

# Participatory methods for risk analysis of informally marketed livestock products in sub Saharan Africa - Advantages and challenges



ILRI

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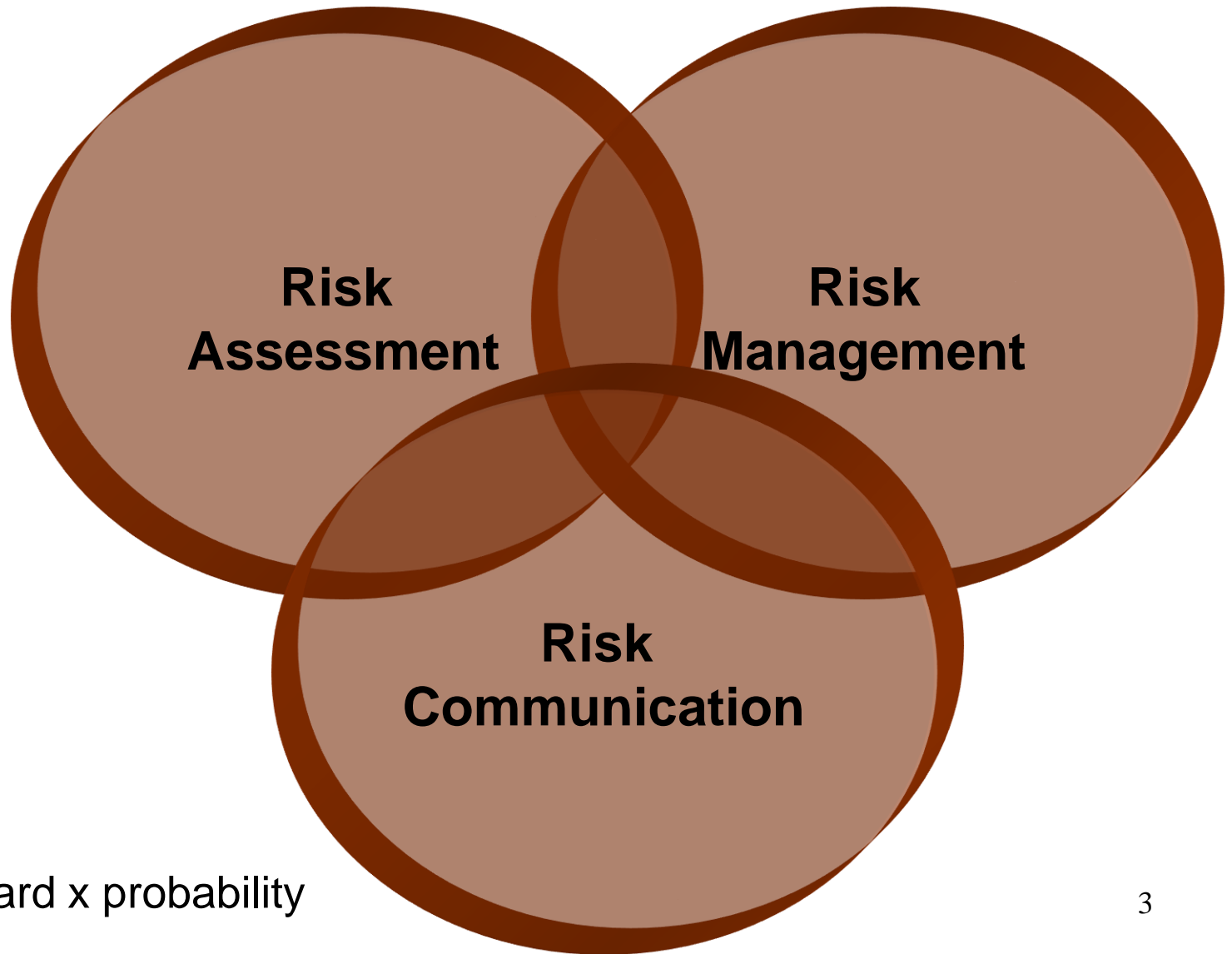
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5 Sokoine University of Agriculture 6 Directorate of Animal Science, Mozambique 7 University of Pretoria, South Africa 8 University of Ghana, Ghana  
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# Food safety in sub-Saharan Africa

- Every year, at least 2 billion cases of diarrhea occur and 1.5 million children under 5 yrs die worldwide
- 80% of child deaths due to diarrhea occur in South Asia and Africa
- Animal source foods are single most important source of food borne disease (FBD)
- In sub-Saharan Africa, large proportion of animal source foods are sold through informal markets

