

**EVALUATION OF IMPLEMENTATION OF FOOD SAFETY LEGISLATION IN THE
RED MEAT ABATTOIRS OF MOPANI DISTRICT, LIMPOPO PROVINCE, SOUTH
AFRICA**

MASTER OF PUBLIC HEALTH

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MARCH, 2014

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RED MEAT ABATTOIRS OF MOPANI DISTRICT, LIMPOPO PROVINCE, SOUTH
AFRICA**

by

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SUPERVISOR: DR M.B.L MPOLOKENG

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DECLARATION

I declare that the evaluation of implementation of food safety legislation in the red meat abattoirs of Mopani district, Limpopo province, South Africa, hereby submitted to the University of Limpopo, for the degree of Masters of Public Health (MPH). It has not been previously submitted by me for a degree at this or any other University; that it is my own work in design and execution, and that all material contained herein has been duly acknowledged.

.....
Shalati Gana (Mrs)

.....
Date:

DEDICATION

This dissertation is dedicated to my lovely husband and our three sons Nyiko Leon, Vukosi Joseph and Ntsako Ndzhaka for the love, support, care and longsuffering they have shown during my studies. Ntsako, nicknamed “Biostatistics” was born just after attending a module on Biostatistics.

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ABSTRACT

Introduction: To evaluate the food safety legislation (FSL) implementation in the red meat abattoirs of Mopani district in Limpopo Province, South Africa.

Method: A cross sectional survey was conducted.

Sampling: A questionnaire was distributed to abattoir managers of various red meat abattoirs. From 16 abattoirs with a population 169, a sample of 22 was selected.

Results: The study revealed that 77% managers were male. Majority of managers were aged 40 and 59 years. Work experience was between 20 to 25 years. Educational background: thirty seven percent (37%) of managers hold certificates on various disciplines, mostly not food safety related. Fifty-four percent (54%) managers did not have food safety knowledge. Fifty-nine percent (59%) abattoirs did not comply with food safety practices. Twenty seven percent (27%) of the structures did not comply with R.1072. The pieces of FSL were less implemented by DoH&SD and DTI. Hygiene Management Systems showed slow progress. Sixty-four percent (64%) abattoirs did not receive training on HMS and PRPs. Very few abattoirs had multi-disciplinary skilled personnel to implement FSL. Abattoirs were reluctant to financial commitment to implement FSL. Eighty two percent (82%) of abattoirs did not involve all stakeholder during planning and decision making process.

Conclusion: The red meat abattoirs of Mopani district did not comply with all standards and requirements of food safety legislation. Factors such as educational background in basics of food safety principles, involvement of role players during implementation process, prevented successful implementation of food safety legislation in the red meat abattoirs of Mopani district. Food safety knowledge and practices of management and malpractice of FSL were determined, results showed that majority lack adequate food safety knowledge and poor food safety practices were identified. One of the recommendation was to establish FSL enforcement forum to develop a FSL strategy.

DEFINITION OF CONCEPTS

Abattoir

It is an approved facility used to slaughter animals for the purpose of human consumption (Meat safety Act, 2000). Abattoirs differ in throughput ranging from high-throughput (HTP), low-throughput (LTP) and rural abattoirs. A HTP abattoir has slaughtering units of 50 or more per day. LTP abattoir has slaughtering units up to 20 per day and a rural abattoir has slaughtering units up to 2 per day (R. 1072, 2004).

Food safety

It means the assurance that food will not cause harm chemically, biologically and /or physically to the consumer when prepared, used or eaten according to its intended use (R. 908, 2003).

Food safety Legislation

It refers to all laws that regulate and guide the food handling enterprises, to maintain the right standard of hygiene and to promote safe and wholesome food to the consumers (Smith, 2003).

Hazard Analysis Critical Control Point

It is a food safety system for identification, evaluation and controlling of hazards associated with food (SANS 10330. 2007).

Illegal slaughtering

It refers to as slaughtering and processing of meat, meat products and the sale of carcasses, without the approval or compliance with food safety standards (Meat safety act 40 of 2000).

Red Meat

It refers to those portions of a slaughtered animal which derive from a cattle, horse, pig, sheep, ostrich and game animal (Red meat regulation, 2004). In this context, it refers to meat derived from cattle, pig and sheep.

Red meat regulation

It is the regulation containing legal requirements that must be met by all red meat abattoirs (Meat safety act 40 of 2000).

LIST OF ABBREVIATIONS

AM: Abattoir Managers.

DAFF: Department of Agriculture, Forestry and Fisheries

DOA: Department of Agriculture.

DoH&SD: Department of Health and Social Development

DTI: Department of Trade and Industry

EC: European Commission

EU: European Union

FAO: Food and Agriculture Organization.

FCDA: Food stuff, Cosmetic and Disinfectant Act

FSL: Food Safety Legislation

FSIS: Food Safety and Inspection Service

FSMS: Food Safety Management System

GMP: Good Manufacturing Practices.

HACCP: Hazard Analysis Critical Control Points.

HAS: Hygiene Assessment Systems.

HM: Hygiene Manager.

HMP: Hygiene Management Programme.

HMS: Hygiene Management System.

HTP: High -Throughput

ISO: International Standard Organization

PHIA: Public Health Inspectors Association

LTP: Low -Throughput

NARS: National Abattoir Rating Scheme

ME: Meat Examiner.

MI: Meat Inspector.

MSA: Meat Safety Act.

PRP: Pre-requisite Programme.

QMS: Quality Management System

RMAA: Red Meat Abattoir Association.

RMIF: Red Meat Industry Forum.

SANS: South African National Standards

WHO: World health organization

USDA: United State Department of Agriculture

VPH: Veterinary Public Health

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CHAPTER 1

INTRODUCTION

The purpose of the study was to determine the extent of food safety legislation implementation and to determine if it is implementable in red meat abattoirs of Mopani district, Limpopo Province, South Africa.

1.1 BACKGROUND INFORMATION

This study emanates from the perceived need to evaluate the progress of food safety legislation implementation process made by the red meat abattoirs (private sector) of Mopani district, Limpopo province and also to identify factors that hinders the red meat abattoirs of Mopani district from complying to minimum requirement stipulated in the food safety legislation.

Implementation of food safety legislation in the red meat abattoirs has become a serious public health concern, this has been noted by two government department responsible for enforcement of these legislation. Issues of morbidity and mortality still baffle the food and safety legislation as numerous amendments have been carried-out. The purpose of food safety legislation is one of the oldest statutory arrangements influenced at first by religious doctrine which promoted food safety and sound hygiene management systems of food processing plants including the red meat abattoirs (Goldsmith, Hamish & Nesve, 2003). Throughout the ages, a need existed for controlling healthy activities at food premises to produce, process, manufacture and prepare (hygienic) food which is fit for human consumption (Griffith, 2006).

Challenges continue to persist in the current system, especially with regard to technical independence and impartiality. This was of particular concern where commercial interests compete with the principles of food safety, neglecting the product and its consumer. Brester & Antle (2003), highlighted within their study that there was no single issue of more long term importance within the red meat industry (especially the beef sector) than food safety. Further mentioned that it is particularly important to vulnerable segments of the population such as the elderly, pregnant

women, young children and immune-compromised to consume safe meat (Rocourt *et al.*, 2003).

The red meat abattoirs comprise of three categories of abattoirs namely: high-throughput, low-throughput and rural abattoirs. A high-throughput abattoir has slaughtering units of up to fifty or more per day: Low-throughput abattoir has slaughtering units of up to twenty per day and a rural abattoir has slaughtering units up to two per day (R.1072, 2004). Poor implementation of food safety legislation contributes to the increasing safety risk in food systems, causing outbreaks of food-borne diseases which create an enormous burden on health systems, leading to a negative impact to the economy of countries (Brewer & Rojas, 2008). The cost of food-borne diseases to the government escalates medical expenses, outbreak investigation, food recall and loss of consumer confidence in the products (WHO, 2007).

The Department of Agriculture and Department of Health and Social Development work together within the red meat abattoirs and the meat retail outlets to ensure that the purpose of food safety legislation is executed by facilitating the implementation process and enforcement of the legislation (Joshi *et al.*, 2003).

In 2008 the Department of Agriculture in Limpopo province was inundated with reports that the red meat abattoirs of Mopani district could not meet the minimum requirements of the food safety legislation enforced by the department. Findings from the reports indicated that very little progress has been made with regard to implementation of the food safety legislation, this included poor compliance in the structural requirements such as buildings and equipment; hygiene management systems and meat inspection services (VPH Annual report: 2008). The researcher developed interest in the study of red meat abattoirs in the Mopani district.

1.2 RESEARCH PROBLEM

The red meat abattoirs of Mopani district lack knowledge of food safety principles. This cause a barrier in effective and efficient food safety legislation implementation. In South Africa, the Mopani district still faces challenges in the red meat abattoirs

where there is still absence of independent meat inspection services, poor hygiene management systems and poor infrastructure such as buildings and equipment. This pose a compromise in food safety.

Food safety legislation particularly focusing on red meat abattoirs has undergone various changes. The meat safety act in particular has, for a long time, mandated the Department of Agriculture to directly enforce and facilitate the implementation process of this Act. Prior 1994 a system existed and was achieved to direct government employment at national and provincial level as well as local municipalities on meat inspection services. Government meat inspectors were responsible for full implementation of food safety legislation within the red meat abattoirs (DAFF report, 2012). However, the Meat Inspection Service was completely privatised just prior to 1994 in line with the changing socio-economic and political environment at the time. In view of the operational challenges immediately experienced, the act was reviewed by the new democratic government in 2000 in order to enable both government and the private sector to play a meaningful and vital role in providing a Meat Inspection Service, a system which currently exists (RMIF, 2013).

WHO, 2000 indicated that food safety legislation implementation is a global concern, as food-borne diseases outbreak originating from red meat was escalating to a significant health problem. Commercial interest are competing with principles of food safety, neglecting the product and the consumer.

1.3 RESEARCH QUESTION

To what extent did the red meat abattoirs implemented the food safety legislation and were they implementable?

1.4 AIM OF THE STUDY

To evaluate the implementation of food safety legislation in the red meat abattoirs of Mopani district, Limpopo Province, South Africa.

1.5 OBJECTIVES OF THE STUDY

1.5.1 To determine the malpractices of food safety legislation by red meat abattoirs of Mopani district

- to assess the understanding and knowledge of food safety legislation by management
- to assess ways of food safety practice of management

1.5.2. To identify factors which prevented successful implementation of food safety legislation in the red meat abattoirs:

- to verify the availability of independent of meat inspection
- to verify the implementation Hygiene management systems
- to check if the red meat abattoir comply to structural requirements of food safety legislation

1.5.3 To make recommendation for future research and or / to further explore of certain findings.

- to come up with possible suggestions or solutions which can assist the red meat abattoirs to implement food safety legislation efficiently and effectively.
- recommendations and requirements to be considered for successful food safety legislation implementation within the red meat abattoirs

1.6 ORGANIZATION OF THE SUBSEQUENT CHAPTERS

The subsequent chapters of this study are organized as follows:

Chapter 1: gives an over view on background of the study and organisation of the subsequent chapters as well as research problem, question, aim and objectives of the study.

Chapter 2: describes the relevant literature pertaining to implementation of food safety legislation internationally and nationally,

Chapter 3: outline the methodology used in the study,

Chapter 4: present data analysis and discussion of findings,

Chapter 5: contains the conclusions, limitations of the study and recommendations for future research.

1.7 CONCLUSION

In this chapter the researcher discussed the background of the study, research problem, research question, aim and objectives of the study, as well as organisation of the subsequent chapters.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter provides a detailed discussion for implementation of food safety legislation both international and national perspective. The researcher's evaluation of various pieces of food safety legislation, namely, the Meat Safety Act, Regulations under the Foodstuffs, Cosmetics and Disinfectant Act (Amended). It also include the review of Codex Alimentary, South African National Standards (SANS).

Documents have always been used as source of information in social research, either as the only method or in conjunction with other methods. Most sources used in this study are documentary material obtained from the internet and government documents (legislation), referred to as secondary material or analysis (Sarantakos, 2000). There were enough documents to review and there was much information written about this subject, but no empirical research has been conducted about it in the Mopani district.

It has been acknowledged in various literature that food safety practices are essential for prevention of food-borne diseases (Khandeker & Alauddin, 2005). Food safety legislation has been developed world wide for consumer protection. Implementation of food safety legislation presents a major challenge as some of the abattoirs fail to comply with the food safety legislation resulting in contamination of food. This challenge was from most developed to the least developed countries. Food-contaminants such as red meat in particular, causes a significant burden of diseases (Brester & Antle, 2003). Internationally and nationally the majority of confirmed cases originating from the red meat abattoirs were mostly due to poor hygiene and slaughtering practices (Joshi *et al.*, 2003).

2.2 INTERNATIONAL PERSPECTIVE

Studies conducted in the United States of America have put forth ideas for modernizing food safety legislation in the red meat abattoirs, with full participation by many stakeholders in the red meat industry such as the scientists, public health experts, consumer organizations and food and agriculture industries (Mckean, 2001).

Yet, many countries still encounter challenges in food-borne diseases and outbreaks originating from contaminated red meat. Another study carried out within the United States of America estimates that 76 million disease outbreaks and 5000 deaths each year are caused by food-borne pathogens (Mead *et al.*, 1999). This estimate was mainly associated with red meat and its product, such as the case of supreme beef which was provided for lunch in public schools and later was recalled due high to levels of salmonella contamination (Goldsmith *et al.*, 2003). Another case of *E.coli* 0157:H7 outbreak within the same region leading Texas cattle producers to introduce a policy on traceability (Henning *et al.*, 2008).

