CHARACTERIZATION OF MEAT RETAIL CONDITIONS IN KIGALI CITY : HYGIENIC PRACTICES AND DETERMINANTS FOR SALMONELLA OCCURRENCE

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INTRODUCTION

Meat is worldwidely known to be an important source of valuable proteins and nutrients for human nutrition. However, as its chemical composition favors the proliferation of a wide range of spoilage and pathogenic microorganisms, meat constitutes one of the major vehicles for microbial pathogens responsible of food borne infections in humans. Salmonellosis constitutes one of the leading food diseases in human, and the consumption of meat is recognized to be one of the pathways of *Salmonella* transmission. The contamination of meat by microbial pathogens such as *Salmonella* can occur at any step of the meat chain from the farm to the consumption. However, the retail level constitutes an important stage in regard with the ultimate quality and safety of meat as it represents the last check point where contaminated products can be identified. Therefore, the microbiological quality of meat at the retail stage constitutes a notable food safety concern for consumers. The aim of the present study was to assess the meat retail conditions in Kigali city as well as the determination of the bacteriological quality and safety of the retailed meat. Data gathered in this study would be helpful in designing a microbiological risk assessment model for *Salmonella* in the Rwandan meat chain.

MATERIAL AND METHODS

Survey on meat retail conditions: The survey was conducted in 150 meat retail establishments of Kigali city by using a structured questionnaire.

Bacteriological analyses: 270 samples of meat cuts under retail were analyzed for the total mesophilic count (TMC) according to the ISO 4833:2003 Standard protocol, *Escherichia coli* count (ECC) by using the ISO 16649-2:2001 standard protocol and *Salmonella* detection by following the ISO 6579:2002 standard protocol.

MEAT RETAIL CONDITIONS

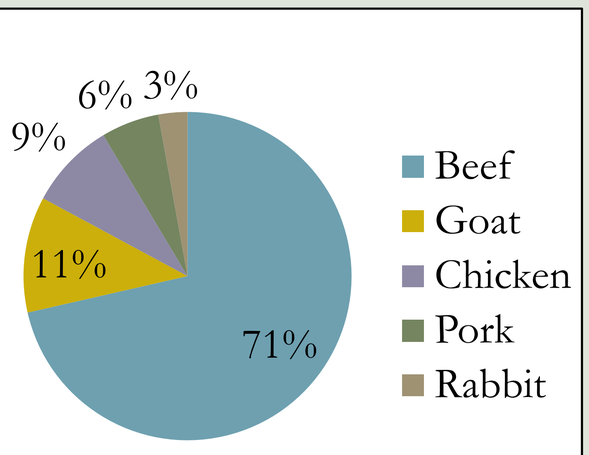


Fig. 1: Meat utilization within the retail establishments.

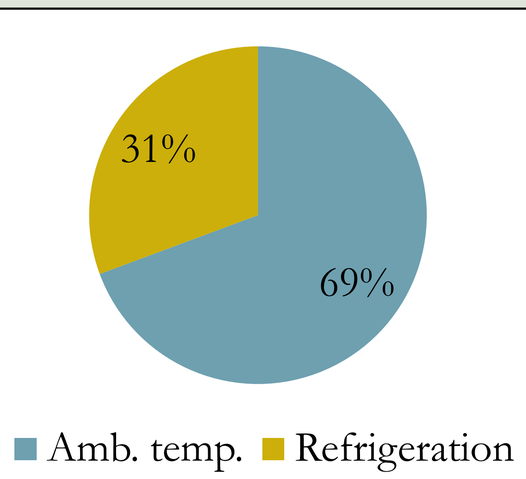
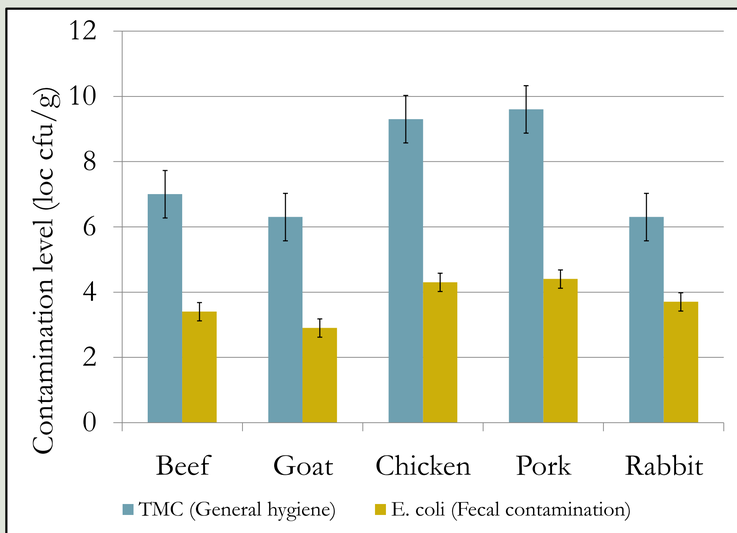


