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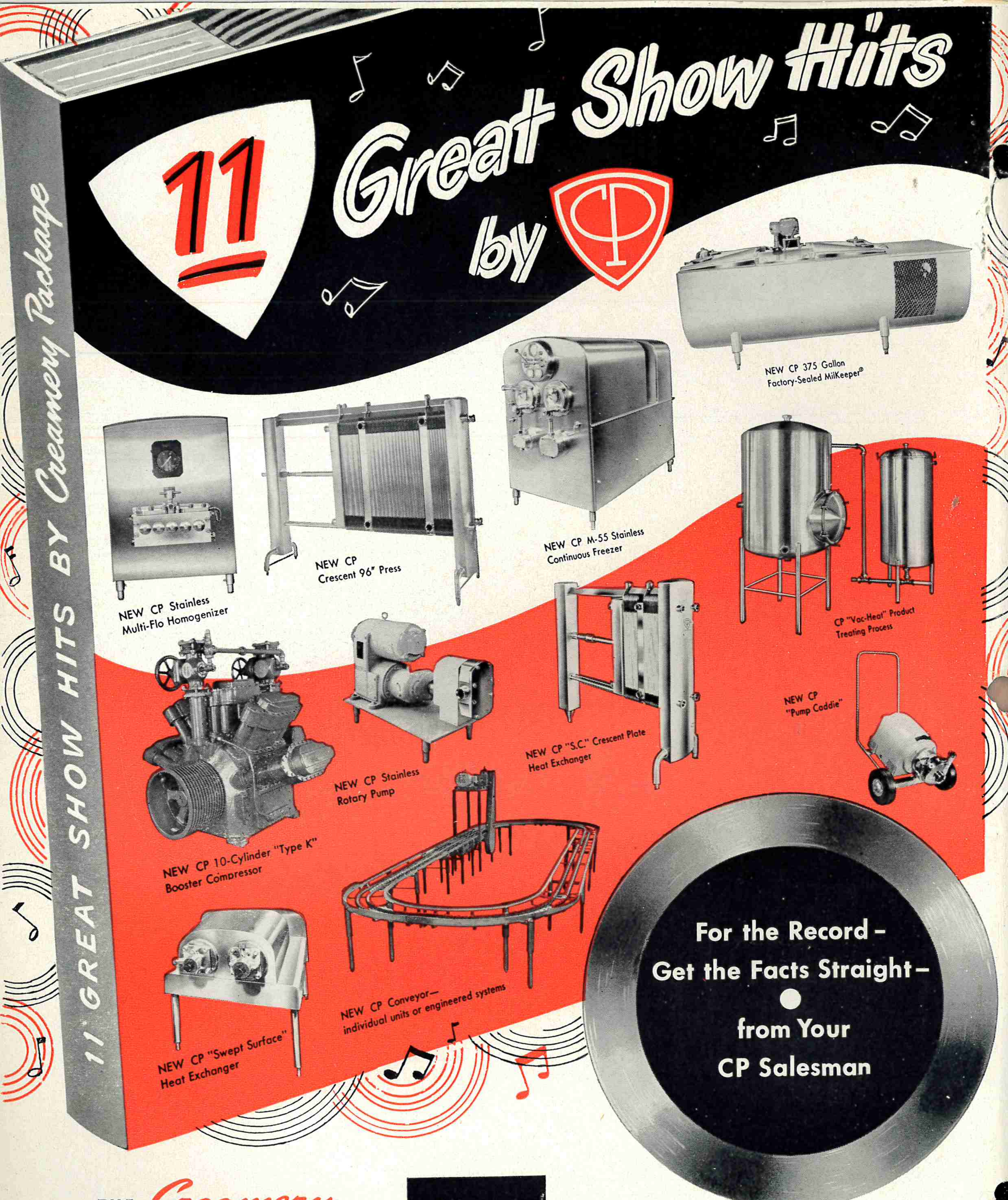
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Contents

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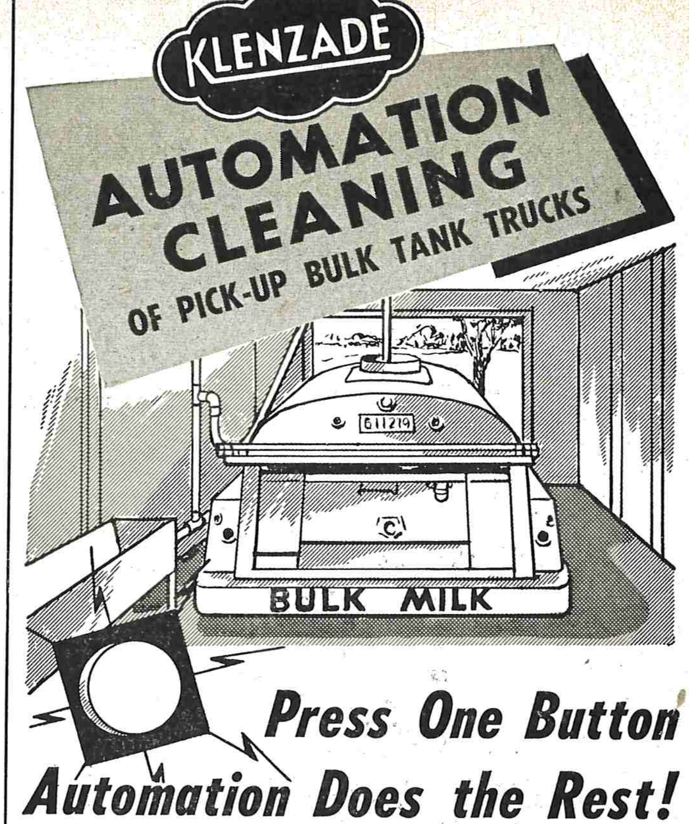

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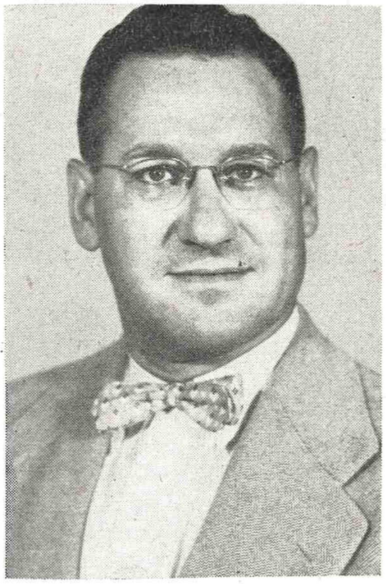
PUBLIC HEALTH ASPECTS OF FOODBORNE OUTBREAKS[1]

S. H. Hopper

Department of Public Health
Indiana University School of Medicine
Indianapolis, Indiana

With the public spending more than one-fifth of its income on foods, the food industry is now larger than sixty billions of dollars per year (1). As this business has grown, the public health agencies have been faced with new procedures in the transportation, refrigeration, preparation and storage of foods. Although the present trend in voluntary and official agencies is toward increased emphasis on adult health and chronic disease, one must bear in mind the ever present potential disease producing capacity of those items of health usually relegated to the area of sanitation. Note that the term of environmental sanitation was not used, since the author is not familiar with items of sanitation that are not in some kind of an environment. Perhaps it is time this redundant term is discarded since it is commonly accepted that we speak of the hygiene of the alimentary canal and the sanitation of the Panama Canal!



Dr. Samuel H. Hopper received the Ph.D. degree in Bacteriology from the Massachusetts Institute of Technology in 1937. He has served on the academic staffs of the Georgia Technological Institute, the University of North Carolina, and presently is Chairman of the Department of Health, Indiana University. Dr. Hopper is a Fellow of the APHA and of the AAAS, and is a consultant to the Indiana State Board of Health.

The milk borne outbreak of paratyphoid fever at Lancaster, Pa., is a current example, if proof is needed, of the necessity for continued vigilance by health agencies in the field of sanitation. An excellent editorial in the American Journal of Public Health (5) points out that the epidemic was mild, with only 200 symptomatic cases reported and 40-50 less manifest infections. The outbreak was an unmistakable exhibition of the value of full time local public health supervision, and the concomitant difficulty of trying to accomplish a proper milk sanitation program where thé central authority is divided. Bacteria are unaware of economics, and health programs should be within the province of persons trained in this field.

Preventive sanitation via the team approach of nurses, laboratory technicians, veterinarians, physicians, health educators, and sanitarians is a well established technique in public health. The work is quite prosaic however for it lacks the spectacular success of a vaccine or of brain surgery, but it is just as necessary as either of these if the humane and legal aspects of public health are to be carried out. It is evident at this point, then, that although a milk plant, or for that matter a water purification plant, can be made to work automatically, that automation does not necessarily entail complete protection because the human element is always present. It should be abundantly clear, also, that food borne outbreaks can be held to a minimum just so long as the responsibility for this is kept in a properly staffed local health department.

Our environment is a combination of many factors, among which the physical, biological and social are probably the most important. It is the study of these aspects of health and disease by epidemiologic techniques that we have developed diagnostic methods which help us to define a health problem, to determine methods and principles for control programs, and to evaluate our accomplishments. As was pointed out earlier, preventive medicine has changed, and we now have more emphasis on cancer, the degenerative diseases, mental illness and accidents. However public health practice may change, we can never lose sight of one of its foundation stones, i.e., sanitation.

The chief reason sanitation has remained in public

[1]Presented at the 43rd Annual Meeting of the International Association of Milk and Food Sanitarians, Inc. at Seattle, Washington, September 5-7, 1956.

health is because it was founded on sound bacteriological knowledge. This is important, because all of our health practices should develop from known facts. We have been proud to obtain ordinances for the protection of the public, and have substantiated our demands with sound public health reasons. Is it time now to re-evaluate the Restaurant Code and ask ourselves what value each item has in the prevention of food borne outbreaks? Is there any evidence in our voluminous literature to prove that floors, walls and ceilings which are dirty have ever had a part in the causation of disease? Should we assign some value to the aesthetic side of restaurant sanitation? For example, if ants were cooked into a browned pork tenderloin they would hardly improve the flavor of the meal, even though said arthropods would be sterile.

In the light of our present knowledge, some of the items in our ordinances have been given public health significance where in reality we would be hard to put to it to justify the relative weights already assigned. Has anything been left out? Should personnel be tested on personal hygiene and sanitation and their score incorporated in the total inspection? It is an item of importance and considerable practical value in public health. Does it seem reasonable to ask that a study of our ordinances and codes by a national agency would be in the public interest? Certainly, new knowledge requires new evaluations and possibly new techniques. Examples of this are numerous.

Each of us is familiar with the sanitary significance of the coliform group of bacteria in water supplies. We know that these organisms are widely distributed in nature, but just because they are firmly established as an index of pollution in one area should not lead us to conclude that their presence in other places indicates fecal contamination. Proof by analogy is not proof. The sanitary significance of coliforms in various foods and food products is not firmly established. The coliforms are part of our daily menu (3).

Turning now to a group of organisms which are the most common in cases of food poisoning, let us summarize some of the facts about the genus *Micrococcus*. We know that this includes what used to be called *Staphylococcus aureus*, but is now called *Micrococcus pyogenes* var. *aureus*. Millions of these bacteria are in our food and do not cause illness; in fact many strains do not produce an enterotoxin. For those which do produce a toxin, a relatively large amount of human suffering occurs annually. This type of sickness or disability is not reportable, and consequently it is difficult to estimate the exact number of cases. The toxin is heat stable, that is, boiling for one hour does not destroy it. Furthermore, laboratory investigation of suspected foods is hard to evaluate because a reliable method of assay for the toxin is not available. There is one general procedure, however, which can be followed and that is to provide conditions which would be unsuitable for the development of the enterotoxin. Reference is made here to the value of good refrigeration and to the necessity for education of the public on this simple and effective preventive method.

In a report on 243 outbreaks of food borne illness in the Navy, Cook (2) points out how the reports "vary in their completeness". The Navy studies centered around shigellosis, but included viruses. They are still trying to find answers to the fundamental questions concerning how the organisms were actually transmitted. Although some of these facts may seem discouraging, is there anything else that sanitarians can do about food poisoning caused by the toxin of *M. pyogenes* var. *aureus*? Of course there is.

No one has ever seen an atom and yet we have succeeded in accomplishing some very practical things with them. Similarly, we are justified in practicing well established public health principles until further scientific evidence and methods are forthcoming. The specific principle the writer has in mind is covered by the general term health education. There is no question about the health benefits which may accrue to the public from the food handlers who are motivated on their own, to carry out simple hygienic measures and good sanitation practices.

Turning now to another kind of toxin about which considerably more has been done let us consider the group of toxins produced by two species of the genus *Clostridium*, the anaerobic spore forming rods. These toxins are the most potent nerve toxins known to man, and it is established on the basis of work done with mice, that the toxic dose for man is about one ten thousandth of a part per million (6). Poets and philosophers have dealt with comparisons of the moral integrity and the relative bravery of mice and men, so a comparison of the biologic effects of a potent toxin may have some literary justification, if no other. It is important to point out that during the last 25-30 years, or for about a generation, no cases have been attributed to commercially canned products. The food industry has earned well deserved praise for this accomplishment. We can conclude our consideration of botulism with the comforting knowledge that it is not a common disease.

Usually summaries of food borne outbreaks have an appalling percentage listed as miscellaneous, with respect to causative organisms.

This large number is a monument to our present ignorance and a challenge which must be met. It appears that viruses are probably involved in many cases. No statistics are available to prove this point as diagnostic methods are still in the developmental stages. The facts at hand show that the alimentary tract of healthy individuals can carry many viruses, such as poliomyelitis, hepatitis, coxsackie, herpes simplex, mumps, influenza and others. One group effects the nose, throat and lungs and is known either as the ARD-acute respiratory disease group or the ADC-meaning adenoido-pharyngo-conjunctival group, or RI-67[2]. Many of these are recognized by the destructive effect they have on monkey kidney tissue (9). In fact the monkey kidney tissue cultures have revealed the existence of a whole new group of viruses present in large numbers in healthy children. It should be pointed out that viruses are measured in terms of millimicrons and there is more than enough room in one drop of water to hold a hundred million million particles.

Still another group of viruses is given the name ECHO, meaning enteric cytopathogenic human orphan viruses. The use of the word "orphan" does not mean that the virus is found only in children who are orphans. It is merely a name for a virus of uncertain classification and unknown reactions. One investigator (8) says, "Orphan virus, as the term is used here, are a heterogeneous group not neutralized by poliomyelitis or Coxsackie antisera, and non-pathogenic for monkeys or suckling mice." They are commonly present in the intestinal tract and there are many types. Their relationship to illness is still poorly defined. It is known that the peak seasonal incidence is between June and October, and that the larger numbers are found in the poorer socio-economic groups where hygienic practices and sanitation may not be very good.

