance with the current edition of Standard Methods for the Examination of Dairy Products of the American Public Health Association.

Public-health reason. It is widely accepted that the bacterial count of milk is an index of the sanitary quality of milk. A high count does not necessarily mean that disease organisms are present, and a low count does not necessarily mean that disease organisms are absent; but a high bacterial count does mean that the milk has either come from diseased udders, has been milked or handled under undesirable conditions, or has been kept warm enough to permit bacterial growth. This means, in the first two cases, that the chances of infection have been increased, and, in the last case, that any infection which has reached the milk has been permitted to grow to more dangerous proportions. In general, therefore, a high count means a greater likelihood of disease transmission.

On the other hand, a wrong interpretation of the signficance of low bacterial counts should be avoided, since low-count milk may be secured from tuberculous cows, may have been handled by typhoid carriers, and may even have been handled under moderately unclean conditions.

Experience indicates that when milk is transferred to tank cars or tank trucks, even if these have been thoroughly cleaned and subjected to bactericidal treatment, the bacterial count is increased; the longer the haul, the higher the count, even with adequate refrigeration. Therefore, a reasonable increase in count must be allowed for milk received at a pasteurization plant in tank cars or tank trucks.

Receiving Stations

Receiving stations shall comply with the grade A standards of the Milk Ordinance and Code recommended

by the United States Public Health Service.

These standards may be found in *Public Health Bulletin* No. 220, page 82 of the 1939 edition.

For a summary of the receiving station requirements see inspection form 8978-C, which may be purchased from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 40 cents per 100. Sample copies may be secured from the U. S. Public Health Service.

TANK TRUCKS AND TANK CARS

Milk tank trucks and tank cars shall be of approved sanitary construction. They shall be thoroughly cleaned after each usage and subjected to an approved bactericidal process before being used. After bactericidal treatment they shall be so stored and handled as not to become contaminated. While containing milk or cream they shall be marked and sealed in an approved manner. For each tank shipment a bill of lading containing all necessary information shall be prepared in triplicate and shall be kept on file by the shipper, the consignee, and the carrier for a period of 6 months for the information of the health officer.

Public-health reason. See items 12r, 13r, 14r, 15r, and 16r.

Satisfactory compliance. To comply with this item,

(1) Milk tank cars and tank trucks shall comply with the construction requirements of item 12r. Milk transportation tanks not mounted on railroad box cars must be provided with a satisfactory dust-proof housing over inlet and outlet valves and fittings.

(2) Tanks shall be subject to the cleaning and bactericidal treatment requirements of items 13r and 14r. They must be rinsed free from any milk residue at the point of unloading. Tank trucks washed and subjected to bactericidal treatment at the unloading point must be examined for cleanliness and must be given bactericidal treatment at the point of filling. For bactericidal treatment with chlorine spray, a solution containing not less than 250 parts per million of available chlorine shall be applied for not less than 5 minutes.

If the washing and bactericidal treatment are done at the unloading plant, a yellow tag must be attached to the outlet housing, containing the following information: (a) the words "washed and sterilized"; (b) date; (c) location of plant where washed and sterilized; (d) name of employee performing these operations.

(3) After bactericidal treatment tanks shall be stored and handled in accordance with items 15r and 16r so as to avoid recontamination.

(4) After loading, all openings shall be sealed with lead seals at the point of filling, and such seals shall remain unbroken until the product is delivered into the custody of the consignee. When the opening is sealed, the label (tag) shall be so attached that it cannot be removed without breaking the lead seal. All sealing of openings of transportation tanks attached to trucks shall be made outside the dustproof housings. Where milk or cream is placed in a tank at more than one shipping plant or station in order to receive its full capacity, the seal placed at the inlet by the prior shipper shall be broken, and the inlet resealed by the subsequent shipper, following his loading in such a manner as securely to attach his tag and the tags of the prior shippers. In such cases, each shipping plant operator shall comply with these requirements in so far as his shipment is concerned.

(5) The words "Milk and Milk Products" shall be painted in a conspicuous manner on all transportation tanks or railroad box cars containing such tanks.

(6) A bill of lading shall be prepared in triplicate by the shipper for each transportation tank, and shall contain the following information in a clear and legible manner:

(a) Name of the operator of the transportation vehicle.

(b) Date of shipment.

(c) Name of the operator and the location of the place of shipment.

(d) Type and quantity (in quarts) of the product (milk or cream) carried.

(e) Name and address of the consignee.

(f) In the case of tank trucks, the truck or trailer license number.

