total customer focus

“Basic principles of shelf life assessment”

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What does this presentation cover?

- Intertek and global market trends
- Safety & Quality aspects of self life

About Intertek…

Intertek provides **quality and safety services** to a wide range of global and local industries.

Partnership with Intertek brings **increased value** to customers' products, processes and ultimately **supports their success** in the global marketplace.

….we support our customers in their global trade

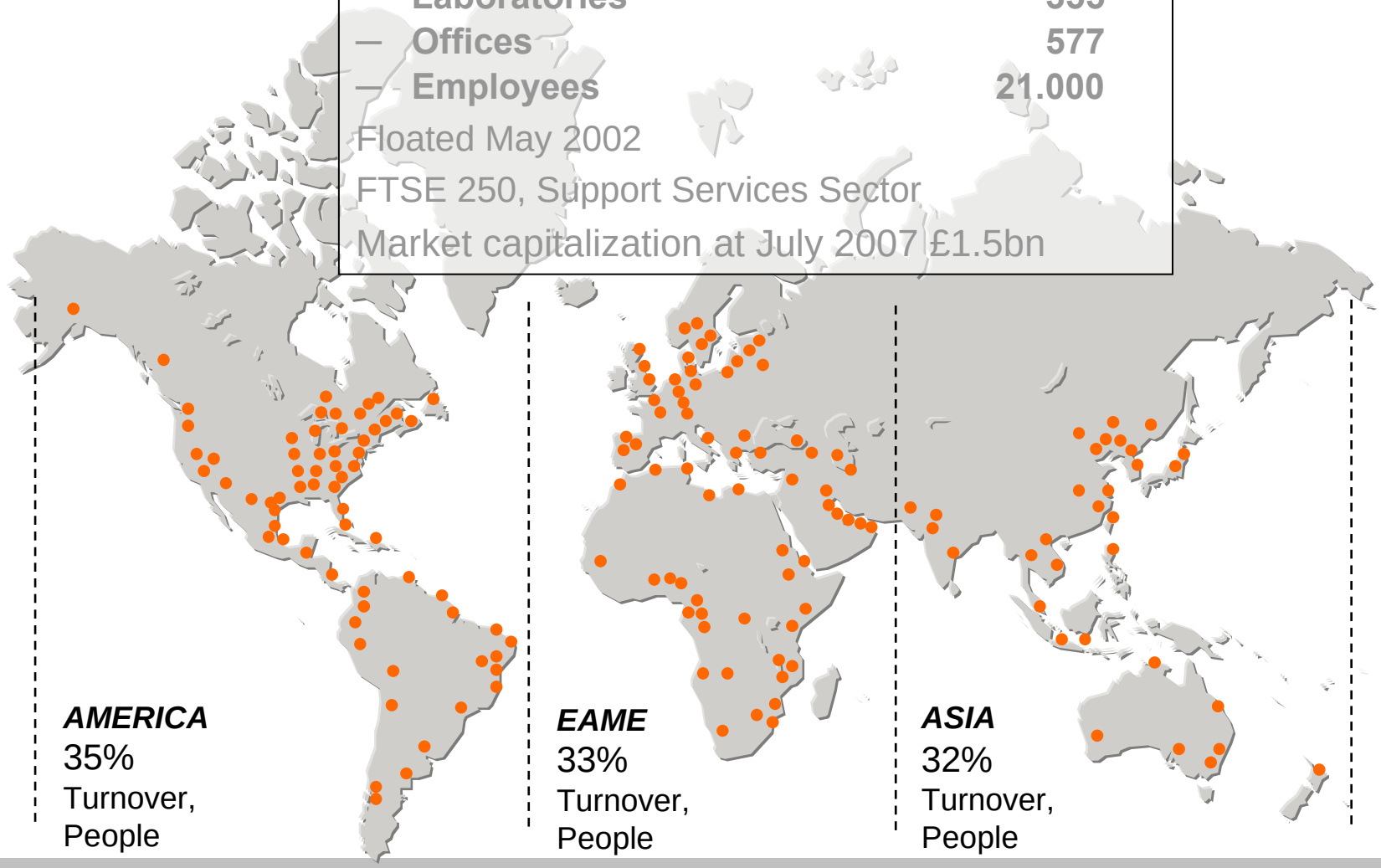
Our Profile

- Countries 110
- Laboratories 355
- Offices 577
- Employees 21.000

Floated May 2002

FTSE 250, Support Services Sector

Market capitalization at July 2007 £1.5bn



AMERICA
35%
Turnover,
People

EAME
33%
Turnover,
People

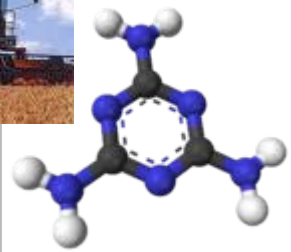
ASIA
32%
Turnover,
People

Crises in the food industry in the past

Salmonella

Dioxin

Melamine

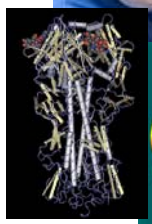


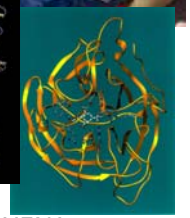
1,3,5-Triazine-2,4,6-triamine

BSE

Bovine spongiform encephalopathy

Avian flu





H5N1

Global impact of foodborne diseases