As Dr. J. E. Gordon points out (7), the manual of the American Public Health Association "Control of Communicable Disease in Man" lists 20 diseases caused by known viruses and 9 others in which viruses are implicated for a total of 29 out of 118 listed in the manual. Public Health control can be planned if the diagnosis is made, but methods for the viruses are new and difficult and laboratory methods are still in the developmental stages. This puts us right back on the track of personal cleanliness, sanitary practices and health education as the means to achieve the end.

The public health aspects of food borne outbreaks can go on and on. Not much attention has been paid to amoebic dysentery. Yet the parasitologists tell us that between 5 and 20 percent of the population are carriers of *Endamoeba histolytica*. Explosive outbreaks of amebiasis are uncommon but this is an endemic disease since eight to thirty-two million Americans are presumably carriers. The task of finding technicians, laboratories, and financial assistance to discover and treat these people is unsurmountable. The administrative difficulties have been overcome by good sanitation and this endemic disease has not caused great concern. We must ever be mindful of the fact that environmental health includes many other important areas besides food poisoning. Among these are the disposal of products of atomic fission, synthetic chemicals, air pollution, noise, and accidents to mention just a few. When one considers the complexity of health department problems which may range from legislation, to budgets, program planning, office procedures, legal issues, and interpersonal relationships, he can only conclude that the sanitarian has his hands full now and the future holds little promise for a rest.

In summary: the public health aspects of food borne outbreaks include consideration of the team approach in health department investigations. The epidemiologic method defines problems and determines methods and principles for control programs. It is recommended that it is time to re-evaluate many items in the Restaurant Code. Research on the sanitary significance of the coliforms in various foods is needed, and the same holds true for the viruses. The importance of personal cleanliness, refrigeration, sanitary practices, and health education is stressed.

[2]All of these now known as adenoviruses.

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STANDARDS FOR DESIGN AND OPERATION OF LOOSE HOUSING SYSTEMS FOR DAIRY CATTLE IN THE NORTH CENTRAL REGION

Dairy Cattle Housing Sub-Committee, North Central Region, Farm Buildings Research Committee

The Midwest Plan Service Cooperating

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General Requirements

Loose housing is a management system for dairy cattle wherein the adult animals are given access to a feeding area, a resting area, and an adjoining open lot. At milking time the lactating animals are passed through a milking room. Other dairy animals may be in separate pens, lots, or buildings.

This set of suggested minimum standards for the design and operation of the loose housing system for dairy cattle in the North Central Region has been developed through the cooperative effort of the staffs of the U. S. Department of Agriculture and the State Agricultural Experiment Stations within the region, and milk sanitarians from federal and state public health agencies. Every effort has been made to standardize the requirements so as to simplify the design, construction and operation of the loose housing system, insofar as present knowledge permits. It is intended that these standards should apply to new construction and insofar as possible to remodeling work.

Variations in climate, differences in farming practices, size of dairy cattle and the number of cows in the herd all have an effect on the acceptable standards. Likewise, the loose housing system is readily adaptable to such a wide variety of plans that many of the advantages of the system would be lost if the standards become unnecessarily restrictive.

The loose housing system can be planned and operated in such a way as to provide suitable housing and yard area for the highly productive dairy herd producing uniform, quality milk with a minimum of man hours per unit of product. This type of housing can be low in cost and flexible as to herd size. The elevated stall milking room provides a sanitary, safe, convenient and effective place for milking the cows properly, and for handling the milk to best advantage. Dairymen should consider the use of improved practices, buildings and equipment, such as the modern milking room equipped for bulk milk production, with the opportunity for producing a better product being one of the most important advantages.

This report lists standards which are *minimum,* and should be used in conjunction with local sanitary regulations in the planning, building and operation of a loose housing system for the production of grade A or other standard quality milk. Current U. S. Public Health Service recommendations should be followed in the planning and operation of all dairy cattle housing and milk handling structures and equipment insofar as they apply.

The complete loose housing system for dairy cattle including buildings, methods and equipment, has been under investigation and study for more than 15 years in the North Central Region. In the last several years a growing number of dairymen have set up this type of housing on their own farms. In addition to the findings of research, the experience gained on these commercial dairy farms has given the system an opportunity to prove its merits both under controlled conditions and under practical farm conditions.

This experience has indicated the need for careful advance planning of the entire layout, including buildings, methods and equipment, which is difficult for dairymen to do if they have had no previous experience with loose housing. Loose housing for dairy cattle is quite different from stall barn housing in its design and management requirements, and there is need for dairymen to study the latest publications on the subject before undertaking the construction of this type of dairy cow housing.

The advantages offered by loose housing are important enough to justify careful study before reaching a decision on the kind of dairy structure to build. If, after studying dairy cattle housing research findings, visiting dairy farms with successful dairy units of this type, and otherwise obtaining full information, one is fully convinced that he should go ahead with loose housing, his next aim should be to plan a layout and management program which will allow him to obtain all the advantages offered by this type of housing.

Plans developed according to these standards should be approved before construction by a representative of the public health or regulatory agency responsible for milk inspection in his area. These representatives will be familiar with any special requirements as well as the general requirements as set forth in the milk regulations in effect, and should approve plans only after these requirements are met.

Information, both verbal and printed, plans from the Midwest Plan Service, and plans prepared by the College of Agriculture in each state are available through county agricultural agents or farm advisors.

In choosing loose housing for his farm, the dairyman should remember that while loose housing can be planned and made to work, it is not a substitute for good dairying practices. Compared to the stall barn it affords a more active life for the cow, is often adaptable to a lower building investment and can save both chore time and chore effort for the dairyman. However, the exacting requirements for the production of high quality milk have still to be met. This set of minimum standards is intended as an aid to farmers in protecting the quality of milk produced, and should be helpful in the orderly development and full acceptance of the loose housing system. The rest is up to each individual dairyman and his desire to produce high quality milk.

Some important points to consider before deciding on loose housing are the following. Loose housing will require the removal of horns from all animals before they are two years old. There is little dust or loose hair on cows in loose housing systems in cold weather; thus, except for early spring, clipping of cows may be limited to lower thighs, inside flanks and udders. Bedding is of greatest importance, especially in northern areas. In most areas more bedding is required than for minimum use in stall barns. It must be provided in sufficient amount to permit satisfactory management of resting areas throughout the housing season. The amount used can be controlled through good management of the resting area such as turning under fresh droppings and by keeping the resting area cold and open or well ventilated. However, one must avoid running out of bedding before the end of the housing season and plans should be made for some carryover from one season to the next. Cows must be kept reasonably clean and free of manure accumulations. It has been amply demonstrated that they can be kept clean in a properly planned and operated loose housing arrangement.

The maintenance of safe, sanitary, healthful conditions in and about all parts of the loose housing barn or structures is essential. Such items as manure removal, odors, fly control, rodent control, drainage, cleanliness and general appearance, as they may affect the health of the herd or the quality of milk, should be given constant attention. A little extra effort in doing the job well will pay off in personal satisfaction as well as in many other ways.

Separation of buildings for loose housing could result in less risk of losing the entire establishment in case of a fire and should be provided where feasible. However, separation of units should not reduce their overall efficiency.

SECTION I

The Farm Milking Plant

The farm milking plant may consist of a structure or a part of structure, the main purpose of which is to provide a clean, sanitary and efficient place for milking cows and caring for and storage of the milk. In addition to the milkroom and the milking room or milking barn, one or more of the following may be included: a washroom including toilet, a furnace and utility room, a feed room, an observation room, an office, passageways and/or vestibules.

Location of the farm milking plant, unless contrary to local regulations, may be either all or partly within the barn used for housing and feeding the cows, calves and young stock, or it may be a completely separate unit. To promote sanitation the farm milking plant should be located on the clean side or end of the barn or barnyard, preferably nearest to the dwelling and with access by a short, all weather drive to the highway. It should be located on a well-drained site, and except for the dairy herd, be as far removed from other livestock as conveniently possible.

Access to the dairy barn is essential, but one should not overlook the opportunity for planning an attractive development with a lawn, landscaping, a favorable location, fire protection, safety and for the selection of construction materials which best meet the functional as well as the sanitary requirements of the farm milking plant. All construction of milking rooms and milkrooms should conform to rodent-proofing standards.

The flexibility of loose housing lends itself to expansion at a minimum of cost once the original unit becomes available, and experience has shown that many of the herds under loose housing are increased in size after the change to loose housing has been made. With this in mind, it may be a good plan to build the milkroom over size for the present so as to accommodate contemplated future expansion. The location of all buildings should be such that future enlargement of them will be possible, or new units may be added. Dairymen should guard against overcrowding part of their facilities when they increase herd size. They are also reminded that when milk surplus is a problem, the shortest path to a satisfactory labor income may be by increasing the production per cow and keeping the herd size at a minimum.

THE MILKROOM

The milkhouse or milkroom is the space set aside for straining or filtering, cooling and storing milk, and for the cleaning and storing of dairy utensils. The milkhouse is a separate structure which is often attached to the milking room. The milkroom is a part of a larger housing structure and/or the farm milking plant.

Milkroom Recommendations.

The milkhouse or milkroom is a subject covered by the U. S. Public Health Service Milk Ordinance and Code with which it should be in full compliance. In existing milkrooms adequate space must permit access for thorough cleaning of all areas and equipment. Recommendations relative to location of the farm bulk tank in the milkroom have been provided by public health officials as their interpretation of satisfactory compliance with the present milk code. Suggested location requirements are as follows:

> The farm tank shall be located in the milkroom so as to provide at least 24 inches of clearance between the rear side of the tank and the wall or any equipment, at least 24 inches of clearance between the rear end of the tank and the wall or any equipment, at least 36 inches of clearance between the working side of the tank and the wall or any equipment, and at least 36 inches of clearance between the outlet valve end of the tank and the wall or any equipment; provided that in the case of existing installations, clearances as specified above may not apply if the producer demonstrates the ability to keep the interior and exterior surfaces of the bulk tank and the milkroom floors and walls in a clean condition. Such tanks shall be located so as to provide at least 6 inches of clearance between the floor and bottom on tanks except that a 4 inch minimum clearance is acceptable if the bottom slopes upward to at least 6 inches in a horizontal distance of 12 inches, or be sealed to the floor in such a manner as to prevent accumulation of milk, water, dust, and harborages of insects or rodents. Remote compressors located in milkrooms shall be installed to be easily cleanable and operate at peak efficiency. Floor drains shall not be located under the farm tank or near the outlet valve.
>
> A fixed, properly encased opening not less than 6 inches above the floor of the milkhouse and the outside loading platform shall be provided in an exterior wall of the milkhouse to accommodate the milk conductor tubing used to pump the milk from the farm tank to the truck tank. Such openings shall be provided with a fly tight self-closing device to cause the opening to be protected at all times.
>
> When electricity is the motive power for the milk transport tank milk pump, a lock type electrical connection with ground and weatherproof type receptacle located on the outside, or inside of the building with a switch box located on the inside of the buiding shall be provided.

For new construction this committee has agreed upon recommended sizes for milkrooms as shown in Table I. They should provide sufficient space for grade A milk production and satisfy milk code requirements as to size for new construction. In this table bulk milk tanks for every day pickup (E.D.) may be large enough to have a capacity equal to three milkings. The bulk milk tanks for every other day pickup (E.O.D.) may be large enough to hold five milkings.

TABLE I — SUGGESTED FLOOR AREA FOR MILKROOMS (MINIMUM SUGGESTED WIDTH 12')

Milk production in gallons per day	Floor area in sq. ft. Can milk	E. D. bulk	E. O. D. bulk
50 or less	144	168	168
50 to 100	168	192	216
100 to 160	192	208	240

Milkroom drains should be located where accessible for cleaning, contain deep water seal traps and be provided with a two quart sediment chamber. There should be a smooth, dense concrete floor with a uniform slope to drains of ¼ inch per foot. It is suggested that the maximum distance to drains be 12 feet. When this floor is to support a bulk milk tank in which milk is to be measured, it should be stable in summer and winter and be capable of carrying the load placed on it. This type of floor can be provided by removing all top soil and backfilling with at least 8 inches of sand, gravel or crushed rock. Where top soil is firm, reasonably free of organic material and little affected by freezing, a sand or gravel fill of 4" to 6" may be adequate. A concrete floor reinforced with 6 x 6 #10 welded mesh steel and 5 inches in thickness placed over this stabilized fill should prove adequate.

THE MILKING ROOM

The milking room, sometimes called the milking parlor, is arranged for milking cows on a more or less continuous flow basis, either in floor level or elevated stalls. The cow enters one of the stalls, is fed her concentrates, her udder is washed, and after the milking operation is performed, is released and walks out of the milking room. While this is going on, a similar sequence is being followed in each of the other stalls in such a way that a continuous pattern of operation is followed.

Insofar as possible, the same general requirements and structural standards set up for the milkhouse or milkroom in the present regulations should apply to the milking room, especially if it is a part of the same building in which the milkroom is located.

The milking barn with a somewhat larger number of floor level milking stalls is operated by changing all, or a part of the cows at a time as a group. They may be fed concentrates as a group and then the milking operation continues until all or enough are milked to require another change. The milking barn may resemble the stall barn in layout except each stall may have to serve for several cows each milking. To help keep cows quiet while being milked, the feed manger is raised 18 inches above floor level. No bedding is used.

For purposes of simplification, where a separate designation is not required, this manuscript will use the term "milking room" to include milking barns.

Floors and Drains.

Floors for the milking room should be of good quality, hard, dense concrete with a wood float finish. Permanent roughness may be obtained by working carborundum aggregate into the surface of the floor before finishing. The platform of the elevated stall should be from 30 to 38 inches above the level of the floor in the operator's area to permit the operator to work in a comfortable position. All floor areas should be well drained to make floor washing with running water possible. This is accomplished by forming (or making) the floor with a uniform slope of ¼″ per foot to shallow "bull nose" type surface floor gutters which in turn have sloping bottoms ¼″ to ½″ per foot to 8 x 12 sediment type deep seal barn and basement drains. A drain of this type with a 4″ wide gutter along the wall in the operator's area will prevent undrained areas of water on the floor. There should be ample toe space of 4″ to 6″ next to the milking stalls. If the 4″ gutter is next to the milking stall wall ample toe space for the operator can be provided by extending the stall floor 8″ horizontally over the supporting wall of concrete or concrete blocks. When concrete blocks are used the cores should be filled with concrete. If desired, a curb may be placed along the edge of the stall floor next to the operator's area. However, where bucket type milkers are used, either for testing or regular milking or where swinging types of milker units are used, a long gap may be provided in this curb in front of the udder for sliding or swinging the milker in or out. Junctions of floor and wall or floor and curb should be coved or rounded to facilitate cleaning.