One copy of the bill of lading shall be retained by the shipper, and two copies shall accompany the shipment. One of the latter copies shall be delivered to the consignee at the time and place of delivery, and the other retained by the carrier. The shipper at the place of shipment, the consignee at the place of delivery, and the carrier at his place of business, shall keep on file their respective copies for a period of 6 months, and these shall be readily accessible and open for inspection by the health officer.

FREQUENCY OF INSPECTION AND SAMPLING

Each receiving station shall be inspected at least monthly. Each producing farm shall be inspected at least twice each year and bacteriological samples shall be taken from each producer and examined at least 8 times per year: Provided, That annual inspection of producing farms shall be accepted if bacteriological examinations and "deck" examinations are made of each producer's milk at least monthly.

Public-health reason. Reasonable inspection and sampling frequencies are necessary to determine compliance with the items of sanitation and the standards of bacterial quality.

Satisfactory compliance. To comply with this provision the health officer must inspect premises and examine samples with at least the minimum frequencies prescribed above. In actual practice, greater frequencies are desirable. As often as possible, inspection of farms should be made during milking time, and of receiving stations while milk is being received.

"Deck" examinations shall include organoleptic, strainer dipper, and sediment tests, as follows:

(1) Every can of milk is examined on the receiving platform by a qualified plant employee for odor associated with excessive bacteria count, and by strainer dipper when indicated to be necessary to determine the presence of dirt or flakes characteristic of "gargety" milk.

(2) Milk which upon examination is found to be of unsatisfactory quality is kept out of the supply.

(3) Producers delivering milk of unsatisfactory quality are inspected within five days to determine and correct the cause.

(4) A sediment test is made of the unagitated milk in the bottom 2 inches of a representative can of each producer, and the producer is promptly informed of any tests showing excessive dirt.

(5) A record is kept at the plant for each producer, showing: (a) unsatisfactory findings upon examinations indicated above and number of cans of milk rejected; (b) action taken upon farm inspection and items violated; (c) bacteria counts or reduction times not meeting the standards herein; and (d) the dates of the above examinations and inspections.

SANITATION RATING OF PRODUCING FARMS

The producing farms supplying a receiving station or a pasteurization plant shall be considered by the receiving community as satisfactorily complying with the farm sanitation requirements of these Emergency Standards, if (1) they have within the preceding 12 months been awarded by the milk sanitation authority of the shipping state a rating of 90 percent or

more in accordance with the principles of the U. S. Public Health Service milk sanitation rating procedure, and on the basis of the weights assigned to each item, as shown on the Emergency Milk Plant-Producer Rating Form prepared by the U. S. Public Health Service, and (2) the rating procedure actually employed by the state rating authority has been checked and approved by the U. S. Public Health Service.

Public-health reason. The health officer of the receiving community will wish to know not only whether the source community is operating under these Emergency Standards, but also whether these Standards are being adequately enforced. The milk sanitation rating procedure referred to affords him such information. A rating of 100 percent means that all farms included comply with all of the applicable requirements of these Standards; if not, the rating is decreased by an amount proportionate to the amount of milk sold by the violators and to the relative weights of the violated items. A rating of 90 percent represents satisfactory compliance. (For a description of the rating procedure, see *Methods of Making Sanitation Ratings of Milk Sheds*, Reprint No. 1970 from the *Public Health Reports* of Aug. 12, 1938.)

Federal Security Agency
PUBLIC HEALTH SERVICE
January 1942

EMERGENCY*
MILK PLANT-PRODUCER INSPECTION FORM

(Inspecting Agency)

GALLONS SOLD DAILY TO

Whole milk .....
Cream .....
Total .....

Name_____ Location_____

SIR: An inspection of your dairy has this day been made and you are notified of the defects marked below with a cross (X). Portions of sub-items that are defective are underscored.