# Food safety risk analysis

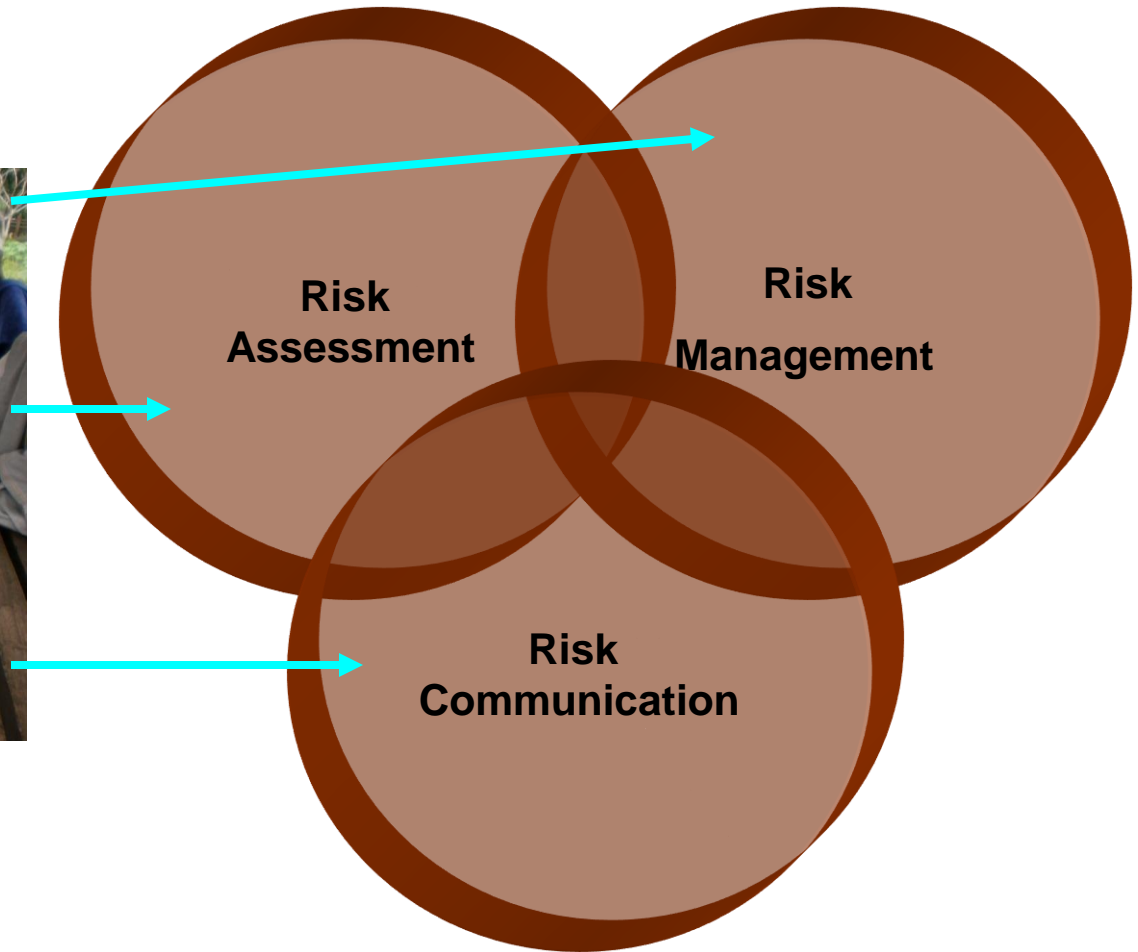
A tool for decision-making under uncertainty



\*Risk = hazard x probability

# Food safety risk analysis in informal marketing system

Participatory methods



# What are participatory methods?



Participants discuss problems

Several formats:

- Rapid rural appraisal
- Participatory rural appraisal
- Key-informants interview





## Safe food, fair food (BMZ, ILRI)

*Building capacity to improve the safety of animal-source foods and ensure continued market access for poor farmers in*

*Sub-Saharan Africa*



# Partners

Centre Suisse des Recherches  
Scientifiques en Côte d'Ivoire  
*Côte d'Ivoire, Mali*

Addis Ababa University  
*Ethiopia*

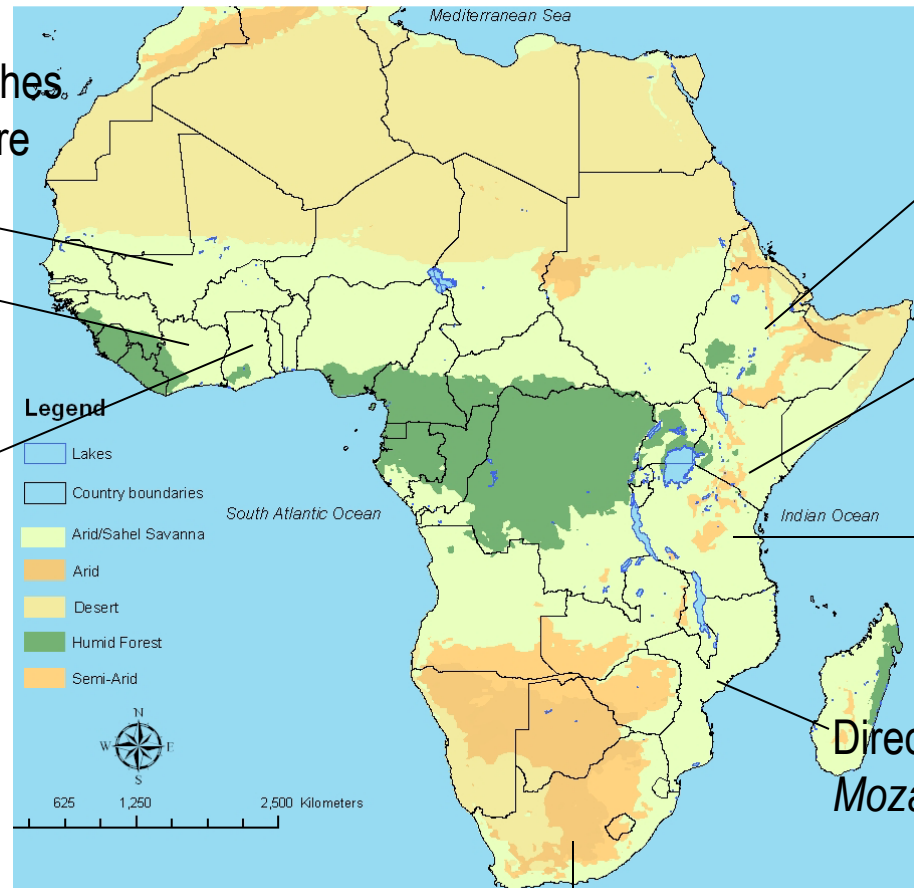
Nairobi University  
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Direcção de Ciências Animais  
*Mozambique*