- Rapid globalization of food production and trade has increased the potential likelihood of food contamination
- In 2005 over 2 million people died from diarrhea diseases.
- Even in industrialized countries, up to 30% of the population of people have been reported to suffer from foodborne diseases every year.
- Foodborne illnesses can and did inflict serious and extensive harm on society.
- Food contamination creates an enormous social and economic strain on societies. (e.q. US $35-40 billion annually on medical costs and lost productivity due to major pathogens)

What does this presentation cover?

- Intertek and global market trends
- Safety & Quality aspects of shelf life

What shelf life means?

- **Shelf life** is the time period from manufacturing until reaching the “best before date”
- **“Best before date”** names the date until the product remains a defined quality **(quality = set standards)**
- **Food must be safe at the “best before date”**
- **Nutritional values, appearances, colour, odour** may have changed when reaching the best before date as any food undergoes permanent change during storage

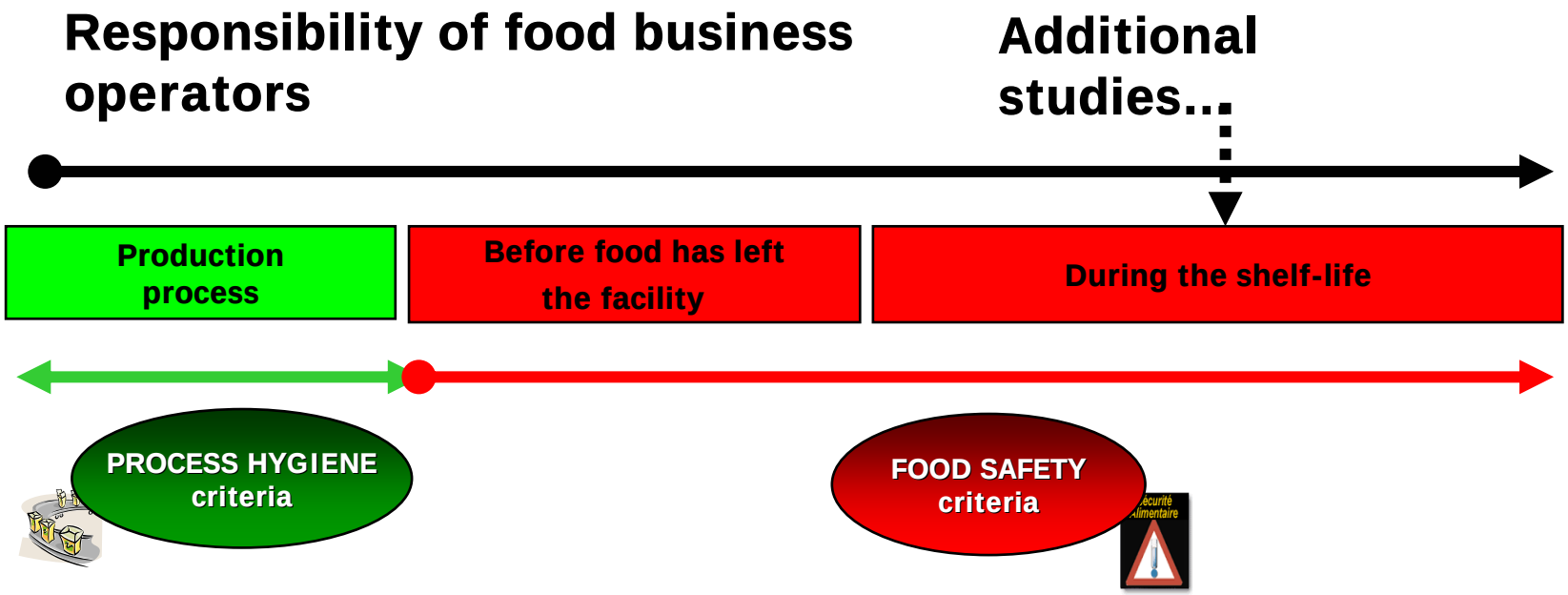
What shelf life means?

