



Public Health Impact of Food Safety Control Programs:

Process Indicators, Microbiologic Testing, and Disease Surveillance



Preventing Foodborne Disease

- Identify relevant foodborne hazards
- Locate points of introduction and control
- Establish control measures necessary to achieve desired level of safety
- Monitor food management system to assure control measures are in place
- Conduct surveillance of human illnesses to measure progress toward public health objectives

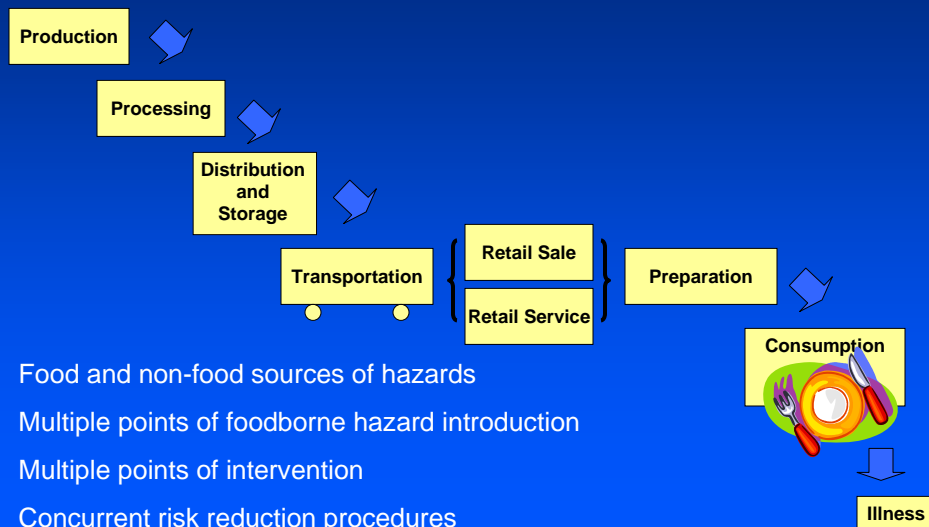


Why We Evaluate

- Make certain we are protecting the public
 - Effectively
 - Efficiently
- Obtain program resources
- Support or change program priorities
- Reassure staff and stakeholders that efforts are working



Evaluating the Effectiveness of Food Safety Programs



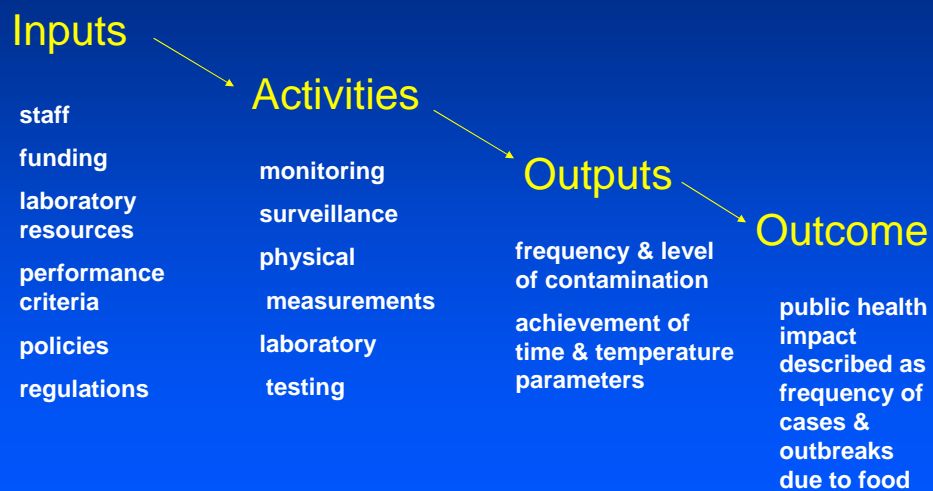


Public Health Impact of Food Safety Control Program

- Where are we now?
 - Monitoring of products
 - Surveillance of disease
 - Investigation of outbreaks
- ALOP--Where do we want to be?
 - Healthy People 2010
 - Other foodborne disease prevention objectives
- Are we making progress, and is it because of the food safety system?

