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**RABBIT PRODUCTION AND CONSUMPTION IN
SOUTH AFRICA**

by

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Submitted in partial fulfilment of the requirements for the degree of

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MOLAO JOHN BASHI

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SOUTH AFRICA

by

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ABSTRACT

The needs, perceptions and attitudes of potential consumers and producers with regard to consumption and production of rabbit products in Moqhaka, Ngwathe and Matjhabeng local municipalities are analysed in this study. The consumers in aforementioned local municipalities consume common livestock meats such as chicken, mutton, beef and pork. The consumers prefer lean meat. Pork is the most disliked meat by the majority of the surveyed consumers due to stomach problem that it causes when consumed. Pension and casual forms of employment are common sources of income among the African households surveyed.

The African and Coloured communities showed more interest in the consumption of rabbit products than the White community. The main attribute that will encourage the African and Coloured communities to consume rabbit products is its lean meat that is suitable for heart disease patients and people who are over weight. The members of the White population will use rabbit products mainly in the form of rabbit fur apparels and manure. The White community showed to have more knowledge about the potential attributes of

rabbit products such as meat rich in protein, low on fat, manure suitable for vegetable growing as well as the ability of rabbit fur to make clothes. Rabbit meat was subjected to sensory taste analysis in a bid to determine consumer preference and taste with regard to meat consumption. Rabbit meat was compared to chicken, mutton and beef. Mutton was the most preferred meat by the panelists. However, the differences in the rank sums were all not statistically significant to justify preference of one meat over the other. This could be attributed to the tasting panel which was selected from a broad socio-economic background and was familiar with at least seventy five percent of the tested meat types. Some members of the tasting panel were familiar with all the meat types.

The small-scale farmers in Moqhaka, Ngwathe and Matjhabeng local municipalities are currently involved in both farming and non-farming activities which they depend upon for survival. The farming activities include livestock and vegetable production while the non-farming activities include sewing, selling of fat cakes and so forth. The majority of producers and consumers have superficial knowledge about the potential of rabbit production and its products. The surveyed producers are faced with a number of problems such as lack of financial resources, lack of storage facilities and reliable form of transport in order to run their activities efficiently. This condition necessitates the formulation of a well co-ordinated support programme. The formulated programme would determine what form of production credit would be best suited for the rabbit producers in the different production areas. The enterprise budgets formulated indicate that the rabbit enterprise is not only a cost-effective enterprise but also profitable. This is shown by the low cost production ratio and high returns to investment when compared to other enterprises. An investigation of the international market shows Europe as the most attractive and largest market for rabbit products.

PRODUKSIE EN VERBRUIK VAN KONYNE IN
SUID-AFRIKA
deur
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UITTREKSEL

Die behoeftes, persepsies en houdings van die potensiële verbruikers en produsente met betrekking tot die verbruik en produksie van konynprodukte in die Moqhaka, Ngwathe en Matjhabeng plaaslike munisipaliteite is ge-analiseer in hierdie studie. Die verbruikers in die genoemde plaaslike munisipaliteite verbruik gewone vleissoorte soos hoender, skaap, bees en vark. Die verbruikers het voorkeur vir maer vleis. Die meeste respondente in die steekproef het die minste van varkvleis gehou weens die hoë vet-inhoud daarvan en as gevolg van geloofsoortuigings. Pensioen en deeltydse vorme van indiensneming is algemene bronne van inkomste onder swart huishoudings in die steekproef.

Die swart en kleurling gemeenskappe het meer belangstelling as die blankes getoon in die verbruik van konynprodukte. Die hoofkenmerk wat swart en kleurling gemeenskappe sal oortuig om konynprodukte te verbruik is die feit dat dit maer vleis het wat goed is vir hart pasiënte en mense wat oorgewig is. Lede van die blanke bevolking sal konynprodukte hoofsaaklik gebruik in die vorm van die pels vir klerasie en die mis vir bemestig. Die blanke gemeenskap het meer

kennis getoon oor die potensiële eienskappe van konynprodukte soos dat dit vleis lewer hoog in proteïene, laag in vetinhoud, mis wat gebruik kan word vir groente produksie en konynpels vir die maak van klere. Konynvleis is onderwerp aan 'n sensoriese smaakanalise in 'n poging om verbruikers se smake en voorkeure met betrekking tot die verbruik van vleis te bepaal. Konynvleis is vergelyk met hoender, skaap en beesvleis. Skaap is deur die meeste lede van die paneel as voorkeurvleis geïdentifiseer. Die verskil tussen die rangordes is egter nie statisties betekenisvol nie en geen regverdiging kan gevind word om te sê dat een vleissoort bo die ander gekies word nie. Dit kan toegeskryf word aan die proe-paneel wat gekies is uit 'n breë sosio-ekonomiese agtergrond en wat minstens met 75% van die vleissoorte bekend was. Sommig van die lede van die paneel was bekend met al die vleissoorte.

Die kleinboere in Mophaka, Ngwathe en Matjhabeng plaaslike munisipaliteite is huidiglik betrokke in boeredery en nie-boeredery aktiwiteite waarvan hulle afhanklik is vir hulle oorlewing. Die boeredery aktiwiteite sluit in lewendehawe en groente produksie terwyl die nie-boeredery aktiwiteite naaldwerk, die verkoop van vetkoeke ens. behels. Die meerderheid produsente en verbruikers het min kennis oor die potensiaal van konyn-produksie. Die produsente in die steekproef staan 'n hele aantal probleme soos 'n tekort aan finansieringsbronne, tekort aan stoorfasiliteite en betroubare vervoer in die gesig. Hierdie probleme beperk hulle vermoë om hulle aktiwiteite effektief te bestuur. Hierdie toestand vereis die formulering van 'n goed gekoördineerde ondersteuningsprogram. Die geformuleerde program sal bepaal watter vorm van produksiekrediet die beste sal wees vir produsente van konyne in verskillende produksie areas. Die opgestelde bedryfstakbegrotings toon dat die konynbedryf nie net koste-effektief is nie maar dat dit ook winsgewend is. Dit word getoon deur die lae koste produksie

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CHAPTER 1

BACKGROUND

1.1 Introduction

Food insecurity is one of the major problems that continue to afflict the world and remains a problem despite the world's economic growth. Food insecurity can be measured at several different levels or units of analysis. The exact dimensions that need to be measured vary depending on the unit of analysis chosen (national, community, household or individual levels) (Leidenfrost, 1993a).

At the individual and household levels, four dimensions (quantity, quality, psychological and social acceptability) need to be measured to identify food insecurity. At the individual level these measures are adequacy of energy intake, adequacy of nutrient intake, feelings of deprivation or restricted choice and normal meal patterns. At the household level the measures include replenishment of household stores, quality and safety of available foods, anxiety about food supplies and sources of food (Leidenfrost, 1993a).

The involuntary nature of any limitation or restriction in these dimensions becomes an integral part in the measurement of food insecurity. This is addressed with follow-up questions to determine whether there is enough money to buy food or food runs out before money is obtained to buy more (Leidenfrost, 1993a).

Undoubtedly, poverty and its associated consequences such as food insecurity and hunger should strike the minds of those in authority on how much food has to be produced in order to meet the needs of the people, who should produce the food and how it should be produced. These are the priorities that

need to be addressed so as to eliminate the world food shortage problems. Even though it is difficult to measure the extent of poverty, the World Bank (1980) defines absolute poverty for an individual as not only low income but also severe malnutrition, poor health and lack of education. Hunger is defined as a condition resulting from chronic under-consumption of food and or nutritious food products (Leidenfrost, 1993b). Hunger may be precipitated by an inability to obtain sufficient quantities of food to eat or a failure to consume adequate quantities of nutritious food products regardless of the ability to obtain sufficient food supplies (Leidenfrost, 1993b).

The whole concept of food security was conceived in Rome at the 1974 World Food Security Conference and its attainment referred to the assurance of adequate food supplies (Malambo, 1992). However, in the recent past, the idea of food security has gained itself many interpretations. For instance, Von Braun, Teklu and Webb (1991) define food security as the permanent access to food in sufficient quantity and quality for an active and healthy life. According to the World Bank, World Food Programme (1991) and AgriReview (1997) food security is the access by all people at all times to enough food for an active and healthy life. This entails adequate food supplies through domestic production or imports and ensures that people are able to acquire food by producing or buying it. Based on the various forms of the definition of food security, it could therefore be deduced that the major components of food security are both demand and supply of food.

A large proportion of the world's population is faced with food insecurity due to poverty. An estimated 1.3 billion people live in poverty (Ashley, Holden and Bazeley, 1999). World hunger is a terrible symptom of poverty, poverty itself serves as the main obstacle towards the achievement of food security (Rogers, 1997). Over a billion people in the world lack basic food needs per day and 35 000 children under the age of five die of starvation or preventable

diseases annually (UN World Development Report, 1998). In rich countries, less than 1 child in 100 does not reach his or her fifth birthday while in the poorest countries as many as 20 in every 100 children do not reach their fifth birthday (World Development Report, 2001). In rich countries, less than 5% of all children under the age of five years are malnourished, in poor countries approximately 50% of the children are malnourished (World Development Report, 2001). About 88 nations fall into the category of income and food deficit countries, of which 42% are in Sub-Saharan Africa (AgriReview, 1997).

Despite the developmental programmes and strategies by a number of authorities in order to solve food insecurity and hunger, there are a number of factors which aggravate the problem (Rogers, 1997). These include unfavourable weather conditions, conflict, unemployment, low returns to farmers, unsustainable resource-use, debt service, overvalued exchange rates and distorted international markets (Rogers, 1997). The problem of food insecurity is further aggravated by the world population which is growing at an alarming rate (Novartis Foundation for Sustainable Development (NFSD), 1999). The world's population increased by 88 million people in 1996 (NFSD, 1999). The total number of people now living on earth is estimated to be 5.8 billion (NFSD, 1999).

According to FAO (1997) and United States Agency for International Development (USAID) (1995) the major factors that could be attributed to food insecurity in a number of areas on the African continent are amongst others, erratic weather conditions, civil conflict, unravelling of diplomatic and economic ties with neighbouring countries, poor infrastructure, farm-to-market roads which may vary between being poor to non-existent hampering distribution and access to food. This could be attributed to inappropriate policies that result in disincentives to local production and efficient marketing. Often local farmers have no incentives to invest in sound agricultural or

environmental practices because of price controls, insecure land tenure and or overly centralised government structures that impede local initiative. Private food distribution as such, happens to be discouraged by excessive regulations and unfair competition from subsidised and inefficient government-run parastatals (FAO, 1997 and USAID, 1995). The rapid population increase in the developing countries is also one of the major factors contributing to food insecurity. For instance, 98% of the 88 million population increase in the world during 1996 was in developing countries (NFSD, 1999).

On the African continent, the condition is pathetic, more than 40% of 160 million people in the "Horn" of Africa suffer from chronic food insecurity (Food and Agriculture Organisation (FAO), 2001a). Furthermore, it is estimated that 800 million people are chronically undernourished in developing countries whilst over 200 million children suffer from Protein Energy Malnutrition (PEM) (Mokwunye, 1996 and AgriReview, 1997). About 20% of the people in the developing countries wake up and are likely go to bed hungry day after day (Rogers, 1997). Millions of people experience prolonged hunger, suffer birth defects, growth retardation, mental deficiency, lethargy, blindness or even death because they do not have the diversity of food required to meet their nutritional needs (Rogers, 1997).

Hunger and poverty appear to discriminate against women and children despite the fact that women play a vital role in ensuring food security, 65% of household food in Asia and 80% in Sub-Saharan Africa is produced by women (Rogers, 1997). For example, in most societies it is customary that women first feed the men, next the children and then eat whatever remains (Rogers, 1997).

Rogers (1997) argues that with equal access to credit, land, education, information, seeds and fertilisers women could boost agricultural productivity and minimise the problem of food insecurity. The number of the countries in

Sub-Saharan Africa with a number of areas in need of food emergencies has increased from 13 during 1997 to 20 (FAO, 1997). The areas which are most food insecure and often threatened by famine are in the following countries Djibouti, Eritrea, Ethiopia, Kenya, Somalia, Sudan and Uganda (FAO, 2001a).

The dimensions of the food security problem in South Africa, at both the national and household levels are quantified by AgriReview (1997). It states that 20% of the urban population and 60% of the rural population in South Africa live below the minimum subsistence level. About 2.3 million people comprising of children under the age of 12 years, pregnant and lactating mothers (among whom 87% are Africans) are malnourished (AgriReview, 1997).

Unemployment is a significant contributor to poverty among the majority of the South Africans. Unemployment rates tend to be highest among Africans, women, the youth, among individuals with no previous working experience and in rural areas (May, Govender, Budlender, Mokate, Rogerson, Stavrou and Wilkins, 1998). There are six basic categories of unemployed poor each requiring a different strategy from the government in order to effectively address their situation (May *et al*, 1998). These are poorly educated rural unemployed (28%), poorly educated urban unemployed (13%), young unemployed with no labour market experience (36%), long-term unemployed with no labour market experience (6%), those with labour market experience and some education (15%) and highly educated unemployed (1%) (May *et al*, 1998).

Van Zyl and Kirsten (1992) argue that in the development of a food and nutrition strategy not only the sufficient supply of food is important but also access to food at all times. This implies the production of food at an affordable price.

Food security and its attainment are influenced by various governmental policies (AgriReview, 1997). In South Africa for instance, food security is influenced by both micro and macro factors ranging from the technology, land taxation system, land reform programmes, farmer settlement programmes, availability of support institutions and monetary, fiscal and trade policies affecting overall economic growth and distribution of income (AgriReview, 1997). The rapid population growth rate in South Africa has a negative impact on government food programme strategies to solve the problem of food insecurity. The South African human population is continuing to grow at an alarming rate. It is estimated to have grown from 40.6 million in 1996 to 43.1 million in mid 1999 (Statistics South Africa, 1999a).

1.2 Problem statement

The prevailing food insecurity and hunger problem leaves the world with a challenging task for the 21st century. The major challenge to those in positions of authority is to explore all the possible avenues that could improve man's social welfare and wriggle out of the vicious circle of poverty.

Wortman and Cummings (1978) argue that the major role player in the facilitation process to solve the problem of poverty and food insecurity is the government. Every government must be responsible for ensuring adequate food supply for its population and the development of its rural people. A primary component for the solution of the world food problem lies in poor countries to increase crop and animal production among the millions of small-scale farmers and the majority of the farming communities in the developing countries (Wortman and Cummings, 1978). AgriReview (1997) states that food security in South Africa can only be achieved through national and provincial government policies which should follow a well co-ordinated multi-disciplinary approach.

Many farmers in the world specialise in crop and animal production processes. The livestock which are commonly produced by farmers include poultry, sheep, goats, cattle, and pigs. The reality is that the production of animals such as rabbits has been grossly ignored by some countries despite an acute need for food to cater for the increasing human population (Owen, 1981). For instance, the department of agriculture in the United States does not recognise rabbit as an agricultural livestock for human consumption (Lamar, 1998). The last effort to have rabbits accepted by the United States Department of Agriculture (USDA) as a livestock for human consumption failed in 1972 due to lack of support (Lamar, 1998). Rabbits have not been accepted as a livestock for human consumption because rabbits are regarded as pets, particularly white rabbits (Lamar, 1998 and Owen, 1981).

Another problem is that many rabbit farmers get into commercial rabbit raising with the attitude that they are going to get rich overnight. They forget that each and every business venture flourishes as a result of certain efforts which precede success such as clear goal-setting, dedication, patience and hard work which are *sine qua non* for rabbit production (Mauer, undated). This problem has resulted in a lot of failures among inexperienced farmers who have not received adequate training and set up commercial units prematurely without proper supporting services and market outlets (Owen, 1981). It is therefore necessary that there should be an exchange of ideas, skills and information amongst various rabbit producers and projects within and between countries (Owen, 1981).

1.3 Objectives of the study

The primary objective of this study is to explore the feasibility of the commercialisation of rabbit production by small-scale farmers in Moqhaka,

Ngwathe and Matjhabeng local municipalities. This objective will be attained by addressing the following sub-objectives.

- To analyse the perception and opinion of potential producers with regard to production of rabbits in aforesaid local municipalities.
- To determine factors that may prohibit small-scale farmers from investing in rabbit production.
- To analyse the needs and perception of potential consumers with regard to rabbit consumption.
- To determine the available market opportunities for rabbit products on the world market.
- To determine consumer preference and taste with regard to rabbit meat consumption.

1.4 Justification of the study

The majority of the South African population is suffering from malnutrition due to poverty (Wilson and Ramphela, 1989). The rearing of rabbits could help alleviate this problem (Erasmus, 1997). Rabbits have proved beyond doubt in some countries to be of significant value to people's lives. In Europe for instance, the major producers and consumers of rabbit products are amongst others, Holland, Italy, France, Spain, Portugal, Belgium, Denmark, Germany and Greece (Keller, 1969). In Africa, recorded production and consumption of rabbit products is noted in Malawi, Burkina Faso, Cameroon and Uganda (Mc Nitt, 1980; Hoffmann, Kobling, Stier and Gall, 1992; Lukefahr and Goldman, 1987 and Kayongo, 1996).

Rabbit meat is suitable for special diets. It is suitable for heart disease patients, the elderly, low sodium diets, weight reduction diets, etc. (Ardeng, 1999). The old Romans who were known for their love of good living, good wines and

good food, regarded rabbit meat as the finest meat obtained from any four-footed animal (Keller, 1969). This is also affirmed by the French who are well known for their cuisine. It is unusual in the modern days to find a menu without rabbit meat in the French household or to find a restaurant of repute without a choice of various rabbit dishes on the daily menu (Keller, 1969). During the second and third century A.D., rabbits were not only acclaimed for their fine taste but had a reputation for cleansing the blood, skin, increasing beauty and prolonging youthfulness (Keller, 1969).

Farmers are attracted to rabbit rearing amongst others because of the rabbit excretory products which can be used as manure (Keller, 1969). In many countries rabbits are kept in deep-litter or colonies primarily to produce manure which is used for gardening or flowerbeds (Keller, 1969). Rabbits do not only have the ability and reputation of meeting the requirements of wholesome and healthy meat. The Angora rabbit fur can be used to make garments and as a result generate income for the producers (Gittens, 1992). Rabbits are fast breeders and can produce large quantities of rich meat for home consumption (Keller, 1969).

Rabbits reproduce faster than pigs, goats and sheep (Adjare, 1984). One doe can produce more than 15 off springs within one year if it is given the proper care (Adjare, 1984). Ardeng (1999) adds that a doe's milk is so rich that the bunnies (rabbit off springs) can double their weight in 6 days compared to piglets at 14 days, calves at 47 days and human off springs at 160 days.

Producing rabbits is very cost-effective as rabbits are good converters of waste foods, vegetable peels and small grasses growing in the backyard into meat. Rabbits can produce 2.7 kilograms of meat when fed with the same amount of feed and water needed by a cow to produce 0.5 kilograms of meat (Ardeng, 1999). The advantage of raising rabbits is that they are not smelly or noisy

animals and can therefore be easily kept near a school building or people's houses without causing any inconvenience (Fielding, 1991).

1.5 The study area

The consumer survey was conducted only in Moqhaka (Kroonstad town and Maokeng) and producer survey in Moqhaka (Maokeng), Ngwathe (Ngwathe) and Matjhabeng (Mamahabane) local municipalities of the Free State Province of South Africa. These local municipalities are doing well in terms of agricultural activities. The small-scale farmers in these municipalities are engaged in both farming and non-farming activities. The sensory taste analysis conducted for this study was performed at the University of the Free State due to logistical problems.

1.6 Research methodology

The sample size of consumers and producers was determined using multi stage sampling techniques and sample determination criteria used by Statistics South Africa when conducting surveys. Consumer survey areas were Kroonstad town and Maokeng of Moqhaka local municipality. The sections surveyed in Maokeng included Gelukwaarts, Koe-koe village, Constantia, Brendpark and Seisoville. Producer survey areas were Maokeng, Ngwathe and Mamahabane of Moqhaka, Ngwathe and Matjhabeng local municipalities respectively. The sample for the sensory taste analysis was also determined from the main population groups at the University of the Free State in Bloemfontein. The sample size for the analysis was attained after the university staff members and students were recruited for participation.

After the survey, the data was coded and then captured on computer for analysis. The descriptive statistics and willingness to pay criteria were used to analyse consumer data, producer data was analysed using descriptive statistics. The Statistical Package for the Social Sciences (SPSS) was used to perform the analysis. The sensory data was analysed using the preference ranking method of Basker (1988). Production budgets of some of the enterprises which the small-scale farmers are engaged in, in the aforementioned local municipalities were formulated and compared to the rabbit enterprise. This was to determine the most profit maximising enterprise with a given set of resources. The international trade of rabbit meat was investigated using data from the International Trade Centre (2001).

1.6.1 Consumer sample size and procedure

The sample of households interviewed comprised of the African, White and Coloured communities. The members of the Asian community were not included in the survey because they form a very small proportion of Kroonstad town and Maokeng population and were not clustered the same way as the African and White population for the enumerators to reach their dwellings conveniently.

A total of 89 households were included in the survey. This consisted of 60 African, 15 Coloured and 14 White households. Ideally, the study intended to interview 30 members of the White population but unfortunately this target could not be achieved because some of the identified respondents refused to be interviewed despite the attempts made to convince them. These respondents claimed to be too busy.