The European Union (EU) was considered to have one of the most advanced food safety programmes for red meat abattoirs such as improvement of food safety systems, harmonization of food safety policies, development of regulations which aimed at assisting with incorporating food safety practices in all red meat abattoirs (EC Regulation: 2002). This has reduced the food-borne disease burden within the European Union region. The EU's integrated approach of food safety systems was intended to assure a high level of protection for human life and health, using "farm to table" approach and monitoring systems which were implemented for improvement of food safety (Raspor, 2007). The region has also given consumers a legal right to safe food, to accurate and honest information, and strive to harmonize existing national requirements to ensure the free movement of meat throughout the region (Smith De Waal & Robert, 2005). A study conducted in the same region, indicated that the EU strengthened the food safety systems within the red meat abattoirs and declared to the world that it will not compromise food safety by importing red meat from countries with lower food safety standards and with programmes that pose additional risks for their consumers. The red meat abattoirs have developed excellent export certification programmes for the red meat industry, resulting in higher standards for red meat exported than for the same red meat sold domestically (Lindsay, 2000). Structural requirement and hygiene management system remain a challenge for many abattoirs slaughtering for domestic purposes within the EU region (Knowles, 2001).

There are numerous factors affecting food safety in red meat abattoirs in the EU region such as new technology, high levels of production and manufacturing systems and increased access to imported red meat (Raspor, 2007). Training in modern food safety systems were identified as an affecting factor at some universities caused by brain-drain of well qualified young specialist and meat inspectors (Kierstan, 1995). Furthermore, the region still faces challenges of food-borne disease outbreaks (Goldsmith *et al.*, 2003).

In 2002, the European Parliament and the Council adopted a regulation establishing the general principles and requirements of Food Law. The aim was to provide a coherent approach in the development of food safety legislation and to establish common definitions, principles and obligations covering all stages of food and feed production and distribution. The Food Law articulates the need for proper scientific advice with emphasis on the fundamental principles of excellence, transparency and independence. To facilitate the implementation by farmers, businesses and national authorities of the major requirements of the Food Law; a guidance document was issued. Inclusion in the document was scope of food safety legislation, particularly, the importance of food contamination has been at the root of many major food scares of the past decade. It made food safety the clear responsibility of food businesses (Dagg *et al.*, 2006).

Animal health is considered an important factor in food safety because some diseases, like *Brucellosis*, *Salmonellosis* and *Listeriosis*, can be transmitted to humans through contaminated meat. Each year, the European commission (EC) publishes a report on sources of zoonotic agents in food, animals and feed, which also indicated the trends in cases of human illnesses in the EU. Following the “farm-to-table” approach, the EC has introduced other tools to control foodborne pathogens along the food chain, such as microbiological criteria for specific foodstuffs, meat and meat products were also part of the criteria (WHO, 2001).

A number of related problems kept food safety legislation implementation at lower level within the African region, the root cause was poverty, which disproportionately affects issues like low education levels among consumers and food-handlers, leading to reduced information on food safety. Moreover, government lack the

financial resources to implement food safety regulations through an efficient inspection system and develop food safety education programmes. As a result, the WHO has developed an integrated approach to combine food safety concepts with poverty reduction activities (WHO, 2002).

WHO (2000) further states that many countries within the African region lack adequate food access, therefore having effective food safety control systems were given a lower priority. Often, minimal effort was also given in promoting, administering and enforcing food safety legislation. Wright's argument in the Enterprise reporter (2008) was that abattoir monitors have played a major role in the rapid decline of red meat processing standards. He indicated that all abattoirs are a disgrace, and a lot of the conditions at these facilities are allowed to exist because of the meat inspectors. He further highlighted that the responsibility of meat inspector goes beyond inspecting meat, meat inspectors must ensure that abattoirs are in acceptable condition and managed hygienically. His argument prompted the needs to revise regulations governing the slaughter of animals for human consumption, as there were weaknesses in the present regulations that affect the performance of meat inspectors.

Watson in Enterprise reporter (2008) pointed out the need to move and keep up with the global food safety issues. The under tree slaughter (illegal slaughtering) and the meat inspector arriving after the animal was slaughtered "just cannot work," he states. This relates more in rural abattoirs where slaughtering takes place without meat inspection services. He further indicated that veterinary public health inspectors should strengthen measures to enforce and ensure hygiene compliance in the red meat abattoirs.

On the other hand, Knight pointed out in SAFEMEAT partnership (2000), that integration of food safety legislation can be reviewed, but should be fully explored before implementation. "Whatever we do must be done in the best interest of the consumer. If there was a need for the unit to rationalise and streamline the whole meat inspection services, that should be done to ensure that decisions taken are in the best interest of public health," Knight states.

"It is not a matter that has just arisen, but a situation where right out there in the public, animals are slaughtered and are not being examined because the slaughterhouses are not properly equipped," said Bartlett (Enterprise report, 2008).

2.3 NATIONAL PERSPECTIVE

The South African food safety systems were often based on law adopted during the colonial era. These systems were introduced on an ad hoc basis to deal with problems of a particular interest to the colonial administrators and some have not been updated nationally. The Departments of Agriculture made an attempt to revise the outdated abattoir hygiene act 109 of 1992 with the meat safety act 40 of 2000 (FAO & WHO, 2005). The current meat safety act still had some loop holes because it applied only to abattoirs, it excluded other meat premises such as butcheries and meat processing facilities (Lues & Letegan, 2006).

2.3.1 Requirements for food safety legislation.

The purpose of the meat safety act is to provide measures which promote the meat safety and the safety of its products. The act also aimed at establishing and maintaining essential national standards in respect of the abattoirs. The act also stated that abattoirs must be managed in accordance with the prescribed hygiene management and evaluation systems, Sec 11(1)(b) of the Meat Safety Act (Act 40 of 2000).

The meat safety act clearly stipulated the responsibility of abattoir management which was to ensure meat satisfy the requirements of food safety legislation: Procure independent meat inspection services, implement hygiene management systems and comply to structural requirements (Manning, Baines & Chadd, 2006). Therefore, abattoir management needs background and understanding of the food safety legislation in order to provide necessary support to workers during food safety legislation implementation process.

The meat safety act and its regulation provides abattoirs with hygiene standards for processing, handling and inspection of all animals slaughtered for human consumption within the abattoir industry (Lindsay, 2000). The act was administered by the Department of Agriculture, Forestry and Fisheries (DAFF) in nine provinces, within the Directorate: Veterinary Public Health. Apart from the meat safety act which the abattoir has to adhere to, abattoirs were also expected to implement other food safety standards such as the Foodstuffs, Cosmetics and Disinfectant Act, regulations under the above mentioned acts, ISO / SANS and the Codex Alimentary (Anelich, 2006).

The Foodstuffs, Cosmetics and Disinfectant Act (FCDA) governs the manufacture and sale of food that is unfit for human consumption from public health point of view. Administered and enforced by the Directorate: Food Control in Department of Health and Social Development.

- The regulation (G.N. No. R. 908 of 27 June 2003), this act requires that food handling establishments including the red meat abattoirs take steps to ensure that all food handlers (abattoir personnel) are sufficiently trained on the application and requirements of food safety systems (HACCP).
- Regulations governing general principles of hygiene requirements for food premises and the transport of food (G.N. No. R. 962 of 23 November 2012, as amended), regulation under FCDA replacement for R. 918, regulation under Health Act.

The South African National Standards (SANS) were bench marked to International Standard Organisation (ISO) guidelines to ensure that the quality and safety of the food is maintained at higher level. These standards include:

- SANS 10049: 2012 a food hygiene management guideline for the foundation of HACCP. It highlight all requirements need to be in place for a sound HMS or Pre-Requisite Programme (PRPs), it also contains detailed explanation to establish and maintain documented HMS manual.
- SANS 10330: 2007 a food safety system for identification, evaluation and controlling of hazards associated with food, known as HACCP. It is applicable after HMS / PRPs has been implemented.

- SANS 22000: 2005 a FSMS that was initially developed by the ISO. It uses a Quality Management Systems (QMS) approach, incorporating the widely proven HACCP principles and Good Manufacturing Practices (GMP) addressed by PRPs in ISO/SANS 22000. ISO/SANS 22000 can be applied to any organization in the food chain, using farm to fork approach (US FDA, 2001).

The Codex Alimentarius also called Codex Code of Ethics for International Trade of food, states that all consumers are entitled to a safe, sound and wholesome food. Also to be protected from unfair trade practices, thus, by implication, this code of ethics promotes the application of HACCP in food establishment and prohibits any person to put any food that is unfit for human consumption into the market. Codex Alimentarius Commission is the official reference point of the World (FAO, 2005).

According to FAO & WHO (2005) many activities relating to food safety in the red meat abattoirs have been implemented nationally. Although, there are still weaknesses in food safety systems within the red meat abattoirs in South Africa due to lack of multi- skilled personnel within the industry. Studies conducted nationally showed that implementation of food safety legislation faces a number of constraints within the red meat abattoirs, the major constraints being lack of resources, fragmentation of different policies of food safety legislations and lack responsibilities within various authorities, including government authorities (Desmarchelier *et al.*, 2007).

The responsibility of food safety in red meat abattoirs of South Africa was shared among different government departments, agencies and the red meat industry. Amjadi & Hussain (2005) indicated in a study conducted that issues directly related to public health such as hygiene and sanitation, as well as food-borne disease surveillance were usually dealt with by the health authorities at municipal level. Issues regarding waste management were within Ministry of Environmental Affairs. Matters related to food production, processing and distribution including the control of the quality and safety of foods from animal origin, often were under the authority of the Ministry of Agriculture, making it more difficult to determine which department can represent the nation on food safety legislation and control.

The provincial government (Department of Agriculture) in South Africa in as far as food safety legislation is concern, regulates systems such as Hygiene Management

systems (HMS), which must be implemented in the form of a documented manual containing different programmes and these programmes should be accompanied by policies, procedures, work instruction, forms and checklist used within the abattoir. HAS as a tool to determine the standard of hygiene in abattoirs in order to evaluate HMS compliance in abattoirs (Smith, 1994).

Limpopo Province was known to be good in agricultural practices including the production of red meat, beef in particular. Food safety legislation issues in the red meat abattoirs were a concern for Limpopo Province like any other province within the country (Anelich, 2006). Food safety committees were established by Department of Agriculture and Department of Health and Social Development to address challenges of implementing the food safety legislation in the red meat abattoirs of Mopani district. Bender (1999) maintains that implementation of food safety legislation in abattoirs still rest with abattoir management and not with food control committees.

2.1 CONCLUSION

This chapter discussed literature of food safety legislation at international and national perspective. The researcher reviewed documents which include various pieces of food safety legislation with specific focus on the concept of FSL implementation process, constraints, knowledge and practices, as well as strategies used by other countries in trying to address the issue of food safety.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter gives overview of research design used in this study. The study site, study design, sampling, pilot study, data collection and ethical consideration were discussed. Research design enabled the researcher to achieve the aim and the objectives of the study.

3.2 STUDY SITE

The proposed study was conducted in the red meat abattoirs of Mopani district, Limpopo Province, South Africa. The district is situated in the eastern part of Limpopo province, sharing its borders with four of the districts which is Vhembe, Sekhukhune and Capricorn district, as well as Bohlabela district which fall under Mpumalanga Province.

Mopani district have 5 municipalities, within these municipalities there are two High-Through Put (HTP): one in Greater Giyani municipality and one Greater Ba-Phalaborwa municipality, two Low-Through Put (LTP): one in Greater Tzaneen municipality and one in Greater Letaba municipality. Twelve rural registered red meat abattoirs which were scattered all over the district of Mopani. All classes of abattoirs were included for the purpose of the study.

3.3 STUDY DESIGN

The design of the study was a cross sectional survey. A cross-sectional study is a study that collects data on subjects at one point in time (Brink, 2008). It allowed for determination of association between variables but did not allow for assessment of temporal relationship between variables. Cross-sectional studies are often used as a basis for health-policy decisions (Abramson & Abramson, 2000).

3.4 POPULATION

Total population of the red meat abattoirs of Mopani district:

GRADE	NO. OF ABATTOIRS	NO. OF MANAGERS / OWNERS	NO. OF HYGIENE MANAGERS	NO. OF MEAT INSPECTORS	NO. OF MEAT EXAMINERS	NO. OF STAFF (incl. food handlers)
HTP	2	2	1	2	1	109
LTP	2	1	0	0	2	24
Rural	12	12	0	0	1	36
TOTAL:						169

3.5 SAMPLING

The study focused mainly on managers of the red meat abattoirs Mopani district in Limpopo province. The managers of red meat abattoirs consist of abattoir managers (owners), hygiene manager(s), meat inspectors and examiners as the direct implementers of food safety legislation. The total population in all 16 abattoirs was 169 and a population of 22 managers from all the abattoirs was selected. A convenient sampling was used, seeing that the number of representative sample was very small. Management in HTP abattoirs: Manager, Hygiene manager, meat inspector and examiner. LTP abattoirs: Managers / owners and examiners. Rural abattoirs: Managers / owner. The abattoir managers, hygiene manager(s), meat inspectors and examiners (abattoir management representatives) were included and the food handlers were excluded from the study for the information in need was to be provided by managers. Meat inspectors and examiners plays a very important role in FSL implementation in abattoirs, hence these professionals' fall within management of the abattoir. The sample was chosen on the basis of availability. This means that respondents were selected because they were accessible (Struwig & Stead, 2000).

