

An assessment of the feasibility of developing a consumer oriented pork value chain in Harare: Zimbabwe.

A Research Project submitted to Van Hall Larenstein University of Applied Sciences in partial fulfilment of the requirements for the award of Professional Master Degree in Agricultural Production Chain Management with specialization: Livestock Chains.



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DEDICATION

To my mother and Gilbert.

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LIST OF ABBREVIATIONS

GDP	Gross Domestic product
FAO	Food and Agricultural Organisation
QMS	Quality Management System
Good	Agricultural Practices (GAP
Good	Manufacturing Practice (GMP
HACCP	Hazards and Critical Control Points
AHA	Animal Health Act
ISO	International Standards organisation
CQS	Colcom Quality Standards
VPHO	Veterinary Public Health Officer
S.1 50	Statutory Instrument 50
PSE	Pale Soft Exudate
DFD	Dark Firm Dry
SAZ	Standard Association of Zimbabwe

Abstract

This research study was undertaken to gather information on consumer perception on pork quality and safety, as well as to find out what quality systems actors in the pork values had in place. This study carried out in Harare came up at the backdrop of a decline in the consumption of pork and pork products in Harare due to absence on the market of quality and safe pork products that could satisfy consumer requirements at the same time being competitive to stand substitutes from local and abroad. The theme was to find possibilities of developing quality oriented consumer pork driven chains.

A survey involving 104 pork consumers was done to gather information of their perception on pork quality and safety in relation to its sensory, safety, freshness attributes as well as source of supply. Eleven stakeholders who included pig producers, pork processors and retailers from small, medium and large scale production were interviewed to get in depth information of the quality assurance and control systems they practised.

The results of the study carried in July to September 2012 revealed that many small to medium scale farmers, processors and retailers of Harare do not practice fully the quality and safety procedures to ensure quality pork is delivered to the market. The study also revealed that pork consumers in Harare are quality and health conscious and use mainly pork sensory attributes as well as safety cues to judge the quality of pork before they buy. Another revelation was the absence of effective linkages among actors within or without the same value chain and with other stakeholders. There is no effective linkage between pork production starting from pig production to retailing with consumer quality and safety demands. The current pork industry in Harare is producer driven.

Finally, this study recommends development of cooperation and linkages among the actors and stakeholders through sharing of ideas, experiences and resources to enable the production and presentation of high quality and safe products for consumers. The study proposes effective cooperation of value chain actors with consumers and makes individual recommendations to three pork chains studies.

CHAPTER 1: INTRODUCTION

1.2 Country's background

1.2.1 Location and Size of Zimbabwe

Zimbabwe is a landlocked country in the Southern African region, lying between the 15° 33' S and 22° 24' S latitudes and 25° 12' E and 33° 03' E longitudes. It borders Zambia in the North, Mozambique in the East, South Africa in the South and Botswana in the West. The total land area is 390,759 km². Its population is estimated at around 9 million distributed in the country's 10 provinces.

1.2.3 Agriculture and the Livestock sector in Zimbabwe

Agriculture is the mainstay of Zimbabwe's economy contributing between 14 and 18 per cent of GDP. Agriculture also provides the bulk of the nation's food requirements in a normal rainfall year, 60 per cent of the raw materials for agro-industries, and 26 per cent of the formal employment in the country and 70 per cent of the population with employment or livelihood.

Livestock significantly contribute to the agricultural GDP. It is estimated that in Africa, livestock-derived food products (meat, milk and eggs) alone contribute on average more than 30% to agricultural GDP (Aldo, et al., 2010). At the present moment, strategic livestock commodities include an estimated 5.1 million cattle, 397 thousand sheep, 3.2 million goats, 202 thousand pigs, 38 thousand dairy cattle and several millions of poultry (MAMID. 2010).

1.2.4 Structure of the Pig Industry in Zimbabwe

The key actors in the pig industry in Zimbabwe include input suppliers, producers, processors, wholesalers, retailers and consumers. Also important are supporters who facilitate activities along the value chain to ensure product delivery for example the Veterinary Field and Public Health Departments, Livestock Department, Municipalities and Research Centres.

1.2.5 Pig Production Trend

Pig production has been fluctuating up and down over the past decade. Zimbabwe national commercial sow herd peaked at nearly 20 000 sows in 2007 from 15 500 in 2005, then dropped by half to about 8000 in 2008 (USAID, 2010).

To date the numbers is believed to be rising steadily and estimated at about 10 000 sow herd as shown in Figure 2 below.

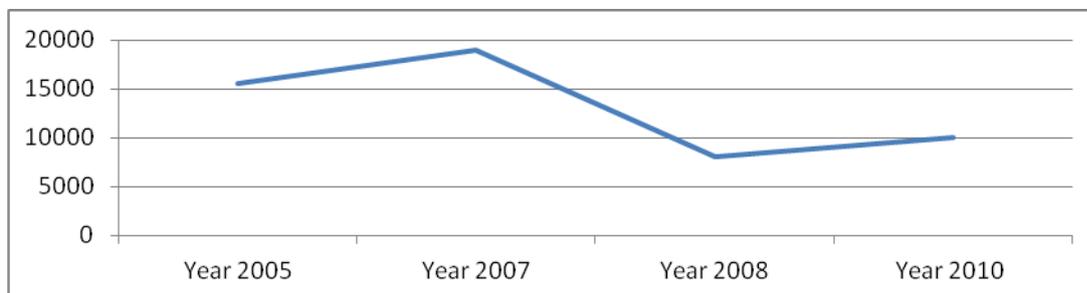


Figure 1.2. Estimated national sow herd in the commercial sector in Zimbabwe

(Source PIB data base, Agricultural statistical Bulletin, 2007)

1.2.6 Demand for Meat Products

It is estimated that overall meat demand is currently between 6,000 MT and 7,000 MT per month, with beef demand around 1,000 MT, chicken 3,500 MT, and other meats, pork inclusive 2,000 MT. Though Harare has the greatest potential compared to all other areas of Zimbabwe, the sector is going down due to the declining demand of the product (Matashu, 2010; Mutambara, 2012)

Pork like other meats plays an important role in the provision of a balanced diet and thus safety is of paramount importance for human consumption. Pork consumption in urban areas like Harare has been going down since the past 10 years and is a major threat to the viability of the pork industry (Mutambara, 2011). It has been noted that over 60% of small to medium scale farmers, processors and retailers in Zimbabwe, do not comply with health and safety regulations in the raising of pigs, slaughtering and marketing of the meat thus posing serious health threats to consumers (Mutambara, 2011). The absence of effective quality control systems in pork value chains, reduce consumer confidence in the product. The increase in consumer quality consciousness and health eating habits coupled by threats of zoonosis disease outbreaks negatively affects consumer demand thus weakening the ability of pork and pork products to stand any competition from local or imported substitutes. Cases of zoonosis diseases such as Cysticercosis, Anthrax, and Salmonella have been recorded, also threats through media of transboundary diseases for example Rift Valley Fever and Swine Fever has an impact on consumer demand.

This study was carried out in Harare, the capital city of Zimbabwe which has the highest population in the country, the highest number of pig producers around it, the major pork processors and distribution channels. Harare has a mixed population which can be categorized into the three main social groups' i.e. high, middle and low income groups. These income groupings are assumed to also define the location of residence classified as low, medium and high density areas. It follows therefore, that the high income group resides in the low density, the middle in medium density and the low income in high density areas of the city. Pork quality and safety consideration is highly linked to the amount of disposable income and standard of life of households (Grunert, et al., 2011).

The three types of residential areas were corresponded to the three pork value chains selected for investigation. These three pork value chains selected are responsible for the supply of pork consumed in Harare. They are linked to the consumer social classes and are members of the combined association of Pig Producers Association of Zimbabwe and the Abattoirs and Retailers Association. The association's main objective is to facilitate sustainable pork production; processing and marketing. These chains vary in terms on numbers of actors and level of organisation as described below:

Chain 1 is a structured pork chain which has been in existence for many years. Pig producers and processor are vertically linked and its customers are mainly the large supermarkets and institutions in the city.

Chain 2 mainly comprises of a single actor taking all the value chain functions. Made up of medium to large scale pig farmers who has butchers, vendors as main customers but also serve consumers directly at farm gate.

Chain 3 is the most fragmented one, it has more actors at each level, and the pork product peels off to the consumers at different stages of the value chain as depicted in Figure 1.1 below. The main customers of this chain area the butchers, small pork shops and vendors are mainly found in the high density areas.

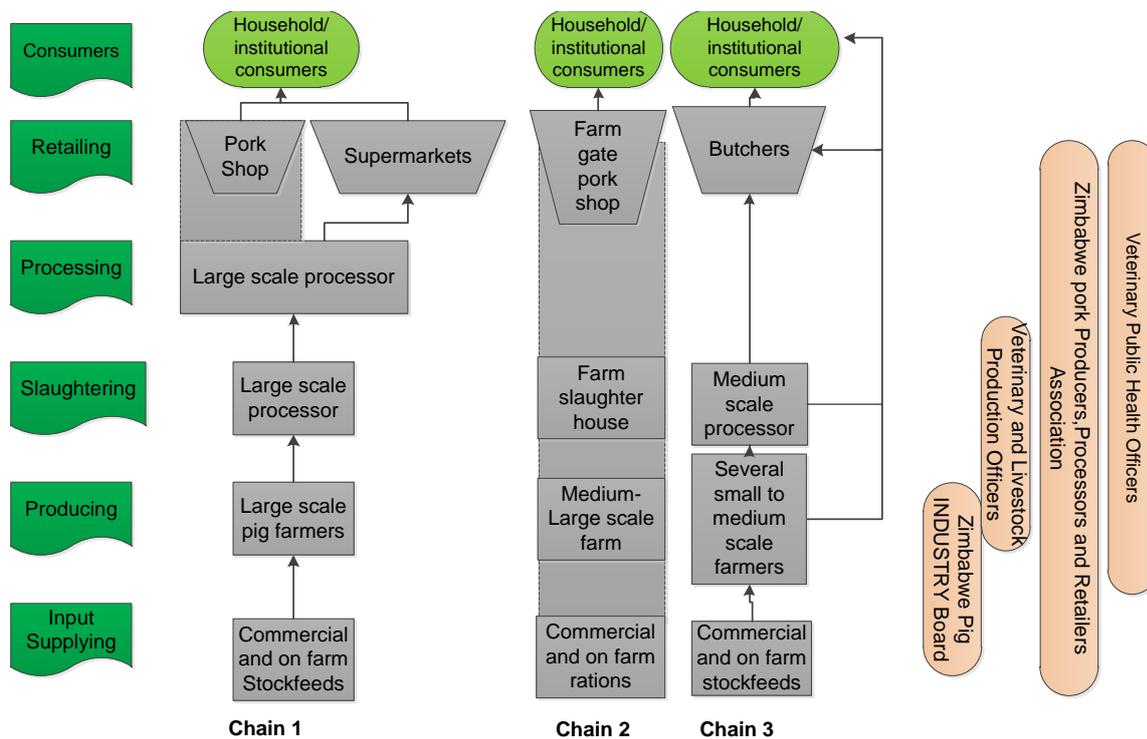


Figure 1.1: Pork value chains of Harare.

The study was undertaken to gather information on consumer pork quality and safety needs and quality control systems used in the value chain actors and identify whether the quality systems enable the production of pork and pork products that meets the consumer requirements.

Data collected through desk study, consumer survey, value chain actor interviews and general observations by the researcher was analysed through descriptive statistics and content analysis for case studies. The information gathered is useful for the combined Pig Producers Association of Zimbabwe and the Abattoir and Retailer Association whose major role is to foster linkages among stakeholders and development of strategies to promote competitiveness of the pork industry in Harare.

