MILK and FOOD SANITATION—

CHANGING RESPONSIBILITIES IN MILK AND FOOD TECHNOLOGY

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Among the challenging possibilities for improving milk and food practices are: pin-pointing sanitation efforts on genuine health hazards; establishment of standards of nutrient quality in foods; assumption by private enterprise of more responsibility for food sanitation; application of modern science to the reclamation of community food wastes; bringing up to date the epidemiology of food-borne disease and adjusting control measures accordingly.

Hydroponic farming, photosynthesis of algae in sewage oxidation ponds to produce cattle feed and thus beefsteak—radiation sterilization of food; complete meals in sealed packages; and the application of positive health measures such as fluoridation of drinking water and enrichment of food are but examples of the rapid change in our technology.

INTRODUCTION

It is a real pleasure for me to return to my native state, especially to talk with you about milk and food. Having been raised in the Red River Valley of Minnesota—the "Breadbasket of the World"—I have much more than a casual interest in the production of food.

Your Association has selected a most appropriate place in which to hold its 39th Annual Meeting. The cooperation that is being given by the people of Minnesota and the various organizations in the state is to be commended. This kind of teamwork is necessary by the increasing complexity of our expanding technology.

HOLDING THE LINE

This constant vigilance remains our first basic responsibility. It is a "line-holding" operation. It should and does change in technique, in efficiency and effectiveness, and in the share of our time that is devoted to it.

Your employer, public or private, depends on you to examine, constantly and critically, the things you are doing, to recommend discontinuing less productive procedures and adding more productive.

The natural tendency of most of us is to keep on doing what we have been doing, until our employer or some other external force causes us to change. This may be an unpleasant shock and an embarrassing realization that we have not been alert to the needs of our own jobs.

The CHANGING CALCULATED RISK

The accelerated advance of technological progress has had a parallel impact on milk and food technology. Since our milk and food codes first came into use about thirty years ago, communicable diseases have greatly declined. We have only about one-fourteenth as many reported typhoid fever cases as we had thirty years ago, and only one-third as many cases of scarlet fever, notwithstanding a twenty-five percent increase in population. The death rates for these two diseases have dropped even more dramatically—to one seventy-fifth of the former rate for typhoid, and one fiftieth of the former rate for scarlet fever.

Advances in sanitation have greatly reduced the chances of contracting these diseases, and advances in medicine have reduced even more chances of dying from them.

ADVANCES IN MILK AND FOOD CONTROL

Our facilities for producing, pro-
cessing, and distributing milk and food are rapidly improving. Animal diseases are declining with improved veterinary practices. Our equipment is easier to operate, easier to clean, and much more reliable. Detergents and sanitizers are more efficient and their action better understood. Production and processing plants of all kinds incorporate features which make their sanitation more practicable. Working in close relationship, the milk and food industries, the universities, and the regulatory agencies have been principally responsible for these advances.

The numbers of milk and food technologists are continually increasing, and more and more scientists are being attracted to this field. A better balance of service between rural and urban areas, and between production, processing, and distribution, is also being achieved. Of particular significance is the addition to the staff of milk and food industries, large numbers of technicians concerned with the quality and safety of food products. Today, both industry and the public are much better informed and more conscious of the health implications of milk and food. Thousands of food handlers have been trained in the techniques of food safety. While there may be a high rate of turnover among this group in any single establishment, the knowledge they have acquired remains with them in another establishment and in the home. More important, and less transient, is the foundation laid with management itself, for management has the continuing force upon which the public must and does depend for protection.

**TAKING INVENTORY OF OUR PRESENT ACTIVITIES**

These changes have operated effectively to reduce the hazards from unsafe food. They have changed the calculated risk quite significantly. Since the public looks to you as its front line of defense against these hazards, you should ask yourselves if the present line of defense is in good order. Are the implements of modern design taking advantage of new knowledge? Are they manned by persons whose knowledge and training are satisfactory? Have we been revising our strategy to attack at the most vulnerable points, in order to make the best use of every ounce of our resources?