3.6 PILOT STUDY

Pilot study consisting of a sample size of 10 managers was conducted from various categories of red meat abattoirs in the Capricorn district of Limpopo. The sample number excluded managers who were involved in the research study. Objectives and aim of the study were disclosed and fully explained to the managers for consent seeking before collecting data.

3.7 DATA COLLECTION

There were several methods in which data could be collected. In this study data was collected using questionnaire attached in Appendix: 1. The questionnaire was designed in English by the researcher using standardized questionnaire from Hygiene Assessment Systems (HAS) evaluation checklist which was validated from similar studies and adapted to the study. The principle of human right were respected. Data was collected from the study site where the research was conducted, at 16 abattoirs within a period of four weeks due to test and re-test technique.

The questionnaires were handed to the abattoir managers (owners) who further distributed to the subordinates in the management team. The completed questionnaires were send to the abattoir managers who handed them back to the researcher at the same spot. This arrangement was found to be less expensive, less time consuming and produce quick feedback and results. An identifier was used to code the consent form and the questionnaires, which were separated during analysis in order to maintain confidentiality.

3.7.1 Reliability

In this study, reliability was achieved by using existing standardized questionnaire validated from similar studies, also from the HAS evaluation checklist and adapted to the study, thereafter re-validated by a test and re-test method. The research tool (questionnaire) was reviewed for improvement to ascertain that the research tool was reliable in providing what was required by the study.

3.7.2 Validity

Reliability was the pre-requisite for validity and this has been ensured as described above. The questionnaire was validated by conducting a pilot study in abattoirs in the Capricorn district. The questionnaire consisted of closed ended questions. The purpose of test and re-test technique, were validated by the information given during pilot study, participants and their answers were weighed against the adapted and standardized questionnaire as outlined in the methodology.

3.7.3 Bias

Bias is a systematic error that is built into a study design. It referred to the researcher and participants effects in computing, reporting and interpreting the results. Bias cannot always be eliminated, but must be recognized and if possible to be minimize. The following biases were expected to be seen:

3.7.3.1 Sampling bias

This was minimised by purposive sampling. Purposive sampling is a non-representative subset of some population, and is constructed to serve a very specific need or purpose. A researcher may have a specific group in mind, in this study the researcher had red meat abattoir management representatives: managers / owners, hygiene manager(s), meat inspector and meat examiners.

3.7.3.2 Information bias

In this study it was noted that managers also may have more information than other employees. This bias was prevented by consulting non-managers in the same abattoirs separately and was also minimized by collecting data on the spot.

3.7 DATA ANALYSIS

Descriptive statistics was used to analyse the data received. Data was captured on the excel spread sheet and exposed to the Statistics Package of Social Science (SPSS) 18.0 statistics for analysis, a Predictive Analysis Software. Presentation of the analysis was in form of frequency, percentage, mode, mean and standard deviation and in form of graph, tables and charts. A statistician was consulted for assistance.

3.8 ETHICAL CONSIDERATION

The approval to conduct research was obtained from the School of Health Sciences' Senior Degrees Committee. Upon approval, the proposal was submitted to the University of Limpopo Ethics Committee (MREC) for clearance, thereafter permission was sought from the Limpopo Department of Agriculture, also permission to collect data was obtained from the Limpopo Red Meat Abattoir Board where the

research was conducted. A standard University of Limpopo Medunsa consent form attached in Appendix: 2 was completed by each manager who agreed to take part in the study after a detailed explanation was provided; in line with the principle of justice, beneficent and human right. Participants identification remained anonymous and confidentiality was maintained. Participant had the right to decline the invitation of taking part in the study with full respect meaning that participation in the study was voluntary and, had the right to withdraw at any time.

3.9 SIGNIFICANCE OF STUDY

Findings of the study will assist the red meat abattoirs to mitigate, prevent and eliminate constraints and challenges faced by the red meat abattoirs. It will also assist the DoA and DoH&SD to review or develop provincial food safety policies, implementation strategies and to formulate guidelines to assist the red meat abattoirs to meet the requirements of FSL. The DoA, DTI and DoH&SD should work together in bringing changes and improvement to promoting food safety assurance, as well as consumer satisfaction (Smith, 1994) within the district of Mopani

3.10 CONCLUSION

This chapter discussed the methodology used in conducting this study. The study site, study design, sampling, pilot study, data collection and ethical consideration were explained. Data collection further elaborated on reliability, validity and bias specifically focusing on sampling and information bias.

CHAPTER 4

ANALYSIS AND PRESENTATION OF DATA

4.1 INTRODUCTION

This chapter present data analysis of the study and includes: demographic information, information on food safety knowledge and practices of managers. Structural requirements; information of food safety legislation implementation; training and development as well as management issues were also discussed.

4.2 SECTION A: DEMOGRAPHICAL INFORMATION.

The purpose of this section was to get the general background (demographic information) of management of red meat abattoirs of Mopani district. Variables such as the age, work experience, educational background and occupational level of management in red meat abattoirs of Mopani district were discussed.

4.2.1 Information regarding gender and age group of the participants.

The South African Constitution of 1996 guarantees the right to equality and it also provide protection to all citizens from unfair discrimination on the grounds of age and gender. The Employment Equity Act (EEA) and the Constitution serves as a guide to every employer to ensure that the purpose of EEA is fulfilled. Sec 20 (2)(c) of EEA prescribe strategies to overcome underrepresentation of people from designated groups at the workplace (EEA 55 of 1998).

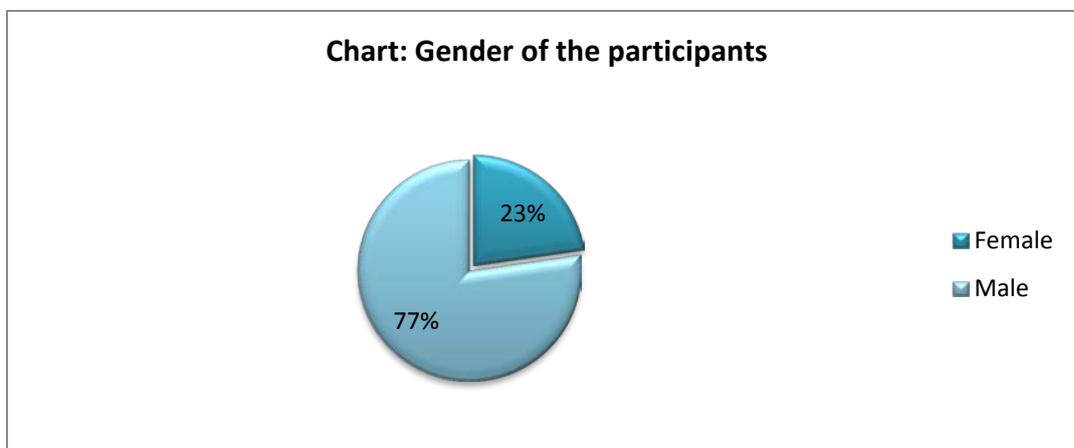


Figure 4.1 Gender of the participants

The information in figure 4.1 indicates that 23% of the red meat abattoirs management of Mopani district were female and 77% were male participants. Male still dominate more than female which shows that the management of the red meat abattoirs of Mopani district did not comply to Sec 20 (2)(c) of EEA 55 of 1998 and the South African Constitution of 1996.

Table 4.1 indicates the age group and gender of managers of the red meat abattoirs of Mopani district. Approximately 35.3% were male and 20% were female participants aged between 20 – 39 years; fifty eight point eight percent (58.8%) were male and 60% were female aged 40 – 59 years, while 5.9% were male and 20% were female aged 60 and older. The results of the study conducted reveals that majority of managers within red meat abattoirs of Mopani district were aged between 40 – 59 years. Age 40 is the beginning of middle age and age 59 is the beginning of old age. It is also socially and psychologically referred to as matured age as far as food safety is concern (De Sorbo, 2009).

Table 4.1: Age group and gender.

Age group	Gender			
	Male	%	Female	%
20 - 39	6	35.3	1	20
40 - 59	10	58.8	3	60
60+	1	5.9	1	20
TOTAL:	17	100	5	100

4.2.2 Information regarding work experience of the participants.

Work experience on food safety issues is highly recommended for proper food safety legislation implementation. The standards and requirements of work experience in food safety are prescribed in clause 5.3 of SANS 10330: 2007. The clause states that personnel implementing food safety legislation must have food safety experience.

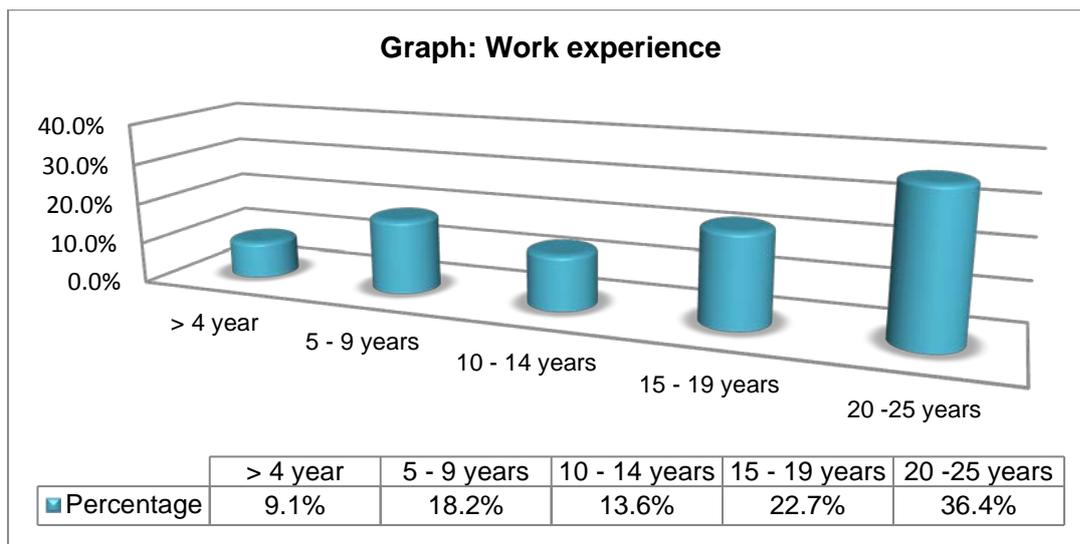


Figure 4.2: Work experience.

The figure above indicates work experience of manager in the red meat abattoirs of Mopani district. Result shows that 9.1% participants were managers (meat Inspector) with less than 4 years working experience while 18.2% had work experience of 5 to 9 years. Another 13.6% had 10 to 14 years working experience; then 22.73% had 15 to 19 years working experience and 36.4% 20 to 25 years working experience.

Results indicate that majority of the managers in the red meat abattoirs of Mopani district have working experience of between 20 - 25 years. Meat inspectors were found to have work experience of less than 4 years, which comply to minimum requirements stated in clause 5.3 of SANS 10330: 2007.

4.2.3 Information regarding education background of participants.

Access to basic and tertiary education are Constitutional rights in terms of the South African Constitution of 1996. Table 4.2 in page 20 shows the educational background of managers of red meat abattoirs of Mopani district. The table reveals that 13.6% participants went through primary schooling (grade 1 to 7); eighteen percent (18.2%) went to secondary school up to grade 11; approximately 22.7% of the participants passed matric (grade 12); about 36.4% participants had certificates this includes the hygiene manager and meat examiners. The meat inspectors, only 9.1% had university degree. Results indicate that majority of managers had access to basic education, with 36.4 % of managers holds certificates on various disciplines. Although such most these certificates were not food safety related.

Table 4.2: Educational background

Highest level passed	N	Percentage (%)
Primary schooling (Gr 1-7)	3	13.6
Secondary schooling (Gr 8- 11)	4	18.2
Matric (Grade 12)	5	22.7
Certificate	8	36.4
Degree	2	9.1
TOTAL:	22	100

4.2.4 Information regarding occupational level of the participants.

South Africa as developing country already has world-class legal framework and standards to ensure differences in occupational level of managers are equalised and all occupational levels meet the requirements as stated in Schedule 9 of EEA 55 of 1998. The requirements for organizational structures in food establishments are prescribed in clause 5.4 and 5.6 of SANS 22000: 2005. These clauses require that responsibilities and authorities for occupational levels of designated personnel involved in food safety legislation implementation process are clearly defined.

Table 4.3 shows the occupational levels of management in the red meat abattoirs of Mopani district. The table reveals that 68.2% of the participants were abattoir managers; approximately 4.5% were hygiene manager(s), while 9.1% were meat inspectors and another 18.2% were meat examiners. Result shows that majority of abattoirs are led by managers. The result further shows that the red meat abattoirs of Mopani district lack proper organizational structures which defines the responsibilities and authorities for occupational levels of designated personnel involved in food safety implementation as prescribed in clause 5.4 and 5.6 of SANS 22000: 2005.

Table 4.3: Occupational level

Level	N	Percentage (%)
Manager	15	68.2
Hygiene manager	1	4.5
Meat inspector	2	9.1
Meat examiner	4	18.2
TOTAL:	22	100

4.3 SECTION B: KNOWLEDGE AND PRACTICES OF MANAGEMENT AND MALPRACTICES OF FOOD SAFETY LEGISLATION (FSL).

This section deals with knowledge and practices of management and malpractices of FSL by red meat abattoirs of Mopani district. Structures such as buildings and equipment were included because of their influence food safety. Meat processed in poor structures may easily compromise the health of the public through contamination.

4.3.1 Information regarding food safety knowledge of management.

The requirements of food safety knowledge are prescribed in clause 5.3 and 8.2 of SANS 10330: 2007. These standards prohibit the implementation of food safety legislation without food safety knowledge and expertise.