1.3 Problem statement

There is absence of effective quality and safety control systems in place for the pork value chains to answer to meet consumer requirements even though the diverse chains can cater for differentiated consumer needs.

1.4 Research objective

To gather information on consumer pork quality and safety needs and quality control systems used by actors of 3 selected pork value chains in order to develop consumer oriented chain improvement strategies for these 3 chains.

1.5 Research questions

1. What indicators of quality and safety do consumers take into consideration when buying pork and pork products?

- What pork quality and safety assurance features do consumers assess before buying pork?

- What factors influence the choice of supplier?
- Which value chain best serve high income quality conscious, medium income and the low income consumers?
- What strategies can be used by producers, processors and traders to improve pork quality and meet consumer needs?

2. What quality and safety criterions in the pork value chains that would link them to consumer requirements?

- What are the quality control standards that are used in the different value chains?
- What are the minimum and optimal quality and safety requirements to meet consumer needs?
- What is done when pork does not meet both obligatory and voluntary standards?
- What is the difference in actors, end products, product and process flows, among the different pork chains?
- Which value chain best serve high income quality conscious, medium income and the low income consumers?

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction to research study

This research study was undertaken to gather information on quality and safety control practices along the pork value chains at the backdrop of a decline in the consumption of pork and pork products in Harare (Mutambara, 2011). The absence of quality pork standards makes the product unable to stand even the competition from others locally produced meats and imports. The thrust is to find ways of what pork value chains can do to produce a product that meets consumer expectations thus making sure they are satisfied.

The primary purpose of purchasing food items is to be able to satisfy appetite and ensure a healthy body (FAO document 1992). The quality and safeness of a product determines the satisfaction obtained from it by the consumer. If quality standards of products do not meet consumer expectation then viability of that product is threatened. Therefore for pork consumers, quality and safety issues becomes basic, yet in Zimbabwe and other developing nations especially in Africa not much research has been done on consumer quality and safety requirements by pork consumers in comparison to quality management systems along pork value chains (Muchenje.,2009.).

2.2 Factors contributing to inefficient quality systems

The problem of inefficient quality and safety systems in producer oriented pork chains can be, as stated **by** the FAO document(1992),and Brinkmann et al.(2011)

Due to a 1 in order to improve consumer satisfaction and promote chain sustainability and growth. Fearme (2009) stated that opportunity for chain wide growth and prosperity rests with being able to provide what consumers want. A vision for value chain alignment must be focused on consumers and providing what they want.

2.3 Value Chain Concept

Value Chain: Kaplinsky and Morris (2001)Vermeulen et al, (2008), refers to value chain as the full range of activities that are required to bring a product (or service) from conception through different phases of production to delivery to final consumers and disposal after use. They further say a value chain exists when all the actors in the chain operate in a way that maximizes the generation of value along the chain and according to KIT et al. (2006) actors create linkages and seek to support each other with the objective of increasing chain effectiveness and competitiveness. According to Roduner (2007) value chains analyses the links and information flows within the chain and reveals the strengths and weaknesses in the process. The value chain concept was therefore used to investigate and analyse the strengths and weaknesses of the actors from pig producers through processors to retailer activities promoting or hindering quality and safe supply of pork to consumers.

The objective of value chain systems is to position organizations in the chain to achieve the highest levels of consumer satisfaction and value while effectively exploiting the competencies of all organizations in the particular value chain (Brown, 2009).

2.4 Consumer pork quality and safety requirement

Consumer demand for particular pork and pork products is influenced by factors such as social class, culture, religion, geographical position which also dictates the type, the quality, safety and even supply of pork. The judgement of whether the pork meets the quality and safety demanded the consumer intrinsic and extrinsic attributes of pork include sensory. Intrinsic pork quality attributes as stated by Luning and Marcelis (2011) include (colour,

odour, texture and taste); safety (microbial/biological, chemical and physical); health (nutritional); shelf life (freshness, keepability) and convenience (easy to use). According to Blaha (1997) and Grunett et al (2011) consumer demands are becoming more focused than branded products which have undergone several processing procedures like adding meat additives such as preservatives, cooking and canning. The fresher and more natural the pork is the better the consumer ranks it as being free from pathogens and other contaminants. Freshness is perceived as the most helpful factor in assessing safety at the time of purchase for pork.

Verberk (1999) states that consumers need to be entirely satisfied with the sensory properties of product, before extrinsic quality dimensions become relevant this is supported by basic marketing observations by marketing guru such as Baker (1999) and, Kotler (1996) who expressed that “product” is not just one but the most important element of the marketing mix theory.

Extrinsic attributes include characteristics of production systems along the chain and is used to make access considerations and compliances by pork value chain actors and supporters. Pork safety is the other characteristic the consumer takes consideration of before demanding pork. Pork safety assessment can be done more objectively using technical methods and tests that can easily be ascertained scientifically like microbial tests, chemical and drug residue and also chemical tests (Lambooi, 2000; Muchenje, 2009; Luning and Marcelis 2011). These tests or safety information will have to be translated to the consumer so that they compare it product safety information to what they deem health so as to make a purchase. This information according to can be communicated in symbols, figures or text.

Verbeke, 1999 proposes that consumer-oriented response strategies should focus at improving these intrinsic qualities characteristics, before other elements like traceability, labelling or marketing can be implemented successfully. The possibilities to improve nutritional value, healthiness and sensory characteristics pertain to selection, pig diet composition, transport, slaughter and post-slaughter circumstances. A successful adoption of consumer orientation urges for co-operation throughout the entire pork production chain (Verbeke, 1999)

2.5 Quality management systems of pork value chains

Quality Management System (QMS) is referred to as resources, processes, procedure and organisational structure that are required in the production of products that meet customer or consumer satisfaction. Pork quality according to Tikk (2007) is complex and multivariate properties, which are influenced by multiple interacting factors including the conditions under which the pork is produced, processed and sold. Quality has become very important especially in the modern era as competition is not only on local or national level but on global level.

QMSs provide the standards and monitoring mechanisms for achieving, maintaining, or improving the desired quality level as well as the mechanisms to signal quality across the value chain and to end consumers (Wever and Talami.2009).The two concepts used to assess QMSs in the selected pork value chains are quality assurance and quality control.

2.5.1 Quality assurance

The entirety of all planned and systematic actions required to ensure that a product complies with the expected quality requirements (NNI, 1989 in Van der Spiegel, 2004).Quality and safety assurance standards were assessed at each actor level in the pork value chain. The standards are set by the signal owner, who can be either a chain actor, or a public player to determine influence of the production (pre harvest) activities like: pig breeding, feeding, housing, disease control; processing (harvesting) activities like pre-slaughter and slaughter

activities like, handling, stunning, dehairing, evisceration and; post harvest processes such as cutting, packaging, storage, presentation and handling by retailers.

2.5.2 Quality control checks

Quality control is a monitoring mechanism employed to ensure a certain level of quality in a product or service. It evaluates whether or not the final product is satisfactory before marketing. The monitoring is done mainly during the pig slaughter and processing stage however there is no way of correcting production failures such as too fatty pork or high drug residues in meat or to upgrade the quality of the pork, it can only be downgraded or discarded. Thus quality control though good has limited potential to increase the function and efficiency of the pork value chain. As Blaha (2009), states, there is the need to simultaneously practice both quality assurance and quality control activities throughout the pork production chain to ensure sustainable production of good quality and safe pork.

2.5.3 Types and use of QMS

Quality management systems encompass both quality assurance and quality control and are designed to promote quality control checks and procedures to prevent and to correct immediately any mistake at every production stage to ensure pork of high quality. (Muchenje 2009; Blaha, 2009)

A variety of QMSs are used world over and this basically include; standard operating procedures which guarantee the desired quality of the interim product at every phase and level in the value chain. These include: Good Agricultural Practices (GAP) at producer level, Good Manufacturing Practice (GMP) from processing to retailing The QMSs comprise of both mandatory usually government related basic standards to ensure safe products and mainly based on the code alimentations, for example the Animal Health Regulations of Zimbabwe which governs the production of pigs and other livestock.

Other voluntary well recognised individual organisation, chain-wide or international standard are used. In food production, as with pork, where food safety and quality has the ultimate priority, the hazard analysis and critical control point system is the one that is common (Blaha, 2009).Pork chains in Harare as in the rest of the country (Mutambara, 2012) and also across the border in South Africa (Neethling, 2007) due to technical challenges of designing HACCP plans especially in the case of fresh meat like pork as well as players to meet the cost of establishment of requirements and registration. The vertical analysis elements as shown in Table 2.1 below will be used in this study

Table 2.1 The vertical analysis plan

Function	Quality standards	Monitored by	Quality parameter	Quality assurance or quality control(check)
Pig producer Pre-harvesting (Product)	GAP AHA(Animal Health Act)	Department of Veterinary Services	Quality assurance	Infrastructure, breeding, feeds and feeding, Health management and drug use, sanitation, Transportation to slaughter, waste management
Processor Pre-Harvesting (Process)	CQS(Colcom Quality Standards) HACCP	Standards Association of Zimbabwe (SAZ) And signal owner	Quality assurance	Source of pigs, offloading, resting, cooling, feeding, Watering, registration
			Quality control	Antemortem
Slaughtering (harvesting)	CQS HACCP	SAZ And signal owner		Stunning, bleeding, scalding, evisceration
			quality control	Meat inspection and carcass grading
(Post harvesting Packaging and storage)	HACCP	SAZ And signal owner	quality assurance	Cutting, chilling, packaging and labelling
			quality control	Microbial and chemical tests on products before dispatch to customers

2.5.4 Choice of pork value chain.

According to consumer behaviour studies carried out by researchers such as Solomon (2010), indicate that consumers will tend to buy and repeat buy products they believe adds value due to the quality and are prepared to pay a premium to get .that value. The way products are processed, packaged, presented, stored and origin and certification of the actors in its value chain, add value to the product such that consumers become more loyal to the product and supplier. Such product, brand or supplier loyalty can create a form of protection to the retailer and value chain even in the advent of competition from substitutes either locally of foreign. Absence of efficient quality control system pork value chains in Harare are failing to compete with other meats like chicken and beef and this has led that has lead it to low consumption of pork (Mutambara,2012)

Past market and consumer studies have also indicated that nicely packaged meat products including pork indicating the origin, certification, expiry dates, and the reputation of the supplier tend to be more preferred and they act as cues to the product quality and also brings to light the value chains the products are produced and processed them(Brown, 2009) and (Solomon, etal.,2010).In the last decade quality and safety has become of utmost importance to consumers who now judge the quality and safety not only from the basis of

pork presented in retail shops but overall quality performance of the value chains producing it (Fischer and Fischer 2005). Quality is more and more managed along the whole food chain from the supplier of raw materials to the consumption.

2.6 Value Chain Development

Value Chain Development was described by Herr (2007) as a means to improvement of cooperation between stakeholders of a particular sector and the coordination of their activities along different levels of a value chain with the ultimate goal of increasing competitiveness of the sector within a particular value chain. It is a series of events which starts with chain research, chain analysis, formulation of chain upgrading strategies then followed by monitoring and evaluation to assess the impact of the intervention. This model can be used practically to solve a problem like the one being faced by the pork chains of Harare.

In his publication “operational guidelines to value chain development”, Herr outlined five critical triggers namely: system efficiency, product quality and specifications, product differentiation, social and environmental standards and enabling business environment.

This study focused on product quality and specifications as a trigger to pork value chain development in Harare. The selection of this area was based on the fact that today markets are fast changing, competition is becoming fierce and to stay in business, actors need to make sure that their products meet the changing market/consumer requirements and demands. What counts, is the end product that the consumer receives and the level of satisfaction that it creates. For the product to reach the consumer there is need also to consider quality and safety standards to be fulfilled for example the Veterinary Public Health Regulations, Traceability, HACCP or ISOs. The form, presentation of product and consumer service is also imperative as only quality products are acceptable by consumers and can also fetch premium price.