The representation of each population group (African, White and Coloured) was determined bearing in mind the proportions of each group in the surveyed areas. The survey did not only target the respondents from various population groups but also tried to ensure that the sample was representative of the respondents from different socio-economic classes. As a result, households included in the sample were from formal and informal settlements. The survey was conducted based on a structured questionnaire, a specimen is attached as Appendix A.

1.6.2 Producer sample size and procedure

Eighty producers were surveyed, the survey included people engaged in farming and non-farming activities such as livestock, vegetables, sewing, bakery and selling of fish oil. This was done to ensure the generation of a variety of opinions. A specimen of the questionnaire used is attached as Appendix B.

The survey sample was arrived at after the respondents were grouped according to their respective activities and randomly sampled among the different activities. The respondents were all members of the African population belonging to different ethnic groups.

1.6.3 Panelist sample size and procedure for sensory taste analysis

The sample of panelists for the sensory taste analysis had similar population characteristic to the ones selected in Kroonstad town and Maokeng. It constituted of the African, White and Coloured communities. A total of 86 panelists completed the sensory taste analysis questionnaire. The panelists were asked to rank the different livestock meats using a preference ranking scale ranging from mostly preferred to least preferred livestock meat.

Additional questions were asked to establish if the panelists have consumed rabbit meat before and the possibility to purchase rabbit meat if marketed in shopping stores. A specimen of the questionnaire used for the sensory taste analysis is attached as Appendix C.

1.7 Data used

Primary data was used to achieve the objectives of the study, collected through the use of structured questionnaires completed by consumers, producers and members of the taste panel. The questionnaires were developed to obtain both quantitative and qualitative information from the aforesaid group of respondents.

The information collected included demographic characteristics of consumers and producers such as population group, age, gender, employment, educational, income, religious denomination, household size and household expenditure on food. Questions to establish knowledge, perception and feelings of consumers and producers regarding consumption and production of rabbits were also included. The information collected using the sensory taste questionnaire was to establish the panelists's taste and preference with regard to the consumption of different livestock meats.

1.8 Outline of the study.

Chapter 2 gives a description of the study area (Free State Province) and a literature review with regard to the state of agriculture in South Africa, constraints faced by small-scale agricultural producers, consumption of livestock meats and factors affecting meat consumption. The methodology used by researchers to analyse willingness to pay for a product is also reviewed. Chapter 3 describes the role played by commonly produced

livestock and rabbit with regard to consumers. The available market opportunities for rabbit products are analysed and discussed in this chapter.

The results regarding demographic characteristics, perception, attitude of prospective consumers regarding consumption of rabbit products and sensory taste analysis are presented in Chapter 4. The demographic characteristics, perception and attitude of prospective producers of rabbit products are presented in Chapter 5. The viability of the rabbit enterprise in Moqhaka, Ngwathe and Matjhabeng local municipalities is analysed and compared to other enterprises in this chapter. A summary of the findings and conclusion is made in Chapter 6.

CHAPTER 2

DESCRIPTION OF THE STUDY AREA AND LITERATURE REVIEW

2.1 Introduction

This chapter gives an overview of the Free State Province, the province in which Moqhaka, Ngwathe and Matjhabeng local municipalities were surveyed. This is given with reference to the activities and factors likely to affect the production and consumption of rabbit products. These include aspects such as the geographical location of the Free State Province, structural composition, demographic characteristics, climatic conditions, vegetation, manufacturing industry, mining industry and the agricultural sector. The chapter further discusses the role of agriculture, mining and manufacturing industries in the economic growth of the Free State Province.

The role of agriculture in the economy of South Africa and constraints faced by small-scale agricultural production are highlighted. Literature on meat consumption and willingness to pay for a product is reviewed. Literature with regard to the importance of meat to consumers, consumption of different livestock meats, factors affecting meat consumption and market potential for common livestock meats is also reviewed.

2.2 The study area

The Free State Province is situated in the central part of South Africa. It is adjacent to the Northern Cape, Eastern Cape, Northwest, Mpumalanga, Kwazulu-Natal and Gauteng Provinces (see Figure 2.1). The province covers 129 480 km² of South Africa's total land area (Free State Department of Agriculture, Undated). Bloemfontein is the capital city of the province and has a well-established institutional and administrative infrastructure. There are

The Free State Province had a population of 2.6 million during 1996, among whom 69% were resident in urban areas. Indigenous Africans constituted 84% of the province's population, Asians constituted 0.1%, Coloureds and Whites constituted 3% and 12% respectively (Statistics South Africa, 1996a). The gender distribution in the Free State Province was even with a male to female ratio of 1:1 (Statistics South Africa, 1996a).

About 16% of the Free State Province's population aged 20 years or more had no formal education in 1996. The dependency ratio in the Free State Province in 1996 was 56.4%, implying that for every 100 economically active adults (aged between 15 and 64 years) there were 56 youths aged 0-14 years and elderly aged above 64 years who depended on them. The youth and elderly dependency ratios were 49.3 and 7.1% respectively (Statistics South Africa, 1996a).

The most dominant language spoken in the Free State Province is Sesotho. Fifty seven percent of Free State Province's population speaks Sesotho. Afrikaans is spoken by 15% of the population, 9% isiXhosa, 6% Setswana, 5% isiZulu and 2% of the population speaks English (Krige, 1997).

2.2.2 Climate

The climatic factors such as temperature and relative humidity are highlighted as important factors to consider in the breeding of rabbits by Erasmus (1997). Rabbits are furred animals and can tolerate low temperatures easier than high temperatures (Erasmus, 1997). Du Plessis (2000) shares the same sentiment that rabbits are comfortable in an environment which is not too cold or hot, in the event that a moderate temperature cannot be maintained, the colder temperature should be the second option.

Rabbits are comfortable in an environment with a temperature between 15 and 18°C and a relative humidity of between 65 and 70% (Erasmus, 1997).

2.2.2.1 Climate of the Free State Province

The temperature in the Free State Province can be extremely cold and hot during the winter and summer (Free State Department of Agriculture, 1996). The Free State Province receives most of its precipitation during the summer season. The variability of the rainfall is much higher in the western parts of the province. The average annual precipitation in the Free State Province which generally occurs in the form of thundershowers (60 to 90 days per year), increases from below 400 mm in the south-west to 1 200 mm in areas around the eastern edge of the escarpment (Barker, 1997).

2.2.3 Vegetation

Rabbits can be successfully raised on grain-free diets based on forages and by-products (Cheeke, 1986). According to Cheeke (1980) rabbits can be fed on high-forage and low grain diets that are largely non-competitive with human food requirements. Good production performance can be realised by feeding rabbits on green plant materials such as weeds, tree leaves, tropical legume, grass forage, vegetable and fruit wastes (Cheeke, 1986; Lukefahr and Goldman, 1985).

In the Northwest province of Cameroon for instance, a wide variety of nutritious forages exist on which rabbits are fed. These include Elephant grass (*Pennisetum purpureum*), Guatamala grass (*Tripsacum laxum*), Brachiaria (*Brachiaria ruziziensis*), Molasses grass (*Melinis minutiflora*), Desmodium (*Desmodium distortum*), African iodine (*Aspelia africana*) and Blackjack (*Bidens pilosa*) (Lukefahr and Goldman, 1985). Leguminous plants such as beans,

ground nuts (peanuts) and indigenous *Desmodium* species are generally the key sources of protein in a non-concentrate based ration. Grasses, weeds and forbs supply important fibre, some energy and protein to the diet along with small quantities of minerals and vitamins (Lukefahr and Goldman, 1985). In the Republic of China rabbits are mainly fed on forage with a supplement of bean curd and grains (Cheeke and Patton, 1987). Furthermore, some aquatic plants such as water peanut (*Alternanthera philoxeroides*) and water lettuce (*Pistia stratiotes*) are fed to rabbits (Cheeke and Patton, 1987). It is in view of this background that there is a need to highlight the type of vegetation in the Free State Province in a bid to show whether the vegetation present could support rabbit production or highlight the possibility of growing the forage preferred by rabbits.

2.2.3.1 Vegetation of the Free State Province

The vegetation of the Free State Province can be divided into three biomes, namely Grassveld, Nama karoo and Savannah. In the extreme Western and Northwestern parts of the Free State Province, a Savannah vegetation type has developed in the Kalahari sands. The vegetation is characterised by clumps of *Acacia* trees growing in the grassveld. In the Southern parts, the veld type is invaded by Karoo vegetation resulting in the grass being replaced by shrub vegetation. In the dry Southwestern parts of the Free State Province, Karoo and Karroid vegetation are the most dominant types (Barker, 1997).

The largest part of the Free State Province is covered by grassveld. In the high-lying Eastern parts of the Free State Province, another mixed grassveld type known as the Southern tall grassveld occurs on doleritic soils. This veld type is characterised by the occurrence of Thatch grass (*Hypparrhenia hirta*) and is classified as a sour grass veld interspersed with stunted trees and shrubs (Barker, 1997).

The most common plant species which are found in the Free State Province are *Pennisetum clandestinum*, *Pennisetum sphacelatum*, *Melinis nerviglume*, *Melinis repens*, *Brachiaria serrata*, *Brachiaria nigropedata* and *Brachiaria eruciformis* (Du Preeze, 2002). However, Du Preeze (2002) cautions that the aforementioned species are likely to have side effects when used in the production of rabbits as such, it is necessary to investigate their suitability by subjecting them to necessary tests before being fed to rabbits.

2.2.4 Economy of the Free State Province

The Free State Province's main economic activities include mining, manufacturing, agriculture and agro-processing.

2.2.4.1 Mining industry

It is estimated that 30% of South Africa's gold is mined in the Free State Province. The mining industry is the biggest employer in the Free State Province and accounts for 22.6% of the Gross Geographic Product (GGP) of the province. Other minerals exploited in the Free State Province include coal and diamonds. Bituminous coal is mined and processed into petrochemicals in the Free State Province in Sasolburg (Free State Department of Agriculture, Undated).

2.2.4.2 Manufacturing industry

The manufacturing industry makes a substantial contribution to the Free State Province's economy and is the second most important sector with regard to contribution to the province's economic growth (Oelofse, 1997). The manufacturing industries in the Free State Province can be categorised as high value adding and as industries with a low capital to labour ratio. Fourteen

percent of the manufacturing industries in the Free State Province can be classified as high technology industries. This is the highest percentage of high technology industries compared to other provinces (Oelofse, 1997). These industries are mostly situated in Mangaung local municipality i.e. in Bloemfontein, approximately 125 manufacturers. Job opportunities in the Free State Province are mainly available in the heavy engineering, light engineering, agro processing, leather processing, mining and textile industries (Oelofse, 1997).

2.2.4.3 Agricultural industry

Ninety percent of the land in the Free State Province is used for agricultural production of which 2 million hectares are under crop cultivation. Twenty nine percent of the land is utilised as arable land, 63.9% is used for grazing purposes, 2.1% for nature conservation activities and 1.1% for other purposes. Dry land cultivation is practised on 97% of the arable land in the province while the remaining 3% is under irrigation. A total of 11 647 commercial farmers are farming on 48 420 farming units (Free State Department of Agriculture, Undated).

The Free state Province produces 40% and 50% of South Africa's maize and wheat crops respectively. The main animal products produced in the province are beef, fresh milk and other dairy products. The average production of beef in the Free State Province accounts for 33.5% of the animal products, fresh milk and other dairy products for 26.4%, mutton and wool for 13.2% each, poultry and eggs for 6.9% and others for 6.8% (Free State Department of Agriculture, Undated).

The horticultural products, vegetables and deciduous fruits contribute an average of 6.8% to the gross income of agriculture of the Free State Province (Free State Department of Agriculture, Undated).

2.3 The role of agriculture in South Africa's economy

South Africa is characterised by high levels of poverty especially in the rural areas where 70% of the poor people live (National Department of Agriculture, 2001). The majority of the rural dwellers earn very low incomes that do not enable them to meet their basic needs. This has been aggravated by the fact that the rural economy is not sufficiently vibrant to provide them with employment (National Department of Agriculture, 2001). Nevertheless, agriculture remains an important sector in the South African economy despite its small direct share of the total Gross Domestic Product (GDP). Primary agriculture accounts for 4.5% of South Africa's GDP and the larger agro-food complex accounts for 9% (National Department of Agriculture, 2001).

The commercial farmers exported products worth about R16 billion or nearly 10% of South African total exports during 2000. The commercial farmers employ about 1 million workers, about 11% of South Africa's formal employment. The majority of farm workers live on commercial farms and their children receive education through farm schools. Commercial farms provide a livelihood to about 6 million people (National Department of Agriculture, 2001).

Small-scale farmers provide a livelihood to more than 1 million of their family members and offer employment to about 500 000 people. The small-scale farmers mainly supply to local and regional markets dominated by informal traders.

South Africa also has 3 million farmers in the communal areas of the former homelands who produce food primarily to meet their household needs (National Department of Agriculture, 2001).

Agriculture can contribute to economic growth and development by making capital available for investment in other economic sectors (Groenewald, 1998). Agriculture can achieve substantial productivity gains without making large claims on scarce capital resources, thereby lowering the capital-output ratio in agriculture possibly to a level lower than in other sectors. This would cause a flow of capital from agriculture to the rest of the economy (Groenewald, 1998).

2.3.1 Challenges facing South African agriculture

Despite the potential role which the agricultural sector plays in improving the South African economy and welfare of its citizens, agriculture faces a number of challenges. The challenges faced by the South Africa's agricultural sector include the following:

1. **Constrained competitiveness and low profitability:** Some sectors within agriculture are not competitive in the local and international markets. The lack of international competitiveness leads to low profitability and below normal returns in the sector which is responsible for low investment in certain industries (National Department of Agriculture, 2001).
2. **Skewed participation:** The legacy of exclusion and discrimination in South African agriculture has left the challenge of how to improve participation in all facets of the sector and rid all entry barriers rooted in its historical dualism. There is a need to identify programmes that will encourage new entrants, Africans and Whites, young and old, men and

women, small and medium-scale enterprises to enter the sector (National Department of Agriculture, 2001).

3. Low investor confidence in agriculture: The poor investor confidence in agriculture is caused by the low returns as well as social problems such as the spate of farm murders, evictions and illegal occupations. Investor confidence is necessary to achieve a vibrant and growing agricultural sector. A lack of delivery and implementation of a wide range of government measures, regulations and programmes as well as ineffective support systems necessary to ensure an enabling environment for agriculture, constitute a major concern and challenge for the agricultural sector (National Department of Agriculture, 2001).
4. Poor and unsustainable management of natural resources: Unused land of high and medium potential is not abundant in South Africa. There is also a limit to the horizontal extension of agricultural production. In addition, the infrastructure and services to support sustainable land use are inadequate. Government programmes such as the Land Care and Working for Water aimed at protecting the natural resource base are successful but insufficient. Land degradation remains a problem on good and marginal lands (National Department of Agriculture, 2001).

2.3.2 Access to resources

Availability of factors such as land, labour, capital and entrepreneurship are necessary for any form of economic activity to take place (Mohr, Fourie and Associates, 1995). Land and labour are sometimes referred to as primary factors of production while capital and entrepreneurship are referred to as secondary factors (Mohr *et al*, 1995). The term land suggests different things to different people, depending upon their outlook and their interests at the

moment. From a legal standpoint, land or real estate may be considered as any portion of the earth's surface over which ownership rights might be exercised (Barlowe, 1978). In a broader term, land is viewed as space, nature, a factor of production, consumption good, situation, property and capital (Barlowe, 1978). Land has become known to most as a scarce resource, the utilisation of which has to be controlled so as to satisfy the needs of the entire population (Balyamujura, 1995).

Labour can be defined as the exercise of human mental and physical effort in the production of goods and services (Mohr *et al*, 1995). Goods and services cannot be produced without human effort. Capital comprises of all manufactured resources such as machines, tools and buildings which are used in the production of other goods and services (Mohr *et al*, 1995).

The availability of land, labour and capital is not sufficient to ensure economic success. These factors of production have to be combined and organised by entrepreneurs who have identified opportunities and are willing to take the risk associated with the activity to produce goods with the expectation that they will be sold (Mohr *et al*, 1995).

Land in South Africa is receiving unique attention from the government due to the past legacy of apartheid which resulted in the skewed ownership of land among South Africa's different population groups. This can be traced back to the period between 1652 and 1910 during which the indigenous people were increasingly disturbed by the rate at which they were losing their land (Balyamujura, 1995).

2.3.2.1 Imbalance in access to land

This imbalance in the distribution of land culminated as a result of the discriminatory land Act which was passed in 1913. The Act drew a line between areas owned by the indigenous African and white population by prohibiting the ownership of land by members of one racial group in areas reserved for the other group (Van Zyl, Mc Kenzie and Kirsten, 1996). By this and subsequent mechanisms of enforcement, the indigenous South African population was restricted to ownership of land in areas that comprised of only 13 percent of the country's land area. Agricultural development was further affected by policies that severely restricted the provision of infrastructure and agricultural support services to those areas of the country where the African population was allowed to own land (Van Zyl *et al*, 1996).

2.3.2.2 Efforts to address imbalance in access to land

The Department of Land Affairs through the land reform programme is addressing the legacy of the past with regard to acquisition of land by the different population groups in South Africa. The land reform programme consists of three elements, namely redistribution, restitution and land tenure.

The land redistribution element aims to provide the previously disadvantaged and poor with land for residential and production purposes. The individuals benefiting from the redistribution programme are the rural and urban poor, farm workers and new entrants into the agricultural sector (May, Roberts, Govender and Gayadeen, 2000). The redistribution has different components or sub-programmes. This includes agricultural development, settlement and non-agricultural enterprise programmes. Agricultural development programme serves to make land available to people for agricultural purposes, settlement programme provides people with land for settlement purposes and

non-agricultural enterprise programme provides people with land for non-agricultural enterprises such as eco-tourism projects (Department of Land Affairs, 2001).

The land restitution process involves the return by means of an administrative or adjudicative process of specific parcels of land to individuals or communities who were unjustly removed in pursuance of racially-based land legislation or policies (Christiansen, 1996). In 1995, the government set aside a period during which people who had lost their land rights during the days of apartheid were to lodge claims. Since then, the Land Claims Commission has played an important role in facilitating and processing land claims (Department of Land Affairs, Undated). The land claim cases are dealt with through the Land Claims Court and Commission established under the Restitution of Land Rights Act of 1994. Eligible cases consist of forced removals due to the Land Act of 1913 (May *et al*, 2000). It is estimated that the claims will benefit 3.9 million people (Department of Land Affairs, Undated).

Land tenure reform on the other hand aims to improve tenure security of all South Africans. This programme includes a review of current land policy, administration and legislation with a view to accommodate more diverse forms of land tenure (May *et al*, 2000). Many people in South Africa live in fear of being evicted, losing their homes or having no place for their livestock to graze. This insecure tenure is in part a result of the policies of the past government (Department of Land Affairs, 1997). The Department of Land Affairs has put a new law referred to as the Extension of Security of Tenure Act, 62 of 1997 in place to give occupiers a legal right to live on land without fear of losing their homes. The law serves to stabilise and improve relations between owners and occupiers by creating fair, clear policies and procedure to be followed for evictions. The law also creates procedures for occupiers to get stronger independent land rights (Department of Land Affairs, 1997).

2.3.2.3 Constraints to small-scale agricultural production

Small-scale agricultural production faces a number of constraints which could be classified as internal and external constraints. This as a result leads to reduced agricultural output.

External constraints

The external constraints emerge outside the farming system and the farmers have no control over them but may influence them or make some effort to limit their effect. These include natural risks typical of any agricultural activity, limited availability of inputs, credit, mechanisation, marketing services, poor institutional and infrastructural support, inappropriate policies and legislation as well as restrictive administrations (Kirsten, 1994).

Internal constraints

The internal constraints differ from the external constraints in that they emerge from within the farming system. Despite the ability of farmers to allocate resources in an economically efficient manner, there are a number of factors hampering them from operating efficiently. The constraints include liquidity problems, shortage of labour, lack of skills; knowledge and education (Kirsten, 1994). Added to these are a range of cultural factors which in some instances prevent the effective management of resources (Kirsten, 1994). The removal of the mentioned constraints would assist farmers to allocate resources in a more economically optimum manner (Kirsten, 1994).

With reference to red meat which is assumably the most produced and consumed livestock meat in South Africa, Lubbe (1992) identified a number of factors which may influence production efficiency, profitability and supply. They include the quality and availability of natural resources such as natural pastures and water, biological parameters such as fertility (calving and

weaning percentages), breeding, adaptability of breeds, parasites, diseases, mortality and genetic capabilities. The other factors include technical input/output relationships, efficiency of infrastructure, distance to major markets, the availability of efficient and effective management, prices of inputs, available technology, the rate of innovation and adoption (Lubbe, 1992).

Solutions to small-scale agriculture constraints

The constraints faced by small-scale agriculture in South Africa necessitate a strategic plan to stimulate increased agricultural output. In a bid to address the aforementioned constraints, Van Rooyen and Nene (1996) state that active community participation in all areas of the development activities, shifting of focus from production to farmer development, rendering of advice with regard to farm income and management, provision of information to the farmers with regard to the production and marketing processes, facilitation of co-operation arrangements and institutionalising linkages with various agricultural development role players in the vicinity are necessary.

Balyamujura (2001) highlights the potential role of organisational structures that can be developed to serve the needs of the rural households involved in agriculture. An organisational structure consists of three components, namely complexity, formalisation and centralisation (Robbins, 1983).

Complexity considers the extent of differentiation within the organisation. This includes the degree of specialisation or division of labour, the number of levels in the organisation's hierarchy and the extent to which the organisation's units are dispersed geographically (Robbins, 1983). Formalisation embodies the degree to which an organisation relies on rules and procedures to direct the behaviour of employees.

