



Food and Agriculture Organization
of the United Nations

FAO Activities on STEC

National Reference Laboratories for *E. coli* in the EU

15th Annual Workshop (Virtual)
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Christine Kopko MSc.

*Food Safety Officer
Food Systems and Food Safety Division
Food and Agriculture Organization of the United Nations (FAO)*

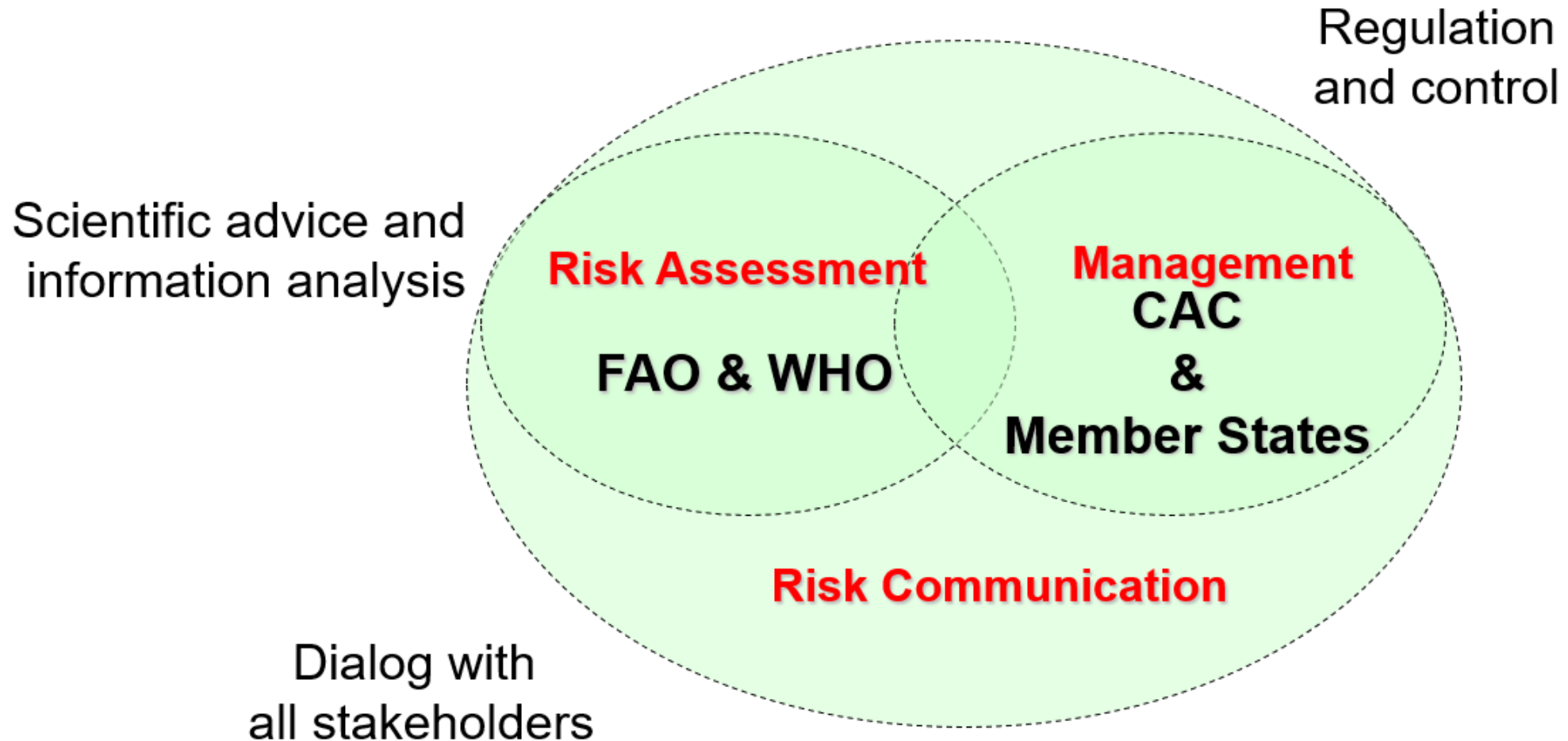


Objectives

- FAO/WHO Risk Analysis: who's involved?
- Background on STEC activities at the FAO
- Control of STEC in meat and dairy products
- Next steps



Risk Analysis Paradigm





CODEX ALIMENTARIUS

INTERNATIONAL FOOD STANDARDS

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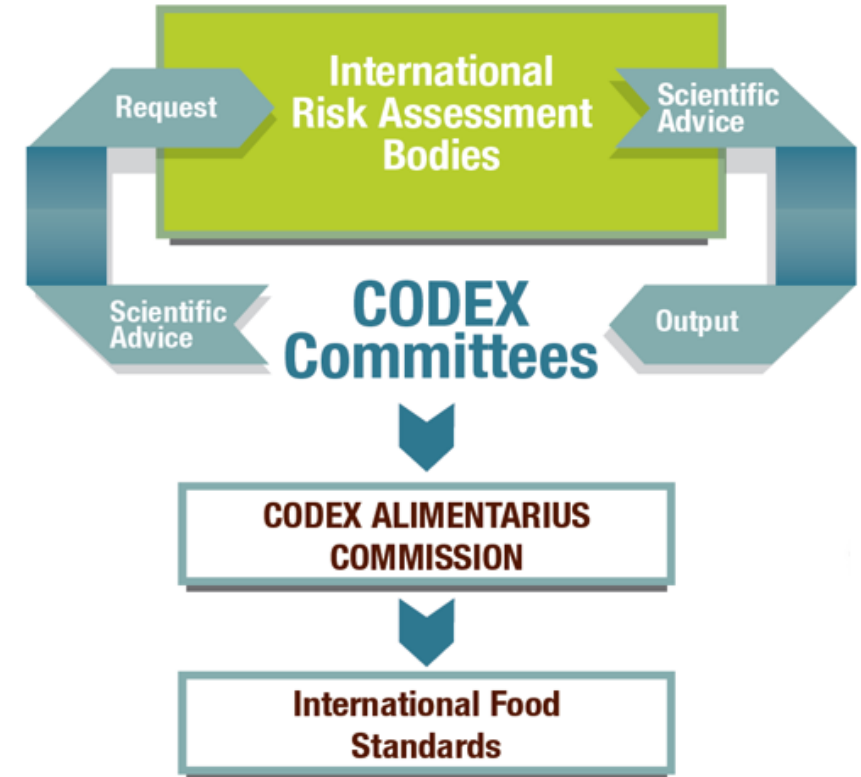