Value Chain Development Intervention strategies that can be used include vertical and horizontal integration.

Vertical integration entails: involving farmers in new activities either upstream or downstream e.g. production, processing or trading. Vertical integration may occur for several reasons including; better quality control, improved information flow, stable supplies, scheduling and reduction in price risk.

Horizontal integration: is the involvement of farmers in chain management with regards to decisions on sales, price, quantity and customers KIT et al (2006). Horizontal integration also provides uniform quality performance by supporting members through quality programs and by providing members with quality demand information from the market.

2.7 Marketing Mix Used by retailers:

This is a tool used to test an existing or new market strategy and involves the different kinds of choices an organisation has to make in the whole process of bringing a product or a service to the market. It is also known as the 4P's namely: product, price, place and promotion. In this study 2P's i.e. product and place are going to be used to analyse the pork value chain focusing on quality, safety and consumer priorities.

Product: This is the good or service offered customers. Typical product attributes include; it's physical appearance, packaging, quality features, different ranges, brand name, warranty and customer service. It should meet the needs of a particular target market therefore adequate knowledge of what the target market wants and what competitors are supplying is important in offering a product that is appealing to customers.

Place: is the distribution channel used to get products to customers and may be intensive, selective or exclusive.

CHAPTER 3: METHODOLOGY

This chapter presents the study area, study design and data collection strategy and the way the gathered data was analysed. The approach of this research was both quantitative and qualitative based on empirical data collected from survey and case study and secondary data obtained from study of literature, documents and from internet sites.

3.1 Study area

The province has a population of around 4 million, and it is also the capital city of the country. Harare receives an average annual rainfall of about 800-1000mm, average temperature of 18.6°C and lies at 17°55'S 31°8'E. The climate and loamy soils of this area support extensive crop and intensive livestock production. Pig production is mainly practiced in this region due to availability of stock feed as major stock feed ingredients like maize and soya bean are mainly grown in this region. Stockfeed companies are also mainly located in Harare with sub units throughout the country.

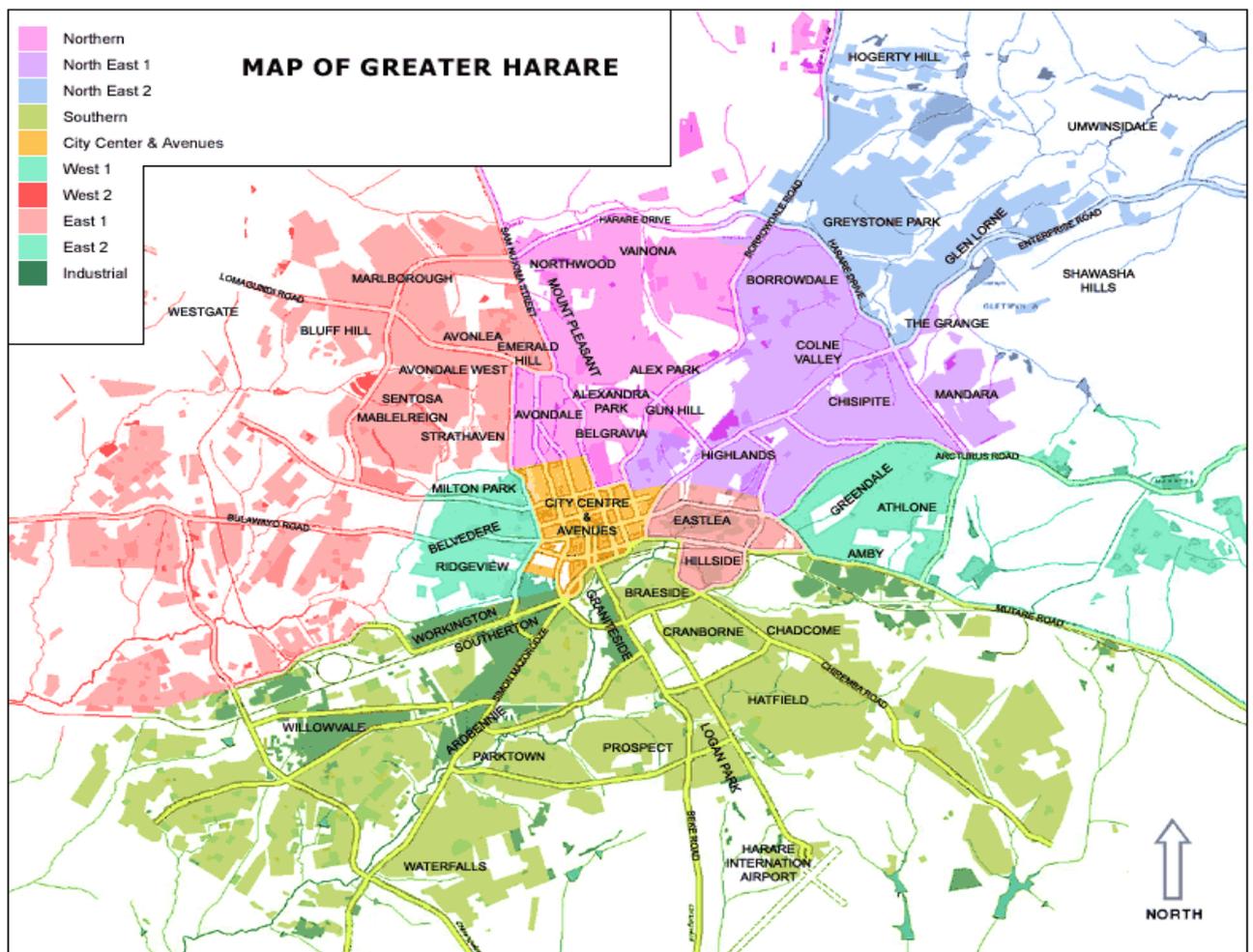


Figure 3.1 The map of Harare

3.2 Study design

The study design in Figure 3.2 below shows the research strategy, data collection, conceptual framework, data analysis, value chain development and desired outcome. The

strategy involved desk study, consumer survey to gather information on pork quality and safety preferences, general observation of activities along the chain and finally interviews with chain actors and supporters. Chain mapping and stakeholder analysis was done to identify the difference in actors, quality standards, end products, and product and process flows, among the different pork chains. Quality managements systems focussing on quality assurance and quality control activities and standards by the actors of the three pork value chains was evaluated. Relationships between consumer preferences and chain characteristics were studied to find out how consumer satisfaction can be attained through the different channels and products.

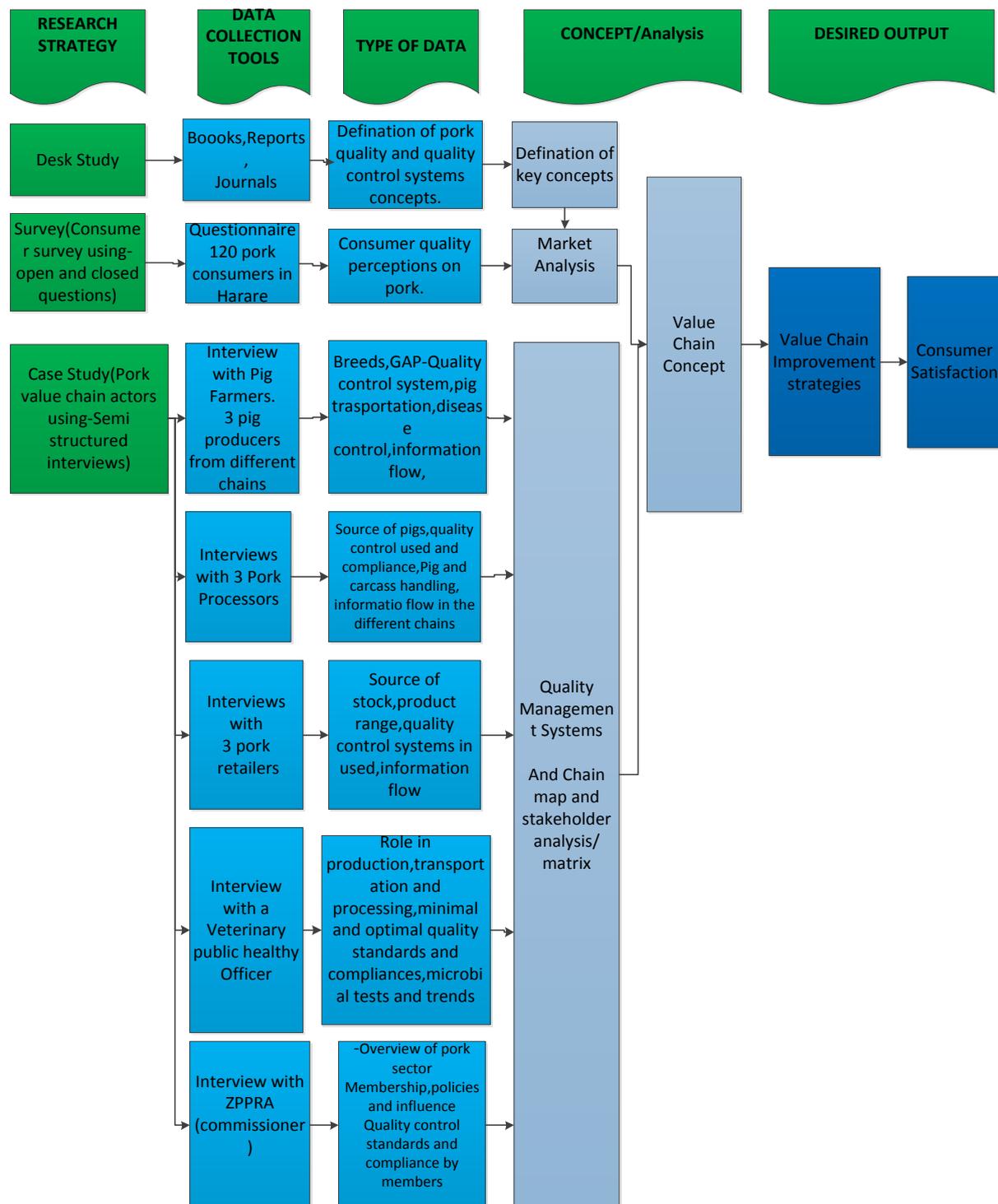


Figure 3.2 Research design and conceptual framework

3.2.1 Desk study

Source of information for desk study was from text books, scientific Journals, books, reports and publications. The data was used to define the concepts used for the study.

3.2.2 Survey

A structured questionnaire was used to gather the views and perceptions of pork consumers in Harare on pork quality and safety considerations they make when buying pork. Respondents were randomly selected from the town with one qualification that they had to be pork consumers. Pre-testing of the questionnaire was done on five randomly picked consumers at the beginning of the data collection period. Results of the pilot test made the researcher to shift a bit from the original proposed plan. The initial plan was to distribute the questionnaire inside and outside selected retail shops in the different types of residential and the consumer responds on spot. This was not favourable as the potential respondents indicated that they would need a bit more time to respond well as the issue of quality of products was crucial to them. After randomly distributing the forms, pick up points for the forms was arranged. The researcher also used local residents' social gatherings to distribute the forms. Emailing was another option but it did not yield good results because the rate of response was about 1%.

3.2.3 Case study

The study involved personal interviewing of the strategically selected actors and supporters of the three pork as indicated in figure 3.2, one large scale farmer from chain 1, medium scale from chain 2 and one small farmer from chain 3. A checklist was used to guide the interviewer through the different interviews (see annex) of quality control systems used by actors of 3 the value chains.

