

- **Food Hygiene**

**HACCP: INTRODUCTION AND  
HAZARD ANALYSIS**

**State: December 15, 2004**

- **Important milestones in the development of food safety systems**

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<b>Time</b>	<b>Activity</b>
Distant past	Use of “prohibition” principle to protect special groups within society against foodborne illness
1900 to present	Microbiological examination of food (= endproduct testing)
1922	Introduction of process performance criteria by Esty & Meyer for canned, low-acid food products
1930-1960	Use of risk assessment (for different pathogenic organisms) in setting process performance criteria for heat pasteurisation of milk
1960	Introduction of good manufacturing practices
1971*	Introduction of formal Hazard Analysis Critical Control Point System
1978	Start of predictive modelling of bacterial growth in food
1995	Introduction of formal quantitative risk analysis

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\*HACCP was described by Pilsbury Company, u. S. Army Natick Res. & Develop. Lab. and NASA in order to provide auditors with the evidence that food intended to be used by the astronauts were safe.

- **Importance of HACCP**



**“HACCP & YOU”**

- **Hazard Analysis Critical Control Points**
- **Recognize hazards in your own environment and take all necessary steps to correct**
- **HACCP is everyone’s job, in the school cafeteria and in your home kitchen**
- **Share your knowledge - It could save a life**

**thanks for your attention!**

**World Health Organization**



- **Basics of**  **HACCP**  
**CERTIFIED**

**HACCP (Hazard Analysis and Critical Control Point) is an effective and rational tool of assuring food safety from (pre-) harvest to consumption. This systematic approach to the identification, evaluation, and control of food safety hazard is based on the following seven principles:**

**PRINCIPLE 1**

**Conduct a hazard analysis.**

**PRINCIPLE 2**

**Determine the Critical Control Point(s) (CCPs).**

**PRINCIPLE 3**

**Establish Critical Limit(s).**

**PRINCIPLE 4**

**Establish a system to monitor control of the CCP.**

**PRINCIPLE 5**

**Establish the Corrective Action to be taken when monitoring indicates that a particular CCP is not under control.**

**PRINCIPLE 6**

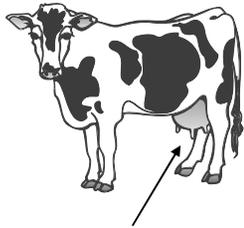
**Establish procedures for Verification to confirm that the HACCP system is working effectively.**

**PRINCIPLE 7**

**Establish Documentation concerning all procedures and records appropriate to these principles and their application.**

● **Basical example for the HACCP-principles (without Corrective Action and Documentation)**