Item No.*		
	COWS	
(1)	*Tuberculosis and other diseases.*—Tuberculin test annually except in modified accredited counties ( ), test certificates or evidence of accreditation on file ( ), other tests as required ( ), no cows with extensive induration of udder ( ), no cows giving abnormal milk ( ) ..	( )
	DAIRY BARN	
(2)	*Lighting, milking barn.*—Adequate light openings ( ), adequate artificial light for night milking ( )	( )
(3)	*Air space and ventilation.*—Well ventilated ( ), no overcrowding ( )	( )
(4a)	*Floor construction, milking barn.*—Floors and gutters, concrete, tight wood, or impervious and easily cleaned material in good repair ( ), floors graded ( )	( )
(4b)	*Floor cleanliness, milking barn.*—Floors cleaned before each milking, gutters daily ( ), no pigs or fowl ( ), horse and calf stalls cleaned daily ( )	( )
(5)	*Walls and Ceilings.*—Painted biennially or whitewashed annually or other satisfactory finish ( ), clean and in good repair ( ), ceiling tight if feedstuffs over ( ), no mixing of feed ( ), fly-attracting feeds stored in fly-tight enclosures ( )	( )
(6a)	*Cow yard, grading and draining.*—Graded ( ), drained ( ), no pooled wastes ( )	( )
(6b)	*Cow yard, cleanliness.*—Clean ( ), no swine ( )	( )
(7)	*Manure disposal.*—Stored inaccessible to cows ( ), outdoor piles do not contact barn ( ); in fly seasons, fly breeding minimized ( ) ..	( )
	MILK HOUSE	
(8a)	*Floors.*—Smooth concrete or other impervious material ( ), graded to drain ( )	( )
(8b)	*Walls and ceilings.*—Smooth dressed lumber, sheet metal, or plasterboard, well painted with washable paint; or hollow tile, cement blocks, bricks, concrete, or cement plaster, surfaces and joints smooth ( ), in good repair ( ) ..	( )
(8c)	*Lighting and ventilation.*—Adequate natural or artificial light ( ), adequate ventilation ( )	( )
(8d)	*Screening.*—All doors self-closing, and screen doors, if used, open outward ( ), all other openings effectively screened if fly season unless flies otherwise kept out ( )	( )
(8e)	*Miscellaneous requirements.*—Used for milk purposes only ( ), no direct opening into living quarters or stable ( ), wastes properly disposed of ( )	( )
(9)	*Cleanliness and flies.*—Floors, walls, windows, shelves, tables, and equipment clean ( ), no trash or unnecessary articles ( ), flies eliminated ( )	( )
	TOILET	
(10)	*Toilet.*—Conveniently located ( ), approved construction and operation ( ), no evidence of defecation or urination except in toilets ( )	( )
	WATER SUPPLY	
(11)	*Water supply.*—Easily accessible ( ), adequate ( ), no surface or cistern water unless approved ( ), safe, sanitary quality ( ), not connected with unsafe supply ( )	( )
	UTENSILS	
(12)	*Construction.*—Smooth heavy-gage material ( ), corrosion-proof surface, no agateware ( ), easily cleansable shape ( ), joints soldered flush ( ), good repair ( ), no woven-wire cloth ( ), single-service filters where available ( )	( )
(13)	*Cleaning.*—Cleaned after each usage ( ), must look and feel clean ( )	( )
(14)	*Bactericidal treatment.*—In steam cabinet 170° F. for 15 min. or 200° F. for 5 min.; or steam jet 1 min.; or immersed in standard chlorine or 170° F. water for 2 min.; or flow of standard chlorine for 2 min. or 170° F. water for 5 min.; or in hot-air cabinet 180° F. for 20 min.; or rinsed with scalding water or double strength chlorine; or machine washers treated with 0.5% lye ( ); rinsed with double strength chlorine in milk house if washed elsewhere ( ); cabinets have thermometer in coldest zone ( )	( )
(15)	*Storage.*—Left in treating chamber until used or stored inverted in protected place in milk house ( ), single-service filters in original package until used ( )	( )
(16)	*Handling.*—After bactericidal treatment no handling of milk-contact surfaces	( )
	MILKING	
(17)	*Udders and teats.*—Clean and rinsed with standard chlorine solution at time of milking ( ), abnormal milk excluded ( )	( )
(18)	*Flanks.*—Flanks, bellies, and tails free from visible dirt at time of milking ( ), brushing completed before milking begun ( )	( )
(19)	*Milkers' hands.*—Rinsed in standard chlorine solution just before milking each cow ( ), clean and dry while milking ( ), hand-washing facilities available ( )	( )
(20)	*Clothing.*—Clean outer garments	( )
(21)	*Milk stools.*—Clean, not padded ( ), stored above floor ( )	( )
(22)	*Removal of milk.*—Immediate removal to milk house or straining room ( ), no straining in barn ( ), can covered, protected from manure and splash ( )	( )
(23)	*Cooling.*—Morning's milk delivered before 9 A.M., evening's before 8 P.M. (standard); or cooled to and kept at 60° F. or less, or to 70° F. when adequate water-heating facilities and wash and rinse vats are provided and used in milk house .	( )
	MISCELLANEOUS	
(24)	*Vehicles.*—Clean ( ), covered ( ), no contaminating substances transported ( ) *Premises.*—Surroundings kept clean ( )	( )

Date_____ _____, *Inspector.*

*Item numbers correspond to those in the U.S.P.H.S. Emergency Standards for Raw Milk for Pasteurization. See letter for standards of bacterial quality, receiving stations, tank cars and tank trucks, and frequency of inspection and sampling.