On the other hand, centralisation considers where the locus of decision-making authority lies. In some organisations, decision-making is highly centralised (Robbins, 1983).

Balyamujura (2001) states that there are organisations that assist the smallholders in pooling resources and at the same time provide services to the members. The smallholder tea development programme implemented in Uganda is a good example and South African small-scale agriculture could learn the following:

- An organisational structure as the one developed for the smallholder tea farmers would be of a great advantage to the previously disadvantaged members of the South African population in that the small-scale farmers are given the opportunity to manage their business through a professional management team. This has proved to help in meeting the necessary management capacity which is believed to be one of the greatest weaknesses of the small-scale farmers.
- The formation of organisation i.e. company or working group would also partly ease the problem of raising the initial capital for the contemplated set up.
- The management of many smallholder farmers would be eased, as on their own accord, they would group themselves according to their needs and with the means available to answer each member's needs. For example, the provision of production credit which commercial banks would find too risky with regard to each member, would be less risky if the credit is given to the farmer company and the farmer company lends to its shareholders. The farmer company would also have the responsibility for supervision repayment collection.

The farmer company would be able to use peer pressure to ensure high recovery rates.

- The company would also serve as a lobbying tool for the smallholder farmers who would otherwise have no say in the development and formulation of agricultural policy.
- South Africa is at the moment in a land reform process with the major aim of giving the formerly disadvantaged members of the population access to land. Some of these lack the knowledge and technical know-how to fully utilise the land that they will acquire. The new entrants may lack capital to acquire adequate amounts of land so as to establish a commercially viable farming activity. The formation of organisational structures or companies would enable the pooling of resources to ensure commercial sustainability.

According to Zinyama (1992) one of the strategies that is being used by the farmers in Zimbabwe to raise their level of crop production and on-farm incomes is participation in local voluntary organisations for collective action, as the farmers seek to overcome their resource constraints. Given the relative weaknesses of peasant households when they act individually for purposes of resource mobilisation and acquisition, collective local action becomes a vital strategy for rural development. Moreover, the process of rural development entails increasing the participation of the people concerned in the decision-making process and this can be enhanced through local groups.

Local farmer groups can also be used to facilitate the collective purchasing and transportation of agricultural inputs, marketing of produce and the timely mobilisation of labour for a variety of tasks such as ploughing, planting and weeding. The distinguishing feature of these collective local action groups is self-management. Where the group is formally structured, management is

done through a committee which is elected by the farmers from among themselves (Zinyama, 1992).

Carney and Van Rooyen (1996) state that collective action could be the logical route to empower farmers. By working together, farmers can in principle, identify members' needs and consolidate demand, aggregate members' economic power and address market failures. These capacities would seem to make farmer organisations the ideal partners for agricultural transformation.

Carter (1989) states that the relationship between the external agency and the farmer takes the form of a catalyst, technical or managerial assistant, trainer or intermediary but not manager or controlling authority. In the northern part of Burkina Faso, small-farmer-managed irrigation schemes are assisted by a national non-government organisation whose role is to provide technical assistance, occasional capital grants and linkages with national co-operatives and marketing organisations (Carter, 1989). In Nigeria, the major introduction of small-scale irrigation is through the statewide agricultural development programmes assisted by the Federal and State Government and the World Bank (Carter, 1989).

2.4 Consumption of meat

Despite the fact that some people may decide to be vegetarians because of their beliefs, principles or economic related factors, meat has formed a part of the human diet since prehistoric times and the development of hunting skills (Varnam and Sutherland, 1995). The greatest contribution of meat to the diet is its protein content; B-vitamins and iron. Meat is an important source of all of the essential amino acids in adequate amounts (Cole, 1966).

The presence of meat in a meal improves the absorption of nonheme iron (Pond, Merkel, Mc Gilliard and Rhodes, 1980). Consumers may at times choose meat, primarily for its aesthetic appeal, or habits based on the criteria of colour, juiciness, flavour and tenderness (Varnam and Sutherland, 1995). A consumer's decision to purchase a product as postulated by the micro-economic theory, may be influenced by the price of the desired product, the price of its substitutes, the utility obtained from the product, income, family size, etc. (Debertin, 1986).

2.4.1 Comparison of meat attributes of different livestock

It is important to determine whether rabbit meat has the potential to meet qualities of being acceptable or regarded as good meat by consumers. Traditionally rabbits are hunted on farmland to prevent damage to crops. These are then cooked and eaten within rural communities mainly during winter (UK Meat and Livestock Commission, 1990). Rabbit meat is lean and has high protein content similar to that of chicken. Rabbit meat has a low fat content and a distinctive flavour which tends to reflect the quality of the diet on which it has been reared (UK Meat and Livestock Commission, 1990). The nutritive value of rabbit meat and other meats is shown in Table 2.1.

Table 2.1: Nutritional value of rabbit and other common meats

Skin less Meat	Protein %	Fat %	Calories (gm)	Cholesterol (gm)
Rabbit	22.8	6.3	1 247.4	1 559.3
Beef	29.9	10.1	1 729.4	2 069.6
Cat fish	22.3	5.9	1 134.0	567.0
Lamb	28.1	9.5	1 644.3	2 211.3
Pork	27.7	14.8	1 701.0	2 041.2
Chicken	28.9	7.4	1 530.9	2 268.0
Turkey	28.9	4.9	1 360.8	1 842.8

Source: USDA cited by Lukefahr, Paschal and Ford (1999)

* 1 Ounce= 28.35 grams

Clearly rabbit meat contains less cholesterol than the other meats except catfish and is comparable to the other meats in protein and calorie content. The protein content difference is not significantly different from that of the predominantly consumed livestock meats. For example, rabbit meat contains 7.1% less protein compared to beef, 5.3% less than mutton, 4.9% less than pork and 6.1% less than chicken. Rabbit meat is therefore able to compete with other meats as a source of protein. Rabbit meat contains 3.8% less fat compared to beef, 3.2% less fat compared to mutton, 8.5% less fat compared to pork and 1.1% compared to chicken. Rabbit meat also contains 63 to 70% water and 1% mineral salts (Erasmus, 1997).

2.4.2 Factors affecting meat consumption

The major objective of any producer involved in food marketing systems is to deliver a product that consumers desire. Kohls and Uhl (1990) state that this involves much more than just matching the total food supply with the total food demand but also the process of matching the right form of a product at the right place and time to a particular buyer. It is essential for any food producer to study the consumption pattern of the prospective consumers.

Kohls and Uhl (1990) state that food consumption is influenced by physiological needs, tastes and preferences, habits, social relationships and economic factors. Williams and Stout (1964) and Djazayery, Siassi and Kholdi (1992) describe the other factors which affect food acceptance and consumption as size and age composition of the family, occupation, time (season), race and religion.

The nature in which people acquire, prepare and eat their food has been brought into perspective by researchers as one of the factors that determine the consumption of a particular product. This is described as a foodway (Kohls

and Uhl, 1990). Foodways are complex behavioural patterns that, from the standpoint of food marketing, have four important characteristics. Notably, that no two societies have identical foodways, standardised foodways result in somewhat similar and stable food preferences and eating patterns within a society.

The human knowledge about foods and meals is established by culture, family background, breadth of experiences and level of education (Kinder, Green and Harris, 1984). Culture distinguishes the edible from the inedible. For instance, chicken but not guinea pigs and peanuts but not acorns are food (Kinder *et al*, 1984).

Foodways define "how to eat" and add social significance to the diet. The foodways are taught to each succeeding generation and adapt to socio-economic changes such as urbanisation, education, income, technology and changing life-style (Kohls and Uhl, 1990).

2.4.3 Market potential for common livestock meats

A study by Van Der Merwe (1968) in Bloemfontein showed that per capita consumption of red meat was decreasing and the red meat consumption was found to be relatively income sensitive. The results also showed that consumer preference had shifted to poultry meat. Hancock (1983) showed that consumption per capita of beef had fallen by 37%, mutton by 35% and pork by 22% while poultry consumption had increased by 45.8% in 1983. He further stated that the White population group had the greatest expenditure on meat and other meat products followed by the African population.

Hui and Mc Lean-Meyinsse (1996) assessed the market potential for speciality meats such as goat, rabbit and quail in the United States. The study revealed market potential for all these livestock in Louisiana and Texas. The assessment was specifically based on the influence of geographic, demographic and socio-economic factors on the consumers' eating the three meats and attitude. Sixty one percent of the respondents had eaten rabbit meat while 31% and 44% of the respondents had tried goat and quail meat respectively.

Thirty two percent of the respondents had positive attitudes towards rabbit meat, 12% towards goat and 39% towards quail. Geographic, demographic and socio-economic factors strongly influenced eating of meat and attitude. Respondents with an above high school education were less likely to have eaten rabbit meat while a blue-collar worker was more likely to have eaten rabbit meat. The attitude model showed that blue-collar workers or respondents with a household income below 25 000 U.S \$ per annum had a more favourable attitude towards rabbit meat compared to goats and quail. Hui and Mc Lean-Meyinsse (1996) recommended agribusiness firms to target the male population, blue-collar workers and people with a low level of education as a marketing strategy that would achieve increased consumption of rabbit meat.

Hoffmann *et al* (1992) showed that the potential demand for rabbit meat was low in Burkina Faso mainly due to the fact that the consumers considered the price of rabbit meat to be high. Only the affluent consumers could afford meat. Hoffmann *et al* (1992) suggested that if rabbit meat were to reach most of the local population in the long run, retailers would have to reduce the price of rabbit meat to at least the price level of poultry meat on the local market.

Kayongo (1996) in Uganda conducted a similar study and showed that most people were not aware of the existence of rabbit meat and products on the market. The market for rabbit meat was mainly limited to hotels and a few restaurants. Market growth and expansion could be achieved through sensitisation and promotional campaigns (Kayongo, 1996).

The general deduction that can be drawn from the studies conducted with regard to the consumption of meat is that consumers seem to have a preference for white meat over red meat. This gives rabbit meat a competitive advantage over red livestock meats as rabbit meat is a white meat.

2.5 Willingness to pay

Policy makers are often faced with the need to assign an economic value to a non-market resource. One method for indirectly valuing a non-market resource is contingent valuation (Cameron and James, 1987). The contingent valuation method has proved to be a useful technique in many research activities, researchers use it not only to determine willingness to pay for a non-market goods but also market goods. Willingness to pay is defined as the value which an individual is prepared to spend or sacrifice to obtain a good or service (Field, 2000).

Malone (1990) used the willingness to pay method to evaluate acceptance of irradiated fresh food products in the market place by the consumers. It was found that 54% of the households were not willing to purchase irradiated food.

Weaver, Evans and Luloff (1992) assessed consumer attitudes towards pesticide use in tomatoes production. It was found that almost half of the respondents were willing to accept cosmetic defects on tomatoes free of any chemical pesticide residues.

The majority of the respondents were willing to pay up to 10% more for tomatoes free of any chemical pesticide residues.

Lichtenberg and Zimmerman (1999) conducted a study regarding farmers willingness to pay for ground water protection. They found that farmers with greater concern for the general environmental quality were willing to pay more to prevent leaching. Farmers that had any direct or indirect health problems as a result of pesticides were not willing to pay more for leaching prevention.

Bagnara and Brumfield (1996) evaluated consumer willingness to pay for a brand that guarantees peaches produced by integrated pest management techniques. It was found that consumers were more willing to sacrifice and pay more for a branded and guaranteed product. Consumers were aware of the risks associated with unbranded products and tended to discount their value (Bagnara and Brumfield, 1996).

2.5.1 Approaches to determine willingness to pay

There are three distinct approaches to asking contingent valuation questions. These include an open-ended approach in which the maximum amount consumers are willing to pay is elicited through a single bid or an iterative bidding procedure and a close-ended approach which establishes whether consumers would pay a specific amount which is varied across the product being valued or not (Mullen and Wohlgenant, 1991). The third approach is the sequential bid which establishes if respondents would pay or accept some specified sum or not. The question is then repeated using a higher or lower amount depending on the initial response (Cameron and James, 1987).

Among these methods, the close-ended approach generates a scenario most similar to that encountered by consumers in their usual market transactions. A hypothetical price is stated and the respondent merely decides whether to take or leave it relieving the respondents with having to state a specific amount (Cameron and James, 1987).

2.5.2 A review of practical applications of willingness to pay

A number of methodologies have been used to determine willingness to pay. In the first part of the questionnaire designed by Mullen and Wohlgenant (1991) to determine willingness of consumers to pay for attributes of lamb, information on socio-economic variables likely to influence lamb consumption such as household size, income, participation in the work force, education and place of birth was used. Thereafter, the respondents were asked questions relating to consumption of lamb.

The respondents who had never consumed lamb were asked to furnish reasons for not consuming lamb. Thereafter, the respondents who had consumed lamb were asked to give an estimate of the quantity they have consumed. This was followed by a series of questions designed to elicit how the respondents valued leanness and portion size.

A national household survey was conducted to evaluate consumer willingness to accept irradiated fresh food products by Malone (1990). Data on willingness to purchase irradiated food by major household food purchaser were obtained through telephone interviews. A number of socio-economic variables were hypothesised as related to consumer willingness to buy and their willingness to pay more for two major benefits of irradiated food, i.e. the reduction of micro-organisms that may result in food-borne illnesses and the extension of the food's shelf life. An iterative bidding procedure was conducted during the

telephone interview. The respondents were asked a succession of questions to determine how much more they would be willing to pay per unit of an irradiated food product if there was a reduction in the level of a food borne-disease. When the respondents indicated an unwillingness to pay, the interviewer proceeded to next set of questions. Education, income and sex were found significant but were not successful in predicting or classifying consumer willingness to purchase or pay more for irradiated food.

The economic and demographic aspects, cultural characteristics, food style, shopping habits and characteristics of product perception were used by Bagnara and Brumfield (1996) to determine consumer willingness to pay for a brand of peaches produced based on an integrated pest management system. The consumers were interviewed directly in the store facing the product they were purchasing. The willingness to pay was modelled directly as a random variable applying the Weibull model.

Lichtenberg and Zimmerman (1999) used the Turnbull estimator and Random utility model to determine willingness to pay. A lower-bound estimate of the farmers' mean willingness to pay to prevent pesticide leaching was obtained using the Turnbull estimator while Random utility model was used to investigate variations in willingness to pay across characteristics of the farmer and the farm operation as well as estimation of maximum willingness to pay for the prevention of ground water leaching. Characteristics likely to influence farmers' willingness to pay for leaching prevention such as human capital, attitudes towards the environmental problems associated with pesticides and other attributes of the farm operation were used.

2.5.3 Factors influencing willingness to pay

Field (2000) states that individual tastes and preferences are important factors in influencing willingness to pay for a product or service. Some people are willing to pay a lot to visit the Grand Canyon, others are not. Some people are willing to pay a lot on white-water recreation opportunities, others are not. Some people place a high value on trying to preserve the habitat of unique animal and plant species while others do not.

Weaver *et al* (1992) state that perceptions and beliefs of consumers about the production process can influence market behaviour in several ways. This includes changing buying habits, influencing willingness to purchase or acceptance of fresh produce and preference for produce free of any chemical pesticide residues.

Researchers highlight the product price as one of factors that greatly influence willingness to pay. Prices play a central role in guiding production and consumption decisions (Tomek and Robinson, 1990). Consumers are more price sensitive and generally react positively to lower prices than higher prices in retail shops (Myres, 1997).

2.6 Conclusion

This chapter reviewed and highlighted the socio-economic and environmental potential of the Free State Province and study area. A review was made of activities such as utilisation of land for the agricultural, mining and manufacturing activities which contribute towards the improvement of the social welfare of the Free State population. The demographic profile, climate and type of vegetation of the Free State Province were explored to highlight how they could influence production and consumption of rabbit products.

Background to the South African agriculture, challenges facing this sector, constraints faced by the small-scale agricultural sector in South Africa and possible solutions were highlighted. The importance of meat to consumers and factors affecting meat consumption were discussed. Contingent valuation as a means of determining willingness to pay was highlighted. The open-ended and close-ended questionnaires and sequential bidding approaches to determine willingness to pay were discussed. A practical application of willingness to pay and factors influencing willingness to pay were highlighted.

CHAPTER 3

THE LIVESTOCK INDUSTRY

3.1 Introduction

This chapter highlights the importance of livestock production and the role played by livestock with regard to consumers. The domestic livestock discussed include cattle, sheep, goats, poultry, pigs and rabbits. Management related issues such as disease control, environment conducive for rabbits, temperature stress management, production schedule, breeding schedule and record keeping are also discussed. The cost-effectiveness of rabbit production is also highlighted.

The available market opportunities for rabbit products are highlighted through an analysis of the International Trade Centre (ITC) TradeMaps. Leading exporting and importing countries of rabbit meat are used in the analysis.

3.2 Importance of livestock to consumers

Livestock make a major contribution to the welfare of human society through the provision of food, fuel, fertilisers, other products and services (Burditt, Buchanan and Fitch, 2000). Livestock produce meat and milk which are important components in the diet of many people whilst the wool, mohair, hides, skins and the numerous by-products of livestock processing industries are used by man for many purposes (Cole, 1966 and Cupps, 2001).

The manure produced by livestock makes an important contribution to the maintenance of soil fertility (Burditt *et al*, 2000 and Cole, 1966). In some developing countries, the manure is not utilised as fertiliser but as fuel when dried (Burditt *et al*, 2000). Animals contribute more in terms of protein than

calories. They supply one-third of the protein consumed in the world (Burditt *et al*, 2000). Meat, milk and fish supply man with the necessary protein, supplying 35%, 34% and 27% respectively, of the world protein (Burditt *et al*, 2000). Some of the commonly produced domestic livestock in the world include cattle, sheep, goats, pigs and chickens. These livestock contribute about 28% of the world's total value of agricultural products (Cupps, 2001):

3.2.1 Cattle

In some regions of the world, cattle are not considered as a source of food. Studies have shown that cattle are mostly utilised or kept for domestic purposes such as the provision of manure, milk and fuel as opposed to being a source of meat. There are three types of cattle, namely beef, dairy and dual-purpose cattle. The world cattle population is more than 1 billion, a half of which is concentrated in South America, Europe, countries of the former Union of Soviet Socialist Republics (USSR), the United States of America and India (Cupps, 2001).

3.2.2 Sheep

Sheep are thought to be the oldest species of domesticated animals (Botkin, Field and Johnson, 1988). Sheep are used as a source of wool, meat (mutton and lamb) and to a limited extent as a source of milk (Cupps, 2001). Sheep are commonly classified into three types based on whether their wool is fine, medium or coarse.

The world sheep population of approximately 1 billion is distributed throughout the world with the largest populations in the western United States, Africa, South America, Asia, Europe and Oceania (Cupps, 2001).

3.2.3 Goats

Goats are reared in the same region as sheep and utilised in a similar manner. They are about two-fifths as numerous as sheep and show a similar distribution and are almost found in all countries (Cupps, 2001). The only regions where goats are not found in significant numbers are at the Arctic and the Antarctic zones.

In many countries, goats are the most important source of animal protein. Approximately 75% of the goats in the world are in developing countries, the goats are reared as a source of meat, skins, milk and hair (Mowlem, 1992). There is still some stigma attached to keeping goats even in those countries where they are numerous. This can be attributed to misguided religious prejudice and to the misguided appreciation of Western ideas (Mowlem, 1992). Unlike the cow, goat is rarely seen as a status symbol yet it makes a greater contribution to the welfare of many households (Mowlem, 1992).

3.2.4 Pigs

Worldwide the population of pigs is estimated to be more than 700 million. Approximately half are raised in Asia (primarily in China), Europe, the former Union of Soviet Socialist Republics (USSR) and South America (Cupps, 2001). Unlike most domestic animals, pigs are omnivorous and compete directly with humans for food (Cupps, 2001). There is a great difference in the consumption patterns of pork throughout the world (Holness, 1991). In some parts of Europe, the annual per capita consumption of pork is over 50 kilograms and accounts for 60% of the total meat consumed. In areas of the developing world, particularly Africa, the estimated annual per capita consumption ranges between 1 and 3 kilograms and accounts for less than 10% of the total meat diet (Holness, 1991). In tropical Asia and parts of China, pork is the predominant

component of the diet. On the other hand, in areas where the Islamic religion is the dominant religion such as the Middle East, Pakistan and other parts of Africa, the consumption of pork is limited due to the fact that the consumption of pork is forbidden (Holness, 1991). Similarly, believers in the Jewish faith are instructed not to eat pork. Several other social factors also play a significant role in influencing the consumption of pork (Holness, 1991). For example, in some pacific islands such as Tonga and Papua New Guinea, pigs are highly regarded as a source of wealth and associated with marriage customs (Holness, 1991).

The pig has historically been considered as an unclean animal, an object of distaste, wallowing in filth and a hazard to human health. Clearly, there is some truth in this assumption if the pig is used as a scavenger but the exact opposite pertains if the pig is reared under a constructed shelter which is well managed (Holness, 1991). Pigs can be reared almost anywhere given suitable housing and management but in situations of extreme temperatures, humidity or lack of rainfall, pigs cost more to produce because of the need for more expensive housing and the absence of suitable foods (Holness, 1991).

