

Quality Changes in Foods

Quality Control
(end product testing)



Quality Assurance
(process control against
accepted standard)

Reactions in foods affecting quality

- ✓ Quality indicators are not constant: the quality of a food changes over time
- ✓ The most important quality-related changes are:
 - ✓ **Chemical reactions:** mainly due to either oxidation or Maillard reactions
 - ✓ **Microbial reactions:** microorganisms can grow in foods; in the case of fermentation this is desired, otherwise microbial growth will lead to spoilage and, in the case of pathogens, to unsafe food

Reactions in Foods That Affect Quality

- ✓ **Biochemical reactions:** many foods contain endogenous enzymes that can potentially catalyze reactions leading to quality loss (enzymatic browning, lipolysis, proteolysis, and more). In the case of fermentation, enzymes can be exploited to improve quality
- ✓ **Physical reactions:** many foods are heterogeneous and contain particles. These particles are unstable, in principle at least, and phenomena such as coalescence, aggregation, and sedimentation lead usually to quality loss
 - ✓ Changes in texture can also be considered as physical reactions, though the underlying mechanism may be of a chemical nature

Measurable food quality factors

- ✓ Microbial counts and types
- ✓ Nutrient content
- ✓ Color & appearance
- ✓ Moisture content
- ✓ Physical shape/size
- ✓ Mechanical properties
- ✓ Flavor panel scores
- ✓ Toxicant level (chemical risk)
- ✓ DAL (e.g. insect fragments)...

Food Defect Action Levels (DAL)

- ✓ Natural or unavoidable defects
 - *not harmful at levels present*
 - *present even with GMPs*
- ✓ ***The Food Defect Action Levels: Levels of natural or unavoidable defects in foods that present no health hazards for humans***

Food Defect Action Levels (DAL)

- ✓ FDA establishes DALs when necessary and possible defect level may not be reduced by blending
- ✓ Example:
 - ✓ Corn (per 25g)--- *1 or more whole insect; 25 insect fragments; 1 rodent hair; 1 rodent excreta per 50g*

Shelf-life of Foods

Definition of shelf-life of foods

- ✓ «*The period the food will retain an acceptable level of eating quality from a safety and organoleptic point of view under specific storage, processing and packaging conditions*»
- ✓ Depends on four main factors;
 - ✓ Formulation
 - ✓ Processing
 - ✓ Packaging
 - ✓ Storage and distribution

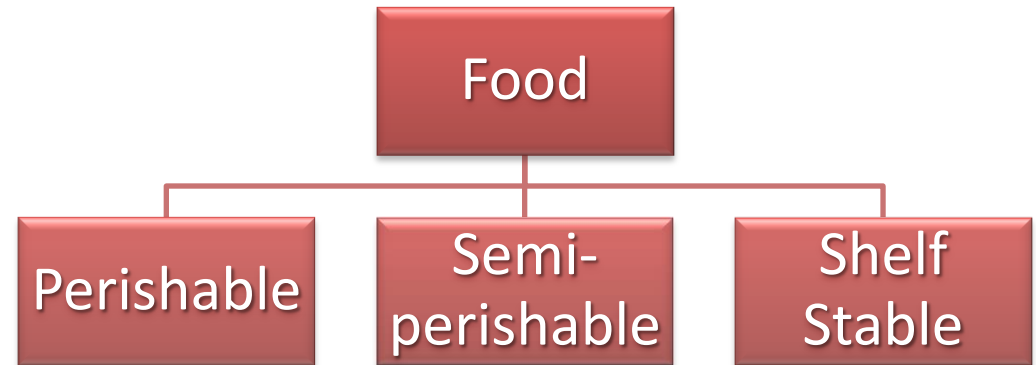
Classification of foods based on shelf-life

- ✓ **Perishable foods (properly stored):** have under 14 days of shelf-life limited in most cases by biochemical or microbial decay
 - ✓ With new aseptic technology and controlled/modified atmosphere packaging such foods may last up to 90 days
- ✓ **Semi-perishable foods:** have a shelf-life of up to 6 months, like some cheeses and frozen deserts
- ✓ **Shelf stable foods (non-perishable):** like most canned foods last over 6 months and as long as 3 years under proper storage conditions

Factors affecting shelf-life of foods

✓ Composition

- Water
- Fat
- Protein
- Carbohydrate
- Other components



✓ Storage Conditions

- Humidity
- Air
- Light
- Temperature

Nutrient loss, Off-colors,
Off-flavors, Microbial
spoilage

Shelf-life tests in foods

- ✓ Microbiological examination, including challenge testing
- ✓ Chemical analysis
- ✓ Physical testing, measurement and analysis such as rheological measurements, microscopical examination
- ✓ Sensory evaluation