9 Cleaning and disinfection: methods

9.1 Introduction

The operations of cleaning and disinfection are essential parts of food production and the efficiency with which these operations are performed greatly affects final product quality. A prerequisite for an efficient sanitation programme is that the factory and the equipment therein have been designed with high standards of hygiene in mind; the most effective sanitation programme cannot make up for basic deficiencies in equipment and factory design and if design faults exist sanitation can never be totally effective.

The surfaces of the equipment used in the manufacture of foods inevitably become soiled and require cleaning. If not continuous, cleaning must at least be performed at regular and frequent intervals so that a consistently good quality of product is maintained. How this cleaning is done depends principally on: (1) the nature of the soil or contamination to be removed; (2) the type of surface to be cleaned; (3) the materials used for cleaning; (4) the degree of water hardness; and (5) the standard of cleanliness required.

The basic steps in cleaning can be summarized as: (1) the removal of gross soil or dirt; (2) the removal of any residual soil with detergent; and (3) rinsing to remove detergent and soil. The first step is omitted where continuous cleaning or CIP systems are installed. But cleaning often needs to be followed by disinfection (sanitizing) or sterilization which involves two further steps, viz. the disinfection or sterilization of surfaces with suitable agents to destroy microorganisms and the rinsing off of these agents.

Since the reader may well be confused by the terminology used in cleaning and disinfection technology, a short definition of the more important terms is given below.

9.2 Definitions

**Bactericide** – A chemical agent which, under defined conditions, is capable of killing vegetative forms of bacteria but not necessarily bacterial spores.

**Bacteriostat** – A chemical agent which, under defined conditions, is capable of preventing the growth of bacteria (N.B. many bactericidal agents may act as bacteriostats at low dilutions)

**Clean surface** – One that is free from soil of whatever form and is odourless. Thus it is one from which food debris, detergents and disinfectants have been removed. It will not contaminate foods in
contact with it and has residual numbers of microorganisms, if any, that could not undermine product quality during subsequent production. A clean surface is not necessarily sterile.

Cleaning – Covers those processes concerned with the removal of soil from surfaces but not those concerned with sterilization.

Detergent – A substance which assists in cleaning when added to water.

Disinfectant – Originally defined in medical terms as a chemical agent which destroys disease-producing organisms; now more correctly defined as an agent capable of destroying a very wide range of microorganisms but not necessarily bacterial spores.

Disinfection – Covers those processes concerned with the destruction of most microorganisms, but not necessarily bacterial spores, on surfaces and in equipment. Any viable microorganisms remaining are not capable of affecting the microbiological quality of foods coming into contact with the disinfected parts.

Fungicide – A chemical agent which, under defined conditions, is capable of killing fungi including their spores.

Sanitation – An all-embracing term covering those factors which assist in improving or maintaining man’s physical wellbeing including the general cleanliness of his environment and the preservation of his health.

Sanitizer – A substance that reduces the numbers of microorganisms to an acceptable level (N.B. this term is widely used in the USA and is virtually synonymous with the popular use of the term ‘disinfectant’).

Sanitizing – See ‘disinfection’.

Soil – Any unwanted food residue, organic or inorganic matter remaining on equipment and other surfaces.

Sterilization – The process of destroying all forms of life, including microbial life.

Sterilizer – A chemical agent capable of destroying all forms of life.

9.3 Types of soil

The type of soil to be removed varies according to the composition of the food and the nature of the process to which the food has been subjected. However, the food constituents themselves vary tremendously in terms of their cleanability (Table 9.1) so that a wide choice of cleaning materials must be available for their removal. Food residues may be dry particulate, dried-on, cooked-on, sticky, fatty or slimy. Such residues may be best removed by physical means or by the use of hot or cold water almost invariably supplemented with detergents of one type or another. The length of time a food residue is left undisturbed also affects the ease of cleaning. For example, fresh raw milk can be readily washed