(See reverse side for remarks by Inspector)

Legal Aspects

Renovated Butter*

Process or renovated butter—Federal regulation of—effect on State action.—(United States Supreme Court; *Cloverleaf Butter Co.* v. *Patterson, Commissioner of Agriculture and Industries of Alabama, et al.*, 315 U. S. 148; decided February 2, 1942.) The plaintiff company was engaged in the manufacture at Birmingham, Ala., of process or renovated butter from packing stock butter. One-fourth of the company's packing stock butter was obtained in Alabama and three-fourths in other States. The company shipped interstate 90 percent of its finished product. The production of renovated butter was taxed and regulated by the United States and was also regulated by Alabama. The defendant Alabama officials, who had the duty of enforcing the Alabama laws regarding renovated butter, entered petitioner's factory and, in a little more than a year, seized on 16 separate occasions a total of over 20,000 pounds of packing stock butter, the material from which the finished product was made. The defendants also seized some butter moving to the factory in interstate commerce. The company sought to enjoin the defendants from acting under the State statute, either to determine the wholesomeness of renovated butter made from the raw material in the company's hands, to inspect its raw material and plant, or to seize and to detain the company's packing stock butter. The theory of the bill of complaint was that the Federal legislation and regulations concerning the manufacture of process or renovated butter excluded such State action. The Federal district court and circuit court of appeals ruled against the company and the case was carried to the United States Supreme Court.

The latter court in its opinion said: "The controversy comes to this: The Federal law requires . . . 'a rigid sanitary inspection . . . of all factories and storehouses where process or renovated butter is manufactured, packed, or prepared for market, and of the products thereof and materials going into the manufacture of the same,' i,e., packing stock butter. But, as we have seen, the Secretary of Agriculture of the United States cannot condemn the packing stock butter. The Commissioner of Agriculture and Industries of Alabama claims authority under the State statute to condemn packing stock butter held for renovation. Does the State's claim interfere or conflict with the Federal power?" The court determined that the State's claim did interfere or conflict with the purpose or provisions of the Federal legislation. It was pointed out that the manufacture and distribution in interstate and foreign commerce of process and renovated butter constituted a substantial industry which, because of its multi-State activity, could not be effectively regulated by isolated competing States and that Congress undertook to regulate production in order that the resulting commodity might be free of ingredients deleterious to health. The States were left free to act on the packing stock supplies prior to their delivery into the hands of the manufacturer and to regulate sales of the finished product within their borders. However, once the material was definitely marked for commerce by acquisition of the manufacturer, it passed into the domain of Federal control. Inspection of the factory and of the material was provided for explicitly and confiscation of the finished product was authorized upon a finding of its unsuitability for food through the use of unhealthful or unwholesome materials. By the statutes and regulations, continued the court, the Federal Department of Agriculture had authority to watch the consumer's interest throughout the process of manufacture and distribution. "It sees to the sanitation of the factories in such minutiae as the clean hands of the employees and the elimination of objectionable odors, inspects the materials used, including air for aerating the oils, and confiscates the finished product when materials which would be unwholesome if utilized are present after manufacture. Confiscation by the State of material in production nullifies Federal discretion over ingredients." The court held that, since there was Federal regulation of the materials and composition of the manufactured article, there could not be similar State regulation of the same subject.

The judgment dismissing the bill of complaint was reversed.

* *Public Health Reprts.*, Feb. 12, 1943.

Milk Ordinance Provisions Upheld

In a suit* to enjoin the enforcement of certain provisions of a San Francisco city and county milk ordinance prohibiting, in effect, the sale of unpasteurized milk, with the single exception of certified, the California State Supreme Court has rendered a decision with interesting public health implications.

According to *Public Health Reports* (December 11, 1942), the ordinance in question provided that market milk for sale and distribution for human consumption should consist of (a) certified milk, (b) guaranteed pasteurized milk, (c) grade A pasteurized milk, and (d) grade B pasteurized milk, and that no other milk should be sold for human consumption within the city and county.

