"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.

And another important thing, we are equipped to meet your complete requirements. You can depend on Tri-Clover as your one reliable source for all types of sanitary fittings, valves, pumps, tubing or allied specialties.

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Cable: TRICLO, CHICAGO
There is no substitute for quality

...for a more prosperous dairy industry

How RAPID-FLO engineered quality helps milk quality...

Rapid-Flo Fibre-Bonded Milk Filters are carefully engineered to provide a reliable Rapid-Flo Check-Up for mastitis and sediment. And there is no compromise in Rapid-Flo quality—laboratory tested and farm proven to provide the safest filter disk possible.

Quality dairy products begin with clean milk on the farm. By revealing evidence of mastitis and sources of sediment, the Rapid-Flo Check-Up points the way to improved milk quality. That's why more and more profit minded producers use Rapid-Flo Fibre-Bonded Filter Disks as an aid to quality milk production.

You can help producers, processors and the consumer by recommending frequent use of Rapid-Flo Fibre-Bonded Filter Disks—and the Rapid-Flo Check-Up for Mastitis and Sediment.
THE NEW STORY OF MILK

begins in the "Parlor"...

...and makes you more welcome than ever in your customers' kitchens!

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.

To make your dairy part of this great new story, offer your customers milk in Pure-Pak. They will like it and you will be on your way to simplified, lower cost milk packaging. Want details...write today!
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.

This month is Dairy Month. A time to salute the dynamic dairy industry, guardian of milk—one of the nation's vital resources.

THE NEW STORY OF MILK
begins in the "parlor"

As she enters the bright, clean "milking parlor," bossie is brushed, washed, and the automatic milker is attached. Milk flows from the milking machine to holding tank, to tank truck, to dairy.

Rigid cleanliness is maintained in the dairy through automatic processing and packaging in disposable Pure-Pak cartons. Pure-Pak cartons assure that your milk comes to you with all its natural freshness and good taste sealed in . . . protected as never before!

Modern milk handling and new packaging convenience are the New Story of Milk.

Pure-Pak disposable containers are safe, light, easy to handle. They save precious space in the refrigerator. Everybody likes them! More than 3/4 of all bottled milk is sold in Pure-Pak today!
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for a High R-Q*

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SCHWARTZ MFG. CO., Two Rivers, Wisconsin

*RQ RECOVERY QUOTIENT

is the percentage of sediment removed from milk during filtration as compared with the amount present in normal farm milk.
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City ........................................ Zone ........ State ........
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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.

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

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<th>Features</th>
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<td>Model</td>
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<td>Stainless Steel Dust Cover—Heavy gauge—designed for life of the tank</td>
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<td>Top Platform adjacent to Manhole—Safety—convenience</td>
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<td>By-Wire Insulation—together thicker for added efficiency—no sweating</td>
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<td>Separate compartment for samples—ops only when removing or replacing bottles</td>
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<td>Refrigeration and samples in same chest—direct cooling is faster and more efficient</td>
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<td>Sample chest insulated—Keeps refrigeration in—and heat out</td>
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<td>Sample chest opens from top—Cool air cannot run out</td>
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<td>All compartments lined with stainless steel—Easy cleaning—long-lasting—no rusting</td>
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<td>Snap-on gaskets on all doors</td>
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<td>Refrigerator-type chrome-plated brass hardware—Superior for dust-tight door seal</td>
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<td>Upright responsibility for trailerized tanks—Tank and trailer chassis designed and built by one company</td>
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<td>Nationwide stainless steel service and repair facilities</td>
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Other HEIL products for the Dairy Industry — FRIGID-LITE® plastic farm bulk pick-up tanks. Stainless steel and FRIGID-LITE® plastic milk trailerized transport tanks. Rectangular and cylindrical milk storage and cooling tanks.

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Lo-Bax is available in two forms—Lo-Bax Special and Lo-Bax-W (with a special wetting agent). For literature and/or samples and information about the Lo-Bax can-tagging program, just write today.
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. Invariably 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 idiosyncracies, our every action. Do we rub people the wrong way — do we make them angry — do they avoid our companionship — 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 quality 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 regulations 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

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 butyric 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, sulffites, sulfates,
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 stainless steelwool or sponges are employed to remove 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 tetrassodium 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:

**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 chloride 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 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.