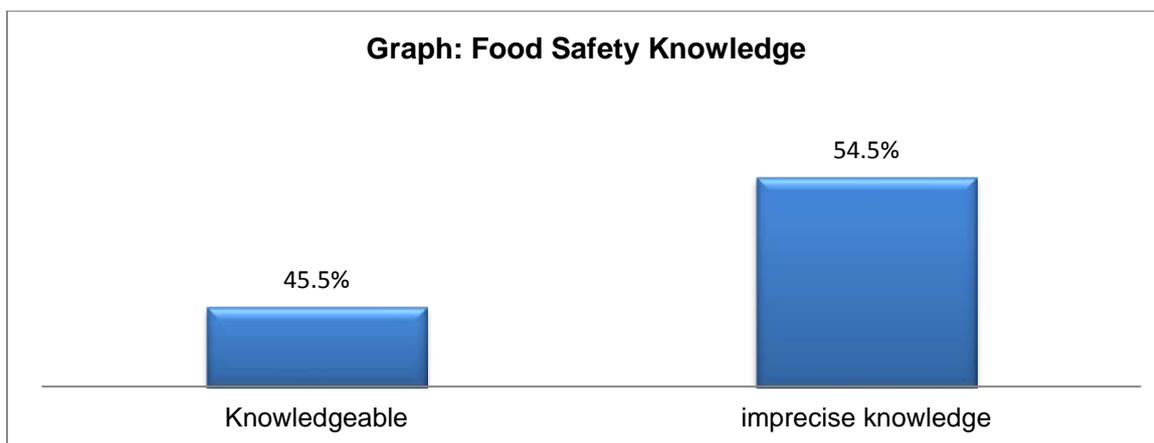


Figure 4.3: Food safety knowledge of management.

The figure above indicates the level of food safety knowledge of managers in red meat abattoirs of Mopani district. The information in figure 4.3 shows that 45.5% of the participants had knowledge on food safety issues. However, 54.5 % of the participants showed imprecise knowledge of food safety legislation.

Results of the study conducted shows that majority of red meat abattoirs of Mopani district do not have food safety knowledge as required and prescribed in regulation 17 of R. 908 and regulation 10(b) of R.962, regulations under FCDA and in clause 5.3 and 8.2 of SANS 10330: 2007. This non-compliance was noted as a high risk issue and critical factor. A lack of knowledge in food safety may lead to a poor food

safety legislation implementation and contamination of meat may occur, which can be detrimental to the health of consumers.

4.3.2 Information regarding food safety practice of management.

The standard and requirements of food safety practices are prescribed in Part II(c) and regulation 49 of R.1072 regulation under MSA and also in regulation 10 of R.962 regulation under FCDA. The regulations prohibit unacceptable practices on safe and hygienic handling of red meat in abattoirs. Poor meat safety practices at abattoirs pose serious risk to the consumers like the case of supreme beef which was provided for lunch in public schools within the EU region and later was recalled due to high levels of salmonella contamination (Goldsmith *et al.*, 2003).

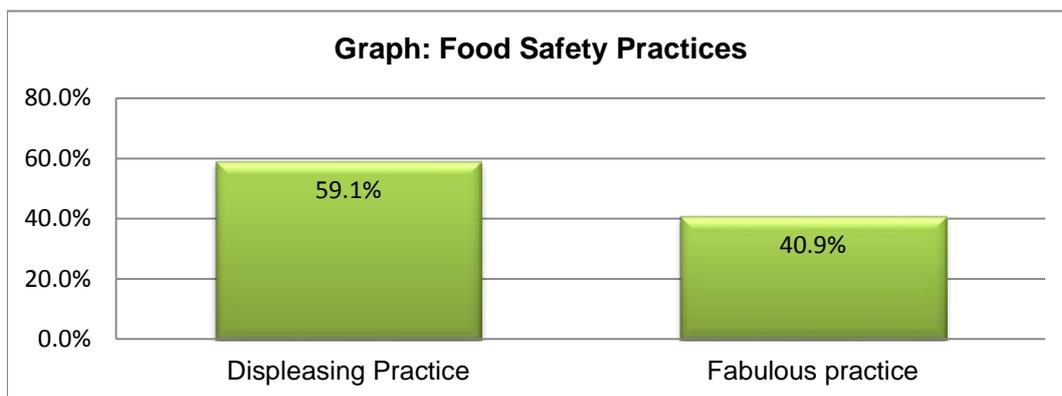


Figure 4.4: Food safety practices of management.

The figure above indicates information on food safety practices of management in red meat abattoirs of Mopani district. The figure shows that 59.1% of management have displeasing or unacceptable practices, while 40.9% indicated fabulous practices as prescribed in the act and regulations. Results of the study conducted indicate that majority of Mopani district do not comply to minimum requirements prescribed in Part II(c), regulation 49 of R.1072 regulation under MSA and regulation 10 of R.962 regulation under FCDA.

4.3.3 Information regarding structural conditions for red meat abattoirs.

The structural requirements for red meat abattoirs are prescribed in Part II (B) of R.1072 of the red meat regulation. The regulation prescribes that a red meat abattoir should be constructed such that it does not cause any health hazard or

contamination to meat during processing and handling. Poor structure such as building and equipment increases the risk of contamination to the meat during processing and handling.

Table 4.4 shows information on the condition of structures in red meat abattoir of Mopani district. The table shows that only 13.6% of the red meat abattoirs at Mopani district managed to meet structural requirements as prescribed in the regulations. While 59.1% of the structures shown to be conditionally acceptable and 27.3% did not meet structural requirements as prescribed in Part II (B) of R.1072 and also prescribed in regulation 5 of R.962 (standard and requirement for food premises). Results of the study conducted shows that majority of the structures of red meat abattoirs at Mopani district do not meet all structural requirements as prescribed as in prescribed in Part II (B) of R.1072 and in regulation 5 of R.962.

Table 4.4: Structural conditions of red meat abattoirs.

Condition	N	Percentage (%)
Acceptable	3	13.6
Conditionally acceptable	13	59.1
Unacceptable	6	27.3
TOTAL:	22	100

4.4 SECTION C: FOOD SAFETY LEGISLATION (FSL) IMPLEMENTATION.

This is the most important core section of this research. It dwells deeply on FSL implementation in red meat abattoirs of the district of Mopani. It focuses on progress made and identifying factors which prevent a successful implementation by looking into various pieces of food safety legislation and Hygiene Management Systems (HMS) in place.

4.4.1 Information regarding pieces of FSL implemented.

The standards to integrate food safety legislation to form sound food safety management system are prescribed in clause 3 of SANS 10330: 2007 and in clause 4 of SANS 10049: 2012. These standards state that all food safety law, by-laws, regulations, standards and compulsory specifications should be integrated to form a

sound food safety management system. Some pieces of legislation governing food safety in red meat abattoirs include the Meat Safety Act (MSA), R.1072 regulation under the MSA, R. 908 regulation under FCDA, R.962 under FCDA which repealed the famous R.918 under the Health Act, guidelines and standards such as SANS/ISOs,etc.

The information in table 4.5 indicates progress made on implementing the pieces FSL in red meat abattoirs of Mopani district. The table below shows that 45.5% implemented the requirements of MSA as prescribed in Sec 11 of the act; approximately 22.7% implemented the requirements of R.1072, regulation under MSA. The table further indicates that 9.1% of the abattoirs implemented R.908, regulation under FCDA; while 13.6% implemented R. 962 regulation under FCDA and 9.1% showed to have implemented SANS.

Table 4.5: Pieces of FSL in place.

Piece of FSL	N	Percentage (%)
Meat Safety Act	10	45.5
R.1072. under Meat Safety Act	5	22.7
R. 908, under FCDA	2	9.1
R.962(918), Under FCDA (Health Act)	3	13.6
South African National Standards (SANS)	2	9.1
TOTAL:	22	100

The results indicate that majority of red meat abattoirs of Mopani district have started with the implementation process, but the implementation process in some abattoirs are still far behind. Results further reveals that regulations administered by DoH&SD and DTI are far less implemented in the red meat abattoirs of Mopani district than those which are administered by Department of Agriculture.

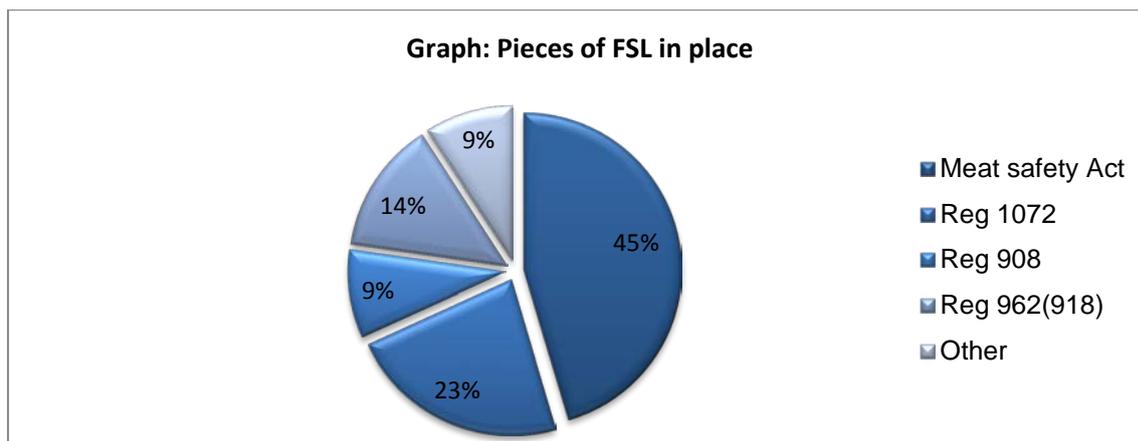


Figure 4.5: Pieces of FSL in place within Mopani red meat abattoirs.

The figure above indicates pieces of food safety legislation in place in the red meat abattoirs of Mopani district.

4.4.2 Information regarding Hygiene Management System in place.

The standards and requirements for hygiene management systems are prescribed in regulation 48 of R.1072, regulation under MSA. A regulation governing hygiene management systems of all red meat abattoirs. It is also stated in Sec 11(1)(e) of the MSA that abattoirs must be managed in accordance with prescribed hygiene management and evaluation system. Regulation 54 of R.1072, regulation under the MSA instruct the abattoir owners to put in place hygiene management programmes to support the hygiene management systems in order to prevent, eliminate or reduce potential hazards that may occur in any process step. HMS are also called Pre-Requisite programmes (PRPs), these programme are also regarded as foundation for food safety management system, without a proper HMS / PRPs the whole implementation process of food safety legislation will fall apart.

Table 4.6 shows that at least 18.2% of red meat abattoirs have put in place personnel hygiene programme in accordance to regulation 55(d) of R.1072, regulation under the MSA. Approximately 22.7% of red meat abattoirs have slaughter and dressing techniques programme in place as prescribed by regulation 55(b) of R.1072, regulation under the MSA. Abattoirs (18.2%) procured meat inspection services as prescribed by regulation 55(c), but not adhered to Sec 11(1)(c) of the meat safety act and another 18.2% progress on cleaning and sanitation as prescribed by regulation 55(h), while temperature control showed

13.6% progress implemented in accordance to regulation 55(n) and only 9.1% progress made to put maintenance programme in place as prescribed by regulation 55(m).

Results of the study conducted shows that majority abattoirs progressed well with the implementation of HMS. However, some of the abattoirs still employ meat examiners within their facilities which is against Sec 11(1)(c) of the MSA. Results also indicated that temperature control and maintenance programme are not properly placed as required by regulation 55(n) and regulation 55 (m) of R.1072, regulations under the MSA.

Table 4.6: Hygiene Management Systems (HMS) in place

Programme	N	Percentage (%)
Personnel hygiene	4	18.2
Slaughter and dressing	5	22.7
Meat inspection	4	18.2
Cleaning and sanitation	4	18.2
Temperature control	3	13.6
Maintenance	2	9.1
TOTAL:	22	100

4.5 SECTION D: MANAGEMENT, TRAINING AND DEVELOPMENT.

This section focus on training and development as well as management issues within the red meat abattoirs of Mopani district. Training and development are considered to be critical issues during implementation of food safety legislation, it is stated in almost all pieces of food safety regulations that food safety training should be received by all stakeholders playing role in food safety legislation implementation process from food handles to top management including administrative staff (HR and finance managers).

4.5.1 Information regarding training and development of the red meat abattoirs.

It is a requirement that personnel involved in food safety should receive sufficient training in food safety related issues. The training should be formal and a certificate should be issued to all competent candidates after completing the course as

prescribed by clause 6 of SANS 22000: 2005, regulations 17 of R.908 and 10 of R.962, regulations under FCDA.

The information in table 4.7 shows the status of training needs for the red meat abattoirs of Mopani district. The table indicates that 36.4% of the red meat abattoirs of Mopani district did not receive formal training on hygiene awareness. This training refers to basic of food safety principles as prescribed in regulation 55 of R.1072, regulation under MSA. The table further reveals that 63.6% of the red meat abattoirs of Mopani district did not receive training on HMS and PRPs. HMS and PRPs are recommended as good foundation for a proper implementation of food safety management systems as prescribed by clause 6 of SANS 22000: 2005.

Results of the study conducted reveal that majority of red meat abattoirs of Mopani district did not receive formal training on food safety issues (HMS and PRPs) as directed by the standard and requirements stated in clause 6 of SANS 22000: 2005, regulations 17 of R.908 and 10 of R.962, regulations under FCDA.