The plaintiffs, who were interested in the sale of guaranteed raw milk being permitted in San Francisco, first contended that the ordinance was invalid because it conflicted with the State law as embodied in the agricultural code. They asserted that that code permitted the sale of five grades of market milk—certified, guaranteed raw, guaranteed pasteurized, grade A raw, and grade A pasteurized—and that the ordinance prohibited the sale of guaranteed raw milk and grade A raw milk. The plaintiffs' view was that the agricultural code so completely occupied the field of milk regulation that there was no room for the operation of a municipal ordinance on the subject. The Supreme Court of California, however, said that it had long been the established general rule, in determining whether a conflict existed between a general and local law, that where the legislature had assumed to regulate a given course of conduct by prohibitory enactments, a municipal corporation with subordinate power to act in the matter could make such additional regulations in aid and furtherance of the purpose of the general law as might seem appropriate to the necessities of the particular locality and as were not in themselves unreasonable.

In answer to the plaintiffs' assertion that section 451 of the agricultural code left to municipalities only the field of imposing stricter requirements upon the various grades of milk as established by the code and did not permit the complete prohibition of the sale of any one of the grades, the court's view was that the ordinance merely imposed the additional restriction that the milk, whether it be guaranteed or Grade A, had to be pasteurized and that, essentially, the requirement in the ordinance of pasteurization for both guaranteed and Grade A milk was merely a higher standard for the grades which was not in conflict with the state law.

The plaintiffs also contended that the ordinance was unconstitutional because discriminatory; that there was no substantial difference between guaranteed raw milk as defined in the agricultural code and certified milk as defined in the ordinance and that, therefore, there was no reasonable basis for forbidding the sale of one and not the other. The court, however, found itself unable to say that the ordinance was invalid on the ground stated, saying that a comparison of the two standards revealed without doubt that there was a substantial and reasonable difference which was directly related to the public health.

The plaintiffs also invoked the due process clause but, according to the court, it could not be said that the city and county had no reasonable grounds for requiring all milk sold therein to be either pasteurized or certified.

> "It was true that the sale of milk was a lawful business protected by the Federal and State constitutions, but it could not be doubted that, as milk was vital to the welfare of the nation and susceptible of being a carrier of disease, the production, distribution and sale thereof could be strictly regulated under the police power to safeguard the public health. The requirement that all milk be pasteurized was a proper police regulation and the fact that no exception was here made with reference to certified milk did not alter the situation. 'Certified milk has long been established as milk in which especial precautions are taken to insure absence of disease and contamination, and the supervision is by especially qualified experts.'"

Another point urged by the plaintiffs was that there was an unconstitutional delegation of legislative power in that portion of the ordinance which provided that certified milk was market milk which conformed to the rules, regulations, methods, and standards adopted by the American Association of Medical Milk Commissions and had to bear the certificate of the milk commission of the San Francisco County Medical Society. The court held that there was no unlawful delegation of legislative power, stating its belief that "the requirement in the ordinance may be said to merely require that certified milk must meet standards established by a private corporation or group who are experts in the field, and that the legislative body was aware of those regulations and standards and by the ordinance merely made them a part thereof."

* California Supreme Court; Natural Milk Producers Ass'n *et al.* v. City and County of San Francisco *et al.*, 124 P. 2d 25; decided April 2, 1942, as modified April 21, 1942.

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Association News

Associated Illinois Milk Sanitarians A New Organization

Milk sanitarians representing the dairy industry, municipal and state health departments convened in Chicago, January 18, for an educational program and luncheon.

"The Conservation Method of Washing Cans with Acid Cleaner" was discussed by V. Schwarzkopf, Lathrop-Paulson Company, Chicago. The speaker stressed the importance of clean cans in the production of milk of good quality. The preservation of cans as a war time necessity to conserve metal and manpower was graphically presented to the audience.

"The Milky Way," a technicolor film, was presented by Louis Shere, Diversey Corporation, Chicago. The old Chinese proverb (or is it Chinese?) that one picture is worth ten thousand words holds true of every frame of this very creditable production. It is of particular value to persons interested in clean milk. The script is technically correct and photography splendid.

"What Are Bacteria?" a sound slide film presented by J. A. Keenan, Jr., General Laboratories, Madison, Wisconsin, could leave no doubt in the minds of the audience as to the part bacteria play in our daily ration of milk. The malevolent laugh of the villain might be disturbing to the slumber of juveniles, but would tend to put the fear of dirt in the minds of adult listeners. This, after all, was the desired result.