设备用于每次清理。近年来，公共卫生部门和他们的奶牛检查官意识到，当正确进行时，同样的成本或更好的清理可以由C.I.P.过程实现，该过程比更费力和耗时的方法更有效，即拆卸设备和分开清理各个部件。一些卫生部门正在推荐C.I.P.方法。

许多大学通过其农业系、实验站和乳品科学系，证明了C.I.P.方法可以非常有效、快速且经济。它也被证明，当平衡的洗涤剂被正确使用时，有很少或没有需要对设备进行消毒以保持设备的清洁和实践上无微生物。热水和热水化学洗涤剂溶液被证明是有效的消毒剂。有效的消毒剂应包含钙氧合剂以控制或防止碱土金属沉淀，足够的碱以完成良好的清洁工作，以及对操作员和设备影响最小的类型。应该添加的是，除了良好的洗涤剂，还需要有一个合乎逻辑的清洁程序，设备的适当类型和良好状态，以及，最后但同样重要，一个我们一直未能混入洗涤剂的成分——常识。

有几种类型的化学消毒剂可用，但过氧化氢和氨化合物最广泛使用。次氯酸盐，其他有机氯化合物和碘代物是其他消毒剂市场上的一些例子。我们也注意到，当正确应用时，洗涤剂对放射性问题的贡献远低于其他任何化学洗涤剂。放射性放射性化合物（例如，氯化钠次氯酸盐和氯化钙次氯酸盐）应被应用于低温（60°F及以下）和时间较短（10分钟，最大）的情况下，以便在设备进入服务的最有效时间之前使用，以大大减少在金属表面发生点蚀攻击的机会。氯已被证明，在冷水中与热水同样具有杀菌效率，而较冷溶液中的氯气损失较低。

如果其他消毒方法能够被发现是足够有效的，那么消毒阶段可以被消除。需要进行更多的实验工作来实现这一点。

引用伊利诺伊大学乳品科学系的一份报告，“……通过不锈钢管道清洗后，当通过同一系统处理的牛奶质量没有明显不同。……

管道未按规定清洗和消毒可能构成一般和热菌污染的来源。管道被有效消毒的方法，包括氯化或热水（185°F）作为杀菌剂。

如果其他消毒方法能证明其有效性，那么氯消毒可以被消除。这需要进行更多的实验工作来实现这一点。

引用Charles Schwartz的报告，“调查我们的经验，可以说，目前对乳品工业来说最好的洗涤剂是其中含有有效的钙盐络合物材料以控制或预先沉淀碱土金属沉淀，足够的碱以完成良好的清洁工作，以及对操作员和设备影响最小的类型。此外，除了良好的洗涤剂，还需要有一个合乎逻辑的清洁程序，设备的适当类型和良好状态，以及，最后但同样重要，一个我们一直未能混入洗涤剂的成分——常识。”
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.
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 may 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 may 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. Correspondence should be addressed to C. A. Abele, Secretary, 2617 Hartzell Street, Evanston, Illinois.
Our ordinances and codes stipulate the minimal requirements for dairy plant sanitation. As practicing 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 identically as the balance. At junctions between stainless steel and other metals, galvanic action will cause accelerated deterioration.

Abrasive 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 chromium-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...
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 chromenickel 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 re-assembly.

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 gear 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 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 drive-way 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 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—butter milk, 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 proliferation 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-
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 sanitation. 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.

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**FORTY-THIRD ANNUAL MEETING**

**HOTEL OLYMPIC — SEATTLE, WASH., SEPTEMBER 5, 6, 7, 1956**

**RAILWAY ITINERARY AND RATES**

**MILWAUKEE RAILROAD**

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Continued on Page 164
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 streptococci 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.

Methylene blue reduction was also investigated by Schipper and Petersen (18) with a strain of Bacillus 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 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.

REFERENCES


**ITINERARY AND RATES TO SEATTLE CONTINUED FROM PAGE 161**

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**One Day Tour from Field, BC to Lake Louise & Banff**

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| 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, $73.48*; Double Bedroom, $115.90*; Drawing Room, $198.66*

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

**TOUR NO. 3**

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

Continued on Page 173
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Pres., E. C. Seaton, Jonesboro; Vice-Pres., John P. Montgomery, Dresden; Sec.-Treas., Elmer Glenn Smith, 3121 Catawba Street, Kingsport; Auditors: T. Carl Martin, Nashville; Raymond B. Medley, Knoxville.