- **“Use by date”** is often used with food that perishes very easily and has an especially high risk of becoming “**unsafe**” due to excessive storage
- Food with the “use by date” must not be sold or put into circulation for consumption in anyway after reaching this date

History and current situation

- Shift towards from fresh foods to perishable foods
- Shelf life can be extended
- Food is longer fit for consumption
- Food can be distributed worldwide without any quality or safety leakages
- Food can be consumed worldwide

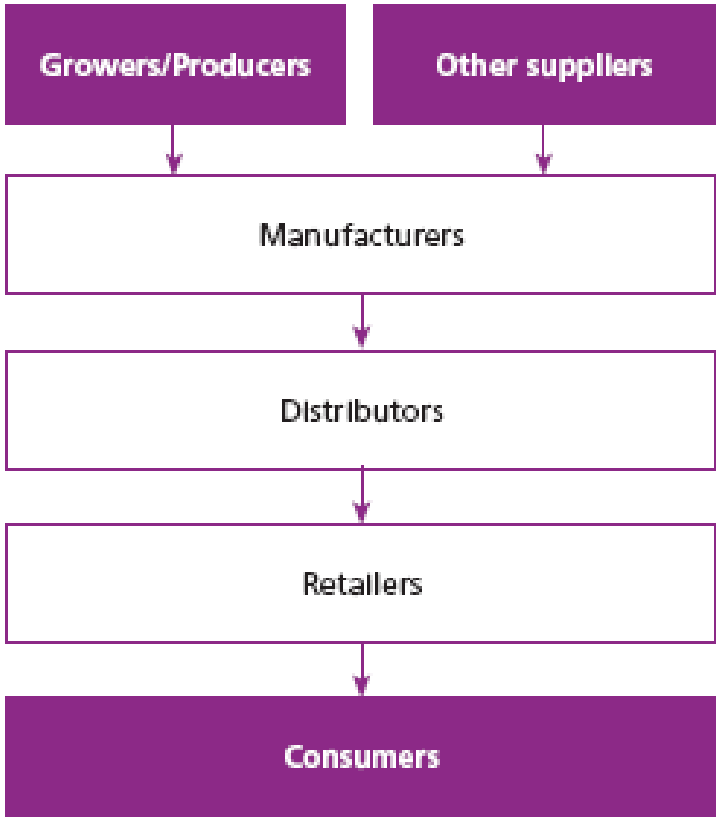
Process hygiene vs. Food safety



→ Under the control of the company with the HACCP and GMP

Source: HDE, 2007

Who influences the shelf life?



Source: A Guide to Calculating the Shelf Life of Foods

Factors affecting the shelf life

- Microbiology, chemistry, enzymatic, moisture, ERH – Equilibrium relative humidity
- Products with high or low:
  - Water content
  - Water activity
  - Moisture content (free water-liquids and bound water-sugar)
  - Fat/oil content-rancidity
  - Alcohol content
  - Acid content
  - pH

