VOLUME 19 No. 6
JUNE, 1956

Journal of

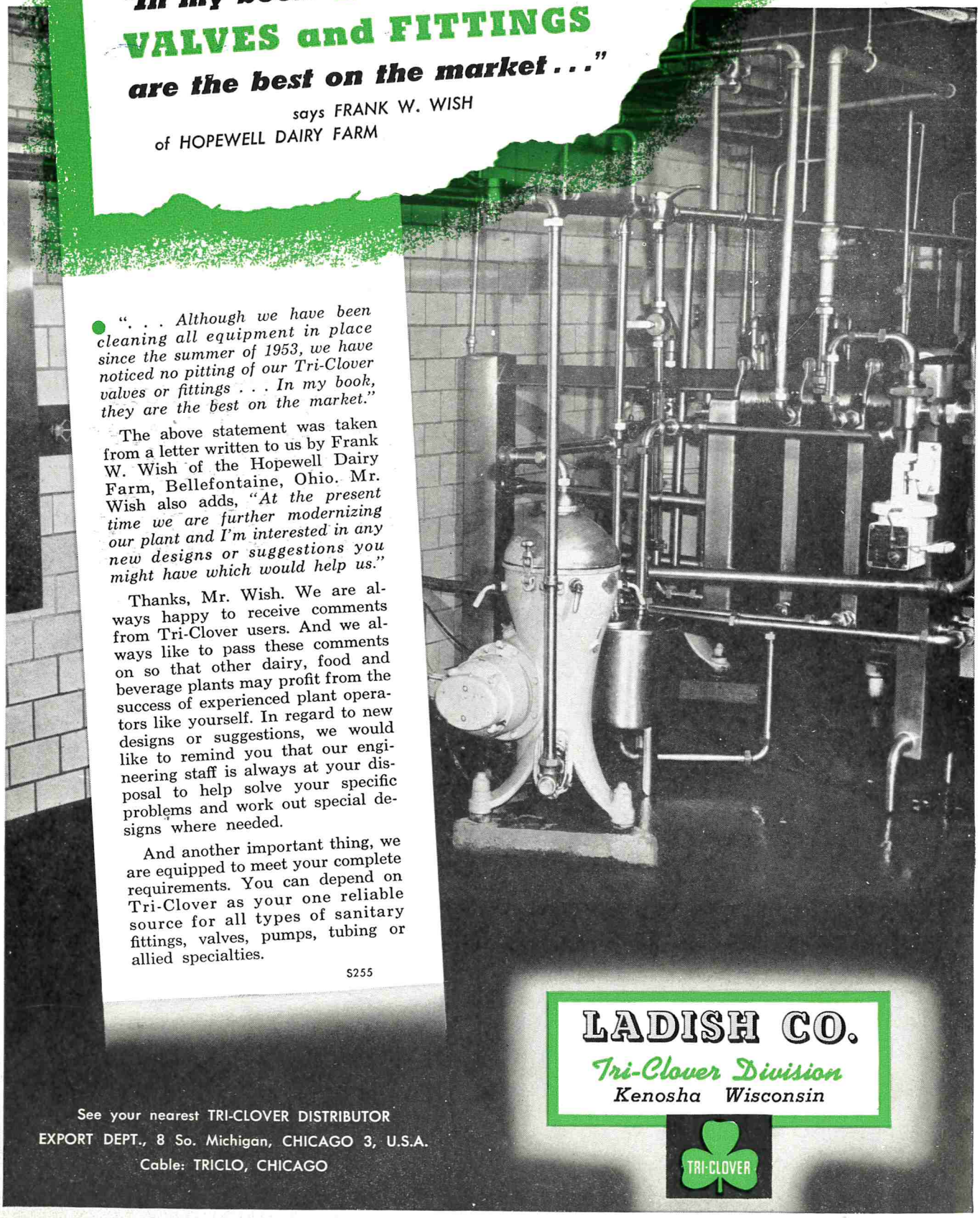
MILK and FOOD TECHNOLOGY

Official Publication

International Association of Milk and Food Sanitarians, Inc.

"In my book TRI-CLOVER VALVES and FITTINGS *are the best on the market . . ."*

says FRANK W. WISH
of HOPEWELL DAIRY FARM



". . . Although we have been cleaning all equipment in place since the summer of 1953, we have noticed no pitting of our Tri-Clover valves or fittings . . . In my book, they are the best on the market."

The above statement was taken from a letter written to us by Frank W. Wish of the Hopewell Dairy Farm, Bellefontaine, Ohio. Mr. Wish also adds, *"At the present time we are further modernizing our plant and I'm interested in any new designs or suggestions you might have which would help us."*

Thanks, Mr. Wish. We are always happy to receive comments from Tri-Clover users. And we always like to pass these comments on so that other dairy, food and beverage plants may profit from the success of experienced plant operators like yourself. In regard to new designs or suggestions, we would like to remind you that our engineering staff is always at your disposal to help solve your specific problems and work out special designs where needed.

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This advertisement appears in June Ladies' Home Journal. Housewives, daily more demanding of rigid cleanliness in the foods they buy, will read how dairymen in all 48 states are assuring convenient, sanitary and safe milk delivery with Pure-Pak cartons.

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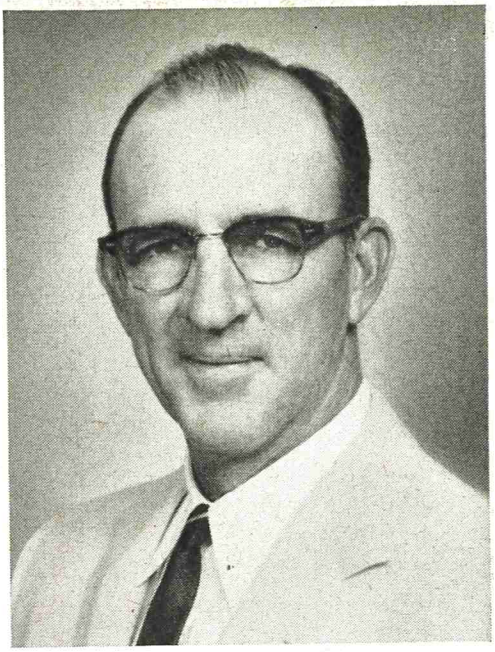
Evolution in milk containers is shown from top left to lower right: Ceramic and crockery, to tin-plated steel, to glass, to disposable cartons.



"We believe that fresh milk and Pure-Pak go together. Both our customers and our employees appreciate the advantages of Pure-Pak cartons," says Mr. Freeman Hales, president of Miami Home Milk Producers Association, Miami, Florida.

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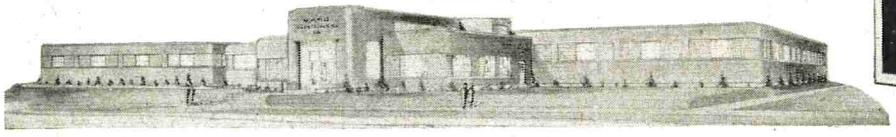

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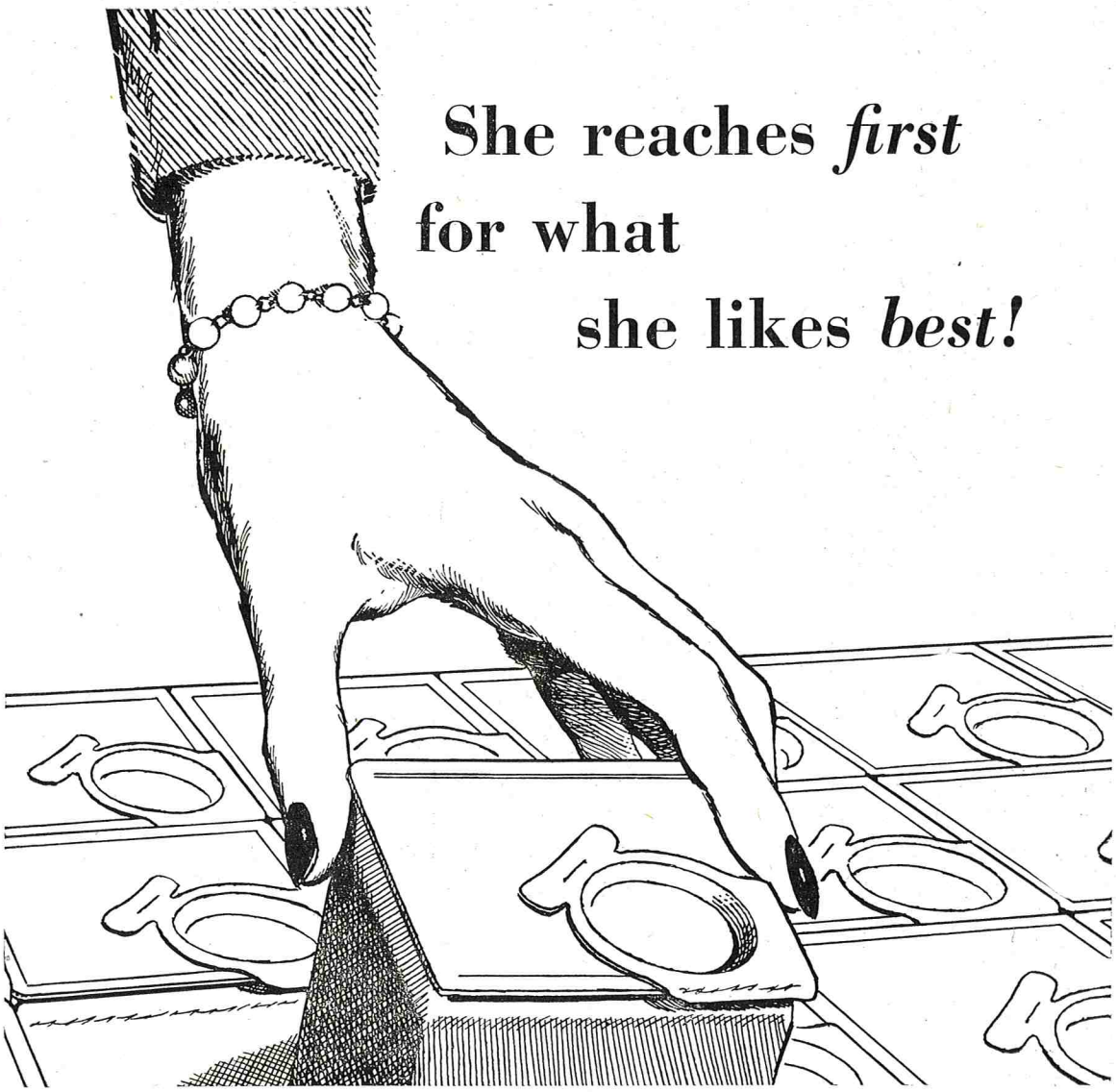

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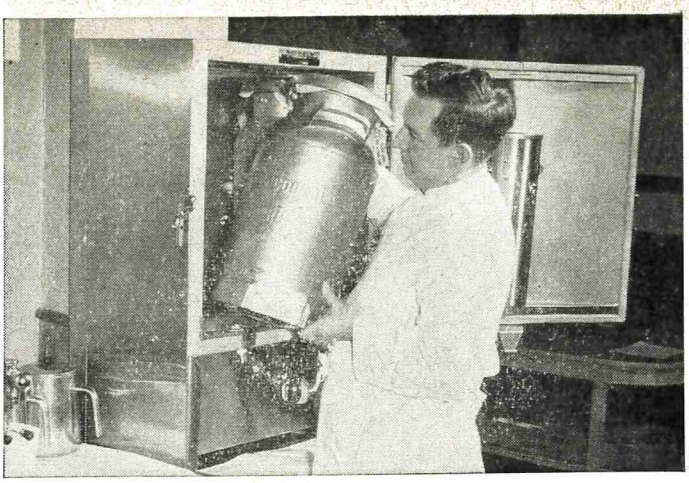

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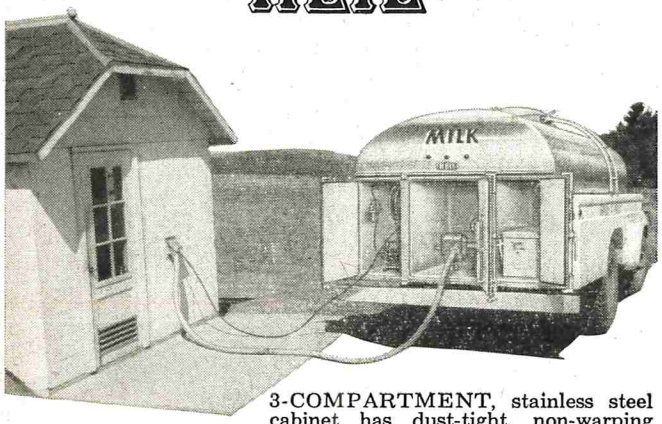

3-COMPARTMENT, stainless steel cabinet has dust-tight, non-warping FRIGID-LITE* plastic doors with snap-on gaskets and refrigerator-type hardware. All compartments and sample chest are insulated. *Registered

HEIL has been building tanks since 1902, produced the world's first stainless steel milk transport in 1927, and originated the truly frameless trailerized tank in 1938.

Stainless steel in a farm pick-up tank costs more than $1,300 a ton. So when you invest in this expensive material, it's just good business to choose a tank which has most of the features found in the "perfect tank."

Craftsmanship in design and construction is why Heil is the world's largest builder of milk transport tanks — why *more milk goes to market in Heil tanks than in all others combined.*

If you were to design a "Perfect Tank," ALL of these Features surely would be included

FEATURES	HEIL	Tank A 1	Tank A 2	Tank B	Tank C	Tank D	Tank E	Tank F	Tank G
MODEL		1	2						
STAINLESS STEEL DUST COVER—Heavy gauge—designed for life of the tank	X	X	X						
SINGLE GASKET FOR MANHOLE AND DUST COVER—Simplicity—easy to clean	X	X	X					X	
TOP PLATFORM ADJACENT TO MANHOLE—Safety—convenience	X								
2½-IN. INSULATION—25% thicker for added efficiency—no sweating	X								
SEPARATE COMPARTMENT FOR SAMPLES—Open only when removing or replacing bottles	X		X	X					
REFRIGERATION AND SAMPLES IN SAME CHEST—Direct cooling is faster and more efficient	X	X				X	X	X	
SAMPLE CHEST INSULATED—Keeps refrigeration in—and heat out	X					X			
SAMPLE CHEST OPENS FROM TOP—Cool air cannot run out	X	X				X	X		
ALL COMPARTMENTS LINED WITH STAINLESS STEEL—Easy cleaning—long-lasting—no rusting	X	X		X					
SNAP-ON GASKETS ON ALL DOORS Easily removed for service and cleaning	X								
REFRIGERATOR-TYPE CHROME-PLATED BRASS HARDWARE—Superior for dust-tight door seal	X								
UNDIVIDED RESPONSIBILITY FOR TRAILERIZED TANKS—Tank and trailer chassis designed and built by one company	X						X		
NATIONWIDE STAINLESS STEEL SERVICE AND REPAIR FACILITIES	X								
TOTALS	13	5	3	2	0	3	3	2	0

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Lo-Bax is available in two forms—Lo-Bax Special and LoBax-W (with a special wetting agent). For literature and/or samples and information about the Lo-Bax can-tagging program, just write today.

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PUBLIC RELATIONS

Public relations mean simply treating others as you would have others treat you. The application of the Golden Rule is the practice of good public relations.

Public relations of the fieldman or the sanitarian determine his success or failure. As our way of life becomes more complex, our relationship with one another becomes more important. Our way of life makes it necessary for us to adjust ourselves to associate with one another. If we learn to live with one another, we have learned the first lesson of good relations. Unfortunately, too many of us never learn the first lesson.

In our work we have only service to sell. The practice of good relations with our competitors, our colleagues, our customers, our producers, and the public is more important than a knowledge of the scientific aspects of our work. To be entirely successful one must be a good diplomat and combine this with scientific knowledge of the dairy industry.

