

Chapter 4

Food Microbial Hazards, Safety, and Quality Control: A Strategic Approach


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ABSTRACT

Food is any material or substance eaten or drunk to provide energy and nutrients for the body's growth, development, and maintenance. Food can be considered safe if it is free from all hazardous substances that can affect consumer health. Food safety issues can place a high burden of responsibility on traders, government bodies, and international organizations. This chapter covers the hazards, their types, foodborne diseases, and strategies to ensure food safety and quality. Different food quality and safety assurance programs are discussed as well like quality management systems, HACCP certification, ISO 9000 family, good manufacturing practices (GMP)/good hygiene practices (GHP), total quality management (TQM), good working practices (GWP), good lab practices (GLP), etc. Moreover, the role of some novel processing technologies is also focused on in this regard.

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INTRODUCTION

Food is any material or substance eaten or drunk to provide energy and nutrients for the body's growth, development, and maintenance. It is usually of an animal or plant origin consisting of nutrients like fats, proteins, carbohydrates, vitamins, and minerals (Abdulummeen et al., 2012). Food is the basic precondition for survival but food quality and safety issues embrace us all time (Jeukendrup & Gleeson, 2018). According to the Food and Agriculture Organization of the United Nations (FAO), food quality can be defined as “a complex characteristic of food that determines its value or acceptability to consumers” (McLoughlin et al., 2017; Nielsen, 2010). Basic quality control and quality assurance programs are used by food industries like other industries for achieving food quality e.g. ISO 9000 Quality Management System Standard, HACCP system, GMPs, etc. (Hubbard, 2012; Nguz, 2007).

Food can be considered safe if it is free from all hazardous substances that can affect consumers' health. In pre-historic times, the food safety chain was very short; it compromised hunter-gatherers and their families. When societies grew complex and larger, this chain became more diffused due to an expanded international trade network and long shipping distances (Gorris, 2005). This chain can be a reason for introducing unfamiliar food safety hazards during food transportation. This situation places a high burden of responsibility on traders, government bodies, and international organizations. There is a need to improve food safety regulations and systems to ensure the safety of consumers by taking multidimensional approaches at all levels of the food chain, from farm to fork (Gorris, 2005; Jeukendrup & Gleeson, 2018; Unnevehr & Huirne, 2002).

FOOD HAZARDS

Food hazard can be characterized by any physical, chemical, or biological agent that has the potential to exert harmful effects on human health (Peter et al., 2013).

Physical Hazards

Physical hazards are any poisonous or deleterious foreign objects incorporated into food that have clinical evidence of injury or traumatic injury including perforation of tissues present in the oral cavity and gastrointestinal tract if ingested. This includes hard or sharp foreign objects and choking hazards. Contaminants like dirt, hair, insects, wood splinters, glass, and metal are included in the category of physical hazards (Das et al., 2019). Potential sources of these hazards include:

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