Water activity vs. RRR vs. Moisture content

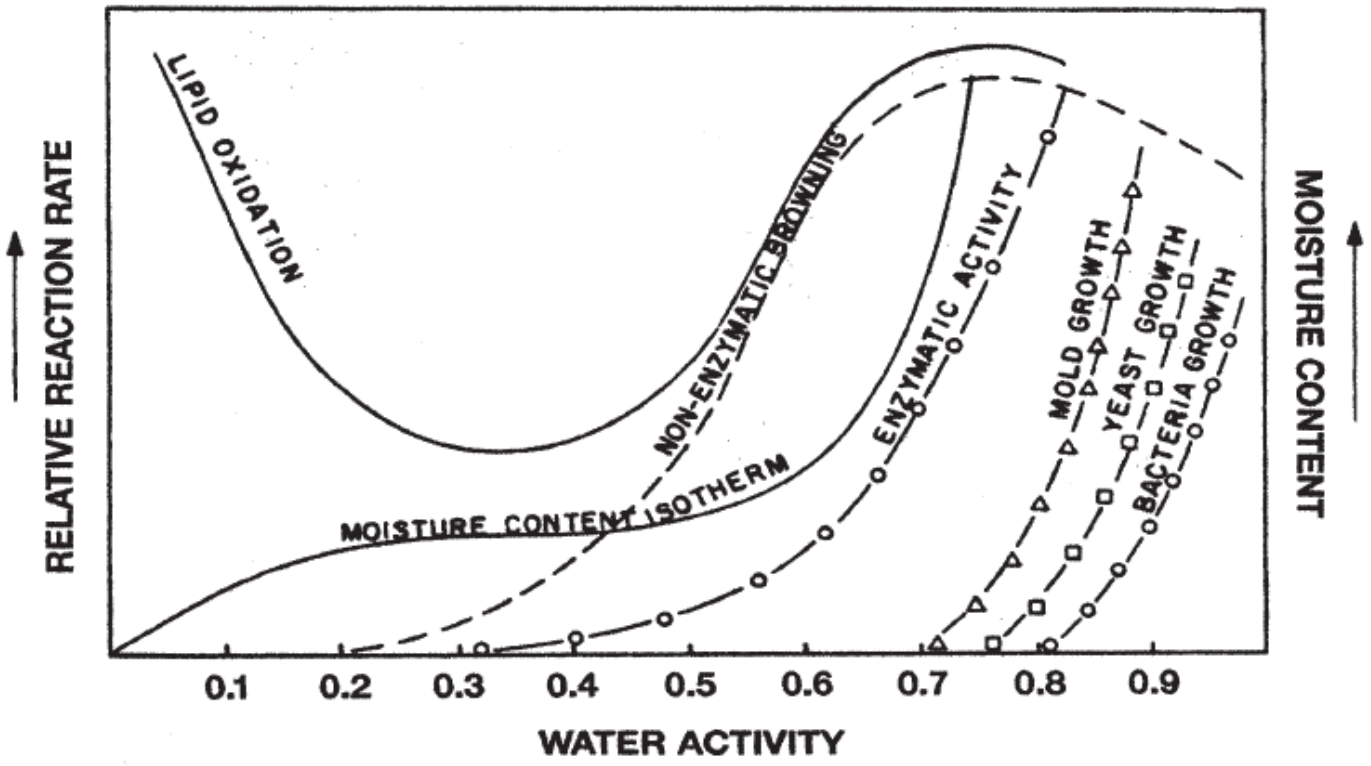


FIGURE 1: Stability map of foods as a function of water activity. Labuza, 1970

Factors affecting the shelf life

- Influence through:
  - Use of preservatives or preservatives measurements (pasteurisation, sterilisation, UHT,…)
  - Tainting of the packaging-material
  - Amount and level of light exposure
  - Quality, consistence of products/ingredients
  - Combination of products/ingredients
  - Manufacturing and storage of all products
  - Atmosphere (MAP-Modified atmosphere packaging)
  - “Intelligent” and other “safe” packaging (e.g. absorbing materials, UV-filters,…)

Shelf life analysis

- Has to be conducted for **each product type**, no generic studies are acceptable
- 2 different methods:
  - **Indirect method:** An accelerated shelf life assessment by increasing the storage temperature (for long shelf life products)
  - **Direct method:** A predictive modelling exercise, which generally tends to concentrate on particular micro-organism (most commonly used method)
- **Purpose:** Determine how long a food product might expect to be fit for consumption (assuming under the correct storage conditions)