University of Ghana  
*Ghana*

University of Pretoria  
*South Africa*



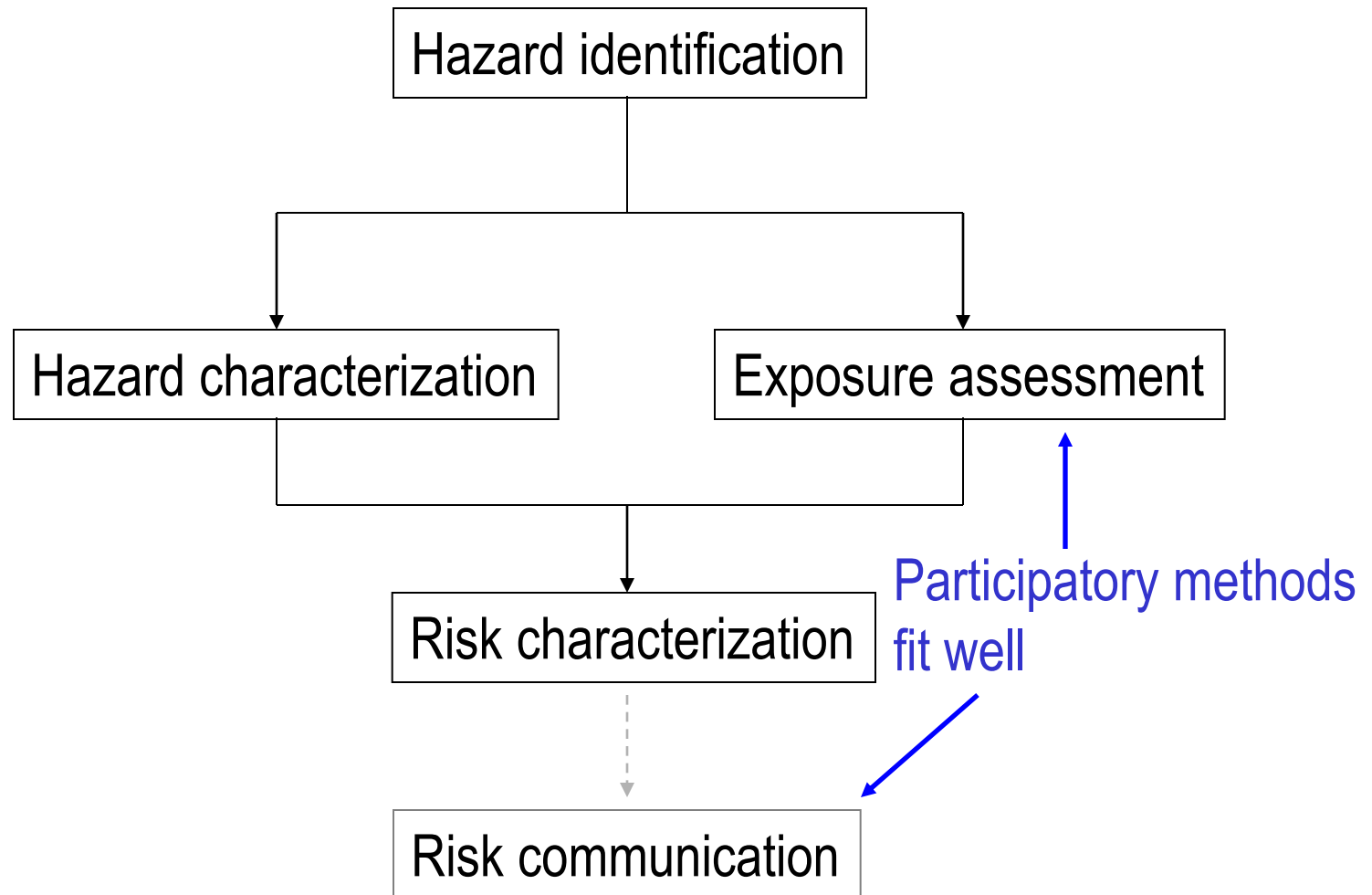
# Activities

- Trainings on participatory risk analysis (2008)
- Food safety situational analysis (2008-2010)
- **Proof of concept risk assessment** (2009-2011)
- National workshop (2010-2011)
- Impact assessment (2011)
- Cross-regional synthesis workshop (2011 Sep)



