MILK AND FOOD SANITATION PRACTICE

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PREFACE

As LECTURER at the School of Public Health, University of Minnesota, the author has felt a need for a text in the field of milk and food sanitation that would combine theory and practice. This book is an outgrowth of that need. It attempts to bridge the gap between what should be done and how to do it. It is intended that it should be useful in orienting the public health student who plans to work in the field of environmental sanitation, and that it should serve as a guide for health officers, public health engineers, and sanitarians whose work in a local health department involves the routine but important duties in the sanitary supervision of milk and food supplies. The book endeavors to present essential and fundamental principles of milk and food control, but it does not attempt to discuss theory exhaustively. It is hoped that the student and the worker alike will find suggestions in it that will make their work more effective and more meaningful.

Modern milk and food control programs emphasize an educational approach as a productive means of advancing sanitation. Classes of instruction for dairymen, milk plant operators, restaurant proprietors, and food handlers offer an excellent opportunity for imparting valuable information to these and other groups. The prominent place instruction plays in an environmental sanitation program has been stressed either directly or by implication in many parts of this book, and in the author's judgment such means of promoting sanitation should always occupy a foremost place in program planning.

References to the literature are intended to be representative rather than exhaustive. In a text such as this it would be impracticable to give the opinions and viewpoints of all persons who have contributed to the vast amount of information in the field. It is assumed that those actively engaged in milk and food sanitation will consult other texts, scientific journals, and special bulletins when additional details are desired, since no single text can encompass the entire field. Furthermore, constant reference to current literature is necessary if one is to keep informed of new methods and techniques as they are developed.

The author wishes especially to express his appreciation to other workers in milk and food control for their critical study of the manu-

script and for their most helpful comments and suggestions: to W. S. Feagan, Public Health Engineer and formerly Chief of the Dairy Section of the Kansas City, Missouri, Health Department, and to H. E. Eagan, formerly assigned to the Mississippi State Board of Health, for assistance with the chapters dealing with milk control; to Ferdinand A. Korff, Director of the Bureau of Food Control of the Baltimore, Maryland, City Health Department, for advice on the food control section; to Roy J. Morton, Professor of Sanitary Engineering, Department of Preventive Medicine and Public Health, Vanderbilt University, for assistance in the development of outlines and early plans for the text. The author is also indebted to manufacturers of dairy and food equipment for many of the illustrations appearing in the text.

It is hoped that this book will prove useful to the many diligent public health workers whose day-to-day duties are so important to the promotion and protection of the public health.

H. S. Adams

Minneapolis, Minnesota
January, 1947

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HISTORY AND PUBLIC HEALTH IMPORTANCE OF MILK CONTROL

THE GENERAL improvement in the sanitary quality and safety of milk during the past few decades has served as a milestone of accomplishment in the promotion of public health. Yet milk sanitation as practiced today, even in localities where it has enjoyed unhampered and wholesome development, is of relatively recent origin. Our present era of milk control began with the publication in 1892 of the paper by Sedgwick and Batchelder on "A Bacteriological Examination of the Boston Milk Supply."[16] This early study showed the relation between the bacterial content and the sanitary quality of market milk.

To add further impetus to improvement in milk quality, Dr. Henry L. Coit,[1] of Newark, New Jersey, formulated in 1892 a plan whereby he and his colleagues might obtain for infant feeding a supply of clean, safe, wholesome milk, the best that knowledge of the time could produce. At Dr. Coit's suggestion, the Essex County Medical Society appointed a committee to make an investigation of the existing milk supply in relation to its effect upon public health. This committee submitted its report condemning many of the methods then employed in the production and handling of milk. An appeal was next made to the state legislature for funds to establish a system of dairy inspection and to hire personnel to carry on the work, but the appeal went unheeded, the legislature pleading lack of funds. Undaunted, Dr. Coit went ahead with plans and organized in April 1894 the Medical Milk Commission of the Essex County Medical Society. Thus was initiated one of the earliest recorded attempts to improve the sanitary quality of milk. The movement progressed and other commissions were formed; in 1907 they federated to become the American Association of Medical Milk Commissions, with the purpose of adopting uniform methods and standards for the production of certified milk and extending the movement throughout the country. The work of this organization has markedly influenced the sanitary quality of milk produced in this country, and many of its rules for sanitary milk production have been incorporated in modern milk legislation.