Table 4.7: Training needs

Course:	N	Percentage (%)
Hygiene awareness	8	36.4
HMS / PRPs	14	63.6
TOTAL:	22	100

4.5.2 Information regarding skilled personnel in the red meat abattoirs.

The standard of skills required in food establishments to implement food safety are prescribed in clause 8.2 of SANS 10330: 2007. The clause prescribes that food safety legislation should be implemented by a multi-disciplinary skilled personnel.

Table 4.8 indicates that only 27.3% abattoirs complied to the requirements of clause 8.2 of SANS 10330: 2007, while 72.7% of the red meat abattoirs of Mopani district did have multi-disciplinary skilled personnel as prescribed in clause 8.2 of SANS 10330: 2007. Results of the study conducted shows that majority of the red meat abattoirs of Mopani district do not comply to standards set in clause 8.2 of SANS 10330: 2007. Lack of multi-disciplinary skilled personnel present a major problem during food safety legislation implementation (see table 4.8 in page 28).

Table 4.8: Skilled personnel

Status	N	Percentage (%)
Skilled	6	27.3
Unskilled	16	72.7
TOTAL:	22	100

4.5.3 Financial management and implications in FSL implementation process.

The standard and requirements of resource management including finance are prescribed in clause 5.3 of SANS 10330: 2007. The clause requires that the management should make financial commitment to support food safety legislation implementation process. Lack of financial commitment to food safety legislation implementation process may hinder progress of implementation.

The information in table 4.9 indicates financial management and the implication it has during FSL implementation at the red meat abattoirs of Mopani district. The table below indicates that 22.7% of the abattoirs complied to clause 5.3 of SANS 10330: 2007. While 77,2% of red meat abattoirs of Mopani district did not comply to clause 5.3 of SANS 10330: 2007 because they did not make financial commitment to implement food safety legislation. Result indicates majority of red meat abattoirs of Mopani district did not comply to standard set in clause 5.3 of SANS 10330: 2007.

Table 4.9: Financial management.

Implication on implementation	N	Percentage (%)
Non implication	5	22.7
Implication	17	77.2
TOTAL:	22	100

4.5.4 Information regarding planning and decision making process

The FSMS standard requires the involvement of all stakeholders playing role in food safety as prescribed in clause 5 and 6 of SANS 22000: 2005. These clauses prescribe that all stakeholders such as suppliers, management, food handlers, regulators and customers should be involved in food safety legislation implementation on planning and decision making process.

The information in table 4.10 indicates the involvement of all stakeholder playing role in food safety legislation during planning and decision making process with the

red meat abattoirs of Mopani district. The table reveals that 18.2% of the abattoirs involved all stakeholders in planning and decision making process, while 81.8% of the abattoirs did not involve all stakeholders in planning and decision making process. The results of the study conducted indicate that majority of red meat abattoirs of Mopani district did not comply to requirements in clause 5 and 6 of SANS 22000: 2005.

Table 4.10: Planning and decision making process.

Involvement	N	Percentage (%)
Involve	4	18.2
Do not involve	18	81.8
TOTAL:	22	100

4.6 Conclusion

In this chapter an analysis of data was made based on standards and the requirements prescribed by food safety legislation. The analysis further focused on demographic information, food safety knowledge and food safety practices. The chapter further highlighted structural requirements, pieces of food safety legislation implemented and hygiene management systems in place. Training and development as well as management issues were compared to the standards and requirements prescribed by food safety legislation to determine the progress and the level of compliance as required by clause 3 of SANS 10330: 2007 and clause 4 of SANS 10049: 2012.

CHAPTER 5

DISCUSSION, CONCLUSION AND RECOMMENDATIONS.

5.1 INTRODUCTION

This chapter provides an overview of the researcher's results. The chapter further highlights comments on the discussion of the results, conclusion of this study and make recommendation based on the results, as well as the summary.

5.2 SECTION A: DEMOGRAPHICAL INFORMATION.

5.2.1 Gender and age group of the participants.

Article 9 of the South African Constitution of 1996, states that all persons are equal before the law and there cannot be any discrimination on the grounds of gender and age. Employment Equity Act (EEA) also prohibits discrimination on the basis of gender and age. Sec 20(2)(c) states that underrepresentation of people from designated groups should be identified, to achieve equitable representation of suitably qualified people from designated groups within each occupational category and level.

The information in figure 4.1 (page 17) showed that 23% participants were female managers, female were less represented than male in the red meat abattoirs of Mopani district. Seventy seven percent (77%) of the participants were male managers, male were highly represented in the red meat abattoirs of Mopani district. The management of Mopani district did not comply to Sec 20 (2)(c) of EEA 55 of 1998 and article 9 of the South African Constitution of 1996.

Table 4.1 (page 18) showed that 35.3% of the participants were male and 20% were female aged between 20 to 39 years. This is a youth stage expected to be active in implementation of food safety legislation, adopting and using all methods and techniques available both nationally and internationally. There was 58.8% male and 60% female aged between 40 to 59 years. Approximately 5.9% male and 20% female participants aged 60 and older. This is old age group, leaving according to what experience taught them. At this stage much resistance is expected because they will always refer to the way things were done 10 years ago (De Sorbo, 2009). The results of the study conducted revealed that majority of managers within red

meat abattoirs of Mopani district were aged between 40 to 59 years. This group is socially and psychologically referred to as matured age as far as food safety is concern (De Sorbo, 2009).

The literature reviewed for the purpose of this study was silent on matters of gender and age in red meat abattoirs. However, gender and age in South Africa is a burning issue and it is highly considered at all work places because of disparities of the past. The purpose of EEA is to promote equal opportunity, fair treatment and implementation of affirmative action measures to redress the disadvantages in employment experienced by designated groups, in order to ensure their equitable representation in all occupational categories and levels in the workforce. The management of red meat abattoirs of Mopani district did not adhere to the purpose of the EEA 55 of 1998.

5.2.2 Work experience of the participants.

Work experience on food safety issues is highly recommended for proper food safety legislation implementation. The standards and requirements for food safety experience are prescribed in clause 5.3 of SANS 10330: 2007. This clause prescribes that personnel implementing food safety legislation must have food safety experience (the duration or period of experience is not mentioned in the clause).

Nine point one percent (9.1%) participants were managers (meat Inspectors) with less than 4 years of working experience. The red meat abattoirs of Mopani district complied to the minimum requirements laid out in clause 5.3 of SANS 10330: 2007. It is indicated in figure 4.2 (page 19) that 18.2% of the participants had work experience of 5 to 9 years. The figure also indicated that 13.6% of the participants had 10 to 14 years of working experience. Approximately 22.7% of the participants had 15 to 19 years of working experience. The figure further indicated that 36.4% of the participants had 20 to 25 years of working experience.

Results of the study conducted showed that the management of red meat abattoirs complied to minimum requirements laid out in clause 5.3 and 8.2 of SANS 10330: 2007. Majority of the managers had work experience of 20 to 25 years. They have been within this field long enough to understand the principles and importance of meat safety as well as the requirements of food safety legislation in general.

However, the work experience for management of red meat abattoirs of Mopani district is more on production aspects than food safety aspects, this might be due to lack of top management's commitment to food safety legislation implementation and poor enforcement of food safety legislation by government departments. Again, the management of red meat abattoirs of Mopani seem not to care much about food safety aspects because they have never receive complains or query on consumption of unsafe meat from their abattoirs. Majority of our citizens may also not be aware of the systems within the country. Poor reporting systems and communication systems might be the cause of lack of information on food poisoning cases originating from red meat abattoirs of Mopani district, as result, these factors may contribute to ignorance of food safety legislation implementation by management of red meat abattoirs of Mopani district. Many food establishment around the world uses the "reactive" than "proactive" approach on food safety matters. This shows that even the government has lost its focus on the theme "prevention is better than cure".

In this study the meat inspectors were found to have work experience of less than 4 years, although results still comply with minimum requirements stated in clause 5.3 of SANS 10330: 2007. Meat inspectors were the only group of managers identified with less experience compared to other groups. The Department of Agriculture, Forestry and Fisheries (DAFF) in 2012 reported after embarking on a road show for independent meat inspection project that meat inspection personnel in red meat abattoirs of South Africa are underpaid and as such the red meat industry cannot retain meat inspectors in service for longer period. In addition to these finding none of the abattoirs of the red meat abattoirs of Mopani district had procured independent meat inspection services. This situation lower the moral of the meat inspectors, as such the inspection of meat can be compromised. Therefore, meat inspected by these personnel may not be safe for human consumption.

Wright's argument in the Enterprise reporter (2008) argued and prompted the needs to revise regulations governing the slaughter of animals for human consumption, as there are weaknesses in the present regulations that affect the performance of meat inspectors.

5.2.3 Education background of the participants.

Access to basic and tertiary education are Constitutional rights in terms of the South African Constitution of 1996. The information in table 4.2 (page 20) showed that 13.6% of the participants went through primary school (grade 1 to 7), but did not received tertiary education as well as basics of food safety principles. Approximately 18.2% went to secondary school up to grade 11. These participants also did not received tertiary education and training on basics of food safety principles. The table also showed that 22.7% of the participants passed matric (grade 12). In addition to the matric 36.4% of the participants hold certificates on various disciplines though it does not include basics of food safety principles. Nine point one percent (9.1%) of the participants with tertiary education were meat inspectors. These participants are well informed and understand basics of food safety principles as well as the application of food safety legislation. Results indicate that majority of managers had access to basic education, with 36.4 % of managers holding certificates on various disciplines. Although most these certificates were not food safety related.

A study conducted in the African region by WHO (2002) revealed that educational background in food safety principles is not seen as a priority because many citizens still lack basic education, in addition, Africa 's priority is food security than of food safety system implemented (WHO, 2002).

5.2.4 Occupational level of the participants.

South Africa as developing country already has world-class legal framework and standards to ensure that differences in occupational levels meet the requirements as prescribed in Schedule 9 of EEA 55 of 1998. The requirements for organizational structures in all food establishments are prescribed in clause 5.4 and 5.6 of SANS 22000: 2005. These clauses require a clearly defined responsibilities and authorities for occupational levels of designated personnel involved in food safety legislation implementation process.

Table 4.3 (page 21) revealed that 68.2% of the participants were abattoir managers, who perform functions on behalf of the abattoir owner as prescribed by Sec 11 of the MSA. Designation of abattoir managers on the organizational structure within abattoir showed compliance as stated in clause 5.4 and 5.6 of SANS 22000: 2005.

The table in page 21 revealed that 4.5% of the participants were hygiene manager(s). Sec 11(1)(e) of the MSA instruct the abattoir owners to manage the abattoirs in accordance with prescribed hygiene management and evaluation system as stated in Part III of R.1072 of red meat regulation. The system referred can only be implemented effectively, if performed by a person qualified to do so and such person should be within the organizational structure of the abattoir as stated in clause 5.4 and 5.6 of SANS 22000: 2005. Lack of hygiene manager(s) on the abattoir organizational structures led to poor hygiene management system implemented which increases the risk of contamination to the meat process at these abattoirs.

The table on page 21 further revealed that 9.1% were meat inspectors. Sec 11(1)(b) of the MSA instruct the owners of abattoirs to procure independent meat inspection services. Meat inspection can only be performed effectively if done by a person qualified to do so and in conjunction of Part VI of R.1072, regulation under the MSA; such person should be within the abattoir organizational structure as stated in clause 5.4 and 5.6 of SANS 22000: 2005. Eighteen percent (18.2%) were meat examiners. Meat examiners are expected to work under the supervision of a meat inspector, in some abattoirs meat examiners perform the services without supervision. In some instances owners were found to be performing meat inspection within their own abattoirs. The procuring of independent meat inspection service as prescribed in Sec 11(1)(b) of the MSA, include both inspectors and examiner, such person(s) should be within the abattoir organizational structure as stated in clause 5.4 and 5.6 of SANS 22000: 2005. If this function is not performed in an abattoir, meat processed at that abattoir cannot guarantee safety.

Results showed that majority of abattoirs lack proper organizational structures as prescribed in clause 5.4 and 5.6 of SANS 22000: 2005. The red meat abattoirs of Mopani district failed to establish sufficient organizational structures which include levels of hygiene managers, meat inspectors and meat examiners. Therefore, food safety legislation implementation cannot be successful and meat processed from these abattoirs cannot guarantee safety, especially in rural abattoirs as the majority of rural abattoirs lack meat inspection / examination services, this may due to lack of finances to procure the services.

A study conducted by Dagg *et al* (2006) parallels the results of this study in that food businesses should ensure that the responsibilities and authorities of personnel involved in food safety management systems are clearly defined under each occupational level. It is also further highlighted from their study that the root cause of many major food scares over past decades, were mainly due poorly designed organizational structures.

5.3 SECTION B: KNOWLEDGE AND PRACTICES OF MANAGEMENT AND MALPRACTICES OF FOOD SAFETY LEGISLATION (FSL).

5.3.1 Food safety knowledge of management.

The requirements of food safety knowledge are prescribed in clause 5.3 and 8.2 of SANS 10330: 2007. These standards prohibit the implementation of food safety requirements without food safety knowledge and expertise. Knowledge and understanding of food safety is known to be the risk eliminator or preventer of food safety hazard. The information in figure 4.3 (page 21) revealed that 45.5% of the participants complied with the requirements of clause 5.3 and 8.2 of SANS 10330: 2007. These abattoirs have put measures in place to ensure that personnel at these abattoirs have food safety knowledge to assist them with food safety legislation implementation.

Fifty-four point five percent (54.5 %) participants do not have food safety knowledge. These abattoirs do not comply with the requirements set in clause 5.3 and 8.2 of SANS 10330: 2007. These abattoirs did not put measures in place to ensure that personnel at these abattoirs have food safety knowledge, hence it is difficult for these abattoirs to implement the legislation without food safety knowledge.