3.2.5 Poultry

Poultry production is an increasingly important agricultural industry in the world (Rose, 1997). Poultry, meat and eggs account for about 10% of the total weight of all meat, milk and eggs produced in the world each year (Rose, 1997). Poultry were domesticated later than other farm livestock. Sheep, pigs and cattle were probably first domesticated in Southwest Asia in 9000 BC, 7000 BC and 6000 BC respectively (Rose, 1997). Poultry includes chickens, ducks, geese, guinea fowl, peacock, pigeons, swans and turkeys. Each of these domesticated groups has descended from a closely related wild bird and probably first developed in the areas where the wild bird was indigenous. The

world chicken population is estimated at more than 6 billion, there are more than 100 million ducks and less than 100 million turkeys (Cupps, 2001). Chickens are numerous in most regions of the world. Most of the ducks are produced in Europe and Asia and most turkeys are produced in the United States (Cupps, 2001).

3.2.6 Rabbits

Rabbits have served as a source of food since 1 500 BC (Ardeng, 1999). A study conducted in 64 developing countries showed that 30% of the people surveyed believed that social, religious or other reasons would not favour the development of rabbit production (FAO, 1999). In spite of all these, rabbit production has proved to be viable in many countries particularly in the European countries. The production of rabbits has been favoured by the fact that rabbits are a source of white meat, with low fat, high protein content, low on cholesterol and highly palatable worldwide. Rabbits in the United States are predominantly raised for non-food purposes and their skins are used for fur garments and trimmings (Sell, 1999).

Rabbits are generally classified according to size (weight) and product (i.e. meat or pelt). Small ones weigh between 1.4-1.8 kilograms at maturity, medium breeds between 4.1-5.4 kilograms and the large breeds between 6.4-7.3 kilograms (Sell, 1999). Rabbits can be further classified according to fur production and meat. The two most popular breeds for meat production are the New Zealand and Californian. The Rex and American Chinchilla are breeds for fur production (Sell, 1999).

3.2.6.1 Rabbit production

One of the factors contributing to the low quantity of food produced in South Africa is lack of diversification and flexibility in terms of agricultural production. The production efforts tend to concentrate mainly on specific livestock products and neglect the others. A typical example of the neglected productive and cost-effective livestock is rabbit. In 2000, world rabbit meat production was estimated at 1 021 358 tonnes (FAO, 2001b). China produced 315 000 tonnes of rabbit meat in 2000 and was the leading world producer (FAO, 2001b). According to FAO (2001b) Europe is the centre for the world's rabbit meat production. Italy produced 221 000 tonnes of rabbit meat during 2000 and was the largest producer in Europe. Spain and France produced 152 427 and 85 500 tonnes respectively (see Table 3.1).

Table 3.1: Rabbit meat production in 2000

Countries	Rabbit meat production (tonnes)
China	315 000
Italy	221 000
Spain	152 427
France	85 500
Egypt	69 600
Czech Republic	38 527
Germany	33 900
Ukraine	14 000
Hungary	10 000

Source: FAO (2001b)

It is against this background that rabbit production should be considered and evaluated as an alternative for increased food production. According to Cheeke (1986) small livestock such as rabbits have a number of characteristics that might be advantageous in the smallholder, subsistence-type of farming system. FAO (1999) states that rabbits could significantly improve the food security of small-scale farmers around the world.

Diversification into alternative agricultural activity appears to be gaining popularity and economic importance as a means to supplement family income and to provide an alternative source of high quality food (Gebremedhin, 1991). Small-scale farmers are faced with a more competitive market, new environmental regulations and increasing production cost (Gebremedhin, 1991). This as result causes them to switch to other cost-effective agricultural enterprises which would ensure, not only income generation but the development of new markets, development of new inputs, development of new products for consumers and the reduction of agriculture's adverse effects on human health (Dicks, 1988 cited by Gebremedhin, 1991).

Despite the fact that in some other countries rabbit production has not yet received great interest from livestock producers, rabbit production is continuing to grow in developing countries (Owen, Morgan and Barlow, 1977). The production of rabbits involves the use of improved breeds and strains, scientifically balanced pellet feeds and strictly controlled environmental conditions (Owen *et al*, 1977). It is important to note that despite the existence of relatively sophisticated rabbit industries, rabbit production on a small scale or backyard level is still important in many countries such as Malta, France and Spain (Owen *et al*, 1977).

The excretion of rabbits has the potential to make excellent compost manure due to its high organic matter and nutrient content. Commercial red worms or African night crawlers grown in rabbit manure produce a high quality and fairly odourless organic material (Lukefahr *et al*, 1999). According to Lamar (1998) rabbit manure used as a plant fertiliser is superior to other sources of manure due to its unique composition. When the manure has been aged and air-dried, rabbit manure will not burn the plants when applied directly to the plants (Lamar, 1998).

Rabbit manure has a very high content of nitrogen surpassing the excretion of cattle and pigs but not chicken. Rabbit manure contains 0.99% less of nitrogen compared to chicken manure. In terms of the phosphorus content, rabbit manure contains 0.61% more compared to cattle. The potassium content of rabbit manure outclasses the potassium content of cattle, poultry and pigs (see Table 3.2).

Table 3.2: Nutrient content of manure from livestock (%)

Animal	Nitrogen	Phosphorus	Potassium
Rabbit	3.71	1.33	3.47
Cattle	2.90	0.72	2.14
Poultry	4.70	1.58	1.03
Pigs	3.52	1.60	1.00

Source: Lukefahr et al (1999)

Lebas and Matheron (1982) state that the production of one kilogram of rabbit meat requires only one quarter of the feed energy needed to produce the same amount of lamb or beef. This is also 70% of the feed required to produce an equivalent quantity of pork. Thirty percent more feed energy is needed to produce one kilogram of rabbit meat than required for the same amount of chicken meat but rabbits have the economic advantage of thriving on feedstuff rich in roughage compared to poultry (Lebas 1981, cited by Lebas and Matheron, 1982).

Shqueir (1986) concurs with other researchers that the rabbit production activity is worth being ventured into by small-scale farmers since rabbits can utilise plant material directly and efficiently compared to ruminants which require intermediary metabolism of herbage by micro-organisms prior to nutrient uptake.

Rabbit producers could offset their costs of production through the sale of a number of rabbit products, namely rabbit meat, apparels made of rabbit fur and manure products. Rougeot (1986) describes rabbit skins as being more of a by-product of meat production in intensive production systems because most rabbits are reared for the production of meat (Rougeot, 1986).

Rabbit skins are a major component in the international fur trade with large numbers being used for the manufacture of hats, trimmings and gloves (Owen *et al*, 1977). The skins can readily be dyed and treated to imitate many other kinds of fur skin such as seal, beaver, ocelot, leopard, etc. (Owen *et al*, 1977). The fur of the Angora rabbit forms the basis of a special rabbit international trade (Lebas and Matheron, 1982).

3.2.6.2 Management of rabbit production

Management of rabbits is an aspect which producers cannot overlook if sound and successful production is to be achieved. Factors such as disease control, management of the environment in which rabbits are reared, temperature stress management, production schedule, breeding schedule and record keeping are significantly important in rabbit production (Lukefahr and Goldman, 1985 and Sell, 1999).

Disease control

Rabbits are very susceptible to a number of diseases (Owen, 1981). *Coccidiosis* is one of the major disease problems faced by most countries. *Coccidiosis* is particularly harmful to young weaned rabbits, rabbits kept on solid floors and in damp climatic conditions (Owen, 1981). Cleanliness and hygienic conditions are prerequisites to keep rabbits healthy and happy (Erasmus, 1997).

A number of general precautionary measures are necessary in rabbit production. Feeds and drinking water for rabbits must be kept clean at all the times. Manure and urine are ideal breeding grounds for disease causing micro-organisms and should never be in direct contact with the rabbits. In order to maintain clean living conditions, the floor of the hutch should be made of wire so that the rabbit excretion falls through. Manure and urine must be removed on a regular basis before heaps are formed since flies usually breed in these heaps and transmit disease causing micro-organisms (Erasmus, 1997).

Rabbit should also be protected from rats and mice which also are a vector for disease. When a nest box is taken from the hutch, the rabbits breeding material must be destroyed. Thereafter, when it is sunny and dry, the box must be ventilated. In the event there is a disease outbreak, the hutches and nest boxes concerned should be cleaned and disinfected. These hutches and nest boxes should also not be used until such time that the environment is conducive for rabbits to live in them. Rabbits that have infectious diseases must be isolated from the rest. If possible, newly bought rabbits should also be isolated for sometime before they are allowed to mix with the rest (Erasmus, 1997).

Housing and climatic condition

Rabbits need protection from adverse environmental conditions and against predators. Rabbits have to be protected from rain, direct sunlight, cold drafts and strong winds (Lukefahr *et al*, 1999). Rabbits are comfortable in an environment with a temperature of between 15 and 18°C and a relative humidity between 65 and 70% (Erasmus, 1997). Proper rabbit housing should permit an adequate penetration of light and good aeration (Lukefahr and Goldman, 1985 and Owen *et al*, 1977).

Production and breeding schedule

The production and breeding schedule also form part of livestock management (Keller, 1969 and Sell, 1999). For instance, as part of a good production routine, producers should keep track of when to wean the off spring, cull the does and bucks and market the fryers (Sell, 1999). Similarly, producers should know the gestation period of the does, when to breed, how to manage the does during pregnancy and off springs at birth (Keller, 1969).

The most important key to successful backyard rabbit farming is reproduction (Lukefahr *et al*, 1999). The chances of a good level of reproduction can be enhanced through three primary management practices such as proper breeding methods, care of the pregnant doe, newborn and sound litter management (Lukefahr *et al*, 1999).

Record keeping

Record keeping plays a vital role in the growth and development of an economic activity. Records are kept for several basic reasons which ultimately determine the success or failure of a business activity (Doyle, 1978). Records are required for purpose such as taxation, legal matters, accessing credit from the financial institutions and keeping the owner of the business in touch with the day-to-day operations (Doyle, 1978).

In any agricultural related, business, records are kept for purposes such as estimation of depreciation, inventory, accounts receivable and accounts payable, receipts, expenditure, labour, machinery and physical production (Standard Bank Agricultural Division, 1999). The improvement of rabbit production will not be effective if accurate records are not maintained (Erasmus, 1997).

In rabbit production the following records are necessary and should be kept: Breeding, re-breeding, nesting, kindling, purchases, weight, culling, replacement selection, feed conversion, mortality and marketing (Sell, 1999).

3.2.6.3 Costs and advantages of rabbit production

The future and the production performance of an enterprise is more often determined by the availability of sufficient capital. For instance, when livestock production like cattle, sheep, goats, chicken and pigs is considered, producers have to budget substantially for the purchase of inputs such as vaccines, feeds, remuneration for labourers and building materials.

However, with regard to the production of micro livestock like rabbits, the costs incurred during production are minimal. Since it is difficult for many producers to afford nutritious feeds for their livestock to reproduce satisfactorily, rabbits are not expensive animals to maintain. Rabbits can be fed on vegetable waste, kitchen waste, lawn mowing, leaves of fruit trees and weeds (Erasmus, 1997 and Shqueir, 1986).

The cost of producing rabbit meat on a small scale is favourably competitive compared to that of fresh chicken meat and pork in Trinidad (Rastogi, 1986). Rabbit production is not an intensive labour requiring enterprise like cattle, sheep, goat or pig production. Production of rabbits on a small scale could enable farm families, rural residents, suburban backyard entrepreneurs and the elderly to use family labour instead of hiring outside labour (Gebremedhin, 1991).

Rabbits have the potential of reproducing throughout the year and have a short generation time. Rabbits are induced ovulators and will breed within 24 hours of parturition. Thus it is theoretically possible for a rabbit to produce

more than 11 litter per year. Rabbits have a high growth rate and show a high degree of genetic diversification both within and between breeds (Cheeke, 1980 and 1986).

Rabbits have a small body size that requires small amounts of feed. The body size provides a small carcass that can be consumed by a family in one meal eliminating the need for storage and refrigeration. Rabbit production uses inexpensive and easy to construct housing (Cheeke, 1980 and 1986).

3.3 Market opportunities for rabbit products

There is no formal market for rabbit meat in South Africa and this encouraging a limited trade of rabbit products. However, the trade of rabbit products is significant in Europe and Asia. An analysis of the world's leading rabbit meat exporters and importers is done to highlight the market opportunities on the world market. The international trade of rabbit meat is analysed using data from the International Trade Centre (ITC), TradeMaps are developed and analysed.

The TradeMaps compare the growth in exports and imports of rabbit meat of six leading exporters and importers on the world market. The three leading rabbit meat exporting countries are China, France and Hungary while leading rabbit meat importers are France, Germany and Netherlands.

3.3.1 TradeMaps

The TradeMaps are used because they are convenient and display all the basic information with regard to the market on one chart. This includes the growth of imports in the importing country, growth of exports from the exporting country, an indication as to whether the exporter has maintained her market

share, etc. (Balyamujura, 2001). In the bubble charts, the diagonal line represents the line of constant world market share which divides the chart into two parts, for example, China in Figure 3.1. Her exports are to the right of this line and have grown faster than her partners' imports, thereby increasing her market share in the world market. China's market share in countries shown on the left of the diagonal line have declined.

The vertical and horizontal reference lines are of particular interest from a trade development perspective since they divide the chart into four quadrants with different characteristics. The size of the circles represents the share of target market on the world imports. A bubble representing 5% of the world's imports is shown as an indication of scale (see Figure 3.1).

Champions-winners in growth market (upper right, first quadrant): The "gains in dynamic markets" quadrant includes markets in which Chinese exporters have performed very well. Trade promotion efforts among the winners in growth markets are less risky and promotional efforts should aim at broadening the supply capacity. In this case, China's exports have not experienced any gains in dynamic markets (see Figure 3.1).

Underachievers-losers in growth markets (upper left, second quadrant): The "losses in dynamic markets" quadrant represents particular challenges for trade promotion efforts in China. China's exports have either declined or grown less dynamically than partner demand. For instance, Belgium-Luxembourg in Figure 3.1. As a result, China has been losing market share although the partner demand has increased at above-average rates.

Losers in declining market (lower left, third quadrant): The "losses in declining markets" quadrant identifies market with bleak export prospects. This includes United Kingdom, United States of America, Germany, France,

Italy, Japan and South Korea (see Figure 3.1). The partner demand for rabbit meat has increased at below-average rate or actually declined, the market share of China has dropped.

Achievers in adversity-winners in declining markets (lower right, fourth quadrant): The “gains in declining markets” quadrant is characterised by growing shares of China’s exporters on the market that are declining or growing below average. For example, the Dutch market in Figure 3.1. From a trade promotion perspective, marketing strategies are necessary to isolate the positive trade performance from the overall decline in these markets.

3.3.2 Performance of leading rabbit meat exporting countries

The performance of leading rabbit meat exporting countries is measured in terms of the quantity of rabbit meat exported by the country in question and its proportion of the world’s total exports.

3.3.2.1 China

The quantity of rabbit meat exported by China in 1999 was 16 583 tonnes, 30.19% of world exports (ITC, 2001). China did not make any gains in terms of her market share in dynamic markets but lost part of her market share in the Belgium-Luxembourg market. The exports prospects of China were bleak in the British, American, German, French, Italian, Japanese and South Korean markets. China’s contribution in terms of international market share has declined although China made gains in the Dutch market. The Dutch market is unfortunately a declining market (see Figure 3.1).

3.3.2.2 France

France was the world's second largest exporter of rabbit meat in 1999 with an export of 6 440 tonnes. France accounted for 11.72% of the world's rabbit meat exports (ITC, 2001). France made gains in terms of her market share in the dynamic markets of Portugal, Austria, Ireland, New Caledonia and Belgium-Luxembourg. Losses in terms of market share were made in the dynamic markets of Greece and Spain. The losses in declining markets were experienced in Djibouti, Gabon, Japan and Switzerland while the gains were made in the Danish, Italian, Dutch, German and British markets (see Figure 3.2).

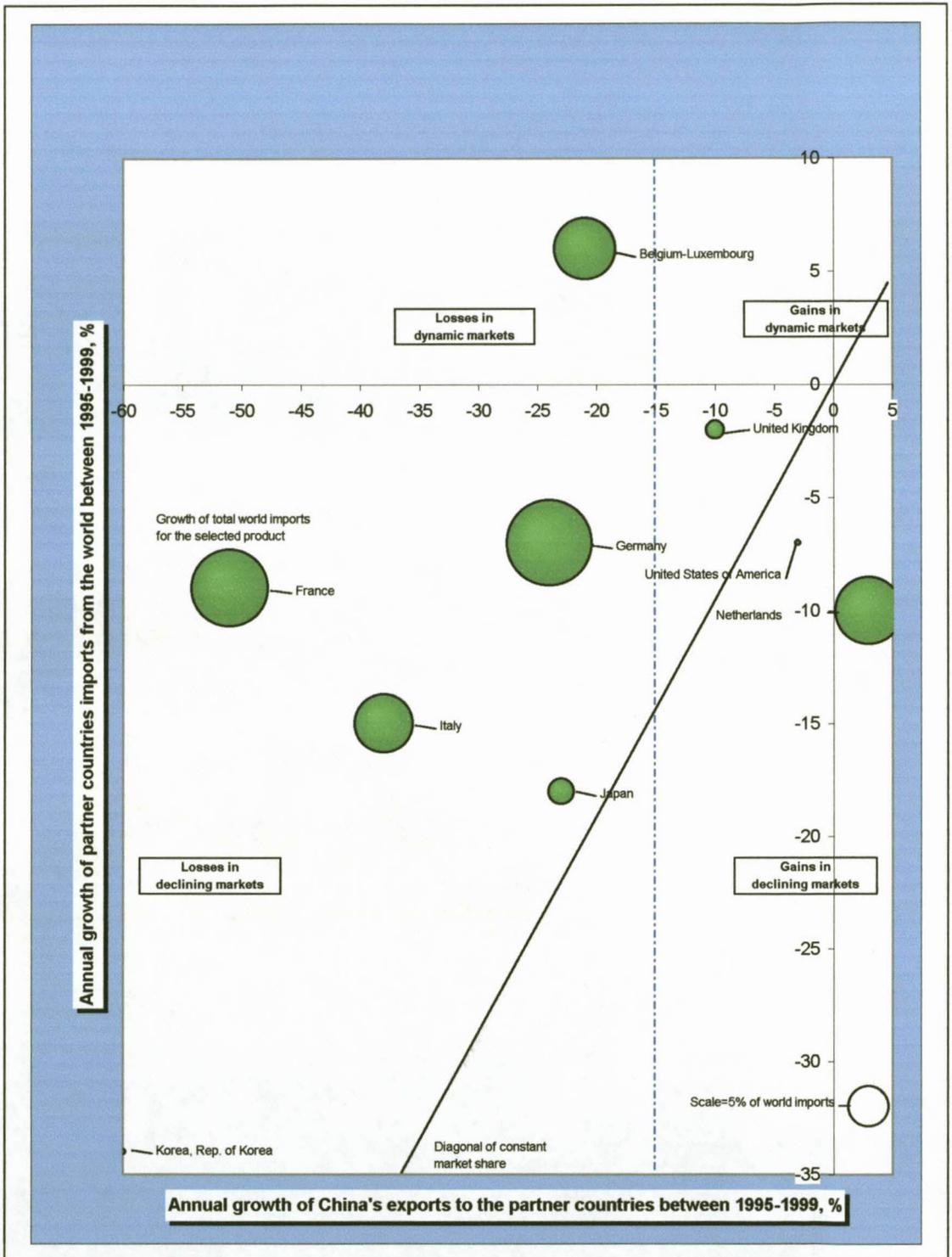


Figure 3.1: Growth in exports of rabbit meat from China (1995-1999)
 Source: ITC (2001)

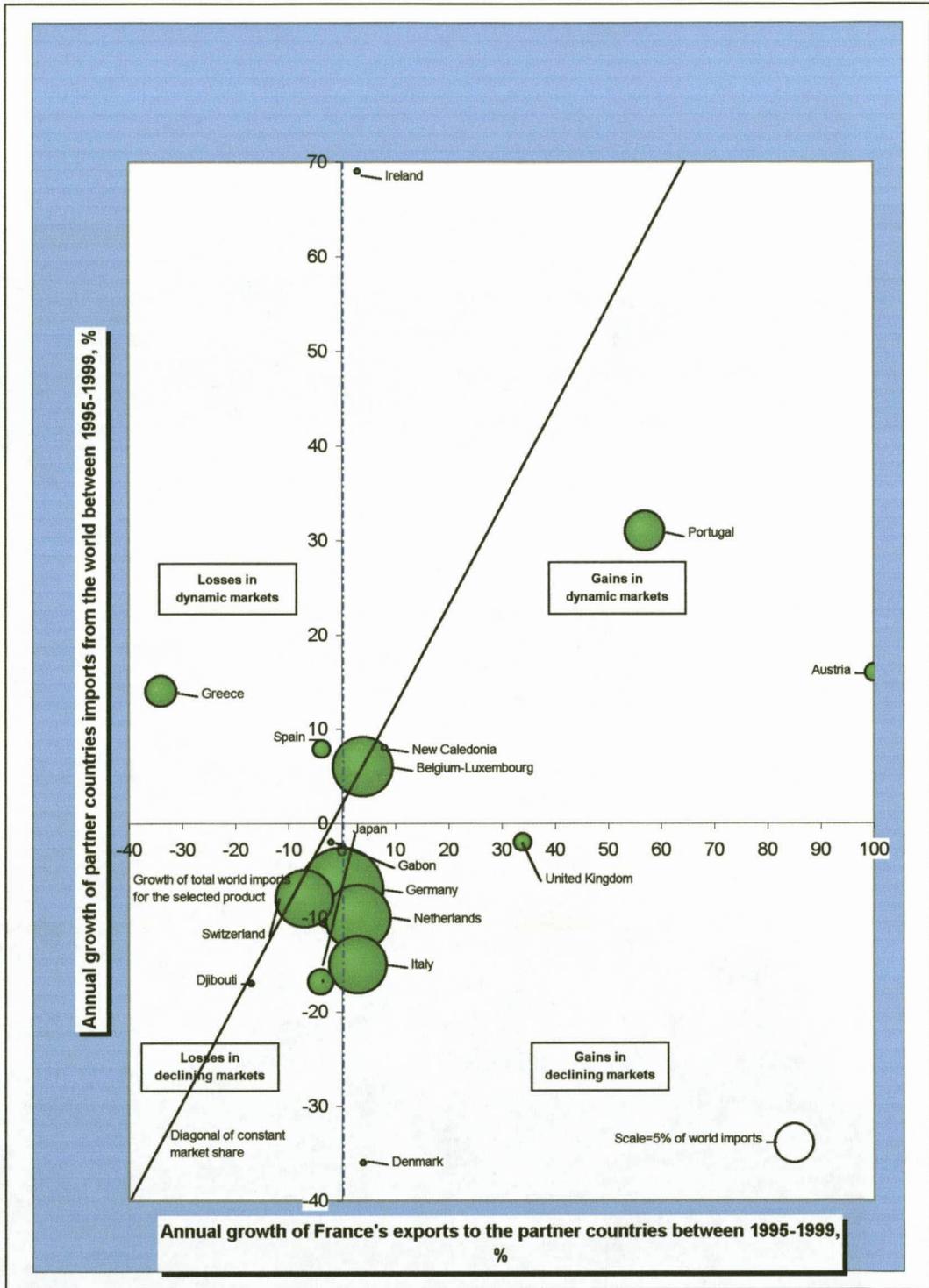


Figure 3.2: Growth in exports of rabbit meat from France (1995-1999)
 Source: ITC (2001)

3.3.2.3 Hungary

Hungary was the world's third largest exporter of rabbit meat in 1999 with an export of 6 428 tonnes and accounted for 11.70% of the world's exports (ITC, 2001). Hungary made gains in terms of her market share in the Belgium-Luxembourg market and did not lose any of her market share in the dynamic markets. Future trade promotions in these markets would be less risky to Hungary. However, Hungary made losses in declining markets, namely French, Italian and Russian markets while gains were made in the German and Swiss markets (see Figure 3.3).