Our resources for health defense are limited. They equal only a tiny fraction of expenditures being made for military defense. Nevertheless, our resources for milk and food sanitation are sizable within the field of public health. The fact is that more than 50 percent of public health expenditures for environmental sanitation are spent on milk and food. Your responsibility is to see that this money is always well spent—that it is in fact preventing disease as effectively as funds being spent for other public health preventive measures.

**SHARPENING THE FOCUS**

First we need to sharpen the focus of what we are now doing. Milk and food procedures, like all sanitation procedures, are closely connected with cleanliness and aesthetics. They may or may not contribute significantly to prevention of disease or illness. And while few would challenge the desirability of most things we do for cleanliness or aesthetics, an objective evaluation of expenditures for prevention of illness from milk or food must necessarily be on the basis of their effective contribution toward that end.

There are, I believe, great potentials for economy and effectiveness to be attained by pin-pointing our efforts.

The evolution of malaria control is a forceful example. It was in 1895 that Sir Ronald Ross discovered that malaria was transmitted by mosquitoes. Thus, malaria control started by directing efforts at killing all mosquitoes—a formidable and expensive task. The first refinement came some ten or fifteen years later when Italian workers discovered that only *Anopheles* mosquitoes transmitted malaria. These mosquitoes were not present in all parts of the world, and further had selective breeding and living habitats. This refinement in approach made possible savings of 75 percent or more and greatly increased the feasibility of control. Some years later, Dr. Paul Russell discovered that a single species of *Anopheles* was responsible for most of the malaria transmission in the United States. This sharpen focus—species sanitation—further reduced costs and increased feasibility. This new knowledge gained was not completely amplified, however, for some years. In fact, it was not until World War II mobilization began that full use was made of species sanitation. Its effectiveness and economy were demonstrated clearly during the next five years—so clearly in fact that interest in malaria eradication began to grow. With the advent of DDT this dream was given potential substance. Le Prince had demonstrated in Panama that malaria control could be achieved by killing adult mosquitoes—mosquitoes on the wing. The principle was given full effect by spraying long-lasting DDT on the interior walls of dwellings where the vector mosquito was likely to rest before or after biting humans. Both rural and urban families could now receive protection—at a price they could afford to pay. The success of this final pinpointing is now a matter of history, for malaria virtually has been eradicated from our country—by continuously sharpening the focus of our efforts.

**MEASUREMENT OF RESULTS**

Infectious diseases have been reduced to levels where it is difficult for us to demonstrate our year to year progress in their control. This has been pointed out clearly in the recent study by the American Public Health Association of sanitation practices in local health departments. Morbidity and mortality figures indicate to us only our long-range progress. Specifically, we are without a good yardstick—such as the profit and loss yardstick of business—to measure the results of our milk and food sanitation efforts in terms of reducing illness. Improvement in the precision and application of milk and food sanitation ratings can give us a better idea of how effectively we are obtaining compliance with our sanitary requirements. While efforts along this line are being intensified, we need to find better ways of evaluating our control measures in terms of increased health or decreases in disease, if we are really to know whether we are progressing or are merely going around in circles.

**NEED FOR BETTER EPIDEMIOLOGY**

Interest in epidemiology suffered an unfortunate decline as the major germ diseases were brought under control. More recently, however, we have seen an increase in the incidence of communicable diseases.
we have come to recognize that infectious and communicable diseases are not gone, but that their manifestations may be more subtle, especially where they are of virus origin. The consequent resurgence of interest and activity in epidemiology is encouraging. This gives us hope that the epidemiological bases for milk and food control may be brought up to date, thus making possible more intelligent reevaluation of our requirements and improvement of our control measures.

This Association is to be commended for its efforts to improve the investigation and reporting of food-borne outbreaks. Your Committee on Animal Diseases Affecting Man is giving increased attention to this problem. When we study the annual reports and find that in successive outbreaks at the same institution involving several hundred people, neither the causative agent nor the contaminated food was identified, we realize the inadequacy of our present epidemiological methods.