Results of this study conducted showed that majority of red meat abattoirs of Mopani district do not have food safety knowledge as required and prescribed in clause 5.3 and 8.2 of SANS 10330:2007. The management of these abattoirs did not put measure in place to ensure that personnel at these abattoirs have food safety knowledge.

According to Brewer & Rojas (2008) poor implementation of food safety legislation increase safety risk in food systems, causing outbreaks of food-borne diseases which create an enormous burden on health systems leading to a negative impact to

the economy of countries and destroys consumer confidence. The study by WHO in 2007 parallels results by Brewer & Rojas (2008) in that cost of food-borne diseases to the government escalates medical expenses, outbreak investigation, food recall and loss of consumer confidence.

5.3.2 Food safety practices of management.

The standards and requirements of food safety practices are prescribed in Part II(c) and regulation 49 of R.1072 regulation under MSA and also in regulation 10 of R.962 regulation under FCDA. These regulations prohibits unacceptable practices on safe and hygienic handling of meat. Poor meat safety practices at abattoirs pose serious risk to the consumers just like the case of supreme beef which was provided for lunch in public schools within the EU region and later was recalled due to high levels of salmonella contamination (Goldsmith *et al.*, 2003).

The information in figure 4.4 (page 22) showed that 59.1% of the red meat abattoirs of Mopani district do not comply with standards and requirements of food safety practices as prescribed in Part II(c) and regulation 49 of R.1072 regulation under MSA and also in regulation 10 of R.962 regulation under FCDA. Meat processed within these abattoirs cannot be safe for human consumption because management of these abattoirs did not put measure in place to ensure good application food safety practices in order to prevent or eliminate the risk of meat contamination. Approximately 40.9% of the red meat abattoirs of Mopani district complied with the standards and requirements of food safety practices as prescribed in Part II(c) and regulation 49 of R.1072, regulation under MSA and also in regulation 10 of R.962 regulation under FCDA. Meat processed within these abattoirs can be safe for human consumption because management has put measure in place to ensure good application food safety practices.

The results of this study indicated that majority of abattoirs did not comply with minimum requirements prescribed in Part II(c) and regulation 49 of R.1072, regulation under MSA as well as regulation 10 of R.962, regulation under FCDA. In this instance meat processed within these abattoirs do not have safety assurance and consumers are not protected from eating unsafe meat because food safety legislation at these abattoirs is not implemented enough to address food safety

practices of the red meat abattoirs of Mopani district. Poor food safety practices in red meat abattoirs of Mopani district may be the cause of some of the food poisoning outbreaks within the consumers of Mopani district.

The literature reviewed in chapter 2 (page 35) by Khandeker & Alauddin (2005) revealed that food safety practices are essential for prevention of food-borne diseases and further indicated that food safety legislation has been developed world wide for consumer protection. Brester & Antle (2003) revealed similar result in their study that food contaminants as a result of poor food safety practices causes significant burden of diseases worldwide. Joshi *et al.*, (2003) parallels the study in that majority of confirmed cases internationally and nationally are cases originating from the red meat abattoirs, mostly due to poor hygiene and slaughtering practices.

5.3.3 Structural conditions of red meat abattoirs.

The structural requirements for red meat abattoirs are prescribed in Part II (B) of R.1072, regulation under MSA. The regulation prescribes that a red meat abattoir should be constructed such that it does not cause any health hazard or contamination to meat during processing and handling. Poor structures such as building and equipment increases the risk of contamination to the meat during processing and handling.

The results in table 4.4 (page 23) showed that only 13.6% of the red meat abattoirs of Mopani district comply with structural requirements as prescribed in Part II (B) of R.1072 of the red meat regulation. Abattoirs which comply with the requirements set in the regulation; promote safe meat production, customers satisfaction and consumer health because safety can be guaranteed from meat processed at these abattoirs.

Approximately 59.1% of the structures were conditionally acceptable. Conditionally acceptable structures do not comply with all requirements prescribed in Part II (B) of R.1072, regulation under the MSA. Meat safety cannot be guaranteed from abattoirs which do not fully comply with structural requirements because there is a probability that meat can be contaminated during processing at these abattoirs, therefore such meat cannot be safe for human consumption. Twenty seven point three percent (27.3%) of the abattoirs did not met structural requirements as prescribed in Part II

(B) of R.1072 under the MSA. Poor structural requirements increase the risk of contamination to meat during processing and handling at the abattoirs, therefore such meat cannot be safe for human consumption.

The results of the study conducted showed that majority of red meat abattoirs of Mopani district do not meet minimum structural requirements as prescribed Part II (B) of R.1072, regulation under MSA. Therefore, meat from these abattoirs cannot be safe for human consumption because management of these abattoirs did not put measure in place to provide and maintain structures in order to prevent or eliminate the risk of meat contamination at these abattoirs.

A study conducted by Knowles (2001) revealed similar result in that structural requirements remain a challenge for many red meat abattoirs slaughtering for domestic purposes within the EU region. The Enterprise report (2008) indicated that animals are slaughtered in poor conditions because the slaughterhouses are not properly equipped and maintained. Wright's argument in the Enterprise reporter (2008) was that abattoir monitors have played a major role in the rapid decline of red meat processing standards. He indicated that the responsibility of the meat inspector goes beyond inspecting meat, other than meat inspection, they must ensure that abattoirs are in acceptable condition.

5.4 SECTION C: FOOD SAFETY LEGISLATION (FSL) IMPLEMENTATION.

5.4.1 Pieces of FSL implemented.

The standards to integrate food safety legislation to form sound food safety management system are prescribed in clause 3 of SANS 10330: 2007 and clause 4 of SANS 10049: 2012. These standards state that all food safety law, by-laws, regulations, standards and compulsory specifications should be integrated to form a sound food safety management system. Some of the pieces of legislation governing food safety in red meat abattoirs include the MSA, R.1072 regulation under the MSA, R. 908 regulation under FCDA, R.962 under FCDA which repealed the famous R.918 under the Health Act, guidelines and standards such as SANS / ISOs, etc.

Approximately 45.5% of the abattoirs implemented MSA as required by clause 3 of SANS 10330: 2007 and clause 4 of SANS 10049: 2012. This act is administered by Department of Agriculture. The purpose of the MSA is to promote meat safety.

Based on the results of this study, majority of red meat abattoirs of Mopani indicated to have fulfilled the purpose of this act. Therefore, meat processed from facilities can be safe for human consumption.

The information in table 4.5 (page 24) showed that 22.7% abattoirs implemented the requirements of R.1072, regulation under MSA as required in clause 3 of SANS 10330: 2007 and clause 4 of SANS 10049: 2012. This regulation is also administered by Department of Agriculture. The regulation provides measures for safe processing and handling of red meat in abattoirs. Abattoirs which implemented the requirements of this regulation can assure safety of meat processed from their facilities and declare it safe for human consumption. The table also indicated that 9.1% of the abattoirs implemented R.908 regulation under FCDA. This regulation is administered by Department of Health and Social Development (DoH&SD). A regulation relating to the application of HACCP. HACCP is a food safety system, the application of this system is described in detail under SANS 10330 of 2007. Very few abattoirs implemented the requirements of this regulation. Approximately 13.6% abattoirs implemented standards and requirements of R. 962 regulation under FCDA. This regulation is also administered by DoH&SD. A regulation governing hygiene requirements for food premises and transportation of food. Few abattoirs have implemented the requirements of this regulation.

Nine point one percent (9.1%) of the abattoirs implemented the requirements of food safety standards (SANS / ISOs) as prescribed in clause 3 of SANS 10330: 2007 and clause 4 of SANS 10049: 2012. The standards are administered by Department of Trade and Industry (DTI). These standards give guidance to apply GMP, HMS / PRPs, HACCP and the entire FSMS. Very few abattoirs implemented the requirements of these standards.

The results indicated that majority of red meat abattoirs of Mopani district have started with the implementation process, but the implementation process is still far behind. Lower food safety standards pose additional risks to the consumers. Results further revealed that regulations administered by DoH&SD and DTI were less implemented in the red meat abattoirs of Mopani district than those which are administered by Department of Agriculture. Meat processes at abattoirs without proper food safety legislation implementation cannot be safe for human consumption because management of these abattoirs did not put measure in place

to ensure that food safety legislation are fully implemented to prevent or eliminate the risk of meat contamination at these abattoirs.

According to Brester & Antle (2003) revealed from the study they conducted that implementation of food safety legislation presents a major challenge, from most to the least developed countries. Caporale *et al.*, (2001) parallels in the study conducted by Brester & Antle (2003) that poor food safety legislation implementation in red meat abattoirs present a major and daily health threat in all countries. Wright in PHIA report (2010) argued that abattoir monitors have played a major role in the rapid decline of red meat processing standards because of poor enforcement measures employed by government. Studies conducted nationally by Desmarchelier *et al* (2007) revealed that implementation of food safety legislation faces a number of constraints within the red meat abattoirs: the major constraints being lack of resources such as financial and skilled personnel. Furthermore, Desmarchelier *et al.*, (2007) revealed that poor food safety legislation implementation was caused by fragmentation of different policies and lack responsibilities within various authorities, including government authorities. WHO (2000) stated that many countries within the African region lack adequate food access, therefore having effective food safety control systems were given a lower priority.

5.4.2 Hygiene Management System (HMS) in place.

The standards and requirements for hygiene management systems are prescribed in regulation 48 of R.1072, regulation under MSA. A regulation governing hygiene management systems of all red meat abattoirs. It is also stated in Sec 11(1)(e) of the MSA that abattoirs must be managed in accordance with prescribed hygiene management and evaluation system. Regulation 54 of R.1072, regulation under the MSA instruct the abattoir owners to put in place hygiene management programmes (HMP) which support the Hygiene Management System (HMS) in order to prevent, eliminate or reduce potential hazards that may occur in any process step. HMS are also called Pre-Requisite programmes (PRPs), they are regarded as foundation of any food safety management system, without a proper HMS / PRPs the whole implementation process of food safety legislation will fall apart.

The information in table 4.6 (page 26) revealed that 18.2% of red meat abattoirs had personnel hygiene programme in place as prescribed by regulation 55(d) of R.1072,

regulation under the MSA. Good personnel hygiene reduces the risk of contamination to the meat processed at these abattoirs. Approximately 22.7% of red meat abattoirs had slaughter and dressing techniques programme in place as prescribed by regulation 55(b) of R.1072, regulation under the MSA. Good slaughter and dressing techniques reduces the risk of contamination to the meat processed at these abattoirs. At least 18.2% of red meat abattoirs receives meat inspection services as stated on regulation 55(c) of R.1072 under the MSA. Sec 11(1)(c) of the MSA prescribes that meat inspection should be performed by independent body to prevent compromising of meat inspection services (Meat inspection can be compromised if performed by an employee of an abattoir). Some abattoirs made arrangements with International Meat Quality Assurance Services (IMQAS) and the Environmental Health Practitioners (EHP) to render meat inspection services at their abattoirs, this practice comply to Sec 11(1)(c) of the MSA, while some of the abattoirs employed meat examiners, this practice do not comply with Sec 11(1)(c) of the MSA.

Eighteen point two percent (18.2%) of the abattoirs had cleaning and sanitation programme in place as prescribed by regulation 55(h) of R.1072, regulation under the MSA. Good cleaning and sanitation programme reduces the risk of contamination to the meat processed within these abattoirs. Approximately 13.6% of the abattoirs had temperature control programme in place as prescribed by regulation 55(n) of R.1072, regulation under the MSA. Poor temperature control programme increases the risk of contamination to the meat processed within these abattoirs. Meat from abattoirs without proper temperature control programme in place cannot be safe for human consumption because meat will be spoiled and cause illnesses to consumers.

The table in page 26 showed that only 9.1% of the red meat abattoirs had maintenance programme in place as prescribed by regulation 55(m) of R.1072 under the MSA. Poor maintenance programme has a direct impact to poor structural compliance and it increases the risk of contamination to the meat processed in these abattoirs. This might be one of the reasons for non-compliance to structural requirements for majority of red meat abattoirs of Mopani district. Meat from abattoirs without proper maintenance programme in place cannot be safe for human

consumption because meat can easily be contaminated due to poorly maintained buildings and equipment.

The red meat regulation was promulgated in 2004, it is expected that all red meat abattoirs in South Africa should have fully implemented HMS as prescribed in regulation 48 of R.1072, regulation under MSA. Results of the study conducted showed that majority of the abattoirs are progressing at very slow pace considering that the regulation came into place almost 10 years ago. Results also indicated that some of the abattoirs still employ meat examiners within their abattoirs. Sec 11(1)(c) of the MSA is against such practice because meat inspection should be performed by an independent body, not an employee of an abattoir. Results further indicated that temperature control and maintenance programme are not properly placed as required by regulation 55(n) and regulation 55 (m) of R.1072, regulations under the MSA. This practice happens because there are not enough meat inspectors to facilitate hygiene management programmes.

Studies conducted within the EU region revealed that HMS remain a challenge for many red meat abattoirs within the region, many abattoir are failing to implement HMS (Knowles, 2001). In some regions within African there is an indication of many abattoirs with similar challenge as the region in the EU, as result of lack of skilled personnel. This situation put consumers at risk because the meat processes in many red meat abattoirs cannot be safe for human consumption as a result of poorly HMS in place. Wright's argument in the Enterprise reporter (2008) was that abattoir monitors have played a major role in the rapid decline of red meat processing standards. He further indicated that all abattoirs are a disgrace, and a lot of the conditions at these facilities are allowed to exist because of the meat inspectors. He further highlighted that the responsibility of the meat inspector goes beyond inspecting meat, other than meat inspection they must ensure that abattoirs are managed hygienically and in acceptable condition. His argument prompted the need to revise regulations governing the slaughter of animals for human consumption, as there are weaknesses in the present regulations that affect the performance of meat inspectors.