3.3.3 Performance of leading rabbit meat importing countries

The performance of leading rabbit meat importing countries is measured in terms of the quantity of rabbit meat imported by the country in question and its proportion to the world's total imports.

3.3.3.1 France

The quantity of rabbit meat imported by France in 1999 was 10 069 tonnes, 20.45% of world imports (ITC, 2001). Spain was the dynamic supplier that gained in terms of her market share with exports to France. Germany also exported to the French market but was not a dynamic supplier. The dynamic suppliers under-represented on the French market were Chile, Italy and Belgium-Luxembourg while her under-represented non-dynamic suppliers were Hungary, China, Netherlands, Austria and Argentina (see Figure 3.4).

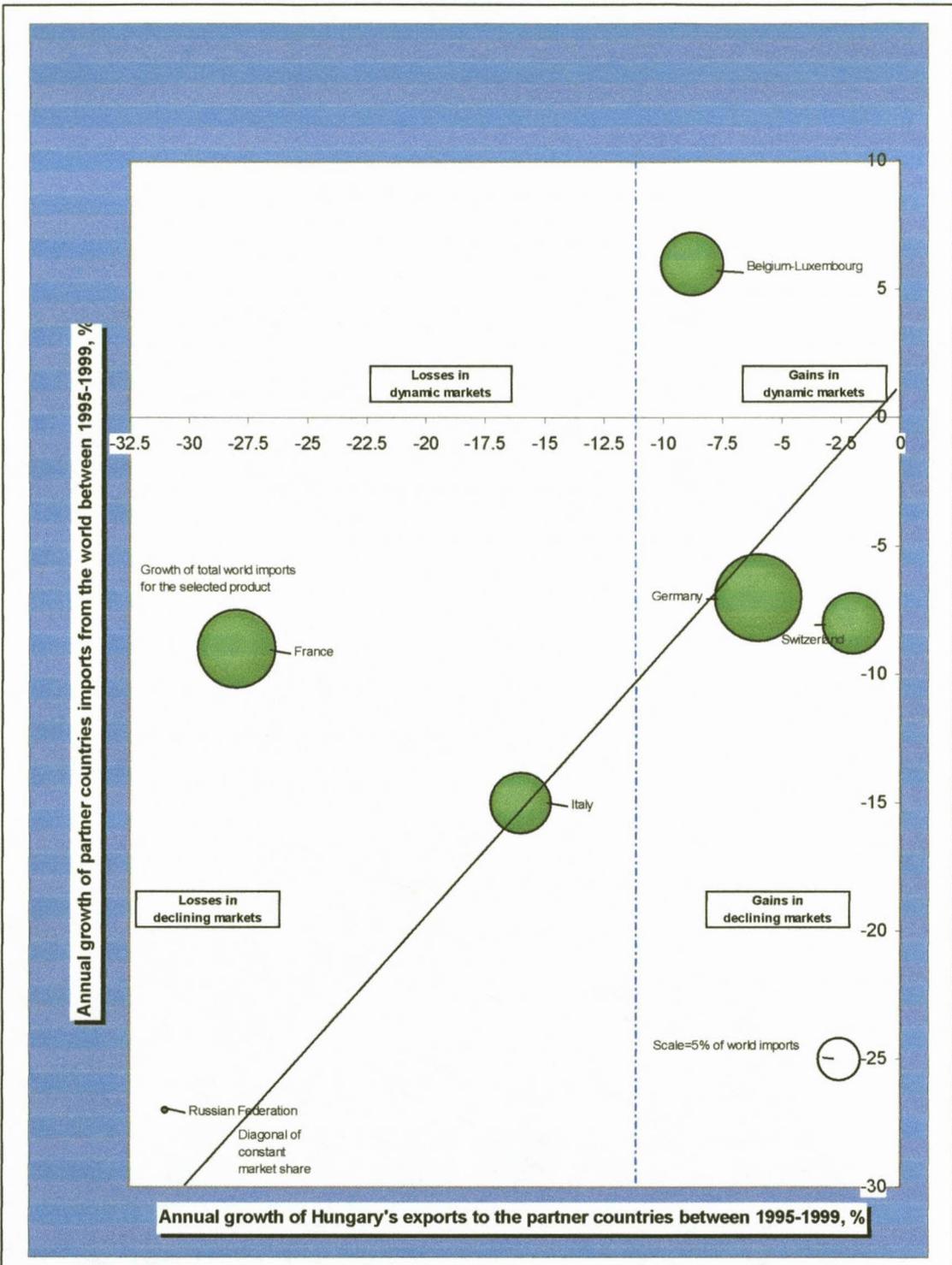


Figure 3.3: Growth in exports of rabbit meat from Hungary (1995-1999)
 Source ITC (2001)

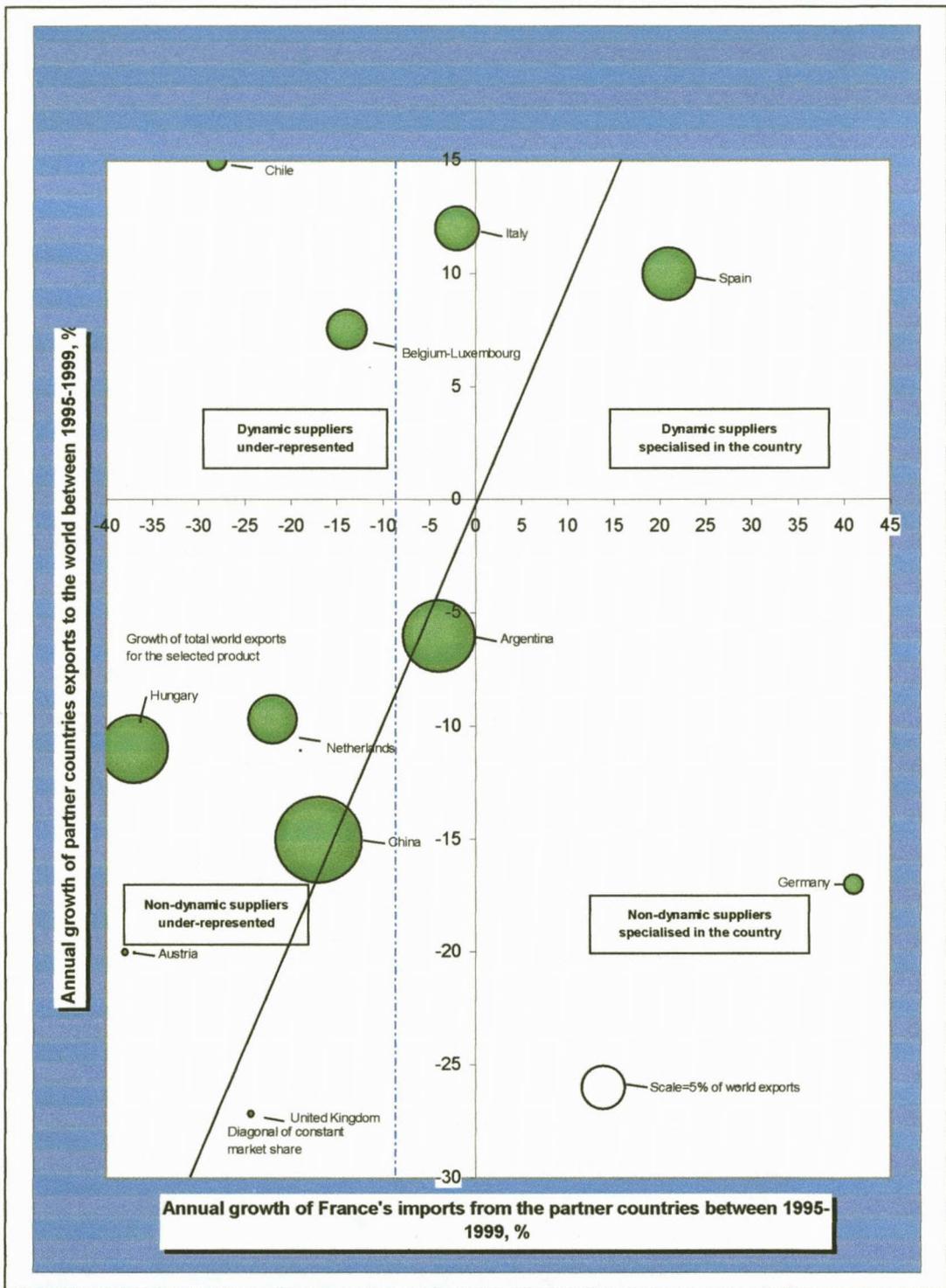


Figure 3.4: Competitiveness of rabbit meat suppliers to France (1995-1999)
 Source: ITC (2001)

3.3.3.2 Germany

Germany imported 8 365 tonnes of rabbit meat in 1999 and was the second largest importer in the world, this accounted for 16.99% of the world's imports (ITC, 2001). Dynamic suppliers made no gains in terms of their market share. The non-dynamic suppliers to the German market were Argentina, Austria, Netherlands, Hungary and Poland. Germany's under-represented suppliers were Chile, Italy, Spain, Belgium-Luxembourg and French markets while her under-represented non-dynamic suppliers were China and Czech Republic (see Figure 3.5).

3.3.3.3 Netherlands

Netherlands was the third largest importer of rabbit meat in 1999 when she imported 6 582 tonnes, accounting for 13.37% of the world's imports (ITC, 2001). The dynamic suppliers on the Dutch market were Chile and France. Italy was an under-represented dynamic supplier on the Dutch market while the United Kingdom was the under-represented non-dynamic supplier (see Figure 3.6).

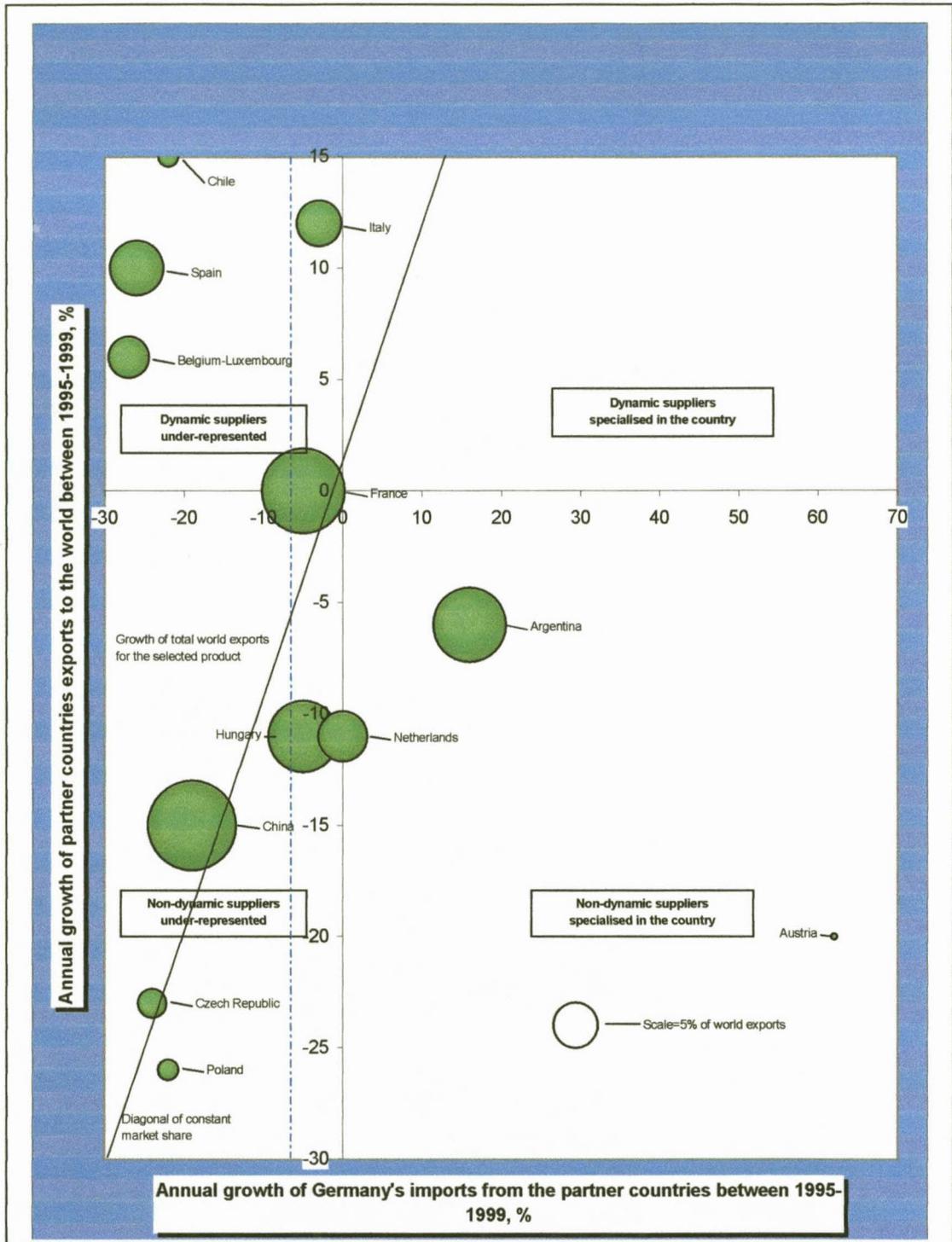


Figure 3.5: Competitiveness of rabbit meat suppliers to Germany (1995-1999)
Source: ITC (2001)

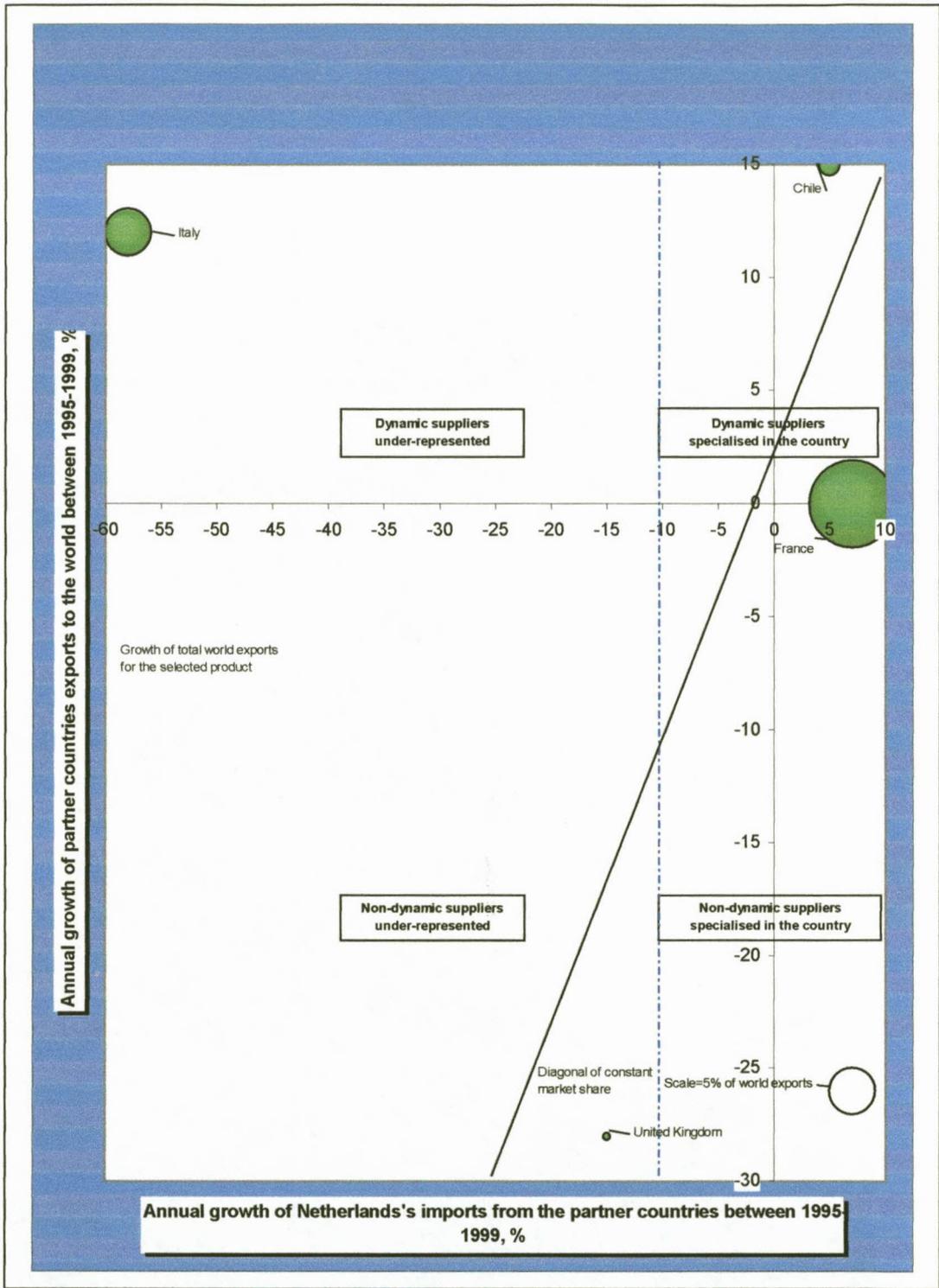


Figure 3.6: Competitiveness of rabbit suppliers to Netherlands (1995-1999)
 Source: ITC (2001)

3.4 Conclusion

This chapter provided a background on the commonly reared livestock and their contribution to human life. The management and production costs associated with rabbit production were highlighted. The TradeMaps analysis highlighted the market opportunities on the world rabbit meat market. Europe was highlighted as the potential market for rabbit products based on its quantity of rabbit meat imports and exports. The growth of rabbit consumption in the European countries could be attributed to the fact that rabbit meat is regarded as nutritious and healthy meat, comparable to chicken and fish.

However, community outreach programmes and market analysis should be undertaken to enable the design and initiation of activities to stimulate increased consumption of rabbit products. The outreach programmes could further help create awareness among the consumers and producers with regard to the importance of rabbit products and production.

CHAPTER 4

CONSUMPTION OF RABBIT PRODUCTS

4.1 Introduction

In this chapter, socio-economic attributes such as race, household size, income, education and religion are analysed to establish the influence they have with regard to the consumption of rabbit products and household expenditure on rabbit products. This is done because Lino (1990) found the socio-economic variable, after-tax income to affect consumption of household items such as housing, transportation, food and clothing. The study also established the consumption of some of these household items to be influenced by household size, sex, age, race, education, employment of the single parent and automobile ownership.

According to Prais and Houthakker (1955) the consumption patterns of goods and services are influenced by household size. Consumption of luxurious goods by a household will decrease with increasing household size as consumption of necessities and inferior goods increases. Large households often suffer the consequences of poverty such as malnutrition, poor health and lack of education (World Bank, 1980). The descriptive statistics and willingness to pay method were used to analyse consumer survey data.

The sensory taste analysis was also performed to establish consumer preference and taste with regard to consumption of rabbit meat. The sensory data was analysed using the preference ranking method of Basker (1988).

4.2 Respondent characteristics

Fifty five percent of the respondents (89) were female. The average age of the respondents was 44 years and varied between 18 and 80 years. The respondents predominantly speak Sesotho and Afrikaans. Sesotho was widely spoken by the African community and Afrikaans by the White and Coloured communities.

The majority of the households consisted of either 3 or 4 household members (see Table 4.1).

