

## SANITATION IN BULK FOOD VENDING\*

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The dispensing of food from vending machines is a new development in the food industry, and is increasing. They should be supervised by the health authorities as to construction and performance of the machine, the contamination of the foods before and during service, the perishability of the foods themselves, the need for a standard control ordinance, and control problems that must be faced.

### FOOD CONTAMINATION

The most widespread outbreaks of disease occur where disease germs multiply in foods; however, serious illness or death may result where the food or the food container acts as a mechanical carrier-fomite. For example, the drinking glass or cup may be the means of conveying respiratory type disease from the infected to the non-infected individual where the cleaning and sanitizing of the utensil were neglected or the properly cleaned and sanitized utensil may have been finger-printed with disease germs from an infected or contaminated food handler.

No matter how the food or its container may have been contaminated, disease may result. A properly handled food or its container need not be contaminated. There is really no excuse for food poisoning because simple hygienic procedures are effective barriers. Salmonella and staphylococcus poisonings are the result of gross ignorance, disbelief, or misunderstanding on the part of the food handler. Every epidemic, every outbreak, every individual case of food-borne disease can be directly traced back to a food handler. The refrigerator, the dish-washing machine, or the utensil are no better than the operator who uses them.

Many years ago the bulk vending of food undoubtedly was responsible for many epidemics due to improper storage, improper packaging, and improper handling. With the advent of packaging in individual containers, for example, bottled milk, many of the avenues of contamination were effectively closed and a new era of food sanitation

was established. No one questions the packaged article today, provided the food entering the package is of sanitary quality, the package processing is done properly under strictly sanitary conditions, and the shipping and handling of the product is in keeping with the perishableness of the product, for example, packaged fresh meat.

### MECHANICAL VENDING

Now, in keeping with rapid strides in the mechanization of our living, a new era in food dispensing has appeared, namely, the mechanical vending of bulk carbonated beverages, fruit juices, milk, coffee, hot chocolate, and soup. Thus a food service is now available to the public at locations where manually served foods would be impossible.

Suddenly we have these food services made available wherever people congregate: subway, railroad stations, street corners, and industrial plants and schools. The public likes this coin-vended service because of easy access, and as a result a new growing industry has developed. Most communities have seen this industry spring into existence before the health authorities had time to evaluate the public health hazards that may evolve. The health authority has found that he now has numerous miniature food establishments serving carbonated beverages, fruit drinks, milk, coffee, and hot chocolate without the constant supervision of human attendants; instead, a robot that is activated to serve food in a paper cup by the introduction of a coin, appears.

As long as the robot machine is supplied with the necessary ingredients, it obediently will serve. Human contamination of the food or its container has been eliminated as each portion is served, which is undoubtedly an advancement in sanitation. But on the other hand, if poor quality ingredients are placed in the machine, the robot does not distinguish between good and bad, so it may continue to serve as long as patrons are willing to deposit coins.

The health authorities in every community, aware of health haz-



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ards, want to know how these mechanical food establishments work, how they are made, what kind of products are vended, how they are protected against spoilage, and how the operator maintains the machines. He should know and he should take steps to protect the welfare of the public. If health hazards exist, assuming that all vending of foods in these machines is safe, the health authority should still require a registration of each machine in his territory. He should approve the site for each machine and he should carefully investigate each operator, evaluate his knowledge of food handling, and, where he is found lacking in knowledge of sanitary food handling, he should be trained either through schooling by the health agency or some other approved agency. The health authority should also be sure that the operator has the necessary equipment to service the machine prop-

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erly both in the field and at the central distribution center. These would be the minimum requirements depending somewhat on the product dispensed irrespective of health hazard.

#### PERISHABILITY OF PRODUCTS

The food product dispensed can be placed in three categories as it pertains to perishability, namely, non-perishable, semi-perishable, and perishable products.

##### *Non-Perishable and Semi-Perishable*

Such products as candy bars, peanuts, popcorn, and gum can be classified as non-perishable provided the dispensing units are serviced at least once a week. The fact that a food is catalogued as non-perishable does not necessarily mean that no health hazard exists because such bulk products as popcorn and peanuts can be contaminated mechanically by shipping containers, hands of operators, and hand contamination by the consumer. The dispensers should be safeguarded mechanically against consumer contamination, and the operator should be taught proper handling and servicing procedures.