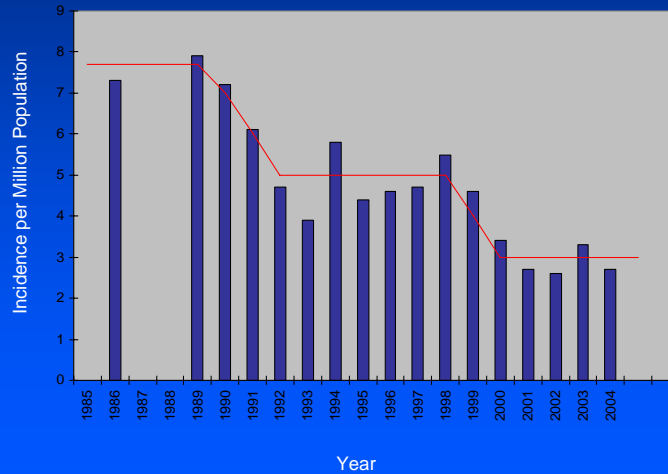


Elements of a Food Safety Control Program





Annual Incidence of Listeriosis, United States



Evaluating a Food Safety Control Program for Fruit Juice

Process output indicator =
% plants correctly
applying 5 log reduction
process

Process output indicator =
% samples that do not
contain ≥ 1 cfu Eco 157 or
Salmonella per 100 ml

Problem
identification
and options
assessment

Regulation and
industry application

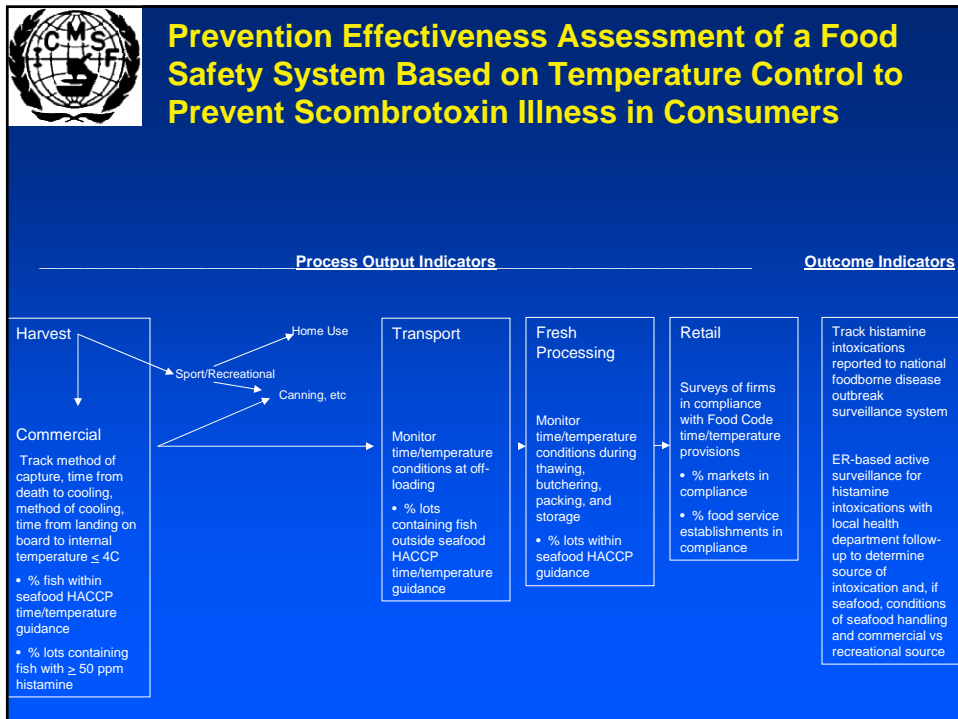
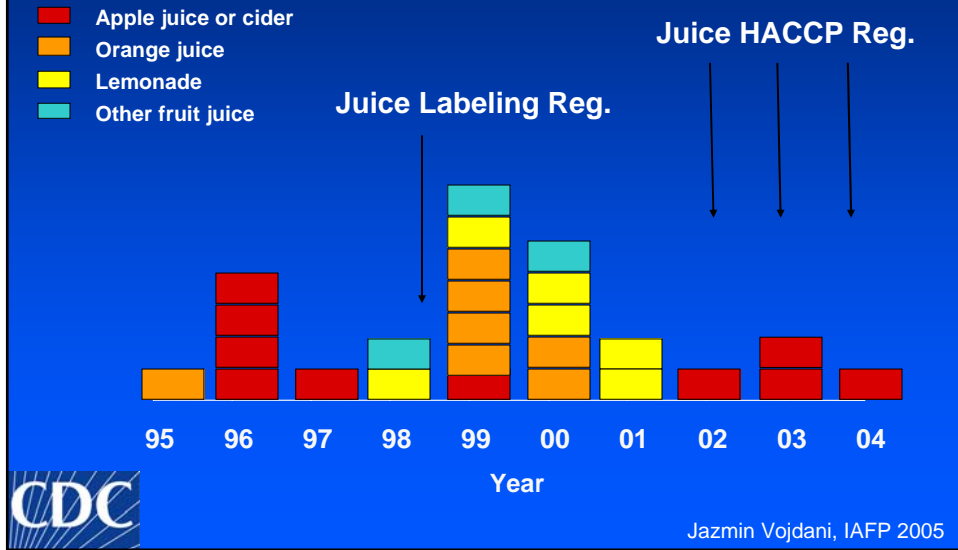
Public health surveillance to
determine incidence of Eco157
and Salmonella infections