An alternate to the use of the shallow gutter in the stall areas consists of providing a drain with an 18″ x 18″ grill in the rear end of each cow stall. All floor areas are uniformly sloped ¼″ per foot to the grills. It is possible to reduce the curb height on the stall platform to less than an inch if the edge of the curb is allowed to extend a full 3″ horizontally from the outside edge of the stall pipes in the direction of the operator for his protection as well as that of the cow. This permits the operator to keep the floors washed down during the entire milking operation while the grills reduce splash from droppings.

Wetting down the milking room floor before starting to milk will facilitate the later washing away of any droppings not otherwise removed, into the drain.

After each milking, the milking room or milking barn should be promptly cleaned by (1) scraping and removing any remaining manure or feed, followed by washing; or by (2) scraping, sweeping, removing of any manure or soiled lime, and applying fresh, clean, ground limestone or other suitable material. This is an alternate that should only be used in unheated milking rooms in winter.

Halls and Vestibules

Halls and vestibules, where used, should be constructed, lighted, ventilated and maintained in sanitary conditions equal to those required for the milkroom. Vestibules should be at least 5 feet long and wide enough to provide passage for a person carrying milking equipment. Vestibules should be provided to prevent direct openings from the milkroom into any housing, barns or domestic living quarters.

These standards recommend the elimination of the ventilated vestibule between the milkroom and milking room. However, a dairyman should consider his present local requirements on this point. Where the vestibule is omitted the passage between milk room and milking room should be equipped with a solid, tight-fitting, self-closing door, opening outward from the milkroom. It is important that flies be kept under effective control, and milking room sanitation be maintained at a high level. It is with this understanding that milk sanitarians have agreed to omit the vestibule requirement.

The Wash Room

A wash room equipped with hand washing facilities and water flush toilet, may wisely be planned to fit into the farm milking plant. Hand washing and sanitary toilet facilities contribute to the production of good quality milk. This room cannot open directly into the milkroom according to milk code recommendations.

Heater or Utility Room

Heating requirements will seldom exceed the practical limits of electric or gas heating, thus necessitating

TABLE 2 — SUGGESTED INSULATION TREATMENT FOR THE FARM MILKING PLANT

Construction	Zone 1	Zone 2	Zone 3
Sidewalls			
Concrete block	8″ + 1″ refrigeration type insulation (cork, foam glass, etc.)	8″ to 12″ — cores filled with insulation	8″
Cinder or light-weight concrete block	8″ to 12″ — cores filled with insulation	8″ — cores filled with insulation optional	8″
Glazed clay tile	8″ + 1″ refrigeration type insulation	8″	8″
Glazed clay tile cavity type	4″ cavity filled with insulation	2″ cavity filled with insulation	—
Wood frame	2″ to 4″ insulation bats[a]	1″ to 2″ insulation bats[a]	½″ insulation[a]
Steel	2″ to 4″ insulation bats[a]	1″ to 2″ insulation bats[a]	½″ insulation[a]
Ceiling Fill or bat insulation	4″ to 6″[a]	2″ to 4″[a]	0 to 2″[a]

[a]Provide vapor barrier.

the use of a central heating plant. If a heating plant is needed it may be placed in a utility room large enough for vacuum pump, heating plant, hot water heater and fuel storage. A chimney will be needed for the heating plant. Where coal is used for fuel, a coal bin and tight fitting door for the utility room should be provided to keep coal dust from entering the milk-room or milking room. Good lighting, ventilation and floor drain are required. The size of the room should be adequate, but not so large as to develop inot a storage or junk room. The room should be of masonry or finished with fireproofing, such as cement plaster on metal lath, or ¼″ cement-asbestos board and fireproof insulation.

INSULATION

Insulation is an important consideration in planning for the economical heating and comfort of a farm milking plant. The amount of insulation necessary will depend upon the zone or part of the region in which it is located. Table 2 may be used as a guide for determining insulation values for the three temperature zones into which the North Central Region is divided. Zone 1 is the area lying north of an east-west line passing through the southern tip of Lake Michigan. The south limit of Zone 2 extends along the Ohio River and the southern borders of the states of Missouri and Kansas. Zone 3 lies to the south of this line.

THE HEATING PLANT

The milkroom in a farm milking plant should be heated enough to prevent freezing in coldest weather. It is most convenient to apply this same rule to the milking room. If a toilet room is included, it too must be protected against freezing temperatures. Any additional heating will tend to increase heating costs although it may add to the operator's comfort, depending upon how he dresses and the speed with which he works.

Where moderate tempering is considered adequate, a heat lamp may be located to warm the operator's feet at each milking stall. There may be some locations where quick "warm up" heating just prior to milking can be obtained through electric radiant heating panels located in the ceiling and sidewalls of the milking room. However, a milking room full of cows soon warms up. Water pipes and drain traps may be protected by electric heating devices. Crushed agricultural limestone may be used on the floor if the drains are covered in cold weather and no heat is used between milkings.

In Zone I and parts of Zone II where considerable use is to be made of the farm milking plant and regular heating other than electric is desired, domestic type space heaters, gas fired unit heaters or a central heating system may be installed as long as air is not circulated from room to room. The type of heating system best suited to this building would be one which has high capacity and quick pickup. For heating economy, temperatures may be held around 35° except when milking is being done.

VENTILATION

Ventilation of the milkroom or milkhouse is necessary to control moisture in winter and temperature in summer. The mechanical milk cooler in the smaller sizes may have an air cooled condenser which will help heat the milkroom in winter but may cause excessively high temperatures in summer.

Mechanical Ventilation.

It is suggested that pressure ventilation be provided in the milkroom by means of a ceiling fan, baffled to spread the fresh air over the ceiling. The supply of fresh air should come from above the roof by means of a suitable intake, screened and, if necessary, equipped with a filter. A louvered and screened opening near the floor will provide a suitable air exhaust. The fan should be equipped with a two-speed motor, one speed to provide 6 air changes per hour for winter operation and a high speed setting for large volume in spring and autumn seasons. Summer ventilation is obtained by opening screened windows if outside air is not dusty. High temperatures can be avoided by using a water cooled condensor on the milk cooler or by using outside air for this purpose. A wall fan may also be used to increase air movement in hot weather.

In the milking room non-pressurized mechanical ventilation is recommended and should provide at least six air changes per hour. For mild weather this rate of air change may be doubled if a two-speed fan is used. The control of moisture, and feed and animal odors is the main winter time requirement. Summer ventilation may be provided by opened, screened windows arranged for cross ventilation or by a large sized exhaust ventilating fan.

Gravity Ventilation.

When gravity ventilation is used provide screened, insulated out-take flues — one for each room with one square inch of cross section area for each square foot of floor area. A suitable roof cupola should be used for gravity systems. It should be pointed out that a well insulated building will permit more ventilation than one not so well insulated, without increasing fuel consumption. In the summer, cooling by well placed, screened, open windows or electric fans of adequate capacity should be arranged.

LIGHTING

It is desirable to provide natural light from well spaced windows having at least one square foot of glass area per ten square feet of floor area in the milkroom and also in the milking room of the elevated stall type. When using glass block, provide one square foot of window area to eight square feet of floor area. This recommendation exceeds the milk code recommendation of 1 sq. ft. of glass area per 15 sq. ft. of floor area for milking barns. In milking rooms with elevated stalls artificial light from lamps (one 100 watt bulb per cow) located well above the operator should be directed from behind the operator if they are to be effective in lighting the cow's udder. At least ten foot-candles of light are required on the working area, in this case, the cow's udder. Some dairymen have installed a shielded light on the curb or under the cow for better lighting. The wiring system should include the power outlets for vacuum pump, milk cooler, water heater, ventilating fan, space heaters and any other special uses as grain meters, electric fence controllers, etc.

INTERIOR WALLS

Interior finish of the milking room should be of approved light color, impervious, washable and easily cleaned. There should be no ledges for the collection of dust or litter. Lighting will be improved by light, clean walls and ceiling. Painted, smooth matched lumber, exterior grade plywood, portland cement plaster on metal lath, or concrete masonry may be used *except no wood surface covering should be used in lining the lower four feet of any wall.* Painted galvanized sheet iron may be used. Durable, waterproof composition board or ¼″ cement-asbestos board with solid backing and regular glazed building tile are good. Any wall finish should be smooth, durable and resist damage if bumped, wet down frequently or scrubbed. Glazed tile or filled and painted concrete blocks make ideal wall surfaces to keep clean and to reflect light. A pipe railing, at a height of 36 inches above the floor and about four inches from walls in the passageways for cows will help protect painted surfaces. Whitewash is not as well suited for milking room or milking barn wall and ceiling finish as washable paint.

CONCENTRATE FEED STORAGE

A feed storage leading to chutes and metering feeders, of sufficient size to hold the amount of feed commonly prepared at one time, is a necessary part of an efficient farm milking plant where cows are to be fed at milking time. This feed storage should be dust tight, dry, well ventilated, rodent proof and arranged for convenient filling. It may be arranged for hand feeding or for metered feeding at each milking stall. Arrangements that have been conveniently used by dairymen include the following:

Overhead storage in hopper bottom bins which have chutes to individual milking stalls. Bulky feeds do not feed down well in hopper bottom bins and, if used, a mechanical agitator may be required.

Feed rooms may be equipped with a feed box at waist height into which the ground feed may be shoveled before milking starts. Feed room or bin with hopper bottom may be built into milking room wall. The feed bin is usually long and narrow, and has a sloping bottom which feeds into the waist high feed box. Such a feed box should be convenient to the operator and it should be equipped with a tight closing door.

Self-contained outdoor steel bin equipped with auger arrangement for delivery of feed to feed box or overhead to chutes leading to individual stalls.

WASTE DISPOSAL FOR THE FARM MILKING PLANT

It is sugested that before constructing a farm milking plant, dairy farmers consult local or state health authorities and their County Agricultural Agent or State Agricultural College. There are three sources of waste from the farm milking plant and each requires individual consideration as listed below:

1. Toilet room wastes must be disposed of as required by state and local plumbing codes. This waste may be taken by appropriate sewer line to the septic tank at the dwelling. Where this is not practical a septic tank and below ground disposal field are generally required.

2. Milking room wastes will vary in amount depending upon the amount of floor washing done and the amount of solids washed down the drains. The volume of such waste may be fairly substantial. Any method of disposal used will most likely require careful and regular attention by the dairyman.

3. Milkroom wastes usually will be low in organic material but also of fairly large volume when in-place cleaning of C. I. P. milk pipelines is followed. This waste may enter the same drains as the milking room wastes and should not be mixed with the domestic sewage.

The combined waste from milking room and milkroom carries a considerable load of fibrous material which may be settled out by means of a settling tank. It will not decompose, thus if a settling tank is used, provisions should be made for pumping or draining out the settled material often enough to keep the settling tank in effective operation. Other disposal methods include surface disposal on broad, well drained, grassed areas (field aeration) or ponding. In northern climates the disposal method must be effective in cold weather and thus, when possible, disposal below ground surface will have a definite advantage in that it would be frostproof. This may be accomplished where soil and ground water conditions permit, by extending the tile leaching system as explained below for the treatment of milkroom wastes.

A settling tank, when used, should be similar to a rectangular concrete septic tank, should be provided with adequate capacity, and should be arranged so it can be readily cleaned through a removable top by dipping or pumping out solids as required. Settling tank capacity should be at least 150 gallons per elevated cow stall, or 20-gallon capacity per cow actually milked, whichever is the greater. These amounts are minimum and for installations where more generous use is to be made of water for washing etc., they should be adjusted accordingly. Operating practices followed in the milking room or milking barn will largely determine the frequency of cleaning the settling tank. Any one of several methods of disposal may be used in conjunction with the settling tank.

Milkroom wastes require oxygen for stabilization. Farm milk wastes are usually small and if there are no milking room wastes with which they may be mixed for treatment, disposal may be successfully carried out in well drained soils by using a two-level tile and gravel leaching trench. The trench, approximately 16 inches wide and 4 feet deep has sloping ends. Its length should be no longer than 75 feet. If necessary, put in parallel trenches. The total length of the trenches should equal approximately 30 feet per stall, or 4 feet per cow actually milked, whichever is the greater. A 4 or 5 inch open jointed or perforated sewer pipe is laid from end to end in this trench. Air is allowed to flow freely through this pipe from end to end. The ends of this aeration pipe should be marked, protected from breakage and screened to keep out rodents.

The next step is to place 16 to 18 inches of ¾ to 1½ inch gravel around and over the sewer pipe. The second level of 4 inch jointed or perforated sewer pipe is laid over this gravel bed and connected with the milkroom waste line. The tile is covered with several inches of the ½ to ¾ inch gravel followed with a 3 inch layer of pea gravel and soil. This provides a simple, frostproof, aeration bed for milk waste disposal without nuisance or odor.

Drains.

All drains should be connected with 4″ diameter cast iron sewer pipe or vitrified clay sewer pipe which may lead to septic tank, tile absorption field, settling tank, pond or other acceptable disposal area that meets local sanitation requirements. Where the drains in the milking room must meet plumbing code requirements full compliance should be planned. Offensive odors are undesirable in the farm milking plant. These odors can be avoided by using deep water seal traps and venting sewer lines through roof of building by standard plumbing code methods.

HOLDING AREA

Cows waiting to be milked may be held in a pen just outside the milking room so they will be readily available as they are wanted for milking. Outgoing milked cows are thus separated from the unmilked cows. This paved holding area may be partly or entirely roofed, substantially fenced, and equipped with suitable steps into the milking room. Steps should have from 18 to 24 inches run and not more than an 8 inch rise. A minimum of 25 square feet per cow should be allowed. The holding area may be a part of the paved barnyard, the feeding area, or simply an open or partly covered lot next to the milking plant. It should be cleaned or bedded daily or as required to prevent cows from tracking manure into the milking room or milking barn.

For large dairy herds it is not advisable to hold cows on resting areas for milking because this tramps-up and soils the bedded area making it more difficult to keep the cows clean. In smaller herds, if cows are to be held on the resting area, some extra bedding will be required to absorb the droppings. In most areas and states holding on the resting area is not recommended.

SECTION II
The Roughage Feeding Area

The feeding area for hay and silage and for watering the herd may be under roof or in the open barn lot. Convenience in feeding both hay and silage is important. In most cases, time can be saved if hay and silage are fed in separate mangers. Feeding stored or stacked hay with a movable feeding fence or manger has been used successfully. Silos located next to feed mangers in the paved portion of the barn lot are most convenient.

Clean Feeding Area.

The feeding area for the cows should be paved, sloped away from the manger, and be readily accessible for cleaning. For larger herds, cleaning with tractor scraper is highly desirable. During the winter months, snow and manure accumulation may inconvenience outside feeding operations, making it difficult to maintain normal operations. When thaws come, a considerable amount of manure and slush must be removed quickly. If the site provides sufficient fall for drainage, convenient manure storage in the form of a paved manure platform along the back side of the yard, 3 or 4 feet below yard level is possible. As the slush forms, a roll-over scraper can also be used to remove it from the barn lot to an adjoining field.