"The Principals and Practice of Better Milking," by Dr. George H. Hapson, DeLaval Company, New York City, was especially presented for milk sanitarians. The theme was the proper cleaning of milking machines. Dr. Hapson's text might be stated that to be able to tell others how to do it you must know how to do it yourself. He stressed and demonstrated the idea that the milk sanitarian's job is to teach milk producers how to clean and care for milking machines so that top quality milk will be produced the year round. About 150 persons from Illinois, Indiana, and Wisconsin attended the meeting.

At the close of the educational program a business session was held for the formal organization of the Associated Illinois Milk Sanitarians. A constitution and by-laws were adopted and officers elected as follows: President, H. W. Weeks, Chief Sanitarian, Champaign-Urbana Health District, Champaign, Ill.; Vice President, Leo Randolph, Supervisor, Chicago Board of Health, Chicago; Secretary-Treasurer, S. V. Layson, Milk Sanitarian, Division of Sanitary Engineering, State Health Department, Springfield, Illinois; Auditors, Frank V. Lee, Director, Elgin Health Department, Elgin, Illinois, and Dr. H. C. Wiley, District Superintendent, The Borden Co., Chicago. W. D. Dotterrer, Director of Laboratories, Bowman Dairy Co., Chicago, and C. A. Abele, Chief, Farm Inspection Division, Chicago Board of Health, were elected members of the Executive Board.

The avowed object of the Association is to develop uniform and proper supervision and inspection of dairy farms and milk plants, and to encourage improvement in the quality of dairy products and the technological development of dairy equipment and supplies. Any person interested in the objects of the new organization may become a member.

S. V. Layson.

Michigan Association of Dairy and Milk Inspectors

At the annual meeting of the Michigan Association of Dairy and Milk Inspectors, Dr. E. H. Parfitt, formerly of Purdue University and now in charge of quality work for the Evaporated Milk Association, talked "turkey" on the lack of a constructive quality program for manufacturing milk in Michigan. Such frank discussions on the shortcomings of our present system jars us out of our lethargy and makes us do some thinking. In his talk at the general session, he discussed the subject of "Problems in the Production of High Quality Milk" with particular reference to war time conditions. His frank criticism of the confusion which exists among quality control officials as to what constitutes adequate rules and regulations and the making of certain quality tests and their interpretations was very well received.

Retiring President Holiday appointed a committee which met with Doctor Parfitt at the College on December 8th to discuss ways and means of attacking the problem of improving manufacturing milk supplies in Michigan.

Dr. Mallman discussed how best to use the laboratory in milk control during war time.

The Michigan Department of Health has formulated two inspection forms to be used in the enforcement of the new Michigan Milk Ordinance, one for pasteurization plants and one for producer farms. The activity and results of the work of this Association are reflected in the fact that one of its members, Dr. Fabian, is a recent past president of the International Association of Milk Sanitarians, and another member, Dr. R. R. Palmer, has just been elected first vice-president of the International.

H. S. Barnum,
Secretary.

New York State Association of Milk Sanitarians

Herbert G. White, milk inspector for the New York State Department of Health stationed at Bellefonte, Pa., was inducted into the army on January 11, 1943.

A trend toward less efficient operation of milk pasteurizing plants, perhaps a result of the manpower shortage and the wearing out of essential equipment, is reported by the New York State Department of Health. The summary of the results for 1942 of the examinations of samples of pasteurized milk and cream fail to show the usual improvement in the percentage of satisfactory phosphatase test results on samples of pasteurized milk. In fact, a comparison between laboratory results for the first half and last half of 1942 shows slightly less satisfactory phosphatase test results during the second half.

More alarming is a pronounced increase in the number of positive coliform results on pasteurized milk, cream, and milk products. It is believed that this is indicative of poorer operation of pasteurizing plants.

Harvey Tower Davis, a son of E. Harvey Davis, Milk Inspector for the New York State Department of Health with headquarters at Corry, Pa., was killed in an accident while on a routine flight over the Gulf of Mexico near Perry, Florida, on January 12, 1943.

Mr. Davis graduated from the Lake Charles, Louisiana Army Flying School as a pilot and had the rating of Second Lieutenant in the Army Air Force.

Every effort is being directed toward checking these dangerous tendencies.

W. D. Tiedeman.
Secretary-Treasurer.

Philadelphia Dairy Technology Society

The Philadelphia Dairy Technology Society held its regular monthly dinner meeting on February 9 at the Robert Morris Hotel in Philadelphia with an attendance of 34.

The speaker of the evening was Dr. J. C. Kakavas who gave a very interesting and instructive talk, illustrated with beautifully colored slides, on the result of using homogenized sulfanilamide-in-oil in the treatment of bovine mastitis. Great interest was shown in Dr. Kakavas' work by the number of questions raised during the discussion following his talk.