Table 4.1: Household size

Number of household members	Percentage
1	13.5
2	18.0
3 to 4	40.4
5 to 7	23.6
8 or more	4.5

The dependency ratio among the respondents was 40.3%. This implies that for every 100 economically active adults (aged between 15 and 64 years) there were 40 youths aged between 0 and 14 years and elderly aged above 64 years dependent on them. The youth and elderly dependency ratios were 22.6% and 17.7% respectively.

4.2.1 Education and religious denominations

The majority of the respondents (87.6%) had formal education, only 12.4% had no formal education. In this particular context, having formal education refers to those individuals who had obtained some form of education varying between primary and tertiary education. Having no formal education refers to those individuals who had attained none of the aforementioned.

The educational level of the majority of the respondents who had formal education varied between grade 8 and 11. Only 18.2% of the respondents who had no formal education were able to read and write.

Various religions were practised by the respondents (see Table 4.2). The majority of the respondents were Christians.

Table 4.2: Household religious denominations

Religious denominations	Percentage
Dutch Reform	11.4
Roman Catholic	6.8
Methodist	9.1
Presbyterians	2.3
Full Gospel	1.1
Christians	56.8
Apostolic Trinity	1.1
Unity	1.1
Old Apostolic	1.1
Faith Mission	1.1
Universal	1.1
New Apostolic	6.8

4.2.2 Employment

The nature of employment held by the respondents varied from professional to casual employment. Most of the households' income was generated by pensioners and casual workers (see Table 4.3). This is not surprising given the unemployment rate in the Free State Province. The Free State Province had an unemployment rate of 30% during 1999 (South African Yearbook, 1999).

Table 4.3: Household employment status

Employment status	Percentage
Pensioners	37.1
Casual/odd jobs	25.7
Semi-professionals	13.3
Professionals	11.4
Domestic/Ancillary works	6.7
Self-employed	5.8

The average monthly income received by the respondents was R1 566.43. Household monthly income varied between R140.00 and R10 000.00. It is very difficult to measure the extent of poverty in terms of income insufficient or sufficient to enable households to meet their basic needs (World Bank, 1980).

However, researchers have given a rough indication with regard to households which are below or above the poverty line. Balyamujura (1995) states that the poverty line varies according to the size of the household and its age composition. Statistics South Africa uses a poverty line of R800.00 per month for the urban and rural area households (Statistics South Africa, 1996b). The average income of the respondents earning below and above this poverty line was R554.58 and R2 764.68 respectively. The poverty line was not adjusted for household composition.

4.2.3 Household expenditure patterns on food

The respondents were categorised according to the following monthly food expenditure ranges R0-50, R51-100, R101-150, R151-200, R201-250, R251-300 and R301 or more. Thereafter, the respondents were grouped according to demographic variables such as household size, level of education, employment and income within the aforementioned food expenditure categories (see Table 4.4). This was to show the association of various household characteristics and food expenditure. Demographic variables such as age, permanent income,

race, marital status, family size, education and employment were significant in predicting households with similar expenditure patterns (Cha, 1991 and Chung, 1991 cited by Fan, 1998). Fan (1998) found age, gender, education, family size and composition, employment, number of earners and housing tenure significant in predicting households with similar expenditure patterns.

Table 4.4: Household characteristics and food expenditure patterns

	R0-50	R51-100	R101-150	R151-200	R201-250	R251-300	R301+
Household size (percentage)							
1	44.4	9.1	0.0	6.7	0.0	37.5	8.7
2	22.2	31.8	0.0	13.3	50.0	12.5	8.7
3 to 4	11.1	50.0	62.5	33.3	25.0	37.5	43.5
5 to 7	11.1	9.1	37.5	46.7	0.0	12.5	30.4
8+	11.1	0.0	0.0	0.0	25.0	0.0	8.7
Educational level of the respondents (Percentage)							
Non-formal	33.3	22.7	0.0	0.0	25.0	12.5	4.3
Grade 1 to 7	11.1	18.2	12.5	26.7	0.0	25.0	17.4
Grade 8 to 11	44.4	40.9	37.5	33.3	25.0	25.0	39.1
Grade 12	11.1	9.1	50.0	26.7	0.0	12.5	21.7
Grade12+certificate	0.0	0.0	0.0	0.0	25.0	0.0	0.0
College/university	0.0	9.1	0.0	13.3	25.0	25.0	17.4
Work done by the household (Percentage)							
Professional	0.0	5.3	0.0	17.6	66.7	25.0	21.7
Casual job	20.0	31.6	75.0	35.3	0.0	25.0	17.4
Semi-professional	0.0	10.5	16.7	17.6	0.0	25.0	26.1
Self-employed	0.0	15.8	0.0	11.8	0.0	0.0	4.3
Domestic work	40.0	10.5	0.0	0.0	0.0	25.0	8.7
Pensioner	40.0	26.3	8.3	17.6	33.3	0.0	21.8
Average monthly income (Rand)							
Household	713.30	1 101.80	1 283.80	1 657.90	2 346.70	2 086.70	2 205.40

The respondents were also grouped according to economic activeness, i.e. economically active, youth and adult dependants. Among the economically active population, the unemployed individuals (11.8%), the employed individuals (65.4%) and students (22.8%) were established.

The households in the categories R51-100 had fewer members holding professional forms of employment compared to the category spending more than R301 and also had a lower average monthly income. The monthly income increased with increasing household food expenditure but dropped among households which spent between R251 and R300 per month (see Figure 4.1 and Table 4.4). The highest monthly income was received by households in the

food expenditure category of R201-250. This category was characterised by the highest proportion of household members holding professional employment. The majority of the respondents consumed meat twice a week and spent less than R250.00 on meat, most of the consumers purchased meat from butcheries. These results are not surprising given the fact that most of the respondents household income was generated by pensioners¹.

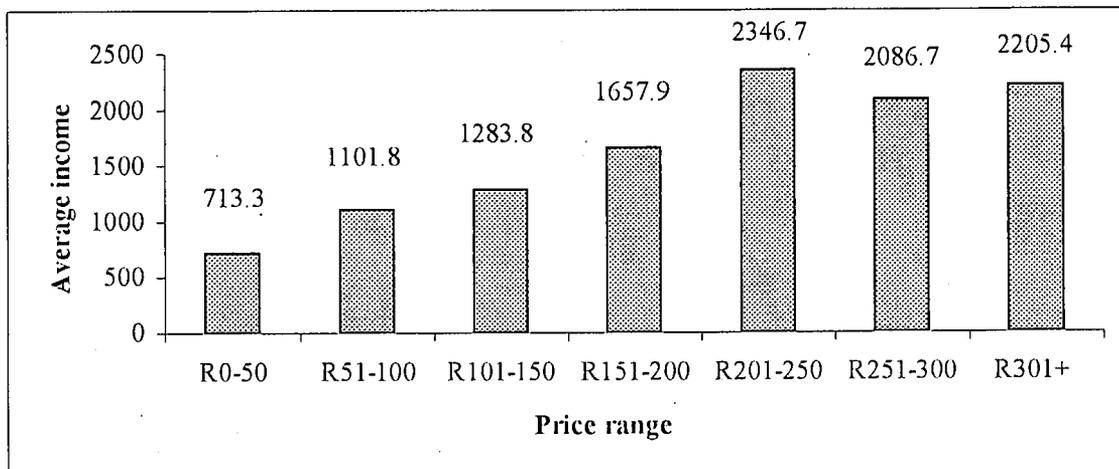


Figure 4.1: Average monthly income and expenditure on food

4.2.4 Attitude towards meat

The respondents were asked to rank the meat products they normally consume. The meats were ranked in a descending order to denote decrease in preference or dislike. A high percentage implies a negative attitude or dislike. Pork was the most disliked by the African and Coloured communities because it irritates their stomach when consumed, has high fat content and it is also disliked due to religious beliefs. This was followed by beef and chevon (see Table 4.5). The Whites disliked meat that is smelly, too bony and tough.

¹ The Department of Social Welfare gave pensioners a monthly income of R540.00 in 1999.

Table 4.5: Ranking of meat dislike by the Africans and Coloureds

Ranking	Meats	Percentage
1	Pork	42.1
2	Beef	31.8
3	Chevon	13.8
4	Mutton	6.7
5	Chicken	2.6
6	Rabbit	2.1
7	Other meat types	1.0

Williams and Stout (1964) state that consumers prefer meat with less fat as highlighted by the attitude towards pork. Chevon was disliked because of its bad odour and beef was discredited because of its toughness and difficulty to cook. This was similar to the findings of a feasibility study conducted in 1998 by the USAID and Agricultural Research Council (ARC) on commercialisation of indigenous goat meat in South Africa. Ward and Hildebrand (1995) showed that meat purchasing behaviour and consumer attitude towards meat are positively related. The consumers were categorised as light, moderately light, moderately heavy and heavy consumers. The consumers in each of these categories were asked about specific meat attributes that are important to them and influence their decision to purchase meat.

The following rank order of the attributes was formulated, namely taste, quality, colour or appearance, tenderness, convenience and ease in cooking, level of fat, economic value, nutritional content, level of cholesterol, variety in meal preparation and packaging. There was no significant difference among the different meat consuming categories with regard to the five most highly ranked attributes (taste, quality, colour, tenderness and ease of cooking). However, significant difference among meat consuming groups was envisaged in meat attributes such as fat, cholesterol and nutritional content. The light category of consumers considered these attributes more important in making a decision to purchase meat compared to the heavy category of consumers.

These three attributes might be the three most controversial attributes of meat (Ward and Hildebrand, 1995).

4.3 Rabbit products

The level of knowledge and attitude of the respondents with regard to the consumption of rabbit products was tested. The analysis was narrowed to the different population groups (Africans, Coloureds and Whites) and thereafter, all the respondents in order to get a holistic perspective of the results.

The product attributes likely to influence the consumption of rabbit products were also investigated. Rabbit products were subjected to the analysis to determine the knowledge held by the respondents with regard to the importance of rabbits and attributes which influence consumption of rabbit meat, rabbit manure products and fur made apparels.

4.3.1 Knowledge of the different population groups about rabbit products

Sixty nine percent of the White population was aware of the various rabbit products. On the other hand, lack of awareness was high among the African and Coloured population groups. Only 32 and 29.9% of the African and Coloured population respectively were aware of the various rabbit products.

4.3.1.1 Attitude of the different population groups towards rabbit products

The attitude towards the consumption of rabbit products was found to be negative among the White population, 64.3% of the White respondents held a negative attitude to the consumption of rabbits compared to only 28.8 and 20.0% of the respondents among the African and Coloured population respectively. The role of race as a demographic variable in influencing

household expenditure patterns on a product is demystified by Fan (1998) using the concept of ethnicity difference. Ethnicity may affect household expenditure patterns in several ways.

Firstly, ethnicity reflects culture and tradition that are unique to a particular ethnic group. The unique culture and tradition may affect the ethnic households' preferences and as result affect their economic behaviour. Secondly, culture and tradition may affect ethnic households' demographic characteristics such as family size and household composition. These household demographic characteristics then affect the preferences of the household and in turn its economic behaviour. Thirdly, ethnicity may also cause ethnic households to face a set of non-economic constraints beyond the monetary constraints. The non-economic constraints may include barriers due to the language and racial discrimination. These constraints may at times also influence the households' economic behaviour (Fan, 1998).

The population groups were asked to rate rabbit products as best, better and worse. The majority (50%) of the White population rated rabbit products as the worst livestock product for human consumption. The White population advocated for the protection of rabbits and the rearing of rabbits as pets at home rather than their consumption. The majority of the African and Coloured communities rated them as better products to consume (see Table 4.6).

Table 4.6: Rating of rabbit products by the different population groups

Rating	Proportion (Percentage)		
	African	White	Coloured
Best	27.1	37.5	20.0
Better	71.2	12.5	80.0
Worse	1.7	50.0	0.0

4.3.1.2 Factors that influence consumption of rabbit products by the different population groups

The different rabbit products attributes likely to influence each population group's decision to consume were analysed. The African and Coloured communities will consume rabbit products because rabbit meat is suitable for patients with heart diseases and people who are over weight or watching their weight. The members of the White population will consume rabbit products mainly in the form of apparels made of rabbit fur and manure products (see Table 4.7).

Table 4.7: Reasons for the different population groups to consume rabbit products

Reasons to consume rabbit products	Proportion (Percentage)		
	African	White	Coloured
Meat is low on cholesterol and highly palatable	15.2	16.7	34.6
Meat is low on fat and high in protein	3.8	0.0	3.9
Meat good for heart disease patients and weight reduction	65.8	16.7	50
Meat good for patients with coronary problems	5.1	0.0	0.0
Apparels made of rabbit fur	7.6	33.3	0.0
Manure good for vegetable growing and flowers	2.5	33.3	11.5

4.3.2 Knowledge of the respondents about rabbit products

The majority of the respondents know very little about rabbit products. Thirty eight percent of the respondents were aware of the potential benefits of rabbit products. However, after the importance of rabbit products was highlighted,

67.1% of the respondents rated rabbit products as the better livestock products to consume, 26.8% as best and 6.1% as the worst products for human consumption (see Table 4.8).

Table 4.8: Rating of rabbit products by the respondents

Rating	Percentage
Best	26.8
Better	67.1
Worse	6.1

The suitability of rabbit meat for special diets, for heart disease patients, the elderly, low sodium diets and weight reduction diets is the attribute most likely to influence the purchase and consumption of rabbit products (see Table 4.9).

Table 4.9: Reasons for the respondents to consume rabbit products

Reasons to consume	Percentage
Meat is low on cholesterol and highly palatable	19.8
Meat is low on fat and high in protein	3.6
Meat good for heart disease patients and weight reduction	59.5
Good for patients with coronary problems	3.6
Apparels made of fur	7.2
Manure good for vegetable growing and flowers	6.3

Specific factors likely to discourage the respondents from consuming rabbit products were also investigated and it was found that the majority of the respondents (42.1%) were against the consumption of rabbit meat.

Thirty seven percent of the respondents were against the fact that rabbits should be bred or kept at home and 21.1% would not purchase the rabbit products if they were expensive (see Table 4.10).

Table 4.10: Repellents about rabbits

Factors	Percentage
Meat consumption	42.1
Home breeding/keeping	36.8
Product price	21.1

4.4 Respondent preference

The respondents' preference of rabbit products was also determined using willingness to pay criteria. The respondents were asked to state the exact amount of money they were willing to spend on the purchase of the following products: rabbit meat, rabbit manure product and apparel made of rabbit fur. The amount of money the respondents were willing to pay for rabbit products is shown in Table 4.11.

Table 4.11: Willingness to pay for rabbit products

Products	Unit	Average price per unit (Rand)
Meat	Kg	12.73
Manure	Kg	19.48
Fur jacket	1 coat	175.04

Rabbit meat was compared with chicken, its manure with mixed fertiliser and a jacket made of rabbit fur compared with a jacket made of fur from some other livestock. It was assumed that all products are very close substitutes. The substitutes to rabbit products are shown in Table 4.12.

Table 4.12: Substitutes to rabbit products

Products	Unit	Average price per unit (Rand)
Chicken	Kg	12.24
Mix fertiliser	Kg	2.02
Other livestock fur jacket	1 coat	1200.00

The average market price for chicken was R12.24 per kg (Statistics South Africa, 1999b). The respondents were willing to spend more money on rabbit

meat compared to chicken. The same applied to manure. One Kg of mixed fertiliser cost R2.02 during 1999 (Statistics South Africa, 1999b). The respondents were not willing to spend more than R175.04 on average for a rabbit fur jacket. This was much lower than the average retail price (R1200.00) for jacket made of livestock fur. The majority of the respondents considered a jackets made of rabbit fur perhaps as a luxurious product which they could forego without any undue inconvenience.

4.5 Effect of demographic characteristics on willingness to pay

The households were categorised into four willingness to pay price ranges. The price range used for rabbit meat and manure product was R0-15, R16-20, R21-25 and R26 or more while the price range for apparel made of rabbit fur was R0-100, R101-300, R301-500 and R501 or more. Willingness to pay was analysed with respect to the demographic variables likely to influence expenditure on the rabbit products such as household size, educational level, employment status and income.

4.5.1 Willingness to pay for rabbit meat

The majority of the respondents (81.3%) were willing to pay between R0 and R15 per kg of rabbit meat. The willingness to pay for rabbit meat did not show a positive linear relationship with the average income of the respondents as expected. This could be attributed to the fact that rabbit meat may be regarded as an inferior product by the respondents in Kroonstad town and Maokeng (see Table 4.13). Cultural differences of societies also play a major role in influencing consumption of a product. Kohls and Uhl (1990) state that man is omnivorous and can thrive on a wide variety of different foods. He is choosy and no society defines all the potentially edible material in its environment as food (Kohls and Uhl, 1990). Man is also a social creature and

his food preferences and eating patterns are culturally bound and socially influenced (Kohls and Uhl, 1990). There seems to be no physiological reasons why some societies cultivate certain crops for food and others shun the same crops, why some people eat insects (an excellent source of protein) and others do not, why some eat animal flesh and some do not (Kohls and Uhl, 1990).

Table 4.13: Willingness to pay category for rabbit meat

	R0-15	R16-20	R21-25	R26+
Household size (Percentage)				
1	10.8	14.3	0.0	16.7
2	20.0	0.0	50.0	0.0
3 to 4	66.2	71.4	50.0	66.6
5 to 7	3.0	14.3	0.0	16.7
8+	0.0	0.0	0.0	0.0
Educational level of the respondents (Percentage)				
Non-formal	9.2	42.9	0.0	0.0
Grade 1 to 7	16.9	28.5	100.0	16.7
Grade 8 to 11	41.5	14.3	0.0	83.3
Grade 12	20.0	14.3	0.0	0.0
Grade12+certificate	1.5	0.0	0.0	0.0
College/university	10.8	0.0	0.0	0.0
Work done by the household (Percentage)				
Professional	11.6	0.0	0.0	0.0
Casual/odd job	40.6	66.7	0.0	14.3
Semi-professional	11.6	0.0	0.0	57.1
Self-employed	7.2	0.0	100.0	0.0
Domestic work	8.7	0.0	0.0	14.3
Pensioner	20.3	33.3	0.0	14.3
Average monthly income (Rand)				
Household	1 436.31	718.57	720.00	1 650.00

4.5.2 Willingness to pay for rabbit manure

The results indicated that the average income of the respondents varied between the willingness to pay categories for rabbit manure product. The average income increased in the first three lower price categories but declined drastically in the highest category. The majority of the respondents (68%) were willing to pay within the range of R0-15 for rabbit manure product per kilogram and were casually employed (see Table 4.14).

Table 4.14: Willingness to pay category for rabbit manure product

	R0-15	R16-20	R21-25	R26+
Household size (Percentage)				
1	15.1	0.0	0.0	0.0
2	22.6	10.0	0.0	7.1
3 to 4	56.6	80.0	100.0	92.9
5 to 7	5.7	10.0	0.0	0.0
8+	0.0	0.0	0.0	0.0
Educational level of the respondents (Percentage)				
Non-formal	13.2	10.0	0.0	7.1
Grade 1 to 7	17.0	20.0	0.0	28.6
Grade 8 to 11	37.7	40.0	100.0	42.9
Grade 12	20.8	10.0	0.0	21.4
Grade 12+certificate	1.9	0.0	0.0	0.0
College/ university	9.4	20.0	0.0	0.0
Work done by the household (Percentage)				
Professional	16.3	9.1	0.0	0.0
Casual/odd job	38.8	36.4	0.0	25.0
Semi-professional	10.2	9.1	100.0	31.3
Self-employed	6.1	9.1	0.0	12.5
Domestic work	6.1	9.1	0.0	12.5
Pensioner	22.4	27.2	0.0	18.7
Average monthly income (Rand)				
Household	1 324.98	1 564.55	3 400.00	1 287.69

4.5.3 Willingness to pay for rabbit fur apparel

The average monthly household income of the respondents willing to pay R501 and more was R2 655.00 and was the highest compared to other categories. The majority of these respondents held professional form of employment compared to other categories (see Table 4.15).

Table 4.15: Willingness to pay category for rabbit fur made apparel

	R0-100	R101-300	R301-500	R501+
Household size (Percentage)				
1	13.5	5.9	0.0	0.0
2	16.2	17.6	0.0	0.0
3 to 4	62.2	73.5	100.0	100.0
5 to 7	8.1	2.9	0.0	0.0
8+	0.0	0.0	0.0	0.0
Educational level of the respondents (Percentage)				
Non-formal	18.9	5.9	0.0	0.0
Grade 1 to 7	16.2	23.5	50.0	0.0
Grade 8 to 11	37.8	50.0	0.0	25.0
Grade 12	16.2	11.8	50.0	50.0
Grade 12+certificate	0.0	2.9	0.0	0.0
College/university	10.8	5.9	0.0	25.0
Work done by the household (Percentage)				
Professional	9.7	9.4	0.0	14.3
Casual/odd job	41.9	31.3	66.7	28.6
Semi-professional	12.9	15.6	33.3	14.3
Self-employed	6.4	6.3	0.0	28.6
Domestic work	0.0	15.6	0.0	0.0
Pensioner	29.0	21.9	0.0	14.3
Average monthly income (Rand)				
Household	1 119.73	1 410.68	2 245.00	2 655.00

4.6 The sensory analysis

Sensory evaluation of food or evaluation of food quality by a panel of judges is essential to most food experiments because it answers the important questions of how a food looks, smells, feels and tastes (Campbell, Penfield and Griswold, 1987). Consumer sensory research can identify consumer needs which are not being met by currently available food products (Agricultural Research Council, 1995). It can anticipate future needs, aid in the identification of new markets and business opportunities, help prevent the costly errors of producing and marketing food products to a dream target group which does not exist (Agricultural Research Council, 1995).

