Food quality and safety principles and practices are rooted in laws, regulations, customer, and consumer expectations. Since the 1970s, the food industry has been shaped by evolving consumer demands (nutrition, convenience, additives), food safety incidents, environmental concerns, regulatory changes, traceability advancements, technological innovations, biotech foods, irradiated and organic foods, economic factors, international trade, and bioterrorism concerns. Food quality and safety are addressed through quality management, assurance, control, HACCP, and GMPs. "Food" encompasses unprocessed, semi-processed, and processed items intended for consumption, including ingredients and food-contact substances. This broad scope covers existing and new/modified foods, requiring safety and quality considerations from conception. Responsibility is shared among the food industry (legal and moral obligation), government regulatory agencies, and consumers. Governments enact laws and regulations to protect consumers from unsafe foods and deceptive practices, enforcing these through various agencies. Customers ensure raw materials and packaging are safe, while consumers must be vigilant in assessing food safety and following handling instructions. Although often used interchangeably, food quality (meeting established requirements) and food safety (meeting requirements preventing harm) are distinct. Food safety is paramount, and non-conformity to safety requirements automatically implies non-conformity to quality requirements. Food safety is integrated into quality assurance/control programs and quality management systems, with HACCP providing a dedicated framework. Government agencies use HACCP-based programs (e.g., FDA Seafood and Juice HACCP, USDA Pathogen Reduction, CFIA Food Safety Enhancement) for monitoring and enforcement, though these may not encompass all quality aspects. Food quality includes characteristics like identity, quantity, components, appearance, flavor, aroma, texture, shelf-life, fitness for use, wholesomeness, adulteration, packaging, and labeling. Non-compliance with regulatory requirements or spoilage can represent quality failures. Codex Alimentarius defines food suitability (distinct from safety). Quality programs (activities ensuring requirements are met) and systems (integrated documented activities) are used in the food industry. Quality control programs involve inspection, testing, and monitoring of raw materials, processes, and finished products. Total Quality Management (TQM), incorporating management principles and quality concepts, aims for competitive advantage. Food safety ensures food doesn't cause harm under intended use. Harmful substances are food safety hazards, and safe food requires eliminating or reducing hazards to acceptable levels and adhering to GMPs. For decades, the industry relied on inspections, testing, and GMPs; since the late 1980s, HACCP has been widely used for prevention. GMPs are incorporated into HACCP prerequisite programs. Food laws and regulations (e.g., US FDCA, Canada's Food and Drugs Act, US CFR Title 21, Canada's Food and Drug Regulations) protect consumers from harm, adulteration, misbranding, and fraud. Enforcement involves inspections and analyses to ensure compliance. Food standards (e.g., Codex Standards) establish requirements but aren't legally binding unless incorporated into regulations. GMPs define minimum sanitary and controlled conditions for food processing, handling, and storage. Food safety hazards (biological, chemical, physical) can originate from naturally occurring substances, deterioration, or contamination. Acceptable levels are established by governments and Codex Alimentarius; some hazards (e.g., Salmonella) have zero tolerance. Risk analysis (assessment, management, communication) establishes food safety

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objectives (maximum acceptable hazard levels). Hazard analysis, the first HACCP principle, assesses health risks. Biological hazards include pathogenic bacteria (Salmonella, E. coli, Listeria, etc.), viruses (hepatitis A, E, Norwalk), and parasites. Chemical hazards include permitted food additives (potential hazards if exceeding levels), naturally occurring harmful compounds (oxalates, alkaloids, toxins), agricultural residues (pesticides, drugs), industrial contaminants (heavy metals, PCBs), chemical residues from processing, prohibited chemicals, and food allergens. Physical hazards are foreign objects; avoidable hazards include glass, plastics, metals, wood, stones, and personal articles. Other concerns include biotech foods, irradiated foods, and herbal supplements. Free radicals (oxidation) cause damage by initiating chain reactions. Antioxidants prevent or stop these reactions. Various quality programs and systems are used to achieve food quality and safety requirements. Quality control aims to detect unacceptable hazards or defects.

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