

Food quality

[Nutrition](#), [Food Safety](#)



FOOD QUALITY Quality * Relates to excellent product or services that fulfill or exceeds our expectations Food Quality * Includes all attributes that influence product's value to the consumers. This includes, Negative attributes (e. g. spoilage, contamination with filth, discoloration, off odors & flavors; Positive attributes (e. g. origin, color, flavor, texture and processing method used -Food Quality is a term which may refer to several things: $\hat{\text{a}}^{\text{TM}} \text{£}$ the extent to which food contains the nutrients that match the kind and quantity of the nutritional needs of the person consuming the food $\hat{\text{a}}^{\text{TM}} \text{£}$ the extent to which the food is attractive in appearance & taste $\hat{\text{a}}^{\text{TM}} \text{£}$ the extent to which food is free from pathogenic bacteria & undesirable materials such as insecticides & antibiotic residues, etc FOOD QUALITY 1. Composite of characteristics/ attributes which differs from one unit to another 2. Totality of features/ characteristics of a product that bear on its ability to satisfy a given need: Needs: Safety Usability Availability Economics Maintainability Environment Reliability 3. Uniformity, consistency and conformity to a given standard or specifications 4. A statement of what the user wants & what the manufacturer can provide 5. " Fitness for use", " satisfaction level of costumers" Other Ways of Describing Quality 1. Fast selling brand of a food product might be labeled as " Extra Special Quality" 2. Products that are sold abroad may be termed as " Export Quality" 3. Some consumers may gauge quality in terms of brand popularity 4. From the large producer's point of view, quality may mean product reliability Small manufacturers — reliability may not be a concern, their concern is more on sell of the products. 5. In a seller's market situation, product availability means quality Quality of Food is Based on the following: 1. Raw material — the quality of finished product is

dependent on the quality of raw material

2. Sensory quality — food quality detectable by our senses can be categorized into 3: - appearance - texture - flavor
3. Microbiological quality - raw material and products should be free from toxin-producing microorganism

QUALITY CONTROL Is Doing Things Right THE FIRST TIME AND EVERYTIME

Quality Control can also be defined as

- a. maintenance of specified finished product characteristics every time it is manufactured
- b. efficient control of raw material and of production process
- c. object of quality control is to produce a quality which: - satisfies the consumers; as cheap as possible; can be delivered in time to meet delivery requirement
- d. is the function or collection of duties which must be performed throughout an organization in order to achieve its quality objectives

Stages of Quality Control

1. Set the specifications
 - a. Exactly what the customer or market expects
 - b. Price at which product can be sold
 - c. Delivery date
 - d. Capability of equipment/ machines
 - e. Capability of available inspection and test equipment
2. Prepare to manufacture
 - a. Decide how to process the product
 - b. Decide what equipment to use
 - c. Specify the quality of raw materials and possible suppliers
 - d. The in-line personnel
 - e. Plan inspection and in-process quality control
3. Actual Processing/ Manufacture
4. Correction of quality defects
5. Provide long-term quality control planning

Defects in Foods

Defect - perceptible deviation from product specs that makes product less fit, or unfit for consumption - the lack of something essential or required; or an imperfection - can occur singly or as a composite of several deviations

Sources:

1. Raw material — biological system that deteriorates over time.
2. Personnel — staff's commitment to their work and their ability to perform their task well.
3. In-process problems - quality loss

due to poor understanding of processing methods and use of inadequate machines - due to lack of staff training

Evidences of Defects Prevention Program: 1. Quality raw materials 2. Reduction of processing losses 3. Drop in the volume of rejects

What is HACCP? * Hazard Analysis and Critical Control Points * Prevention-based food safety system * A systematic approach to the identification, assessment of risk, and severity and control of biological, chemical and physical hazards associated with a particular food production process or practice (US FDA CFSAN, 2000)

Two Important Terms * HAZARDS * CRITICAL CONTROL POINTS

HAZARDS * Any biological, chemical, or physical property that may cause an unacceptable consumer health risk. * 3 major hazards * Biological * Chemical * Physical

-Biological Hazards * These organisms are commonly associated with humans and with raw products entering the food manufacturing facility. * Bacteria, foodborne viruses, parasites * Examples: * Salmonella, Listeria, Staphylococcus * Hepatitis A and Norwalk Viruses * Trichinella