Amount of Feeding Space.

Provide at least 30 inches of feed manger per cow for batch feeding of hay and silage where all must feed at the same time. With this practice, both hay and silage may be fed in the same manger. This practice tends to make extra work for the operator. This arrangement requires about 45 square feet per cow when manger and feed alley are included. Provide some sort of short stanchions, V-notch openings or posts to prevent boss cows from chasing other cows from the manger.

For free choice feeding hay and silage separate managers which provide 12 to 18 inches of manger per animal for each kind of feed will be enough. Silage fed in the morning in a deep feed manger will last nearly all day without serious difficulty from freezing. If there is too much freezing, it should be fed twice a day. Dairymen indicate that a foot of manger space per cow out in an open paved lot and from 4 to 6 inches of feeding space in self feeding bunker silos may be satisfactory for feeding silage. Where limited amounts of corn silage are fed, it is best to have feeding space for all cows to eat at one time or some will get more than their share.

Mangers for feeding hay should be constructed so the cows will not pull hay out onto the feeding area. Hay may be self fed direct from storage or it may be fed in conveniently located mangers filled once or twice a day, depending upon the kind of feeder.

The feeding area is not bedded or allowed to become partially covered with wasted hay as cows may lie down there and get extremely dirty. The feeding area should be cleaned as required and be kept free of hay or litter which might encourage cows to bed down on it. Failure to observe this rule has caused more than one dairyman to criticize his loose housing system. This situation is not difficult to correct as cows do not often choose to lie down on a bare paved concrete floor. An inside feeding area may be bedded for smaller herds if adequate space is available. Inside feeding reduces the number of animals permitted within the given area. Success with inside feeding requires good light and ventilation. Self-feeding from a hay shed open to the south or east is recommended. In this case there should be no ventilation problem so long as strong, prevailing winds have been screened out.

Water.

Watering need not be difficult if properly planned. This may be an electrically heated drinking bowl, or a small, banked, float-controlled stock tank located in a somewhat sheltered place in conjunction with the feeding area. It may also be an open stock tank conveniently located in the cattle yard. If the tank is filled with warm well water in the morning with enough water to last 24 hours only, the small amount of ice in the tank the following morning will melt when the tank is filled. In the colder climates some banking, and even a tank heater, may be required. The Milk Code requires that all water connections must have an air break or other protection against back-siphoning of contaminated water supplies.

SECTION III
The Resting Area

In the North Central Region, a suitable resting place for the dairy herd that is dry, sheltered from the wind, and well bedded, is a definite requirement. Provide an open or well ventilated barn with from 40 to 60 square feet of area per animal. The larger area is for larger breed types in northern states (Zones 1 and 2). Avoid a tight, warm, resting area where high humidity is a serious problem. The resting area should have a ceiling or roof high enough to accommodate a manure pack 3 or 4 feet in depth. The well bedded manure pack remains at from 60 to 100 degrees F. throughout the winter. In northern areas (Zone 1) the manure pack must be established early in the fall so it will be warm when cold weather arrives. It should be open and available to the herd at any time the cows prefer to use it when autumn arrives. To keep the cow free from any accumulation of manure on the udder and flanks, the bedded area must be given daily attention. Enough bedding must be used to prevent the manure pack from becoming soft and punched up. The resting area should be free of all feeding, watering and cross traffic. All other kinds of livestock should be excluded from it.

Location.

The resting area may be a part of the same building in which the feeding area is located, or it may be a separate structure. The resting area shelter should face south or east, and form one side of the barnyard. The openings to the area should be protected from the sweep of prevailing winds in northern areas. As in arranging all buildings for loose housing, it is well to provide as much protection for the barn lot as possible. A well drained site that is high and protected on all sides from any sort of flooding is extremely important. Once a portion of the bedded area becomes soaked with water the bedding pack will have to be completely removed and a fresh bedding pack started from the floor. Insofar as possible, choose the most favorable site, then fill, if necessary, to raise the floor level at least 6 to 8 inches above outside grade. Finally grade the area outside the building so all ground slopes away from the building.

There are some hillside locations where well drained soils will permit, and topography will require, lowering floor levels below outside grade for some parts of the structure. Where this can be done so as to keep out all surface and seepage water, there should be no objection to it.

The Resting Area Floor.

Floor for the resting area may be earth, although concrete makes the removal of manure easier. Adequate paved yards are more important than paved floors in the resting area. The paved barn yard should extend into the opening to the resting area. Local requirements on this point should be checked with your plant fieldman. It is more important to pave the feeding area and barn lot first. This will keep the cows from tracking mud onto the bedding, and it will make manure removal easier. The lot should provide ample space for the manure spreader and the tractor mounted blade and manure loader to operate efficiently. The resting area will need head room of about 9 to 10 feet. Since the tractor mounted manure loader operates on the solid footing afforded by the floor, this head room is sufficient for its operation. Accessibility to all parts of the resting area requires unobstructed door openings 10 to 14 feet wide, clear span construction or post or column spacings 14 to 16 feet apart in both directions, and removable panels for any pen or partitions.

Special Foundation Requirements.

The foundation walls and posts should be designed for a 3 to 4 foot depth of manure. For the frame building, concrete or masonry walls should be 4 feet or more above the floor level in the bedded area. The pole type barn, constructed with pressure treated poles set four or five feet into the ground, may be enclosed at the bottom with two-inch pressure treated planking to a height of 3 feet-six inches or 4 feet. These planks should be fastened on the inside or outside surface of the poles. Lag screws or deformed nails should be used if planks are fastened to the outside to prevent the manure from pushing them off. For additional support, extra posts may be set between framing poles. If the planks in the lower wall are matched so they are tight, the siding need not extend down over them. Any wood in contact with moist earth or moist manure should be pressure treated, or treated by soaking in an effective preservative for the control of rot, decay and termites.

Manure Removal.

There is no one best date for manure removal. Cows do not seem to like to rest on warm manure packs in late winter and early spring when warm weather arrives. They are used to rigorous winter weather conditions. One solution is to remove the manure pack at this time. Dairymen usually have time at this season and hauling can be arranged to use frozen ground or wait for periods when ground is firm. An early cleaning date will beat the fly season. However, much valuable nitrogen is lost unless manure from the barn can be plowed under immediately after spreading. Each individual dairyman will have to work out his cleaning dates with his milk plant fieldman or milk sanitarian if he wishes to deviate from standard practices.

Bedding storage for an adequate supply of bedding over or alongside the resting area is most desirable. Storage for at least one and one-half to two tons of bedding per cow in the northern zone should be provided.

Lighting.

Adequate natural and artificial light should be available to permit the operator to bed the area properly and care for his herd. For the open front shed, windows are not needed. For closed structures, provide one square foot of glass area, or open doorways, per twenty square feet of floor area. For artificial lighting, provide at least one 100 watt bulb, or equal, for each 400 to 500 square feet of floor area.

Ventilation.

The warm manure pack keeps cows comfortable in cold weather. Temperatures not more than from 5 to 8 degrees above outside temperatures are desirable in order to reduce humidity and keep the bedding crisp and dry. Cows do better when sheltered in an open or thoroughly ventilated area provided drifting snow and cross drafts are controlled. Barns constructed with barn boards without battens provide well ventilated resting areas. All parts of all metal buildings must be at least as well ventilated. Tightly enclosed buildings of any material are to be avoided for loose housing. Barns open to the south or east are comparatively free of condensation unless of tight construction. Under such conditions provide louvered gable ends or ridge ventilators.

SECTION IV
THE PAVED BARNYARD

While a generous sized barn yard is desirable, there are a few weeks in the year when the cows can be kept cleaner if confined to the paved area. It is suggested that at least 100 square feet of paved barn lot area be provided for each cow and the minimum should not be less than 60 to 70 square feet and it should be arranged for access by power equipment for regular cleaning. The total lot area should be from 130 to 150 square feet per cow when feeding out of doors. Paved feeding areas are essential in humid regions if cows are to be kept clean.

Since continued use of the barn yard is necessary in all seasons, it should be surfaced with a suitable material which will permit cleaning of congested areas at any time except when frozen. Cows must be kept clean and this can be done only when accumulations of manure, wasted feed and water are regularly removed, and they must especially be removed at the time of the spring thaw. While concrete paving is generally considered best for the barn lot that is used in all seasons, other materials such as crushed rock have been used with varying degrees of success. This material may serve as a temporary treatment over which concrete paving may be eventually placed. All manure, mud and other organic material should be removed from the surface before any surfacing material is applied. All grading should be completed to allow for a coarse crushed limestone or coarse road bed gravel fill of 6 to 8 inches in thickness. After thorough wetting and rolling, a 2 inch to 4 inch layer of finer material may be placed, wet down and rolled or packed.

Concrete Paving.

When concrete paving is used, a 4 inch to 6 inch layer of sand, gravel or clean crushed rock will provide excellent support for the pavement and prevent heaving from frost action. Provisions should be made for thickening the pavement on all edges. A layer of good quality concrete 4 inches thick may be used if loadings are light in spring seasons. When laying concrete paving on silt loam or saturated clay soils without the above mentioned fill as a sub-base, a 5-½ inch thickness of concrete is suggested and where frost heaving is a problem, this slab should be reinforced with a 6 x 6 – No. 10 welded steel mesh.

Wind protection of the barn yard can often be obtained by properly locating the buildings. Tight board fences can be used to complete the protection. Good exposure to the south or east for sun is also essential.

Drainage.

Drainage of the paved barn lot is essential. A uniform slope of one inch in four feet is a minimum, and should lead away from the buildings and have an adequate outlet. An open, concrete-lined ditch, or curbs along the paved area to a grassed waterway outside the cow lot is advisable to prevent the formation of mud holes and gullies.

SECTION V
HOSPITAL, CALF AND YOUNG STOCK SHELTER

The loose housing system used for calves, young stock, dry cows and hospital facilities should be planned, located, constructed and operated in such a way that they will not interfere with, or detract from, the requirements and facilities for housing, feeding and milking the dairy herd. While cattle other than milking cows may be fed in their pens, the location of these pens and the cleaning of them should meet the same requirements set up for the resting area for the cows.

Hospital Section.

For the purpose of working the herd for blood testing, udder clipping or other necessary handling operations, enough stanchions for 10 per cent of the herd or a cattle chute with the necessary holding area and the gate arrangement should be provided. A convenient time to cut out cows needing attention is as they leave the milking room. If a gate can be swung across the exit lane to direct the cow into a covered holding pen equipped with stalls or stanchions, this operation can be most convenient.

In the section with the stalls it is convenient to also have one hospital pen for each 20 cows in the herd. However, gates can be used to enclose cow pens as required on the resting area. When these pens are to be used in cold weather it is best to have an active, warm manure pack in them. Young stock may be rotated in these pens early in the autumn and as much as required throughout the winter to build up manure packs in the cow pens and to keep them active so as to produce warmth.

When manure packs are allowed to build up in pens, the pens should be arranged for tractor fork cleaning. If steel stanchion equipment is used it should be set into a concrete curb from 12 inches to 18 inches above pen floor level. Before the pens become filled with a manure pack that approaches the top of the curb it should be cleaned out. This means that at least one side of the pen will have a removable panel for tractor fork cleaning and be accessible without removal of a major part of the manure in the resting area.

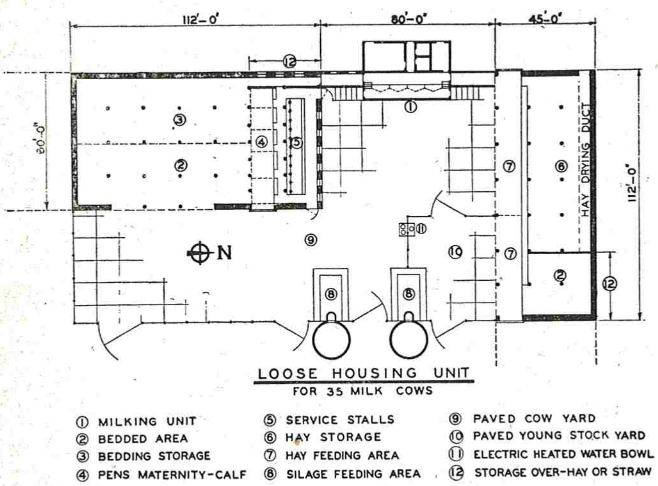
Calf Pens.

Calves have been born and successfully raised in open shelters. Hospital stalls and calf pens that have warm manure packs seem to be essential for the protection of the calf in cold weather and to insure rapid gains. When there are strong air currents within the area it will be advisable to use tight partitions for the sides of the pen not equipped with feeding manger. When a calf is not claimed by its dam at birth in cold weather, it may be advisable to move the calf into an unoccupied pen long enough for one or two heat lamps to warm and dry it.

Convenience in caring for calves is an important consideration. They may be located close to hospital stalls and milking room. Hay and bedding storage may often be conveniently located overhead. Ground feed storage should be ratproof, dry and convenient for filling and for use. Water may be supplied by use of frostproof water bowls, one for each two pens. The pens may be arranged with permanent stanchions, a concrete feed manger and concrete feed alley. However, since a deep manure pack is necessary for the comfort of the calves, the pens should be enclosed with partitions that can be lifted as the manure pack builds up. This may be accomplished by hanging on chains from above. These partitions should also be removable to permit complete removal of the manure pack by using the power loader on a tractor.

For the control of flies in the summer calf pens will need thorough cleaning every few days. A concrete floor will aid in the cleaning of the pens with a tractor loader and it will facilitate fly control.

The calf pen section should be well ventilated and lighted. South exposure is preferable. Frequent exercise in sunshine and fresh air may also prove advantageous.



This schematic layout of a 35 cow loose housing system is presented to aid the reader in interpreting the written text. The plan should be expanded to 75 or 100 cows if desired by increasing the length of the resting or bedded area and the hay storage unit.

SECTION VI

FLY CONTROL

The control of flies is a public health requirement. For loose housing, the complete removal of all manure accumulation before fly season is recommended and is usually required. Greatest benefit from manure is obtained in this way. Modern tractor operated equipment simplifies the entire operation so it can be readily fitted into the spring seasons work schedule.

If the resting area is used for summer shade, adequate bedding and frequent cleaning should be arranged to control cleanliness of cows and eliminate the breeding of flies. A summer entrance into the milking room should be provided for the paved yard in arrangements where the resting area is used for a winter holding area. Calf pens should receive twice a week cleaning in the summer for control of fly breeding. Older calves and young stock may be kept on pasture as an aid in fly control if creep fed concentrates, provided shelter in cold, damp weather and shade in hot weather.

OBSERVATIONS ON THE THERMAL INACTIVATION OF THE ORGANISM OF Q FEVER IN MILK.[1]

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Q Fever is an infectious disease of man. Cattle, sheep and goats, who for the most part suffer inapparent infections with the organism, are the important sources of infection for man. These animals shed the organism in their milk.