Shelf life studies types

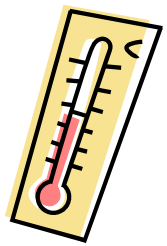
Test Type		Usage	Disadvantages
Accelerated		Long life products, R&D new products Time sensitive introduction (Real time recommended as back-up)	Bacterial growth rates do not properly reflect shelf-life for storage or transport
Real Time	Ideal Conditions	For best shelf-life Storage set to ideal conditions	Bacterial growth rates do not properly reflect shelf-life for storage or transport
	Average Customer Conditions	Conditions set to average levels Bacteria species and levels reflect actual	Does not take into account storage extremes (ie. Winter vs. Summer temperatures)
	Extreme Customer Conditions	Conditions set to average levels	Does not reflect typical customer, or ideal shelf-like conditions

The concept of Q10

- Q10 is the

  increase in the rate of the reaction when the temperature is increased by 10 degrees centigrade (18°F).

E.g. ***If a food has a stability of 20 weeks at 20°C and 10 weeks at 30°C, thus the Q10 will be 20/10***



Steps for the study

- **STEP 1:** Identify what may cause the food to spoil or become unsafe (acc. HACCP)
- **STEP 2:** Which tests to use (sensory, microbiological, etc.)
- **STEP 3:** Plan the shelf life study
- **STEP 4:** Run the shelf life study
- **STEP 5:** Determine the shelf life
- **STEP 6:** Monitoring the shelf life

Source: A Guide to Calculating the Shelf Life of Foods

Evaluation in a shelf life analysis

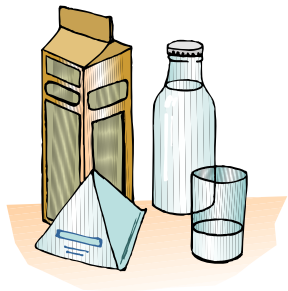
- **Analysis of:**
  - Microbiological quality
  - Physical quality
  - Chemical quality
  - Organoleptic (sensory) quality
- **With an understanding of:**
  - Ingredients
  - Packaging material
  - Manufacturing
  - Storage and Distribution/Transport

Microbiological analysis

- Total aerobic count
- Coliform bacteria / E.coli
- Lactic acid bacteria
- L. monocytogenes
- Salmonella
- Staphylococcus aureus
- Yeast and mould
- and many more …

Physical analysis

- Water activity (AW-value)
- Viscosity
- Determination of atmosphere inside the packaging (oxygen, nitrogen, CO2-content)
- Decreasing or increasing pressure inside the packaging
- Turbidity



Chemical analysis

Organoleptic analysis/evaluation

- Appearance
- Colour (e.g. acc. to a comparison chart)
- Taste including “mouth feel” and texture
- Odour/smell
- Acoustics (e.g. cracking of biscuits)

Government role

- Requirements for Analysis, Labelling with fixed limits for the determination of the shelf life:
  - Regulations
  - Directives
  - Test-methods of analysis
- Link with government analysis

Legal requirements (examples)

- Worldwide: FAO/WHO, Codex Alimentarius-Guidelines and country specific requirements
- Europe: EU 852-854, Country specific requirements
- Germany: DIN 10969, §64 LFGB
- America: FDA-Guidelines
- China: Food Hygiene Law

Food producer role

- Responsible for the food and the food safety
- Responsible for the labelling (shelf life under 2 years have to be clearly date marked)
- Responsible for the product specification
- Responsible for the instruction for the preparing and also for the opening after storage (have to be stored <4°C after opening,…)
- Implementation of a HACCP and Management analysis

Benefits for the industry

- Operational Benefits
  - Improve food safety aspects
  - Increase risk management and reduce recalls
- Marketing and Sales
  - Support quality promises
  - Avoid brand damage
- Commercial benefits
  - Enhance brand protection
  - Establish extent of liability
  - Avoid recall costs

- How can Intertek support you?
  - Global and local management capability
  - Extensive understanding of different market expectations
  - Strong laboratory support
  - Offices and laboratories everywhere to match your sourcing plan
  - Strong customer service support

Thank you for your attention!

Intertek Food Services

www.intertek.com

www.intertek.com/food

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