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## ***Applicability of Food Safety Objective- derived Microbiological Criteria in Developing Countries***

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ICMSF Symposium – Washington DC  
31 October–1 November 2005



### ***Presentation***

- Introduction
- FSOs in International Trade
- Developing Countries and Microbiological Criteria
- Indonesia\*, Brazil\*, South Africa & MCs
- Conclusions





## *Introduction*

**Food safety objective (FSO): maximum frequency and/or concentration of a microbiological hazard in a food at time of consumption that provides appropriate level of protection (ALOP) (ICMSF, 2002)**

## *Introduction...*

- FSO translates public health goal to measurable level of control
- Creates link between ALOP and performance / process criteria for manufacture of specific foods



## *Introduction...*

**Microbiological Criteria (MCs): define acceptability of a product or food lot, based on absence/presence/number microorganisms, including parasites &/or quantity of their toxins/metabolites, per unit(s) / mass / volume / area / lot (CAC, 2002).**



## *Introduction...*

- MCs may include testing for safety *and* quality
- FSOs → basis for setting MCs
- MCs applied to provide evidence that FSO is met → reducing foodborne illness
- MCs contribute to achieving ALOP



## *Introduction...*

- MC should consist of:
  - **Statement of m.o. of concern &/or toxins/metabolites + reason for concern**
  - **Analytical methods for detection / quantification**
  - **Sampling plan → no. field samples + size of analytical unit**
  - **Micro limits at specified point of food chain**
  - **No. analytical units to conform to limits**



## *Introduction...*

- MC should also include:
  - **Food to which criterion applies**
  - **Point(s) in food chain where criterion applies**
  - **Actions taken when criterion not met**



## *FSOs in International Trade*

- Govts have right to ensure food safety, animal & plant health protection in particular countries
- Imported foods may be rejected

WTO/SPS



## *FSOs in International Trade...*

- NB: criteria used to determine safe/unsafe foods must be communicated clearly to exporting country (*transparency*)
- Criteria may not be more restrictive than those implemented for domestically-produced food → artificial barrier to trade

WTO/SPS



## *FSOs in International Trade...*

- FSOs provide means of implementing concept of *equivalence*
- Countries may use different control measures to ensure FSO is met

WTO/SPS



## *Developing Countries & MCs*

- Food control systems in developing countries (DC) differ widely
- Some more sophisticated than others
- Least developed countries (LDCs) have rudimentary food control or none
- LDCs rely on more developed countries in region for support / testing imported foods / foods for export



## *Developing Countries & MCs...*

- Example: Namibia – has no system for inspection of fresh / frozen fish / canned fish for export
- SA Bureau of Standards (SABS) fulfills function



## *Developing Countries & MCs...*

- All inspected fish taken to SA by refrigerated truck (approx 2000 km) and exported from Johannesburg International Airport to EU
- MCs set by EU
- Refined procedures developed by SABS to ensure micro limits met (including parasites on fresh fish)



## *Developing Countries & MCs...*

- Many DCs have food control system spread out over:
  - **Several government agencies**
  - **Parastatal bodies**
  - **Private organizations (NGOs)**
- Fragmentation
- Duplication of scarce resources
- Lack of capacity on all levels e.g. provincial and local





## *Developing Countries & MCs...*

- Overlapping of functions
- Multiple decision-making
- Lack of communication between food control agencies
- Weak import control → dumping ground
- ***No clear responsibility re food safety***
- Difficulty in harmonizing regulations with stds and related texts of CAC



## *Developing Countries & MCs...*

- Many socio-economic problems too:
  - **High unemployment rates**
  - **Lack of adequate sanitation & drinking water**
  - **Under-nutrition**
  - **HIV/AIDS (sub-Saharan Africa)**
  - **Illiteracy**
  - **Civil wars (Africa)**
  - **Human rights violations**
  - **Lack of good governance**



## *Indonesia and MCs*

- 4<sup>th</sup> largest population in world → 220 million over thousands of islands
- Food product standards developed by National Standardization Agency – based on consensus amongst all stakeholders
- Stds developed with reference to:
  - ANZFA (New Zealand-Australia)
  - CFR (USA)
  - CAC