The work of the fieldman or sanitarian is such that good public relations is of vital importance to them. In my 25 years in this business, it has been my good fortune to know many hundreds of people engaged in this type of work. I have known the successful, the mediocre, the failures. The successful take care of themselves, the mediocre are unhappy with their lot, the failures are miserable. The confusion and wasted effort of the latter is a real tragedy. Invarably a large part of their problem can be traced to one thing — the inability to get along with their fellowmen. How can we develop better public relations and in doing so improve our professional standing so that we may command respect from the milk producer and the public?

Generally, it can be said that it is important not only to develop personality traits that are related to leadership but also to understand the forces that motivate man. Paul Garrett, Vice President of General Motors Corporation, said in an address, "Leadership in industry will pass to men who first of all make it their business to study human relations with just as much science as they now study materials and methods. It will pass to executives who understand that the major problems in the future will be with governments and with people. And the time will come in your life when the big jobs in industry will be bossed by men who in their comprehension of the practical factors in the business include also understanding of the influences that move mens' minds and hearts".

The Introvert and the Extrovert. Individuals are commonly referred to as either an introvert or an extrovert, depending upon their personality traits. The introvert is likely to be self-conscious. He is easily offended, suspicious in nature, likes to be independent, works out his own problems, worries a good deal, has definite religious and political ideas, is inclined to be moody at times, and often is pessimistic about the future. He is apt to be accurate and exacting, and expert in his specialized field. He is dependable in many respects, and conscientious about his work but may not be popular with many of his fellow workers.

The extrovert greatly enjoys the society of others. He usually talks freely and with action. He meets people easily, is friendly and socially inclined. He is not argumentative, does not worry about details, is generous to others, can talk in public with ease, laughs readily and looks pleasant.

The personality of most people probably lies between that of the introvert and that of extrovert, having some of the characteristics of both. Such a person is an ambivert. Extroverts as a rule are more popular on first acquaintance, though the quieter introvert's friendship may be more lasting. Each has his place in industry and society. To be a leader and to develop good public relations, a person needs many of the characteristics of the extrovert.

What can each of us do to improve our relationships with one another and with the public? We need to self analyze ourselves regularly to try to see ourselves as others see us. We need to study the reactions of others to our approaches, our idiocyncracies, our every action. Do we rub people the wrong way —do we make them angry—do they avoid our campanionship—do they resent our suggestions? If we are more introvert than extrovert and if we cannot conduct ourselves in the manner that pleases them, we should not pursue a vocation that calls for the exercise of good relations above everything else. Certainly our profession calls for the exercise of good relations at all times — not occasionally. If our self analysis and the reactions of others show that our personality is such that the reactions of others is negative, we should seek out a vocation that fits the characteristics of the true introvert or the extreme extrovert.

How often have we heard it said, "It isn't what he said but how he said it that makes me mad"? All of you have known two kinds of people, those who make others hopping mad by something they say and those who say the same thing and the recipient loves it. There are many things that may make the difference — the inflection of the voice, the expression on the face, whether or not the person is highly respected, over confidence, and cockiness. Oh yes, many things. We often wonder how some people

can continue to make people mad for so long without getting wise to themselves. There is need for long and continued study and a real effort to overcome these things if the person afflicted is to become successful in his relationships with others.

Most of us are engaged in a profession that calls for continuous self-analysis of our actions. We are probably not born with the ability of getting on with people — with handling a delicate situation — with making people respect our views and following our suggestions. Inheritance helps but it can be developed if we have the good sense to practice well known rules and most of all good common sense.

Our everyday work brings us face to face with reality — with decision — with problems that require decisions. Among other things we are concerned with the problems of the dairy farmer and how to obtain an adequate supply of high quailty milk for our milk plant or the public. Let us look at a few simple things that all of us can do to improve our position with the dairy farmer. Our first objective should be to keep down confusion. We should not underestimate the intelligence of the average farmer. We should approach our immediate problem with the facts well in hand. We should then justify our requests or demands, not because the book says so but because common sense and experience has proven the basis for our argument.

It would seem that our first duty when calling on a milk producer would be to make known the purpose of our visit and to properly introduce ourselves. After all it is a basic principle that respect for others propriety demands that you carry this out. Would you want someone to enter your home or your property without your permission or your knowledge?

Next we must remember that no one likes criticism. We dislike our faults being called to our attention. In our work we have the difficult job of pointing out faults or neglected actions in a manner that does not make one angry. It is difficult to determine how best to do this. This is where we must become students of human nature. What works for one may not work for another. Certainly, sugar always catches more ants than vinegar. A little praise for the things well done always gives one an entry to point out and discuss the neglected items. Too often we forget that most of us are dedicated to a profession and because of our constant work in that profession we understand the fundamentals and details. We forget how long it took us to acquire that knowledge. We lack the patience and the know how of explaining the intricate details. We lose our patience because the patient does not readily absorb the information we are trying to give him in a few minutes time. We must learn to be good teachers. We must aspire to sell ourselves and our program.

The majority of people desire to do the right thing. Many times failure to do a job properly is due to ignorance of the rules or to lack of knowledge of how to do it. Often we hear people say that they object to being accused of failure to carry our regullations in a manner that suggests that a great crime has been committed. Each of us is human. We often go faster than the legal speed limit — miss a stop sign, etc. We get boiling mad when a cop accuses us of committing a crime for a slight infraction of the law. I once knew a cop in a small city whose service extended over 30 years to the community. His Chief told me that he had never made an arrest. He found other ways of getting the job done. Everyone had great respect for him and would rather do most anything than cross him. Juvenile delinquency was nil in that town.

The answers to the following questions will give you a guide to your public relations batting percentage.

1. Do you shout at people?
2. Are you impetuous?
3. Do you like people and enjoy their company?
4. Do you question their sincerity?
5. Do you know more about your subject than your pupil?
6. Do you respect the views of others?
7. Do you readily admit making mistakes or are you the kind of person who never makes a mistake?
8. Are you vindictive?
9. Do you throw your weight around?
10. Can you sit down and enter into a healthy discussion without losing your temper and accusing your opponent of being stupid or crazy?
11. Can you really justify your existence?
12. Do you take a good look at yourself in the mirror occasionally — are you really impressed with what you see?
13. Do you carry tales from one producer to another?
14. Do you discuss things you know nothing about?
15. Do you snoop into things and private affairs which are of no concern of yours?

You know what the answer to each should be. Are *you* batting 1000 percent?

Harold J. Barnum

CAUSES AND CONTROL OF CORROSION OF STAINLESS STEEL, ESPECIALLY IN CONJUNCTION WITH MILK AND OTHER FOOD EQUIPMENT[1]

G. M. RIEGEL

Metallurgical Department, Republic Steel Corporation, Massillon, Ohio

This paper presents background information regarding classified types of corrosion of stainless steels and methods of preventing corrosion. Detergent cleaning is discussed with reference to a general chart. A few examples of dairy equipment corrosion are shown and analyzed.

In-place cleaning has proven to have some very definite advantages for both farm and city dairies. It is thought that sanitizers have been responsible for most of the pitting on stainless dairy equipment.

To understand fully the causes of corrosion of stainless steel and to know how to combat these causes, it is necessary to become familiar with some of the ways by which stainless steels may be affected from corrosive standpoints. For convenience in discussing conditions leading to corrosion, metallurgists and corrosion engineers use a number of terms to classify the types of varieties of corrosion. The forms of stainless steel corrosion may be classified under about ten headings:

1. *General* or etching attack—such as may be caused by an inorganic (mineral) acid used in a cleaning process. Stainless steels are not particularly resistant to corrosion by hydrochloric and sulfuric acids. Therefore, these acids (even though inhibited) are not recommended as satisfactory to use in the cleaning of stainless dairy equipment. However, stainless steels are quite resistant to nitric acid of various concentrations and at various temperatures; but this acid attacks many other materials quite readily and is dangerous to use for several reasons.

   Consequently, less harmful organic acids, such as lactic, citric, acetic, tartaric, gluconic or butytric may be employed for dissolving off mineral (lime-type) deposits on dairy equipment when necessary.

2. *Galvanic* corrosion—which may be produced by contact of dissimilar metals in a solution or electrolyte. Even low ionized or weak solutions may cause attack with flow of current but the strongly ionized electrolytes increase the corrosion.

3. *Electrolytic* imposed or stray current attack—such as stray electric currents producing undesirable pitting attack on installations where electrical equipment is being employed.

4. *Intergranular* corrosion—where a particular set of conditions causes a preferential attack at metallic grain boundaries.

5. *Contact* or crevice corrosion—as may be produced as a result of clinging organic and mineral deposits or overlapping metal conditions plus corrosive sludges.

6. *Stress* corrosion and corrosion fatigue—such as caused by a variety of metallic strain conditions accompanied by pitting and cracking due to some kind of corrosive environment.

7. Regular *chemical pitting*—usually produced by members of the halogen family of elements (fluorine, chlorine, bromine and iodine) and their compounds. Among the compounds capable of causing pits are certain of the fluorides, chlorides, bromides, iodides, sulfides, sulfites, sulfates,

Garland M. Riegel received the M.S. degree in Chemical Engineering from the University of Illinois in 1935. He began work for Republic Steel Corporation in a general metallurgical laboratory at Canton, Ohio, in September, 1935. He has remained with Republic until the present time. Since 1940 he has been in charge of a laboratory group engaged in development and research work on stainless steels and corrosion.

[1]Presented before the INDIANA ASSOCIATION OF MILK AND FOOD SANITARIANS at Indianapolis, Indiana, June 8, 1955.

thiocyanates, and chlorites (or hypochlorites). Of these, the most frequently encountered are the chlorides and acid conditions will usually accelerate the attack.

In connection with dairy equipment, we are occasionally concerned with such chemical pitting. This may result from various sources, as from lactic acid and salt derived from milk and milk products including butter, cheese and ice cream; by cleaning and sterilizing solutions; or it may be produced by some coolants used in heat exchangers which may be utilizing calcium chloride or sodium chloride in the cooling water.

The lactic acid content of milk products is not a factor in corrosion of Type 302 stainless steel when considered alone. However, in conjunction with other factors (e.g., salt) it may aid in corrosion by acting as an acid electrolyte. For this reason it is important that the formation of concentration or galvanic cells be prevented or avoided. This can be accomplished by adequate and frequent cleaning.

Brine refrigerants contain chlorides and, to avoid pit corrosion by these solutions, they should be kept on the alkaline side, about pH 8 to 10. Otherwise, and in addition, an inhibiting agent probably should be used. As a precaution against corrosion, brine tanks should be frequently brushed or wiped clean of deposits around the solution level to prevent concentration cell pitting.

If chlorine solutions are used for sanitizing, they should never be allowed to stand for more than a few hours or, preferably, not longer than one hour in contact with stainless steel at any one time period. Usually chlorine sanitizing can be done in a few minutes or not longer than ten minutes before the equipment is put into service.

8. *Bacteriological* product pitting—has developed in some cases such as where sulfur compounds have been released and have produced corrosion of metals.
9. *Erosion* corrosion—sometimes occurs due to swift movement of materials causing an active condition at sharp bends and at restricted zones as in nozzles.
10. *Fretting* corrosion—caused by rubbing, pressure and resulting strain in metal parts along with an attack by a corrosive environment which causes small pieces of metal to become dislodged, resulting in a roughened surface.

Frequently, there is an overlapping of these forms of corrosion so that two or more are involved at the same time. However, general classifications are convenient for explanation of the processes of attack and methods of preventing or controlling corrosion. In the processing of milk products, several of the conditions ideal for pit corrosion are apt to be present.

Milk and milk products have a tendency to form a tightly adherent substance called "milkstone" which in the presence of slight acidity and/or somewhat salty condition may cause corrosion, especially if the milkstone is allowed to remain for long periods. Thorough and regular removal of the milkstone coat will prevent premature failures.

The removal of milkstone from stainless equipment may be effected by various solvents and detergents, including some organic acids and such alkaline chemicals as caustic soda, sodium metasilicate, soda ash, trisodium phosphate, sodium tetraphosphate, sodium tripolyphosphate, sodium hexametaphosphate and tetrasodium pyrophosphate. Addition of wetting agents usually makes these chemicals more effective in cleaning.

If the milkstone is very tenacious or difficult to remove from the equipment, high grade bristle brushes or nylon brushes, possibly in conjunction with a fine grade of pumice or whiting, may be used. Sometimes stainless steel wool or sponges are employed to remove very tenacious coatings; also, fibrous pads and cellulose or plastic sponges are used. Care should be exercised to prevent undue scratching of the metal surfaces. Likewise contamination should be avoided, as may be caused by employing ordinary steel wool or bronze and brass sponges.

Figure 1 lists the most common detergent ingredients. These may be grouped into three classes for consideration and discussion:

COMMON DETERGENT INGREDIENTS

KEY TO CHART
A.....HIGH VALUE
B.....MEDIUM VALUE
C.....LOW VALUE
D.....NEGATIVE VALUE
*....VIA PRECIPITATION
•....VIA SEQUESTRATION
⊛....ALSO STABLE TO HEAT

	INGREDIENTS	COMPARATIVE ABILITY											
		EMULSIFICATION	SAPONIFICATION	WETTING	DISPERSION	SUSPENSION	PEPTIZING	WATER SOFTENING	MINERAL DEPOSIT CONTROL	RINSABILITY	SUDS FORMATION	NON-CORROSIVE	NON-IRRITATING
BASIC ALKALIS	CAUSTIC SODA	C	A	C	C	C	C	C	D	D	C	D	D
	SODIUM METASILICATE	B	B	C	B	C	C	C	C	B	C	B	D
	SODA ASH	C	B	C	C	C	C	C	D	C	C	C	D
	TRI-SODIUM PHOSPHATE	B	B	C	B	B	B	A*	D	B	C	C+	C-
COMPLEX PHOSPHATES	SODIUM TETRA-PHOSPHATE	A	C	C	A	A	A	B•	B	A	C	AA	A
	SODIUM TRI-POLYPHOSPHATE	A	C	C	A	A	A	A•	B	A	C	AA	B
	SODIUM HEXAMETAPHOSPHATE	A	C	C	A	A	A	B•	B	A	C	AA	A
	TETRASODIUM PYROPHOSPHATE	B	B	C	B	B	B	A•	B	A	C	AA	B
ORGANIC COMPOUNDS	CHELATING AGENTS	C	C	C	C	C	A	AA⊛	A	A	C	AA	A
	WETTING AGENTS	AA	C	AA	A	B	B	C	C	AA	AAA	A	A
	ORGANIC ACIDS	C	C	C	C	C	B	A⊛	AA	B	C	A	A
	MINERAL ACIDS	C	C	C	C	C	C	A⊛	AA	C	C	D	D

Figure 1. The common ingredients variously used in commercially available detergents are listed in this chart. The ratings under the "non-corrosive" column apply to metals in general and not to stainless steel alone.

1. *Basic Alkalis*—Note that caustic soda, or sodium hydroxide, is the most efficient of the chemicals listed on the chart for cleaning butter fat from dairy equipment because of its excellent saponifying characteristic.

The corrosive effects of caustic soda are rated "D", or bad, in this general chart which does not hold for stainless steels. However, dilute and very dilute solutions of caustic soda, especially when hot, are quite corrosive toward tin plate, galvanized coatings, aluminum, brass and bronze. In the concentration and temperatures used in the dairy industry, caustic soda will not harm stainless steels.

Also, it may be observed that although sodium metasilicate rates good in this group, it is surpassed in general by superior properties of trisodium phosphate.

2. *Complex Phosphates*—Generally speaking, the complex phosphates are more valuable cleaning agents than the basic alkalis. Note particularly the excellent and almost equivalent characteristics of the first three listed, namely, the tetraphosphate, tripolyphosphate and hexametaphosphate.
3. *Organic Compounds*—The organic chelating agents are excellent sequestering materials on account of their ability to hold normal hard water deposits, including iron hydroxide, in solution by chemical combination.

The addition of wetting agents is important in order to lower surface tension and allow complete, instead of partial cleaning of surfaces whether irregular or not.

Organic acids, such as lactic, acetic, tartaric, citric and gluconic are excellent for dissolving off mineral deposits or hard water scale because they do not have the corrosivity toward metals which is usually characteristic of the mineral acids. However, dilute solutions of phosphoric acid may be used effectively with stainless steels providing the contact duration is of normal cleaning periods and complete flushing and neutralizing is accomplished after cleaning.

