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# HAZARD ANALYSIS CRITICAL CONTROL POINT (HACCP) IN A RED MEAT ABATTOIR

By

Bethsheba Emily Akinyi Wagude

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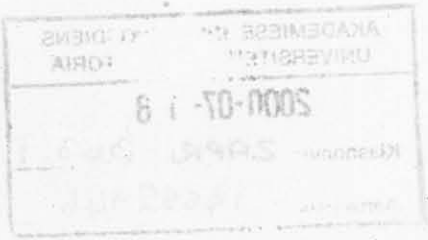

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I declare that this thesis hereby submitted for the M.Sc. Food Science degree at the University of Pretoria had not been previously submitted by me for a degree at any other university.

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# ABSTRACT

## HAZARD ANALYSIS CRITICAL CONTROL POINT (HACCP) IN A RED MEAT ABATTOIR

By

Bethsheba E.A Wagude

Leader: Ms H L de Kock
Department: Food Science
Degree: M.Sc. Food Science

A hazard analysis critical control point (HACCP) programme was carried out in a class C abattoir in the Hammanskraal region of Pretoria, South Africa to determine whether the implementation of HACCP would minimise pathogens in meat at the abattoir level. The need to find methods to minimise these pathogens is due to the fact that the incidences of food poisoning and food-borne diseases are not declining. In addition, most animals are symptom-less carriers of these pathogens implying that their presence cannot be detected by the classical meat inspection procedures and assumed healthy animals can be a potential health hazard. This work is therefore important as it justifies the potential for use of the HACCP system in small abattoirs bearing in mind that various researchers have found pathogens within the meat chain of South Africa.

The experimental design involved a hygiene evaluation of the plant, a hazard analysis and microbiological analyses. The hygiene evaluation of the plant was carried out to determine whether the abattoir has basic good manufacturing practices in place, a foundation for a HACCP system. Thereafter, by following the processing line step-by-step, a hazard analysis was done to fully comprehend the impact of the slaughtering and hygiene procedures on the microbial loads of the carcasses. A critical control point work sheet was drawn up for the skinning, evisceration and chilling steps.

The main objective of the study was to determine the effect of HACCP on the microbiological status of carcasses. A non-destructive microbiological analysis was carried out on a total of 100 carcasses with 50 forming the baseline data and the other 50 forming the HACCP data. Analyses were done for aerobic plate counts, *Staphylococcus aureus,* total coliforms, *Escherichia coli, Clostridium perfringens,* and *Salmonella.*

The statistical evaluations of the data showed that all variables were significantly reduced ($p < 0.01$) after HACCP implementation except for the aerobic plate count data and *Escherichia coli* at splitting of carcass. However, after 24 hours chilling all the pathogens were significantly reduced ($p < 0.05$). A consistent positive hygiene trend was achieved for all the variables tested. Minimal detections as low as 40% of carcasses at splitting and 2% after 24 hours chilling for *Escherichia coli* and 14% at splitting and 0% after 24 hours chilling for *Clostridium perfringens,* were also recorded after HACCP implementation. *Salmonella* was isolated from only 2% of the carcasses during the baseline data collection at the splitting step. After HACCP implementation all the samples were negative at both the control points.

The main limitation of the study was that most of the personnel within the meat industry were illiterate and therefore training was difficult and took a longer time. The high employee turn -over also calls for constant training and can lead to hygiene fluctuations within the line. The workers remuneration also depended on the number of carcasses they processed hence chain speeds tended to be fairly high and these could compromise the hygiene of the product. Generally, there is also still a lack of minimum microbial standards for meat processing operations using the HACCP system.

The aim of the study, which was focused on reducing pathogen levels in a carcass, was attained. The study can therefore form a basis for implementation of HACCP in small red meat abattoirs in South Africa. However, it is recommended that a further similar study should be done for multiple abattoirs concurrently over a longer duration to get a more comprehensive picture of the South African abattoir industry viz. HACCP.

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