● **Raw Material**



Milk

● **Critical Control Point**



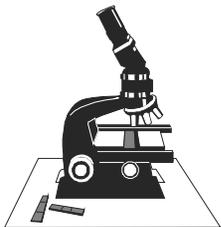
Boiling in pot

● **Monitoring**



Observation of foaming

● **Potential Hazards**



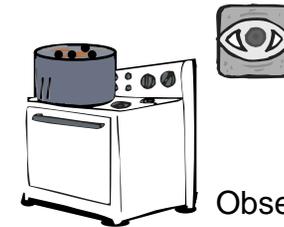
Salmonella  
Listeria  
Coxiella

● **Critical Limit**



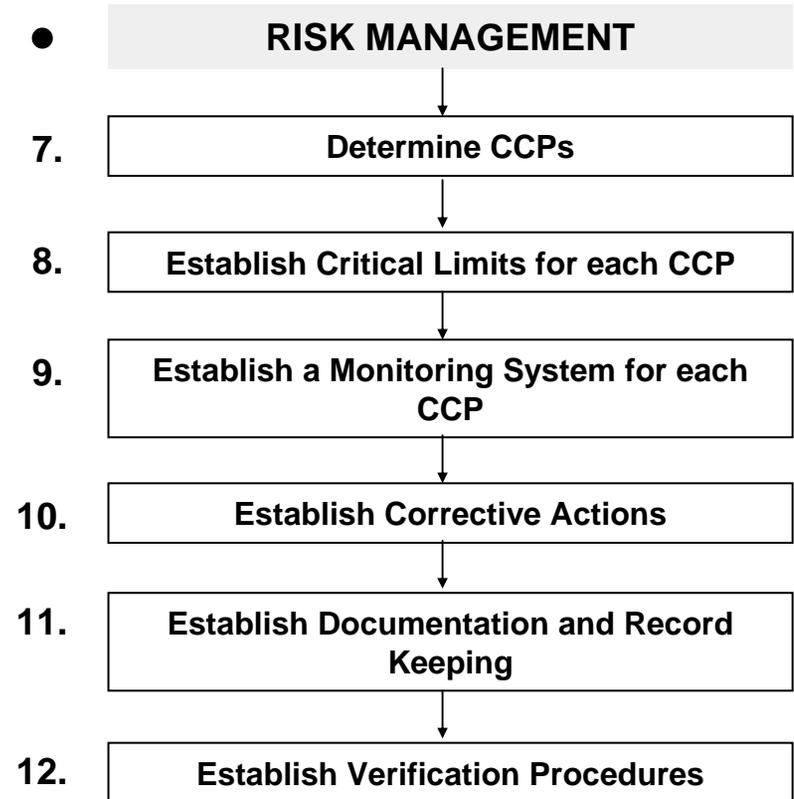
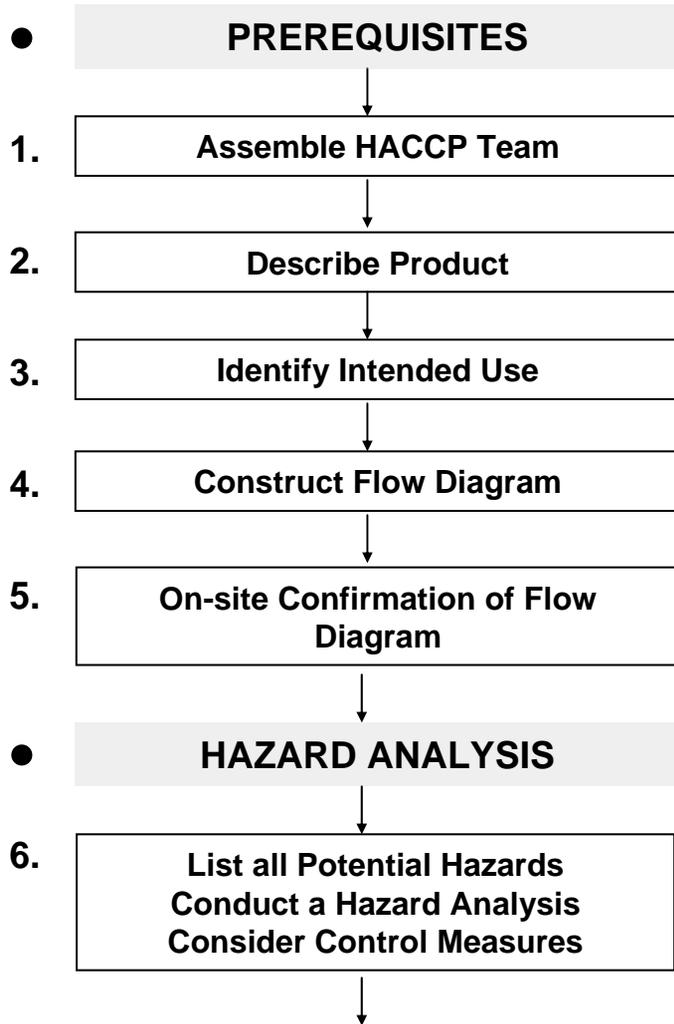
Cooking point