Recently an investigation was completed in regard to a corroded ice cream scraper blade made of Type 410 stainless steel. Its badly pitted condition indicated that it had been in contact with corroding solutions, such as those containing chlorine and/or chlorides for periods of too long duration without rinsing or removing the harmful solutions. (See figure 2.)

Apparently, such scraper blades should be properly cleaned and sanitized by using a detergent and about 200 ppm. of a quaternary ammonium compound solution. A quaternary solution should be employed for such sanitizing to minimize opportunity for corrosion of such stainless steels of lower chromium content and

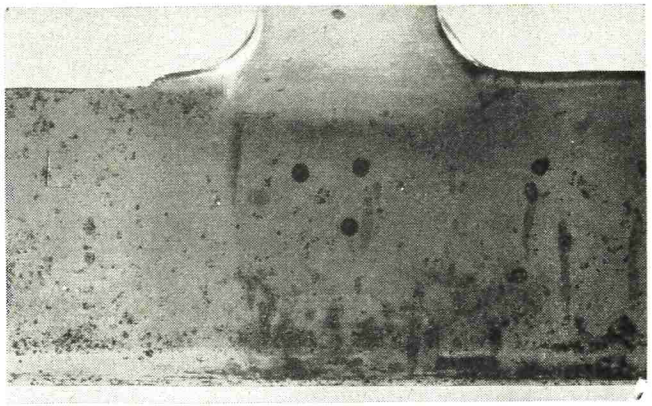

Figure 2. Corrosion or pitted condition on an ice cream scraper blade indicating an apparent lack of proper cleaning and rinsing.

of lower corrosion-resistance. Pumps and various valves should be scrubbed and sanitized in a similar manner to do an effective economical job.

Investigations of localized corrosion on pump shafts have sometimes revealed that milk and milk products (e. g., ice cream mixes) have seeped into packing glands around the shafts; also cleaning and sanitizing solutions have done likewise. Consequently, pitting developed due to long time contact with corrosive solutions plus crevice conditions and possibly electrolytic or galvanic action between dissimilar material, e.g., bronze bushings or graphitized packing and the stainless steel. The smaller shaft shown in photograph was made of Type 416 stainless and the other of Type 303, both showing competitive analyses of free machining quality. (See figure 3.)

Apparently, better designed pump and mixing shafts or methods of sealing off the bearings have greatly reduced failures of this kind in recent years. Also, improved cleaning methods are being employed and more care is being exercised to supply stainless in its best corrosion-resistant condition for the particular applications.

The importance of surface finish and care should not be underestimated nor neglected and may be summarized as follows:

1. For proper sanitation and ease of cleaning, it is first necessary to start with food handling equipment which has smooth, clean surfaces.
2. Next it is very important to keep them that way with the right kind of cleaning methods.
3. Polished finishes have ordinarily proven to be less susceptible to pitting corrosion than rough, coarse ground and as-pickled surfaces.
4. Bright cold rolled or polished surfaces are easier to maintain in the proper sanitary manner.

Many farm and city dairies are now employing, where possible, cleaned-in-place (C.I.P.) methods instead of completely disassembling the milk handling

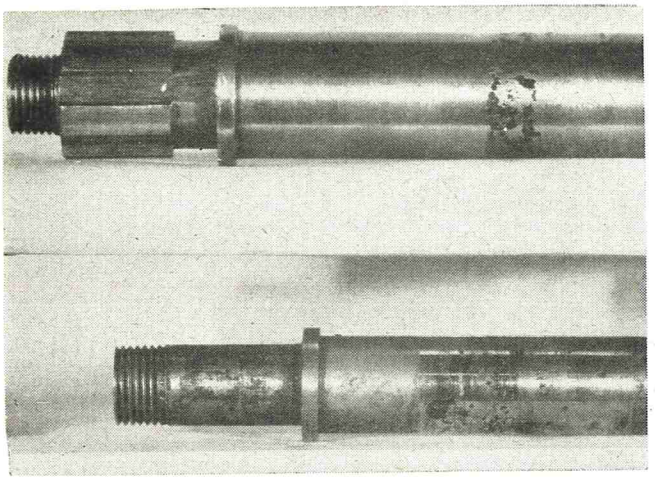

Figure 3. Better design of packing glands and stuffing boxes, as well as pump and shaft arrangements on mixing apparatus, have reduced the frequency of corrosion problems such as those shown here on shafts from earlier machines. Periodical check and replacement of packing materials is advised.

equipment for each cleanup. Various public health departments and their dairy inspectors in more recent years realize that, when done properly, just as good or better cleaning can be accomplished by the C.I.P. process as by the more laborious and time-consuming method of taking apart the equipment and cleaning the various pieces separately. Some health departments are now recommending the C.I.P. methods.

A number of universities through their departments of agriculture, animal experiment stations and dairy science departments are proving that C.I.P. methods can be very effective, speedy or more efficient and economical. It is also being demonstrated that, when balanced detergents are employed properly, there is little or no need for a sanitizer as the equipment is made really clean and practically free of microorganisms. Hot water and hot chemical detergent solutions are still found to be effective germicidal agents.

There are several types of chemical sanitizers available but hypechlorites and quaternary ammonium compounds are most widely used. Chloramines, other organic chlorine compounds and iodophors are some of the other sanitizers on the market. Also receiving some attention an sanitizers are isothiourea alkyl ether derivatives and commercial grade antibiotics. Usually we can expect more corrosion trouble from the halogen sanitizers (which ordinarily liberate free chlorine, bromine or iodine) than from any other chemicals sold by reputable suppliers of cleaning compounds. Such halogen liberating compounds (e.g., sodium hypochlorite and calcium hypochlorite) should be employed at low temperatures such as 60°F. and under, as well as for short time periods (10 minutes, maximum) just before utilizing the equipment in order to be of service at the most effective time and in order to greatly reduce the chances of pitting attack on the metallic surfaces. It has been proven that chlorine has about the same germicidal efficiency in cold water as in hot water and there is lower loss of gaseous chlorine in the cooler solutions.

If other means of sanitizing can be found to be sufficiently effective, halogen sterilizing should be eliminated. Considerably more experimental work needs to be done along this line.

Quoting from a report issued by the Department of Dairy Science at the University of Illinois, ". . . . the quality of milk handled through a stainless steel pipeline cleaned in position did not differ significantly from the quality of milk handled through the same system when the pipeline was disassembled for cleaning after each milking.

"Improperly cleaned and sanitized pipelines may constitute an important source of general and thermoduric contamination of raw milk. Milk pipelines were santized effectively by the use of procedures which included either chlorination or hot water (185°F.) as the germicidal agent.

"A milk pipeline which was allowed to become excessively contaminated through the use of inadequate sanitation procedures was readily restored to a satisfactory bacteriological condition by a resumption of correct rinsing, washing and sanitizing operations. It was not necessary to disassemble the pipeline in order to achieve this result."

Then, quoting from "Detergents in the Dairy Industry" by Charles Schwartz of the Hall Laboratories, Inc., Pittsburgh:

"Surveying our experience broadly, we might say that the best detergent available to the dairy industry today is one in which there is contained an efficient calcium-sequestering material for the control or prevention of alkaline-earth-metal precipitates, an alkali sufficient in amount to do a good cleaning job and a type least harmful to operator and equipment. It might be added, though, that in addition to a good detergent, there is required a reasonably well worked out cleaning procedure, equipment of the proper type and in good condition, and, last but not least, a fair proportion of an ingredient which we have not been able to mix into detergents—common sense."

3-A SANITARY STANDARDS FOR STORAGE TANKS FOR MILK AND MILK PRODUCTS

(AS AMENDED, NOVEMBER 9, 1955)

Formulated by
International Association of Milk and Food Sanitarians, Inc.
U. S. Public Health Service
The Dairy Industry Committee

It is the purpose of the IAMFS, USPHS, and DIC in connection with the development of the 3-A Sanitary Standards program to allow and encourage full freedom for inventive genius or new developments. Storage tank specifications heretofore or hereafter developed which so differ in design, material, construction, or otherwise as not to conform with the following standards, but which, in the fabricator's opinion, are equivalent or better, may be submitted for the joint consideration of the IAMFS, USPHS and DIC at any time.

Storage tanks for milk and milk products conforming to 3-A Sanitary Standards comply with the following in design, material and construction.

DEFINITION

A storage tank is a cylindrical, rectangular, oval, or other equally satisfactory shape storage or cooling tank for milk or milk products as herein described.

A. SIZE OF TANK

(1) *Inside Height*

Tanks having an inside height of more than 96-inches shall be provided with means (see suggestions, "APPENDIX B") that will facilitate cleaning and inspection of all interior surfaces.

B. MATERIAL

(1) *Inside Lining*

The inside lining and all attachments welded thereto within the milk zone shall be of 18-8 stainless steel with a carbon content of not more than 0.12 percent. The metal of the weld area shall be substantially as corrosion-resistant as the parent metal.

The material used for the inside lining shall be not less than No. 14 U.S. standard gauge stainless steel.

(2) *Outer Shell*

The outer shell shall consist of a continuous covering of metal or other waterproof material which shall be smooth, durable, and effectively sealed.

(3) *Insulation*

Insulating material shall be of a nature and amount sufficient to prevent, in 18 hours, an average temperature rise of greater than 3°F. in the tank full of water when the average differential between the temperature of the water and that of the atmosphere surrounding the tank is 30°F., provided that the material shall be the equivalent of not less than 2-inches of cork in insulating value.

(4) *Agitator Shafts, Blades and Collars*

The agitator shafts, blades and collars shall be of 18-8 stainless steel.

(5) *Bearings*

Bearings which are within the milk zone shall be made of stainless steel, nylon, nickel alloy, or other equally corrosion-resistant material.

(6) *Umbrella for Vertical Agitator Assembly*

The umbrella shall be made of 18-8 stainless steel, or of rubber or rubber-like material that is non-toxic, relatively stable, relatively non-absorbent, and shall have a smooth surface.

(7) *Outlet Valves*

Outlet valves shall be made of 18-8 stainless steel, nickel alloy, or other equally corrosion-resistant material.

(8) *Manhole Assembly*

Manhole opening collar, door and/or cover shall be of 18-8 stainless steel.

(9) *Legs and Leg Socket Exteriors*

Legs and leg socket exteriors shall be of corrosion-resistant material. Paint on non-wearing surfaces shall be considered corrosion-resistant.

(10) *Air Vent*

The air vent shall be made of 18-8 stainless steel.

(11) *Gauge Opening Sleeve*

The gauge opening sleeve shall be made of an 18-8 stainless steel.

(12) *Sample Cock*

Sample cocks shall be made of 18-8 stainless steel.

(13) *Gaskets*

Gaskets shall be made of a resilient rubber or rubber-like material that is non-toxic, relatively stable, relatively non-absorbent and have a smooth surface. Block tin, single or multiple service gaskets may be used for the outlet valve connection.

(14) *Sight and Light Glasses*

Sight and light glasses shall be of clear glass.

(15) *Motor Mounting*

Motor mounting, drive and exteriors of structural parts not in product zone shall be of corrosion-resistant material with a smooth finish; or shall be rendered corrosion-resistant or painted.

C. FABRICATION

(1) *Welds*

All outside seams shall be welded or bonded. All inside seams shall be welded and welds shall be ground flush with the plate surface. Outside welds, if reasonably smooth, need not be ground. All welds on the inside surface shall be polished to a finish not less than that of the adjoining surface.

The inside radii of all welded or permanent attachments shall be not less than 1/4-inch.

(2) *Construction*

The tank shall be so constructed that it will not sag, buckle, or prevent complete drainage of water when the tank has a pitch of not greater than 1-inch in 100-inches. Where the inside head joins the lining of the tank the radius shall not be less than 3/4-inch.

The inside lining and all attachments welded thereto shall be as smooth as a No. 4 mill finish on stainless steel sheets or 120 grit finish properly applied.

Longitudinal welds in the drainage line shall be so located as not to interfere with drainage.

(3) *Legs*

Adjustable legs of round stock with sealed bases shall be provided of sufficient size and spacing to carry the tank when full and to raise the milk outlet sufficiently high to allow for adequate cleaning. The tank or bracing shall have a minimum clearance of 8-inches from the floor.

Leg socket exteriors shall be readily cleanable.

(4) *Outlet*

The outlet shall have a flanged or sanitary external thread connection for the value and shall be located where readily accessible to provide complete drainage of the tank. The minimum diameter of the outlet opening shall correspond to that of a 1-1/2 inch 3-A Sanitary Fitting.

(5) *Outlet Valve*

Valves shall be close-coupled, sanitary plug type or close-coupled compression type with no stuffing box, conforming to "3-A Sanitary Standards For Fittings Used On Milk And Milk Products Equipment And Used On Sanitary Lines Conducting Milk And Milk Products" and the supplements thereto.

The value body shall be so designed that it can be mounted on the tank with either single service, multiple service, or block tin gaskets. If a block tin gasket is used, it shall be scraped in and smoothed off after the value body is drawn up tightly in its permanent and fixed position. The valve body shall be considered readily removable when used with single or multiple service gaskets and when secured by not more than (four) hex nuts. The tank outlet and valve bores shall have the same inside diameter and shall be concentric and parallel.

(6) *Inlet*

The inlet connection shall comply with "3-A Sanitary Standards for Fittings Used On Milk And Milk Products Equipment And Used On Sanitary Lines Conducting Milk And Milk Products" and the supplements thereto and shall be equipped with a 3-A Sanitary Standard cap. All parts located within the tank shall be readily removable and so designed that all interior and exterior surfaces are visible when removed. There shall be no threads in the milk zone. All interior angles shall have radii of not less than 1/8-inch.

(7) *Air Vent*

A hooded air vent of sufficient free opening area to prevent back pressure during filling and to prevent vacuum during emptying of the tank shall be installed in the front head above highest potential liquid level or in the top of tank not more than 5-inches from the junction of the front head and tank cylinder. It shall be provided with a perforated cover having openings not greater than 1/16-inch diameter, or slots not more than 1/32-inch wide and woven wire mesh shall not be used for this purpose. It shall be so designed that parts are readily accessible and easily removable for cleaning.

(8) *Gauge Opening*

The gauge opening, when required, shall be not less than 2-inches in diameter, located in the head and fitted with an approved 3-A Sanitary Standard cap.

(9) *Thermometer Fitting*

One or more thermometer fittings conforming to "Supplement No. 1 To The 3-A Sanitary Standards For Thermometer Fittings And Connections" shall be provided that will accommodate an indicating or recording thermometer. The thermometer inlet shall be located sufficiently low to permit registering of temperatures when the tank contains not more than 10% of its capacity and shall be so positioned to be easily visible.

(10) *Manhole*

The manhole shall be located at the drainage end or side of the tank except that in a vertical tank it may be located in the top of the tank. The inside dimensions of the manhole opening shall be not less than 15″ x 20″ oval, or 18″ diameter.

The top manhole opening of a vertical tank shall be not less than 3/8-inch higher than the surrounding area and if the exterior flange is incorporated in it, it shall slope and drain away from the opening.

(11) *Manhole Cover*

Manhole cover shall be the inside or outside swing type. If the cover swings inside, it shall also swing outside away from the opening for disassembly and cleaning. No threads or ball joints shall be employed within the milk zone to attach the manhole cover and its appendages. The manhole cover and its appendages shall be removable without the use of tools.

(12) *Gaskets for Manhole Cover, Sight and Light Glasses*

Gaskets shall be removable. Any gasket groove or gasket retaining groove shall not exceed 1/4-inch in depth or be less than 1/4-inch wide. The minimum radius of any internal angle in a gasket groove or gasket retaining groove shall be not less than 1/8-inch.

(13) *Sample Cock*

Tanks shall be provided with a flush type sampling cock, the inside diameter of which shall be not less than that of 1-inch 3-A Sanitary Standard Tubing. Sampling cock may be located in the manhole cover, head or wall of tank.