5.5 SECTION D: MANAGEMENT, TRAINING AND DEVELOPMENT.

5.5.1 Training and development issues of the red meat abattoirs.

It is a requirement that personnel involved in food safety should receive sufficient training in food safety related issues. The training should be formal and a certificate should be issued to all competent candidates after completing the course as prescribed by clause 6 of SANS 22000: 2005, regulations 17 of R.908 and 10 of R.962 regulations under FCDA.

The information in table 4.7 (page 27) indicated that 36.4% of the red meat abattoirs of Mopani district did not receive formal training on hygiene awareness. This training refers to basic of food safety principles as prescribed in regulation 55 of R.1072, regulation under MSA. Majority of abattoirs did not comply to clause 6 of SANS 22000: 2005, regulations 17 of R.908 and 10 of R.962, regulations under FCDA. Therefore, food safety legislation implementation process cannot be declared complete prior to the fulfilment of this requirement by the red meat abattoirs of Mopani district. The table further revealed that 63.6% of the red meat abattoirs of Mopani district did not receive training on HMS and PRPs. HMS and PRPs are recommended as good foundation for a proper implementation of food safety management systems as prescribed by clause 6 of SANS 22000: 2005. Receiving training in this area will assist many abattoirs to understand food safety principles and the whole implementation process, which when implemented will make the red meat abattoirs of Mopani district to guarantee the safety of meat processed within their abattoirs. In this case food safety legislation implementation process cannot be declared complete prior to the fulfilment of this requirement by the red meat abattoirs of Mopani district.

Results of the study conducted revealed that majority of red meat abattoirs of Mopani district did not receive training on HMS / PRPs as directed by the standards and requirements prescribed in clause 6 of SANS 22000: 2005, regulations 17 of R.908 and 10 of R.962, regulations under FCDA. Although an indication of experience was shown in table 4.2 (page 19). Though management showed to have good working experience in figure 4.2 (page 19), such experience does not originate from formal training received because majority did not received formal training on food safety related matters.

A study conducted in the EU region identified training in modern food safety systems at some universities as a serious factor caused by brain-drain of well qualified young specialist and meat inspectors (Kierstan, 1995). Another study conducted in the African region by WHO (2002) revealed that many abattoir personnel lack adequate training in food safety principles. Food safety in general is not seen as a priority because of poverty and many citizens still lack basic education. Instead, Africa 's priority is food security than food safety (WHO, 2002). Dr Nelson Mandela mentioned in one of his speeches that "Education is the most powerful weapon which can be used to change the world". The red meat abattoirs of Mopani district can also use the similar weapon to change their industry.

5.5.2 Skilled personnel in the red meat abattoirs.

The standard of skills required in food establishments to implement food safety legislation are prescribed in clause 8.2 of SANS 10330: 2007. The clause prescribes that food safety legislation should be implemented by a multi-disciplinary skilled personnel.

The information in table 4.8 (page 28) indicated that only 27.3% abattoirs complied with the requirements of clause 8.2 of SANS 10330: 2007. While 72.7% of the red meat abattoirs of Mopani district did have multi-disciplinary skilled personnel as prescribed in clause 8.2 of SANS 10330: 2007.

Results of the study conducted showed that majority of the red meat abattoirs of Mopani district do not comply to standards set in clause 8.2 of SANS 10330: 2007. Lack of multi-disciplinary skilled personnel present a major problem during food safety legislation implementation. The Department of Labour has noted that skills revolution in this country was necessary and came up with the law to close the gap cause by apartheid through regulating skills at work place. The red meat abattoirs of Mopani district also did not comply to standard and requirements for skill development as prescribed by the National strategy under the Skills Development Act (No. 97 of 1998).

According to FAO & WHO (2005) weaknesses in food safety systems within the red meat abattoirs in South Africa are due to lack of multi-disciplinary skilled personnel to implement food safety legislation. Studies conducted nationally by Desmarchelier *et*

al (2007) revealed that implementation of food safety legislation faces a number of constraints within the red meat abattoirs: the major constraints being lack of skilled personnel.

5.5.3 Financial management and implications in FSL implementation process.

The standards and requirements for resource management including finance are prescribed in clause 5.3 of SANS 10330: 2007. The clause requires that the management should make financial commitment to support food safety legislation implementation process. Lack of financial commitment to food safety legislation implementation process may hinder progress of implementation.

The information in table 4.9 (page 28) indicated that 22.7% of the abattoirs complied to clause 5.3 of SANS 10330: 2007. While 77,2% of red meat abattoirs of Mopani district did not comply with clause 5.3 of SANS 10330: 2007 because they did not make financial commitment to implement food safety legislation. A budget allocated for food safety legislation implementation process produce good results, even meat processed from these abattoirs can be declared safe for human consumption because the implementation process was supported and it went on successful.

The result of this study indicated that majority of red meat abattoirs of Mopani district did not comply with standards set in clause 5.3 of SANS 10330: 2007. Lack of financial commitment to food safety implementation process hinder progress of implementation, because management of these abattoirs did not put measures in place to ensure that funds are committed for successful food safety legislation implementation process.

A study conducted in African region by WHO (2002) revealed that even government lack the financial resources to implement food safety regulations through an efficient inspection system. Bender (1999) maintains that implementation of food safety legislation in abattoirs still rest with abattoir management (food businesses) .

5.5.4 Planning and decision making process

The FSMS standards requires the involvement of all stakeholders playing role in food safety as prescribed in clause 5 and 6 of SANS 22000: 2005. These clauses

prescribe that all stakeholders such as suppliers, management, food handlers, regulators and customers should be involved in food safety legislation implementation during planning and decision making process. Planning allows for decisions to be made comfortably and in a smart way.

The information in table 4.10 (page 29) indicated that only 18% of the abattoirs complied with clause 5 and 6 of SANS 22000: 2005 by involving all stakeholders in planning and decision making process. Therefore, meat from these abattoirs can be safe for human consumption because preventative measures to eliminate or reduce risk during food safety legislation are in place. Eight two percent (82%) of the abattoirs did not involve all stakeholders in planning and decision making process. Therefore, meat from these abattoirs cannot be safe for human consumption because preventative measures to eliminate or reduce risk during food safety legislation are not in place.

The result of the study conducted indicated that majority of red meat abattoirs of Mopani district did not comply with the requirements set in clause 5 and 6 of SANS 22000: 2005. Meat processed in abattoirs without involvement of all stakeholders playing role in food safety cannot be safe for human consumption. Management of these abattoirs failed to put preventative measures in place by ensuring that all stakeholders are involved and apply their expertise during food safety legislation implementation process.

Mckean (2001) argued in his study that a successful food safety legislation implementation is a joint effort for all. If workers, other levels, government, suppliers and consumers are not involved in all processes, poor food safety legislation implementation can be encountered. Another study conducted in the United States of America revealed their success of food safety legislation implementation in the red meat abattoirs. Their success entailed full participation of many stakeholders within red meat industry such as the scientists, public health experts, suppliers, consumer organizations and food and agriculture industries.

5.6 CONCLUSION

The objectives of the study were reviewed after the results and discussion to determine whether they were met. The **first objective** was to determine food safety

knowledge and practice of management and malpractice of food safety legislation by red meat abattoirs. On food safety knowledge 54% of the red meat abattoirs did not have knowledge on FSL. The results on food safety practices showed that 59.1% of the red meat abattoirs did not follow correct procedures during food safety practices. The results on work experience showed that majority of managers in the red meat abattoirs have work experience between 20 to 25 years. The results on pieces of food safety legislation implemented showed that regulations administered by the DoH&SD and DTI in the red meat abattoirs of Mopani district were less implemented. The results on Hygiene Management Systems (HMS) in red meat abattoirs indicated systems progressed at a slow pace.

The **second objective** was to identify factors which prevented successful implementation of food safety legislation in the red meat abattoirs. The results showed that planning and decision making process as the first factor 82% did not involve other stakeholders including experts during FSL implementation process. The second factor on occupational level at the red meat abattoirs lacked proper organizational structures. The third factor on skilled personnel showed that 72.7% of the abattoirs did not have multi-disciplinary skilled personnel. The fourth factor on financial management showed that 77.2% of the abattoirs did not make financial commitment to support food safety legislation implementation process. The fifth factor on training and development showed that 63.6% of abattoirs did not receive training on basics of food safety principles. The sixth factor on structural compliance indicated that 27.3% of the structures did not meet the minimum structural requirements as prescribed in Part II(B) and regulation 49 of R.1072.

The **third objective** was to make recommendation for future research and / further exploratory of certain findings.

An integrated food safety legislation manual consisting of strategies to address factors identified on this study must be developed with all stakeholders involved in red meat industry. The manual should also include procedures to improve the food safety knowledge and food safety practices of management of the red meat abattoirs.

The study concluded that food safety legislation in red meat abattoirs of Mopani district were not fully implemented as required and prescribed by food safety acts,

regulations and standards. It is stated in Codex Alimentary that all consumers are entitled to safe, sound and wholesome food and to be protected from unfair trade practices. The code also prohibit any person to put any food that is unfit for human consumption into the market (FAO, 2005).

5.7 RECOMMENDATION

The results of this study can be used to come up with possible suggestion or solution which can assist the red meat abattoirs to implement food safety legislation efficiently and effectively. It is therefore recommended that the following be considered for successful food safety legislation implementation within the red meat abattoirs of Mopani district and the entire province (if possible).

- All abattoirs must procure independent meat inspection services as prescribed in Sec 11(1)(b) of the MSA.
- All pieces of food safety legislation must be fully implemented in all red meat abattoirs.
- A fully documented hygiene management system manual must be in place in all abattoirs.
- All red meat abattoirs must comply to structural requirement as prescribed in Part II (B) of R.1072, regulation under the MSA.
- Top management must be financial committed to food safety legislation implementation process.
- All abattoirs should have a properly designed organisational structures which caters for multi-disciplinary skills needed in red meat abattoirs.
- All red meat abattoir personnel should undergo food safety training to increase their knowledge on food safety principles.
- A continuous development programme must be in place in all red meat abattoirs to improve food safety practices of personnel.
- Integrated food safety legislation manual must be developed with all stakeholders involved in red meat industry to address challenges during food safety legislation implementation process.
- A food safety legislation implementation enforcement team or forum should be established. This team should encourage the red meat abattoirs of Mopani district

must to adopt a risk-based approach along the red meat chain “farm to fork” principle, including awareness to the consumers.

5.8 LIMITATION OF THE STUDY

Evaluation of this research study and the procedures around it revealed several limitations which need to be acknowledged:

- In some abattoir workers also wanted to be part of the participants, they wanted to express their view about working conditions, salaries and management issues. The research however, explained that the focus of the study was on management only. Though, their inputs were considered to prevent information bias by management and such information will be taken into account during formulation of strategies.
- Some participants were not willing to reveal all challenges that they face fearing that it may have negative implication either on their position or it may put the abattoir into a situation of being closed if they are to be found guilty by not complying to the minimum requirements of food safety legislation.
- The researcher is based on the same sector in terms of work environment or area. Some participants felt that the researcher already knew the challenges of some abattoirs because the researcher worked in those abattoirs some years back.

5.9 IMPLICATIONS OF THE STUDY

The researcher believe that the findings of the study will assist the management red meat abattoirs as food safety legislation implementer to know their challenges and also to make contribution of addressing these challenges.

5.10 IMPLICATIONS FOR FUTURE RESEARCH

The results of this study cannot be extrapolated and generalised to other contest when given the exploratory nature of this research and taking into consideration of the sample size which was small.

5.11 IMPLICATIONS TO FOOD SAFETY LEGISLATION IMPLEMENTERS

This study describe the nature and causes of different challenges that the management of red meat abattoirs come across within their abattoir facilities, it assess the impact of these challenges, promote implementation strategies, formulate guidelines that will assist the enforcement departments to facilitate implementation and to suggest possible solutions to these challenges.

5.12 SUMMARY

Chapter 5 included discussion and conclusion which further explained the three objectives of this study: (a) demographic information; (b) food safety knowledge, food safety practices and malpractices of management of the red meat abattoirs of Mopani district, as well as compliance with structural requirements; (c) implementation of various pieces of food safety legislation and Hygiene Management Systems; (d) management, training and development. The chapter also included recommendations made for this study, limitation and implication of the study.

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APPENDIX 1

QUESTIONNAIRE

Please mark with an "X" on the spaces relating to your answer. Kindly provide answers to all questions where possible.

SECTION A

1. Gender

Female	1	Male	2
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2. Age.

