

**PREVALENCE OF SELECTED ZONOTIC AND CONTAMINANT BACTERIA IN  
INDIGENOUS CHICKEN VALUE CHAIN FROM MAKUENI COUNTY, KENYA**

A Thesis Submitted in Partial Fulfilment for the Award of the Degree of  
Master of Veterinary Public Health

Esther Wangari Ngethe (BVM)

Department of Public Health, Pharmacology and Toxicology,

Faculty of Veterinary Medicine;

College of Agriculture and Veterinary Sciences


University of Nairobi

July 2015

**DECLARATION**

This thesis is my original work and has not been presented for a degree in any other University.

Esther Wangari Ngethe (B.V.M, University of Nairobi)

Signature  Date 30/06/2015

This Thesis has been submitted for examination with our approval as University Supervisors

1. DR. KURIA J.K.N (BVM, MSc., PhD.)

Department of Pathology and Microbiology  
College of Agriculture and Veterinary Sciences  
University of Nairobi

Signed:  Date: 30<sup>th</sup> June 2015

2. DR. GATHURA P.B (BVM, MSc., PhD.)

Department of Public Health, Pharmacology and Toxicology  
College of Agriculture and Veterinary Science  
University of Nairobi

Signed:  Date: 02/07/2015

3. PROF. LUCY W.KABUAGE (BSc, MSc., PhD.)

Department of Agricultural Resource Management  
School of Agriculture and Enterprise Development  
Kenyatta University

Signed:  Date: 1<sup>st</sup> July 2015

## ABSTRACT

Indigenous chicken play a major role of providing proteins and additional income to resource poor small scale farmers in rural areas. Backyard or village-level poultry production is the most popular livestock enterprise in Kenya. This system may expose the chicken to zoonotic microorganisms during production. Further, the chickens are transported to and held in live bird markets under unsanitary conditions and slaughter is done in non-designated premises under poor hygienic conditions. Microbiological baseline information on the extent of the risk to human health from indigenous chicken is scanty. Studies on health risk in chicken value chains have been limited mainly to extensive production systems in Europe and North America. This study sought to estimate the prevalence of selected zoonotic and contaminant bacteria along the indigenous chicken value chain. The specific objectives were to estimate the prevalence of *Campylobacter species*, *E.coli* (O157:H7) and *Salmonella* bacteria along the value chain. The second objective was to assess the level of Total Viable Counts (TVC), total coliforms, coagulase positive *Staphylococcus* and *Streptococcus* genus as contaminants of indigenous chicken carcasses. The study was carried out in Wote and Kisau divisions of Makueni County and in Burma market in Nairobi County. The prevalence of the selected bacteria was determined by analysis of cloaca material from live birds at the farm, market and in dressed carcasses rinse wash. Concentration of contaminant bacteria was determined by analysis of the carcass rinse fluid. Cloaca swabs were collected from 280 and 390 chickens at farm and live bird market respectively. Out of the 390 chicken, 40 were randomly selected and slaughtered in the market slaughter slab. All the samples were cultured in selective media to isolate the specific organisms. Suspect isolates of *E. coli* O157:H7, *Salmonella*, coagulase positive *Staphylococcus* and *Streptococcus* genus were confirmed by biochemical and serological tests while *Campylobacters*

were confirmed by PCR analysis. The prevalence of *Campylobacter*, *E. coli* O157:H7 and *Salmonella* at farm level were 50.87%, 1.42% and 0.71% respectively. Prevalence at market level for *Campylobacter*, *E. coli* O157:H7 and *Salmonella* in cloaca samples was 9.49%, 5.92% and 1.18% respectively and 27.5% 11.42% and 0% in the carcasses respectively. Prevalence of *Campylobacter* infections was the highest amongst the three zoonotic microorganisms along the value chain. Coagulase positive *Staphylococcus* was isolated in 30% of the carcasses while *Streptococcus* was isolated in 87.5%. The mean concentration for TVC, Coliforms, *Staphylococcus*, and *Streptococcus* in the carcasses was 6.04 log CFU/cm<sup>2</sup>, 3.74 log CFU/cm<sup>2</sup>, 1.24 log CFU/cm<sup>2</sup>, and 2.48 log CFU/cm<sup>2</sup> respectively. The study showed that free-range indigenous chicken may carry zoonotic organisms such as *Campylobacter*, pathogenic *E. coli* (O157:H7) and *Salmonella* in their gut and can contaminate their meat during slaughter. Coagulase positive *Staphylococcus* and *Streptococcus* species can contaminate poultry meat during slaughter. Also, the low hygienic standard in transportation and processing may expose the chicken meat to spoilage organisms. The presence of zoonotic bacteria and pathogenic contaminants pose a health risk to consumers. The information generated from the study will inform stakeholders along the value chain and assist in the design of mitigation measures in the poultry industry. There is need to train the stakeholders along the value chain to improve production and marketing infrastructures of indigenous chicken to assure food safety. Further studies are however required to compare the zoonoses threat between confined, semi-confined and free range indigenous chicken production systems