(14) *Sight and Light Glasses (When Required)*

Sight and light glasses shall be of such construction that the interior surfaces drain inwardly and shall be readily removable for cleaning. The diameter of the openings into the tank shall be not less than 4-inches. Sight and light glasses shall be so placed that the opposite end of the tank, when empty, can readily be observed through the glass. The exterior flare of the opening shall be pitched so that liquids cannot accumulate.

(15) *Other Openings*

All openings in addition to those specified shall be of sanitary design and capped.

(16) *Protection of All Openings*

All openings into the tank shall be suitably protected against the entrance of drip, dust, oil, insects, and other contamination.

D. AGITATORS

(1) *Agitation*

When specified, the tank shall be provided with means of adequate agitation of product. Adequate agitation for whole milk is that degree of agitation which at full tank capacity will result in not more than 0.1% variation in fat content after 20-minutes agitation of milk stored 24-hours at 40°F.

(a) *Horizontal Mechanical Agitators*

Horizontal agitators may be installed in either front or rear head or shell of tank.

The agitator shaft shall be readily demountable for cleaning and shall have a packless bearing. The agitator shaft shall have a sanitary rotary seal.

(b) *Vertical Mechanical Agitators (Atmospheric)*

The vertical agitator shaft assembly if removable, shall have a sanitary coupling located outside the milk zone.

The collar or point of entrance through the top of the tank for the vertical agitator shaft shall be at least 3-inches larger in diameter than the shaft diameter at this point, and shall extend at least 3/8-inches higher than the highest point of the surrounding area of the outer jacket. This opening shall be suitably protected against the entrance of dust, moisture and insects by means of a sanitary and easily cleanable one or two-piece umbrella designed for quick and easy disassembly for inspection and cleaning. This opening and umbrella shall be further protected against oil contamination by means of a metal oil diverting slinger attached to the drive shaft above the umbrella.

The bottom guide bearing shall be removable, of sanitary design and shall permit quick and easy accessibility to all surfaces for inspection and cleaning. The welded guide bearing support shall be so positioned as not to interfere with drainage.

(c) *Vertical Mechanical Agitators (For Pressure or Vacuum Tanks)*

When tanks are used under pressure or vacuum operation, the vertical agitator shaft shall be readily removable for cleaning by means of a sanitary coupling outside the milk zone and shall be equipped with a removable type rotary seal. Specifications otherwise shall comply with the requirements for vertical agitators in atmospheric tanks as above.

(d) *Alternate Agitation*

When compressed air is used for agitation of the product, or to unload the storage tank, the air shall be processed to remove dust, insects, and extraneous material. The air piping installation used to convey the air shall be designed to prevent siphoning or backflow of milk into the external air system. The air tubing within the tank shall conform to 3-A Sanitary Standards for Tubing and shall be readily and easily removable for cleaning outside the tank. No threaded fittings shall be used in the milk zone. Walls of holes in air distributor piping shall be chamfered for easy cleaning and all burrs shall be removed. (See "APPENDIX, Paragraph (A), Recommendations for Air Agitation".)

F. MOTOR MOUNTING

Motor mounting shall be so constructed as to be easily cleanable. All exterior surfaces shall be self-draining.

G. ACCESS TO TOP OF TANK

The tank shall be provided with ladder rungs or platform if any openings are above the eye level.

APPENDIX

(This appendix covers recommendations for (A) Air Agitation and (B) Manual Cleaning.)

A–RECOMMENDATIONS FOR AIR AGITATION

(A) Oil-free air my be produced by one of the following known methods or their equivalent:

(1) Use of carbon ring piston compressor.

(2) Use of an oil-lubricated compressor with effective provision for removal of any oil vapor by cooling.

(3) High pressure water-lubricated or non-lubricated blowers.

(B) Compressors should be provided with the following air filters:

(1) Large removable filter to be located at inlet end of compressor.

(2) Filter and moisture trap to be located immediately after compressor.

(3) Single service filter to be provided at junction of sanitary milk line and non-sanitary air line.

(C) All filters should be easily accessible.

(D) Non-sanitary air line should be pitched away from sanitary inlet pipeline.

(E) Compressor inlet should be located in a clean space or in clean outer air.

B–MANUAL CLEANING

(A) If it is necessary to enter the tank to clean any or all surfaces, the tank should have the following minimum dimensions:

(1) 36-inches in height by 48-inches in diameter, or 48-inches square.

(2) 36-inches in height, 36-inches in width, by 48-inches in length, if oval or rectangular.

(3) If the tank's inside height exceeds 96-inches, it is suggested that as an example of means for manual cleaning that the manufacturer weld a stainless steel rung on each end of the tank to support a removable platform at a height which will facilitate cleaning and inspection.

This Amended 3-A Sanitary Standard, on June 30, 1957, supersedes the 3-A Sanitary Standard published in the May-June 1946 number of the *Journal of Milk and Food Technology,* which on the above named date expires and becomes null and void.

The 3-A Symbol many not be applied to equipment conforming to the foregoing 3-A Sanitary Standard without formal authorization obtained from the 3-A Sanitary Standards Symbol Administrative Council. Correspondance should be addressed to C. A. Abele, Secretary, 2617 Hartzell Street, Evanston, Illinois.

DAIRY PLANT SANITATION[1]

DAVID LEVOWITZ

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Our ordinances and codes stipulate the minimal requirements for dairy plant sanitation. As practising inspectors, it can be assumed that all of us are well versed in them. Because the dairy industries are now more highly competitive than ever before, it is essential that all operations be kept as efficient as possible. Equipment must be maintained in its best condition, to avoid too high depreciation and replacement charges. Hand labor is costly and sometimes erratic; automatic, fatigue-free mechanical aids, while initially expensive, are more economical, from the aspect of total operating cost.

This paper will review some of the recent developments in the direction of better dairy plant sanitation at lower cost.

CARE OF STAINLESS STEEL EQUIPMENT

Stainless steel's virtues are well known. It is extremely rugged, and can be welded, formed, machined and drawn readily. It is more suitable for use in dairy processing plants than the tinned copper, nickel-plated copper, "white metal" and monel alloys which were previously employed. It does not impart metallic flavor, nor induce oxidized flavor. When it first came into use, many assumed that stainless steel was substantially indestructible.

It is certainly much more durable than the metals its replaced; but it is subject to breakdown, as some dairy plant operators have already learned—first hand. The mechanism of stainless steel deterioration, and how to avoid it, has been investigated for the past few years, and has just recently been charted.

Stainless steel is an alloy of iron, chromium and nickel. Its inertness is due to the formation, and retention at its surface of a chromium-nickel oxide film. When this film formation is inhibited or interfered with, galvanic action causes "pitting".

The smoother the surface of the stainless steel, the greater the effectiveness of the oxide layer. An electro-polished, mirror or fine-grit finished surface is thus more resistant than one finished with a coarse grit. To avoid local action at welds, the joined area must be ground-down carefully and finished indentically as the balance. At junctions between stainless steel and other metals, galvanic action will cause accelerated deterioration.

Dr. David Levowitz received the B.S. degree from the College of the City of New York in 1927, the M.S. degree in bio-chemistry in 1927 and the Ph.D. degree in physical chemistry in 1936 from Rutgers University. Since 1936 Dr. Levowitz has been Director of the New Jersey Dairy Laboratories. This organization supplies laboratory and consultation service to health departments and to the dairy and food industries.

Abrasives harder than stainless steel will score the surface. Pitting will be initiated at the grooves formed. Stainless steel is preferably cleaned by using detergent solutions which can solubilize the residues. If these are not wholly effective and if abrasives must be used, they must be selected carefully—must not contain any components harder than stainless steel. Stainless steel sponge is satisfactory. No other metal sponge or ribbon or wool should ever be used on stainless steel.

Ordinary steel wool should never be used—not only because it is prohibited by codes, and portions may find their way into the product—but because microscopic particles of the steel fibers will be strongly adsorbed on the stainless steel surface and will turn to rust. This iron oxide will unstabilize the chrome-nickel oxide film and result in rapid pitting.

Residues of any nature or size, even inert dust particles, will unstabilize the oxide film, also. Detergents

[1]Presented at the 50th Annual Meeting, MASSACHUSETTS MILK INSPECTORS ASSOCIATION, Bancroft Hotel, Worcester, Massachusetts, January 5, 1956.

and sanitizing solutions must be rinsed away thoroughly, immediately after use, and the final rinse should be with a non-ionic, or low-ionic, clear water. When permitted to remain on stainless steel surfaces, detergent solutions stimulate galvanic deterioration. (Highly ionizing inorganics are more harmful than lower-ionizing organics). The residues of detergent solutions, after drying, are as destabilizing to the chrome-nickel oxide of the stainless steel surface, as residues of any other origin.

THE WATER SUPPLY

The need was noted above, for water of low-ionic character, for the final rinsing of cleaned stainless steel equipment. The waters used in many plants, derived from their wells or from city systems, while they may meet sanitary code specifications, are hardly describable as "low-ion". To convert a "high-ion" water to "low" requires equipment somewhat more elaborate than that employed for merely "softening".

The water supplies of many plants contain appreciable concentrations of iron or manganese, or both. The residues from such waters result in accelerated stainless steel deterioration. Equipment becomes particularly unsightly, and difficult to clean. The film formed on heat transfer equipment surfaces acts as an efficient insulator, to make fuel costs excessive. Troubles from iron and manganese are avoided by appropriate water treatment.

Waters which satisfy sanitary standards may contain many varieties of psychrophilic bacteria. Perfectly processed products, traversing equipment rinsed with such water, will be inoculated. Subsequent storage may permit sufficient elaboration of the psychrophiles to result in spoilage and consumer complaints. A proper control program should include the regular checking of the water supply both before and after treatment.

The flavor of water must be watched carefully too. Supplies whose flavors are other than constantly "good" should be subjected to activated charcoal or equivalent treatment. Consumers, after once noting a flavor abnormality in a product, seem to look for recurrences forever after.

Many studies have shown that the money paid for the extra chemicals needed to soften a hard water for regular plant cleaning would, within three or four years, fully pay for the installation and operation of a system to treat their whole water supply. Most plant operators do not yet realize the serious losses they suffer through continuing to employ inadequate water.

CLEANING AIDS

Many of us can recall when codes regularly stipulated that only certain alkaline compounds were permitted for employment in dairy plant equipment cleaning operations. The realization that alkaline residues can best be solubilized by acid media has removed these limiting regulations, excepting only that there are still many codes which continue to specify that high concentrations of caustic must be used in bottle washers.

Practically all of the detergent manufacturers serving the dairy industries prepare bottle washer compounds of low causticity and cost, which outperform the old-fashioned alkali. These yield cleaner, brighter, rapid-draining surfaces, and do not etch the glass so that the bottles must be discarded after a few trips. The requirement of high causticity in bottle washer solutions is obsolete; no useful purpose is served by keeping it on the books.

Some of us can recall when dairy plant chemical cleaners consisted only of soda ash and caustic soda. Much progress was made when the simple phosphates came into use. The complex phosphates, tripoly, tetrapyro and hexameta, came into employment when their abilities to "sequester" or "chelate" polyvalent metallic ions into soluble non-ionic association, was recognized. Complex phosphates' solutions hydrolyze into simple form on aging, heating or variations of hydrogen ion range, and thus lose their sequestering ability.

During the past few years, the abilities of many salts of ethylene diamine tetra acetic acid to permanently chelate polyvalent metal ions into soluble non-ionic form, has brought a number of these compounds into existence. Some are already being incorporated into cleaning compounds offered to the dairy industries. Others are intended for use in water treatment plants.

"Wetting agents" which increase penetrating ability by affecting interfacial tension, were chemical curios a few years ago, but have been developed into a number of specialized compounds today. Non-foaming and foaming types, stable at high or low temperature, and at high or low hydrogen ion concentration, are commercially available alone, or as components of cleaning compounds offered for sale to dairy plants.

There is no doubt but that chemicals for cleaning will continue to be improved. Today's chemicals should be used today. Coupled with a good water, they make mechanical cleaning faster, and circulation cleaning most practical.

CIRCULATION CLEANING

Look at any river bed. Plain water traveling over a surface, will ultimately erode it. The higher the velocity, the more rapid the erosion. Milk residues, deposited on pipes' internal surfaces, will be eroded by the flow of milk, as is shown by the tapering off of

coliform concentrations, in milk processed through unprepared equipment.

The principle of circulation cleaning is sound. Detergent manufacturers have learned how to incorporate wetting, chelating and oxidizing agents into their formulations, to make them most effective. Plate, barrel and internal tube heat exchange equipment and piping, have been cleaned successfully with this method for several years. Equipment has been developed and reported as successful, for cleaning storage tanks, tank trucks, pasteurizer vats, surge tanks, vacuum pans and multiple effect evaporators.

Studies have shown that gaskets of various types used on standard and special fittings for stainless steel and glass piping cause no serious trouble, or threat to health, even when self-centering molded items didn't seat as properly as calculated, provided the circulation solutions and duration of cycles was adequate.

Automatic temperature maintenance charted on recording thermometers, pumps of adequate displacement and detergent solution tanks of proper capacity help to make circulation cleaning effective.

Circulation cleaning hook-ups will generally include some portions of equipment which must be hand-cleaned. The qualifications and character of the men to whom this manual cleaning is assigned becomes a question of tremendous importance. Do they know how to clean parts thoroughly? Which parts must they clean regularly? Will they (and their relief men) do so regularly? This should not be left to chance; frequently, it is when all of the cleaning is manual. It has been demonstrated too often that cleaning personnel have not been adequately trained, or are not sufficiently reliable. In plants which employ circulation cleaning, inspection systems should be instituted to check with particular care, daily, on the treatment of the manually cleaned equipment, as well as of that cleaned by circulation.

THE CLEANING ROUTINE

The purpose of each cleaning operation must be fully explained to the men entrusted with the cleaning. If they don't understand what they are supposed to do, and how to do it, good performance will never be attained. The acid and alkaline solutions for circulating high temperature presses have been mixed together in more than one plant!

Directly after use, after all product has been drained out of lowest points, as much as possible of the fully-connected system should be flushed out with warm (110°-120°F.) soft or softened water, fortified with some alkaline-wetting agent-sequestering agent cleaner. This will remove the fat mechanically, disperse the bulk of the other solids which might dry on equipment surfaces, and retard molecular calcium precipitation.

Portions of the hook-up which are to be hand-cleaned, should be removed and brought to the cleaning sink or trough. Small, stiff bristled brushes should be provided. They permit exertion of higher pressures. The moist brush, shaken free of water, may be dipped into dry detergent and then used to brush the equipment surfaces thoroughly. The dry detergent, wetted by the brush, produces a saturated solution at the utensil surface; this is extremely effective in removing soil. Less detergent is used by this method than is employed in making the usual solution. The equipment then should be rinsed thoroughly with clean water.

Sections of hot systems should be soaked for a few minutes in an acid-wetting agent (milk-stone removing) solution, water rinsed, and racked until reassembly.

Circulation-cleaned sections may be given acid and alkali treatments adequate to remove all residues without hand brushing. The only way in which the proper duration of treatment can be established, is by experimentally determining how long it takes to displace the soil residue from the most resistant surface after a peak capacity run, and then gearing the daily treatment at 25% additional.

LIMITING THERMODURIC AND COLIFORM BACTERIA

Calcium salts are excellent nutrients for thermoduric organisms. The usually slight daily accumulation of precipitated molecular calcium is readily displaced by rinsing the entire processing line, daily, with a solution of a mixture of an acid (whose calcium salt is soluble) and a compatible wetting agent. This will prevent growth of thermodurics on plant equipment and will limit the thermoduric level to that of the raw supply.

Perfect cleaning of equipment surfaces will prevent nutrients from being available for extensive growth of coliforms which might find their way to such surfaces introduced either by mishandling or carelessness. Recognize that in the periods of non-use, equipment incubates at room temperature, and moisture and oxygen demands for bacterial metabolism are more than satisfactorily met.

There is only one positive way of insuring against the entry of coliforms into a freshly pasteurized product. It is to heat all surfaces to be contacted by the product, after it leaves the pasteurizer gate valve or the flow diversion valve in forward flow, to not less than 165°F. for not less than one minute. Excepting only for large surge or storage tanks, and fillers whose closely articulating parts may be damaged by such heating, this system is entirely practical.