This manuscript reports on the cooperative studies designed to determine the times and temperatures needed to eliminate the causative rickettsiae, Coxiella burnetii, **from cows milk. It is reported that the present minimum standard of pasteurization by the vat method of 143° F. for 30 minutes is inadequate, but the temperature of 145° F. for 30 minutes will eliminate the organism. The pasteurization of milk according to the present standards for HTST equipment of 161° F. for 15 seconds seems adequate to destroy** C. burnetii.

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Q Fever is a rickettsial disease of man which may be acute or chronic in course and mild or severe in reaction. In the short time since the disease was first described by Derrick (*7*), the disease or the causative organism has been identified in many countries of the world (*5*). The etiological agent, *Coxiella burnetii* (Derrick) is found rather widely distributed in nature where it causes infection in many species of animals (*8*). In the majority of animals the infection is not associated with illness and it is not unusual to find an infected dairy cow one of the dairyman's better producers.

Investigation of various outbreaks of Q Fever in the United States has revealed that cows, sheep and goats are the important sources of infection for man (*2, 3, 17, 21*). The rickettsiae are shed in the milk of the infected animal (*4, 10, 12, 16*) and from other body orifices (*1, 14, 18, 22, 23*). Since *C. burnetii* may be found in great numbers in the milk of infected dairy cows, this food becomes one of the vehicles responsible for transmission of the organism from the infected cow to man. The organism is also found on dust and other particles in the environment of the infected animal and the smaller of these particles may become air-borne (*6*). Inhalation of these infected air-borne particles constitutes another means of exposing man to the organism.

The early studies of Q Fever in California revealed *C. burnetii* to be relatively more resistant to heat than other vegetative pathogens. Evidence of this characteristic was obtained with the isolation of the organism from milk pasteurized according to the recommended minimum standards (*11, 15*). This observation was confirmed in the laboratory together with indications that *C. burnetii* was also quite resistant to some of the more common disinfecting agents (*19*). The rickettsiae were shown to be in the butter and the buttermilk made from the unpasteurized milk of infected dairy cows and this butter was still infectious for guinea pigs 41 days after preparation (*13*).

Because of these findings and their implications to the public health, the Director of the California State Department of Public Health inquired as to the possibility of a study to determine the times and temperatures necessary in the pasteurization of milk to elimi-

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nate viable *C. burnetii.* Upon this basis a cooperative study was undertaken by the United States Public Health Service[4], the Dairy Industry Supply Association, The Milk Industry Foundation and the School of Veterinary Medicine of the University of California with the close support of the California State Departments of Agriculture and Public Health[5].

The study required better identification of the problem in the field, determination of the most suitable quantitative methods, laboratory thermal-resistance studies and application of the laboratory findings to commercial equipment and methods. The results of this study are published in detail (9). The purposes of this communication is to present some of the findings of this study of pertinent interest to the International Association together with some information obtained during the course of the study not included in the detailed report.

EXPERIMENTAL

Before a realistic thermal-resistance study could be conducted it was necessary to obtain answers to two fundamental questions.

The first of these questions concerned the maximum number of *C. burnetii* that might be found in the milk of an infected cow. To obtain information on this point the milk supplies of three communities were sampled; samples of milk were obtained from widely-separated areas of California; the milk of individual dairy cows within an infected dairy herd was tested at intervals during which time some of the animals calved; a dairy cow was infected and the number of rickettsiae in her milk determined; and information from investigators in other parts of the United States was obtained. It was necessary to establish this point because the heat necessary to eliminate the number of rickettsiae found in the placental fluids of an infected cow might result in objectionable flavors in the milk, while the temperature required to kill a lesser population might result in an unsafe product.

The second question concerned the evalution of several methods to ascertain the most sensitive and accurate procedure for determining the presence of small numbers of viable rickettsiae in a test sample. Since *C. burnetii* will not grow on artificial media and because it neither induces a constant symptomatology nor pathology in animals, the criterion for infection is the appearance of specific complement-fixing antibody in the serum of the experimental host. The question arose as to the possibility of the heat-killed rickettsiae also inducing the formation of specific antibody.

When the best answers to these questions were obtained a thermal-resistance study was conducted in the laboratory with the proper concentration of *C. burnetii* suspended in whole raw milk. This was followed by observations on the thermal-inactivation of the rickettsiae suspended in whole raw milk and subjected to different combinations of time and temperature in regular commercial heat exchangers installed in a complete modern pasteurization plant using standard procedures and controls[6].

Limitations of both time and space prevent the description and identification of the materials and methods used in this study. These are presented in detail elsewhere (9).

RESULTS

A total of 109 samples of the raw milk supply of three California cities was tested for the presence of *C. burnetii.* Each sample was obtained from the milk of a different producer except for one sample that was obtained from a tank truck that contained the milk from three large dairies. These samples were obtained at the plant upon delivery from the dairy farm and were composite samples of the milk from each farm. It was found that the milk from 1 of 5, 1 of 10 and 1 of 13 of the producers supplying the respective cities contained the organism of Q Fever. Of the 109 samples 8 or 7.3 per cent contained the organism in demonstrable numbers.

In a second survey 376 retail milk or cream samples were obtained from different areas of California. While each of these samples was from a different creamery and represents a composite from different producers, this should not be considered as a representative sampling of the milk supply of California – only as a large number of samples representing several geographical areas and many different breeds of dairy cattle. Of the 376 samples 14 raw and one pasteurized contained the organism of Q Fever. Titration of these positive samples revealed that two had 1000, six had 100, four had 10 and three had one infective guinea pig doses[7] per 2 ml. These composite samples indi-

[4]Participated in by the Communicable Disease Center; the Robert A. Taft Sanitary Engineering Center; The Milk and Food Program, Division of Sanitary Engineering Services; and the Division of Grants, National Institutes of Health.

[5]The cooperation and assistance of the personnel of all these agencies is gratefully acknowledged.

[6]The commercial equipment was made available through the kindness of the Dairy Industries Supply Association. The authors wish to express their deep appreciation for this courtesy.

[7]An infective guinea pig dose may be defined as the minimum number of *C. burnetii* required to infect a guinea pig by intraperitoneal inoculation. In this study these organisms were always contained in 2 ml. of inoculum. This unit of measurement of the concentration of rickettsiae, the infective dose, is composed of many individual organisms, but is treated as a unit mathematically.

cated no difference in the numbers of rickettsiae in the milk from different geographical areas of California.

The milk from 137 individual cows in a dairy herd known to be infected with *C. burnetii* was obtained. Eighteen of these 137 samples were found to contain the rickettsiae. Titration of these positive samples showed three contained 1000, five contained 100, five contained 10 and five contained one infective guinea pig dose per 2 ml. Serological evidence indicated that 12 of the 18 positive cows were infected at least 200 days prior to the sampling of their milk. The milk from four of these positive animals was collected 205 days later after each had calved. One of these was found to be shedding the same number of *C. burnetii* as previously. This animal's milk contained 1000 infective guinea pig doses per 2 ml. and serological evidence indicated that she had been infected at least 405 days prior to the collecting of this second sample of milk.

A lactating dairy cow was inoculated by way of the teat canal with the Henzerling strain of the organism. She was nursing two calves and presumably milked out each day. On the ninth day after inoculation a milk sample was taken, immediately diluted and inoculated into guinea pigs. This milk sample was found to contain 10,000 infective guinea pig doses per ml.

In the studies of other investigators, *C. burnetii* in concentrations of 10,000 infective guinea pig doses had been demonstrated in the milk of infected dairy cows.

Since *C. burnetii* in concentrations to be found in 1000 infective guinea pig doses had been found in milk samples that were composites of the milk of many individual cows, either all the animals in the infected herd from which the composite was derived were shedding the same number of organisms in their milk or a few individuals were shedding tremendous numbers. Investigation of the individual cows in an infected dairy herd revealed only 13.1 per cent of the animals were shedding these organism in their milk. Furthermore, since all dairy breeds were not tested, and some might secrete more organisms in their milk than others, it was deemed prudent to use a test population of 100,000 infective guinea pig doses in the thermal-resistance studies.

Four methods of determining the presence of small numbers of *C. burnetii* were compared. Each method was compared using both unheated and heated samples of milk containing the organism. Evaluation of the results of this experiment showed that two consecutive passages in guinea pigs was the most sensitive and specific test compared. Results using one passage in guinea pigs were influenced by the killed rickettsia contained in relatively high proportion in the heated samples.

In the thermal-resistance study conducted in the laboratory a population of *C. burnetii* represented by that number contained in 100,000 infective guinea pig doses was suspended in whole raw milk and subjected to various combinations of time and temperature. Well-controlled, experimentation was conducted through the temperature range from 141° F. to 151° F. The absence of good sampling devices prevented accurate observations in the temperature zone 153° F. to 163° F., with the extremely short time intervals necessary. While certain statistical considerations limit the reliability of extrapolation, this was done as the only method available of indicating the time-temperature relationships to be found in this higher temperature zone. The statistical treatment of the data, the use of a 2 *sigma* or 97.7 percent confidence interval added to the minimum time of destruction, and the relatively large population subjected to heat all tend towards minimizing the dangers of this extrapolation. Nevertheless, the time-temperature relationships expressed by the extrapolated regression line may be accepted as indications only for application to the data obtained in this higher temperature range with the high-temperature-short-time commercial pasteurization equipment.

In Table 1 the pertinent results of calculations from the data obtained in the laboratory study are presented. These are arranged according to certain selected temperatures and the time point on the LD_{50} percent, and the minimum time of destruction regression line intercepted by these temperatures. In addition, the intercept of the minimum time of destruction regression line plus a 2 *sigma* or 97.7 percent confidence level (as a margin of safety) is also listed for each temperature. The maximum times of survival and minimum times of destruction from which the regression lines were derived include the factor representing the lethal effect occuring during the heating-

TABLE 1 — TIMES AT PERTINENT TEMPERATURES ON THE REGRESSION LINES DERIVED FROM THE LABORATORY DATA.

Temp. °F.	50 percent endpoint	Minimum time of destruction	Minimum time of destruction plus 2 sigmas
143	29.39 min.	33.02 min.	46.03 min.
145	16.29 min.	18.31 min.	25.42 min.
160	11.7 sec.	13.2 sec.	20.4 sec
161	8.7 sec.	9.8 sec.	15.4 sec.
162	6.5 sec.	7.3 sec.	11.6 sec.

up and cooling-down periods expressed in equivalents of the times at the holding temperature.

In Graph I are presented the regression lines derived from the data obtained in the laboratory thermal-resistance study together with the presently recommended pasteurization line. There is also plotted on this graph the results of the study in which *C. burnetii* suspended in whole raw milk was subjected to different combinations of time and temperature in a commercial Vat-Type pasteurizer. The dots represent points of maximum survival while the circles represent the points of minimum destruction obtained with this type of equipment. The times are those at the holding temperature only.

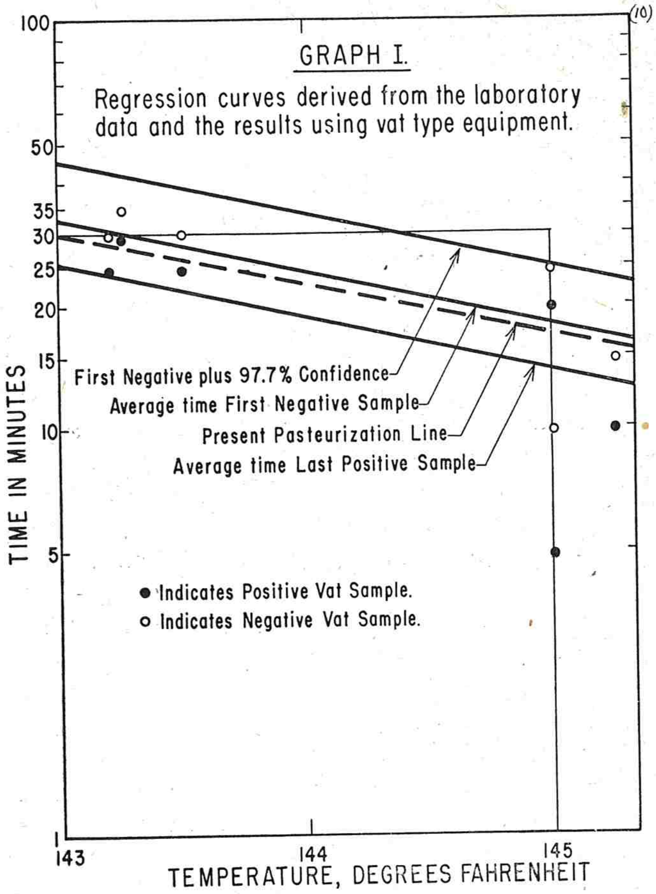
In Graph II are plotted the results obtained when the organism of Q Fever suspended in whole raw milk was subjected to heat in a commercial type high-temperature-short-time heat exchanger. In this study fifteen temperature points were studied in the range 155.5° F. to 163° F. For each temperature, the total time the organisms were subjected to heat (expressed in equivalents of the holding time) and the results of animal inoculation are plotted for samples obtained at the entrance to the holding tube, at the end of the holding tube and at the exit from the cooling section. The dots represent the presence of viable rickettsiae while the circles indicate no viable organisms could be demonstrated. In this way 45 samples were obtained.

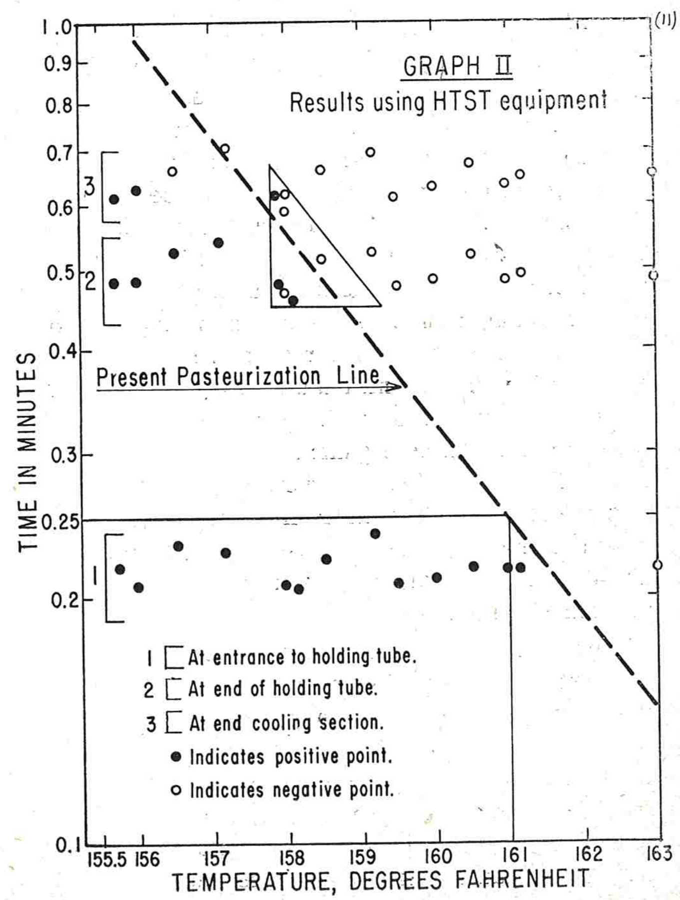
It should be pointed out that the concentration of organisms heated in the HTST equipment was considerably higher than that used in the laboratory studies. Populations of one to ten million infective guinea pig doses were used. This error in dilution of the 100 gallons of milk used in each trial was not discovered until the experiment was finished due to the length of time required for its determination. However the larger concentration of organisms may be considered as an additional safety factor.

