

An estimation of thermophilic *Campylobacter* population in ready-to-eat roast beef and chicken sold and hygiene practices of sellers in beer bars in Arusha, Tanzania

Toyomaki H¹, Ishihara K¹, Sanka P², Kurwijila R³, Grace D⁴, Makita K^{1,4}

¹ Rakuno Gakuen University, Japan; ² Veterinary Investigation Centre, Arusha, Tanzania

³ Sokoine University of Agriculture, Tanzania; ⁴ International Livestock Research Institute, Kenya

INTRODUCTION

- '*Nyama-choma*' (roast beef) and '*kuku-choma*' (roast chicken) are very popular ready-to-eat food served in beer bars in Tanzania.
- A separate risk assessment for thermophilic *Campylobacter* in Arusha was investigated. (Mahundi 2010)
- The incidence rate : 6.4 people (90% CI: 3.4-10.4) per 1000 people per day
- The concentration of *Campylobacter* in beef was not studied.

OBJECTIVES

- Understanding of the concentration of thermophilic *Campylobacter* on roast beef and chicken surfaces as well as that on raw beef.
- The concentration was estimated using the most probable number (MPN) approach.

SAMPLING AND INTERVIEWS

- Where?
 - In Arusha, Tanzania.
- When?
 - In September and October 2010.
- What?
 - All 70 samples were collected.
 - Thirty samples of beef sold at butchers and 30 samples of roast beef and 10 samples of roast chicken sold at *nyama-choma* beer bars
- Interviews : These butchers and beer bars for sale and hygienic information.

ISOLATION OF CAMPYLOBACTER AND ESTIMATION OF THE MPN

- Fifty grams of samples were rinsed with 25 ml of Phosphate Buffered Saline (PBS).
- One ml of each three replicates of this solution and 10 and 100 times diluted solutions were inoculated to Preston broth and incubated at 42°C for 24 hours in a CO₂ jar.
- The solutions were then cultured on CCDA agar at 42°C for 48 hours and the isolates were sub-cultured on blood agar and the DNA was extracted.
- The extracted DNA was tested for thermophilic Campylobacter using PCR and positive DNA was tested for both *C. jejuni* and *C. coli*.
- The MPN of the isolates was obtained from the MPN table.

PREVALENCE OF CAMPYLOBACTER IN MEAT

- Un-typed bacteria colonies : 31 samples.
- Thermophilic Campylobacter isolates : **Only 1 sample** of roast chicken, and identified **C.coli**.
- The prevalence
 - Zero% (0/30) for beef at butchers, 0% (0/30) for roast beef and 10% (1/10) for roast chicken.

INFORMATION OF BEER BAR WHICH CAMPYLOBACTER WAS DETECTED

- The MPN of the *C. coli* was 0.37/g of meat (95% CI: 0.07 – 1.0).

Table 1. Hygiene of the beer bar from which *Campylobacter* was detected

Sales per day for beef	Sales per day for chicken	Urbanization type	Possession of a refrigerator
20kg	5birds	Urban	No
Water to use	Hygienic training	Use same knives for both beef and chicken	Use same knives for raw and roast meat
Tap water	Trained	Yes	No

HYGIENE OF SALES

Table 2. Summary of hygienic information of butchers and beer bars

Sample		Possession of a refrigerator		Water to use		Hygienic training		Use same knives for raw and roast meat	
Sales type	Total	Yes	Percentage	Tap water	Percentage	Trained	Percentage	Yes	Percentage
Butcher	30	7	23%	30	100%	16	53%	NA	NA
Beer bar	40	8	20%	40	100%	20	50%	18	46%

- No correlation between the experience of training and separate use of knives for raw and roast meat in beer bars (Chi-squared=0.22, df=1, p=0.64).
- Most beer bars cooks were using a same cutting board for raw and roast meat by observation.

Urbanization type

- Urban butchers : 17%
- Urban beer bars : 38%

- Urban butchers sold more beef (110.8kg/day) than in peri-urban (39.1kg/day, $t=4.34$, $p=0.005$)
- Urban beer bars sold more roast beef (19.9kg/day) than in peri-urban (9.0kg, $t=3.4$, $p=0.002$).

- No association of level of urbanization in the training status for hygiene, or possession of refrigerator, or separate use of knives for raw and roast meat.

CONCLUSION

- A low recovery rate and the small value of MPN might be due to dry and hot environment in butchers and heat of roasted meats.
- The fact that *C. coli* was detected from roast chicken suggested possible post-roast contamination.
- **Ready-to-eat meats in beer bars was proved not to be risky for Campylobacteriosis.**
- Hygienic training was not effective.
- Separate use of knives cutting boards for raw and roast meat was recommended.

FUTURE RESEARCH

- Updating the risk assessment
- Incentives of compliance to hygienic recommendations by the health authorities.

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