A supply of hot water at 180°F. should be prepared (in the pasteurizer furthest from the pump to the

cooler, or by introducing it into the balance tank of a high temperature system) and directed to the remainder of the fully connected hook-up. "Tempelstiks" are most convenient for determining metal temperatures. The hot water treatment should not be stopped until all surfaces have achieved the temperature desired, for the exposure required. This treatment will inactivate coliforms, even if the equipment has not been cleaned perfectly.

Parts which cannot be treated with hot water can be sanitized with hypochlorite solution. Surfaces must be perfectly clean for this method to be effective. The hypochlorite solution should be brought to a pH of 6.5-7.0 immediately before use, by the addition of acetic (or any other organic) acid. At this lower hydrogen ion concentration, the hypochlorite is much more effective than it is in the usual alkaline range. Fog or spray surfaces with 400 p.p.m. hypochlorite fifteen minutes before use or soak in 100 p.p.m. for one minute before use. Then drain and rinse with clean water.

Rubber parts whose surfaces may be cut (bottle filler valves, etc.) must be treated by hot water. Sanitizing solutions cannot penetrate cuts until the rubber is stretched.

After the system is prepared, it must be handled aseptically, if at all. Personnel must be trained to avoid careless, reflexive handling. The man who has just pushed a dirty case of bottles will contaminate bottle cappers or valves if he handles them.

THE PREMISES

The construction of a plant can simplify or complicate its maintenance in a sanitary condition. Hose stations, sinks and troughs should be located where needed. Less fuel is wasted when hot water is drawn from a tap, than when made by mixing steam and cold water.

Convenient drains should be spotted immediately below exhaust lines. Center drains, and floors pitched to them, keep men walking in the wet all day, and is unpleasant. Floors should be pitched to the sides, gently, to side-gutters. This will keep the working area of the floor dry and much more comfortable for the workers.

Hose stations and drains should be located in driveway areas to permit prompt flushing down after spillage. Milk solids not removed rapidly, will create a nuisance.

Floors, walls and ceilings of operating areas are supposed, by code, to be impervious to moisture. Tile, grouted with thermoplastic resin, is truly so, but most expensive. Tile, grouted with regular (Portland) cement masonry, does not long remain satisfactory. Every concrete sidewalk shows that such masonry is not impervious, after the surface finish is worn off. When the grouting becomes absorbent, milk solids are imbibed and begin to ferment. Floor fermentation aroma annoys personnel, irritates visitors and may even affect product flavor. The end products of the fermentation deteriorate the masonry rapidly. Floor fermentation aroma thus is a sign that repairs soon will be needed.

Anti-bacterial cement masonries are not as chemically inert as thermoplastic resin, but they are substantially impervious and they fully prevent milk solids fermentation. Its cost is very little above than that of Portland cement mortar when employed for grouting tile. The difference in expense is more than covered by the costs of repairs avoided.

Air-borne contamination is not a significant problem in the processing of fluid milk; however, it is in the manufacture of those products which are processed after the pasteurization treatment—buttermilk, cottage cheese, butter, sour cream, etc. The walls, ceilings and floors of rooms in which such products are handled must be kept as clean as the equipment surfaces; otherwise microorganism prolififeration will permit them to seed air currents endlessly with spoilage flora. Use of antibacterial cement for grouting wall and ceiling tile is therefore particularly desirable in these rooms. Lowered maintenance recommends it in the milk rooms as well.

The high maintenance costs of floors, walls and ceilings made of integral anti bacterial cement masonry can be avoided by two-layer construction, employing anti-bacterial cement mortar for the exposed surfaces. This is recommended too, for top dressing the surfaces in tank truck unloading rooms, and for use on the driveways adjacent to milk plants.

While equipment is generally installed to keep pipe runs to minimum length, more attention should be paid to spacing to insure that workers are not so crowded as to jostle each other. Discomfort decreases efficiency. Keeping the operating rooms at a comfortable temperature, and properly ventilated is at least as important as creating a pleasant atmosphere in the plant manager's office.

Insect activity increases with temperature. Dirty bottles and cases are not as strong a fly-bait on cool days, as they are on warm days. To minimize the fly problem, unloading docks should be designed to be kept cool during the hot weather. This, coupled with blowers to create air barriers at doors which must be opened, and general good housekeeping will prevent insect control from becoming a major headache.

Conservation laws, designed to minimize pollution of water resources, are now being enforced rigorously. Dairy plants have been instructed that they can no longer discharge their untreated wastes into conven-

ient brooks, streams or rivers.

A pound of dairy effluent is as difficult to handle in a municipal treatment facility as twelve of human waste. Plants which can hook into city systems are fortunate in that they do not have to install and maintain individual disposal units, but they must learn to keep their waste-solids to a minimum. More cities every year are basing sewer rental charges on the amount of solids treated, measured by automatic samplers.

"Good housekeeping" entails segregating concentrated waste and disposing of it separately (it can frequently be used as animal food); keeping dilute waste to a minimum by preventing milk and milk product leakages and spillages; and avoiding continuous water loss through careless rinsing, open lines, etc.

The "aeration-oxidation" disposal system, developed by the Philadelphia Regional Laboratory of the U.S.D.A., has been demonstrated in actual plant use to be much more economical to install and operate than any other. In this system, dairy solids are rapidly digested by intensive (but odorless) bacterial metabolism induced by supplying oxygen at a very high rate in the form of air. No chemicals need be used; the entire operating cycle can be made automatic by the use of simple timers. This method is recommended even for city plants where sewer-rental charges become excessive.

SUMMARY

1. Stainless steel equipment should, for best performance, be finished with a high polish; cleaned thoroughly to the complete removal of residues; and rinsed with non-ionic water.

2. A good water supply is essential to efficient dairy plant santitation. Treating water by "batch" addition of chemicals is much more expensive than by installing a permanent system.

3. Cleaning aids presently available, the wetting agents, inorganic and organic chelating compounds, make residue removal easier.

4. Circulation cleaning is not automatic; operating personnel must be fully trained and responsible to make it, and manual cleaning, proper and efficient.

5. Careful equipment preparation is essential for the control of thermoduric and coliform bacteria.

6. Anti-bacterial cement masonries improve sanitary conditions and decrease maintenance costs.

7. Dairy plant sanitation is a function of many factors, and is efficient when all are correlated.

FORTY-THIRD ANNUAL MEETING
HOTEL OLYMPIC — SEATTLE, WASH., SEPTEMBER 5, 6, 7, 1956

RAILWAY ITINERARY AND RATES
MILWAUKEE RAILROAD

	Station	*Railroad*	*Train*	*Time*	*Date*
LV Chicago	Union	Milw. R.R.	Olympian Hia.	3:00 PM	9/3
AR Seattle	Union	NP	Olympian Hia.	9:30 AM	9/5
Attend Convention Sept. 5-7, 1956					
LV Seattle	King St.	NP	City of Portland	12:30 PM	9/8
AR Chicago	Union	Milw. R.R.	City of Portland	11:30 AM	9/10
No. 2					
LV Chicago	Union	Milw. R.R.	Olympian Hia.	3:00 PM	9/3
AR Seattle	Union	Milw. R.R.	Olympian Hia.	9:30 AM	9/5
Attend Convention Sept. 5-7, 1956					
LV Seattle	King St.	NP	Cascade	12:30 PM	9/8
AR Portland	SP	NP	Cascade	4:30 PM	9/8
LV Portland	SP	SP	Cascade	4:45 PM	9/8
AR San Francisco	Market St.	SP	Cascade	9:15 AM	9/9
LV San Francisco	Market St.	SP	C. of San Fran.	4:00 PM	9/9
AR Chicago	Union	Milw. R.R.	C. of San Fran.	11:15 AM	9/11

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THE PROBLEM OF ANTIBIOTIC DETECTION IN MILK

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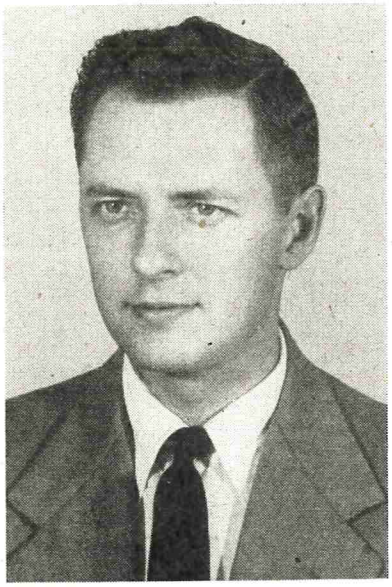
The potential importance of the presence of antibiotic compounds in raw milk has led to the development of several antibiotic detection methods. The majority of these procedures is based on the inhibition of the metabolic activities of dairy streptococci with antibiotics as evidenced by a decrease in acid production rate or in reductase activity. Considerations of the problems associated with the use of antibiotic-free control samples, the time required for the test and other factors are important in the application of these methods.

Several investigators have discussed the potential importance of the presence of microgram amounts of antibiotics in raw milk (1, 4, 5, 10, 14) where accepted chemotherapeutic procedures for the treatment of mastitis are primarily responsible for the introduction of these antibacterial compounds into milk (2). Elimination of antibiotic milk from dairy plant milk supplies would be facilitated by an antibiotic detection method which embodies the characteristics of speed and simplicity. Quite logically research on this problem has generally been based on the interference by antibiotics on the metabolic activities of dairy streptococci. It is the purpose of this review to present information on the existent methods and to discuss some of the applications and limitations of these procedures.

One might expect a high degree of sensitivity from detection methods involving only a small dilution of the unknown sample. To this end several procedures have evolved which consist essentially of inoculating with a known bacterial culture and estimating the rate of acid production or reductase activity. Following the findings of Krienke (14), Silverman and Kosikowsky (19) presented a detection method based on the retardation of lactate formation. With a commercial starter as the test organism, added low concentrations of penicillin, aureomycin and dihydrostreptomycin prevented normal acid formation as measured titrimetrically in a four hour test period. Earlier data on the retardation of lactic steptococci by penicillin were provided by Hunter (10) as well as by Berridge (3).

Other evidence for the interference of antibiotics with the metabolism and multiplication of bacteria in a milk medium has come from investigations in which nonspecific reductase activity is estimated by the use of oxidation-reduction indicators. Johns and Katznelson (12) demonstrated that penicillin inhibited the reductase activities of starter organisms as measured by methylene blue or resazurin reduction. Ruche (17) concluded that penicillin retarded only slightly the reduction of methylene blue in either normal milk to which antibiotic was added directly or in milk sampled after udder infusion. This investigation involved extended incubation as no inoculum was added.



Dr. L. A. Nutting received the B.S. degree from the University of New Hampshire in 1941 and later received the M.S. and Ph.D. degrees from Virginia Polytechnic Institute. His doctoral thesis research was completed under the auspices of the Oak Ridge Institute of Nuclear Studies. Since 1950 he has been connected with the National Dairy Research Laboratories, Inc. as a microbial physiologist.

Methylene blue reduction was also investigated by Schipper and Petersen (18) with a strain of *Bacillis cereus* as the test organism in the presence of added aureomycin. These investigators were able to detect concentrations well below 0.1 microgram per milliliter.

Resazurin reduction has been employed for the quantitative determination of nisin by Friedmann and Epstein (9). The principle of the reductive conversion of tetrazolium compounds to formazans in the presence of proliferating microorganisms has also been employed by Neal and Calbert (16) as a nonspecific test for inhibition. A single strain of *Streptococcus thermophilus* exhibited greater sensitivity to added penicillin, aureomycin or terramycin but not

streptomycin than a single commercial lactic starter. Total incubation time was two and one half hours and detectable antibiotic concentrations were similar to those generally regarded as deleterious to the manufacture of cultured dairy products.

Mattick *et al.* (15) have adapted the inhibition of nitrate reduction by *Micrococcus pyogenes* var. *aureus* for the assay of low concentrations of penicillin in milk. By using large inocula these workers were able to obtain sufficient rates of nitrate production to run a complete test in two hours.

In cases where one is willing to rely on more elaborate and time consuming procedures several basic methods which have been applied to the assay of antibiotics in nonmilk biological samples are available; these include dilution methods, diffusion methods and turbidimetric methods (7).

Any procedure applicable to milk which depends primarily upon some aspect of the inhibition of bacterial multiplication in the suspected sample is inherently subject to certain limitations. Of prime importance is a consideration of the type of medium employed as a control. One, of course, must be reasonably certain that the control medium contains inhibitors in a concentration below the level required to have an influence on the test culture. Silverman *et al* (19) have suggested the use of a reconstructed milk control, although no data with this medium were presented. Foster (8) has very adequately demonstrated both a beneficial and a deleterious effect on the growth of streptococci in heated milk which require consideration in any use of reconstituted milk controls. These heat effects might possibly be compensated for by heating suspected samples; however, such a procedure would entail the possible destruction of antibiotic (6, 10). A thorough investigation of the comparative behavior of the same organism in both reconstituted and raw milk would presumably provide background information which would contribute to a detection method utilizing a reconstituted milk control.

In addition the use of heated milk requires a consideration of the findings of Jenness (11) concerning the heat liberation of sulfhydryl groups and their influence on dye reduction.

Another important aspect concerns the minimum time required for completion of the test. The length of the incubation period is probably the principal factor although Neal *et al.* (16) have mentioned the importance of inoculum size. Presumably, increasing the inoculum decreases the required incubation time. However, in the case of large inocula one must consider the effect of dilution by the inoculum and its relationship to the sensitivity.

For measurements of reductase inhibition the choice of indicator affects the measurement and in this connection the blue diformazan obtained by the reduction of tetrazolium blue[1] might have desirable characteristics over the red formazans studied to date.

Most of the methods contained in the literature are nonspecific and serve only to detect general inhibition of the test organisms, a limitation which is probably not serious in most plant sample testing. Should a more precise knowledge of inhibitor type be required then one would be obliged to investigate further the positive test samples.

In general the detection procedures which are presently available are found wanting principally when one attempts to integrate these procedures with daily plant operations. The time factor is too great. Rapid milk rejection tests are an ever-present problem to individuals responsible for efficient plant practices as well as a demanding challenge to the investigator. One approach to rapid antibiotic detection method development which has been suggested (13) involves some type of labeling in the chemotherapeutic treatment materials prior to use. Presumably the incorporation of a dyestuff or a long half-life radio-active indicator might provide a means for the rapid detection of antibiotics in high dilution. However, the authors are not aware of any published findings on tracer experiments as applied to milk-antibiotic test systems.