WASHINGTON MILK SANITARIANS ASSOCIATION

WISCONSIN MILK SANITARIANS ASSOCIATION
Pres., Robert M. Kown, Elkhorn; Vice-Pres., and Vice,Elect, Burdette L. Fisher, Kiel; Sec. Treas., L. Wayne Brown, 421 Chemistry Bldg., Univer of Wisconsin, Madison, Wisconsin; Directors: James T. Judd, Shawano; Alvin Noth, Reedsburg; Past Pres., Harold E. Calbert, Madison.

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.-Treas. of the Michigan Association and winner of the association's annual sanitarians award for 1956.

WASHINGTON MILK SANITARIANS ASSOCIATION

WASHINGTON MILK SANITARIANS ASSOCIATION

WASHINGTON MILK SANITARIANS ASSOCIATION

WASHINGTON MILK SANITARIANS ASSOCIATION
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.

Corresponding Sec. — Dr. L. G. Harmon, M.S.U. East Lansing
Board Members —
  Dale Brooks, past president, Flint
  Fessis Smith, Kalamazoo
  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.

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IAOCH 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, Massachusetts 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 epidemic 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 Chicago 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 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
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 interment were at Arlington Cemetery, Monday, May 28, at 3:00 p.m.

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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 roundtable 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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MATERIALS - METHODS - SERVICE
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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 Florida 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 hindrance; you will create friendliness and not enmity. 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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**Automatic curd tension measurement to 1 gram with the new CHERRY-BURRELL Curd Tension Meter**

Cherry-Burrell's Curd Tension Meter is a simple, automatic device which gives direct tension readings to the nearest gram. Used to determine curd tension of homogenized and soft-curd milk solids and low and high heat non-fat dry milk solids.

Operation is automatically self-controlled. Operator places sample on scale under knife . . . depresses actuating button . . . takes and records direct scale reading.

Unit connects with 110 volt AC outlet. No expense for compressed air line or other special attachments.

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tanks and preparation of charts is the responsibility of the manufacturer or owner. The Department of Agriculture’s policy is to later check them upon request or complaint. Florida has about 600 bulk tanks. The figures used to convert gallons to pounds will have to be agreed upon by the buyer and seller since it is not a weights and measures standard. They recognize only the volume (gallon) measurement since it is not possible to give an exact weight per gallon for different milks which vary considerably in composition.

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. Willkowske, 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; J. 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. Willkowske, 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.

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**ITINERARY AND RAILWAY FARES CONTINUED FROM PAGE 164**

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**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-
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**
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, Steinhardt Aquarium, Golden Gate Park, Ocean Beach, Seal Rocks & Cliff House, Palace of Legion of Honor, Lincoln Park Sea Cliff, Presidio, 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 transferred. 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 preferred 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 ‘our’ 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.

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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.

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Spray Arm 1
INDEX TO ADVERTISERS

American Can Co. .................................................................VI
Babson Bros. Co. .................................................................Back Cover
Baltimore Biological Laboratories ..................................Page 169
Cherry-Burrell, Corp. .............................................................Page 171
Creamery Package Mfg. Co. ................................................Page 169
Chr. Hansen Laboratories ....................................................Page 172
Classified Ads ........................................................................IX
Diversey Corp. ........................................................................VII
Ex-Cell-O, Corp, Pure Pak Div. ......................................II, III
Johnson & Johnson .................................................................I
Klenzade Products Co. ..........................................................Page 176
Lazarus Laboratories ............................................................Page 172
Div. West Disinfectant Co. ................................................IX
Laddish Co. — Tri Clover Div. ........................................Inside Front Cover
Majonnier Bros. Co. ...............................................................Page 175
Northern Pacific Railway ..................................................Page 173
Oakite Products Corp. ..........................................................Page 170
Olin Mathieson Chemical Corp. ..........................................VIII
Schwartz Mfg. Co. .................................................................IV
Sparta Brush Co. .................................................................IX
The Heil Co. ..............................................................................VIII
United States Steel Corp. .....................................................VII
Wilson Refrigeration, Co. ....................................................Inside Back Cover

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<th>3 &amp; 4 Pages</th>
<th>5 &amp; 8 Pages</th>
<th>12 P.</th>
<th>Cover</th>
</tr>
</thead>
<tbody>
<tr>
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<td>$12.50</td>
<td>$15.00</td>
<td>$21.00</td>
<td>$30.00</td>
<td>$50.00</td>
<td>$21.67</td>
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<td>1.60</td>
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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.

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