Control of Microorganisms

The control of microorganisms is one of the major concerns of food microbiologists. This control is needed to retard or prevent spoilage and to reduce or eliminate health hazards associated with foods. The control of contaminants also aids in obtaining better results when specific microorganisms or enzymes are used in food processing.

Four basic systems are used to aid in the control of microorganisms in foods. These are (1) prevent contamination (asepsis); (2) remove contaminants; (3) inhibit growth; and (4) destroy contaminants.

In most food products, two or more of these systems are used to control the microbial level. Preventing contamination is practiced for all foods, but since contamination will still occur, other safeguards are needed.

Besides controlling the microorganisms, foods must be protected from reactions that are catalyzed by inherent enzymes, from chemical degradation such as fat oxidation, loss of nutrients, and from the destruction by pests, such as insects and rodents. There are various chemicals and procedures that will control microorganisms and pests but cannot be used for foods. This is because the food must be safe for consumption, be of acceptable organoleptic quality, and have good nutritional value.

Although the control of microorganisms in food is usually relegated to the food processor, everyone involved in the production, processing, handling, warehousing, retailing, preparation, and serving should be involved in the control process as well as in maintaining a safe and nutritious food supply.

The need for this overall effort is evident from the fact that only a few outbreaks of foodborne illness are caused by problems at the processing level. Most of the outbreaks are caused by mishandling and contamination of foods at foodservice establishments or in the home.

In some cases, we assume that a food will be handled and used in a particular manner; but this assumption may not always be correct. For example, we assume that people will cook meat before eating it. However, a series of outbreaks of salmonellosis revealed that some people thought that eating raw hamburger would make them healthy, strong, and vigorous. Because of such misuse of foods by some people, it is necessary to take precautions beyond the normal processing requirements.
food microbiologist must be aware of all aspects of a food, from production to consumption.

A primary function of food processing is the preservation of foods. This preservation ranges from short periods of a few days or weeks to long terms of a year or more. Preservation by the removal, inhibition, or destruction of microorganisms is easier and the results are more satisfactory when the original microbial index of the food is low. Keeping the contamination low by sanitary means is very important.

CONTROL BY ASEPSIS

If all of the microorganisms in a food were either useful or inert, we would have no concern about them. Unfortunately, the spoilage and health hazard types are quite prevalent. Generally, the higher the microbial load, the greater the possibility that undesirable types are included. The exceptions are foods in which specific microorganisms are grown to produce desirable products and a high level of the useful microorganism is needed.

It is much easier to inhibit or destroy low numbers of microorganisms than high numbers. A food with a low microbial load will generally have a longer shelf life than a food with a high microbial level. The shelf life is the time after packaging during which a food maintains its best quality if it is stored under proper conditions of humidity and temperature.

Because microorganisms are ubiquitous, it is impossible to keep them from contaminating food. However, we can reduce contamination by controlling the potential sources of microorganisms.

The control of contamination is referred to as sanitation. Sanitation may be defined as a modification of the environment in such a way that maximum health, comfort, safety, and well-being are ensured for people. The sanitation involved in the food industry is only a small part of overall sanitation.

The control of the microbial quality of food must begin with the production and harvesting of food. Then it must carry over to the processor and on to the ultimate consumer.

Production and Harvesting

The raw materials used by the food processor affect the quality of the finished product. To have adequate supplies of high-quality raw materials with acceptable microbial loads, the food processor must work closely with the producer or become the producer. In some cases, a food processor who is also the producer seems to be the best method. As a result, we