Studies to determine proportion
of disease that is attributable to
juice

Potential public health outcome indicators =

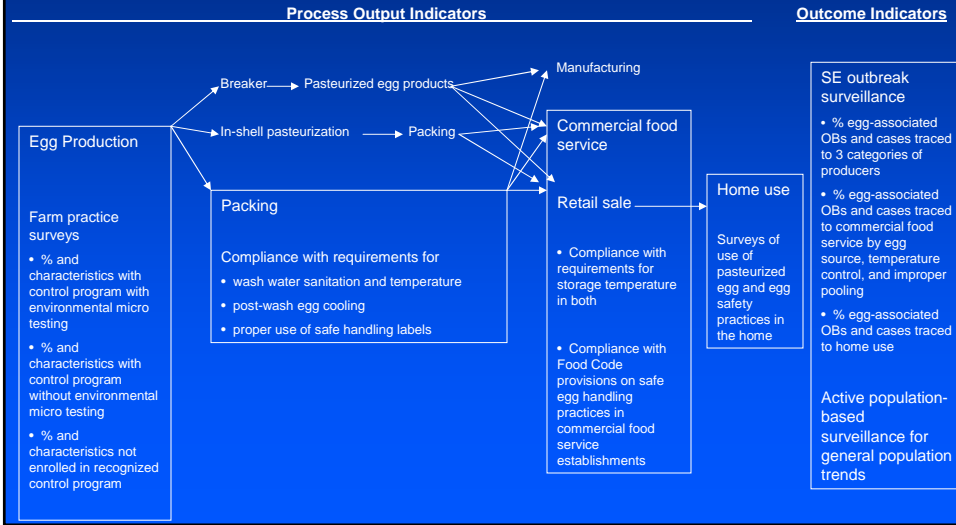
- trend in juice-associated incidence of infections in FoodNet sites
- trend in number of outbreaks of treated/untreated juice-associated infections

Reported Juice-Associated Outbreaks by Type of Fruit, United States, 1995 - 2004

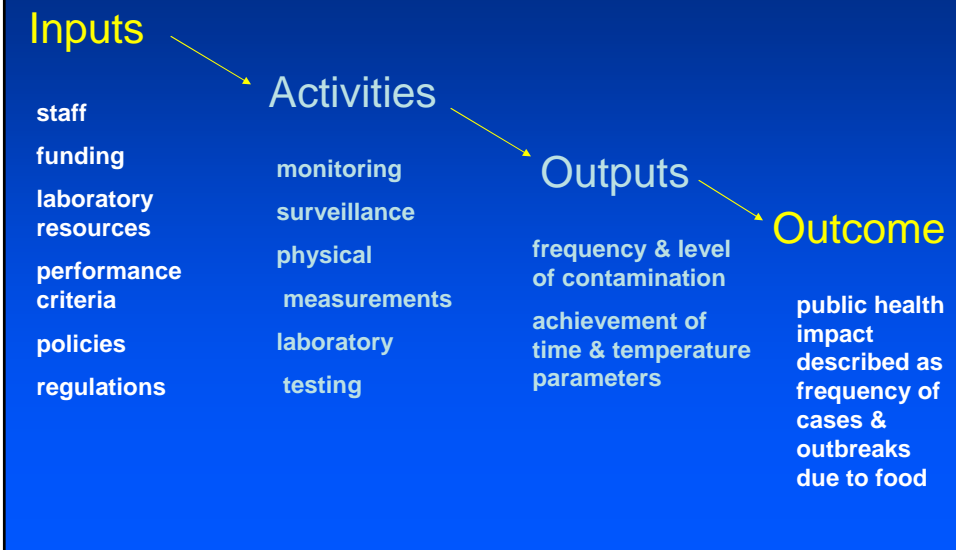




Prevention Effectiveness Assessment of the Egg Safety Program Based on Prevention of SE Outbreaks and Sporadic Cases



Evaluation Based on Co-variation





Study Design and Evaluation: Co-variation and Causality

- Experimental: analysis of data from random assignment of subjects to risk groups
- Observational: inferences drawn from uncontrolled data
- Quasi-experimental: comparisons of groups with and without intervention in place