DISCUSSION

The collection of milk samples from different areas of California revealed the presence of *C. burnetii* in many of the raw milk samples collected. The samples were either composites of the milk produced on one dairy or composites of the milk received from several producers by a creamery. Even though the samples represented milk from many animals some were found to contain the organism in concentrations represented by that number found in 1000 infective guinea pig doses. This indicates that all the animals whose milk contributed to the composite were secreting this number of organisms in their milk or some were shedding many more.

Investigation of the individual animals in a dairy herd in which the infection had been shown to be





present for at least 200 days showed only 13.1 percent of the animals shedding the organism in their milk. However, the milk of none of these animals contained over 1000 infective guinea pig doses of the organism in their milk. One infected animal in this herd was continuing to shed this number of organisms 205 days later and after a subsequent calving. The persistence of the infection is indicated by the fact that serological evidence showed this animal to be infected 405 days prior to the collection of this last sample of milk.

Information from other investigators and determination of the concentration of *C. burnetii* in the milk of a dairy cow infected by way of the teat canal demonstrated that the milk of an infected dairy animal could contain as many as 10,000 infective doses of the organism in her milk. Not all breeds of dairy cows were tested and some might be capable of shedding greater numbers of organisms in their milk. This factor could be of importance in the pasteurization of milk from some pure bred dairy herds. Other investigators had indicated the possibility that the greatest number of organisms would appear in the milk shortly after freshening. In the investigation of the individual animals in the infected dairy herd many different time intervals after parturition were encountered, but not all. For the above reasons it was thought safer for the purposes of the thermal-resistance studies to consider 100,000 infective guinea pig doses as representing the maximum number of *C. burnetii* to be found in the milk of dairy cows. Through an error in dilution that could not be discovered until after the experiment was concluded, because of the time required to determine the number of organisms at risk, the concentration of rickettsiae subjected to heat in the HT ST runs was in the neighborhood of 1 to 10 million infective guinea pig doses. This greater number of organisms can only be considered as increasing the margin of safety of these findings.

The results of the laboratory conducted thermal resistance studies are briefly outlined in Table 1. It may be seen that the present minimum standards recommended for the pasteurization of milk by the vat method will not kill *C. burnetii.* Elevating the temperature from 143° F. to 145° F. and maintaining the 30 minute hold interval results in the destruction of the number of *C. burnetii* apt to be found in cows milk. This time and temperature combination of 145° F. for 30 minutes offers more than the 97.7 percent confidence level as a margin of safety as indicated in Graph I. Application of the findings of the laboratory study to commercial vat type pasteurization equipment equipped with a spaceheater confirm these conclusions. It may be seen in Graph I that *C. burnetii* did survive at time and temperature combinations greater than those represented by the present pasteurization curve, but never at combinations greater than the regression line derived from the minimum time of destruction (first negative sample) points plus a two *sigma* or 97.7 percent confidence interval.

The points plotted on Graph II show the results of heating large numbers of *C. burnetii* suspended in whole raw milk in HTST pasteurization equipment. These points are presented in relation to the presently recommended pasteurization curve. Since extrapolation of the regression lines calculated from the data collected in the laboratory in a lower temperature range might be misleading these lines are not included in Graph II. Certain pertinent points of time and temperature on the extrapolated lines are presented in Table 1. The use of a 15 second holding time and a two degree temperature interval does not allow precise determination of either the maximum survival of the minimum destruction endpoints. It may be seen by examination of the 44 points on Graph II that only one maximum survival endpoint falls above the present pasteurization line, while two minimum time of destruction endpoints are below it. Further strength is given to the impression that the present pasteurization line approximates the thermal-inactivation of *C. burnetii* by consideration of the seven points located within the triangle on Graph II. Here there are positive and negative points within a 0.5° F. and 0.12 minute range. This relatively narrow range straddles the present pasteurization line, but is well below the minimum destruction plus the 97.7 confidence interval regression line extrapolated from the laboratory data.

The data obtained with the HTST equipment include the total heat treatment of the organism. However, it must be kept in mind that in practice the only time controlled is that in the holding tube. The interpretation of the data must be qualified by these facts and presented with reservations as conditions under which different heat-exchangers in the hands of different operators will vary. These variations will influence the lethal effect in the heat-up and cool-down periods. However if the 15 second interval in the holding tube is strictly adhered to and if the regression line derived from the laboratory data which intercepts 161° F. at 15.4 seconds is accepted it is highly improbable that the total equivalent heat treatment will fall below this time-temperature combination. Furthermore, the number of safety factors and the use of a concentration of organisms 100 to 1000 times greater than the maximum concentration demonstrated in the milk of infected dairy cows still further reduces the probability of *C. burnetii* surving HTST pasteurization at the minimum recommended standards when suspended in whole raw milk.

Phosphatase tests run by the method of Sanders and

Sager (*20*) were run on 36 of the 44 samples obtained in this experiment. None of the samples collected from the end of the holding tube at temperatures above 158° F. were positive. This again emphasizes the important point that phosphatase positive milk indicates greatly inadequate heat treatment, but phosphatase negative milk does not mean that the milk was pasteurized according to the minimum recommended standards for HTST equipment.

SUMMARY

Observations relating the number of organisms apt to be found in the milk of infected cows to the population of *C. burnetii* to place at risk in studies of the effectiveness of pasteurization of milk from cows infected with this rickettsiae have been presented.

Results using the vat type pasteurization equipment support the findings of the laboratory study that 143° F. for 30 minutes is wholly inadequate to eliminate viable *C. burnetii* from whole raw milk, while heating for the same time at 145° F. insures elimination of these organisms with a high level of confidence.

The observations using HTST pasteurization equipment tend to confirm the extrapolated regression line derived from the laboratory data and strongly support the presently recommended standard of pasteurization of 161° F. for 15 seconds as adequate to eliminate viable *C. burnetii* from whole raw milk.

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RAPID CALCULATION OF LOGARITHMIC AVERAGE BACTERIAL COUNTS OF MILK

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Determination of logarithmic averages of bacterial counts is a necessary and laborious task in grading raw and pasteurized milk. As the plate count determination replaces the methylene blue test for the ever increasing number of bulk milk producers, the problem becomes greater. A slide rule type of device has been developed that may materially simplify this task. This method is explained with information relative to its principle, application, accuracy, and advantages.

John C. Schilling received the B. S. Ch. E. degree from the Missouri School of Mines in 1943. He served in World War II after graduation, and was employed by the St. Louis Health Division as a Public Health Engineer in 1946. After varied experience in sanitation, industrial hygiene and rodent control work, he was assigned to his present position of Dairy Plant Engineer in the Milk Control Section. He has held this position since 1951.

The administration of a milk control program which is based on the Public Health Service's Standard Milk Ordinance entails the routine computation of large numbers of logarithmic averages. Under the ordinance the bacterial quality is judged on the *logarithmic average* of the bacterial counts of the four most recent samples of the milk or milk product from the supply in question.

The use of logarithmic, rather than arithmetic, averages creates a clerical difficulty which can be serious at times. The calculation of the logarithmic averages is a procedure which does not readily lend itself to simplification or short cuts, and the usual office machines are of limited value in speeding up the procedure. The Public Health Service Code does suggest one method using a calculator, but this method requires constant reference to a table of fourth roots. It offers little advantage over the conventional method.

A new technique for rapidly determining logarithmic averages has been devised. The method is actually an application of the slide rule principle to the problem. It has been used for a period of several months on bacterial counts of pasteurized milk and raw bulk milk and has saved time, without sacrificing accuracy.

THE NEW TECHNIQUE

This new method takes advantage of the fact that four samples are averaged in all cases. As can be seen in Figure 1, the method uses a special slide rule which has two scales; both are logarithmic. The larger scale has a cycle of 12 inches and is stationary, the smaller scale has a cycle of three inches and is movable.

In using the new slide-rule method of computation it is necessary that the first logarithmic average be established in the usual manner. As will be seen later, full efficiency of the slide rule will be achieved only if samples are recorded by plant, by product and by date. Once the initial average is established subsequent logarithmic averages are found without further reference to logarithmic tables and without any mathematical computations whatever. The operation of the slide rule proceeds as follows.

THE SLIDE-RULE TECHNIQUE IN OPERATION

The large stationary scale is used for the logarithmic *average* bacterial count; the smaller movable scale is for the *individual* count. First, locate the current logarithmic average on the large scale; opposite this, on the small scale, place the bacterial count of the oldest sample (the one being dropped) which contributed to that average. Then find on the small scale, the bacterial count of the newly reported sample; the new logarithmic average will be found directly opposite this on the large scale. By thus setting the value of the oldest sample opposite the current average, the new average will be found opposite the new sample. Only one setting of the scale is required for the whole operation.

A series of actual bacterial counts is shown in Table 1 and both procedures analyzed. In calculating these counts by the conventional method when Sample E is reported, the logarithm of 22,000 (4.34) must be added to the logarithms of the three previous bacterial counts. The same result may be obtained by starting with the total of the logarithms of the four previous samples (15.60), subtracting from it the logarithm of 3,000 (3.48), and adding the logarithm of 22,000 (4.34). The result (16.46) is the same as obtained by adding the logarithms of Samples B, C, D, and E. Actually, this subtracting and adding is the basic principle involved in the operation of the slide rule device. Figure 1 shows the setting for calculation of the above example. The bacterial count of the individual Sample A (3,000) on the small scale is set opposite the logarithmic average bacterial count of the previous four samples (8,000) on the large scale. The logarithmic division of the scales and the four-to-one relationship between the scales results in subtracting the logarithm of 3,000 from four times the logarithm of 8,000 or from the total logarithm of the four samples whose logarithmic average is 8,000. The slide rule automatically adds the logarithm of 22,000 (4.34) without resetting the scales and the new logarithmic average (13,000) is shown on the large scale opposite the value (22,000) on the small scale.

Efficient use of the device requires the arrangement of data as indicated previously in Table 1. All four bacterial counts contributing to the expiring average must be readily observed; otherwise, the time saved by rapid calculation will be dissipated in a search for the oldest sample contributing to the current average. For this reason it is advisable that the official record of the laboratory results list the samples chronologically by plant and by product. An incidental advantage gained from the keeping of records in this manner is the fact that this grouping facilitates the calculation of the average temperature, since the last four temperatures will also be grouped together.

PRACTICALITY AND APPLICATION

To determine the practical value of this new method of calculation, a simple time study was made to compare both methods. On the average, the slide rule reduced by over 50 per cent the time required between the recording of the initial data from the laboratory report and the final recording of the new logarithmic average. With the slide rule method it was noted that most of the time was spent writing in the record

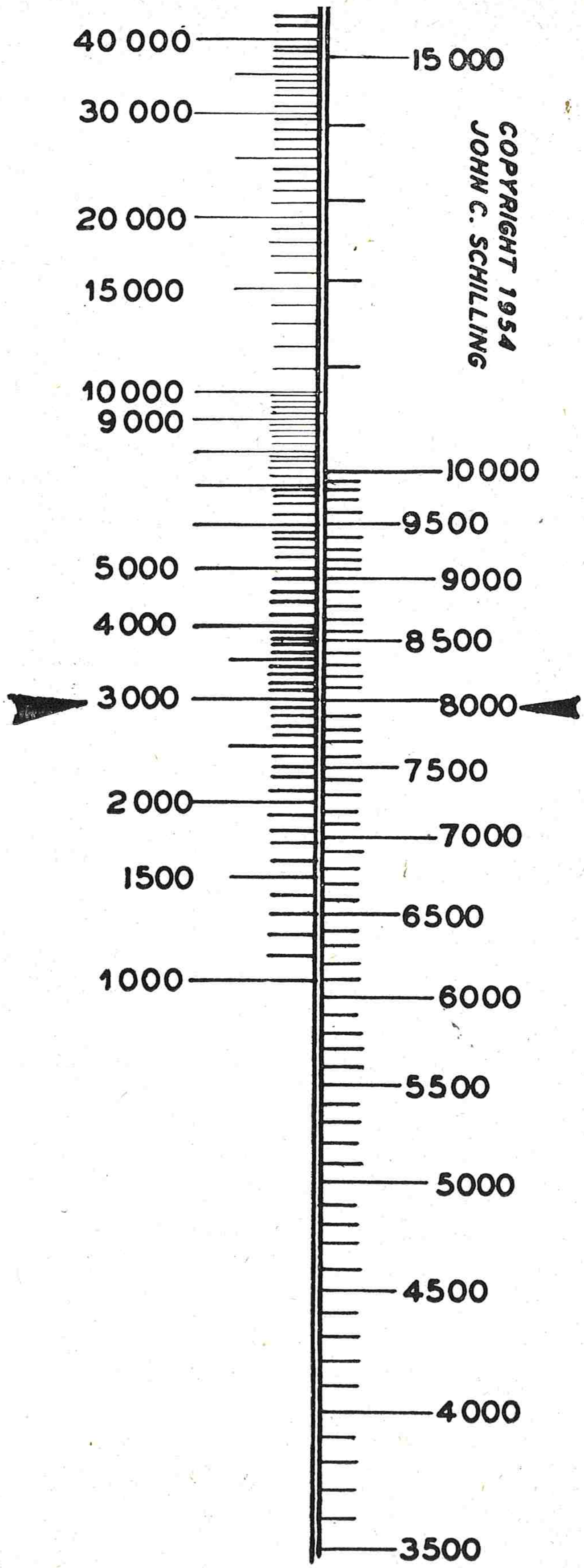

Figure 1. A portion of the calculating device showing specific setting for determining log. average count of results shown in Table 1. The full scales are extended to the limits described in the text. (Anyone interested in obtaining this device should communicate with the author – *Editor*).

TABLE 1 – HYPOTHETICAL RESULTS FOR CALCULATION OF LOGARITHMIC AVERAGE BACTERIAL COUNT.

