ON THE TRAINING OF MILK PLANT OPERATORS AND ADMINISTRATIVE PERSONNEL

HERBERT H. ROGERS

Communicable Disease Center, Training Branch, U. S. Department of Health, Education, and Welfare,
Atlanta, Georgia

During the past 35 years, pasteurization of milk has been accepted as the primary answer to the milk-borne diseases problem; and many persons consider the achievement of milk control objectives as a fait accompli. However, there are now new techniques of pasteurization and problems of time-temperature relationships which make it impossible to be complacent about the gains which have been made in the reduction of milk-borne diseases. In the study of certain milk-borne disease outbreaks, it has been found that the human factor is often implicated as the primary cause of the outbreak.

The March, 1956, issue of the American Journal of Public Health (46: 345-346) contained an editorial entitled "Some Important Lessons from the Lancaster, Pennsylvania, Paratyphoid Fever Epidemic," which stated that "The present trend toward 'automation' does not necessarily entail the complete protection which it may seem to imply." It further pointed out that actual operating practices involve a number of hazards to health, including the human elements which enter into such procedures as inspections and manual adjustments. Additional hazards to public health include cross-connections, lack of leak-proof valves, unapproved water supply, and normal failure of automatic equipment.

The editorial also stated that "This occurrence must have a salutary effect on the attitude of many health officers toward the continuing need for the protection of milk supplies to safeguard the public health. This particular barrier against disease may have reached a maintenance level, but still requires our attention, our interest and adequate legal authority to act before as well as after misfortune occurs."

Recent studies on Q Fever have pointed out that our present methods of pasteurization are not sufficient to inactivate all organisms of public health importance. This finding, plus problems accruing from the new developments in pasteurization equipment, increases the need for continuous dissemination of up-to-date information to persons having responsibility for control of the quality of milk. The effectiveness of the dissemination of this information is complicated by indifference, educational deficiencies, and turnovers in personnel, and by divided responsibilities among milk plant operators.

Both milk control administrators of the public service agencies and management personnel of the milk industry realize that their sanitarians and the key men of the present highly mechanized milk processing plants must be men trained in proper techniques and principles. It is no longer the desire of these administrators to employ an inspector—a reporter of violations and "wielder of the big stick." Both the sanitarian and the plant operator must be grounded in the basic principles governing the production, processing, and distribution to the consumer of clean, high quality, safe milk and milk products.

The work of the sanitarian must be closely allied with the work of the pasteurization-plant operator. Both must be thoroughly familiar with the regulations which have been adopted as a guide for reaching the ultimate goal of a safe and acceptable product. These persons must not only be familiar with these regulations, but they must be "sold" on their necessity. Then, and only then, will the plant operator carry out the provisions of the regulations without constant surveillance of the sanitarian.

In most instances, the sanitarian and his superiors have recognized their responsibility to protect the health of the consumer. In many instances, these protectors of the public health have performed their duty in the face of unjust criticism which may have arisen from a group of uniformed milk plant operators who resent regimentation and regulation. On the other hand, this criticism may be warranted because some untrained public servant is "wielding the big stick." As trained sanitarians and operators are employed, this just and unjust criticism will decrease proportionately.

Consumer prejudice existing today against pasteurized milk is not, in most instances, the result of the industry's failure to meet the regulations. It is primarily due to the plant operator's limited knowledge as to the proper methods of handling milk. Such phrases as "cooked milk," "cardboard milk," and

1Presented February 12, 1960, at the Milk Sanitation-Administration course, Communicable Disease Center, Public Health Service, Atlanta, Georgia.
“pasteurized milk rots before it sours” are all indictments against the operator. These statements hurt his industry, and a decrease in milk consumption lowers the vitality of the nation. Americans consume large quantities of milk and will continue to do so if a clean, wholesome, palatable, safe product is delivered to the consumer.

In the training of the pasteurization plant operator, the word quality must be impressed on his mind. The bottle of milk he produces must be uniform in taste and appearance from day to day. The operator must first know the fundamental elements of a quality product. To achieve quality, the operator must have a conscious understanding of the approved sanitary precautions required to produce acceptable raw milk. He must assist the producer to eliminate off-flavors and odors. The off-flavors and their quality-reducing factors not only decrease the consumption of milk, but they may cause serious processing difficulties. The ability to recognize these milk detriments is a requirement in the selection of quality milk for pasteurization.