## *Indonesia and MCs...*

- Some standards old – need updating
- Stds do not cover many components of MCs e.g. sampling plans
- Most cases, ***military standards*** used
  - Do not include sampling plans / stringency categories as per ICMSF (2002)
  - Are sampling methods for general purposes of analysis
  - Based mainly on random sampling



## *Indonesia and MCs...*

- Govt participates in Codex activities
- Only those involved + academics / scientists understand terminology
- Initiatives exist attempting to improve food safety focus
- 1998: team of Indonesian and Australian specialists developed national Integrated Food Safety System (IFSS)



## *Indonesia and MCs...*

- Model implements risk analysis principles on national level through three networks:
  - **Food Intelligence Network – Risk Assessment**
  - **Food Control – Risk Management**
  - **Food Promotion Network – Risk Communication**



## *Indonesia and MCs...*

- IFSS provides national framework for food safety – transcends govt depts, academia, industry and consumers
- Enables them to work together to maximise resources and improve food safety



## *Brazil and MCs*

- 2001: Population of 172 million; 24 % below international poverty line



- VERY NB: *Poultry export*
- Third largest poultry meat producer in world



## *Brazil and MCs...*

- 1994: National Programme on Poultry Health
- Main goal is control of following in poultry and eggs:
  - **New Castle disease**
  - ***Salmonella***
  - ***Mycoplasma***
- All aspects related to control of above covered



## *Brazil and MCs...*

- 2003: National Pathogen Reduction Programme (Ministry of Agriculture)
- Phase 1 (2003-2006): Focused on *Salmonella* in broilers and turkeys
- Directed to processing plants for both export and domestic production



## *Brazil and MCs...*

- Objectives:
  - Evaluate occurrence of *Salmonella* in products
  - Build database
  - Establish quantitative standards
  - Monitor degree of contamination in plants
  - Increase ultimately, safety of products
- Micro testing in accredited labs included



## *Brazil and MCs...*

- Sampling plan also established:
  - Every 30 000 chicken carcasses or every 1000 turkey carcasses / day: one tested for *Salmonella*
  - 51 samples = one cycle (n)
  - c= 12
- When no. + samples > 12, GMPs, SSOPs, HACCP re-evaluated



## *Brazil and MCs...*

- When 2 consecutive cycles out of spec, can no longer export till 2 consecutive cycles fall back within spec.
- Here, plant comes up with contingency plan within 5 days, otherwise shut down



## *Brazil and MCs...*

**Retail**



- 2000: National Programme for Monitoring Sanitary Quality of Foods (Ministry of Health)
- Focused on physico-chemical & microbiological parameters, labelling



## *Brazil and MCs...*

### *Retail...*



- Appropriate only to selected products
- Selection based on level of consumption, higher risk, availability on market, previous involvement in outbreaks, possibility of collection of samples, possibility of lab analysis



## *Brazil and MCs...*

- 2001: Ministry of Health established micro limits for 28 types of food through Resolution
- Resolution established 2 types samples:
  - **Indicative - only one sample tested (2-class sampling plan)**
  - **Representative – five units of same product (3-class sampling plan):  $n = 5$ ;  $c = 0-3$  according to *RISK***





## *Brazil and MCs...*

- Brazil also recognises need to re-evaluate food control system
- Paper presented at Second FAO/WHO Global Forum of Food Safety Regulators held in Bangkok, Thailand in 2004, outlined new policy approach



## *South Africa & MCs*

### **Scenario 1**

- Population: 46.6 million
- 48.4% have < 38US\$/month to spend
- One-fifth to one-quarter: HIV/AIDS i.e. 9-11 million
- Malaria
- TB
- Under-nutrition
- Lack of sanitation (rural)
- Lack of drinking water (rural)



## *South Africa & MCs...*

### Scenario 2

- Well-developed food & bev industry
- Generates 90 billion Rand (+/- 14 billion US\$) per annum
- 21% of total manufacturing sector = biggest
- 2238 companies – most multinationals



## *South Africa & MCs...*

### Scenario 2...

- Economy:
  - **Market-driven**
  - **Export-oriented**
  - **DTI 1994: trade reforms to > regional (SADC) & international trade**
- Policy shift to *value-added products* from *primary products* (pre 1994)