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ITINERARY AND RATES TO SEATTLE CONTINUED FROM PAGE 161

	Station	*Railroad*	*Train*	*Time*	*Date*
No. 2-A					
LV Chicago	Union	Milw. R.R.	Olympian Hia.	3:00 PM	9/3
AR Seattle	Union	Milw. R.R.	Olympian Hia.	9:30 AM	9/5
Attend Convention Sept. 5-7, 1956					
LV Seattle	King St.	NP		11:45 PM	9/7
AR Portland	SP	NP		5:45 AM	9/8
LV Portland	SP	SP	Shasta Daylight	7:45 AM	9/8
AR San Francisco	Market St.	SP	Shasta Daylight	11:30 PM	9/8
LV San Francisco	Market St.	SP	C. of San Fran.	4:00 PM	9/9
AR Chicago	Union	Milw. R.R.	C. of San Fran.	11:15 AM	9/11
No. 3					
LV Chicago	Union	Milw. R.R.	Olympian Hia.	3:00 PM	9/3
AR Seattle	Union	Milw. R.R.	Olympian Hia.	9:30 AM	9/5
Attend Convention Sept. 5-7, 1956					
LV Seattle	CP Docks	CPSS	Princess SS	8:00 AM	9/8
AR Victoria, B.C.	CP Docks	CPSS	Princess SS	11:00 AM	9/8
LV Victoria, B.C.	CP Docks	CPSS	Princess SS	2:15 PM	9/8
AR Vancouver, B.C.	CP Docks	CPSS	Princess SS	5:00 PM	9/8
LV Vancouver, B.C.	CPR	CPR	Soo Dominion	7:30 PM	9/8
AR Field, B.C.	CPR	CPR	Soo Dominion	2:40 PM	9/9
One Day Tour from Field, BC to Lake Louise & Banff					
LV Banff, Alta.	CPR	CPR	Soo Dominion	6:05 PM	9/10
AR St. Paul, Minn	Union	SOO	Soo Dominion	8:00 AM	9/12
LV St. Paul, Minn	Union	Milw. R.R.	Am Hiawatha	8:25 AM	9/12
AR Chicago	Union	Milw. R.R.	Am Hiawatha	2:40 PM	9/12

Rates from Chicago to Seattle, Washington

TOUR NO. 1

Round-trip rail fare $115.00 plus $11.50 tax, total $126.50

Round-trip sleeping car fares Roomette, $64.68; Double Bedroom, $101.54; Drawing Room, $175.56

TOUR NO. 2

Round-trip rail fare $126.45 plus $12.65 tax, total $139.10

Round-trip sleeping car fares Roomette, $79.97; Double Bedroom, $125.63; Drawing Room, $217.14

TOUR NO. 2-A

Round-trip rail fare $126.45 plus $12.65 tax, total $139.10

Round-trip sleeping car fares Roomette, $73.48*; Double Bedroom, $115.90*; Drawing Room, $198.66*

*Includes seat charge of $1.00 plus $0.10 tax from Porland to San Francisco on Shasta Daylight

TOUR NO. 3

Round-trip rail fare $115.00 plus $11.50 tax, total $126.50

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NEWS AND EVENTS

MICHIGAN ASSOCIATION OF SANITARIANS TWENTY-SECOND ANNUAL MEETING

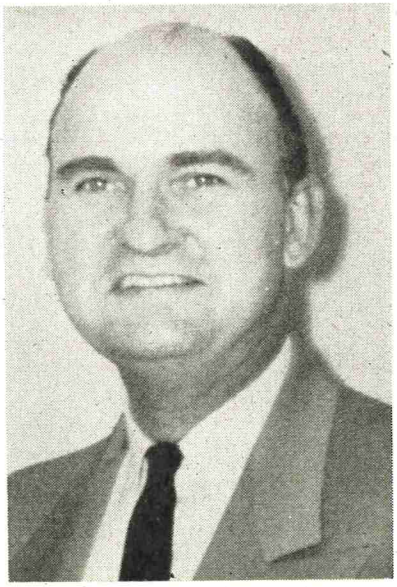
The Michigan Association of Sanitarians held its twenty-second annual meeting and its twelfth annual sanitarians' school at Kellogg Center, Michigan State University, East Lansing, April 24, 25, 26.

The school presented a particularly well-balanced program with subjects covering nearly all fields of milk and food sanitation.

Attendance was good with registrations showing an attendance of over 225. Many were able to attend only one day and consequently their numbers are not included in the register figure.

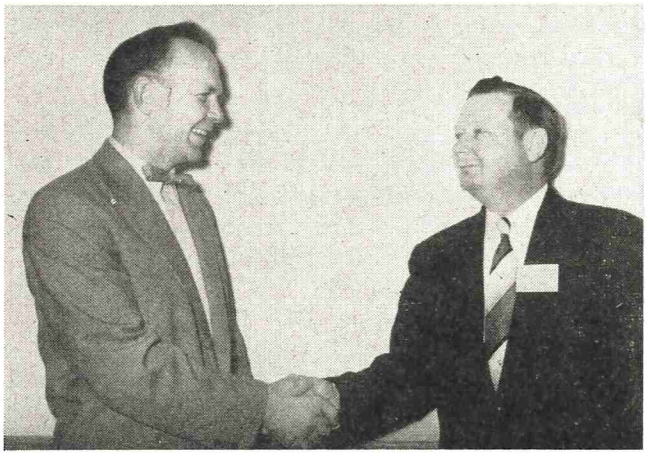
The annual meeting was held the afternoon of the 25th and was followed by a banquet in the evening.

The officers elected for the coming fiscal year were:
President Dr. Clyde K. Smith, Mich. State Univ. East Lansing
V. President — Orville Nelson, Rockford, Mich.
Second Vice President — William R. Wade, Flint
Sec. - Treas. — Robert Lyons, East Lansing



Robert Lyons, Sec.-Tres. of the Michigan Association and winner of the association's annual sanitarians award for 1956.

Grey Turney, Michigan Association's nominee for the International award.



Newly-elected President Dr. Clyde Smith is congratulated by outgoing President Dale Brooks.

Dr. Clyde Smith, President, William R. Wade, Second Vice-President, Dale Brooks, Past President and Robert Lyons, Sec.-Treas.

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Robert Kramer, Ionia
Harold Skeoch, Coral
Kenneth Kerr, Grand Rapids
Armin Roth, Wyandotte

The banquet in the evening featured the presentation of the annual sanitarians' award to Robert Lyons, Chief Milk Sanitarian, Ingham County Health Dept. Lansing and the nomination of Grey Turney, Chief Food Sanitarian of the same department, for the International Sanitarians Award.

The banquet speaker was Bill Knox, M.S.U. '41, editor of Hoard's Dairyman, who gave a precise, definite summary of the national dairy problem and pointed to a possible method of solution. This hard-hitting talk raised eyebrows and also a large measure of agreement in his audience.

DUTCH CHEESE FOUND BURIED IN ANTARCTIC

A Dutch cheese which lay buried for forty-four years in a cache of supplies under the snow and ice of the Antarctic was discovered recently and was eaten by members of the U.S. task force with Admiral Byrd.

Buried by the British explorer, Captain Robert F. Scott, in 1912, the cache was unearthed last month. The cheese, a round Edam manufactured in Holland in 1909 or 1910, was tasted by members of the U. S. party. It was declared edible and was noted to have maintained its "excellent taste," though the cheese had become somewhat "crumbly." The latter is characteristic of very old Dutch Edam cheese.

The manufacturer still produces cheese in Holland and is Johannes M. Verschure & Company of Rotterdam.

The cheese was found by members of Task Force 43, a part of Operation Deepfreeze, the present Antarctic exploration led by Admiral Byrd. Originally packaged for the tropics, the cheese was discovered double-wrapped in tin containers among other items dating from the British expedition. Captain Scott, on his way back from the South Pole with four companions, died in early 1912.

News of the find came to light in a letter mailed from the Antarctic to a Netherlands Government office in New York City. Written aboard the U.S.S. Wyandot by Warren R. Laigton, a member of the team that unearthed the cache, the letter sought to advise the manufacturer of his high quality product.

DR. WILLIAM H. HASKELL, V.M.D.

On May 22nd, at St. Vincent's Hospital, Jacksonville, Florida, there passed a man whose life had been devoted to the betterment of his fellow men. Dr. William H. Haskell was a comparative newcomer to Florida, having selected Jacksonville about three years ago as the location of his semi-retirement activities for teaching, writing and developing health and sanitation materials.

Dr. Haskell was born in Taunton, Massechusetts on March 12, 1889. The son of a veterinarian, he agreed to his father's wish that he follow the same profession. After grade and high school had been completed, he enrolled at the University of Pennsylvania's School of Veterinary Medicine, where he graduated in 1912 with the Degree of V.M.D. His fraternity was Alpha Psi.

Dr. Haskell's interest in public health was aroused during research preparation of his graduation thesis. And instead of active practice, he chose the Bureau of Animal Industry for the beginning of his career. He was stationed at Beaumont, Texas in 1917 when he joined the Army, August 13th, with the rank of 2nd Lieutenant, 116th Mobile Veterinary Section, attached to the Field Artillery.

After promotion to 1st Lieutenant, he was placed in command of his own company of 17 men at Camp Bowie. During this period, his record was outstanding, inasmuch as his company — due to his insistence on the observance of sanitary procedures — was the only one in the camp to escape a fatality in the 'flu epidemic of 1918.

Following a 9 months tour of duty in France, where he was head of the Veterinary Field Hospital, 111th Engineers, he was discharged in Forth Worth, Texas with the rank of Captain.

Dr. Haskell became meat and milk consultant of Beaumont, Texas under City Manager Roark. His handling of a rabies opidemic and an outbreak of bubonic plague, as well as his remarkable success in raising and maintaining the quality of milk and meat for the City of Beaumont drew the attention of the U.S. Public Health Service to his ability. He was asked to join the Service as one of the three original milk consultants assigned to travel over the entire country to promote milk sanitation. During this assignment, he was instrumental in the drafting of the first Standard USPHS Milk Ordinance and Code.

There followed many stormy years, well remembered by those public health workers who felt the impact of Dr. Haskell's drive for clean farms, clean milk production, clean milk processing — all aimed at providing the American people with safe milk of the highest quality. He travelled the countryside from town to town, explaining the advantages of Milk Ordinance adoption to city councils, educating the milk industry in sanitation, training Federal, State and local health authorities and milk sanitarians in the compliance necessities to insure safe milk for all America.

The title of Senior Milk Specialist was created for Dr. Haskell by the Public Health Service, and he is the only person to be so designated.

Honored by many communities, probably his most famous work was accomplished during the adoption and initial enforcement period of the USPHS Milk Ordinance and Code by the City of Chicage in 1935. This was the first large American city to attempt such a project. Health Commissioner Herman N. Bundeson, himself a national figure in the public health field, placed the resources of his entire staff at Dr. Haskell's disposal. Under Dr. Haskell's leadership, this team was successful in making the City of Chicago the first great American community to satisfactorily meet the requirements of the Public Health Service Milk Ordinance and Code.

Dr. Haskell next turned his attention to the food field. Here he helped develop the model PHS Ordinance and Code Regulating Eating and Drinking Establishments. Here he again travelled across the nation, teaching the food industry and food handlers how to make food safe for the consumption of the American people. During World War II he worked constantly with all branches of the Armed Forces in the inauguration of food programs in Service Installation areas. He trained hundreds of sanitarians in his methods, sanitarians whose grieving messages convey their realization that a solid wall of strength is no longer here for them to fall back upon in time of need.

After 22 years of devoted service with the Federal Health Agency, Dr. Haskell left the Public Health Service to devote his time entirely to educational work in sanitation. This opportunity was afforded him by Klenzade Products, Inc. of Beloit, Wisconsin, who established for him the position of Director of Programs. From this association came many notable writings and many significant achievements, among which was the expansion to a national level of a bi-annual educational seminar which brought together the leaders in industry and officials in public health throughout the nation to discuss and solve problems of mutual interest.

The transition from official agency work to industry was another signal achievement, inasmuch as Dr. Haskell was the first sanitarian to take such a step,

His activities and work were closely observed by both government and industry leaders. By his example, he was instrumental in developing a cooperation between official agencies and the milk and food industries — a cooperation which has brought about an understanding and appreciation of the importance of sanitation to the nation's health and economy.

Dr. Haskell's writings were many. As an active member and leader in the International Association of Milk and Food Sanitarians, and the National Association of Sanitarians his work and comments have been published in the Journals of both these organizations. He was an Honorary Life Time Member of the National Association of Sanitarians. He was a monthly contributor to INSTITUTIONS MAGAZINE, published by DOMESTIC ENGINEERING, Chicago, Illinois. This series of articles has become so famous in health circles that they are used in many places as the "training bible" of milk and food personnel. Requests for as many as 300 copies of certain articles have come from various states and foreign countries.

His lectures and training methods for milk and food workers have been copied by public health workers in many fields and in many countries. He was, indeed, the originator of a training course for milk procedure and processors. In Jacksonville, he collaborated with Dr. E. R. Smith's staff in the revision of the food handlers course to make it an effective educational instrument for the control of food-borne diseases.

Dr. Haskell's advise and counsel have been sought to inaugurate sanitation programs by the Council of State Governments, the National Sanitation Foundation, the Armed Forces, the candy industry, the baking industry, the milk and food industries and — more recently — the poultry industry. One of his last activities was to assist in drafting a model Poultry Ordinance for adoption by the industry and official agencies.

Dr. Haskell's greatest gift was his ability to discuss sanitation in terms understandable to the average layman. His desire was to teach sanitation to the American people. It was his firm conviction that until we had raised one generation of sanitation minded people, it would be difficult to establish sanitation as a way of life.

In every state of the union his name is known to public health workers. He numbered his friends by the thousands. He left an unforgettable impression of personal integrity, of getting the job done properly, of discarding half-way measures. He was never asked for advise or assistance that he did not give, no matter the inconvenience or hardship to himself. He was never asked to travel that he did not go, no matter the difficulty created for his family and himself. He was never asked for visual material that he did not provide—If there was none available, he created it himself. Above all, he never shirked a fight for his conviction that the American people were entitled to a safe environment in which to live, work and play.

His memory will be an everlasting inspiration to

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public health workers to continue the battle until that desired goal has been achieved.

Dr. Haskell was a great man. There was no more staunch exponent of public health and sanitation in our time. His loss to his family, his profession, his associates and friends cannot be expressed adequately in words.

Dr. Haskell is survived by his wife, the former Lynet Plumley, whom he married in Beaumont, Texas, on November 2, 1917; two daughters, Mrs. F. S. Hutchinson of Washington, D. C. and Mrs. James M. Murphy, Bellaire, Texas; and one son, William Allan Haskell, Lake Charles, La.

Dr. Haskell was a Mason and a member of the Beloit, Wis., Elks Lodge. Services were conducted Thursday, May 24, at the Chapel of Hardage & Sons. Military honors and internment were at Arlington Cemetery, Monday, May 28, at 3:00 p.m.

IDAHO HOLDS SECOND ANNUAL CONFERENCE

Idaho's Second Annual Milk Plant and Dairy Sanitation Conference was held March 26 to 30 on the campus of the University of Idaho.

The program arranged by the Department of Dairy Husbandry of the University of Idaho in cooperation with the Bureau of Dairying and the Idaho Association of Sanitarians included discussions on some of the processing problems of butter, cheese, ice cream, evaporated and powdered milk, and fluid milk.

Out of town speakers included Prof. C. C. Prouty, Dairy Bacteriologist, State College of Washington, who spoke on "Problems involved in the Bulk Handling of Milk," Mr. R. D. Bovey, Klenzade Products, Inc., Salt Lake City, who spoke on "Some New Cleaning Techniques," and Mr. Walter Dashiell, Regional Milk and Food Consultant, Region 8, U.S. Public Health Service, Denver, who spoke on "The Status of Various Sanitizing Agents."

Others speakers included the Dairy Husbandry staff of the University of Idaho. Mr. Robert Green, Director of Dormitories, conducted a tour through the new kitchens and food preparation room of the University's newest dormitory, and a workshop session on "How to write better business letters," and "How to improve your speaking," rounded out the program.

Evening entertainment included a bean feed and yellow dog initiation sponsored by the Dairy Club of the University of Idaho, and a banquet at which the President of the University of Idaho spoke on "Intercollegiate Athletics."

A short course for Dairy Laboratory Technicians was held at N. C. State College February 20-23, 1956. The course was designed as a refresher for personnel employed in regulatory armed services and industry laboratories. Twenty-six students attended. Lecture and laboratory instruction was given on the standard plate count, direct microscopic count, coliform count and phosphatase test. On the afternoon of last day a round-table was held jointly with milk sanitarians, the subject of the discussion being "The effective use of the laboratory in quality milk control". Special assistance was given by Dr. R. P. Myers, of the U. S. Public Health Service, Cincinnati, Ohio.

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FLORIDA ASSOCIATION OF MILK AND FOOD SANITARIANS

Report of Annual Meeting

H. H. Wilkowske, Secretary-Treasurer

The twelfth annual meeting of the Florida Association of Milk and Food Sanitarians was held March 20-23 at the University of Florida, Gainesville, with 140 persons participating.

The officers and directors elected are shown in the photo.

Ten year Citation Certificates were awarded to four Florida men (shown in the picture) which read as follows: "In recognition of outstanding service in the Floriada Association of Milk Sanitarians, active membership in the International Association of Milk and Food Sanitarians, regular participation in the annual conferences conducted by the Department of Dairy Science, University of Florida Agricultural Experiment Station, and for contributing to the improvement and protection of public health through the sanitary control of production, processing and distribution of dairy products."