Products that can be classified as semi-perishable would be carbonated beverages and powdered food drinks (coffee, chocolate, soup). The term semi-perishable would mean products that will not readily spoil so that the operator may make additions to supplies in the machine over a period of a week or more without increasing the hazard of pathogenic bacteria or increase of spoilage organisms.

Carbonated beverage syrups may be placed in this category provided the syrups contain ingredients inhibitory to pathogenic and saprophytic microorganisms. For example, the nationally known fountain syrups carry pH values ranging from 1.8 to 3.7. Thus pH values range from a point of quick acting germicidal action (pH 1.8) to one of more gradual kill (pH 3.7)—in no instance will pathogens multiply. Most pathogenic organisms will be inhibited at pH values of 4.5-5. Molds may grow slowly within this range, and inasmuch as they will utilize the organic acids for food, multiplication may be increasingly rapid when the acid content is diminished. An empty, unwashed syrup tank may mold rapidly because the volume of acid pres-

ent in the thin syrup layer on the container is small.

These syrups also carry sugar contents ranging from 47 to 65 percent. Such sugar contents exhibit high osmotic pressures making it very difficult for bacteria to exist and inhibiting growth of molds except in exposed sugar layers and then only in limited amount in the presence of oxygen.

The high sugar contents and low acidities, frequently coupled with 0.1 percent sodium benzoate, protect the syrups against the survival of pathogens and most saprophytic organisms with the possible exception of molds.

##### *Non-Perishable*

The dried products, coffee, soup, etc., could in a sense be classified as non-perishable; however, since they are introduced into water in a mixing bowl within the machine, a semi-perishable classification is justified.

The containers, service lines, and valves should be constructed of non-toxic, non-corrosive materials, and the equipment should be so designed that cleaning is facilitated. The parts should be easily disassembled or so constructed that flush washing can be used successfully. Although the public health hazard of syrup containers and lines is negligible, still a spoilage problem may occur where servicing is not properly performed, or where design prevents proper cleaning.

The water supplies of the carbonated beverage machines are those of the building supply. Thus the potability of the water will be the same as that from any other tap on the system. If filters or other devices are placed in the lines, the same precautions should be taken in the installation that would be required for the introduction of such devices in any water line.

If cooled water is stored in the machine, the storage tank should be so designed that replacement of water in the tank does not permit short circuiting. If the water becomes stagnant, bacterial reproduction occurs and off-tastes may be imparted to the drink.

##### *Perishable*

The third group of vended products can be classified as perishable. These products include milk, cream and fruit juices. Refrigeration becomes extremely important because

these products are excellent media for many kinds of microorganisms, particularly saprophytic bacteria, yeasts, and molds. Fruit juices are particularly susceptible to those organisms that prefer a slightly acid medium for growth such as yeasts and molds. Both yeasts and molds will grow slowly at temperatures of 45-50°F. The writer observed that at a temperature of 38°F, yeasts grew very slowly whereas a rise of 4° to 42°F showed a surprising increase. The writer recommends that the maximum temperature for fruit juices should be 40°F.

The use of temperatures of 45-50°F, where a fruit juice was held for periods in excess of a week, yielded a product high in yeasts, and that was attractive to fruit flies that were drawn to the product as a result of the fermentation that was occurring.

Milk and cream carry bacterial flora familiar to all sanitarians. There is little need to point out that such pathogens as typhoid, paratyphoid, dysentery, bacilli, staphylococci, and many others find milk a desirable medium for multiplication. For this reason milk and cream must be surrounded with the same safeguards in the vending machine as those exercised for bottled milk. Milk and cream should be packaged at the dairy and the same precautions in cleaning and filling the large containers (5 and 10 gallon cans) should be exercised as those required for bottled milk. Post-pasteurization handling must be aseptic, and if manual filling is to be allowed, extreme care must be practiced.

If bulk vending of milk is to be adopted in place of bottled milk in our public eating establishments, the dairy supplying such milk should be urged to provide special cleaning, sanitizing, and filling equipment comparable to that used for bottled milk.

The writer can see no change in health hazard by the use of 5 or 10 gallon containers provided the container is protected in the manner comparable to that given a bottle of pint, quart, or gallon capacity, and the dispensing of the product is done in a sanitary manner.

Milk and cream should be stored in the vending machine at temperatures not to exceed 38°F.