W. S. HOLMES,
Secretary.

COMMITTEE TO STUDY MILK ORDINANCES AND REGULATIONS

At the St. Louis meeting of the International Association of Milk Sanitarians, the following motion of Dr. P. B. Brooks was adopted:

BE IT RESOLVED: That the President appoint a committee of from five to seven members of the Association, to study milk ordinances and regulations which it considers fairly representative of those in effect throughout the United States, and to formulate a set of standards and requirements covering the production and handling of raw milk for sale and use in its raw state; raw milk for pasteurization; the process of pasteurization; and pasteurized milk; including in such standards and requirements only those which the committee considers essential and necessary to insure a safe product of acceptable quality.

BE IT FURTHER RESOLVED: That the committee be directed to report its conclusions to the membership of the Association at the earliest convenient time, not to exceed one year from this date; and that the report be not publicized, except with the majority approval of the active membership of the Association.

President Abele has appointed the committee as follows:

J. W. YATES, *Chairman*
A. W. FUCHS — P. F. KRUEGER
H. L. DELOZIER — C. S. LEETE
O. A. GHIGGOILE

A number of advisers or consultants will be named to assist this committee in the consideration of technical details.

New Members

INTERNATIONAL ASSOCIATION OF MILK SANITARIANS

ACTIVE

Button, Milton H., Chief, Dairy and Food Division, State Department of Agriculture, Capitol, Madison, Wisconsin.

Gamble, James Alexander, Assistant to Milk Marketing Administrator, Hotel Essex, 13th and Filbert Streets, Philadelphia, Pennsylvania.

Moyer, First Lieutenant Clifford, T 9-4, Station Complement, Military Reservation, Indiantown Gap, Pennsylvania.

Steele, Putnam, Consultant and Laboratory Technician, Steele's Dairy Service Laboratory, 156 Whitman Street, East Bridgewater, Massachusetts.

Wilster, G. H., Professor of Dairy Manufacturing, Department of Dairy Husbandry, Oregon State College, Corvallis, Oregon.

ASSOCIATE

Aldrich, Bob, Field Man, Burlington Sanitary Milk Co., Burlington, Wisconsin.

Alexander, Leslie V., Milk Inspector, Health Department, 409 Calumet Avenue, Aurora, Illinois.

Baron, Robert H., Assistant Milk Sanitarian, Will County Health Department, 21 East Van Buren Street, Joliet, Illinois.

Brown, Oden E., Assistant Milk Sanitarian, State Department of Public Health, 521 North Fifth Street, Auburn, Illinois.

Cookson, Joe, Inspector, East Side Health District, 5000 Missouri Avenue, East St. Louis, Illinois.

Dahl, David V., Assistant Milk Sanitarian, State Department of Public Health, 1531 26th Avenue, Moline, Illinois.

Doyle, Joseph Lewis, Engineer of Dairy Equipment, Standard Cap and Seal Corp., 9 Roslyn Court, Roslyn, Long Island.

Duzansky, John, Dairy Inspector, Pure Farm Dairy Co., 1412 North LaVergne Avenue, Chicago, Illinois.

Grossman, Harvey, New York City Health Department, 2215 East 19th Street, Brooklyn, New York.

Gust, Alex A., Milk Inspector, 519 Cummings Avenue, Waukegan, Illinois.

Hadfield, W. A., Research Chemist, Pennsylvania Salt Manufacturing Co., 1000 Widener Building, Philadelphia, Pennsylvania.

Helmbrecht, M. F., Field Man, Kraft Cheese Co., Beaver Dam, Wisconsin.

Hinde, Wilfrid, Manager, Illinois-Iowa Milk Producers, 2449 27th Street, Moline, Illinois.

Keller, Floyd M., Field Representative, Associated Milk Dealers, Inc., 309 West Jackson Boulevard, Chicago, Illinois.

Lee, Frank V., Health Officer, Health Department, Elgin, Illinois.

Lindseth, Frank J., Milk Sanitarian, Health Department, Oak Park, Illinois.

Lindsey, Robert R., Milk Sanitarian, 505 S. Fifth Street, Champaign, Illinois.

Lowry, Mrs. Aileen, Milk Technician, 505 So. Fifth Street, Champaign, Illinois.

Meadows, James O., Sanitary Engineer, J. T. Donald and Company, Ltd., 1181 Guy Street, Montreal, Canada.

Minkin, Joseph L., Assistant Milk Sanitarian, State Department of Health, 214½ First Avenue, Sterling, Illinois.