-Chemical Hazards * Chemical contaminants may be naturally occurring or may be added during the processing of the food. * Naturally Occurring Chemicals * Toxins from molds (aflatoxin) * Allergenic Proteins * Added Chemicals * Agricultural chemicals * Industrial chemicals * Ingredients: Flavors enhancers, colors, preservatives

- Physical Hazards * Foreign and extraneous materials * Foreign Materials * Anything that does not naturally occur in the food material * Hair, fingers (fingernails), plastic, metal filings, jewelry, gum etc. * Extraneous Materials * Anything that naturally occurs in the food but should not be there * Pits, seeds, peel, stems

Critical Control Points * CCP's * Process steps in specific food systems in which loss of control may result in an unacceptable health

risk 7 Principles of HACCP: 1. Identify hazards in the system 2. Determine critical control points 3. Establish critical limits 4. Establish monitoring procedures 5. Establish corrective actions 6. Establish verification procedure 7. Establish record keeping and documentation procedures Good

Manufacturing Practices (GMP) - set of sanitary guidelines and control for compliance to assure safety and wholesomeness of foods. Concerns: 1. Personnel 2. Plant and grounds 3. Sanitary operation 4. Sanitary facilities and control 5. Equipment and utensils 6. Process and control Cleaning and Sanitization Cleaning — an operation that will remove at least 90% of the soil or dirt. Sanitization — application of sanitizers Sanitation — over-all cleanliness of the surroundings or anything that surrounds the food Steps: a. remove the debris b. pre-rinse c. application of cleaning aids d. post rinse e. sanitizing rinse FOOD SPOILAGE / DETERIORATION Food

Spoilage/Deterioration -Includes losses in organoleptic desirability, nutritional value, safety and aesthetic appeal of the food -Food is subject to physical, chemical and biological deterioration, which go hand in hand Causal Factors: -Temperature (heat and cold) * Oxygen * Moisture * Light & radiation * Time * Natural food enzymes * Micro- and macro- organisms * Industrial contaminants * Some foods in the presence of other foods In general, deterioration is slowed down when the food is low in moisture, high in salt/sugar or acid Shelf-life and Dating of Foods Shelf-life - is the time it takes a product to decline to an acceptable level - time a product remains saleable MAQ - minimum acceptable quality for the product must be defined by the manufacturers or retailers Actual length of shelf-life is dependent on a number of factors : 1. processing methods 2. packaging 3. storage conditions

Dating - provides consumers some indication of the shelf-life or freshness of the products they buy Type of code dates include: * date of manufacture ("pack date") * date the product was displayed ("display date") * date by which the product should be sold ("sell by date") * last date of maximal quality ("best used date") * date beyond which the product is no longer acceptable ("use by date" or "expiration date") Major Causes of Food Deterioration -often the following factors do not operate in isolation -as such, effective preservation must eliminate or minimize all of these factors in a given food to prevent/minimize deterioration

1. Growth activities and activities of microorganisms - Bacteria, yeasts, molds - Microbial growth curve * Conditions necessary for microorganisms to grow: * Source * Food residue * Moisture * Time * Temperature * Invasion of microorganisms is due to contamination which can be avoided by sanitary practices and proper processing procedures and packaging * Not all microorganisms can cause disease or food spoilage, others are useful for food processing * Food borne diseases - special kind of deterioration that may or may not alter a food's organoleptic properties
2. Infestation by insects, parasites and rodents * Insects destroy 5-10% annual grain crops (US), in other countries (50%) * Parasites Examples of Parasites: * *Trichinella spirallis*, enters hogs eating uncooked food wastes; nematodes, penetrates hog intestines and find way into the pork - *Entamoeba histolytica*, parasite associated to raw human excrement and can infect crops when raw human excrement is used as fertilizer -can cause amoebic dysentery * Rodents - can consume large quantities of foods and they can contaminate food by filth they carry - can spread diseases like: Salmonellosis Leptospirosis Typhoid fever Plague
- 3.

Activities of food enzymes and other chemical reactions within food itself *

food enzymes are natural in healthy, uninfected foods * activity is intensified right after harvest * activity is sometimes desirable * can be inactivated by heat, chemicals and irradiation, etc.