The two principal groups of organisms at which our food—as differentiated from milk—control efforts are aimed today are Staphylococcus and Salmonella. Both of these occur so universally in our environment that some have raised serious doubt as to whether we can ever hope to eliminate, for example, contamination of bulk foods in the raw state. Even if this were possible technically, there is question that we could afford the cost. We turn then from what is ideally desirable to what is more practical—the prevention of multiplication and growth of the organisms to keep their numbers below the levels of dosage—and we need to know more about those levels—which are likely to produce illness. Some of you may disagree with this approach. I am conscious, when I suggest it, of what Samuel Johnson wrote of a contemporary whose manuscript he had just read: "The good portions he likely stole from someone else, the rest, which is bad, is presumably his own."

**SPECIFIC CONSIDERATIONS FOR IMPROVING OUR TECHNIQUES**

Refrigeration is one of the most important factors in food sanitation. While we go to great lengths to insure strict adherence to temperature requirements in milk processing, we have much less effective control over refrigeration of other foods. Our standards are lower, and our means of knowing whether requirements are being met are less adequate. In general, recording thermometers and dated temperature charts are not widely used to guide us with respect to the environment within the food refrigerator. Nor do we have specifications for the sizes, shapes, and conductive of containers in which foods are placed, so we can be assured that the body of a given food will reach a specified temperature in a specified time. Toward the other end of the temperature range, we need increased use, for example, of meat thermometers to be sure that we are killing, not incubating, organisms which cause illness.

Speaking of meat, it is hardly necessary to call your attention to the need for improved sanitary practices in the poultry industry. Likewise the meat industry should assume responsibility for eliminating the insanitary practices still found in some meat processing establishments, both large and small.

Of the 347 reported food-borne outbreaks in 1936, at least half of them—and approximately half the resulting cases of illness—occurred in places which are not generally covered by established public health control programs. They occurred mostly in private homes, schools or colleges, penal institutions, hospitals, and at public gatherings. We can combat these outbreaks by more intensive education; but certainly, we should also give a good deal more direct attention to these places which now receive very little or none of our attention. In order to do so, we may have to "delegate" more responsibility to public eating and drinking establishments and to food industries for enforcement of standards of sanitary practice in their own establishments. The humble housewife, as she pays the grocery bill and in turn possibly even the taxes which may defray part of your salary, some day may ask why the meat she has just purchased is not required to be "U. S. or State Inspected," like that which is sold by the restaurant next door.

Revolutionary changes are taking place today in milk and food production, processing, packaging, and distribution. Fruit juice processing is undergoing intensive research, especially in the development of new freezing and heating methods for preserving juices without impairment of taste. Dried milk and skimmed milk are assuming new roles in our daily diet. Radiation sterilization of food boils in and out of our conversation; whole meals are packaged in cellophane. The loaf of bread you used to be able to "test" by the "squeeze method" sometimes seems to defy the laws of elastic limits. Even the time honored and almost universally established methods of milk pasteurization are giving way to new methods which provide equal protection against pathogens and also hold promise of keeping the milk fresh for months instead of days—without refrigeration. Such developments will mean many changes in our public health practices.

**POSITIVE ASPECTS OF FOOD**

Thus far we have been talking about the negative aspects of food—the hazards connected with its use. There is a positive side to food which is—or should be—of interest and concern to us.

As pointed out by Wilder, the human body requires for growth, maintenance and productive activity a mixture of foods of good nutritional quality—in other words, a diet which will supply at regular intervals a minimum of each of 30 or more nutrients. With all the possible combinations and variations of this number of nutrients we can see that the positive effects of food on life, vigor, mental alertness, resistance, and reaction of the body to disease, is a complex matter. It is one which is not yet completely understood. Nevertheless, a great deal is known about nutrition, and some of the proven principles are being applied. Among applications which you will identify readily are the use of vitamins with the consequent eradication of diseases like pellagra, the use of iodized salt to prevent goiter, and the fluoridation of drinking water to reduce tooth decay. These are positive applications, as distinguished from practices like chlorination of water supplies, pasteurization of milk, and high temperature treatment of the foods we preserve.