3.2.4 Observation

The interviews were done at the stakeholder's work premises. Visiting the interviewees gave the researcher an opportunity to observe the practices, activities and status regarding quality assurance and control. An opportunity to validate some of the data given in interviews was accorded and this enhanced the study.

3.3 Data processing and Analysis.

Data gathered through survey was clustered according to residential areas thus high, medium and low density areas and analysed using SPSS, tables and some graphs using excel sheets. Presentation of survey findings was by using tables and bar graphs. Content analysis was done with data from case studies and observation using guidelines from the pork quality vertical chain plan (Figure 3.2).

CHAPTER 4: RESULTS

This chapter presents findings from the research study in 4 parts. Findings from a pork consumer survey is presented first, followed by case study findings obtained through interviews and observation and then finally the pork value chain map showing the different stakeholders and quality systems at various levels.

4.1: Results from consumer survey

Response Rate to Questionnaire

Of the 180 questionnaires distributed, 104 were filled in and this represented a 57% response rate of the demographics described in table 4.1.

4.1.1 Background Information

The findings showed that females comprised the greater proportion of consumers in the 3 residential areas studied i.e.52% High density, 86% of Medium density and 100% of low density. About 90% of consumers in each area had secondary education or higher. Comparing income and residence, table 4.1 below shows that 82% of consumers in the high density area are in the low income bracket as compared only 29% in the low density areas. A normal distribution on the consumers' age group is consistent in the three areas as shown below.

Table 4.1 Background information of consumers

PARAMETER		HIGH DENSITY1	MEDIUM DENSITY	LOW DENSITY
Gender	Male	29(48%)	3(14%)	0 (0)
	Female	32(52%)	19(86%)	21(100%)
Education Background	Never been to School	3(5%)	0(0)	0(0)
	Primary Level	3(5%)	0(0)	0(0)
	Secondary Level	20(33%)	4(18)	9(43%)
	College/university	35(57%)	18(82%)	12(57%)
Income Level	Low Income	50(82%)	10(45%)	6(29%)
	Medium Income	11(18%)	5 (23%)	0(0)
	High Income	0 (0)	7(22%)	15(71%)
Age Groups	19-28years	0(0)	2(9%)	6(29%)
	29-38years	21(34%)	7(32%)	4(19%)
	39-48years	23(38%)	11(50%)	0(0)
	48-58years	9(15%)	0(0)	7(33%)
	Above 58years	8(13)	2((9%)	4(19%)

1.3 Sensory criteria for assessing pork quality.

The consumers were given different options of sensory indicators of pork quality and were asked to show the description which matched their choices. On colour, 67.2% of the consumers in the high density preferred pork of a pale colour, the same with 90 and 100% from medium and low densities respectively. On fattiness of the pork, 60.6% from high density preferred moderate fat compared to just 36.3% in medium and 14.3% in the low

density areas. Soft and moist pork is also preferred across the areas as indicated by values which are above 80% in table 4.2 below.

Table 4.2: Sensory pork quality indicators

Colour	High density	Medium Density	Low Density
Very Pale	9.84%	9.09%	0.00%
Pale	67.21%	90.91%	100.00%
Red	22.95%	0.00%	0.00%
Fattiness			
High Fat	4.92%	0	0
Moderate Fat	60.66%	36.36%	14.29%
Lean	34.43%	63.64%	71.43%
Very Lean	0	0	14.29%
JUICENESS			
Dry	0	0	14.29%
Moist	81.97%	86.36%	85.71%
Wet	18.03%	13.64%	0.00%
TENDERNESS			
Soft	86.89%	1	90.48%
Firm	13.11%	0	9.52%

4.1.2 Consumer pork preferences

Figure 4.1 below, indicates that high density consumers can consumer most of the products on the market though fresh and precooked products seem dominant, medium density prefers more of fresh and canned products whilst low density consumers would special pork cuts and smoked products.

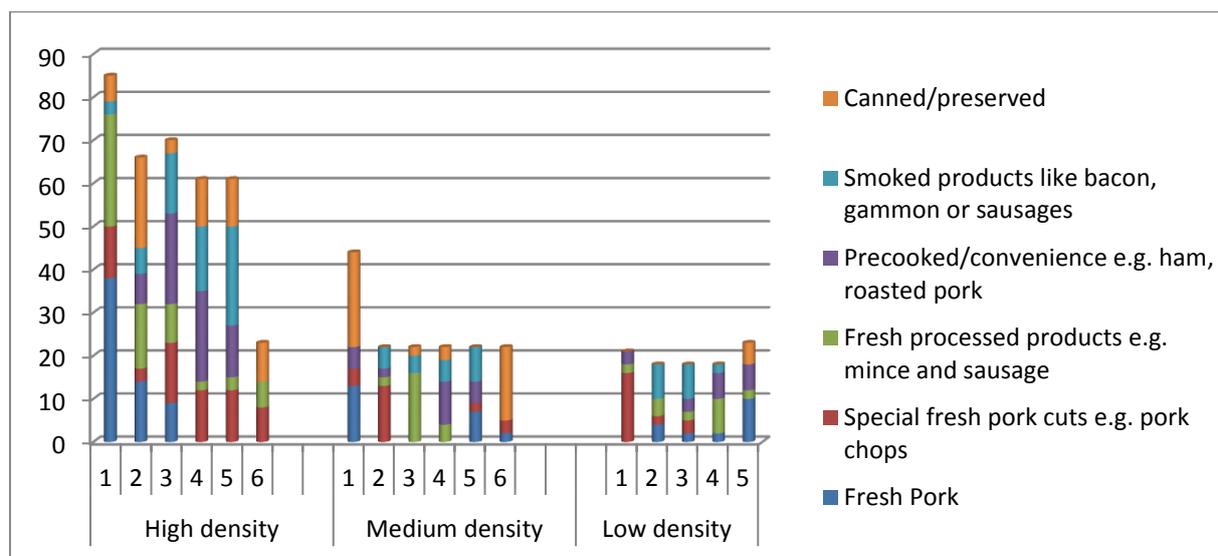


Figure 4.1 Consumer choice of pork

As depicted in figure 4.1 about 30% of low density consumers prefer special cuts followed by smoked products. High and medium consumers prefer fresh pork and canned.

4.1.4 Criteria for accessing pork freshness

The colour of pork is dominantly used by consumers in the three areas to assess pork freshness as indicated by over 80% of the respondents. The colour of pork is dominantly used by consumers in the three areas to assess pork freshness as indicated by over 50% of the respondents. Consumers from high and low densities also made use of aroma and price to base their judgements as compared to medium density where more than 50% of the population relies on colour, supplier reputation and storage facilities

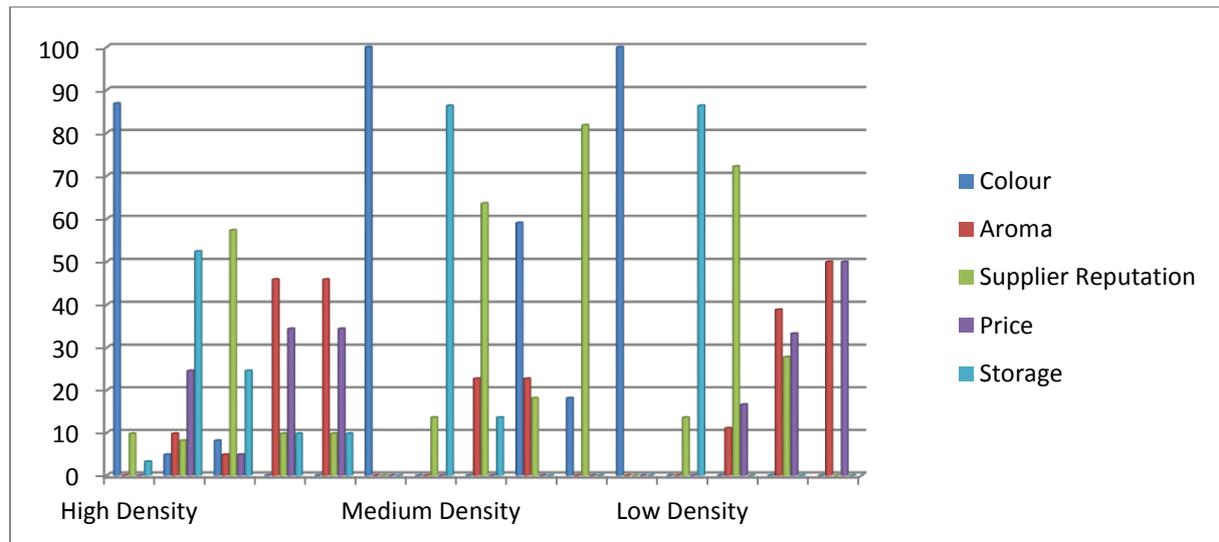


Figure 4.2: Criteria for accessing pork freshness

4.1.5 Criteria for assessing pork safety

The general picture from the graph shows that consumers use a variety of safety indicators when buying pork. The most dominant indicator with a count of 8 from the low density is the veterinary stamp, 10 people from medium density check for expiry date whilst 20 from the high density check for the roller mark.

Figure 4.3 below, indicates that high density consumers can consumer most of the products on the market though fresh and precooked products seem dominant, medium density prefers more of fresh and canned products whilst low density consumers would special pork cuts and smoked products.

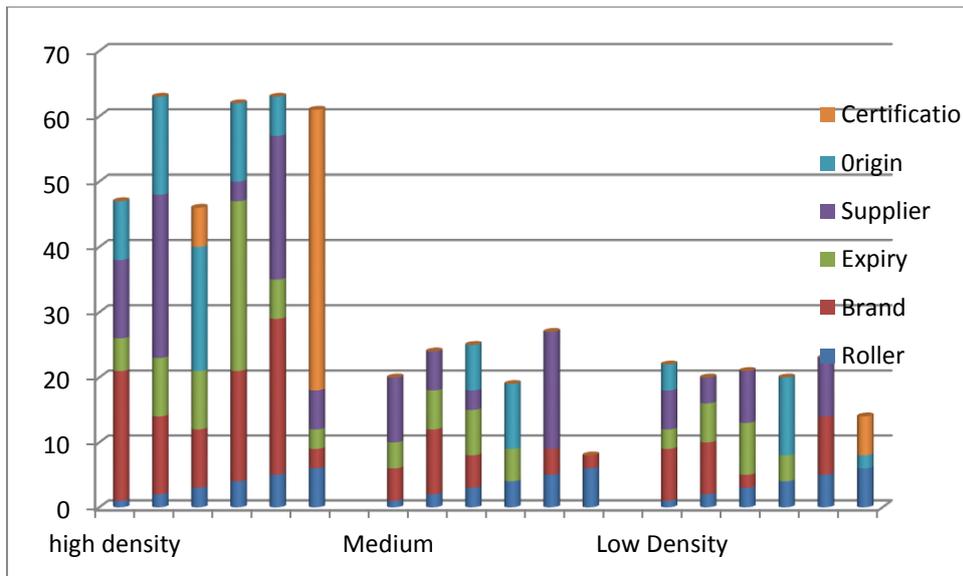


Figure 4.3: Criteria for assessing pork safety

4.1.6 Choice of pork supplier

In order to find out which pork value chain the consumers are mainly linked to, they were asked to identify where they get their pork supplies from. A majority of 25% of the respondents who reside in the high density area indicated the butcher as the main source and those in the medium and low density areas indicated the large supermarkets with a score of 11.5% each as shown on Figure 4.4 below.

The consumer from the three areas picked three reasons as the most important reason for choosing different suppliers. As shown on the figure 4.5 below, most high density consumers indicated accessibility (49.1%). Consumers in the low density area are highly quality conscious as depicted by the response of 71% of the population.