● **Verification**



Observation  
of foam residues  
in the pot

# ● LOGIC SEQUENCE FOR APPLICATION OF HACCP

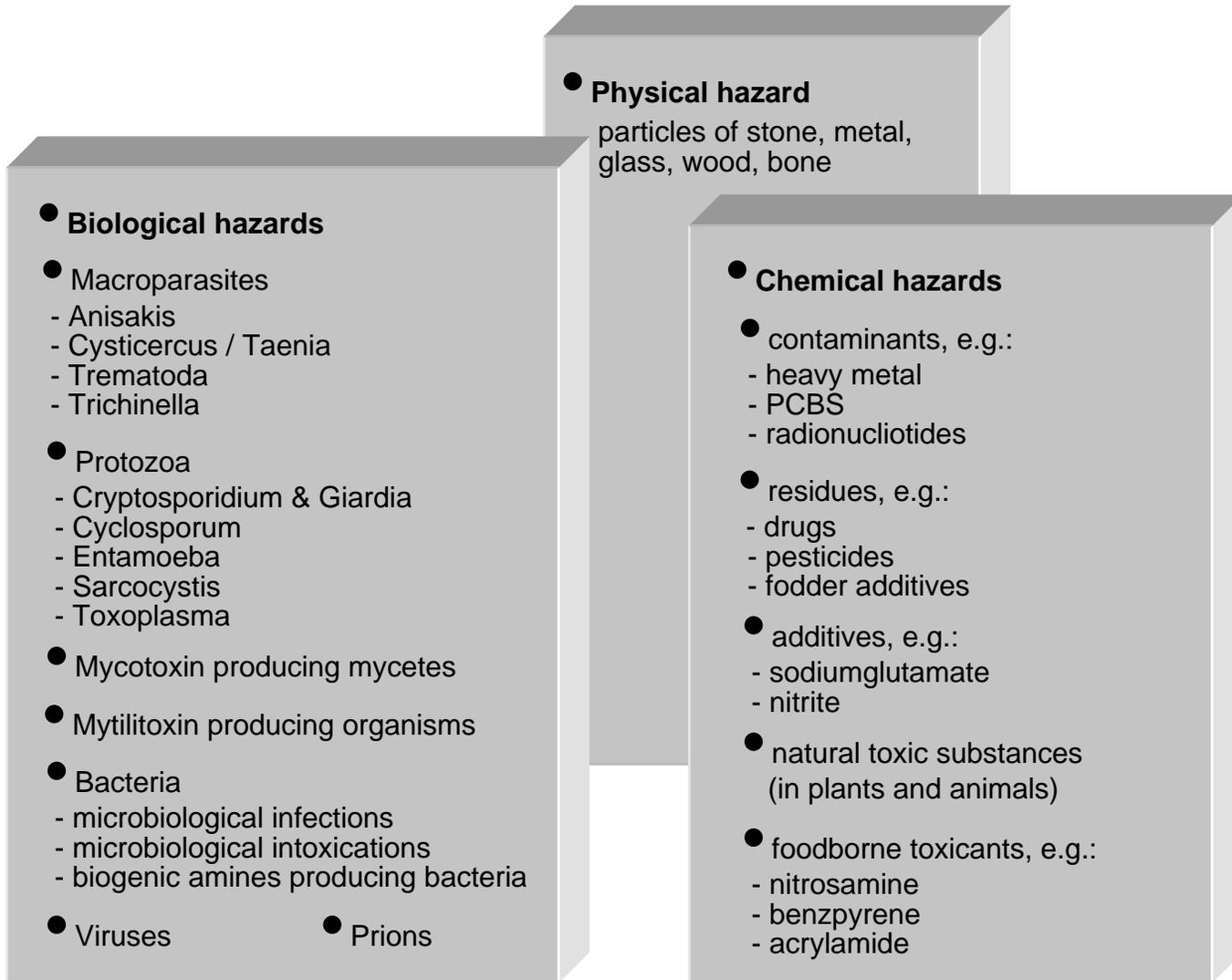


## **Terms relating to “hazard”**

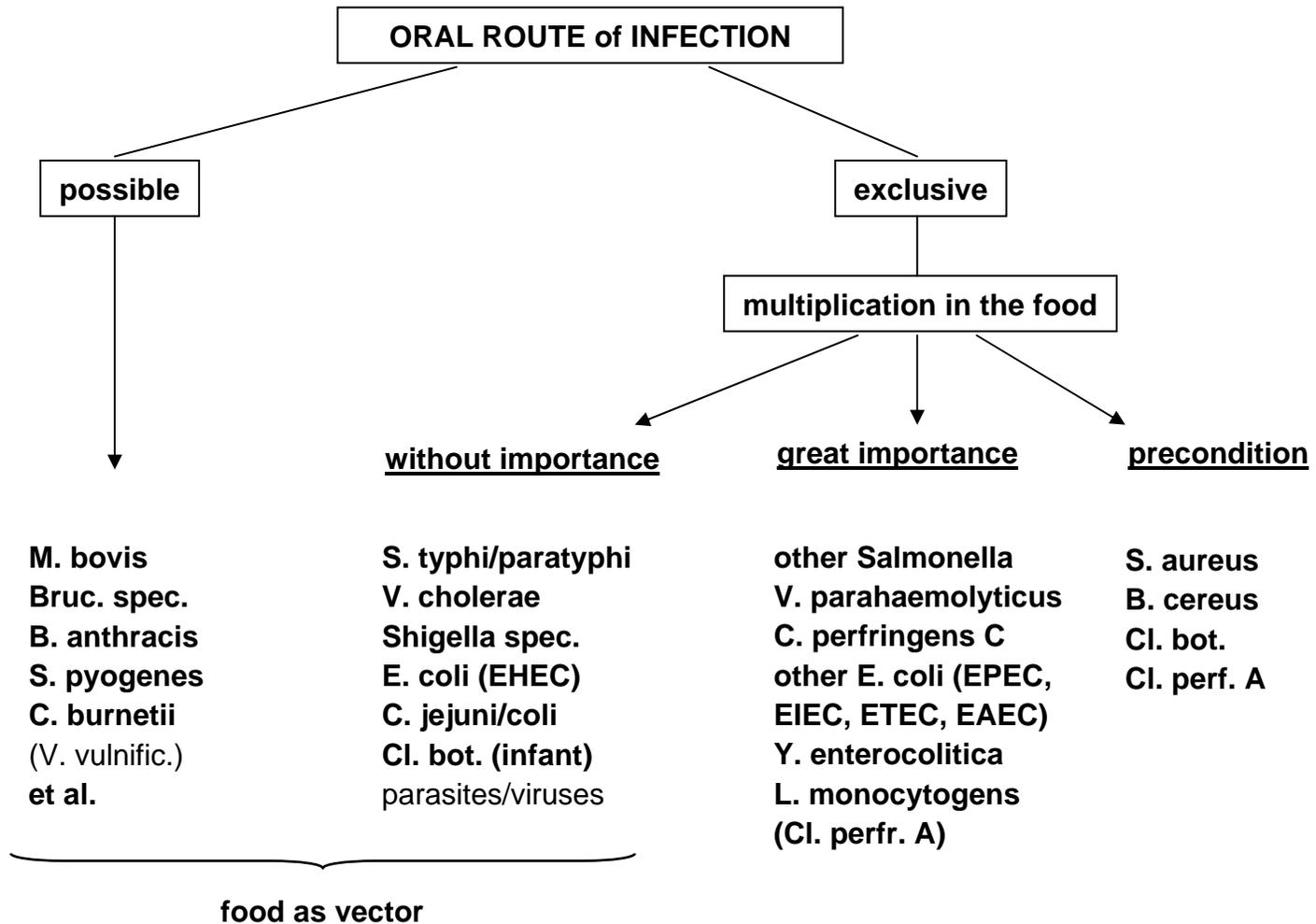
- **Hazard** means a biological, chemical, or physical agent in, or condition of, food or feed with the potential to cause an adverse health effect (Regulation (EC) No. 178/2002).
- **Hazard identification** means the identification of biological, chemical and physical agents capable of causing adverse health effects and which may be present in a particular food or groups of foods.
- **Hazard characterisation** means the qualitative and/or quantitative evaluation of the nature of the adverse health effects associated with biological, chemical and physical agents, which may be present in food. For chemical agents, a dose-response assessment should be performed. For biological and physical agents, a dose-response assessment should be performed if the data are obtainable.
- **Hazard analysis** means the process of collecting and evaluating information on hazards and conditions leading to their presence to decide which are significant for food safety and therefore should be addressed in the HACCP plan.