Food and Agriculture
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World Health
Organization

- EST 1963
- Risk Management Strategies - international standards, guidelines and codes of practices based on science
- Consumer protection and food trade





Joint FAO/WHO Expert Meeting on Microbiological Risk Assessment (JEMRA)

- EST 2000
- Scientific advice on microbiological risk assessment
- Expert meetings based on requests from Codex (CCFH)
- Roster of experts from around the globe (2017-2022)

Background on STEC at the FAO

2015 - Request for advice from Codex

- The global burden of disease attribution
- Hazard identification & characterization
- Monitoring programs & lab methods used

2016 & 2017 - JEMRA meetings on STEC

2019 - Request for advice from Codex

- Control of STEC in **beef, raw milk and raw milk cheese**, leafy greens and sprouts





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Cattle and beef chain from primary production to processing

Good agricultural and hygienic practices

- Not specific to STEC
- On-farm: housing, bedding, drinking water, animal density, biosecurity measures, sanitation and disposal of manure
- Processing: lairage hygiene, optimized dressing and evisceration procedures, trimming, and effective cooling systems



Cattle primary production control measures

- Diet management strategies
 - Forage vs. concentrate rations vs. grains: more research needed
- Feed additives
 - Probiotics
 - Bacteriophages
 - Colicins and sodium chlorate
- Vaccines
- Antimicrobials, Beta-agonists
- Transportation – long distance  shedding and x-contamination



Beef processing control measures

- **Lairage**
 - Design, time spent, stress, density, cleanliness, hide scoring
- **Hide decontamination**
 - Washing, dehairing and bacteriophage
- **Carcass decontamination**
 - Steam vacuuming & pasteurization, hot water wash, 24h chilling ↓ STEC
 - Organic acids and other chemicals
- **Primals and trim**
- **Ground beef** – HPP, irradiation ↓ STEC significantly



Dairy from primary production to processing

Good agricultural and hygienic practices

- On-farm: faecal contamination from animal and equipment during milking, personnel and environment
- Processing: x-contamination, personnel and environment
- Temperature control
 - Transportation and storage



Raw milk and raw milk cheese processing control measures

- Pasteurization
- Bactofugation and microfiltration and HPP
- Bacteriophages
- Irradiation
- Cheese making process (acidification, temperature and aging)

Time and \$\$



STEC monitoring and detection

- Processing and post-processing - testing is important for verification of control measures
 - Sampling and testing methodologies (intact vs. ground)
 - Generic E. coli as indicator (dairy)
- Culture enrichment and rapid screening assays for food samples
- Molecular techniques – quick and low cost but require culture confirmation
- Methods are needed for efficient and specific isolation of STEC O157:H7 and non-O157 STEC



Gaps and challenges

- Study design – laboratory vs. commercial production
- Analytical methods – strains used and initial concentrations
- Individual control measures vs. hurdle technology
- Surrogate bacteria



Emerging research for the future

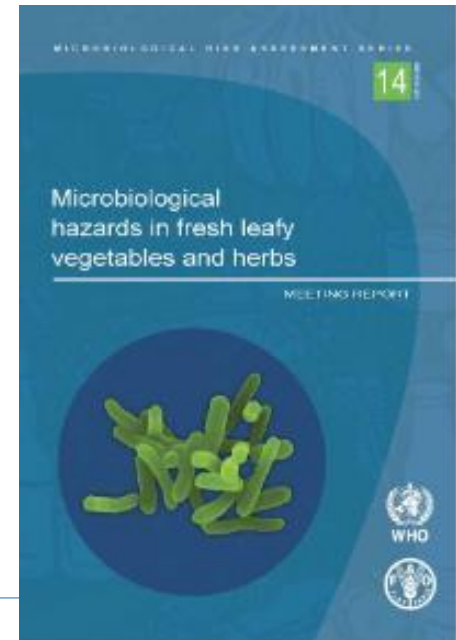
On-going research...

- Commercial use of visualization technologies for faecal/ingesta contamination
- Blast freezing and storage of packed beef
- Innovative processing aides and packaging technologies

Next steps for STEC at FAO

Codex: Control of STEC in beef, raw milk and raw milk cheese, **leafy greens and sprouts**

- 2021: Microbiological hazards in Fresh Fruits and Veg
 - Call for experts and data
 - Update of MRA 14: Microbiological hazards in fresh leafy vegetables and herbs: Meeting Report, 2008
- 2022: Microbiological hazards in sprouts
 - Call for experts and data





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Thank You