In concluding the Presidential address, Dr. H. H. Rothe clearly described a word picture of a successful, professional sanitarian in the following challenge: "In appearance, always neatly dressed; it bespeaks cleanliness and sanitation. In behavior, dignified; it commands respect. In approach, friendly and direct; it commands attention. In the administration of regulations, know your subject, be both firm and reasonable by giving willingly the reasons for asking others to follow regulations; it begets confidence. If you follow this procedure, you will in most cases create a sense of being helpful and not a hinderance; you will create friendliness and not encity. And if you do this, you will find yourself as a welcome guest and your work will be pleasant and fruitful."

Dr. Robert Myers, Cincinnati Health Center, presented an authoritative discussion of the plating techniques and told of the importance of sanitarians and laboratorians working together cooperatively.

A proposed Sanitarians Registration Act for Florida was discussed by B. G. Tennant (IAMFS Sanitarians Award Winner of 1955) and the Association has endorsed a joint sponsorship with the Florida Association of Sanitarians (NAS) to attempt getting it passed by the 1957 Florida Legislature.

Dr. J. O. Bond, State Epidemiologist, stated that "The major efforts of sanitarians in relation to food poisoning outbreaks, are preventive. Investigation of outbreaks that do occur are important in that they may provide valuable specific information to aid in educational programs designed to prevent further outbreaks. Detailed information is also very useful for medico-legal problems that may arise. The common bacteria, staphylococci, are the most frequent causes of food poisoning outbreaks. They are a dangerous enemy in that they are found everywhere, and if allowed to grow in food, produces no signs of spoilage. It is estimated that as many as 500,000 persons have been affected by this type of food poisoning during a given year in the United States. The poisoning is not fatal, but can cause very unpleasant distress for several hours or days."

Mr. Garland M. Riegel, Metallurgist, Republic Steel Corporation, discussed the causes and control of corrosion of stainless steels. He pointed out that in-place cleaning has proven to have some definite advantages for both farm and city dairies. He was of the opinion that sanitizers have been responsible for most of the pitting on stainless steel dairy equipment.

Nalls Berryman, Director of Florida's Weights and Measures Division stated that calibration of farm

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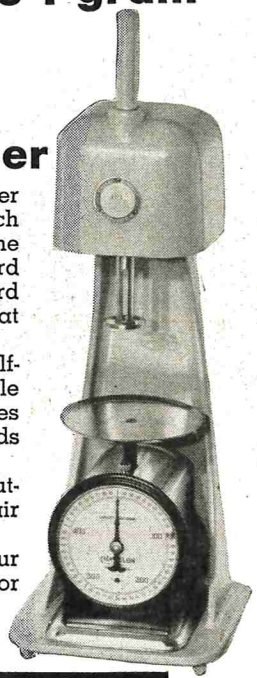

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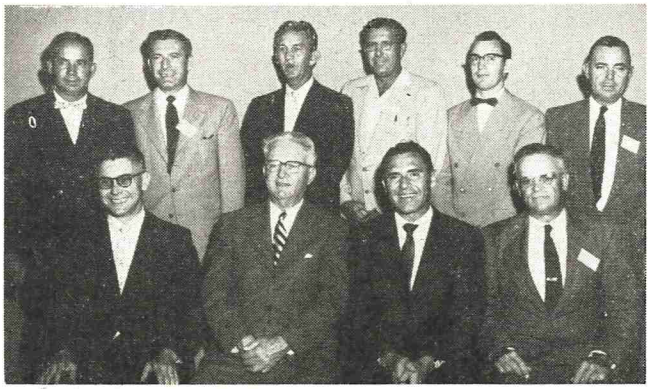
A highlight of the program was the presence of popular John Marshall, Secretary, Technical Committee, Dairy Industries Supply Association who reviewed the program of the 3-A Sanitary Standards for Dairy Equipment and told the audience how they may best be used.

Armin A. Roth, Wyandotte Chemicals Corporation, gave some interesting demonstrations and discussed food plant maintenance, dishwashing and the use of cleaners and sanitizers in general.

E. Russell Jackson, Florida State Board of Health and President-elect of the National Association of Sanitarians gave an outstanding address on the importance of an educational program.

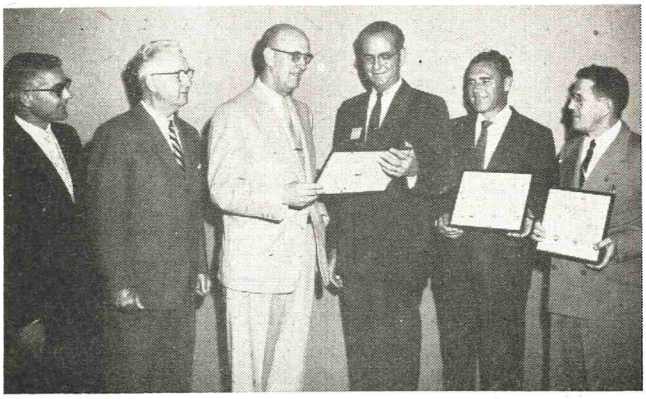
Ezra P. Yocum, Southern Dairies Fieldman, pointed out how important it is for sanitarians and fieldmen to cooperate in improving the quality of milk in their respective areas.



FLORIDA ASSOCIATION OF MILK AND FOOD SANITARIANS
OFFICERS AND DIRECTORS, 1956

Officers seated left to right: H. H. Wilkowske, Secretary-Treasurer, Assoc. Professor, University of Florida, Gainesville, Florida; H. H. Rothe, Past President, State Dairy Supervisor, Dairy Division, State Department of Agriculture, Gainesville, Florida; S. O. Noles, President, Milk Consultant, State Board of Health, Jacksonville, Florida; J. H. Baker, Vice President, City Sanitarian, Ft. Pierce, Florida.

Directors standing left to right: J. D. Robinson, State Dairy Supervisor, Plant City, Florida; P. J. Griffin, Superintendent, Borden's, Tampa, Florida; J. S. Massey, Milk Sanitarian, Escambia County Health Department, Pensacola, Florida; W. H. Jordan, Dairy Inspector, Miami, Florida; David D. Fry, Laboratory Technician, T. G. Lee Dairy, Orlando, Florida; L. E. Ford, State Dairy Supervisor, Hialeah, Florida.



Left to right: Representing IAMFS, The Florida Association of Milk and Food Sanitarians and the University of Florida respectively are H. H. Wilkowske, Secretary-Treasurer, H. H. Rothe, President, and E. L. Fouts, Head of the Dairy Science Department, who are shown presenting the Florida Association Ten-Year Awards to Prue D. Shirely, Supervisor, West Coast Milk Producers Association, Tampa; Sam Noles, Milk Consultant, State Board of Health, Jacksonville; and Lyle L. Chaffee, Milk Sanitarian, Pinellas County Health Department, St. Petersburg. One additional award recipient not shown was Gustav Bennett Ulvin, Chemist and Bacteriologist, Gustafson's Dairy, Green Cove Springs, Florida.

Two representatives of the Dairy Division, State Department of Agriculture, Mr. J. D. Dennis and Alex G. Shaw, Chief, discussed the new mobile milk products lab and interstate milk shipments, respectively. Mr. Shaw emphasized the importance of distinguishing between economic problems and public health problems when considering the problems of interstate movement of milk and other dairy products.

The annual banquet was very entertaining with the professional handling of the toastmistress duties by Elizabeth Reed of the Division of Health Information of the State Board of Health.

At the business meeting the Florida Association voted to provide $25.00 annually to the IAMFS scholarship fund. Also, after a one-year trial run, the Council on Sanitary Standards and Procedures was formally approved as a permanent part of the Association. The Council consists of 12 members from all geographical sections of the State which meet and resolve all differences in regulations, standards, procedures and approve all new equipment and recognize all industry grievances.

ITINERARY AND RAILWAY FARES CONTINUED FROM PAGE 164

Round-trip sleeping car fares Roomette, 62.65*; Double Bedroom, $99.45*; Drawing Room, $168.41*

*Includes seat charge St. Paul to Chicago —Morning Hiawatha

NOTE:

There are numerous side-trips and sight-seeing tours available at Yellowstone National Park, Seattle, Vancouver, Victoria, Lake Louise, Banff, Portland, San Francisco, Reno, Los Angeles, Las Vegas, and many many others. Also all of the tours outlined can be reversed. If the going trip or return trip is not made via the Canadian Routes, then a *free side-trip* is available on Tours 1 - 2 - 2A from Seattle to Victoria and return to Seattle which is a one-day trip from 8:00 AM until 9:00 PM.

Traveling Passenger Agent

NORTHERN PACIFIC RAILWAY

SUNDAY, SEPTEMBER 2

Connecting trains from east, south and north, and travelers will meet in Chicago's Union Station — leave 11 PM via CB&Q.

MONDAY, SEPTEMBER 3

Pass thru St. Paul and Minneapolis, riding in upper Mississippi valley. Morning ride gives fine view of Minnesota's lakelands, containing hundreds of dairy products producers, their homes, and their fine herds. Enter North Dakota at Fargo with afternoon spent in the 'bread basket of the world' — the broad flat fertile plains where our highgrade grains are grown. Northern Pacific dining car ready to serve all meals today — NP GREAT BIG BAKED POTATOES and many other tasty items at reasonable cost.

TUESDAY, SEPTEMBER 4

Over the Gallatin Mountains thru historic Bozeman Pass, reaching Logan, Montana, 9:15 AM, where motor coaches will leave direct from station. Driving from Logan, route is via Three Forks and Whitehall, then up over the main range of the ROCKIES, crossing 'continental divide' and later descending to Butte, Montana, where there's as much activity underground as above. The city is located on a mountain of copper. See some of the interesting sights, and make a noontime snack stop, continuing west in Silver Bow Canyon, reaching Garrison, Montana, about 1:45 PM, re-boarding Pullmans. Afternoon rail ride in Hellgate Canyon, cross the wooded Bitterroots, follow the picturesque Clark Fork River and the shores of Lake Pend Oreille (pronounced Pond der Ray) in moun-

Going to SEATTLE?

If you plan to attend the Seattle convention of the International Association of Milk and Food Sanitarians, Inc., in September, you are invited to join the congenial party of delegates and members leaving Chicago on the Burlington-Northern Pacific Sept. 2. You'll enjoy the scenic route—1400 miles of rivers and 28 mountain ranges along the way.

Return via California and Grand Canyon

After the convention our party will return east via Portland, San Francisco, Los Angeles and Grand Canyon. For complete information and reservations, please address

NORTHERN PACIFIC RAILWAY, 73 E. Jackson Blvd., Chicago 4.

NORTHERN PACIFIC RAILWAY

tainous western Montana, Idaho and eastern Washington.

WEDNESDAY, SEPTEMBER 5

Reach Seattle by 8 AM, dinner ready enroute, or eat upon arrival in station or at hotel. Baggage taken from train to hotel.

CONVENTION MEETING
WEDNESDAY, THURSDAY, FRIDAY – SEPT. 5-6-7

FRIDAY, SEPTEMBER 7

Final Convention session during morning – baggage will be taken from rooms to King Street Station from which train leaves 12:30 PM – dining car for lunch if desired. Day ride in beautiful western Washington thru a mountain corridor, the Cascades to the east, and rugged Olympics over in the west. In view will be snow-capped peaks – RANIER, ADAMS, ST. HELENS and HOOD – –plus many miles along shorelines of Puget Sound & several rivers, including the mighty Columbia. Reach Portland 4:30 PM where motor cars are ready for the drive on COLUMBIA RIVER HIGHWAY – several stops for scenic views before reaching base of MULTNOMAH FALLS for a Columbia River Salmon dinner. Back in Portland for 10 PM departure via Southern Pacific.

SATURDAY, SEPTEMBER 8

Fine view of Mt. Shasta and northern California – meals in SP dining car – reach Oakland Pier 7:45 PM. Ferry crosses San Francisco Bay under massive 'Bay Bridge' with views of illuminated Golden Gate Bridge, Treasure and Alcatraz Islands, and the busy waterfront. From Market Street Terminal party and baggage will be transferred to hotel.

SUNDAY, SEPTEMBER 9

A fine motor tour around San Francisco this morning. Leave about 9 AM for Civic Center, Mission Dolores, Twin Peaks, St. Francis Wood residences, Steinhart Aquarium, Golden Gate Park, Ocean Beach, Seal Rocks & Cliff House, Palace of Legion of Honor, Lincoln Park Sea Cliff, Presideo, Palace of Fine Arts, the Marina, Yacht Harbor & Ft. Mason – a comprehensive sight-seeing program. Back to hotel during noon hour. At 2 PM leave for the Giant Redwoods in Muir Wood, Marin County. Cross mighty Golden Gate Bridge to picturesque Sausalito, and thru wooded canyons to see these living mammoth trees – some over 1000 years old, and reaching a height of 300 feet – an always-remembered sight. Time for dinner in San Francisco before departure about 9 PM.

MONDAY, SEPTEMBER 10

Morning tour of Los Angeles, Hollywood, Beverly Hills and on to Santa Monica beach will leave direct from the unique Spanish-type Union Station, ending at hotel to which baggage will have been tranferred. Balance of today, evening, and tomorrow morning 'unscheduled' for choice of visiting in southern California. For those interested, sightseeing is available to Pasadena; Forest Lawn; Disneyland; Movie Studios, etc., and if sufficient go, special motor coaches will start from and return to our hotel.

TUESDAY, SEPTEMBER 11

All morning open for choice of visiting, sightseeing or shopping. Santa Fe train leaves from Union Station 1:30 PM – baggage will be taken from hotel to train. Afternoon ride in southern California's citrus growing areas, later cross the 'great American desert' – dining car available for dinner.

WEDNESDAY, SEPTEMBER 12

GRAND CANYON – our second great national park visited on this trip. While baggage remains in Pullmans during day, our day is spent viewing this massive chasm from various vantage points along the rim. All meals today, and both morning and afternoon motor tours included in our program. Dining room service will be in Bright Angel Lodge, or El Tovar Hotel. Leave 8 PM.

THURSDAY, SEPTEMBER 13

Riding thru the great southwest – Santa Fe diner available for all meals today.

FRIDAY, SEPTEMBER 14

Pass thru Kansas City early – then on thru Ft. Madison, Galesburg and reaching Chicago's Dearborn Station 3 PM. Baggage handled from train to transfer platform in station.

THIS IS A FINE TRIP WE CAN ENJOY TOGETHER – IT WILL ADD A GREAT DEAL OF PLEASURE TO OUR 1956 CONVENTION.

COSTS: These charges are, at present, based on 1955 tariffs and any later differences must be reflected in final charges. Included are—starting from and returning to Chicago: RAIL, PULLMAN, HOTELS (except in Seattle), SIGHTSEEING TOURS IN YELLOWSTONE, PORTLAND & COLUMBIA RIVER HIGHWAY, SAN FRANCISCO & MUIR WOOD, LOS ANGELES & AREA, GRAND CANYON NATIONAL PARK. There are 6 meals included (lunch Old Faithful, steak dinner Chico Lodge, Salmon dinner Multnomah, and 3 meals at Grand Canyon). All required transfers of travelers and baggage enroute – – US & State taxes where required. *Not Included*: Meals, other than 6 named – expenses during convention – tipping.

ESTIMATED COSTS PER PERSON

1 person using lower berth	each	$312
2 persons sharing lower berth	each	274
1 person using upper berth	each	294
2 persons sharing upper berth	each	265
1 person using roomette	each	342
2 persons sharing bedroom	each	320
2 persons sharing compartment	each	343
3 persons sharing compartment	each	309
4 persons sharing compartment	each	290
2 persons sharing drawing room	each	377
3 persons sharing drawing room	each	329
4 persons sharing drawing room	each	307

Note: Pullman accommodations will be provided as available, and as near as possible toward filling all requests. Early reservations will assist in determining preferences and better assurance of providing type of Pullmans wanted.

Reservations: When asking for space, please mention: Type of space prefered and number in your party. Names of each member of your party (for train roster).

If young children, please give ages.

City from which you will start your railway trip – we'll give you the best roundtrip basis from there with 'tour' features starting from and returning to Chicago.

Hotels (other than Seattle). Costs are based on 2 to a room. We will do best possible to arrange differently, as preferred, and adjust charge in accordance with hotels' rates.