## *South Africa & MCs...*

### Scenario 2...

- 2001: SA one of 6 net exporting nations
- Exports = 30% total value of annual agric production
- Food & bev exports from Africa: 65% from SA (10% from Gauteng)
- Free trade with 15 (25) EU countries
- Exports to USA via AGOA Act



## *South Africa & MCs...*

- Changes necessitated revision of food control system
- 1997-2003: three projects FAO, World Bank
- No progress
- Consumer Goods Council of SA (CGCSA)  
Food Safety Authority (Feb 2006)



## South Africa & MCs...

- Food control very fragmented
  - Dept Health
  - Dept Agriculture
  - Dept Trade & Industry (SABS)
  - Private Orgs (NGOs)
- MCs understood, developed, used differently
- MCs in govt = *micro limits & methods*



## South Africa & MCs...

- Most cases, no sampling plan, no analytical units, size of analytical units

Exceptions



*Peanuts*



*Fish & fish products*



## *SA & MCs...*

### *Peanuts – domestic & imported*

- Hazardous to health → aflatoxins (B1)
- SA (rest of Africa): high hepatitis B
- Risk for liver cancer higher
- Peanut butter in school feeding schemes
- **All** consignments taken as hazardous regardless of exporting country



## *SA & MCs...*

### *Peanuts – domestic & imported*

- 2003: DoH: Regulation on “tolerances for fungus-produced toxins in foodstuffs”; Annexure A: Sampling plan for total aflatoxins in peanuts intended for further processing
- Well-described MC included:



*SA & MCs...*

*Peanuts – domestic & imported*

- Material to be sampled
- No. incremental samples for lots < 15 tonnes
- Incremental sample collection
- Sampling static lots
- Sampling dynamic lots
- Weight of incremental sample
- Packaging & transmission of samples



*SA & MCs...*

*Peanuts – domestic & imported*

- Sealing and labelling of samples
- Precautions with sample preparation
- Homogenization of sample
- Size of test portion
- Selection of appropriate method of analysis
- Toxin limit of 15 µg/kg total aflatoxins



## *South Africa & MCs...*

- Most other foods under DoH – few MCs
- Not specified which pathogens NB
- Testing left to discretion of Env Health Officer



## *South Africa & MCs...*

- Food safety low on list of priorities of govt → ***food security***
- Function of ensuring imported foodstuffs safe left to importers (retailers) & standards agencies
- Here, MCs better understood and implemented



*SA & MCs...*

*Fish & fish products:  
domestic, import, export*

**SABS (DTI)**

**Export**

- Competent authority for EU
- MCs set according to EU requirements
- MCs further refined to ensure achieving EU requirements



*SA & MCs...*

*Fish & fish products:  
domestic, import, export*

**SABS (DTI)**

**Imports and domestic**

- Compulsory standard specs
- Specify:
  - **Pathogens + other m.o.**
  - **Micro limits**
  - **Micro procedures**





*SA & MCs...*

*Fish & fish products:  
domestic, import, export*

**SABS (DTI)**

*Imports and domestic*

- Based on stds, SABS develops sampling plans etc to fulfill elements of MCs



## *Conclusions*

- Food control systems need to be restructured in DCs with respect to food safety
- Need political will
- FSOs and MCs not clearly understood in govt
- LDCs still grappling with GHPs, GMPs
- MCs developed where there are “hot spots” + exports



## *Conclusions...*

- Most MCs for domestic foods not well developed
- Most are antiquated and origin not known
- Definitely place for FSO-derived MCs in DCs:
  - **More scientifically based**
  - **Derived from recent info on risk assessments**
  - **More relevant**



## *Conclusions...*

- Such MCs transparent + provide for equivalence → NB re WTO/SPS

- ALOPs need to be set esp re immuno-compromised population
- Training, awareness
- VERY NB: participation in international discussions and decision-making



## *Conclusions...*

- Intensive process: well-planned strategy
- Matter of urgency
- Already perception that FSOs are designed by developed world as artificial barrier to trade with respect to developing countries