Sample	Bacterial count	Loga-rithm	Total last 4 logarithms	Average logarithm	Logarithm average bacterial count
A	3,000	3.48	–	–	–
B	6,000	3.78	–	–	–
C	11,000	4.04	–	–	–
D	20,000	4.30	15.60	3.90	8,000
E	22,000	4.34	16.46	4.12	13,000

book; with the conventional method of calculation, more time was used in referring to tables and in figuring. Obviously the amount of time required for writing in the record is the same regardless of the method of calculation used.

To be sure, there was some hesitancy on the part of clerical personnel in accepting the strange, rather mysterious new method – and some reluctance to trust the results obtained by the device. However, once the clerical people agreed to try it they very quickly developed a high degree of proficiency in its use.

SCOPE AND EASE OF OPERATION

It may seem that the device has been made unduly large. The large stationary scale has been devised to include logarithmic average counts from 3,000 to 750,000; this necessitates that the large scale be 29 inches long. The small sliding scale will accommodate individual samples with bacterial counts from 1,000 to 10,000,000; thus it is 12 inches long. The range and the length of the cycle of the large scale governs the size of the device. This particular range was selected primarily to facilitate the calculation of logarithmic averages for products whose standards range from 30,000 in the case of Grade A pasteurized milk, to 400,000 in the case of Grade A raw milk for pasteurization after dumping and before pasteurization. The choice of 3,000 as the lower limit on the logarithmic average scale is obvious since lower bacterial counts are normally reported simply as "less than 3,000". The scale was arbitrarily extended to 750,000 to accommodate calculations where the logarithmic average might exceed the requirement while conditions requiring degrading or permit revocation do not exist. The latest edition (1953) of the Public Health Service Recommended Milk Ordinance and Code makes the 400,000 maximum bacterial count on Grade A raw milk after dumping and prior to pasteurization an individual sample requirement, and consequently does not require the calculation of logarithmic averages on samples of this type. In light of this change, it would probably be satisfactory to make the upper limit of the large scale somewhere near 350,000. This would shorten the device by four inches.

In some situations the device may even be lengthened. It might be necessary for milk less than Grade A; where samples of raw cream are routinely tested; or where it is the practice to count individual organisms, rather than clumps, when samples are examined by the direct microscopic method.

It would be inadvisable to reduce the size of the slide rule by reducing the length of the logarithmic cycles. Thus, if the large scale had a cycle of 6 inches with the smaller scale having a cycle of 1½ inches, the overall length would be cut in half. Such a proportional reduction, however, would make accurate reading of the scales difficult in many instances. This is particular evident on parts of the small scale where a difference of two in the second digit from the left is represented by a distance of only 1/32 inch. Experience has shown that although this instrument is approximately three feet long, it is not cumbersome to manipulate. It is supported on six half-inch rubber pads and can be operated with one hand.

COMPARATIVE ACCURACY

The accuracy of this new method has been found very satisfactory. It is reasonable to believe, and has been shown so far, that errors due to the human element are less likely to occur in this method. Accuracy is actually increased by this method on calculations involving individual counts and/or logarithmic average counts below 10,000. This is because counts reported by the laboratory with a second significant figure from the left, such as 3,400 or 9,700, can be used as such on this device. In using the conventional method, logarithms of the closest thousand were used in such cases. Although more complete logarithm tables can be used, the logarithmic tables given in the various editions of the Public Health Service Recommended Milk Ordinance and Code give logarithms of only every thousand under 10,000. Greater accuracy is also achieved in the conversion of an average logarithm to a logarithmic average count under 10,000.

DIFFICULTIES AND DISADVANTAGES

The method has some minor disadvantages. Any error made in calculating a logarithmic average will be perpetuated because the existing logarithmic average count is always used to calculate the new logarithmic average. Such an error, however, can be rectified by arithmetic check or it may be obvious under certain conditions which are likely to develop. For instance, four consecutive counts of 7,000, 9,000, 8,000, and 9,000 couldn't produce a logarithmic average of 9,500 because none of the individual counts is over 9,000.

Another difficulty is encountered when more than one sample of a product is taken on the same day. In this case, it is necessary to calculate the *daily* logarithmic average count from conventional logarithm tables before using the device. In our particular situation more than one sample of the same product is not taken in most instances. Where more than one daily sample is taken, the procedure recommended by the Public Health Service Milk Ordinance and Code (1953) is followed.

REPORT OF THE COMMITTEE ON RECOGNITION AND AWARDS — 1956[1]

Two awards for distinguished service – *The Citation Award* and *The Sanitarians Award* –are presented annually by the INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, INC. It is the responsibility of the Committee on Recognition and Awards to conduct those activities of this Association concerned with selection of the recipients, presentation of the awards, publicity, and related matters.

The purpose of *The Citation Award,* which was formally established in 1952, is to bestow well-deserved recognition upon members of this Association who, through long and distinguished service, have contributed greatly to the professional advancement, growth, and reputation of the International Association of Milk and Food Sanitarians, Inc. The rules for this Award state that a suitably framed citation shall be presented each year to the member whose past services have been judged to be the most outstanding.

Any member of the Association, or an Affiliate Association, may nominate an individual for *The Citation Award.* Such nomination must be accompanied by a statement listing the individual's past contributions and services to the Association, and it must be mailed prior to April 15 if the candidate is to receive consideration for the current year's award. All nominations are reviewed and rated by the Committee on Recognition and Awards, and the names of the two candidates rated the highest are then submitted to the Executive Board who selects the recipient. This year five nominations were received by the Committee. Dr. Kenneth G. Weckel, whose services to this Association have been so outstanding, was selected as the recipneit of *The Citation Award* for 1956. It was presented to him at the annual meeting banquet.

[1]Presented at the 43rd Annual Meeting of the International Association of Milk and Food Sanitarians, Inc., Seattle, Washington, Sept. 5-7, 1956.

The second of these two awards, *The Sanitarians Award,* is in the opinion of the Committee, one of the most important honors that can be conferred upon a professional public health worker. It was created for the purpose of bestowing long overdue recognition upon the local sanitarian – the man whose contributions to public health have been so great. *The Sanitarians Award* is sponsored jointly by five manufactures of sanitation chemicals, the Diversey Corporation, Klenzade Products, Inc., Oakite Products, Inc., Pennsylvania Salt Manufacturing Company, and the Olin Mathieson Chemical Corporation, and is administered by our Association. It consists of a framed citation and one thousand dollars in cash, and is conferred annually upon a local sanitarian from the United States or Canada who within the past five years has made a meritorious contribution in the field of milk and food sanitation to the public health and welfare of his community.

The rules governing the eligibility of candidates for *The Sanitarians Award,* method of nomination and method of selection, are published each year in the December or January issue of the *Journal of Milk and Food Technology.* The Committee on Recognition and Awards has sole responsibility of the selection of the recipient, and the Executive Board has no voice in the selection. This year eight nominations for *The Sanitarians Award* were received by the Committee. All of the nominees were outstanding men, and had made significant contributions to the health and welfare of their communities. Selection of the recipient from among these men was a difficult task, however, the Committee judged the over-all contributions of Mr. John H. Fritz, Chief of the Milk and Food Section, Division of Public Health Engineering, Kansas City, Missouri, Health Department, to be the most outstanding and he was selected as the recipient of *The Sanitarians Award* for 1956.

Last year, in its report, this Committee called attention to (a) the need for Affiliate Associations establishing their own committee on awards to consider the nomination of well qualified sanitarians from within their own States for both *The Sanitarians Award* and *The Citation Award;* (b) the desirability of utilizing a nomination form which would enable the sponsors of candidates to specifically set forth the work and accomplishments of the nominees in a uniform manner; and (c) the need for clarifying the instructions as to the procedure to be followed in submitting nominations.

The 1956 Committee took action on each of these recommendations. On December 20, 1955, a letter was sent to the Secretary of each Affiliate Association recommending that a committee on recognition and awards be established by the Affiliate for the purpose of nominating local sanitarians, whose work and accomplishments were considered outstanding. The Committee, with the assistance of Mr. Harold Barnum, Dr. Kenneth G. Weckel, and Dr. John Sheuring, prepared a new nomination form which was used this year for the first time and which, in the opinion of the Committee members, proved quite satisfactory.

The Committee also reviewed the instructions pertaining to *The Sanitarians Award* and clarified all points on which questions had been raised. The principal question related to the rule which specifies that State and Federal employees are not eligible for the Award. This had been interpreted as ruling ineligible sanitarians who, although employed at the local level, were paid in whole or in part from State funds. After the Committee had discussed this question with the sponsors of *The Sanitarians Award,* at a meeting held in Seattle on Sept. 6, the ExecutiveBoard agreed upon the following change in the wording of the rules concerning the eligibility of candidates. "Employees of State or Federal agencies and of industry are not eligible for the Award. However, this shall not be interpreted as affecting the eligibility of a local sanitarian whose salary or travel expenses are supported in whole or in part by State or Federal funds; provided that such sanitarian's work is under the full-time direction of a local health department, and no part of the work of the sanitarian is subject to State or Federal direction."

The Committee also reviewed the rules and procedures governing *The Citation Award* and recommended that the Committee rather than the Executive Board select the recipient. This proposed change in the rule was approved by the Executive Board at the Seattle meeting.

Finally, the Committee desires to report that the organization and structure of the Committee on Recognition and Awards was modified this year by President Adams, with the advice of the Executive Board, in order to provide continuity from one year's Committee to the next. The Committee now consists of six members – the immediate two Past-Presidents, and four members selected at large. The tenure of appointment for all members is now two years, and their terms are staggered so that one-half of the members are replaced each year. The Senior Past-President serves as Chairman of the Committee and votes only in the event that it is necessary to break a tie.

Respectfully submitted:

John D. Faulkner, Chairman, Bethesda, Maryland.

William F. Hickey, Rocky Mountain Association of Milk and Food Sanitarians.

John H. McCutchen, Missouri Association of Milk and Food Sanitarians.

Ivan E. Parkin, Pennsylvanian Dairy Sanitarians Association.

Hubert Shull, Sanitation Section, Texas Public Health Association.

George H. Steele, Minnesota Milk Sanitarians Association.

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NEWS AND EVENTS

CONNECTICUT ESTABLISHES SCHOLARSHIPS

A few years ago "Red" Thomasson outlined the need and the value of getting the information and story concerning the milk and food sanitarians into our elementary schools. Our first move in that direction was to furnish subscriptions to the *Journal* in all of our high schools where vocational agriculture was taught. More recently we have increased these subscriptions to include all high schools in this state where a specialist in student guidance is employed.

For many years we have studied the possibility of establishing an annual scholarship. More recently we have received donations from any interested parties, and particularly from industries, to subsidize prizes which were offered at our annual outings. In watching the trend of such a project, it was obvious that a majority disliked being bored with the distribution of prizes for one and one-half to two and one-half hours after the outing banquet, and we reduced the number of prizes to those for sporting events, and a very very few door prizes of higher cost and value than had been previously distributed. The outings became more popular and a surplus began to build up in our prize account. We suggested to industry that we would like to be somewhat frugal in the issuance of prizes and to build up a surplus which could be used to subsidize scholarships.

In four years this special scholarship fund has reach $1,500, and on September 28, 1956, our Board of Governors voted to continue to expand the distribution of the *Journal of Milk and Food Technology* in our high schools, to award $300 annually in scholarship funds, to establish three $100 annual scholarships for freshmen at the University of Connecticut, who intend to major in dairy manufacturing and/or dairy and food sanitation. Such scholarships shall be awarded by the Scholarship Committee at the University of Connecticut, preferably to boys or girls from Connecticut.

In designating college freshmen to receive these scholarships, it is apparent that we have not followed the most common practice of awarding the scholarships to juniors or seniors who have fully designated their major subjects. It was the consensus of the Board of Governors that we should continue with the distribution of the *Journal,* and endeavor to so build up and perpetuate those contacts with young men and women with the hope that some would eventually seek careers in the dairy and food industry.

CITATION AWARDS IN CONNECTICUT

Following the custom of the International, our Connecticut Association in 1952 followed a similar practice of citing a member for outstanding achievements and unusual contributions to our local organization. The first such honor was bestowed on Dr. Ira V. Hiscock, Director of Public Health Education at Yale University, President of the International in 1928, a charter member of our Connecticut Association in 1926, and an ardent supporter and worker down through the years.

In 1953, Dr. Friend Lee Mickle received an award. He had for many years been active in the International, and some of the time was Chairman of the Committee on Frozen Desserts, and had contributed greatly to Connecticut's organization.

In 1954, the honor went to the long time Secretary — H. Clifford Goslee.

In 1955, Professor E. O. Anderson of the University of Connecticut was honored. He had done an outstanding job in dairy manufacturing, and was a great help to the programs of our organization for a long period.

This year, the Association honored Curtis W. Chaffee, who has been Treasurer and right arm for the Secretary for many years.

RECIPIENTS OF DOOR PRIZES AT ANNUAL MEETING

As customary at past Annual Meetings, door prizes were given at the beginning of each of the convention sessions. Those holding the lucky numbers, their prizes and the donors of the prizes are listed below.

R. B. Parker, Carnation Co., San Francisco, Calif.; one years subscription to "Arizona Highways", donated by Arizona Association.

Dr. J. C. Flake, Evaporated Milk Association, Chicago, Ill.; serving tray, donated by California Association.

Harry Reed, Seattle Health Dept., Seattle, Wash.; chenille bedspread, donated by Georgia Association.

Dr. H. H. Wilkowske, University of Florida, Gainesville, Fla.; chest of native cheeses, donated by Idaho Association.

David Cleveland, Oklahoma City, Okla.; fishing lure assortment, donated by Indiana Association.

Walter Zobrist, Seattle Health Dept., Seattle, Wash.; travel alarm clock, donated by Michigan Association.

Louis E. Smith, Louisville, Ky.; ten pounds of Kansas City steak, donated by Missouri Association.

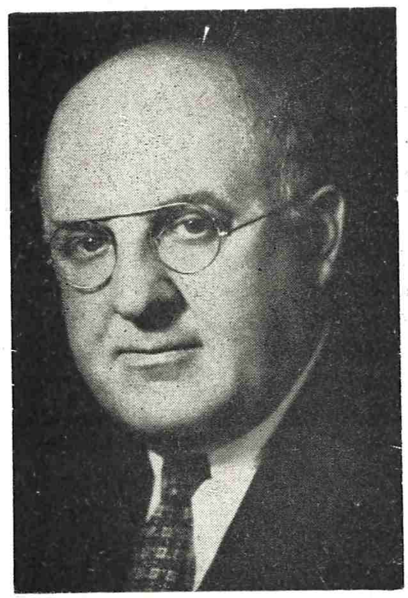
Sid Suckling, Carnation Co., Seattle, Wash.; Myrtlewood lamp, donated by Oregon Association.

Alvin Ferre, Ogden, Utah; gold tie clasp and cuff links, donated by Rhode Island Association.