In the City of New York at about this same time, Nathan Straus,[75] a man of great humanitarian ideals, began a vigorous campaign against the intolerable conditions surrounding the production and handling of milk sold in that city. With the aid and counsel of faithful friends, he worked untiringly to improve milk quality as a means of safeguarding the health and lives of infants and small children. His investigations disclosed that infants were dying by the hundreds during the hot summer months because the milk fed them was contaminated, adulterated, and dangerous. Straus's ardent desire was to reduce infant mortality, and he realized that this could be accomplished through pasteurization. But even before pasteurization was officially adopted in New York City, the Nathan Straus Pasteurized Milk Laboratories became an institution and were heavily patronized by mothers anxious to obtain safe milk for their babies and young children. Straus's persistent efforts in behalf of pasteurized milk eventually succeeded, for on November 13, 1914, Dr. S. S. Goldwater, then Commissioner of Health for the City of New York, ordered pasteurization of the city's entire milk supply. Nathan Straus's desire to safeguard New York's milk and that of other large communities is an epic in the annals of milk sanitation and public health. Although pasteurization is now almost universally accepted as an essential process for safeguarding milk, its general acceptance has been achieved, in many instances, against strenuous opposition of special interests, politicians, and others whose reasoning ignored sound scientific facts and was largely emotional.

While pasteurization was gradually gaining recognition in many of the larger centers of this country, the control of milk supplies generally was in a chaotic condition, with little semblance of uniformity in sanitation requirements. The seriousness of this situation, coupled with the fact that milk-borne outbreaks of disease were frequent, prompted many health officials to regard milk sanitation as an increasingly vital component of public health protection. One of the first states to recognize the need for uniformity was Alabama. In 1923 it requested the United States Public Health Service to work with it on a cooperative basis to formulate and execute a state-wide milk program. Such a program was instituted under the direction of S. W. Welch, State Health Officer, and C. A. Abele, Director of the Bureau of Inspection. The late Leslie C. Frank, then Associate Sani-

tary Engineer for the United States Public Health Service, was assigned to carry out the project. As a result of the efforts of Mr. Frank and the Alabama officials, a standard milk ordinance was promulgated. The first printed edition of this ordinance appeared in the Public Health Reports of November 7, 1924. Since that date the ordinance has been changed and revised many times to keep pace with new developments and technological improvements in the handling and processing of milk; all revisions are acted upon by a board of consultants, first appointed about 1932 and now known as the Public Health Service Sanitation Advisory Board. The Standard Milk Ordinance recommended by the United States Public Health Service has done more to guide the thinking of milk sanitarians generally and to establish uniformity in milk legislation than any other document,* and mention of the progress made in the field of milk control would not be complete without recognition of the work done by Leslie Frank and the several members of the Advisory Board. However, the need for uniformity in milk control legislation is still an acute problem, and there are too many communities attempting to regulate milk sanitation with old and outmoded ordinances which fail to emphasize essentials, omit them altogether, or place undue stress upon requirements of little public health value.

THE NUTRITIVE VALUE OF MILK

A quart of milk provides all of the calcium needed by an individual for one day, all or practically all of the phosphorus, a liberal amount of vitamins A and G, one-third or more of the protein, one-eighth or more of the iron, at least one-fourth of the energy, and some of vitamins B, C and D. Considerable evidence has been accumulated to indicate that a diet composed predominantly of milk and dairy products increases the life span and promotes virility and fertility. Dr. Robert McCarrison[19] of the British Medical Service tells of a race of people in the Himalayas with magnificent physique, who retain the characteristics of youth until late in life. These people, he found, live on a frugal diet of goat's milk and vegetables.