The transmission of the diseases of cattle, although the diseases in themselves may not cause the health of the consumer any serious trouble, should be understood. The plant operator must appreciate the fact that breaks in the pasteurization process will allow certain animal diseases to reach the consumer.

The laboratory training in milk bacteriology and the physical and chemical testing of milk offered by schools of agriculture are essential. The routine examinations, as conducted by the plant personnel and public service agencies, must be interpreted correctly and in such a manner as to improve the product constantly. The ability of the operator to make practical application of results from chemical tests, physical tests, and bacteriological examinations of his raw and finished products cannot be over emphasized. These tests are useful in controlling his milk-production problems.

It is highly important that the plant operator have the knowledge necessary for the most proficient operation of his equipment and for the selection of the proper equipment to get the best results. The handling of this equipment to do a specific job satisfactorily may spell the difference between success and failure. The quality of the finished product depends upon selecting a high quality raw milk; transferring this milk into properly protected receiving vats; processing the milk by the use of adequate, mechanically sufficient pasteurizing equipment; and timing the bottle filler to assure proper cooling of the milk in the bottle. All this requires constant planning. The correlation of the equipment speed to demands fluctuating during the day should be constantly studied. The safeguarding of the milk from all possible contamination, particularly after pasteurization, is dependent upon the choice and maintenance of adequate and properly constructed equipment.

The regulations of most communities and states provide equipment safeguards to assure a safe product. These regulations apply to such safeguards as temperature controls, engineering design of equipment, protective devices, and acceptable methods of operation. The operator should know these regulations and the public health reasoning underlying the formulation of each regulation. In addition, he must know the construction and placement of valves in the lines, the type of pump needed, and the best temperatures at which to pump milk. The maintenance of sanitary piping, agitation of the milk during pasteurization, efficient cooling, and speed of the bottling machine affect the uniformity of the final product. This is true for the quality factors of taste and odors, as well as for the appearance, cream line, and bacteria count.

The knowledge of how to wash milk equipment properly and to treat it bactericidally is of utmost importance. These items are covered in milk ordinances by a description of the results desired, but the methods of attaining these standards depend entirely upon the operator. The selection of the proper detergent to do a particular job may be accomplished by the trial-and-error method, but a knowledge of the chemical aspects of water hardness and of the composition of the material to be cleaned may save many costly experiments in the selection of a proper detergent. Water hardness variations in different parts of the country may play an important part in the selection of proper methods and agents to effect bactericidal treatment.

The pasteurization plant operator who does not understand the public health reasoning underlying the pasteurization of milk, as well as the theory and practice of the correct procedures involved, is a potential menace to the industry and to the consumer. The most important single factor in the protection of the health of the milk consumer is the process of pasteurization. Knowledge of the fundamental public health reasons for the pasteurization of milk will lead to an understanding not only of the importance of pasteurization but also of protecting the pasteurized milk adequately against any possible contamination until it reaches the consumer. Many milk-borne epidemics are caused by the plant operator who does not realize the potential dangers of manipulating holding time or temperature, or who fails to place every safeguard around the milk during and after pasteurization.

A review of the important details of a 1945 epidemiological problem in an outbreak of acute enteritis will illustrate this point. The epidemic occurred in a city of 10,000 population. There were 409 cases
and eight deaths in adults. Of twenty-four infant cases, nine died. All cases were directly traced to the users of milk from a spasmodically inspected milk processing plant. A summation of the problem revealed that “No measures were used to control flies or fly breeding; screen doors were propped open, hog wallows were within ten to fifty yards of the plant; a rag was observed wound around a water pipe, with water dripping directly into the pasteurized milk just before bottling.” The description went on to name other similar factors involved, and then related that “The pasteurization plant operator stated that recording thermometers, foam heaters, covers for milk coolers, sterilization of bottles and hand washing facilities were not specifically required. The statement was made, “The City Ordinance doesn’t require such things, so why do it?” Such a statement could come only from an untrained operator. This epidemic is referred to in order to show the need for adequately trained plant operators.