C. A. Abele, Diversey Corp., Chicago, Ill.; Black Hills gold cuff links, donated by South Dakota Association.

Bob Cheek, Diversey Corp., Seattle, Wash.; Smithfield ham, Virginia Association.

Clayton Gustafson, Wash. State Dept. Agric., Vancouver, Wash.; cranberry delicacies, donated by Wisconsin Association.



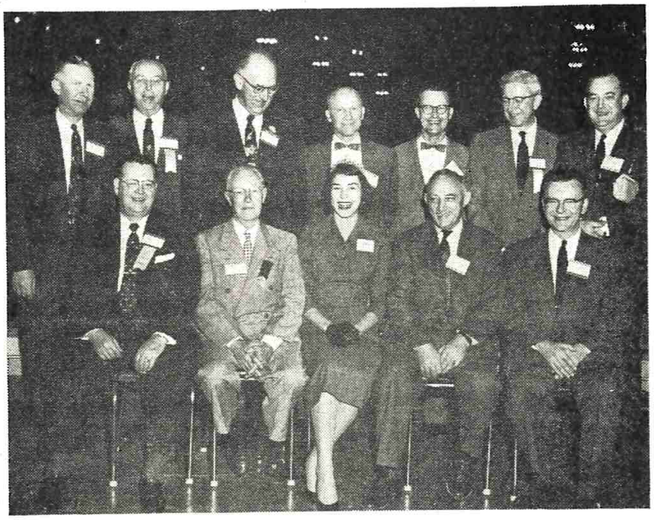
DR. GEORGE WEBSTER GRIM

Dr. George W. Grim, Milk Control Officer of Lower Merion Township and of District No. 1, comprising four local municipalities (Lansdowne, Aldan and Narberth) died at his residence in Merion Monday evening, October 15th at age 63. Since 1922 Dr. Grim had been a leader in the sanitation of milk and dairy products and had become one of the leading authorities on the inspection of dairy machinery and transportation facilities for milk. Surviving him is his wife Catherine Grim and a son William Grim of Ithan.

Born in Doylestown, Pa. Dr. Grim attended Friends Central School and the University of Pennsylvania, School of Veterinary Medicine, class of 1916. He was always known as an ardent fisherman and maintained a cottage at Seaside Park, N.J.

During World War I Dr. Grim was a Captain in the U.S. Army Veterinary Corps, serving in Europe. He was formerly Chief Veterinarian for the Walker Gordon Laboratory Co. in New Jersey.

He was Chairman of the Public Health Committee, Pennsylvania State Veterinary Medical Association; member of the Veterinary Public Health Advisory Committee, Pennsylvania Department of Health; Past President of the International Association of Milk and Food Sanitarians; member of the Central Atlantic States Association, Dairy Food and Drug Officials; member of the Pennsylvania Milk Sanitarians and a Fellow of the American Public Health Association. He was also a former Secretary of the Section on Food and Nutrition and served on various committees in the American Public Health Association, the American Veterinary Medical Association, International Association of Milk and Food Sanitarians and Committees of various other organizations. He was the author of publications relating to Dairy and Food Sanitation, Veterinary Public Health and originator of sanitary standards and specifications for material and design of milk and food handling equipment adopted and now widely used by the dairy and food industry.



3-A SANITARY STANDARDS PROGRAM SALUTED AT EXPOSITION

Gathered on the platform for ceremonies dedicating "3-A Sanitary Standards Day," November 1, at the 20th Dairy Exposition in Convention Hall, Atlantic City, N.J., are these active participants in 3-A work and America's Dairy Princess. In the front row, left to right, are Emil Howe, Waukesha Foundry Company; C. A. Abele, secretary of the 3-A Symbol Council; Miss Shari Lewis, America's Dairy Princess and Official Hostess of the Exposition; Paul Corash, president of International Association of Milk and Food Sanitarians, principal speaker of the day; and G. H. Tellier, Cherry-Burrell Corporation. Left to right in the back row are H. L. Solie, General Dairy Equipment Company; S. E. Crofts, Batavia Body Company, Incorporated, DISA president; A. E. Nessler, Sanitary Standards Subcommittee, Dairy Industry Committee; Dr. John L. Barnhart, DISA Technical Director; H. E. Thompson, U. S. Public Health Service; T. A. Burress; The Heil Co.; and John D. Faulkner, USPHS. The 3-A program develops standards of sanitary design and performance for dairy equipment.

DAIRY INDUSTRIES EXPOSITION FILLS SEVEN ACRES IN ATLANTIC CITY CONVENTION HALL

A Panoramic view of the Broadwalk Level at Atlantic City's Convention Hall during the 20th Dairy Industries Exposition, October 29 – November 3, shows a part of the seven acres of exhibits which filled three levels of the Hall. Nearly 400 supply and equipment firms, members of the biennial show's sponsoring organization, Dairy Industries Supply Association, displayed latest industry developments during the week of the Exposition and concurrent Atlantic City Conventions of major dairy groups. A total of 24,000 dairy processors, regulatory officials, sanitarians, educators and students attended the exposition.

3-A STANDARDS HAILED IN SPECIAL CEREMONIES AT DAIRY EXPOSITION

Referring to the 3-A Sanitary Standards for Dairy Equipment program as one which has "set a new pattern of industrial and political democracy", Paul Corash, President of International Association of Milk and Food Sanitarians, dedicated Thursday, November 1, as "3-A Sanitary Standards Day" at the 20th Dairy Industries Exposition in Atlantic City.

The 3-A program is a voluntary effort, by sanitarians, Public Health Service officials, dairy processors and dairy equipment manufacturers, to set nationally acceptable standards of sanitary performance and design in dairy equipment.

Mr. Corash, who is Chief of the Milk Division of the New York City Department of Health, noted the recent formation of the 3-A Symbol Council which authorizes manufacturers to use the 3-A symbol on conforming equipment by remarking, "For the first time in the history of the Dairy Industries Exposition, you can observe the proudly-displayed 3-A Symbol on various types of equipment, indicating that they have been built to meet a rigid but fair standard. The user can purchase it with a fair assurance of acceptance by the sanitarian since the latter knows that his colleagues have had a voice in determining the specifications of its construction."

The complete text of Mr. Corash's remarks follows:

Members of the Dairy Industry and friends.

The associations convening in Atlantic City this week have seen fit to dedicate this fourth day of the Dairy Industry Exposition as 3-A Sanitary Standards Day and I am extremely happy to take part in this brief ceremony as President of the International Association of Milk and Food Sanitarians, Inc., one of the three component groups which is instrumental in the formulation of 3-A Sanitary Standards for Dairy Equipment.

The situation with respect to the acceptability of dairy processing equipment prior to the formation of the 3-A organization was confusing, irrating and frequently conducive to waste. A great deal of equipment was built to satisfy the demands of a particular area and some things which were considered acceptable in one jurisdiction were rejected in another. Much equipment was custom built and manufacturers were hampered in trying to apply assembly line methods.

In 1944, industry leaders organized a group known as the Dairy Industry Committee which got together with the United States Public Health Service and the International Association of Milk Sanitarians and together these groups worked out the details of the 3-A concept. This may truly be regarded to have opened up a new frontier, since other groups in the food field have adopted the basic principles for their particular industries. We have reference here to the Baking Industry Sanitary Standards group, the National Sanitation Foundation and others.

The standards which have been adopted to date may truthfully be said to reflect the best thinking of all segments of the dairy industry. Committee members are chosen from all over the country to reflect different geographic considerations and although it is frequently necessary to reconcile different points of view by compromise, the end product is usually a workable standard of wide national acceptability.

While the development of equipment standards is of necessity a slow process, much progress has been made as can be seen from the hundreds of superb examples on the Exhibition Floor. For the first time in the history of the Dairy Industry Exposition, you can observe the proudly displayed 3-A Symbol on various types of equipment indicating that they have been built to meet a rigid but fair standard. The user can purchase it with a fair assurance of acceptance by the sanitarian since the latter knows that his colleagues have had a voice in determining the specifications of its construction. Even where standards have not yet been developed, the manufacturer knows enough about the thinking of the sanitarian to incorporate basic sanitary features and he builds these ideas into such equipment by way of anticipation.

New developments are rapidly coming to the fore in the dairy industry. The rapid spread in the use of farm holding tanks and mechanical cleaning of equipment are merely forerunners of things to come. New techniques developed by other industries will soon be finding application in the dairy industry. Among the foreseeable ones may be pictured more sensitive processing controls, milk rendered safe by radioactive application, heat treatment without the loss or change of flavor, greater use of the principles of automation and many other features.

The 3-A Committee may be depended upon to keep alert to the most pressing equipment needs of the industry and will be ready to establish standards for any new equipment or any new processes which appear to have significance to the industry.

The 3-A idea represents a partnership in progress and the various component members feel with pride that they have helped set a new pattern of industrial and political democracy by cooperatively working out principles and procedures which serve the public, the processor and the equipment manufacturer equitably.

3-A COMMITTEES SCHEDULE EXCELSIOR SPRINGS MEET; FULL AGENDA ANNOUNCED

A regular semi-annual meeting of the 3-A Sanitary Standards Committees will be held December 11-13 at the Elms Hotel, Excelsior Springs, Missouri, a suburb of Kansas City, Missouri.

These are the committees which evolve 3-A Sanitary Standards for dairy equipment. They are composed of representatives of the United States Public Health Service, International Association of Milk and Food Sanitarians, and Dairy Industry Committee.

The following agenda for the sessions has been announced:

Tuesday, December 11 – (1) Batch pasteurizers; (2) Coin operated bulk milk vendors.

Wednesday, December 12 – (1) Separators and clarifiers; (2) Fillers and sealers for paper containers; (3) Farm holding tanks; (4) Ice cream freezers.

Thursday, December 13 – (1) Reports of various

Committees and new and/or unfinished business.

An attendance of more than a hundred sanitarians, federal officials, and dairy processors and dairy equipment engineers is expected for the sessions.

JOHN MARSHALL APPOINTED SECRETARY OF BEVERAGE MACHINERY MANUFACTURERS ASSOCIATON, INC.

Mr. H. H. Nussbaum, President of the Beverage Machinery Manufacturers Association, Inc., announces the appointment of John Marshall as Secretary, effective as of October 15th, 1956, with offices located in Suite 301, 1012 Fourteenth St., N.W., Washington 5, D.C. He succeeds J. R. Pat Gorman who is now Secretary-Treasurer of the Crown Manufacturers Institute, Inc.

Mr. Marshall is a graduate of Cornell University, B.S., M.S. in Agricultural Economics and Marketing. He served as an Agricultural Economist with the Federal Government and later as a Milk Marketing Specialist with the State of California. In 1934 Mr. Marshall became the Executive Secretary of the San Francisco Milk Dealers Association and in 1940 was appointed Milk Marketing Economist for the State of California. In 1948 the New York City Milk Dealers Association called him to New York to serve as their Executive Secretary and in 1950 the Dairy Equipment Manufacturers asked him to serve on an Industry Committee in cooperation with the government agencies, set up to handle critical materials during the Korean War.

During the past five years Mr. Marshall has served as Executive Officer of the National Association of Dairy Equipment Mfgrs. and for the last three years has also been Secretary of the Dairy Industries Supply Association's Technical Committee, charged with the development of 3A Sanitary Standards for dairy equipment. He has resigned his position with DISA to assume the duties as Secretary of the Beverage Machinery Manufacturers Association but will continue in his capacity as the Executive Vice President of the National Association of Dairy Equipment Manufacturers.

KLENZADE FORMS NEW SOUTHERN CORPORATION

Klenzade Products, Inc. of Beloit, Wisconsin, announces the formation of Klenzade Southern, Inc., successor to Klenzade Delta Company, a Klenzade franchise branch covering the territories of Louisiana and Mississippi. The new corporation is headed by F. Paul Juneau, President, and Dick B. Whitehead. Mr. Juneau is a long time associate of Klenzade and has been in charge of sales in this territory for the past five years. Mr. Whitehead was supervisor of the Division of Food and Milk Control of Mississippi State Board of Health for the past sixteen years. He also holds the degrees of Bachelor of Science and Master of Science from the University of Missouri and has a distinguished record of service in public health work. He served in the last war as an operations officer and batalion commander with tanks. After the war he was directly connected with the dairy and food industry for five years and was also a member of the 3A Standards Committee and was prominent in the work of the National Conference on interstate milk shipments as well as a long time member of the Dry Milk Standards Committee. Mr. Whitehead will headquarter in Jackson, Mississippi, and warehouses of the company will be maintained at Jackson, New Orleans and Alexandria.

OREGON STATE DAIRY TECHNOLOGIST JOINS EASTLACK IN COLUMBIA FOR PROJECT TO BUILD DAIRY INDUSTRY

Dairy Society International (formerly known as DISI) announced completion of its staff for the joint U. S.-Colombian long-range dairy program as it flew Antonio Diaz Morales to Bogota last week. He will join Joseph O. Eastlack, head of the DSI-ANAL AC project, aimed at improving the quantity and quality of milk for the Colombian people.

Diaz, a graduate of Oregon State University, attended the 20th Dairy Industries Exposition in Atlantic City where he met many of the U. S. dairy industry leaders and also a number of the Colombian leaders with whom he will work. He also made a tour of dairy processing plants where he was briefed on the latest methods of handling dairy products. In Bogota, Colombia, Diaz will act as technical advisor to Mr. Eastlack in this program sponsored by Foreign Agricultural Service of the U. S. Department of Agriculture, with DSI as co-operator.

First of the two long-range programs so far inaugurated – the other is in Thailand – this is a joint project between DSI and ANALAC (Asociacion Nacional de Productores y de Industrias Lacteas) which was organized earlier this year by Colombian producers and processors of milk. Sr. Carlos Reyes Patria is ANALAC president, and Dr. Alberto Chajin L., executive secretary. Francisco Correa is the third member of the DSI staff.

Foundation for this project was laid earlier by a DSI Market Survey Team, headed by Gordon Lamont of Darien, Connecticut, a Nestle Company director, Peter Olsen of the Olsen Publishing Company and Professor Ivan Parkin of Pennsylvania State University. Their report, submitted to the Foreign Agricultural Service in May, formed the basis of the long-range cooperative plan launched by DSI and ALALAC in September.

Diaz, who received his early schooling in Peru, before coming to the United States to complete his education, was particularly recommended to DSI by the Oregon State Dairy Commission, which helped finance his trip to Washington for briefing for the post. Diaz received his Bachelor's degree in Dairy Manufacturing at Oregon State College and has been in charge of the by-products plant for Fairview Farms, Portland, Oregon. Previously he had been Assistant to the Chief of Publications Department of Agriculture in Panama, where he wrote and edited for "Revista de Agricultura", the official agricultural magazine of Panama.

Mr. Diaz will shortly be joined by his wife, the former Nancy Jackson (Class of '54, Oregon State University) and his daughter, two-year-old Linda Leta.

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