The measurement of the sensory properties and determination of the importance of these properties to the consumer's acceptance of the product represents a major accomplishment in sensory evaluation (Stone and Sidel, 1985).

Panelists may be asked to discriminate among samples, describe or score the quality of a product, rate the acceptability of a product or describe the preference for a product (Campbell *et al*, 1987).

The methods used to establish acceptance, preference or degree of liking for food items should be conducted among large number of untrained, inexperienced people who are representative of the target population or users of the product under study (Moskowitz, 1991 cited by Agricultural Research Council, 1995).

According to Campbell *et al* (1987) procedures used to select a panel will depend on the type of sensory testing to be done as well as circumstances under which it is being done. If few persons are available, it may be necessary to accept anyone who will serve. It is, of course, better to select the most able judges from a larger group (Campbell *et al*, 1987). The sample size of the panel is also a critical aspect in the sensory evaluation. The size of the panel should be as large as possible in order to reduce the experimental error thus improving the reliability of the results (Campbell *et al*, 1987). It has been established that the sample size of at least 50 to 100 panelists should be used for acceptance or preference tasting (Agricultural Research Council, 1995).

4.6.1 Panelist characteristics

Taste quality of meat was evaluated using preference ranking of Basker (1988). Eighty six panelists constituting members of the African, White and Coloured communities were recruited for the panel evaluation. These were drawn from the University of the Free State, mainly from the Faculty of Natural and Agricultural Science and comprised of 28 students and 58 university members of staff. The university staff members consisted of academic staff, administrative staff and members from the support services such as cleaners

and security personnel. Twenty seven of the panelists were male and 59 female.

4.6.2 Material and methodology

The various types of lean meat were minced, lightly salted and fried in sunflower oil. Twenty five millilitres of meat samples were spooned onto miniature glass bowls, covered with foil and kept warm in the warming drawer (setting 8) of a Defy Thermofan Stove. For evaluation, the meat samples were presented on white polystyrene trays.

Panelists assigned ranks by using a scale of 1 to 4, 1 for the most preferred and 4 for the least preferred sample. No ties were allowed, i.e. no two samples could be awarded the same numerical value. Tap water at room temperature was provided to the panelists to rinse their mouths while tasting between samples. Apples were not used to remove flavour from the mouth between samples since lean meat types were used and no fat build-up was expected.

Four meat samples (chicken, beef, mutton and rabbit) were evaluated by panelists. Samples were coded using three digit numbers picked from a table of random numbers. The tasting was performed at room temperature (20-22°C) in individual tasting booths under red lights in the Sensory Evaluation Laboratory.

4.6.3 Results

The values were added to obtain a rank sum for each sample. Differences in the preference rank sums between all possible pairs of products were calculated and considered. For example, between sample A and B it was 23 while between sample C and D it was 22 (see Table 4.16). If any of these

(absolute) differences exceeded a critical value, then the preferences for that pair of products differed from one another at certain statistical significance level.

Table 4.16: Ranking of livestock meats

Sample	A (Chicken)	B (Beef)	C (Mutton)	D (Rabbit)
Rank sum	209	232	198	220
Difference vs A		23	11	11
B			34	12
C				22

Basker (1988) compiled a set of tables with critical values of differences among rank sums for multiple comparisons. In this sensory taste analysis, a 5% statistically significant difference between the rank sums is attained when the difference is greater than or equal to 43.5 while significance at 1% is attained when the rank sum difference is greater than or equal to 52.7:

In Table 4.17, the results are arranged with the products in decreasing order of preference or increasing order of rank sums. Sample C (mutton) is put first because it had the lowest rank sum and was most preferred. It was followed by sample A (chicken) which had the second lowest rank sum, then by sample D (rabbit) and finally sample B (beef) which had the highest rank sum and was least preferred. The majority of the panelists were willing to buy mutton at the same price as its substitutes. Lowercase Greek letters were used to indicate products whose rank sums did not differ significantly.

Table 4.17: Rank sums of livestock meats

Significance level	P= 0.05	P= 0.01
Critical difference	43.5	52.7
Sample C	α	α
A	$\alpha\beta$	$\alpha\beta$
D	$\alpha\beta$	$\alpha\beta$
B	$\alpha\beta$	$\alpha\beta$

The results imply that no product was significantly highly preferred over the other since all differences were lower than the critical values at both $p= 0.05$ and $p= 0.01$ significance levels. This result could be attributed to the tasting panel which was recruited from a broad socio-economic background and was familiar with at least three types of the meat being tasted. Some members of the panel were familiar with all four types of meat. Furthermore, the results could be attributed to the fact that the taste and flavour of the main product (rabbit meat) was acceptable and even preferred by some members of the tasting panel.

Only 50% of the panelists reported to have eaten rabbit meat before. The main reason presented by the majority of the panelists who have not eaten rabbit meat before was that they never had an opportunity to consume rabbit meat since the meat is not readily available on the market. Some panelists stated that they had not consumed rabbit meat before as they equated the eating of rabbit meat to eating cat meat or meat of other related pets.

4.7 Summary and conclusion

This chapter highlighted the demographic characteristics of potential consumers of rabbit products in Moqhaka local municipality. The educational background of the respondents, their religious denominations, nature of

employment, source of income and expenditure patterns on food were described to characterise the potential consumers. The chapter also analysed the attitude of the respondents towards meat consumption, attitude towards consumption of rabbit products, knowledge about rabbit products, factors affecting consumption of rabbit products and willingness to pay for rabbit products. Certain important features likely to influence consumption of rabbit products such as suitability of its meat for patients with weight reduction and coronary problems, usefulness of its fur to make clothing and suitability of its manure were highlighted. The African and Coloured communities regarded rabbit products as products good for human consumption. Unlikely, members of the White population who regarded rabbit as an animal which should be reared as pet and not for meat.

The sensory analysis was conducted to establish consumer preference and taste with regard to meat consumption. The meat samples which were tasted included chicken, mutton, beef and rabbit meat. It was established that mutton is the most preferred meat by the panelists and rabbit meat the third preferred. However, the differences in the rank sums were all not statistically significant. This implies that no meat sample was significantly highly preferred by the tasting panel over the other. This giving rabbit meat an opportunity to be sold in the markets the same way as the aforesaid substitutable products.

CHAPTER 5

PRODUCTION OF RABBIT PRODUCTS

5.1 Introduction

The demographic factors likely to influence the production of rabbit products such as race, education, income, knowledge about rabbit products and perception held about rabbit production are analysed in this chapter. The descriptive statistics was used to analyse the aforesaid demographic information.

The viability of the rabbit enterprise in Moqhaka, Ngwathe and Matjhabeng local municipalities is tested by comparing it to other activities in which the small-scale farmers are engaged. The comparative analysis of these activities serves as a guide for the decision-making process.

5.2 Producer characteristics

Fifty three percent of the respondents (80) were male. The average age of the respondents was 50 years and varied between 20 and 87 years. The majority of the respondents (90.8%) had formal education, the level of education of the majority of the respondents varied between grade 1 and 7. Only 12.5% of the respondents who had no formal education were able to read and write. Ninety one percent of the respondents spoke Sesotho.

5.2.1 Employment

The producers were engaged in both farming and non-farming activities, most of the producers' income (43.6%) was generated from government pension funds (see Table 5.1). The average monthly household income was R829.02.

This varied between R200.00 and R3000.00. Income is generated by the producers and household members engaged in both farming and non-farming activities.

Table 5.1: Producers employment status

Employment status	Percentage
Pensioners	43.6
Casual/odd jobs	27.3
Self-employed	16.4
Farming with only own livestock	9.1
Professionals	1.8
Semi-professionals	1.8

5.3 Economic activities

Most of the respondents (45%) were involved in livestock production and 55% in other activities such as vegetable growing, bakery, sewing and cooking oil. The livestock reared include cattle, goats, sheep, chickens and pigs. The vegetables grown include carrots, spinach, beetroot, pumpkin, cabbage, onions, tomatoes and potatoes. All the members involved in the aforesaid activities worked in groups. Eighty four percent of the farmers had access to land for farming purposes and the land was communally used. The land was mainly utilised for both vegetable and livestock production (see Table 5.2).

Table 5.2: Agricultural land use

Productions	Percentage
Both for livestock and crops	54.8
All for crops	30.1
All for livestock	15.1

Oricho (1997) argues that the communal land system in South Africa has its own limitations. The communal land ownership discourages investment in land and undermines long-term quality of use. Communal ownership is incongruent with commercial and Land Bank collateral requirements thus

depriving emerging farmers of collateral to enable them to borrow from financial institutions. Most of the land which is communally used is without irrigation facilities or developments thus exposing farmers to the risk of rainfed agriculture (Oricho, 1997). Even where land is available, despite its quality and quantity, the absence of complementary facilities, infrastructure and services reduces the potential of such land and expected production (Oricho, 1997).

5.3.1 Production

The purpose of production by small-scale farmers in Moqhaka, Ngwathe and Matjhabeng local municipalities was mainly for subsistence. Small-scale farmers sold their products only when there was a surplus so as to generate some income. Depending on the amount of money they realised, they remunerated themselves for work done and saved for the purchase of production inputs.

The production inputs used were however very basic due to the nature of operation. For instance, the livestock producers more often grazed their livestock on the veld and very seldom fed them on concentrates. The vegetable producers used inputs such as wheelbarrow, hosepipe, fork, spade, rake, etc. to perform their daily agricultural activities. The farmers treated their vegetables and livestock against disease only when there was a serious outbreak.

5.3.2 Marketing

Private selling is the most common marketing channel used by the small-scale farmers in Moqhaka, Ngwathe and Matjhabeng local municipalities to market their products. They sell their products to the community on a cash basis and

sometimes through credit arrangements. The Centre for International Agricultural Marketing and Development (2001) states that the commercial farmers utilise a range of marketing channels, in some cases, the small-scale farmers utilise the same channels. For instance, in the Free State Province, the small-scale farmers sell their maize to the co-operatives while milk, broilers and food crops are sold directly to consumers and hawkers. Livestock is sold at auctions even though there is a perception amongst some of the small-scale farmers that the prices offered at these livestock auction markets are low.

The selection of a marketing channel is affected by a number of factors, including the availability of the market, price offered in the market, distance to the market and potential or size of the market (The Centre for International Agricultural Marketing and Development, 2001). According to Stilwell (1997) in the past many African farmers had to market their produce through White farmers in order to get a fair price. There is a genuine lack of information and ignorance of quality standards among the small-scale farmers. There is a need for training and those that have been involved in agricultural marketing such as commercial farmers could do much to assist the small-scale farmers through capacity building (Stilwell, 1997).

5.4 Factors affecting production

The producers in Moqhaka, Ngwathe and Matjhabeng local municipalities experienced different problems. For instance, the vegetable producers lack transport to market their products and storage facilities for their highly perishable products. The South African National Department of Agriculture, FAO (2001) and the Centre for International Agricultural Marketing and Development (2001) state that farmers often do not have their own means of transport and are dependent on contractors, taxis or neighbours to transport their products to the market.

Hired transport is in some cases expensive because relatively small quantities are produced by the small-scale farmers. In some cases, transport contractors are not willing to render the service in rural areas because of very poor road conditions. In many rural areas, storage facilities are either non-existent, unsuitable or centralised to the extent that crops need to be transported over long distances at considerably high costs. This may at times result in loss of quality due to handling and transportation.

Even though lack of finance was a general problem to the small-scale farmers in Moqhaka, Ngwathe and Matjhabeng local municipalities and hampering the development of their activities, the producers involved in non-farming activities were in a dire need for financial means to purchase the necessary production inputs. Nell (1998) states that small-scale farmers have difficulties in acquiring production inputs and lack access to services and information which are vital for any production decisions.

5.4.1 Factors affecting the decision to produce

The factors that influence the new entrants' decision to produce include the acquisition of production inputs as well as the technical, financial and managerial skills to operate the small holdings in an economically viable manner (Mashile, 1997).

The small-scale farmers and emerging farmers struggle to get credit through formal credit institutions which require collateral. Established co-operatives which could provide credit require the farmers to meet a percentage of their credit needs. For example, 10% is required by the Eastern Free State Cooperatives and can be prohibitive to the emerging farmers (Mashile, 1997). Inability to secure credit as a result directly affects the acquisition of the necessary production inputs (Mashile, 1997).

Kirsten (1994) states that limited availability of inputs, mechanisation, marketing services, poor institutional and infrastructural support, inappropriate policies and legislation may affect increased productivity or adoption of technology by the prospective producers. Lubbe (1992) states that the producer may also be influenced by factors such as the ability to have several alternative marketing options e.g. cash contract, future delivery, bargaining power concerning his product, marketing goals, market strategy implementation (product, price, promotion and distribution), ability to achieve recognition through product differentiation (via volume, quality or branding), continual access to demand, supply, price, etc.

5.5 Knowledge about rabbit production

The level of knowledge of the producers with regard to the production of rabbits was tested. The respondents were asked to indicate the level of knowledge they had on rabbit production as to whether they had little knowledge, more knowledge or did not have any knowledge at all. It was found that the majority of the producers were not aware of the potential of rabbit production and only a few had made an attempt to rear rabbits (see Table 5.3).

Table 5.3: Knowledge about rabbit production

Knowledge	Percentage
Little knowledge about rabbits	30.1
More knowledge about rabbits	0.0
I do not know anything about rabbits	69.9

The producers were also tested on a "yes or no" basis to establish whether they knew certain rabbit production attributes. The majority of the respondents were not aware of the rabbit production attributes they were questioned about (see Table 5.4).

Table 5.4: The potential of rabbit production

Rabbit production attributes	Response percentage	
	Yes	No
Female rabbit (doe) can produce 15 off spring in a year which other related livestock cannot do	15.7	84.3
Feeding rabbits is cheap. They can be fed on garden leaves, roadside grass, etc.	42.9	57.1
The manure of rabbits can be turned into compost and later be used for vegetable growing	31.4	68.6
Rabbit's fur can be used to make clothes, thus a source of income	45.1	54.9

Despite the producers' superficial knowledge about rabbit production, 54.3% rated the business as the best, 21.4% as better and 24.3% as the worst business for someone to try. The majority of the producers (62.7%) are willing to try rabbit production at a very small-scale to minimise risk due to their lack of knowledge and expertise on rabbit production.

5.6 Enterprise Budgets (EB)

The fundamental key factor that normally producers establish prior to engagement in a particular business or activity is whether profit or loss will be generated. The enterprise budgeting is one of the common economic tools used to determine viability of economic activity by comparing the projected costs and benefits. Enterprise budgets are often a prerequisite in the development and compilation of other budgets such as partial, total, capital and cash flow budgets (Standard Bank Agricultural Division, 1999).

Wanjaiya and Pope III (1985) used the enterprise budget in order to test the competitive position of rabbits. The enterprise budget was used to calculate returns per man-day of labour utilised in the enterprises. Rabbits were

compared against poultry, bacon pigs and goats. The results of the analysis showed that the gross margin excluding labour costs was highest for rabbits at R464.94² per man-day, followed by bacon pigs at R405.59, poultry and goats at R221.00 and R208.28 per man-day respectively (Wanjaiya and Pope III, 1985). However, if labour costs were to be included in the gross margin calculation, bacon pigs had the highest gross margin at R311.09 per man-day, then poultry at R66.40, followed by goats and rabbits at R58.78 and R58.59 per man-day respectively.

The budgets indicated that where under-utilised family labour was used for subsistence production, rabbits were a better alternative. Where labour was hired, bacon rearing was the better alternative. There was no difference between returns generated by the rabbit and goat enterprises (Wanjaiya and Pope III, 1985).

5.6.1 Comparison of production alternatives available to the small-scale farmers in Moqhaka, Ngwathe and Matjhabeng local municipalities

The viability of small-scale rabbit enterprise in Moqhaka, Ngwathe and Matjhabeng local municipalities is compared with other activities in which small-scale farmers are engaged such as broiler, carrot, beetroot and maize production. In this case, comparison is not made uniform by comparing rabbit production with other related micro-livestock such as poultry but also crop production. The reason to include the production of crops in the analysis is because the farmers in the aforesaid local municipalities may decide to stick to their current crop activities as opposed to rabbit production due to differences in the production costs. Production cost ratio is used to determine the cost-effectiveness of the aforementioned activities.

² South African Rand traded at 6.3 Kenya Shilling in 1985.

The enterprise budgets provide an estimate of the costs and revenues with a given set of resources. It should be noted that some adjustments were made to the aforementioned budgets for the sake of uniformity. A number of production assumptions were also made for each activity.

5.6.1.1 Rabbit production enterprise budget

It is assumed a farmer starts production with a breeding stock of 1 buck, 10 does and a starting up capital of R2 538.40 for the whole year. Eleven breeding cages and 10 nest boxes for the does³. One doe produces 8 litters in a year and within a litter 6 bunnies are produced. The total number of the fryers produced is 480. This production includes any possible yield losses or mortalities that may result from the bunnies.

The transfer of the bunnies from the does to the cages takes place between ±16-28 days. This is the period which the first group will occupy the cages. At this stage, the second breeding cycles of the bunnies will be ready to be weaned for the fattening cage.

The total cost of rabbit feeds is estimated for 11 breeding stock and 480 bunnies produced. A matured animal eats 80 grams and young one 40 grams a day. Rabbit feed cost R58.00 per bag (50 kilograms). One unskilled labour is utilised instead of skilled labour since rabbit enterprise is not difficult activity to monitor and also require minimal labour force. The unskilled labour is paid R2.80⁴ per hour and R67.20 per month. It should be noted that in terms of the Department of Labour's basic conditions of Employment Act, unskilled labour

³ The breeding cages and the nest boxes are self-constructed with mesh. The costs for the feeders and drinkers are not included since they are components of the constructed cages.

⁴ This is an estimate by Mr. Fourie (Agricultural Economist).

is supposed to work maximum of 24 hours in a month. In this particular case, an assumption is made that an unskilled labour works the whole 24 hours.

Vaccine is given to the whole herd of rabbits every 6 months or during times when the producer suspects that there is a serious disease outbreak. A bottle of vaccine at a price of R5.00 can treat 100 animals (\pm 50 doses per rabbit). It is assumed that a farmer uses his own water. The formulated enterprise budget is shown in Table 5.5.

Table 5.5: Rabbit enterprise budget

	Quantity used	Value per unit (Rand)	Value per year (Rand)
Gross receipts	480.00	15.20	7 296.00
Variable cost			
Unskilled labour (hour)	288	2.80	806.40
Feeds (kg)	1 450		1 682.00
Vaccine (bottle)	10	5.00	50.00
Total variable cost			2 538.40
Gross margin			4 757.60
Production cost ratio			34.79%

The breeding stock is replaced after a year or two depending on its track record. A farmer could swap his buck with another farmer engaged in rabbit production and the does needed for the next production could be replaced from the off springs. Repair and maintenance of the cages and nest boxes could on average be carried out once every five years⁵. After the breeding cycle is completed, a farmer is now ready to sell his 480 produced fryers. The average slaughter weight of a fryer between 6-8 weeks is 1.2-1.5 kilograms. This can be sold at R15.20 per kilogram depending on the area in which the product is marketed. For instance, in big cities like Johannesburg, a producer can realise up to R25.00 per kilogram. However, this study uses the average price of

⁵ Information regarding cost and number of cages, nest boxes, feeds, labour, vaccine needed, production cycle of rabbits, estimated output from production and selling price is provided by Mr. Du Plessis (Commercial rabbit breeder).

R15.20 per fryer to calculate the total revenue. The projected total annual receipts from rabbit enterprise is R7 296.00. The gross margin yielded is R4 757.60 with a production cost ratio of 34.8%.

5.6.1.2 Broiler production enterprise budget

A starting up capital for broiler production is R32 366.40 per year. Five hundred day old chickens are used in the analysis. It is assumed that this quantity will tally with the number of fryers (480) to be produced from rabbit enterprise. The mortality rate of these chickens (5%) is determined by Free State Department of Agriculture, this yielding 475 fattened broilers from production. There are 6 broiler production cycles in a year. On average, a live weight broiler is sold at R21.00. The reared chickens are fed on starter and finisher ration.

The other production inputs include medicine and one unskilled labour paid at a rate determined by the Department of Labour to look after the whole flock of chicken. It is assumed transport is seldom used, repair and maintenance are not recurrent problem during production. There is no replacement of breeding stock since the day chickens used in production are all the envisaged output. The formulated enterprise budget is shown in Table 5.6.

Table 5.6: Broiler enterprise budget

	Quantity used	Value per unit (Rand)	Value per year (Rand)
Gross receipts	475.00	21.00	59 850.00
Variable cost			
Starter ration (kg)	1 400	2.72	22 848.00
Finisher ration (bag)	400	2.68	6 432.00
Medicine (bottle)	475	0.80	2 280.00
Unskilled labour (hour)	288	2.80	806.40
Total variable cost			32 366.40
Gross margin			27 483.60
Production cost ratio			54.1%

Source: Fourie (2002)

The projected total receipts from the broiler enterprise per cycle and annually (over 6 production cycles) are R9 975.00 and R59 850.00 respectively. Production cost ratio of broiler enterprise is 54.1%.