Younger than 20	1	20- 39	2
40 - 59	3	60 and older	4

3. How long have you worked in the abattoir?

Less than 4 years	1	5 – 9 years	2
10 - 14 years	3	15 – 19 years	4
20 – 25 years	5	More than 25 years	6

4. Indicate your highest level of Education.

No schooling	1	Primary school	2
Secondary school Grade 7 to Grade 11	3	Matric / Grade 12	4
Certificate	5	Diploma / degree	6

5. Indicate your position in this abattoir.

Owner	1	Manager	2
Hygiene manager	3	Meat inspector	4
Meat examiner	5	Other (please specify)	6

SECTION B

KNOWLEDGE QUESTIONS

Please indicate with an "X" in the box whether the following statements are **True** or **False**. 1 2

	1	2
	True	False
7. Humane handling of cattle is important.	1	2
8. Sickesses in animals must be checked by the foreman.	1	2
9. Injured animal must be slaughtered last.	1	2
10. Sick animals must be slaughtered first.	1	2
11. Correct bleeding time for cattle is 6 minutes.	1	2
12. Dressing must start after bleeding.	1	2
13. All openings must be made from inside to outside.	1	2
14. Not all organs should be available for Meat inspection.	1	2
15. Stomach contents can be opened on the slaughter floor.	1	2
16. First inspection of meat should be done by Veterinary doctor only.	1	2
17. Secondary inspection is done by a Meat Inspector.	1	2
18. Condemned materials must be place in lockable container marked "Waste Material".	1	2
19. Measles carcasses are kept at -18°C for 72 hours.	1	2
20. Warm carcasses are only loaded into the chiller after out loading and cleaning.	1	2
21. All chilled meat must be at 7°C or less at out loading.	1	2
22. Red and rough offal can be kept in the same refrigerator.	1	2
23. All products must be washed under clean and running water.	1	2
24. Floors and walls must not be washed when meat is hanging.	1	2
25. Hand washing soap must be used at all time when washing hands	1	2
26. Fingernails must be short, clean and free of nail vanish when handling meat.	1	2

PRACTICE RELATED QUESTIONS

Please indicate with an "X" in the box whether the following statements are **True** or **False**. 1 2

	True	False
27. Cattle are bled within 30 minutes after stunning.	1	2
28. Knives are washed and sterilized between each cattle.	1	2
29. Stomach contents, uterus, and gall are treated as condemned products.	1	2
30. All sterilizers are kept at 65-c during slaughtering.	1	2
31. Protective clothing is clean and in good condition.	1	2
32. Protective clothing is only washed in the laundry.	1	2
33. All products are always handled away from the floor.	1	2
34. All equipment are cleaned and sterilized during and after use.	1	2
35. Daily hygiene check list is done by a meat inspector.	1	2
36. One is not allowed to handle meat when coughing.	1	2
37. Meat Inspection is only done by a qualified meat Inspector.	1	2
38. Anyone can enter the slaughter floor at any time.	1	2
39. Temperature for chillers and freezers are always checked.	1	2
40. Meat is left on the floor for a night after slaughtering	1	2
41. Condemned carcasses are kept and packed together with passed meat.	1	2
42. Meat is placed on the floor of the truck when loading for delivery.	1	2
43. Trucks loading live animals and delivering meat are washed in the same area.	1	2
44. Staff from slaughtering floor can load meat on the trucks.	1	2
45. Only personnel trained on hygiene practices can handle meat.	1	2
46. Staff may eat and smoke when busy working with meat.	1	2

STRUCTURE RELATED QUESTIONS

The following information describes the condition of this abattoir (use the following key):

1= Acceptable (A); 2=Conditionally acceptable (CA); 3= Unacceptable (UA).

	1	2	3
	A	CA	UA
47. The abattoir does not have a fence and lockable gates.	1	2	3
48. The premises is always kept neat and in tidy conditions.	1	2	3
49. All lairages are well maintained and provided with water troughs.	1	2	3
50. Enough equipment is available to handle condemned and waste material.	1	2	3
51. Water is always available during slaughtering.	1	2	3
52. All windows have fly proof.	1	2	3
53. Doors are always closed when slaughtering.	1	2	3
54. Electricity is always available to keep the process running.	1	2	3
55. Engineering and fixing of equipment is done while meat is hanging.	1	2	3
56. Walls, floors and ceilings are without cracks and openings.	1	2	3
57. Drainage system is always functioning well.	1	2	3
58. Equipment can easily be cleaned and sterilized.	1	2	3
59. Smoking and eating areas are available for staff.	1	2	3
60. All walls are light in colour and easy to clean.	1	2	3
61. Washing hand basin and sterilizer are far from the working station.	1	2	3
62. Meat out loading area is also used as a storeroom.	1	2	3
63. Store area is available to keep food for staff members.	1	2	3
64. Toilets are always clean and with toilet paper	1	2	3
65. Antibacterial soap and drying facilities are available in hand washing areas.	1	2	3
66. No laundry for washing of protective clothing is available.	1	2	3
67. Apron wash and hangers are available in all entrance lobbies	1	2	3
68. Hand washing facilities are available in all entrance lobbies.	1	2	3
69. Boat washing facilities are available in all entrance lobbies.	1	2	3

SECTION C

FOOD SAFETY LEGISLATION (FSL) IMPLEMENTATION

Indicate if you agree with the following statements, using the key below:

1= strongly disagree (SD); 2=disagree (D); 3=don't know (DK); 4=agree (A); 5= strongly agree (SA).

70. Which of the following pieces of FSL are in place in your abattoir?

		1	2	3	4	5
	Pieces of food safety legislation	SD	D	DK	A	SA
a	Meat Safety Act (Act 40 of 2000).	1	2	3	4	5
b	Red Meat regulation (No 1072 Of 2004).	1	2	3	4	5
c	Regulation 908: Application of HACCP.	1	2	3	4	5
d	Regulation 962: General hygiene requirement for food premises and transportation of food.	1	2	3	4	5
e	South African National Standards (SANS)	1	2	3	4	5

71. Which of the following programs of HMS are already in place in your abattoir?

SD= strongly disagree, D=disagree, DK=don't know, A=agree, SA= strongly agree.

		1	2	3	4	5
	Hygiene Management Programme	SD	D	DK	A	SA
a	Personal hygiene.	1	2	3	4	5
b	Slaughter and dressing.	1	2	3	4	5
c	Meat inspection.	1	2	3	4	5
d	Cleaning and sanitation program.	1	2	3	4	5
e	Temperature control.	1	2	3	4	5
f	Maintenance.	1	2	3	4	5

SECTION D

MANAGEMENT, TRAINING AND DEVELOPMENT

72. Indicate the number of personnel completed the following courses:

	Courses	Number of people :
a	Hygiene Awareness Course.	1
b	Hygiene management system /PRPs.	2

73. Which skills are available at this abattoir?

	Skills	Available	Unavailable
a	Slaughter and dressing	1	2
b	Hygiene Awareness	1	2
c	Meat Examiner's	1	2
d	Meat Inspector's	1	2
e	Hygiene management systems / PRPs.	1	2
f	Other (please specify)	1	2

74. How does finance affect FSL implementation process at this abattoir?

	Programme	Implication	Non Implication
a	Personal hygiene.	1	2
b	Slaughter and dressing.	1	2

c	Meat inspection.	1	2
d	Cleaning and sanitation program.	1	2
e	Temperature control.	1	2
f	Maintenance.	1	2
g	Other (please specify)	1	2

75. Which of the following programs do this abattoir involve other stakeholders during planning and decision making process?

	Programme	Involve	Do not involve
a	Slaughter and dressing techniques.	1	2
b	Personnel hygiene management.	1	2
c	Production management.	1	2
d	Hygiene management systems / PRPs.	1	2
e	Financial management.	1	2
f	Other (please specify)	1	2

APPENDIX 2

UNIVERSITY OF LIMPOPO (Medunsa Campus) ENGLISH CONSENT FORM

Statement concerning participation of research study

Name of the Study

EVALUATION OF IMPLEMENTATION OF FOOD SAFETY LEGISLATION IN THE RED MEAT ABATTOIRS OF MOPANI DISTRICT, LIMPOPO PROVINCE, SOUTH AFRICA

I have read the information on / heard the aims and objectives of the proposed study and I was provided the opportunity to ask questions and given adequate time to rethink the issue. The aim and the objectives of the study are sufficient clear to me. I have not been pressurized to participate in any way.

I know that the information will be needed from me. I am aware that this information may be used in scientific / social publications which will be electronically available throughout the world. I consent to this provided that my name is not revealed.

I understand that participation in this study is completely voluntary and that I may withdraw from it at any time and without supplying reasons. This will have no influence on the regular performance at work.

I know that this study have been approved by Medunsa Research Ethics Committee (MREC), University of Limpopo (Medunsa Campus). I am fully aware that the results of this study will be used for scientific purposes and may be published.

I agree to this, provided my privacy is guaranteed.

I hereby give consent to participate in this study

Name of the participant

Signature

Date

Place

Statement by the researcher

I provide verbal and / or written information regarding this study

I agree to answer any future question concerning the study as best as I am able.

I will adhere to the approved protocol.

Name of Researcher

Signature

Date

Place

*Delete whatever is not applicable

APPENDIX 4

Enquiry: Mrs S Gana

Contact no: 079 288 7431

P.O BOX 5521
POLOKWANE NORTH
0750
29 April 2013

To: Limpopo Department of Agriculture.

**SUBJECT: REQUEST TO EVALUATE IMPLEMENTATION OF FOOD SAFETY
LEGISLATION IN RED MEAT ABATTOIRS OF MOPANI DISTRICT.**

I am currently enrolling for a Master of Public Health (MPH) degree with the University of Limpopo, Turfloop Campus. This is a study for the purposes of research in order to fulfill the requirements of the above mentioned degree. The study have been approved by Medunsa Research Ethics Committee (MREC) and the University of Limpopo (Turfloop Campus).

The information provided will assist in completing the research study on the Evaluation of implementation of Food Safety Legislation in red meat abattoir of Mopani district, Limpopo Province in South Africa. The objectives of the study is to identify factors which prevented successful implementation of FSL, to determine food safety knowledge and practice of management and malpractice of food safety legislation by red meat abattoirs and to formulate strategies that can be used to deal with FSL implementation process in red meat abattoirs. A period of two weeks to collect data was allocated for this study.

I also wish to inform the department that the information provided will be highly appreciated and will be treated confidentially

Regards.

Mrs S Gana (Student).
Contact cell number: 079 288 7431



RESTRICTED

LIMPOPO

PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF AGRICULTURE

REFERENCE: 4/2/1/2
ENQUIRIES: DR DS KHOZA
DATE: 02 MAY 2013.
TO: MRS SHALATI GANA, CC/UNIVERSITY OF LIMPOPO.
CC: GENERAL MANAGER: AGRICULTURAL ADVISORY SERVICES.
FROM: VETERINARY SERVICES.
SUBJECT: REQUEST TO COLLECT DATA FROM LIMPOPO RED MEAT ABATTOIRS OF MOPANI DISTRICT.

Permission is hereby granted to Mrs. Shalati Gana to collect data from managers of red meat abattoirs of Mopani district for the purpose of evaluating food safety legislation implementation within the red meat abattoirs of Mopani district, Limpopo Province. Limpopo Department of Agriculture: Veterinary Service branch and its directorate Veterinary Public Health would like to have a copy of the complete research of its own resource center after completion of the study (if possible).

The researcher should be prepared to assist in interpretation and implementation of recommendations where possible.

The abattoir management of institutions where study will be conducted should be made aware of the purpose of the study and the objective thereof.

Regards

Dr DS Khoza
Senior State Veterinarian: Veterinary Public Health

2 May 2013
DATE

APPENDIX 6

Enquiry: Mrs S Gana

Contact no: 079 288 7431

P.O BOX 5521
POLOKWANE NORTH
0750
29 April 2013

To: Limpopo Red Meat Board.

**SUBJECT: REQUEST TO ACCESS INFORMATION FROM LIMPOPO RED MEAT
ABATTOIR OF MOPANI DISTRICT.**

I am currently enrolling for a Master of Public Health (MPH) degree with the University of Limpopo, Turfloop Campus. This is a study for the purposes of research in order to fulfill the requirements of the above mentioned degree. The study have been approved by Medunsa Research Ethics Committee (MREC) and the University of Limpopo (Turfloop Campus).

The information provided will assist in completing the research study on the Evaluation of implementation of Food Safety Legislation in red meat abattoir of Mopani district, Limpopo Province in South Africa. The objectives of the study is to identify factors which prevented successful implementation of FSL, to determine food safety knowledge and practice of management and malpractice of food safety legislation by red meat abattoirs and to formulate strategies that can be used to deal with FSL implementation process in red meat abattoirs. Attached is the type of questionnaire which will be send to the abattoirs, the questionnaire has 4 Sections with a total of 75 questions to be completed by abattoir management

I also wish to inform you that the information provided will be highly appreciated and will be treated confidentially.

Regards.

Mrs S Gana (Student).
Contact cell number: 079 288 7431

APPENDIX 7

Vencor Holdings (PTY) Ltd

Posbus 749
Ladanna
0704

Tel: 082 317 8139
Faks: 086 525 1906

BTW: 4430121204
REG. NO. 77/004006/07



Enquiry: Mr. C J Calitz
Contact no: 082 317 8139

LIMPOPO RED MEAT BOARD
P.O BOX 749
LADANNA
0704
02 May 2013

To: Ms Shalati Gana
CC: University of Limpopo
Department of Agriculture

RE: EVALUATION FOOD SAFETY LEGISLATION IMPLEMENTATION WITHIN THE RED MEAT ABATTOIRS OF MOPANI DISTRICT, LIMPOPO PROVINCE.

Permission is hereby granted to Mrs. Shalati Gana to collect data of evaluating food safety legislation implementation within the red meat abattoirs of Mopani district, Limpopo Province for the purpose of completing her degree. The board would like to have a copy of the complete research of its own resource center after completion of the study (if possible).

The researcher should be prepared to assist in interpretation and implementation of recommendations where possible. The abattoir management of institutions where study will be conducted should be made aware of the purpose of the study and the objective thereof.

Kind regards

Mr. C J Calitz
RMIF board, Limpopo Province

13/05/2013

DATE