The milk industry is full of strange and wondrous things. The great strides made in methods of milk production, in engineering feats of design and economy, and in the science of the ways and means of controlling quality and safety may be nullified by lack of knowledge. The industry has many honest workers, but, because of improper training, these remarkable developments fall short of attaining the goal of providing clean, safe milk to the consumer.

There are several sources of training which may provide industry with capable men. The universities and colleges offer a variety of courses ranging from a two-day “in-service” refresher course to post-graduate courses. Many universities have a full four-year program in Dairy Technology. A review of these courses will reveal that “public health reasoning” is closely integrated with the theory and practice.

The courses provided by universities fall into three distinct types of training: courses for the plant operator, technical and theoretical courses for the technologist, and courses to meet special needs of the persons involved.

The courses for operators vary from two weeks up to a year in length. These may offer extensive studies in the basic fundamentals of milk production, receiving of milk at the plant, operation of the pasteurization plant, quality control, and certain administrative and legal requirements of the control agencies. Courses of practical chemistry and related subjects may be given to meet the plant operators’ needs. In some instances highly specialized training might be offered.

The schools and universities in several states provide a four-year course of study leading to a Bachelor of Science degree with majors in milk production, plant operation, and quality control. The curriculum provides information on milk distribution, manufacture of dairy equipment, supplies, and machinery; sales promotion of dairy products; and laboratory control of milk and milk products. An essential part of the course is the practical application of theory to the field conditions found in industry. The student receives a broad education which equips him to go into the field of production, processing, distribution, and accounting.

In such a four-year course a person is taught all phases of the manufacture of dairy products. Teaching is geared to production, manufacturing and operational problems of a creamery, cheese factory, milk plant, ice cream plant, and condensery. A large percentage of some states’ milk control personnel come from this university trained group.

Further review of the university courses leading to a degree in dairy industry will reveal subjects dealing with the various branches of the dairy industry as to their administrative organization and with the composition and analysis of the dairy products as they are related to nutrition and the economics of the industry. In addition to study of nutritional values, time is devoted to a study of the part that its relationship to public health plays in the milk industry. Studies are made of the regulatory agencies, the structure of their organization, and their legal powers. Considerable stress is placed on the sanitary methods of inspection of milk supplies, the tests used, the limitation of these tests, and field work in milk plant inspection and operation.

The third type of course may include special topics, such as the composition and processing of market milk and related products, dairy plant engineering, and courses in related mechanics. The subjects covered may include air and water purification, steam generation, and the use of metals and electricity.

In some states the Department of Vocational Education sponsors training programs wherein subject matter is presented through lectures, demonstrations, and visual aids. These classes are generally held at night for the convenience of persons who work during the day. Certificates may be awarded to those industrial and control personnel who complete the training. Another method of inducing workers to obtain needed training is to provide wage increases after they have completed the course of instruction.

It is felt that in order to achieve the ultimate goal of elimination of milk-borne diseases, training must be provided for all levels of public health and milk-control personnel. The level of training must vary according to educational and experience qualifications of persons being taught. In this training, it is essential to reach top-level administrators so they may more fully understand the problems and give their support to training of control personnel and to opera-
tion of control programs under their jurisdiction.

The Training Branch, CDC, has organized in-service field training programs for public health and related personnel including milk plant operators. Training given by the Environmental Health Training Section, Training Branch, CDC, is in the fields of milk and food sanitation, water supply sanitation, housing hygiene, and general sanitation. Courses are planned to meet the needs of three broad groups of personnel: (a) epidemiology and control courses for the public health administrators; (b) administrative courses for persons who have direct responsibilities for administering control programs; and (c) courses for control and operational personnel. Examples of the types of courses offered in milk sanitation are: (a) Epidemiology and Control of Milk-Borne Diseases; (b) Milk Sanitation—Administration; and (c) Milk Pasteurization Tests and Controls. The objectives of these courses are:

1. To teach the use of proper epidemiological methods applicable to the study of outbreaks of milk-borne diseases.

2. To provide administrators of milk programs with up-to-date information that can be used in preventing disease outbreaks or in bringing them under control as soon as possible.