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Study Design and Evaluation

Food Safety Control Test Group



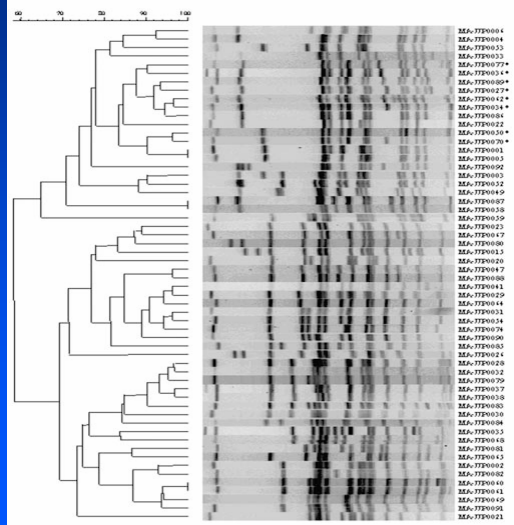
Food Safety Control Comparison Group



Time →



Evaluating the Effectiveness of Food Safety Programs



- Phylogenetic relatedness
 - Food isolates
 - Clinical isolates
- Distinguish illnesses related to specific foods or processes



Quasi-Experimental Studies

- Pre-test/post-test comparison group design
 - Pre-intervention baseline
 - Foods and consumers otherwise comparable in populations with/without intervention
- Industries can compare process outputs of lines with/without intervention to evaluate performance
- Governments can invest in systematic data collection before and after regulatory change and use comparison groups to attribute disease to specific foods/processes
- Better data will make more convincing evaluations



Evaluating the Effectiveness of Food Safety Programs

Inputs

staff
funding
laboratory resources
performance criteria
policies
regulations

Activities

monitoring
surveillance
physical measurements
laboratory testing

Outputs

frequency & level of contamination
achievement of time & temperature parameters

Outcomes

public health impact = frequency of cases & outbreaks due to food



Evaluating the Effectiveness of Food Safety Programs

Production

Processing

Distribution and Storage

Transportation

Retail Sale

Retail Service

Preparation

Consumption

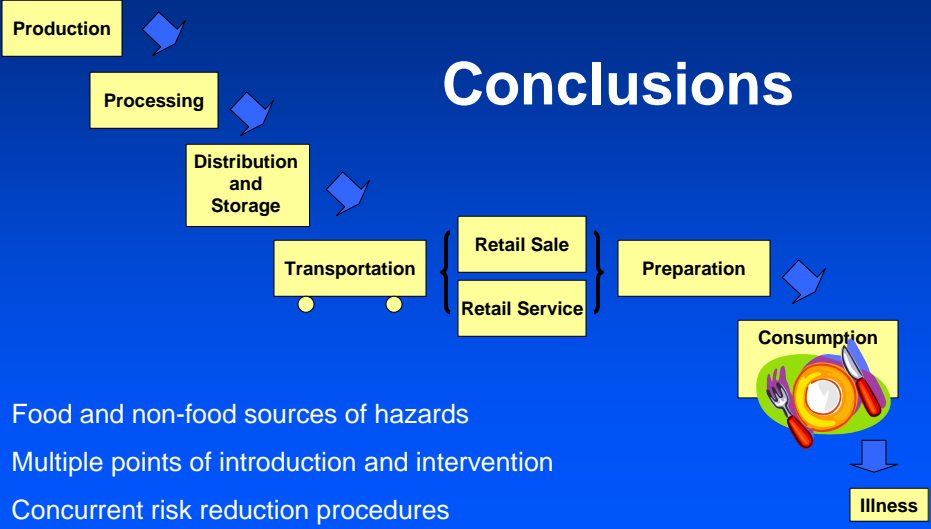
Illness

Conclusions

- Establish datasets on important variables
- Track control program activities and outputs
- Track public health outcomes
- Look for co-variation in trends



Evaluating the Effectiveness of Food Safety Programs



Conclusions

- Food and non-food sources of hazards
- Multiple points of introduction and intervention
- Concurrent risk reduction procedures



Evaluating the Effectiveness of Food Safety Programs



Conclusions

- Active surveillance and enhanced food attribution
- Measurements before and after application
- Comparisons to foods produced without program
- Microbial/epidemiologic categorization



Why We Evaluate

“... The gods condemned Sisyphus to endlessly roll a rock up a hill, whence it would return each time to its starting place. They thought, with some reason, that there was no punishment more severe than eternally futile labor...”

The Myth of Sisyphus