Service Enroute: Interested railroads, sightseeing companies, hotels, will have representatives supervise service at all times . . . these plans outlined are for first class features during entire trip.

EMPIRE BUILDER

Burlington —— Great Northern

Ex.	Westbound		Eastbound	Ex.
Sun.	2:00 PM	LV Chicago AR	2:00 PM	Sun.
Tues.	7:50 AM	AR Seattle LV	3:30 PM	Fri.

The Empire Builder leaves Chicago daily from Union Station 2:00 PM (C.S.T.) arriving Seattle second morning 7:50 AM.

The newest luxury train west is the Empire Builder; it's Great Domes for both coach and Pullman passengers offer dome seats for everybody at all times via the Scenic route west –the line nearest the Canadian border across the Rockies and Cascades. For your

key laboratory servants

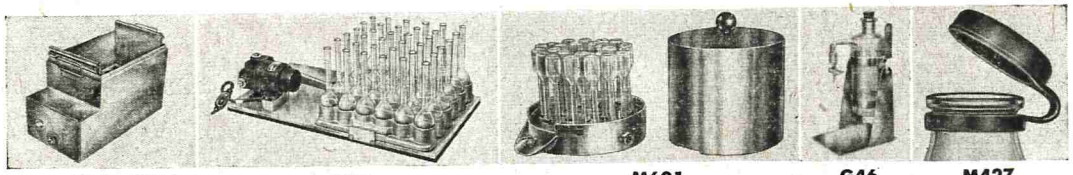
. . . that save and $ $ $ $ $

Write today for Bulletin 312 containing latest information on Mojonnier quality equipment and supplies for the modern dairy laboratory. Write:

MOJONNIER BROS. CO., 4601 W. OHIO ST., CHICAGO 44, ILL.

a flip of the thumb and it's open!

Mojonnier Composite Sample Bottles. Widely used in Dairy Industry for holding composite samples. Stopper cannot be dropped or lost – fits tightly, prevents evaporation. 3 sizes: G-400 – 4 oz. (¼ pt.) 7 day Tests. G-800 – 8 oz. (½ pt.) 15 day Tests. G-1600 – 16 oz. (1 pt.) 30 day Tests. All with etch spots.



M535 & M536 M50 M601 G46 M427

M535 & M536 Mojonnier Stainless Steel Babcock Test Bottle Bath. Thermostatically Controlled. Provides a means for keeping the fat in neck of babcock test bottles at proper temperature when readings are taken. Capacities 24 and 36–6" babcock bottles.

G46 Mojonnier Acid Bottle Trunnion. Stainless Steel. By tipping the bottle forward and then letting it come to an upright position, the pipette will fill to an exact pre-determined level.

M50 Mojonnier Babcock Bottle Shaker. Insures accurate fat reading. Complete with motor. Capacity 36 bottles. Size 11"x20".

M601 Wilson Babcock Bottle Washer. Designed to wash cream and milk test bottles, 6" or 9" size. Also used for washing test and culture tubes. Furnished in 24 and 36 bottle capacity. All stainless steel construction.

M427 One-Piece Rubber Closure with Connector. Recommended for use with bulk milk pickup tankers.

Mojonnier LABORATORY EQUIPMENT and SUPPLIES

choice: bedrooms, compartments, drawingroom-suites, roomettes and duplex roomettes, lowers and uppers. Luxury all-reserved coaches for those who wish to economize. Regular-dining car as well as the famous Ranch Car for inexpensive meals.

The first-class round-trip rail fare via Empire Builder, Chicago to Seattle and return is $126.50. Fair permits different route in each direction including choice of return through Canadian Rockies. Or, for about $12.60 additional, return through California. In each direction; lower berth $23.10; double bedroom for two $50.77 or double compartment $65.07; duplex roomette $25.41; regular roomette $32.34. All fares quoted include U.S. federal tax.

For further information, reservations, including stopover at beautiful Glacier National Park on Great Northern's Western Star Streamliner, write:

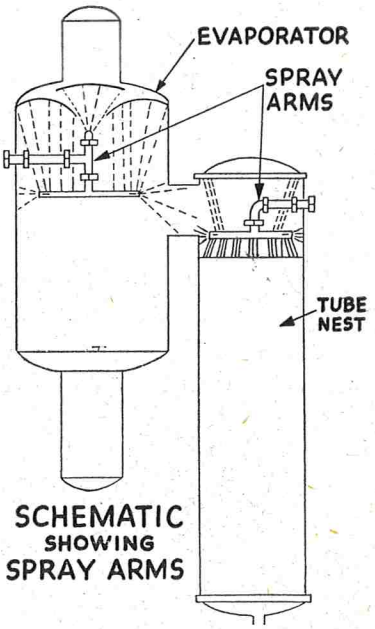
G.M. French, AGPA
Great Northern Ry
142 S. Clark St.
Chicago, Illinois

A conference for Milk Sanitarians was held at N. C. State College February 23. Approximately 50 milk sanitarians attended. The theme of the conference was "The Effect and Use of Milk Sanitarians Time". Speakers were Mr. C. A. Abele, Diversey Corporation; Dr. R. P. Myers, U. S. Public Health Service; Mr. Howard Goforth, Coble Dairy Products Cooperative; Mr. J. M. Jarrett, N. C. State Board of Health.

KLENZADE

Spray Arm

NEW! SPRAY TECHNIQUES for Cleaning VACUUM PANS!



SCHEMATIC SHOWING SPRAY ARMS

Advantages of cleaning pans with KLENZADE SPRAY ARM.

- Safe to operators and equipment . . .
- Saves in fuel to make boiler steam . . .
- One-tenth as much water as other methods . . .
- Saves on man hours by faster cleaning . . .
- Cleans all sections thoroughly . . .
- For best results use KLENZADE Flash-Klenz, OR-3 Acid, or Brite-Klenz.

FOR FURTHER INFORMATION CLIP COUPON

AND MAIL TO

KLENZADE PRODUCTS, inc.

BELOIT, WISCONSIN

KLENZADE PRODUCTS, Inc., Beloit, Wis.

PLEASE SEND ME FURTHER INFORMATION

NAME .....

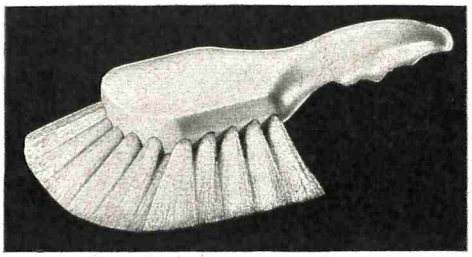
ADDRESS .....

CITY..... ZONE..... STATE.....

.....Spray Arm 1

INDEX TO ADVERTISERS

BIG SAVINGS IN GONGS



Outwears Up To Several Dozen Ordinary Brushes

SPARTA No. 45 ALL-WHITE "HERCULES" GONG

Power-Packed With Tufts That Won't Pull Out

The most rugged, longest-wearing hardest-working gong brush ever designed. Only Sparta can offer the sensational new "Exclusive" white plastic block — indestructible — on't chip, crack, split, mark or mar tanks. This wonderful new "Hercules" block material is hard enough to stand up under all kinds of use and abuse, yet sufficiently resilient to hold the stiff white crimped nylon bristles like a vise. Tufts won't pull out . . . individual strands won't straggle out. The "Hercules" will easily outlast several dozen ordinary fiber brushes — you can hardly wear it out because the "deep-anchored" nylon bristles maintain their scrubbing power almost down to the very block itself. Biggest dollarsaving value ever offered in a gong type brush!

Sold By Leading Jobbers Everywhere

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Sparta, Wisconsin

IOSAN®

"TAMED IODINE®" DETERGENT-GERMICIDE

does all your cleaning and sanitizing

removes and prevents milkstone

Manufactured by Lazarus Laboratories Inc.
Division of West Disinfecting Co., 42-16 West St., Long Island City 1, N. Y.

AVAILABLE FROM OUR BRANCHES IN PRINCIPAL CITIES OR THROUGH YOUR REGULAR SUPPLIER

CLASSIFIED ADS

FOR SALE: Single service milk sampling tubes. For further information, please, write: Bacti-Kit Co., 2945 Hilyard Street, Eugene, Oregon.

WANTED retail sales outlet for new inexpensive dairy utensil and farm tank chlorinator by spray method. Bacti-Kit Company, 2945 Hilyard Street, Eugene, Oregon.

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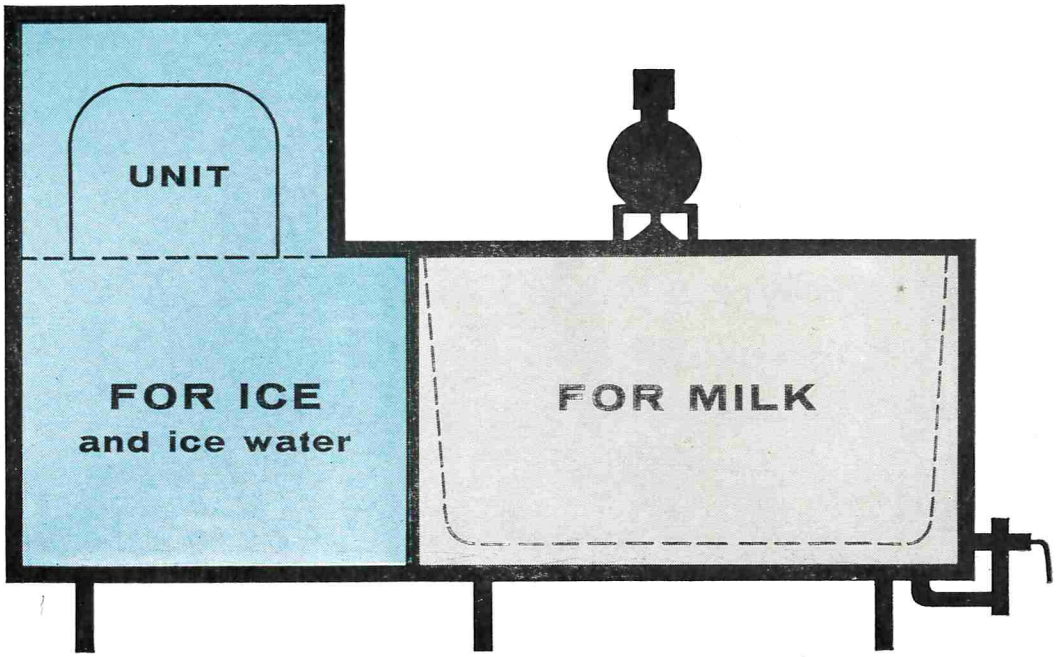
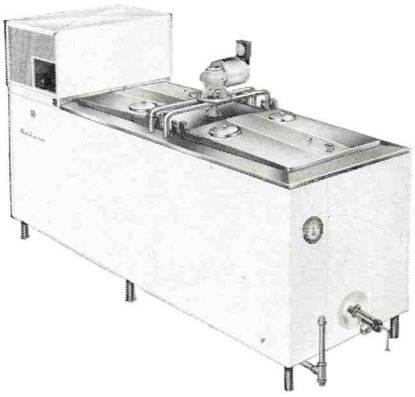
WILSON BULK MILK COOLERS LEAD THE WAY FOR PROFIT, EFFICIENCY AND ECONOMY!



Dairy Farmers Get
REAL MILK PROTECTION
with Wilson's Exclusive Cooling Feature!

(made possible by the famous Drop-in Unit)



Standard capacities from 100 to 700 gallons.

Wilson guarantees in writing that milk can never freeze in a Wilson bulk cooler. The diagram above shows why. Ice builds up in its own compartment, completely separate from the milk tank. Then ice water is sprayed against the sides and the bottom of the milk tank itself. But, since ice can't be sprayed—only ice water—milk tank walls can never get below 32.1 degrees.

Wilson also guarantees in writing that milk tank will not be distorted to interfere with calibration. The diagram shows why. If too much ice builds up, it is in its own compartment, safely away from the milk tank. You always get fair measure in a Wilson bulk cooler.

Dairy farmers get easier maintenance too because Wilson's isolated ice bank makes possible the famous Wilson Drop-in Refrigeration Unit. The complete unit—coils and all—can be removed and replaced in a matter of minutes. Or block ice can keep milk cool in case of power failure. You'll want complete information on Wilson bulk coolers. Get the full story today by sending in the coupon below.

WILSON
BULK MILK COOLERS
WILSON REFRIGERATION, INC.
Smyrna, Delaware
A Division of Tyler Refrigeration Corporation

Wilson Refrigeration, Inc., Department M-4, Smyrna, Delaware
Rush information on Wilson's NEW Model Bulk Coolers.

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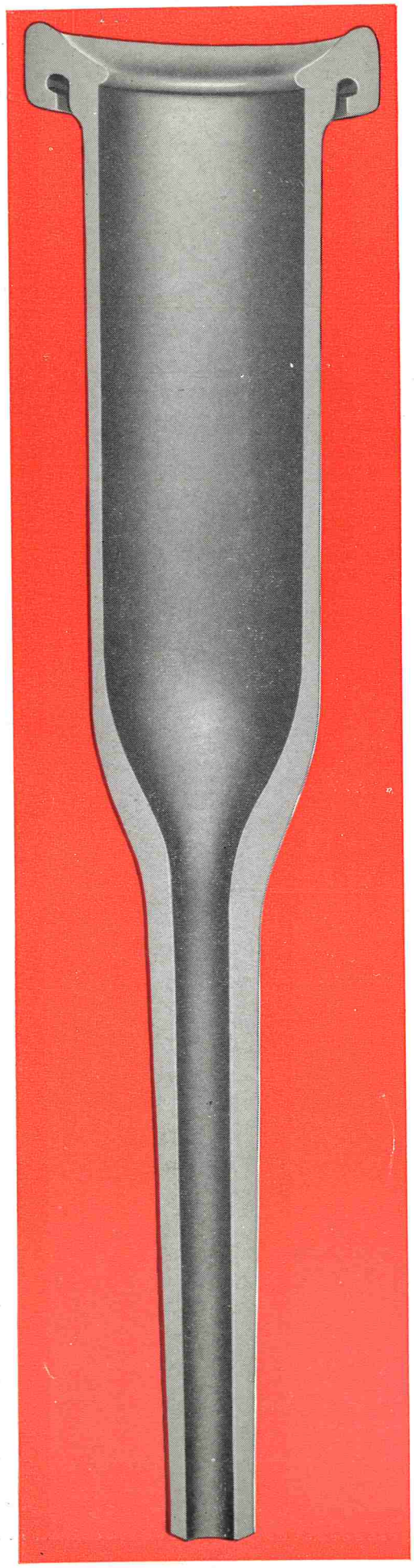

Sure this is an Advertisement, but . . .

It is an unfortunate fact that the very first step that milk takes after it leaves the end of the cow's teat is often the dirtiest step because the Milker Inflation is so very often not nearly as clean as it should be.

That is why we have spent so much time and effort in building Surge Inflations. We are helped by the fact that the very nature of the Surge makes it unnecessary to have a bunch of creases around the top of the inflation to hold it on.

Even so, with anything that anybody now knows, the inflation just has to be built of either a rubber compound or a compound of some synthetic.

We use both. For the man who insists upon rubber and won't have anything but rubber — we provide rubber inflations.

For men who don't like the way that rubber inflations absorb butterfat and swell up and go out of shape, we provide inflations built of a synthetic compound that does not soak up the fat from the milk or the lanolin-like fat from the teats and udder.

This inflation does not swell up and go out of shape and we therefore are sure that it does a much better job of milking than rubber, and it most certainly is more easily kept clean.

Admitting promptly and freely that no compound of this sort is an ideal container for milk, it is still entirely possible with not too much work to keep the Surge Black Inflation so clean that no contamination can be traced to it.

This is an advertisement, but even so we are saying exactly what we sincerely believe to be true. We most certainly would neither build nor sell this Surge Black Inflation if experience did not satisfy us that it is the most satisfactory article now being built.

We have by no means quit trying to make this one better and better, but as it stands right now it is mighty good. Good for cow safety and cow milking . . . good for the man whose job it is to keep it clean.

Surge

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