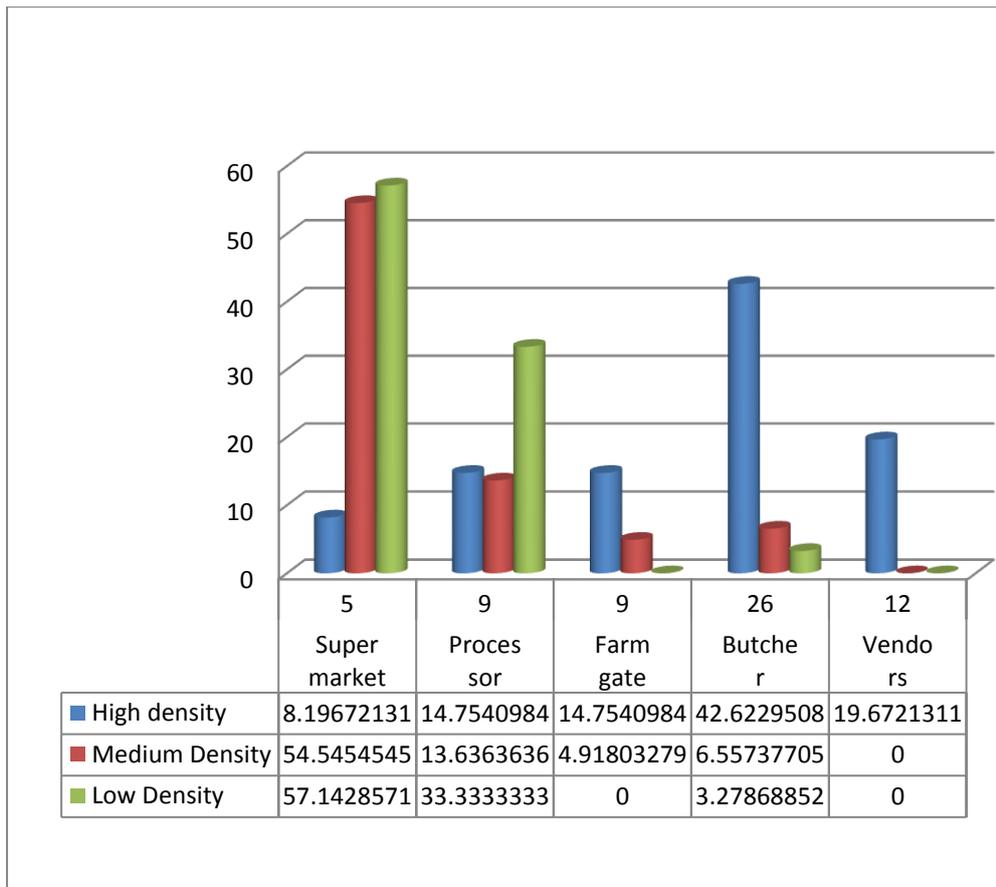


Figure 4.4: Choice of pork supplier

4.1.7 What factors influence choice of supplier?

The consumers from the three areas picked three reasons as the most important reason for choosing different suppliers. As shown on the figure 4.5 below, high density consumers indicated accessibility (28.5%), low density said due to quality and medium area indicated product range .

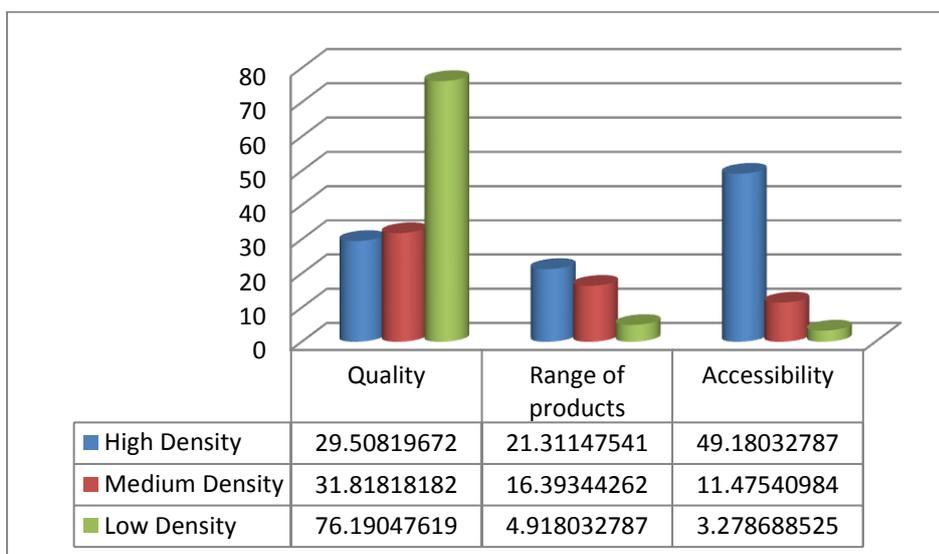


Figure 4.5: Factors influencing choice of supplier

2 Results From Case Studies

The results presented here are from data collected during interviews and observations with stakeholders of the three pork value chains in Harare.

4.2 Interview with pig producers: pre harvesting stage

4.2.1 Pig Producers Background Information

On the large scale pig farm, operations are coordinated by trained piggery manager who work in hand with the owner and are supported by a consultant veterinarian and subordinates including; piggery supervisor, forepersons e.g. farrowing unit foreperson and experienced pig stockmen. Contrary, on small scale farm, the farm owner who is also the manager is educated but not agricultural trained and has few untrained stockmen. On medium scale the manager is agriculturally trained but his stockmen are not. The small scale farmer had 25 pigs, medium scale had 212 and large scale had 2400 pigs.

Bio security

All the 3 farms visited have fences to control movement of animals and people onto the farm, however only the large scale farm had the fence buried in accordance with African Swine Fever regulations to prevent wild pigs and warthogs from gaining entry into the piggery as they transmit the African Swine Fever virus to domestic pigs. Wheel baths and footbaths were also observed on all farms but their use was doubtful as the wheel bath showed signs of a prolonged dryness. Small and medium scale farms had basic infrastructure for a piggery i.e. easy cleaning concrete walls and floors which meets the minimal requirements for a pig farm according to the national Animal Health regulations. However broken floors and broken pig sty doors were a common sight at these two farms.

The large scale farmers on the other hand have special housing for the different classes of pigs on the farm with marked boundary lines such that workers in one section do not cross into another section. New pigs arriving quarantined under observation to detect a disease or condition the pig could have been incubating. The situation was different at the small and medium scale farmer as no special quarantine pens are provided. New pigs are put in pens but within the main herd. On small and medium farms visitors use the foot baths only for disease control unlike the large farm where footbath, protective clothing is also provided.

Farm production practices

Feeding

Small and medium scale farms buy concentrates from stockfeed companies and they mix with home-grown or purchased maize to make a complete feed. On small farm, pigs are supplemented with swill allowed to scavenge in the yard in order to reduce concentrate feeds. Straight feeds or complete farm formulated feeds are used from soya bean, maize and minerals on large farms.

Health management and use of drugs

Herd health programs in place at large farms are executed by the farm manager and the consulting veterinarian. No functional herd health program at smaller farms and the stockman is responsible for all treatments and deworming in the smaller farms and sometimes dosages and withdrawal periods are not done properly due to less skills and poor

record keeping. The small scale farmer highlighted that dead carcasses are just dumped in refuse pits on the farm as they had no incineration facilities.

Breeds

The large scale farmer highlighted that, a closed herd is maintained and new animals would be only breeding stock imported from South Africa replace culls and to improve genetics. The common breeds of pigs at farms are the Landrace, Large White, Duroc, Dalland and their crosses. Duroc crosses was more common with the small and medium farmers and the Dalland and the other breeds common with large scale farmer. Large scale farmer imports breeding stock mainly from South Africa but the other two farms buy locally.



Picture 4.1 Crossbreed pigs from medium farmer of Chain 2

Animal handling

Selection and preloading Inspections are done by stockman and pig manager in small and medium farms respectively. The pigs are washed just before transportation to the processors. The small scale farmer of chain 3 hires out a truck for transporting pigs to slaughter and indicated usually have not much bargaining power on the time of the day to move pigs such that pigs are moved even during the hottest time of the day .Cases of pigs found dead on arrival at the processor were reported by the stockman.

On the medium scale farm, pigs are moved as a group on hoof from the finishing pens to the abattoir .Fighting along the way increase stress levels especially where pigs from different pig sties or age groups are moved together. Cases of bruises and even fractures were reported.

On the large farm, inspection and selection is done by the trained pig manager, pigs are prepared a month or two before slaughter through deworming. Strategic feed adjustments are also done depending on the anticipated grade and slaughter. Too fat pigs have been recorded at big farms due to the addition of feed towards slaughter. Washing of pigs and loading onto trucks are also done. The farmer usually transport pigs in own trucks to the processor and therefore can choose the most conducive time of the day to move pigs as shown in picture 4.2 below.



Picture 4.2:Pigs from a ready to be moved to the slaughter house from Medium Scale Farm(Chain 2)



Picture 4.3 Offloading of pigs at the processor from a large scale farm (Chain 1)

Table 4.3 QUALITY STANDARDS AND CONTROL FOR PIG PRODUCTION

Chain Level	Standards	Monitored by	Descriptive	Indicator attributes	Compliance (chains)		
					1	2	3
Input	GMP	SAZ					
Supplier			Stockfeed companies	Fleshing, Fattiness,	Yes	Yes	Yes
		Non	Home mixes		Partly	No	No
Pig Farms	GAP, AHA	Dept. Vet. Services					
			Bio security	Microbial hazards	Good	Good	Partly
			Feeding practices	Sensory microbial	Good	Partly	No
			Chemical/ drug use	Chemical	Partly	Partly	Poor
			Animal handling	Physical PSE,DFD, Abscesses.	Good	Good	Fair
			Stress Management towards slaughter	Physical-PSE,DFD, Abscesses, sensory	Fair	Fair	Poor
			Cases/ warnings/ Penalties		Low	Low	High

Key: practices, compliance to standards and quality effects

Good: Practices comply optimally with relating quality standards.

Fair: Practices barely satisfy the minimal requirements of relating standards.

Poor: Practices far below the minimum requirements of relating standards.

High: Many cases recorded.

Low: Few cases recorded.

Yes: Practice is done but the level of efficiency can not be verified.

Partly: Practice not done in full and efficiency level cannot be measured.

4.2.2 Interview with pig processors

Interviews were done at three processing plants serving one of the three chains i.e. Chain 1 processor getting pigs from large scale farms and selling pork to supermarkets, Chain 2 processor slaughtering pigs from own farm and selling at farm gate and Chain 3 processor getting pigs mainly from small scale farms and selling mainly to butchers and vendors. The three processors also played the wholesaling and retailing function as they have each a cold storage facility and pork shop outside the processing plant. The basic slaughtering process showing some critical areas which can impact on quality of pork are shown in pictures 4.4 to 4.9 below.

 <p>Picture 4.4: Electric stunner used at chain 1 and 3 abattoir</p>	 <p>Picture 4.5: Bleeding stage: Under stunning as shown by struggling picture of second carcass from left. Chain 3.</p>	 <p>Picture 4.6: Evisceration at medium scale processor chain 3</p>
 <p>Picture 4.7: Blood splashed carcass to be washed at medium scale processor :Chain 3</p>	 <p>Picture 4.8: Meat inspection at small scale processor of chain 2</p>	 <p>Picture 4.9 Inspected carcass rolled marked in a chilling room at medium scale processor of chain 3</p>

The findings revealed critical areas during processing that have a huge bearing on the quality and safety of pork and pork products namely: Pig handling; Slaughtering ,Inspection, Packaging and Storage and cold storage maintainance. Table 4.4 below summaries the quality standards of the areas for the three processing plants visited.