The positive food practices we have mentioned are merely the initial steps in a vast new field of endeavor. In the first place, most of
what has been done—such as in the enrichment of white flour and bread—has been on a voluntary basis. Moreover, in order to obtain the most widespread benefits, the population must be educated to know what to buy for what purposes. This education process is expensive, and, more serious, it may not reach the groups who need it most.

We are well aware of the natural resistance in a democracy to mandatory requirements. Nevertheless, there are numerous examples of public willingness to accept such requirements when they can be shown to be of the greatest good to the greatest number. The minimum butterfat content of milk prescribed in most milk control ordinances is an example of a positive requirement that has won public acceptance. So are the requirements in more than half the states that all white baker's bread, and all family flour, be enriched. Before the development and issuance by the Food and Drug Administration of a standard for enriched flour, there were some 17 kinds of fortification. The regulation accompanying the standard brought welcome order out of chaos.

The net result in the case of both milk and bread has been good. Along the way, however, a number of problems arose. The fortification of bread in some cases was so minimal that it was hardly worthy of the term. The baker who honestly fortified his product was subjected to unfair competition—because the general public was not in a position to differentiate. Since there are almost no limits to what can be added to such universal vehicles as milk and bread, public confusion and loss of faith can easily result.

Development of Standards

All of us are familiar with the fact that the processing of food can change its nutritional qualities. There is sufficient loss of vitamins in the roller milling of wheat into white flour to make restoration through enrichment advisable; vitamins and amino acids may be altered even with greatly improved canning processes. The public is, therefore, still faced with some dilemma in knowing when they are buying the right thing.

The experience of England in World War II is very significant in pointing to some possible answers. Faced with heavy curtailment of food imports, the government found it necessary to assume responsibility for the character and distribution of foods. Such vulnerable groups as the sick, pregnant women, children, and persons doing exceptionally heavy work received adequate amounts of basic foods such as milk, meat and eggs and distribution of all such foods was strictly rationed. It was required that bread (made from undermilled flour) further be enriched with calcium, and that margarine be fortified since they had almost no butter. The result of this total program was that people who previously were not eating minimum acceptable amounts of certain nutrients were now getting them. Indexes of health which had worsened in previous wars were actually improved. Infant mortality, maternal mortality, and tuberculosis death rates dropped; the health of the people was demonstrably improved in other ways.

We have touched on some of the parallel developments in this country with respect to food itself. Much more remains to be done. On the food equipment side some noteworthy progress has been made. First, there are the “3A” standards for dairy equipment. More recently, there is the cooperative arrangement through which the National Sanitation Foundation will promulgate national standards for dairy and food service equipment. The development of these standards is made possible by the joint participation of the industry and its task forces, six national organizations interested in the health aspects of food, and the Foundation. Like the “3A” standards, these standards will meet a long and urgently felt need. The international Association of Milk and Food Sanitarians is to be commended, not only for their participation in the “3A” and NSF programs but also for providing leadership in their formulation.

With this fine precedent established, would it not be possible to establish a parallel mechanism for standards of quality—specifically minimum nutrient quality—for basic foods? As illustrated by the early chaos regarding enriched flour, a label—such as fortified or enriched—can mean a lot of different things. You have an opportunity here to give real meaning to the word “quality” by establishing, in collaboration with national groups skilled for those foods which are consumed in quantity by almost everyone. The interest of the public in a matter so vital to life and death, is such that we can hardly afford to be guided by a policy of “let the buyer beware.”

Chemicals in Foods

In this chemical age we cannot escape the influence of chemicals on our daily lives. The Select Committee to Investigate the use of Chemicals in Foods and Cosmetics—the Delaney Committee—has sought among other things to determine the effect of chemicals on the health and welfare of the Nation. The Committee's reports have been released and many of you are familiar with them.

It is clear that we need more research to determine the acute and chronic toxicity of chemicals which are to be added to foods. Not so clear is the division of responsibility between industry and Government for the basic research in toxicity leading to the development of standards of maximum allowable concentration; and the promulgation and enforcement of such standards. As these questions are subjected to the free and open debate of a democratic society, answers will emerge. As milk and food technologists representing a broad cross section of the parties at interest you have a major responsibility to assist in the development of a sound public policy.