4. Inappropriate temperatures (heat and cold) for a given food * heat and cold — can cause deterioration if not controlled; 10-38°C (normal working temperature) * excessive heat: denatures protein, breaks emulsion, dries out food by evaporation and destroys vitamins * uncontrolled cold: FAV are frozen — discoloration, changes in texture - can break emulsion such as in milk - denatures milk protein - chill injury

5. Either the gain or loss of moisture - Aw and Moisture Content (needed by microorganisms for growth and by different chemical reactions)

6. Reaction with oxygen * can cause chemical oxidation of nutrients, colors, flavors * required for growth of some microorganisms * can be excluded by vacuum packaging, addition of oxygen scavengers

7. Light * can destroy some vitamins (riboflavin, A and C); deteriorates many food colors * in milk — can cause “sunlight flavors” (induced fat oxidation and changes in CHON) * Can be minimized by opaque packaging

8. Time * quality decreases with time * object is to maintain and capture freshness of foods * to prolong shelf life — adequate processing, packaging and storage

Spoilage of Different Kinds of Foods

1. Bread Mold: results in discoloration of the bread Ropiness: soft and sticky to touch, caused by sporeforming bacteria, *Bacillus subtilis* and *Bacillus licheniformis*

2. Honey * high sugar(70-80%) and acidic (pH= 3. 2-4. 2) * chief cause of spoilage : *Zygosaccharomyces mellis*

3. Candy * not subject to microbial spoilage (high sugar and low MC) * except chocolate with soft centers (burst and may

explode), cause by Clostridium spp. 4. Fruits and Vegetables * spoilage due to physical factors, action of their enzymes, microbial action or combination of these agents * microbial spoilage may be due to plant pathogen and/or saprophytic microorganisms * general type of spoilage: * bacterial soft rot (Erwinia caratova) * gray mold rot (Botrytis cinerea) * rhizopus rot (Rhizopus nigricans) * anthracnose (Colletotrichum lindemuthianum) * blue mold rot (Penicillium) * black mold rot (Aspergillus niger) 5. Fruit Juices * acidic (pH 2.4-4.7), all contain sugars (2-17%) * molds * alcohol fermentation 6.

Sauerkraut * inferior quality due to abnormal fermentation: high temp; low temp; too long fermentation * surface spoilage (destroy the acidity, permit other microorganisms to grow, softening, darkening and bad flavors) 7. Fresh Eggs * Defects: cracks, leaks, dirty spots on the exterior (will favor spoilage on storage) * Changes caused by microorganisms during storage: * green rot (Pseudomonas fluorescens) giving green color of the egg white * colorless rot (various microorganisms): yolk is affected 8. Meat and Meat Products * raw meat: enzyme, microorganisms, oxidation of fats * beef: moderate amount of autolysis is desired to tenderize it, excessive autolysis (souring) * general principles: * Factors influencing invasion of tissues by microorganisms: * load in the gut of the animal * physiological condition of the animal before slaughter * method of killing and bleeding Factors affecting the growth of microorganisms in meat * kind and amount of microorganisms * physical properties of meat (exposed area, grinding) * chemical properties of the meat (MC, protein, CHO, pH) * availability of oxygen * temperature General types of spoilage in meat * aerobic condition: * surface slime (Pseudomonas, Achromobacter, Streptococcus, Leuconostoc, Bacillus, Micrococcus) * surface

discoloration (*Serratia marcescens*, *Pseudomonas*, *Micrococcus/Flavobacterium*) * oxidation of fats * stickiness (molds) * whiskers (*Thamnidium elegans*, *Mucor mucedo*) * anaerobic condition: * putrefaction, souring Cured meats: addition of nitrates inhibit growth of microorganisms, spoilage same with fresh if stored improperly

9. Fish and Other Seafoods * spoiled by autolysis, oxidation or bacterial activity * factors influencing spoilage: * kind of fish: flat fish vs. round fish, fatty fish deteriorates faster * condition of fish when caught: exhausted spoil rapidly * kind and extent of contamination of the fish flesh with bacteria * temperature * use of an antibiotic ice or dip evidences of spoilage: * brightness fades and dirty, yellow discoloration appears * slime on the fish increases * eyes gradually sink * gills: light pink to grayish yellow * softening of the flesh * development of off-colors

10. Poultry * chief source of spoilage: bacteria * bacterial growth takes place on the surface and any cut surfaces and the decomposition products diffuse slowly into the meat * off-odor is noted when the bacterial count is at 2.5×10^6 cfu/cm² * *Pseudomonas* and *Achromobacter* * *Micrococcus*, *Flavobacterium* and *Achromobacter* * Surface of skin becomes slime, acid/sour odor

11. Milk Chief type of spoilage : * Souring or acid formation * Gas production * Proteolysis * Ropiness * Surface or throughout the milk