Table 4.4 QUALITY STANDARDS AND CONTROL FOR PROCESSING AND RETAILING

Descriptive		Quality And safety Indicator	Compliance		
			Chain 1	Chain 2	Chain 3
Pig handling	Stress related	PSE, DFD	Fair	Fair	Fair
Ante mortem inspections			Good	Fair	Fair
Stunning, bleeding and evisceration		Microbial sensory	Fair	Fair	Fair
Carcass inspection and grading	Diseases, Parasites, and conditions	Microbial sensory	Good	Fair	Good
Rate of Condemns			Low	Low	High
Common reasons					
	Stress related	Sensory	Fair	High	Fair
	Diseases and Parasites	Microbial sensory	Low	Low	High
Microbial inspection	Salmonella, E.coli	Safety quality	Good	Low	Fair
Labelling & storage	Salmonella, Coli	Safety quality	Good	Low	Fair
			Fresh Processed and tinned	Fresh pork	Fresh pork and a few processed products
Cold chain and product handling	Microbial	Safety, Sensory	Fair	Low	Low

Legend

- Good: Practices comply optimally with relating quality standards.
- Fair: Practices barely satisfy the minimal requirements of relating standards.
- Poor: Practices far below the minimum requirements of relating standards.
- High: Many cases recorded.
- Low: Few cases recorded.

4.2.3 Interview with pork retailers

The quality systems of retailers interviewed differed mainly in range of pork products, storage, packaging and product labelling. Chain 1 had a widest product range which included fresh pork, special pork cuts, processed meat e.g. sausages, ham and canned pork; chain 2 supplies fresh (ungraded) pork and chain 3 has fresh pork and sausages. The retailers in town are licensed by the municipality's city health department who also 3-4 times a year visit the retailer to check compliance to the quality and safety conditions. The vendors operate informally and do not comply with any quality and safety regulations even though supplying pork to high density pork areas.

In relation to packaging, labelling and storage of pork and pork products, it was noted that the butcher do not sell already packed products, pork is stored in a refrigerator and wrapped according to the amount the consumer demands. There are no special cuts. There is no information on quality and safety on the product and the consumer relies on sensory attributes to make a judgement. The same was the scenario for the pork sold from farm gate. Vendors also play a role in pork retailing; however, they are not housed so they sell pork from any place and in any container available to them. Absence of proper labels on some pork products which prejudice the consumers product information e.g. on safety of the product they are buying was also found. Pictures 4.9 to 4.12 below shows the scenarios observed at different retail shops.

 <p>Picture 4.13:Unpacked, not labelled pork in a heap in a butcher in chain 3</p>	 <p>Picture 4.14:Not well packed and not labelled products in a butcher in chain 3</p>
 <p>Picture 4,15:Well packed and labelled pork cuts in a supermarket in Chain 1</p>	 <p>Picture 4.12:Well labelled and packed pork products in supermarket in Chain 1</p>

4.2.4 Interview with Veterinary Public Health Officer (VPHO)

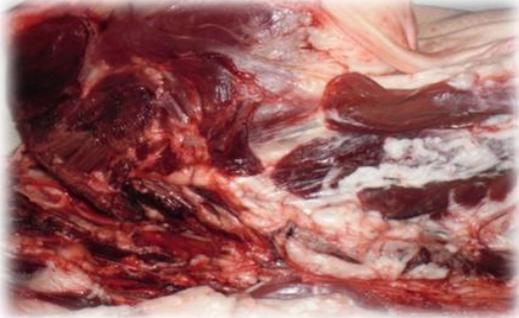
Through the interviews, it was found that the role of the Veterinary Public Health Department in the promotion of safe supply of meat to the public was through the implementation of the Animal Health Regulations Act. The animal health act is a government instrument which enforces minimal standards that pig producers and processors have to comply to ensure basic safety with the consumers. The act is in two parts i.e. the animal health act for pigs farmers which draws its guidelines from the GAP and the S.I 50 for processors which also draws from GMP. The VPHO are responsible for meat inspection in all licensed processing plants. VPHO are also responsible for carrying out microbial tests on water used in processing plants, plant surfaces, workers, feed for animals in the Lairage and finally the finished products before dispatch to customers.

At farm level, if a pig is suspected with a zoonosis, the pig is destroyed and movement of pigs from that farm is stopped for a stipulated period within which control measures would be implemented. This department works with the Veterinary Field branch at farm level such that diseases identified at meat inspection are dealt with at farm level by the field branch and other stakeholders.

At the processing plant, the meat inspector or VPHO can recommend the following: total condemnation of a carcass and is incinerated; partial condemnation leads to trimming of affected portion or carcass is downgraded to pet food.

From the interview, the common health hazards recorded in Harare processing plants include microbial, physical and chemical (see table 4.4) the following were however said to be common in the three chains i.e.

- Chain 1: Pre slaughter stress related conditions like PSE, DFD. The reason for common occurrence was said to be mainly due use of electric prod at loading and during and also transportation stress.
- Chain 2: Stress related conditions during the production phase and pre-slaughter. Conditions include PSE, DFD, fractures, bruises, abscesses, pneumonia and arthritis.
- Chain 3: Stress related conditions during production like emaciation during low rainfall seasons, pre-slaughter stress indicators, fractures, bruises, Cysticercosis, mange, E.coli and abscesses. Below are some pictures 4.13 to 4.16 taken during data collection shows common conditions which can affect pork quality and safety at a medium scale processor.



Picture 4.13: Carcass not well bled



Picture 4.14: Congested and pneumonic lungs



Picture 4.15: Over scalded carcasses



Picture 4.16: Porcine stress syndrome signs on carcass

4.2.5 Interview with the Combined Association of Pig Producers in Zimbabwe and Zimbabwe Abattoirs and Retailers Association

This association is fairly new and still undergoing structuring. The association's main objective is to facilitate sustainable pork production; processing and marketing. From the interview with interim organising secretary and the technical assistant, an indication that the association intends to revitalise the industry through working with all chain players and supporters was shown. The Harare chapter was busy creating a database for all stakeholders so that would be able to draw a plan of how to improve the competitiveness of the pork industry in Harare. The association is working hand in hand with the research arm of the pig sector i.e. the Zimbabwe Pig Industry Board.

Access of information

All the actors interviewed were asked how they rated information flow and cooperation from their chains and the industry. The actors expressed dissatisfaction and hoped for improvement in information access and linkages.

4.2.6 Chain map for pork value chain in Harare

The 4.1 below shows chain actors ,process and product flow, quality management system and information flows for the pig value chain in Harare.

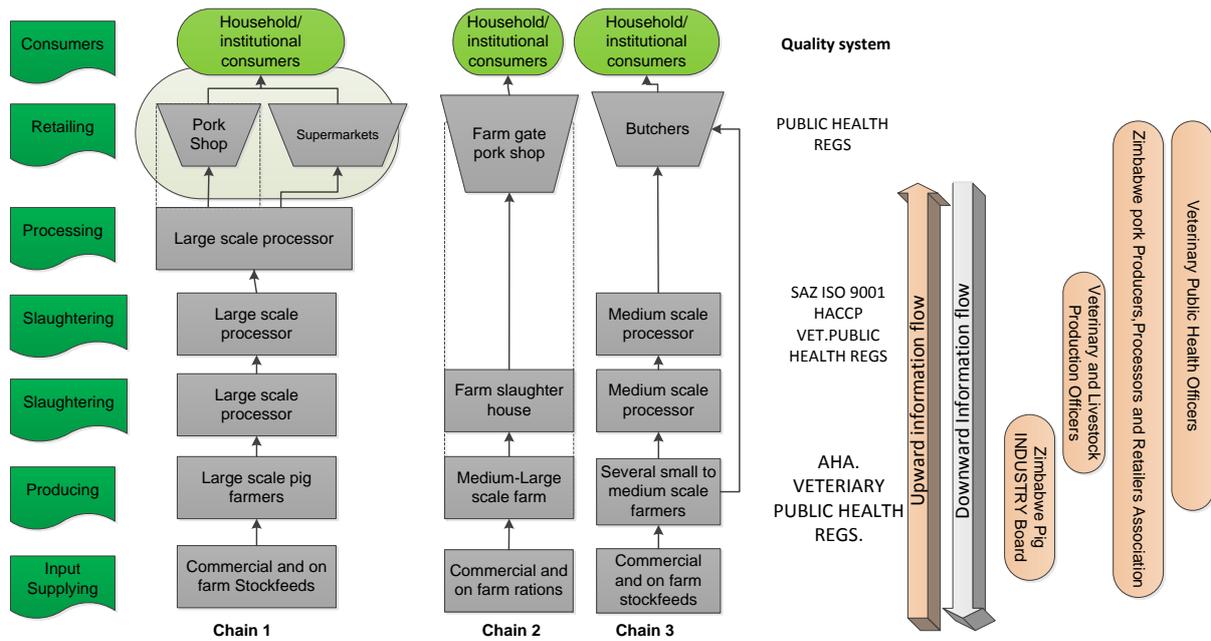


Figure 4.1 Chain Map pork value chains in Harare

CHAPTER 5: DISCUSSION

5.1 Discussion of Survey Findings

5.1.1 Background information of respondents

The results show that women comprised the greater proportion of the consumer survey. This could be due to gender roles in households as women are responsible for nutrition and health issues of the family.

There is no significant difference in the level of education across the 3 areas and this could be due to the fact that the survey was carried in an urban area where access to educational institutes is easier and that urban areas usually comprise of the working class and school going age group population. The phenomenon of educational level not having any relationship with the amount of income cannot be explained, it may be due to slow national economy. There is a positive relation between the level of income of pork consumers and residential area that is low density had the highest number of consumers in the high income bracket as compared to the high density where most of the consumers were in the low income bracket.

5.1.2 Consumer pork preferences

Consumers from the 3 areas preferred fresh pork more than processed. However consumers from the low density areas want the pork graded and packed as special cuts. The demand for fresh pork by the consumers is in line with the finding by Blaha (1997) who stated that consumers are demanding more of fresh meat than products which have undergone several processing procedures like adding meat additives such as preservatives, cooking and canning. The fresher and more natural the pork is the better, as the consumer ranks it as being free from pathogens and other contaminants.

5.1.3 Pork Quality Indicators

The majority of consumers from the 3 areas indicate that they prefer pale, soft and tender pork as shown by values which are above 60% for each indicator against the other options. From the results it was noted that consumers in the high density area prefers pork with more fat than the other areas. On fattiness, 60% of consumers in high density preferred moderate fat as compared to 63, 4% and 71.4% in medium and low density respectively that preferred lean pork. Previous researches indicate that consumption of pork with a high fat level predisposes to health risks. This difference in preference may be a case of societal influences on quality.

The consumers indicated a high degree of awareness to safety precautions when buying pork as various safety indicators are used i.e. freshness, veterinary stamp, expiry dates and brand are the main criteria used by pork consumer to ascertain the quality and safety.

The understanding of consumer requirements is therefore fundamental for the creation of a pork demanding population thus an improvement in the sustainability of the value chain coupled with satisfied consumers who are likely to become loyal to the particular value chain.

5.1.4 Choice of pork supplier

The study revealed that those consumers in the low density area buy from large supermarket and the reason given was pork quality. On the other hand, though the majority in high density areas indicated they buy from the butcher due to accessibility reasons, it was also observed that they buy from a variety of other retailers even from vendors. This can be

an indication of an absence of vibrant pork retailers in high density area with products meeting the consumers demands such that they just buy from any particular supplier when needs arise.