Milk ranks high in digestibility. Its fat is 99 per cent digestible, its

* By November 1944 this ordinance was in effect throughout Nevada and Alaska as well as in 1,001 municipalities and 150 counties and districts in 36 other states and Canada with a total population of 26,142,664.

protein 97 per cent, and its carbohydrates 98 per cent. The fact that fat is present in emulsified form makes it more easily assimilated than most other food fats. Moreover, milk coagulates in the stomach, which is advantageous to the digestive process.[71] Research work now being carried on by the United States Bureau of Dairy Industry[73] indicates that there are other nutritive qualities in milk besides those generally attributed to it. Experimental animals have been fed a synthetic mixture of all the known nutrients of milk, while other animals were fed natural milk: the animals fed milk grew more and were in better general physical condition than those receiving synthetic milk. Bureau workers do not as yet know exactly what this factor is, but further research is continuing toward its identification.

On the other side of the ledger, milk has some defects. It is deficient in iron and copper and cannot be considered a very reliable source of vitamins C and D. Furthermore, experiments have shown that infants and young animals restricted entirely to milk over considerable periods of time develop anemia. Milk in the diet of certain individuals produces allergic symptoms: it was reported to be the contributing factor in 40 per cent of 120 cases of allergy studied.[20] Even with these limitations, the advantages of milk as an article of diet greatly outweigh the disadvantages, and it is still considered "Nature's most nearly perfect food."

THE HEALTH DEPARTMENT'S RESPONSIBILITY

The public health official has a very prominent part to play in the dairy industry, with a heavy responsibility to both the industry and the consumer. In the early history of milk control, inspection was primarily for the detection of adulteration and prevention of fraudulent practices. Today this aspect has largely disappeared, and the problem now is mainly one of education, leadership, and technical assistance. Dairymen and milk processors alike turn to the competent health official for advice and guidance, and it is through such mutual cooperation that benefit accrues to the whole community.

Acting jointly, the health department and the dairy industry can encourage the increased consumption of safe, wholesome milk and dairy products and engender public confidence. There is a challenging educational job to be done in this connection, for the consumer is not yet fully aware of the dietary value of dairy products. A recent

poll has disclosed that 43 per cent of adult Americans use no milk and 34 per cent no milk or cheese. If good nutrition is to be encouraged, Americans need to know more about milk and use it more generously. To this end, health officials must promote the increased use of pasteurized milk and dairy products by emphasizing their nutritive value and the value to the community of a well-supervised pasteurized supply. While significant advances have already been made, much remains to be done.

The control and regulation of milk is well recognized as an essential governmental function and has been so held in courts of law in all parts of this country, for milk, though of such great importance nutritionally, is a food which when produced and handled carelessly may easily become infected and serve as a ready vehicle for the transmission of disease. The expenditure of public funds to insure adequate and effective supervision of the milk supply is justified in terms of sickness prevention. The validity of such a statement can quite readily be demonstrated when one reviews reports of milk-borne outbreaks of disease. Records reveal that milk-borne disease is negligible, even non-existent, where well-organized milk control measures are in effect and where proper pasteurization is employed. In fact, proper pasteurization is much more likely to be practiced where vigilance is exercised on the part of control agencies. A review of records in New York City, for example, where no raw milk other than a relatively small amount of certified milk is sold, indicates that no recorded milk-borne outbreaks occurred in the twenty-two-year period 1917–1938, inclusive, while the state, exclusive of New York City, had 151 milk-borne outbreaks.[11] Situations comparable to this exist throughout the country, leading to the conclusion that the greatest need, generally, for raising sanitary standards in the production and handling of milk is in the smaller cities and towns and in rural areas where organized milk control is not well developed or is nonexistent. A compilation of records of outbreaks attributable to milk and milk products as reported to the United States Public Health Service by State and Territorial Health Officers for the year 1941 reveals that more than 80 per cent of such outbreaks occurred in communities with populations of 30,000 or less.*

* Data arranged by the author from reports issued by the United States Public Health Service.