The bacterial spectrum of milk and cream stored in the vending machine would be the same as that obtained in bottles stored at the same temperatures. The quality would be identical. The growth of psychrophilic bacteria would occur in the same manner so that storage periods within the machine should be the same as that for bottled products.

In the case of milk or cream, the vending tubes, valves, and spouts preferably should be single service or if of multiuse design they should be returned to the dairy with each can for cleaning and sanitizing. The vending equipment must be so designed that it is fully protected against contamination during shipment.

In the case of fruit juices, a product packaged at a central service station is preferred, for it would be possible to transfer the packaged material to another receptacle in the machine for dispensing. However, the receptacle in the machine should be cleaned at a central point and replacement made each time the machine is serviced. The health hazard from fruit juices would be much less than that from milk because the acid juices are not favorable media for the growth of pathogenic bacteria. Most pathogens as you likely know, prefer a medium with a neutral or slightly alkaline reaction. The juices are excellent media for molds and yeasts; hence precautions must be exercised to avoid introducing contamination initially, to protect the product by refrigeration in the machine, and replacement in the machine should be frequent.

#### ORDINANCE NEEDED

There is a need for a model ordinance for the operation of coin vended food products so that the cities throughout the nation will have uniformity; hence avoiding the multiplicity of specifications that exist in present food ordinances that make it nearly impossible to design equipment that meets the requirements of the various communities.

Any model ordinance should be so planned that it covers all phases of mechanical vending that involves food products. The ordinance should preferably consist of three sections, namely: (1) perishable products, (2) semi-perishable

products, and (3) non-perishable products. The design and management of the equipment for the various food products may be quite different. If design and management were planned for perishable products, hardships might be imposed in handling on the non-perishable or semi-perishable products that were not in keeping with health hazards and food quality.

#### PROBLEMS TO BE ANSWERED

The vending machine is a relatively new development. It should be carefully examined for possible health hazards as well as a means of eliminating health hazards that now exist in our present manual means of food distribution. Each new development in the food industry generally aids in the elimination of some problems but sometimes creates others which may be greater than those already in existence.

Our prime objective as health workers, whether we are in regulatory work or at the research laboratory bench, is to lessen the incidence of disease. For this reason, we should examine the vending machine critically with the following questions in mind.

Does this device increase or decrease health hazards in vending food?

Where are the health hazards: in the food itself, the vending equipment, the management, or maintenance?

How important are these health hazards in relation to other health hazards in the community?

Is the health hazard one of progressive contamination (multiplication or disease organisms) in the food product or is it one static contamination?

What diseases could be spread by means of vending machines, considering the food vended?

Would the diseases be epidemic in nature or would only sporadic cases occur?

Has the product dispensed been a common source of disease under other methods of distribution?

If certain parts of the machine or operation practice are important health hazards, what steps should be taken to rectify the conditions?

Each health worker, who may be responsible for the supervision of vending machines, should acquaint himself with the literature on the

vended products and the environmental conditions that affect the products beneficially or detrimentally. Most books on food technology and bacteriology will give the answers either in direct statements on the particular food in question or in basic data on the physical, chemical, and biological behavior of the products.

After a careful health hazard evaluation of the machine, food quality should be considered. Is the machine delivering a quality product? Is the source material satisfactory? Is the material properly stored and vended so that the consumer receives an acceptable product?

Food quality is indirectly the responsibility of the health worker because the intake of quality food may aid in the resistance of the individual toward disease. It is not the purpose of this paper to attempt to limit the boundaries of activity for the health worker but to call attention to the need of a careful evaluation, health and quality wise, in planning the acceptance or rejection of a new mode of food service. This type of analysis should be applied to every phase of health work so that the citizens of our nation will receive the best return from their investment.

#### OREGON STATE COLLEGE, SHORT COURSE

The 43rd annual short course and convention of Oregon Dairy Industries will be held in Withycombe Hall, Oregon State College, February 15, 16, 17 and 18, 1954. The first two days will be devoted entirely to short course and the last two days to convention. A full program of technical lectures, demonstrations, and discussions of timely interest is being prepared. Dr. G. M. Trout, Professor of Dairy Industry, Michigan State College, has been secured as the principal out-of-state speaker. Samples of dairy products for the contests held in connection with the convention must be sent to Corvallis during the first week in February. Entertainment features will include social hours, a men's smoker, a luncheon, and a banquet.