5.2 Discussion of case study

5.2.1 Pig producer background information

The 3 farmers visited operated on different scale of production with the small farmer having 25 pigs, medium scale, 212 and large scale having about 2400 pigs. In relation to educational background of the farmers, it was noted from the interview results that large scale farms had more agriculturally trained workers followed by the medium scale and lastly the small scale where the owner or pig manager had no agricultural training.

The level of agricultural training seem to have some effects on the execution and management of quality control systems as the efficiency of bio security, production and stress management was noted to be lower at the small scale farm than at medium and large scale farms(see section 4.2.1,and Table 4,1).This result is consistent with previous studies by Kilpatrick (1998) who found out that education and training enhances farmer's ability and willingness to adapt or make successful changes to their management practices.

Bio security

Bio security is very important in the prevention and control of diseases and parasites and the AHA regulations (1995) specifies basic practices that should be followed to ensure pig health by preventing or controlling entry of pathogenic microbes that can cause diseases in pigs and subsequently affect the quality of pork. The practices include segregation of pigs (fences and sties), disinfection and hygiene. The 3 farms comply with the basic regulation of having the structures to enable bio security but the issue is "are they being used efficiently"? From the results a lot of inefficiencies on the noted especially on the small farm where the fence is not wild pig proof, there is periodic disinfection, workers are not or partly provided with protective clothing, use of untreated water from the well and improper disposal of carcasses indicates non-compliance to AHA and GAP standards. Medium scale comply partly as ill practises like use of untreated water for pigs, still being practised, but large scale farms do comply. According to Verbeke (1999) and Blaha(2009) bio security greatly influence the quality of meat as mistakes in quality and safety at the farm can not be reversed at quality control checks at the processing plants.

Farm production practices

It was noted that to reduce costs and also to ensure supply of stock feeds, the 3 farms are engaged in either home mixing of purchased ingredients or are formulating and mixing own rations from home grown crops such as soyabeans and maize. Feed analysis of such diets is not done and this can be an entry point for either biological or chemical contamination. The GAP guidelines stipulate that farmers buy feed which is certified free of harmful microbes and chemicals. The practice also done at small farms of allowing pigs to scavenge is very dangerous as it predisposes to Cysticercosis, other diseases and conditions.

The large scale farmer acknowledged that it was possible to through altering diets of pigs towards slaughter to influence the grade of pork at slaughter. Although cases of too fatty porkers have been recorded, this presents an opportunity for farmers to deliver pork conscious demanded by the consumer through diet changes and other additives. The different grades have a bearing on the amount of money the farmer gets. However it is possible for the farmer with information from the consumer to deliver pigs which met consumer requirement but this is currently not the case.

It was noted that the three farmers all had breeds which are known to produce good quality pork. The small and medium farms had more of their pigs being Duroc crosses. According to research findings, the Duroc is the best breed as far as fat distribution is concerned. About half the consumers in the high density area indicated a preference for moderate fat distribution.

Health management of pigs, instructions and handling of drugs was seen to be directly related to number of pigs and level of education of the responsible people.

The assistance of the vet, through the drawing up of a herd health plan indicates compliance to standards stipulating the use of drug only with instruction from authorised persons. Therefore cases of drug contamination are minimum unlike on small and medium farms where an untrained stockman is responsible.

Animal handling (Transportation to processor)

Animal handling prior to slaughter is very important as it predispose to stress. Stressed pigs produce low quality pork. Sources of stress can be at loading and offloading, the use of electric prods and sticks to move pigs, long duration of transportation, poor e.g. prickly condition of truck and truck stocking density. It was noted that large scale farmer has more options for reducing stress in pigs during transportation by selecting the cooler time of the day as well as to stick to correct pig density on the truck as compared to small scale and medium scale farmer. Stress predispose to PSE and DFD. Electric prods used by large farmers and processors predispose to the stress inflicted conditions of PSE and DFD.

5.2.2 PROCESSING (Harvesting)

Each of the 3 studied chains is supplied by a particular processing plant which is measured by its daily slaughter capacity. The numbers of pigs slaughtered in each of the processing plant are 14pigs, 70pigs and over 300pigs for small, medium and large processors respectively. The 3 abattoirs are registered and their licences are renewed each year. The processors indicated that they are guided by the basic mandatory regulations Veterinary Public Health Regulations of 1995. The basic slaughtering procedure is the same and the operations are managed by trained personnel. Type and the range of products differ with size of the processor thus ranging from just pork meat in small processor to smoke or canned products by the large processor (see figure 4.4, Annex 4). However the quality and safety of the pork mainly vary due to the condition of pigs as a result of differences in production. This agrees with Verberke (1999) and Blaha (2009) who expressed that it is not possible for quality control practices downstream the chain to correct mistakes upstream at production, and would maintain quality by removing and throwing away the affected product. Production quality standards are therefore noted to be of paramount importance in both ensuring both quality and safety of pork.

The quality control system starts from receiving and offloading of pigs. Minimal stress should be inflicted. Pork which does not meet the minimum standards is either downgraded to pet food, or is totally condemned for incineration. If a carcass is suspected with a zoonosis after passing the inspection stage, the veterinary health public officer stops the process, and institute cleaning and disinfection of the entire plant. This scenario was said to be more common in the medium processors. Cases of condemnation due to parasitic conditions like pork measles, physical damage like injuries, fracture were more common in the medium processor, and health related conditions were higher for the medium processor. Pork from such sources can not be of premium grade and therefore will find its way to small butchers and vendors to be sold to consumers who are less quality and safety conscious. The kind of pork uncompetitive and such a processor and supplier will be known for non quality products as expounded by Fisher when he said “decade quality and safety has become of utmost importance to consumers who now judge the quality and safety not only from the basis of pork presented in retail shops but overall quality performance of the value chains producing it”(Fischer and Fischer 2005). Quality is more and more managed along the whole food chain from the supplier of raw materials to the consumption.

5.3 Interview with retailers

The retailers are regulated by municipal laws and the city health department is responsible for registration and monitoring of the shops. Only large supermarkets and processor pork shops were seen to comply partly to quality and safety control regulations of selling pork refrigerated display with the date of manufacture and expiry date well written and shown. However it was noted that some supermarkets were still selling expired pork products though the regulations and human safety concerns orders such to be removed.

5.4 Interview chain supporters

The main role of the professional government department of veterinarians and meat inspector is to implement the AHA and S.I 50 so as to ensure safe production of meat and meat products to the people. It is by statute that every abattoir should be registered and that every slaughter should be inspected. They have the authority to condemn infected or damaged carcasses or to force closure of non-complying abattoirs. Despite the regulations and standards, quality and safety of pork products reaching the retails is not guaranteed due to a lot of slaughters not regularised as well as vending.

5.5 Interview with the combined association

The association tend to intend to revitalise the pork industry in Zimbabwe through facilitation of stakeholders to adopt ways that would make the pork value chain competitive. The association has already made significant effort to find out why the demand of pork has gone down and what are the real problems underlying the inefficiency in quality management systems, problems with breeding and stock feed supply. The association will therefore benefit from this study.

5.6 Chain map

Below is the chain map for Harare indicating quality systems at different levels as well as product flow.

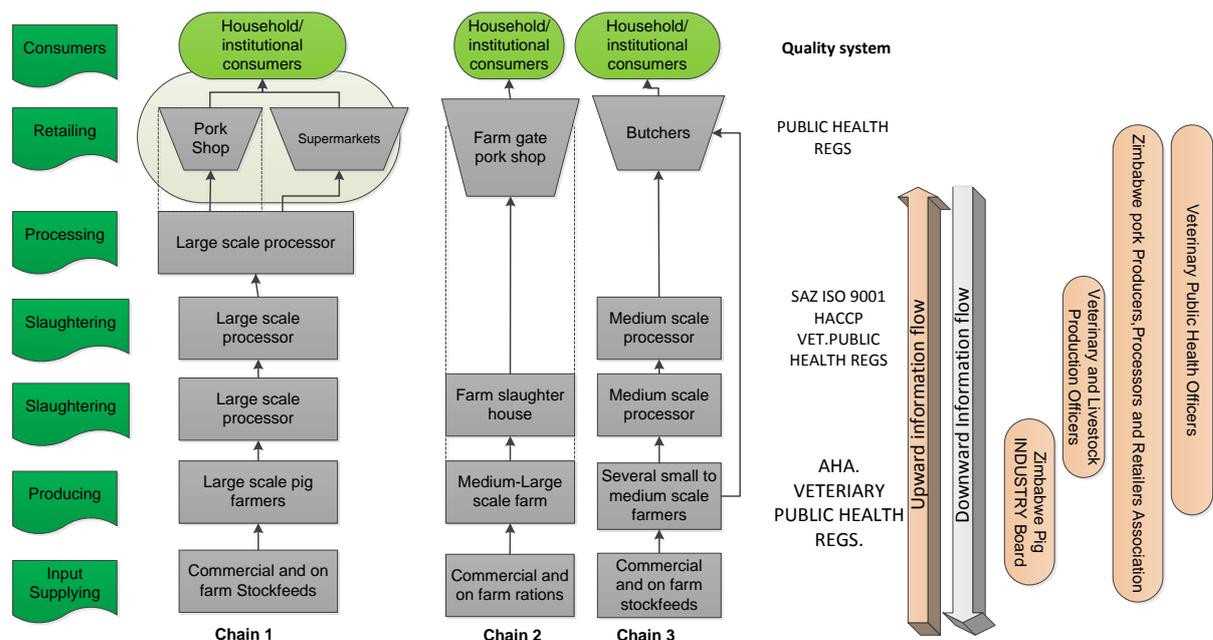


Figure 4.1: Pork value chain map for Harare

CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

The conclusion and recommendations of this study are drawn from survey, case study, observations and from literature like organisational reports. The first part deals with conclusions from pork consumer survey, then from case studies and observation and lastly recommendations are made.

6.1 Conclusions

The objective of this study was to gather information on consumer pork quality and safety needs and quality control systems used by actors of 3 selected pork value chains in order to develop consumer oriented chain improvement strategies. The following conclusions were made:

Educational background had no bearing on pork consumer incomes but had influence on how quality management practices are done at pig farms.

The key results from the consumer survey in the three areas showed that: sensory indicators of quality of pork i.e. colour, fattiness, juiciness, texture are used by pork consumers in Harare to make the decision of which of pork to buy. More than 65% consumers from the three areas indicated that they would buy pale, soft and moist pork. The only variation was on fattiness, where a majority from high density area showed they prefer pork with more fat than consumers in the other areas. This agrees with Wang et al (2008 statement that meat appearance is the most direct and the first criterion for a consumer to judge the qualities of meat.

The consumers indicated a high degree of awareness to safety precautions when buying pork as a variety of safety indicators are used i.e. freshness, veterinary stamp, expiry dates and brand are the main criteria used by pork consumer to ascertain the quality and safety. The high degree of quality and safety consideration can be ascribed to the level of education. More than 65% of the consumer populations from the 3 residential areas considered safety cues like veterinary stamp and expiry date of pork and pork products as the two most important considerations. Some retailers, even big supermarkets do not comply fully on the provision of information of product with consumer and some even sell expired pork to quality and safety unconscious consumers who do not read labels.

Low density consumers choose supermarkets as their pork supplier, for quality reasons in contrast to high density consumers who buy from butcheries because they are more accessible. From case studies, it was clear that consumer requirements are not solicited for to influence production in the current producer driven pork value chains. Full compliance to mandatory quality standards would assist in meeting the minimal consumer demands but the actors do not fully comply.