Reclamation of Community Food Wastes

Another related field of development we should be thinking about is the salvage or reclamation of community food wastes. It has been said that some countries could live on what we throw away. Composting of garbage and other organic refuse is, for the first time, being seriously considered in this country. We can expect, as the necessary processes are developed, that many communities will adopt this practice and thus convert their wastes to a valuable humus-fertilizer that can be returned to the soil. Such a development may hold real promise for effective control of trichnosis, vesicular exanthema, and other human or animal diseases. Another

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example is the current research on recovery of organic materials in sewage by growing algae in photosynthetic sewage oxidation ponds. The algae may be a valuable cattle food. The whole process thus may be considered one which salvages the fixed nitrogen contained in sewage and converts it to beefsteak. Hydroponic* farming for the production of raw vegetables is moving forward rapidly in other areas of the world and may not be as far in the future for this country as it may seem now.

More and more we can see that our activities in milk and food are closely related to other activities in health and sanitation. Thus we share in a mutual responsibility for integrating our work with the broad effort in health.

The milk and food industry is moving forward in high gear. If we are to keep up with it we will have to find ways to get more miles to the gallon. We can do this by critical examination to eliminate that which is not strictly essential; and by administrative and technical research to do the essential things more efficiently. This should make available funds which will permit us to develop new techniques to meet new problems as they emerge; and to probe the unknown so these new problems will not truly be new but rather ones which we intelligently anticipated.

If we equip ourselves to accept change, our job will be easier. We should change our requirements as the conditions underlying them change—or as fuller knowledge points to a changed approach. Two recent examples come to mind in this connection: First, the development of a modified interpretation of milk ordinance requirements in relation to anthrax in cattle; and second, recognition by both the National and North Central States Brucellosis Conferences that while ideally we should, and in many areas do, obtain our market milk from brucellosis-free cattle, the ultimate goal must be reached without bringing economic ruin to the producer. They have recommended requirements which provide satisfactory health and economic protection, while moving positively toward the desirable goal of virtual brucellosis eradication.

*Editor—Soil-less agriculture, using nutrient solutions.

It is this spirit of change that we need to preserve a dynamic milk and food-technology in a constantly changing society. For in this business "when we’re through changing, we’re really through."

REFERENCES


Chancing Responsibilities

Harold Wainess, Chief Sanitary Officer of the Chicago Health Department, on leave from his duties as Regional Milk and Food Consultant of the U. S. Public Health Service, has resigned from both organizations to enter private practice as a milk and food consultant at 228 North LaSalle street, Chicago, Illinois.

After over ten years of service with the U. S. Public Health Service, he will specialize in assisting manufacturers of various types of equipment used in the milk and food industry and in industrial sanitation in order to aid them in operating and building equipment that will meet the various public health requirements of governmental bodies throughout the United States.

He will also be engaged in problems of public health relative to the operation of various milk and food and industrial processes that will result in the production of products acceptable both to the public and public health authorities.

Associated with Mr. Wainess will be two laboratories in the fields of biochemistry and bacteriology.

Mr. Wainess was associated with the U. S. Public Health Service since 1943 and has worked in the capacity of a milk and food consultant for them in California, Oregon, Washington, Arizona, and Regional Offices comprising the mid-western and southern states.

Prior to that, he was employed in various capacities in the dairy industry, and has spent a number of years as a trouble shooter for the York Corporation, York, Pennsylvania.

He holds a Master of Science degree in Agriculture from Purdue University, and a degree in Bacteriology from Brooklyn College.

Among the many organizations in which Mr. Wainess has membership are the 3A Sanitary Standards Committee of the International Association of Milk and Food Sanitarians, the American Public Health Association, the American Dairy Science Association, the Society of Illinois Bacteriologists, and the Chicago Public Health Engineers.

He is also a consultant to the Baking Industry Sanitation Standards Committee, and has published many papers in the fields of milk and food sanitation.