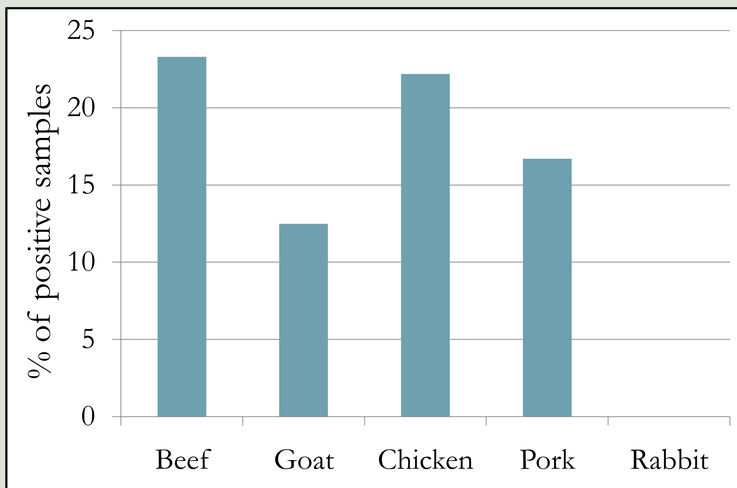
Fig. 2: Temperature conditions for meat transportation

QUALITY AND SAFETY OF RETAILED MEAT



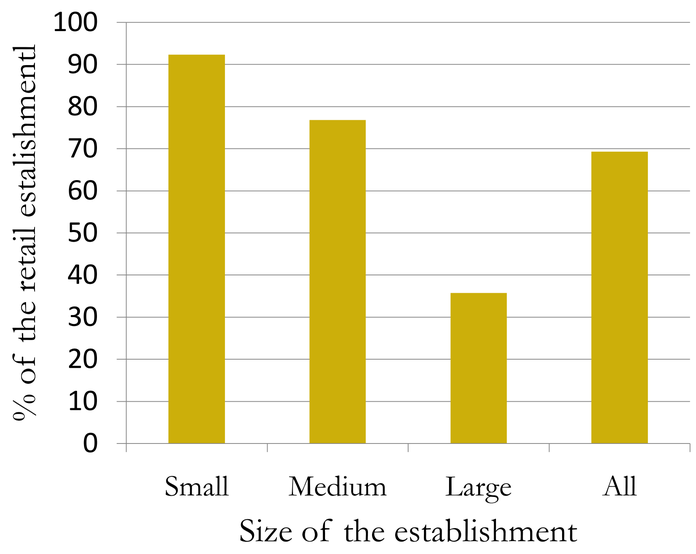
High
levels of hygiene indicator bacteria (need for hygiene improvements).

Fig 5. Levels of meat contamination by hygiene indicator bacteria



19.6%
Relatively high prevalence of Salmonella in retailed meat cuts.

Fig 6. Occurrence of *Salmonella* in the retailed meat cuts



69.3%
Establishments exposing meat cuts under retail at ambiant temperature

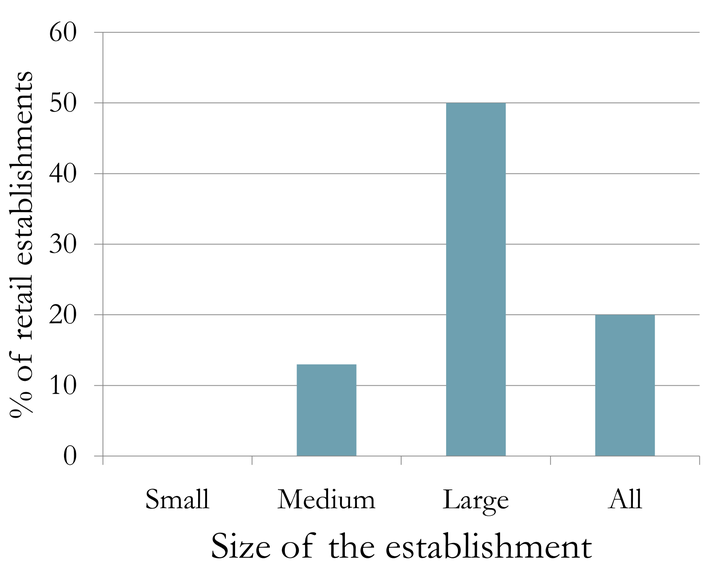
8.2 h
Maximal duration of meat exposition under ambiant temperature conditions

Fig. 3: Exposition of retailed meat at ambiant temperature

Variable	Percentage of Salmonella positive establishments (*).		Binary logistic regression		
			Odds ratio	95% CI	p-value
Retail temperature condition for meat					
	Ambient temperature (n=104)	71.4	1		
	Refrigeration (n=46)	17.0	0.082	0.032-0.211	0.000
Easy to clean (and disinfect) meat cutting board					
	No (n=93)	88.9	1		
	Yes (n=57)	7.0	0.009	0.002-0.037	0.000
Training of personnel in meat handling and hygiene					
	No (n=120)	57.8	1		
	Yes (n=30)	18.4	0.165	0.063-0.430	0.000

(*).Meat retailed in a given establishment was considered contaminated by Salmonella if at least one meat sample was found to be Salmonella positive

Fig 7. Risk factors for *Salmonella* occurrence in meat cuts



20.0%
Proportion of meat retail establishments whose personnel has received a training in hygienic meat handling practices

Fig. 4: Training of meat handlers in hygienic practices

CONCLUSIONS

The findings from this study indicate the loads of hygiene indicator bacteria in retailed meat as well as the prevalence of *Salmonella* are relatively high and call for hygiene improvements in meat retail establishments and/or in earlier stages of the meat chain. The exposition of meat at ambient temperature as well as the lack of professional training for meat handlers were identified as the key factors hampering the quality and safety of retailed meat in Kigali. Further studies addressing the occurrence of *Salmonella* in earlier steps of the chain are needed to design an accurate risk assessment model for *Salmonella* in the Rwandan chain

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