3. To teach control procedures applicable to equipment of old or new design.

The CDC training program for milk-control and pasteurization-plant personnel had its beginning in the mid-forties in Savannah, Georgia. The plan at that time was to provide a practical “learn-by-doing” approach for these persons. It was realized early in this training that these people had little or no opportunity to gain a workable intimate knowledge of the controls used in the automation of milk-processing plants. A recorder-controller and water-temperature-indicator controller were purchased so that they might gain this knowledge in the training given. In the latter 1940’s, pasteurization equipment was purchased to use at two field training stations.

Restrictions on out-of-state travel created a demand for decentralized training programs, and in the early 1950’s one HTST unit was installed in a van-type truck for transportation to the training sites. It became a very important training tool because most universities did not have pasteurization control equipment which could be used strictly for training purposes.

In 1955, Cherry-Burrell Corporation loaned a Vac­

creteator to the Training Branch, CDC. This equipment plus a HTST unit was mounted on a fifteen ton semi-trailer. In a two-and-a-half-year period (1955-58), these up-to-date heating units were demonstrated at many locations throughout the United States. From July, 1958, to the present, opportunities were further provided for this truck to return to any of the 48 states for use in training programs. Although this ambulatory program was designed for training of official milk control personnel, it has been given to many pasteurization-plant operators, students in dairy technology, and others. It is estimated that 3500 persons have attended training programs which utilized the two mobile milk-pasteurization units (van-type truck and semi-trailer).

This program of training in Milk Pasteurization Plant Controls and Tests has met an expressed need for state and local personnel. The complex details of testing intricate controls are better impressed in the minds of individuals when the written word is translated into physical action. The actual operation and manipulation of equipment in the Mobile Milk Pasteurization Training Unit have provided a medium of training heretofore not readily available to the employees of control agencies. Furthermore, the presentation of this subject material has encouraged universities and state-control agencies to include the subject of milk pasteurization controls and tests in collegiate and other training programs. This has encouraged and brought about closer supervision of the pasteurization process. The dissemination of knowledge of new developments by industry has enabled control agencies to acquaint themselves with necessary control techniques in time to prepare for the installation of such new equipment within their jurisdiction. This acquisition of skills and knowledge has brought about a better understanding of each other and an improved working relation between control agencies and industry.

The accomplishments in the training of a large number of milk control personnel and of a few pasteurization plant operators can further be realized by the proper training of all pasteurization plant operators. Such a program should logically be conducted by and within a state, with the use of resources available therein. Materials for teaching have been prepared by the Training Branch, CDC. This material is flexible enough so that it may be altered to meet local needs. It is emphasized, however, that actual plant facilities should be utilized for portions of this training and should provide for the “learning-by-doing” process.

In summary, the danger of becoming complacent about the control of milk-borne diseases must be reiterated. The disease potential is still very much with us; and, with the continuous change of equipment and techniques, it is essential in the interest of public health protection that regulatory and key personnel be kept current with new developments.

Schools and universities are assisting in the task of providing trained industrial and official control personnel. Those who have interest in this field must
realize, however, that the task of training is tremendous and that all resources must be mustered to do the job. This can be done by securing the interest and cooperation of both official and industry organizations. Such training should be aimed at all strata of the operating agencies and industry, starting at the top administrative level and working down to the plant operator. Training at each of these levels cannot be overstressed, nor can the fact that the pasteurization plant operator is still a very important link in the control of milk-borne diseases.

---

Make Your Plans Now To Bring Your Wife And ———-If Possible——- Give Us Some Indication That You Expect To Bring Her So That We May Know How Much Of An Entertainment Program To Plan.

While Chicago Has Many Activities——A Bus Trip To Hagger Potteries Should Be A Must —— And —— I Am Sure Many Of Your Wives Will Enjoy Don McNeill’s Breakfast Club Which Is Going On Every Morning They Are Here.

THE 47TH ANNUAL MEETING
HOTEL MORRISON, CHICAGO, ILL.
OCTOBER 26, 27, 28, 29.