- **discussion / conclusion**
- **In the terminology of the EC “Hazard identification” and “Hazard characterisation” are parts of “Risk assessment”, which is the first step in “Risk analysis”**

- **Hazard identification:**  
**Biological, chemical and physical hazards connected with food consumption**



● **Microbiological hazards**



- **Severity of differing types of microbiological hazards**

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- **Severe hazards**                      *Clostridium botulinum* types A, B, E and F; *Shigella dysenteriae*; *Salmonella typhi*; *S. paratyphi* A, B; *E. coli* O157:H7; *Brucella abortis*; *Brucella suis*; *Vibrio cholerae*; *Vibrio vulnificus*; (*Taenia solium*); (*Trichinella spiralis*).
- **Moderate hazards - extensive spread from infection**                      *Listeria monocytogenes*; *Salmonella* spp.; *Shigella* spp.; enterovirulent *E. coli* (EEC); (*Streptococcus pyogenes*); rotavirus; Norwalk virus; *Entamoeba histolytica*; *Ascaris lumbricoides*; *Cryptosporidium parvum*.
- **Moderate hazards - limited spread**                      *Bacillus cereus*; potentially toxigenic Bacilli; *Campylobacter jejuni*; *Clostridium perfringens*; *Staphylococcus aureus*; *Vibrio cholerae* (non-O1); *Vibrio parahaemolyticus*; *Yersinia enterocolitica*; *Giardia lamblia*; *Taenia saginata*.
- **Other microbiological hazards**                      These include naturally occurring toxicants such as mycotoxins (e.g. aflatoxin), scombrototoxin (e.g. histamine), toxic mushrooms and varieties of shell-fish poisoning.
- **Toxins**                                      Toxins of most concern are produced by *Clostridium botulinum*, *Clostridium perfringens*, *Bacillus cereus* and *Staphylococcus aureus*.

- **Different characteristics of microbiological and chemical risks**

**microorganisms**

single exposition  
complex structured immunity  
dynamic behavior  
adaption to environment  
multiple factor pathogenity  
stratified distribution

**xenobiotics (chem. toxins)**

cumulation, long-time exposition  
metabolic resistance and detoxification  
static concentration  
no interactions with the environment  
mathematical models for pathogenity (NOEL)  
homogenous distribution

- **Hazard analysis in the sense of HACCP (= preliminary risk assessment)**

For example, the microbiologist should as a minimum consider the following questions in relation to possible hazards:

- **1. What is the product formulation?**

What is the microbiological profile of the raw material?

What is the pH?

What is the water activity?

Are preservatives used?

Will the pH,  $a_w$  and/or presence of a preservative prevent microbial growth?

- **2. What is the intended process?**

Consider those steps that lead to the contamination by, or survival or destruction, inhibition or growth of, food-borne disease or spoilage microorganisms (e.g. handling, heating, drying, chilling, fermenting or curing). Construction of a flow chart listing the steps in the process is often necessary.

- **3. What are the conditions of intended distribution and use?**

**Is the product to be distributed under ambient, cold or hot storage temperatures?**

**What packaging will be used, and is this integral to product stability, as in the vacuum packaging of fresh meats?**

**What is the expected shelf-life both during distribution and storage and in the hands of the person who will ultimately use the product?**

**How will the product be prepared for consumption?**

**What mishandling of the product is likely to occur during marketing or in the hands of the consumer?**

**Will the food be consumed by a highly susceptible population?**

- **discussion / conclusion:**

**HACCP is a management tool that in many ways can be equated to Risk Management (HACCP-principles 2 - 7), rather than Risk Assessment. It is a practical operational system to assure the production and handling of safe food by a particular business, with clear identification of the potential hazards in that operation and the application of appropriate and effective control measures.**

**In comparison, Risk Analysis is a process or design tool enabling the risks from a particular and defined hazard to be identified and to find operational solutions, e.g. regular decisions. Risk Assessment and Risk Management should not be done by the same institution.**

**While it is recognised that full and comprehensive Risk Analysis is only likely to be undertaken by government agencies, research organisations and perhaps some larger food organisations, the principles and tools of Risk Analysis will have wide applicability throughout the food chain to businesses of all sizes. In that way Risk Analysis interacts with HACCP.**