The pork value chains in Harare are diversified. They comprise mainly of farmers, small number of processors and wide range of retailers that are capable of satisfying the different needs of consumers in the city in relation to quality and safety of pork if they comply with the quality management standards. The quality standards in use relate to the different functions of the pork value chain. There are mandatory standards like; AHA and the S.I 50 for pig production, processing and retailing respectively are common to all the three chains. The standards and practices like the GAP, GMP and those already stated are only categorically stated but most actors do not fully comply and this has led to the distortion and inefficiencies of quality management systems in the diverse pork value chains. Large scale producers and processors in chain one comply with additional voluntary standards like the local chain wide standard, CQS and the international HACCP standards.

The three farms studied to some extent act as input suppliers of stock feed to their farms. Stock feed companies use the GMP guidelines and are monitored by SAZ and so the level

of compliance could not be verified. The farms that are doing farm mixes use the general guidelines but conform to no mandatory standard.

Government or Municipal officers monitor to ensure minimum compliance to mandatory quality and safety standards in the three chains. If conditions are not met the actor the operation is stopped, actor warned or licence revoked. For international quality standards, the SAZ does the monitoring. At farm level, AHA regulations are used cases of actors being warned were only recorded in chain three. Cases of carcass condemnations or downgrading common in the chains for conditions like PSE,DFD, abscesses, bruises, pneumonia but farm related problems like pork measles was reported for chain three.

The three chains studied varied in number of actors and size of business of pig farmers; product and process flows; level of coordination. Chain one is very linked up to processor and they produce both fresh pork and a number of processed products; Chain two, one actor takes up all the value chain functions that makes it strongly linked, closed and mainly produce fresh pork; Chain three actors have no linkages, business transaction are spot market and there is no two way communication and coordination. Product and process flows as shown in the chain map are more efficient for chain one and two.

From the results, it has been found out that basic structures to enhance efficient quality and safety are available but some actors are not willing to comply. Since it's a chain from pig production to the time when the consumer get satisfaction from the pork, it therefore means if one actor does not comply the ultimate pork product quality is reduced and its competitiveness is reduced hence demand of such product crumbs and so does the chain.

In summary, the study showed that consumers living in the low density area prefer quality and specialised products(see figure 4.1 and 4.2).They prefer pork cuts and gammon products linked to chain one where there is multilevel processing and that slaughter pigs from large farms with good agricultural and quality practices which can result in quality pigs slaughtered. The processor in this chain other than compiling to mandatory quality systems, also comply with international standards is also a well as the processor being a signal owner too. The product range varies from fresh pork, fresh processed, cooked, and canned products, though this chain is very convenient for the high income healthy conscious segment, it can cater for all other consumers due to the wide range of and quality systems.

Medium density shopper can either be linked to the three chains as from the survey an indication of a wide variety and quality conditions. The chain actors in chain three do not usually comply with safety standard such that the pork from this chain may not be a good for highly conscious market.

The low income less quality and safety conscious group can be linked to chain 3 whose major retail outlets are butchers located close to their residences. The quality standards and systems and compliance are less monitored especially at pig producing farms.

6.2 Recommendations

A number of challenges have been identified which are general to the three pork value chains and some which are for particular chains. Addressing these challenges and exploiting opportunities for improved quality and safety practices along the different chains can contribute to the development of a more consumer oriented pork value chains. Recommendations are made initially broad for the three chains then later specifically for individual chains. The recommendations are:

- Facilitation of workshops and training programs on quality and safety for the actors of the three chains to create awareness by the combined Pig Producers Association and Abattoirs and Retailers Association. The inclusion of associations that act as a voice for the consumers like the Consumer Council of Zimbabwe would help to have consumer quality requirements taken on board. It can also create trust and mutual understanding among members.
- Through the Combined Association of Pig Producers of Zimbabwe and the Abattoir and Retailers Association of Zimbabwe, in conjunction with the research arm of the pig industry i.e. the Zimbabwe Pig Industry Board, more research into incorporating consumer pork values into breeding, production and marketing program will help in the development a consumer quality oriented pork value chains.
- The association to promote compliance to quality standards by its members through training programs and the look and learn visits to actors doing well.
- To guarantee safety and value of home mixed feeds, pig farmers in the three chains can regularly sent feed samples for nutritive analysis and identification of any contamination.

Chain 1

- Promotion of a vertical links of the processor in chain one and retailers in order to improve market coordination of pork through sharing of resources for example blast freezers. The cooperation can also enable the use of computer aided ordering system that may allow overstayed products at the shop to be sent back to the factory for petfood. This will ensure that always fresh pork is sold by the retailers.
- Both pig producers and processor of chain one to embark on more modern methods driving and stunning pigs in order to reduce use of known predispose carcass to conditions like PSE and DFD which greatly reduce pork quality, safety and shelf life.
- Producers to adopt more modern farming methods and reduce and chemical use and hence more natural way of raising pigs to meet the fresh pork requirement of the consumer.

Chain 2

- Horizontal linkage with other actors and vertically with input supplies and retailers in order to share and learn from others quality and safety issues. Currently this chain is closed and it makes it difficult to ascertain compliancy and everything is done internally.

Chain 3

- Through the engagement of veterinary officers and livestock specialists, pig producer in this chain need to improve on the production practices than enhance safety and pork quality to meet consumer specifications.
- There is need to improve coordination and linkages in this chain which at present is more of a supply chain as they are current operating spot market kind of transactions. The processor can play this coordination role so as to create relations.
- The processor and retailer need to ensure that consumers have enough product information to make their choice, products need be well packaged and safety information like expiry date indicated.

Finally as Fischer and Fischer (2005) states that consumers who now judge the quality and safety not only from the basis of pork presented in retail shops but overall quality performance of the value chains producing it. It is imperative for the actors in the three pork value chains of Harare start to cooperate and comply with quality standards to increase

efficiency, win back pork consumers by assuring them of good quality and safe pork as per the results of the consumer survey.

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Appendix 1: Questionnaire for pork consumer preference survey

QUESTIONS FOR PORK CONSUMERS

1. What is your gender? Female Male
2. What is your age?
19-28 years 49-58 years
29-38 years 59 years +
39-48 years
3. What is your education background?
a. Never been to school c. Secondary
b. Primary d. College/university
4. Which category indicates your income (USD) per month?
a. 50-200 c. 351-500 e. 750-1050
b. 201-350 d. 501-750 f. 1050+
5. In which suburb of Harare, do you live?
a. High density
b. Medium density
c. Low density
d. Informal settlement
6. Which type of pork do you prefer? Rank 1 to 6, with 1 being the most preferred and 6 the least.
a. Fresh pork
b. Special fresh pork cuts e.g. pork chops
c. Fresh processed products e.g. mince and sausage
d. Precooked/convenience e.g. ham, roasted pork
e. Smoked products like bacon, gammon or sausages
f. Canned/preserved
g. Others _____
7. How many kilograms of pork do you buy per month? -----kg
8. How many people do you buy pork for in your household? -----Member(s)

9. From each column in the table below, indicate the description of pork you would buy, by putting a tick .(one selection is allowed per characteristic/column)

Colour	Fattiness	Juiciness	Tenderness	Method of Preservation
Very pale 	High fat 	Dry	Very soft	Chilled
Pale 	Moderate fat 	Moist	Soft	Frozen
Red 	Lean 	Wet	Firm	Canned
Dark 	Very lean 	Very wet	Very Firm	Smoked
Others _____	Others _____	Others _____	Others _____	Others _____

10. How do you assess the freshness of pork before buying? (Rank the indicators from 1 to 5 with 1 as the most important and 5 being the least.)

- a. Colour c. Price
 b. Aroma d. Storage-refrigeration exists
 c. Reputation of supplier

11. What pork safety indications do you look for when buying pork?

(Rank the indicators from 1 to 6, 1 being the most important and 6 as the least).

- a. Roller mark /Veterinary stamp d. Supplier whether formal
 informal
 b. Brand e. Origin of the pork
 c. Expiry date f. Certification
 g. Others _____

12. Where do you buy your pork and pork products?

- a. Large supermarkets d. Farm gate e. Small shop
 b. Pork processing firm e. Butcher f. Vendor

13. What is the reason for choosing to buy pork from the supplier you mentioned in question 12 above?

- a. After sale services c. Wide range of pork products
 b. Quality of pork d. Accessibility
 c. Other _____

14. Give the reason for your answer of number 14 above.

15. What do you think should be done to improve the quality of pork for consumers?(Specify)

THANK YOU VERY MUCH

Appendix 2: Checklist for pork value chain actors and supporters

a) Checklist for pork producers

1. Breeds.
2. Scale of production and number of pigs sold per year.
3. Feeding strategy and diets for pigs.
4. Pig health and disease control (Use of antibiotics, antiparasitics and chemicals)
5. Feed additives to improve pork quality.
6. Who are the customers for the pigs
7. How are the pigs transported to the customers?
8. Basic Veterinary Public Health conditions
9. Information flow along the pork value chain.

b) Check list for pork processors/slaughter house

1. Source of pigs and consistence of supply
2. Number of pigs slaughtered per week
3. End products of processing and distribution channels
4. Pre-slaughter inspections and handling of pigs
5. The length of time from receiving of pigs to slaughter
6. Slaughtering process-e.g. how is stunning done
7. Handling of carcass immediately after slaughter
8. Processing activities.
9. Microbial tests, levels of contamination and trends
10. Information made available to customers and consumers eg shelf life, organic or conventional
11. Other aspects e.g. personnel hygiene, equipment and machinery hygiene, waste/effluent management.
12. Compliance to basic Veterinary Public Health Regulations/obligatory as well as other voluntary quality and safety standards.
13. Information flow along the pork value chain.

c) Checklist for retailers.

1. The pork products sold and the source of the stock.
2. Pork handling, storage and presentation in the shop.
3. What are Existence organizational quality and safety standards?
4. Mandatory quality control systems across chains
5. Minimum and optimal quality standards to meet consumer requirements.
6. The consumer segment served by the retailer.
7. Information flow from the consumers to upstream actors and vice versa.

e) Checklist for Association

1. Role of association relating to pork quality and food safety.
2. Consideration of consumer requirements (quality and safety), what are the gaps?
3. Programs to ensure sustainable pork production, processing and marketing?
4. What are the minimum and optimal quality and safety requirements to meet consumer requirements?
5. What action is taken by the association to members who do not meet obligatory and chain wide standards.
6. What linkages and cooperation exist with supporters, influencers and independent organisations?

Appendix 3: Summary of Interviews

1. Producers

	Small scale	Medium	Large scale
Number of pigs	25	212	2400
Breeds	Crossbreeds	Crossbreeds	Crossbreeds
Pig housing Concrete floors, walls and warthog proof fences.	Yes but no warthog proof fences.	Yes	Yes
Wheel and footbaths	Yes	Yes	Yes
Cleaning of sties with clean water	Yes	Yes	Yes
disinfection of sties	Rare	After a batch goes out	Weekly
Source of water and treatment	Untreated well water	Untreated well water	Chlorinated water.
Concentrate feeding done	Yes and also scavenging	Yes	Yes
Use of feed additives for growth	No	No	Yes
Storage of feeds	Feed bins	Feed stores	Feed stores
Important vaccination and parasite control done	Partly	Partly	Yes
Incineration of diseased	No	No	Yes
Regular Veterinary Inspection	No	No	Yes
Dosage, withdrawal periods observed and disposal of containers of veterinary medicines and antiparasitics.	Partly	Partly	Yes
Protective clothing, hygiene, health checks done for workers	No	Partly	Yes
Unauthorised people banned from pig houses	Partly	Yes	Yes
Pigs inspected and washed before transportation to slaughter houses.	Washed only	Inspected by unqualified personnel	Yes
Pig customers	Medium and small abattoirs, butchers and individuals	Medium and small abattoirs, butchers and individuals	Large processor