# Food safety risk assessment

## Codex Alimentarius Commission system



# Summary of risk assessment studies

- Hazards:
  - Bacteria: *Escherichia coli*, *Staphylococcus aureus*, thermophilic *Campylobacter spp.*, *Vibrio*, *Bacillus cereus* and *Listeria monocytogenes*
  - Parasite: *Paragonimus*
  - Chemical: aromatic polycyclic hydrocarbons
- Livestock products:
  - Beef, milk, chicken, venison offal, crabs and fish
- Number of postgraduate students:
  - 24 students from 11 countries
  - *21 presenting here: 10 orals and 13 posters*
- Diverse studies
  - Risk assessment, HACCP and socio-economics

# Modeling process in exposure assessment

Fault tree

Understanding a logic of exposure

Participatory & interviews

Understanding a value chain

Participatory & interviews

Quantifying a value chain

A survey, literature

Quantifying contamination and growth

Participatory & interviews

Quantifying risk mitigation in a value chain

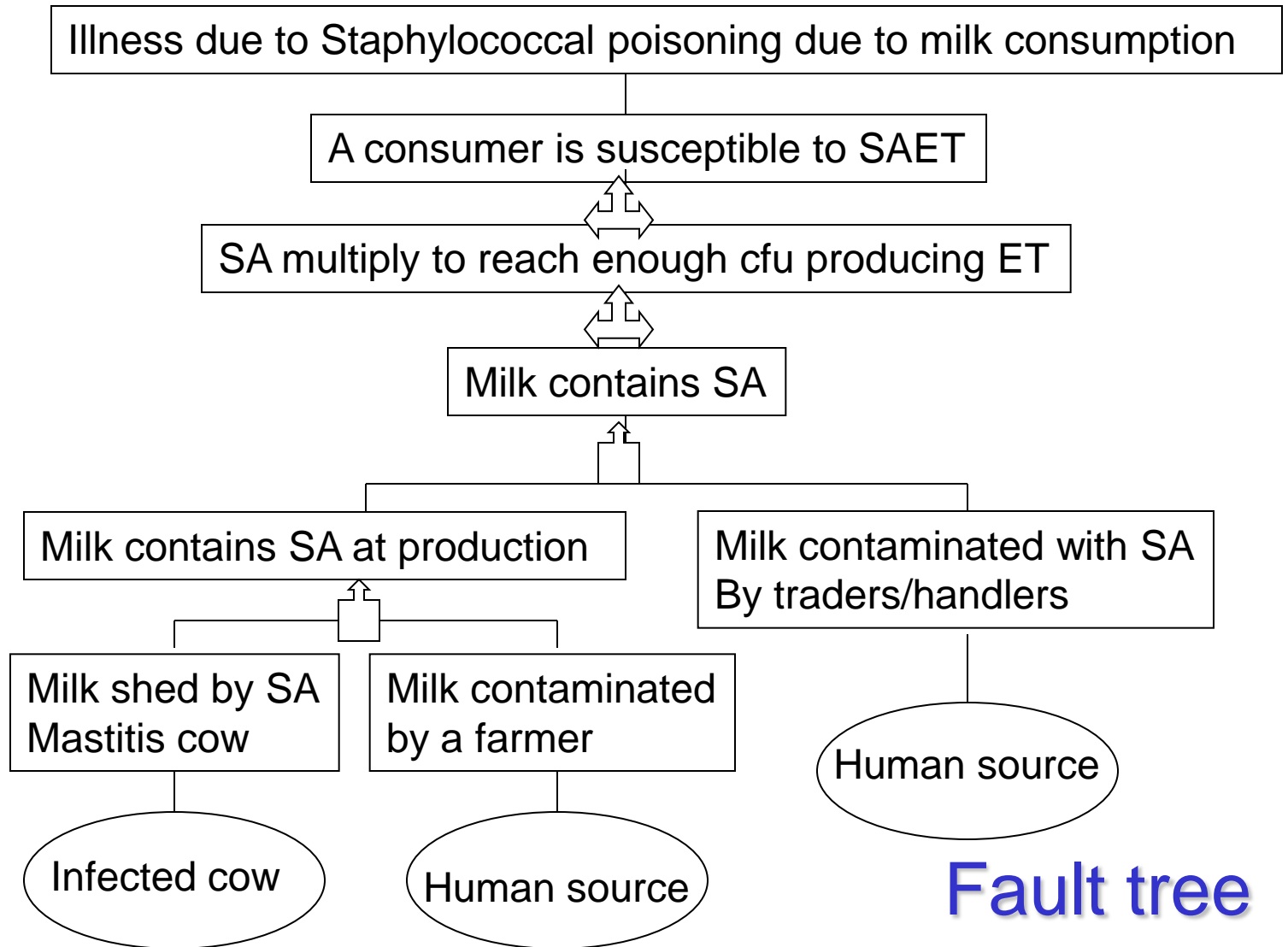
Literature

Dose-response model

Building into risk characterization model

Example:

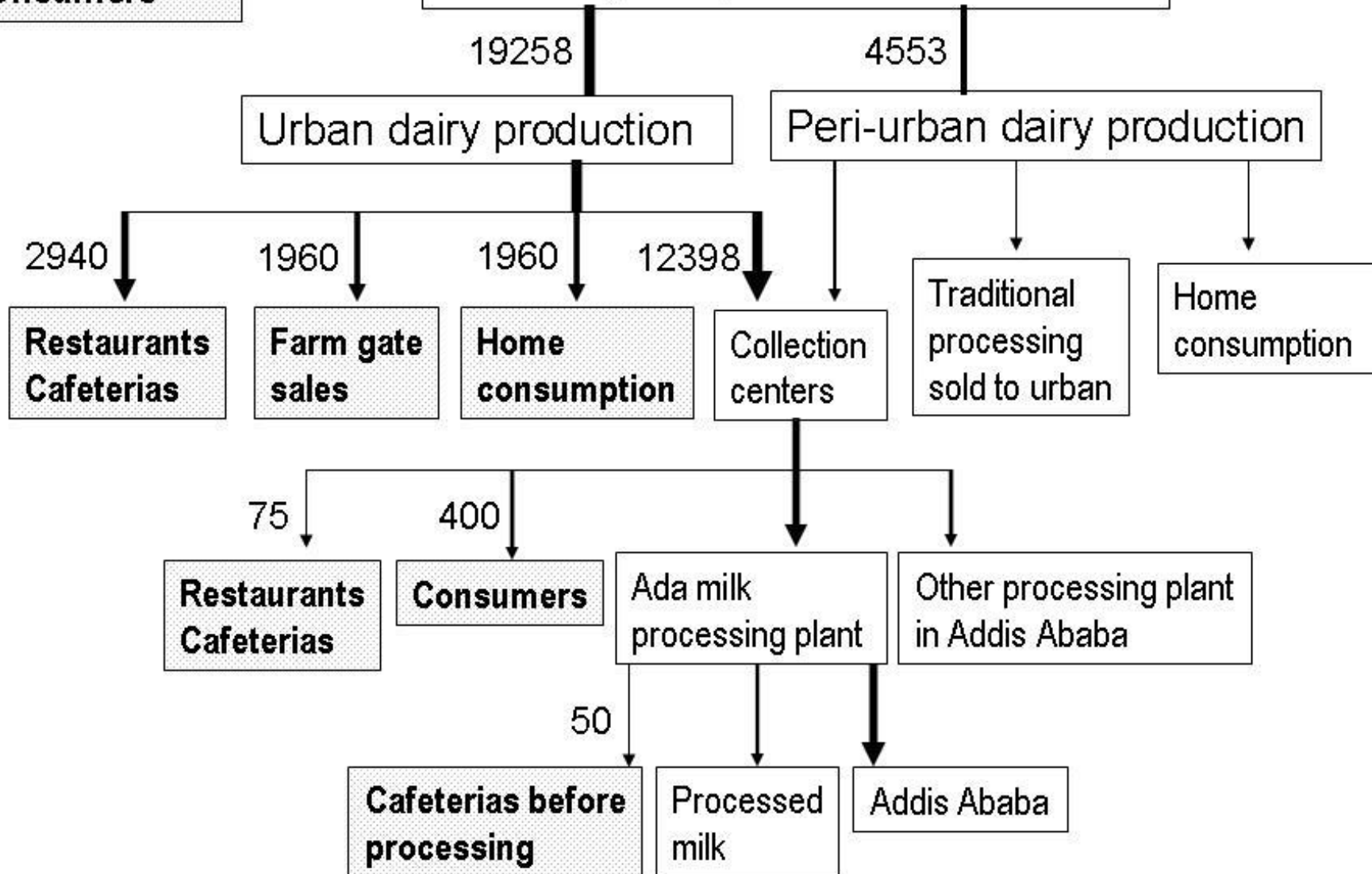
# Risk assessment for staphylococcal poisoning through consumption of informally-marketed milk in Debre Zeit, Ethiopia (Makita, Dessisa *et al.*)



Fault tree

**Liquid raw milk  
sold to urban  
consumers**

Dairy production in and around DZ by  
Ada Dairy Cooperatives farms



Dairy value chain- participatory and interviews

Example:

## Contamination- a survey

	Isolation of <i>S aureus</i>	Boiling before sales
Milk collection centre (n=25)	18 (70.4%)	0
Dairy farm (n=170)	74 (43.6%)	0



