FOOD SAFETY RISK ASSESSMENT IN BEEF IN ARUSHA MUNICIPALITY, TANZANIA

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Authors

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Introduction

- Thermophilic *Campylobacter* is one of the most important pathogens causing food borne illness in the world

- In Tanzania, the risks of campylobacteriosis had not been studied and the risks especially from informally marketed foods had not been assessed
• A study on risk assessment for thermophilic *Campylobacter* infection through the consumption of ready to eat beef in Arusha, Tanzania was carried out from January to March 2010
• A total of 160 samples were collected:
  • beef carcass swabs from butcher shops (n=73)
  • 1 g samples of roast beef (n=45) and skewer beef (n=42) sold in beer bars
Justification

• 80% of the population depend on informal market as source of food

• Arusha has 1,523,238 heads of cattle and has a modern abattoir, butcher shops and beef selling stations

• Food safety risk assessment had not been done in ready-to-eat beef in Arusha, Tanzania
Objectives

- To assess the consumption of beef contaminated with thermophilic *Campylobacter* in Arusha municipality

- To estimate the risk associated with the consumption of beef contaminated with thermophilic *Campylobacter*
Methodology

• The municipality was divided into two wards, northern and southern
• Participatory methods were applied
• Fault tree was constructed
• Microbiological examination was conducted
• Stochastic modeling was carried out using Monte Carlo
Ingestion of thermophilic *Campylobacter* through ready to eat beef

- Contaminated during serving or eating
  - Contaminated during or after cooking in bar
    - Contaminated during selling
      - Contaminated during transportation of carcass
        - Contaminated at abattoir during slaughtering
  - Contaminated before eating
    - Inadequate heating during cooking
      - Contaminated before selling
        - Contaminated carcass
          - Infected animal
Results

Isolation of thermophilic *Campylobacter* in raw beef, roast beef and skewer beef

<table>
<thead>
<tr>
<th>Type of Product</th>
<th>Ward</th>
<th>No. sampled</th>
<th>No. positive</th>
<th>Prevalence %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raw beef</td>
<td>Northern</td>
<td>41</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Southern</td>
<td>32</td>
<td>8</td>
<td>25</td>
</tr>
<tr>
<td>Roast beef</td>
<td>Northern</td>
<td>21</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Southern</td>
<td>24</td>
<td>7</td>
<td>32</td>
</tr>
<tr>
<td>Skewer beef</td>
<td>Northern</td>
<td>20</td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Southern</td>
<td>20</td>
<td>7</td>
<td>35</td>
</tr>
</tbody>
</table>
# Exposure assessment for thermophilic *Campylobacter* in roast and skewer beef in beer bars in Arusha, Tanzania

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Result – stochastic model</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
</tr>
<tr>
<td>Total quantity of <em>roast beef</em> contaminated per day</td>
<td>3,595 kg</td>
</tr>
<tr>
<td>Total quantity of <em>roast beef</em> consumed per day</td>
<td>23,152 kg</td>
</tr>
<tr>
<td>Probability of eating contaminated <em>roast beef</em></td>
<td>15.5%</td>
</tr>
<tr>
<td>Total quantity of <em>skewer beef</em> contaminated per day</td>
<td>165</td>
</tr>
<tr>
<td>Total quantity of <em>skewer beef</em> consumed per day</td>
<td>474</td>
</tr>
<tr>
<td>Probability of eating contaminated <em>skewer beef</em></td>
<td>34.7%</td>
</tr>
</tbody>
</table>
Focus group discussions with consumers

- Beef was their favourite meat (78%)
  - Beef consumption at household 3/wk (75%)
  - Quantity purchased 1 kg (70%)
- Had not received training on food hygiene (75%)
  - Not aware of campylobacteriosis (100%)
- 68% graded beef by looking at fat content and colour only
Cont’d…

- Considered good hygiene was a criterion for food safety assurance (70%)
- Serve food within 30 min after cooking (60%)
- Purchase meat before noon (49%)
Discussion

- This study found that almost all beef products examined in Arusha municipality were contaminated with thermophilic *Campylobacter*.

- Southern wards had higher prevalences in all products suggesting the risk of contracting campylobacteriosis is greater in those wards than in the northern wards.
Cont’d…

• Isolation of thermophilic *Campylobacter* in meat sampled from butcher shops suggests there is contamination of carcasses either
  - at the abattoir or
  - during transportation or
  - at the butcher shop.
• Probabilities of ingestion described by this study in both roast and skewer beef are significant in magnitude suggesting that consumption of contaminated ready-to-eat beef and/or cross contamination is possible.

• Poor knowledge of food handlers may contribute to high contamination rates
Roast and skewer beef are widely consumed in Tanzania increasing the likelihood of thermophilic *Campylobacter* spp. transmission to humans.

- Therefore it is essential to enforce regular inspection at all selling outlets, LGA`s should allocate enough budget for health officers for inspection activity.
Cont’d…

• Health education for all stakeholders on good hygienic practice regarding food consumption is a useful risk mitigation procedure to ensure and safeguard health of consumers.

• Due to the increasing incidence of HIV-related deaths due to *Campylobacter*, interest in campylobacteriosis research and control should be emphasized.
Thank you!