

ASSESSMENT OF MICROBIOLOGICAL RISKS FROM FOOD

Dean O. Cliver, PhD
Professor of Food Safety
University of California,
Davis

Topics

- Hazards from food
- Food safety in China
- Principles of risk assessment (microbiology)
- Risk assessment risk analysis food safety

Hazards from food

- Microbiological: infections, intoxications
- Other: intoxications, allergies, intolerances, idiopathic illnesses
- Bioterrorism? (infections, microbial & nonmicrobial intoxications)

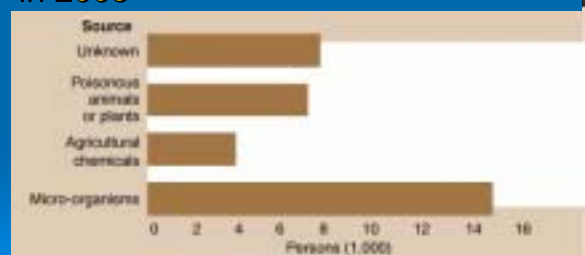
Microbiological hazards

- Infections: live agent in food when eaten
- Intoxications: preformed microbial poison in food when eaten

Foodborne illness, China

Year	Out-breaks	Illnes-ses	Deaths
2001	624	20,124	143
2002	464	11,572	68
2003	1481	29,600	262
2004	2305	42,876	255

Microbial contamination caused more foodborne illness in China than agricultural chemical contamination in 2005



Foodborne disease in China

- 2d quarter 2006: 5696 cases; 1950 in schools
- Safety of school food?
- China Daily: official data, ann. avg. ~300 million/yr

Schools in Sichuan, September 2006

- Chongzhou 1^o: 300/1100 students (*Shigella*)
- Chengdu 1^o: ~90 ill (same-day onset?)
- Chengdu teachers now eat 30 minutes before students.

Risk assessment to predict:

- Probability, severity
- Disease agent, vehicles, “at-risk” population
- Exposure assessment: frequency & levels of ingestion via food

Pathogens in food (1)

- Sources: humans (food handlers?), animals, environment
- Bacteria & fungi may multiply in food; viruses (Shanghai clams, 1988, 300k ill) & parasites cannot

Pathogens in food (2)

- Persistence: freezing, refrigeration, processing, preparation
- Hazard characterization: dose vs. severity

Risk characterization parameters:

- Prevalence (time & place of occurrence)
- Severity (bias)
- Susceptibility of hosts
- Social (& economic?) impact

Information for risk assessment:

- World's scientific literature
- Incidence of present illness in targeted population
- Update as new information becomes available

Records needed for risk assessment

- Illnesses & etiologies (diagnosis, field work, lab analyses)
- Vehicles (sampling, testing, traceback)
- Preventive measures in place (resources)

The zero-risk goal

- Cost of incremental improvement
- The not-eating option
- Cost “no object” — food elitism

Risk management by HACCP:

- Prevent contamination
- Undo contamination by processing (CCP)
- Last resort: test

System design for risk analysis and safety

- Responsibility shared by government, industry, consumers
- Assessment, management, communication
- Costs, public perceptions

Applying risk analysis:

- Risk assessment — greater accuracy (> data collection & sharing)
- Risk management — government leadership, industry execution
- Risk communication — government, industry, public