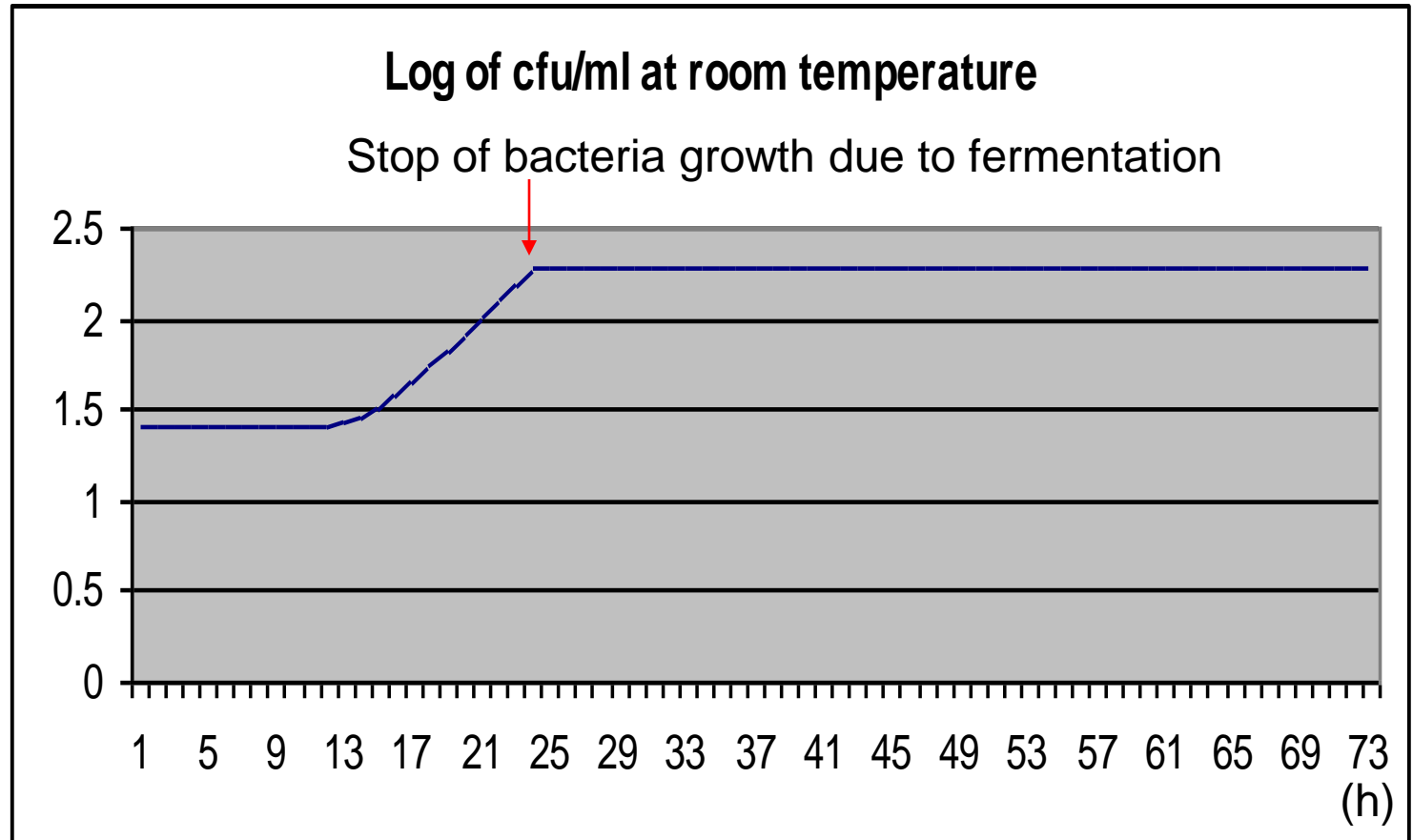
## Risk mitigation by consumers -participatory and interviews

	Boil milk before consumption	Percentage
Dairy farming households (n=170)	116	68.2
Consumers (n=25)	16	64.0



Example:

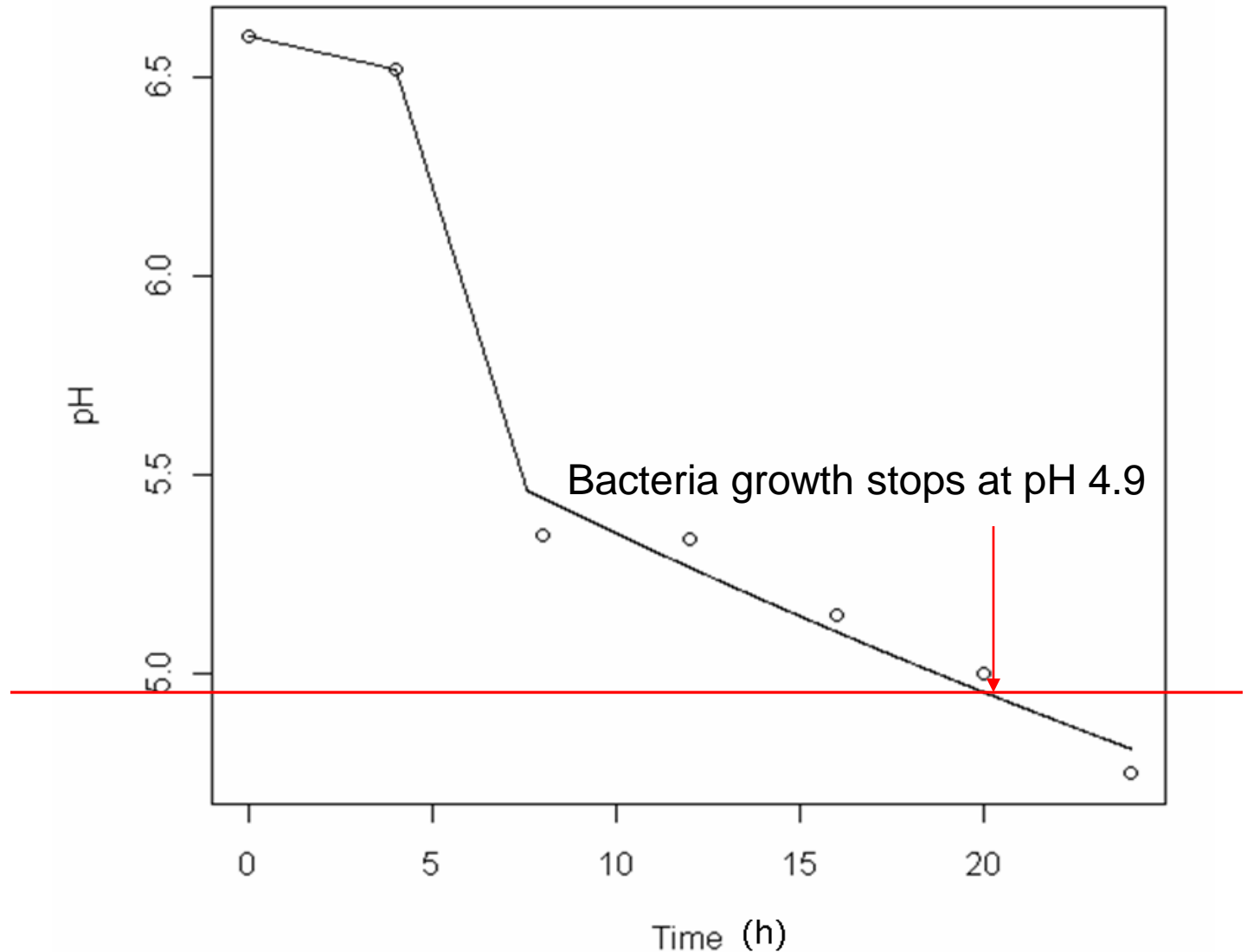
## Growth model of *S. aureus* in milk- literatures