Myers, Bernard E., Milk Inspector, 114 So. Loomis, Naperville, Illinois.

Nolan, Captain A. F., V. C., Office of the Station Veterinarian, Fort Dix, New Jersey.

Nusbaum, Dave, Extension Specialist in Dairy Mfg., University of Wisconsin, Department of Dairy Industry, Madison, Wisconsin.

Peterson, Morris, Peterson Laboratories, Califon, New Jersey.

Phillips, John D., Field Man, Lake View Cooperative Creamery, Juneau, Wisconsin.

Rosen, Joe L., President, Illinois Creamery Supply Co., 715 So. Damen Avenue, Chicago, Illinois.

Russell, David F., Federal Milk Market Administrator (Lab. Supervisor), 1348 Crystal Street, Chicago, Illinois.

Schroeder, H. C., Lab. Technician, Hawthorn Mellody Farms Dairy, 7938 Crandon Avenue, Chicago, Illinois.

Sessions, W. M., Sanitarian, District Health Service, No. 9, Burlington, Iowa.

Weeks, Harry W., Supervising Milk Sanitarian, Champaign-Urbana Public Health District, 505 So. Fifth Street, Champaign, Illinois.

Weiner, L. H., Director of Laboratory, The Borden Co., 3638 Broadway, Chicago, Illinois.

White, Alvan H., Manager and Partner, The Dairy Laboratories, 210 East Lexington Street, Baltimore, Maryland.

Whitman, W. J., Dairy Farm Inspector, East Side Health District, 408 S. 47th Street, East St. Louis, Illinois.

Wiley, E. J., Service Department, Wyandotte Chemical Co., 820 W. Lawrence Avenue, Springfield, Illinois.

Winters, L. H., Dairy Specialist, Cherry-Burrell Corp., 424 Normal Road, De Kalb, Illinois.

Wisniewski, Theo., Dairy Inspector, Chicago Board of Health, 3008 No. Kimball Avenue, Chicago, Illinois.

Wood, LaMar J., Field Man, Pabst Dairy, Route 4, Oconomowoc, Wisconsin.

Wren, R. D., Research and Service, De-Laval Separator Co., 1205 Sherwin Avenue, Chicago, Illinois.

Young, Vernon T., City Bacteriologist, City Board of Health, Wilmington, Delaware.

Zelenko, Nicholas F., Assistant Milk Sanitarian, State Department of Health, 5319 W. Winona Street, Chicago, Illinois.

"Dr. Jones" Says—*

A FELLOW was in the other day—he'd been up in the city two or three days and eaten around different places. A restaurant he was in, he found a gob of dried egg or something on his plate. Then he went in a drug store to get a soda. He said after the glasses had been used they swashed 'em around in some messy looking water and gave 'em a quick rinse over a spout and put 'em back to work again. "And, my gosh," he says, "we're supposed to be so up-and-coming in health work here in New York State! Stuff like that," he says, "you'd think they'd *do* something about it."

Well, they are doing something about it but, as I told him, his not knowing it—that was a good illustration of what they're up against. Here in the village—that dish-washing picture " 'Twixt the Cup and the Lip": they ran it two nights. I had a piece in the paper and the Rotawanis Club—I got 'em a speaker on restaurant hygiene. And still this fellow hadn't heard anything about it. Getting this stuff over and getting it going—it's like the woman said about feeding spinach to her youngster: yes, she said, he'd eat it—if you put it in his mouth and then chewed it and swallowed it for him.

Of course up there in the city I s'pose there's upwards of a hundred eating places, including the soda fountains and so on. And they're changing help all the time, more or less. And the city health department—they've only got two or three sanitarians to cover milk and all the rest. The bulk of their time has to be put on the things that're most important from the health standpoint and that don't leave 'em an awful lot of time to work on the eating places. They usually try to get 'em started right; plenty of hot water and washing powder and seeing the need of it and all that. And then they check up on 'em once in a while to see how they're doing. But they can't stay there and wash their dishes for 'em—the inspectors can't.

When you get right down to it the best way to get these places to furnish clean eating tools is when the customer gets a glass or something that ain't clean to call the boss around and point it out to him—in a nice way, of course. I know the average person, the same as myself—they don't like to make a fuss about such things and get the reputation of being kickers. But if it's a good place the boss'll want to know about it and if it ain't—anyway, if they think you're a kicker they'll look out for your heels.

PAUL B. BROOKS, M.D.

* *Health News*, New York State Department of Health, Albany, May 25, 1942.