- SA enterotoxin is produced at more than cfu  $10^{6.5}$
- Little amount of toxin (100ng) can cause poisoning

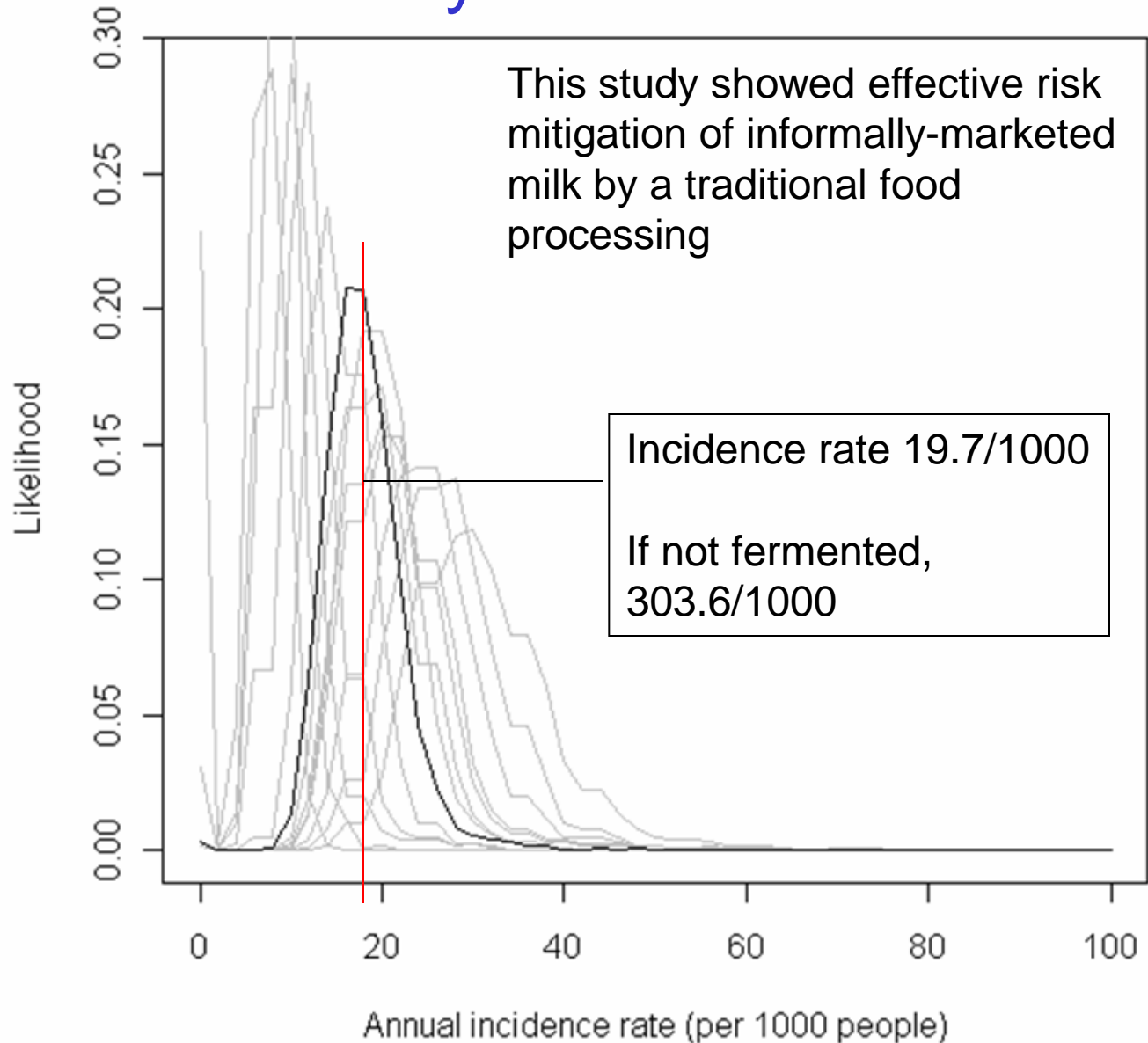
Example:

## Risk mitigation by traditional milk fermentation- interviews and literatures

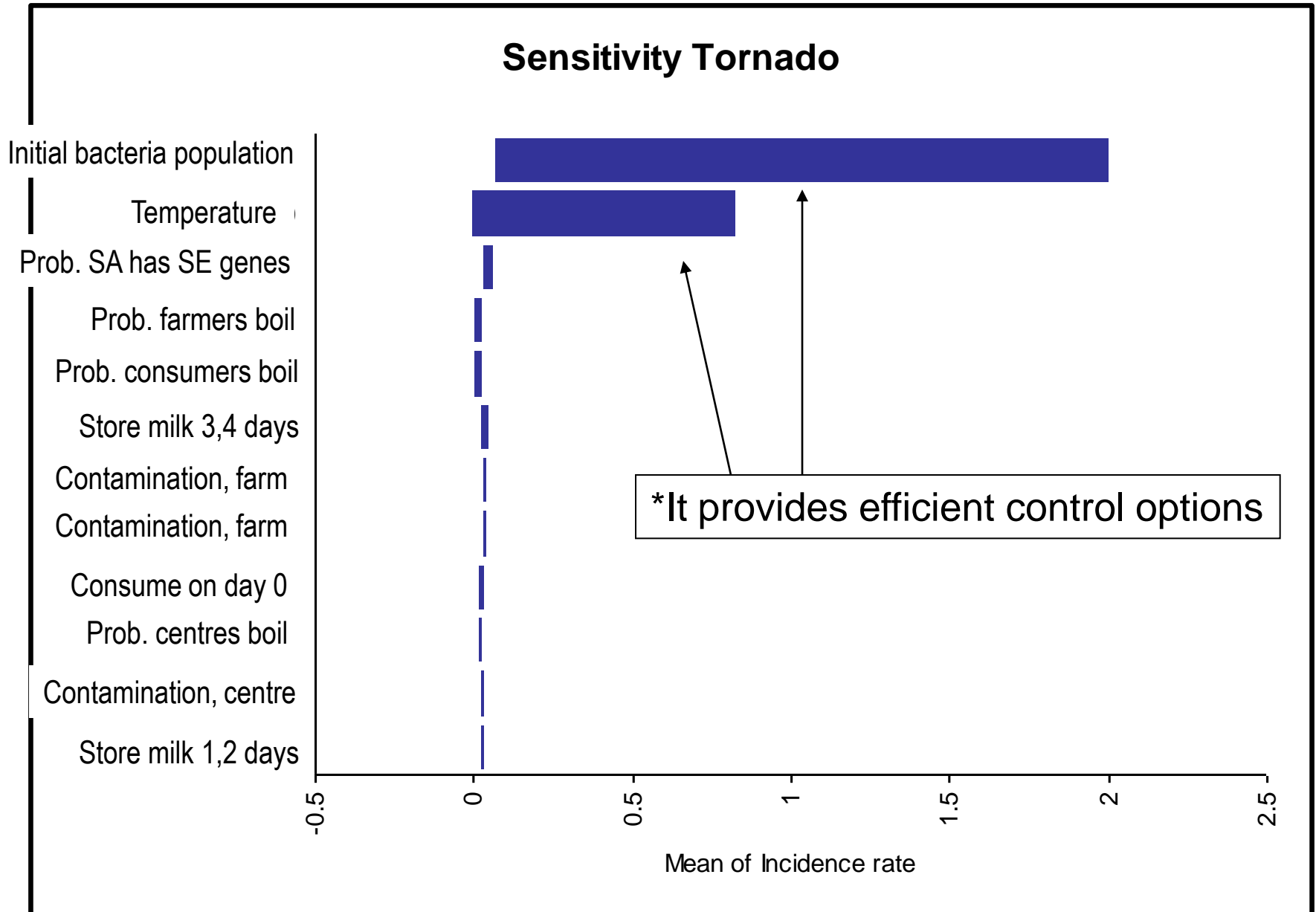


Example:

# Finally risk is characterized by a simulation



# Sensitivity analysis



# Advantage of participatory risk assessment identified



- Speed
- Affordability
- Flexibility in application
- Understanding of culture
- Best control option
- Potential to change behavior

# Challenges

- Interpretation of ‘participatory methods’
- Advanced statistics for stochastic risk assessment
- Assessment of multiple pathogens
- Inclusion of socio-economic aspects into risk assessment



# Conclusions

- Participatory risk analysis is suitable in informal markets
- Perception of risks may not represent true status of risks
- Traditional practices are often risk mitigating
- Multi-disciplinary, One Health, approaches needed to manage food safety in informal markets

# Acknowledgements

German Federal Ministry of International Cooperation (BMZ)

Federal Institute for Risk Assessment, Germany

Germany-South African Funding with Hohenheim University (GTZ)

Promotion of Private Sector Development (PSDA/GTZ)

Italian Embassy

Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA)

National Research Foundation, South Africa

Japan Ministry of Education, Culture, Sports, Science and Technology

Centre Suisse de Recherches Scientifiques en Côte d'Ivoire