5.6.1.3 Carrot, beetroot and maize production enterprise budgets

The annual projected starting up capital per ha for carrot, beetroot and maize is R1 448.10, R1 633.10 and R1 842.56 respectively. It is assumed that a farmer uses his own ploughing implements and water. The same as other enterprises, unskilled labour is utilised to monitor one-hectare size vegetable field. The unskilled labour is paid at rates determined by the Department of Labour. The stated crops are cultivated under dry land. Limestone, pesticides and herbicides are also used in production. The carrot, beetroot and maize enterprise budgets formulated are shown in Table 5.7, Table 5.8 and Table 5.9 respectively.

Table 5.7: Carrot enterprise budget

	Quantity used	Value per unit (Rand)	Value per ha (Rand)
Gross receipts	1.50	1 117.13	1 675.70
Variable cost			
Carrot seed (kg)	3	90.00	270.00
Fertiliser (kg)	1	156.52	156.52
Agricultural lime (kg)	1	114.34	114.34
Pesticides (kg)	1	50.42	50.42
Herbicides (kg)	1	50.42	50.42
Unskilled labour (hour)	288	2.80	806.40
Total cost per ha			1 448.10
Total cost per ton			965.40
Gross margin per ha			227.60
Gross margin per ton			151.73
Production cost ratio			86.42%

Source: Mapatha (2002)

Table 5.8: Beetroot enterprise budget

	Quantity used	Value per unit (Rand)	Value per ha (Rand)
Gross receipts	1.50	1 152.99	1 729.49
Variable cost			
Beetroot seed (kg)	10	45.50	455.00
Fertiliser (kg)	1	156.52	156.52
Agricultural lime (kg)	1	114.34	114.34
Pesticides (kg)	1	50.42	50.42
Herbicides (kg)	1	50.42	50.42
Unskilled labour (hour)	288	2.80	806.40
Total cost per ha			1 633.10
Total cost per ton			1 088.73
Gross margin per ha			96.39
Gross margin per ton			64.26
Production cost ratio			94.43%

Source: Mapatha (2002)

Table 5.9: Maize enterprise budget

	Quantity used	Value per unit (Rand)	Value per ha (Rand)
Gross receipts	2.00	1 700.00	3 400.00
Variable cost			
Maize seed (kg)	7	24.89	174.20
Fertiliser (kg)	1	336.34	336.34
Agricultural lime (kg)	1	151.67	151.67
Pesticides (kg)	1	88.66	88.66
Herbicides (kg)	1	285.29	285.29
Unskilled labour (hour)	288	2.80	806.40
Total cost per ha			1 842.56
Total cost per ton			921.28
Gross margin per ha			1 557.44
Gross margin per ton			778.72
Production cost ratio			54.19%

Source: Mapatha (2002)

5.6.2 Comparison of constructed enterprise budgets

The results of analysis show and prove rabbit enterprise to be more cost-effective and profitable compared to other enterprises. This is reflected by the computed production cost ratios and gross receipts from aforesaid enterprises. For instance, the production cost ratio of rabbit enterprise is 34.8%, broiler enterprise (54.1%), carrot enterprise (86.4%), beetroot enterprise (94.4%) and maize enterprise (54.2%). This could be attributed to the fact that rabbit

enterprises require low production inputs compared to the aforementioned enterprises.

5.7 Summary and conclusion

This chapter gave descriptive characteristics of the small-scale farmers in Moqhaka, Ngwathe and Matjhabeng local municipalities. Factors limiting the production potential of the small-scale farmers such as finance, storage facilities and transport were highlighted.

The producers in aforementioned municipalities are concentrating on the production of commonly known livestock such as beef, poultry, sheep, goats and pigs not because they do not have interest on other livestock but due to the lack of knowledge on other possible livestock production activities. The producers showed a positive attitude with regard to rabbit production after the cost-effectiveness of rabbit enterprise was highlighted to them.

The constructed enterprise budgets indicate that rabbit production is capable of competing with other activities in which the small-scale farmers are engaged and is also cost-effective.

CHAPTER 6

SUMMARY AND CONCLUSION

6.1 Introduction

The study gave a geographic and demographic description of the Free State Province. The contribution of agriculture, mining and manufacturing sectors in economic growth of the province were highlighted. The state of agriculture in South Africa, constraints to agricultural production and challenges faced by the sector were also highlighted.

Literature was reviewed on the role played by livestock in human life, consumption of different livestock meats, factors affecting meat consumption, management for rabbit production and product sensory analysis. The methodologies used by researchers to determine willingness to pay and viability of production alternatives were also discussed. The study further explored the available market opportunities for rabbit meat on the world market. The opinion, perception and attitude of the consumers and producers in Moqhaka, Ngwathe and Matjhabeng local municipalities were tested with regard to consumption and production of rabbit products.

The next two sections of this chapter describe the important findings of the study and identify possible areas for further research.

6.2 Summary of findings of the study and recommendations

The study found that farmers, retailers and other interested parties have great opportunities to develop the market for rabbit products in Moqhaka local municipality. This is because the consumers and producers have showed a great interest on rabbit products and production. The results of the TradeMap

analysis have shown that European countries are the largest consumers of rabbit meat in the world. The results of the sensory analysis reflected that even though mutton was the most preferred livestock meat by the panelists, this was not statistically significant to justify preference of mutton over the other meats. There is still an opportunity to market rabbit meat based on preference ranking results.

The constructed enterprise budgets indicate that rabbit could compete with other activities in which the small-scale farmers are engaged. The rabbit enterprise is not only a cost-effective enterprise but also profitable.

The motivation behind this study is to seek solutions to the problem of food insecurity. It was therefore hypothesised that a product such as rabbit meat would help to address the problem of hunger. It was found in this respect that the consumers are willing to pay more money for rabbit meat. However, the results of the study have revealed a lack of knowledge by the consumers and producers on the potential attributes of rabbit products and production.

There is a need for community outreach programmes, workshops and campaigns to create awareness on the potential of rabbit production and its products. Primarily, the campaign should focus on the nutritional aspects by highlighting rabbit meat attributes such as rich in protein, low on cholesterol and low fat content.

The other products such as rabbit fur made apparels and manure from its excretory products should be considered as products of secondary importance, their market should be explored as secondary products of rabbit production. It is necessary to teach prospective producers about the cost-effectiveness of rearing rabbits. For instance, that rabbits can be fed on mainly vegetable peels for survival with minimal supply of concentrates.

Over and above, a number of marketing strategies need to be adopted by potential producers, retailers or any interested parties in Moqhaka local municipality. First and foremost, it is important that consumer behaviour in a product market is understood. The different population groups have shown different attributes towards the consumption of rabbit products in Moqhaka local municipality. Subsequent to analysis of consumer behaviour, market segmentation is necessary.

The agribusiness firms or potential rabbit product producers should initially target the African and Coloured communities as the potential market segments to position their products. The White community undoubtedly has showed no interest towards consumption of rabbit meat and as such, promotional activities to this population group should be limited. The market promotion activities such as offering meat samples at the retail shops, agricultural exhibitions and during farmers' days should be put into place. This would help to stimulate increased consumption of rabbit products and most importantly, dispel some of the wrong perceptions and doubts about rabbit products.

Some researchers have complex theoretical perspectives and ways of trying to define the concept of consumer behaviour. Peter and Olson (1987) define and demystify the concept as the process which involves the dynamic interaction of cognition, behaviour and environmental events by which human beings conduct the exchange aspects of their lives. It includes the relationships among what people think, feel, do in various consumption situations and environments as well as the role of marketing strategies in the process.

Factors likely to induce consumers to buy or not to buy particular products need to be examined. This is because consumers will buy a particular product subject to certain conditions and behaviour (O'Shaughnessy, 1987). For instance, consumers may want a product but this want for a product may remain "latent" because they are not aware of the usage of the product. Consumers can thus be aware of the existence of a product without realising the potential of the product to meet their goals. Consumers may however be aware of the potential benefits of a product but be inhibited from buying it because of factors beyond their control. Consumers may also be held back from buying by "exclusionary" reasons that take them temporarily or permanently out of the market such as shortage of money, health risks etc. (O'Shaughnessy, 1987).

According to Stanton (1978) the decision of a consumer to purchase a particular product is influenced by a number of factors such as psychological, cultural and social factors. In addition to this, for consumers to want a certain product, the consumers must believe that the product plays a role in achieving good life and the product coheres with their lifestyle, values and beliefs (O'Shaughnessy, 1987). These factors often interact and strengthen the desire for specific goods whilst in some instances, an interaction of these factors may lead to conflicting buying motives that result in confused buying intentions (Imerman, 1985).

The other aspect that has to be considered by producers is to clearly be able to define the needs of consumers. For example, have a clear distinction between what the consumer treats as a necessity and luxury. The aforementioned background justifies the point why it is necessary to look at the factors that influence and contribute towards the decision making of consumers in buying a particular products and services which are applicable with regard to the consumption of rabbit products.

The different opinions, perception and attitude regarding consumption of rabbit products by population groups in Moqhaka local municipality necessitates the application of market segmentation to identify potential markets for rabbit products, help in allocation of resources, marketing, distribution channels and pricing.

Market segmentation is the process of dividing the total market into several relatively homogenous groups with similar product or service interests, based on demographic or psychological characteristics, geographic location or perceived product benefits (Gunter and Furnham, 1992). Rhodes (1993) refers to market segmentation as the process of identifying a group or submarkets within the total and focusing on such target submarkets. A study conducted by Imerman (1985) highlighted and interpreted the concept of market segmentation as the quest and ultimate goal of the producer to satisfy the consumer's needs and wants. It is not easy for producers to visualise and comprehend the exact priority needs and wants of consumers in the entire product market. Notwithstanding, Imerman (1985) states that it is possible though, to select a group or a few groups of consumers with common attributes, behavioural patterns and investigate these characteristics in great depth. This information which has been collected will eventually help to formulate a profile of rabbit meat to consumers. This profile can then be used as a basis for directing producers' entire marketing strategy.

One very important way of segmenting the entire potential market is to divide it into two broad categories, ultimate consumer and business users (Stanton, Etzel, Walker, Abratt, Pitt and Staude, 1992). However, this study limits itself to the assessment of the consumer market. There are four commonly used bases for segmenting consumer markets. Gunter and Furnham (1992) describe them as geographic, demographic and psychological segmentations.

The geographic segmentation is used by dividing the market into different geographic units such as regions, counties, states, cities and neighbourhoods. These segments are important because where people live, work and play can have a great impact on their purchasing behaviour (Gunter and Furnham, 1992).

The most common approach to market segmentation is to divide consumer groups according to demographic variables (Gunter and Furnham, 1992). These variables include age, sex, income, occupation, education, household size and stage in the family life cycle. These variables are used to identify market segments and to develop appropriate marketing mixes (Gunter and Furnham, 1992). Psychological classification of markets has evolved from personality and lifestyle profiles which are two principal types of consumer variables (Gunter and Furnham, 1992). Psychological profiles are often used jointly with geographic and demographic segmentations in order also to develop an appropriate marketing strategies (Gunter and Furnham, 1992).

There is a potential to develop market for rabbit products in Moqhaka, Ngwathe and Matjhabeng local municipalities of the Free State Province. However, one of the crucial factors limiting development and expansion of the small-scale farmers activities is production capital. This problem is aggravated by difficulty of the small-scale farmers to obtain production credit from the formal financial institutions which require reliable collateral before credit can be granted. Mashile (1997) states that the inability of small-scale farmers to secure credit directly affects the acquisition of necessary production inputs.

It is in view of this problem that an integrated credit programme planning and management be put into place. This should focus at provision of business management training to small-scale farmers, highlight possible means that can help them to raise production capital, provision of market information and business advisory services so as to improve the effectiveness of credit programmes.

6.3 Recommendations for further research

The areas which need further investigation include the following:

1. Determinants of household welfare: The majority of the households in Moqhaka local municipality depend on pension grants from the Department of Social Welfare as their major source of income. There is a need to investigate how the majority of the households are able to cope with basic household needs such as education, rent, clothing, food, transport and other related social services. Added to this, is the need to identify how these households are coping with the HIV/AIDS epidemic which increases medical expenses in affected households.

2. Determine areas suitable for rabbit production: Rabbit production is a viable enterprise for some provinces in South Africa. There is a need to investigate if rabbit production will be successful not only in Moqhaka, Ngwathe and Matjhabeng local municipalities but South Africa as a whole. The aspects which need to be thoroughly investigated before rabbits are produced on a large scale should be suitability of an area for rabbit production. Rabbits are very susceptible to several diseases and need proper care and housing. What kind of housing modification if any would be necessary for the varying agro-ecological zones of South Africa.

3. Formulation of producers support programmes: The results of the study indicate that lack of finance is one of the major factors prohibiting increased productivity in Moqhaka, Ngwathe and Matjhabeng local municipalities. The producers are unable to purchase the necessary production inputs, lack storage facilities and transport to deliver their products to the market. There is a need to investigate various forms of production credit sources that could be put in place to assist small-scale farmers while ensuring a high recovery rate. The investigation would determine what form of credit i.e. cash or kind, repayment period, mode of payment and of the lender would be best suited for the rabbit producers in the different production areas.

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APPENDIX A

All information provided will be treated as strictly confidential.

RABBIT PRODUCTION AND CONSUMPTION IN SOUTH AFRICA
QUESTIONNAIRE SPECIMEN FOR CONSUMERS

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General information

Name of interviewer

Date of interview

Respondent's name

Address: P.O. Box

Town

Code

Telephone number

District

Town/village/farm

Questionnaire number

SECTION A: Personal information and educational background

1. Gender

Male	1
Female	2

2. Age in years

--

3. Race

African	1
White	2
Coloured	3
Indian	4

4. Home language

Sesotho	1
Setswana	2
Afrikaans	3
English	4
Other (Specify):	5

5. Religion

Christian	1
Muslim	2
Other (Specify):	3

6. What kind of education do you possess?

Formal education	1
No formal education	2

(i) If formal education, what is the last grade or highest level of education attained?

(ii) If no formal education, can you read or write?

Yes	1
No	2

SECTION B: Employment status of the household

7. Please complete the following table:

List all the people earning an income in the household*	Age	Sex	Income per month	Occupation
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				

* Only the position of the people in the family should be provided.

SECTION C: Household size and expenditure

8. How big is your family?

1	1
2	2
3 to 4	3
5 to 7	4
8 or more	5

9. How much money do you spend roughly on food every month, excluding meat?

R0 to R50	1
R51 to R100	2
R101 to R150	3
R151 to R200	4
R201 to R250	5
R251 to R300	6
R301 or more	7

10. How do you get your meat products?

I buy from the butcheries	1
From chain stores like OK, Shoprite, Pick'n'Pay	2
From individuals selling meat as a form of business	3
From my farm	4
By slaughtering my backyard livestock production	5
Other (Specify):	6

11. If you buy meat from the butcheries, how much money do you spend monthly on meat?

R0 to R50	1
R51 to R100	2
R101 to R150	3
R151 to R200	4
R201 to R250	5
R251 or more	6

12. If you buy meat from the chain stores, how much money do you spend monthly on meat?

R0 to R50	1
R51 to R100	2
R101 to R150	3
R151 to R200	4
R201 to R250	5
R251 or more	6

13. Expenditure on meat bought from individuals selling meat as a form of business

R0 to R50	1
R51 to R100	2
R101 to R150	3
R151 to R200	4
R201 to R250	5
R251 or more	6

SECTION D: Household livestock product consumption and propensity to purchase

14. How often do you eat meat?

I do not eat meat	1
Every day	2
Once a week	3
Twice a week	4
Thrice a week	5
Other (Specify):	6

15. Immediate awareness of meats:

What livestock comes into your mind when you think of meat to consume? (Please rank them according to order of preference by assigning value 1 to your mostly preferred livestock meat, 2 to your second preference, 3 to your third preference and so forth).

Cattle/beef	
Goat/chevon	
Sheep/mutton	
Poultry/chicken	
Pig/pork	
Rabbit	
Other (Specify):	

16. Having ranked the livestock meat you normally consume in order of preference, then rank in the same way your meat type preference:

Lean	
Easy to prepare	
Tender	
Low in cholesterol and fat	
Healthy colour	
Quick to prepare	
Tasty	
Other (Specify):	

17. Outline your purchasing behaviour of the meat type rated number 1 in terms of its preference in question 16:
I am prepared to pay

A higher price for this product	1
The same price as other substitutable products	2
A cheaper price than other substitutable products	3
I really do not know	4

18. Give your possible disinterest towards meat products of livestock you normally do not consume.

Smelly	1
Tough type of meat	2
Too bony	3
Expensive	4
Against my personal belief	5
Other (Specify):	6

SECTION E: Other related or substitutable livestock products awareness

19. Rabbit production potential: If rabbits are not part of the livestock products you normally consume, could you please tell if you know the following about rabbits.

(i) That rabbit produces white meat that is highly palatable and low on cholesterol?

Yes	1
No	2

(ii) That rabbit produces meat that is fined grained with low fat but high in protein?

Yes	1
No	2

(iii) That rabbit meat has been used and is suitable for special diets, such as for heart disease patients, diets for the aged, low sodium diets, weight reduction diets, etc.?

Yes	1
No	2

(iv) That with its low fat contents, the physicians even went to an extent of recommending its meat to patients with coronary conditions?

Yes	1
No	2

(v) That rabbit's fur is processed to make clothing?

Yes	1
No	2

(vi) That rabbit's manure could be used for vegetables growing or flowers?

Yes	1
No	2

SECTION F: Willingness to try consumption of different livestock products

20. Having been made aware about the production potential of rabbits in question 19, what product attributes will make you change your mind to try consumption of rabbit products? (Could you please write them down).

21. At what price will you buy each product in question 19 which rabbit is capable to produce? (Please write down the actual amount)

Rabbit meat per kg	R
Rabbit leather products	R
Rabbit manure per kg	R
Fur products	R
Other products (Specify):	R

22. Having been made aware about the production potential of rabbits, then compare it with other substitutable livestock products and make a general rating of its products to you:

Best	1
Better	2
Worse	3

23. Could you please furnish if possible with any factors that might prohibit you to consume rabbit products:

Thanks for your time!!!

APPENDIX B

All information provided will be treated as strictly confidential

RABBIT PRODUCTION AND CONSUMPTION IN SOUTH AFRICA
QUESTIONNAIRE SPECIMEN FOR PRODUCERS

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General information

Name of interviewer

Date of interview

Respondent's name

Address: P.O. Box

Town

Code

Telephone number

District

Town/village/farm

Questionnaire number

SECTION A: Personal information and educational background

1. Gender

Male	1
Female	2

2. Age in years

3. Race

African	1
White	2
Coloured	3
Indian	4

4. Home language

Sesotho	1
Setswana	2
Afrikaans	3
English	4
Other (Specify):	5

5. What kind of education do you possess?

Formal education	1
No formal education	2

(i) If formal education, what is the last grade or highest level of education attained?

(ii) If no formal education, can you read or write?

Yes	1
No	2

SECTION B: Farming activities and access to land-use

6. Do you have the right or access to use any land for farming purposes?

Yes	1
No	2

7. If "yes", is this land ...

Communal	1
private (own farm)	2
private (rented)	3
Other (Specify):	4

8. What is the total size of all land you have access to in hectares (ha)?
(Record in hectares for those who can give the information, otherwise estimate by using a football ground).

Hectares

9. For what production do you use land?

All for crops	1
All for livestock	2
Both for crops & livestock	3

SECTION C: Livestock ownership and production performance

10. Do you own any livestock?

Yes	1
No	2

If "yes", please complete the table below.

Type of livestock	Total number of livestock owned currently	How much money do you spend monthly for the feeds of this livestock? (Amount)	How much money do you get monthly out of the total produce of this livestock? (Amount)	For how long have you been engaged in this production?
Rabbits		R	R	
Cattle		R	R	
Goats		R	R	
Sheep		R	R	
Chickens		R	R	
Pigs		R	R	
Other (Specify):		R	R	

SECTION D: Livestock production improvement

11. What are the future plans which you have for the livestock enterprises mentioned in question 10? (Please complete the table below)

Type of livestock	List all future plans you have in mind	How do you plan to achieve these activities	Possible problems that you may encounter in achieving these activities
Rabbits			
Cattle			
Goats			
Sheep			
Chickens			
Pigs			
Other (Specify):			

SECTION E: Marketing of livestock products and general farm operation

12. Through which marketing channel do you market your farm products?

Free market system	1
Co-operatives	2
Exporting	3
Private sales	4
Other (Specify):	5

13. From which livestock do you market most of your produce?

Rabbits	1
Cattle	2
Goats	3
Sheep	4
Chickens	5
Pigs	6
Other (Specify):	7

14. How many workers do you have on your farm?

15. Worker' average salary or wage range per month

R50 to R500	1
R501 to R700	2
R701 to R900	3
R901 to R1100	4
R1101 to R1300	5
R1301 to R1800	6
R1801 or more	7

16. Where do you get finances to run your farm?

Agricultural Co-operatives	1
Commercial Banks	2
Own farm	3
Stockvels	4
Clubs	5
Other (Specify):	6

17. How often do you treat your livestock against disease or use sprays and/or remedies?

I do not treat my livestock against disease	1
Every day	2
Once a week	3
Twice a week	4
Thrice a week	5
Other (specify):	6

18. Are the facilities of veterinary personnel easily available?

Yes	1
No	2

SECTION F: Other related or substitutable livestock enterprise awareness

19. If rabbits are not part of the livestock production you are engaged in, have you ever heard of or tried rabbit production?

Yes	1
No	2

20. What could be the major reason for a "no" answer in question 19?

I have little knowledge about rabbit production	1
Lack of funds to kick start a project	2
I have tried and failed	3
I just do not like to produce rabbits	4
Other reason, then (Specify):	5

21. Could you please rate your level of knowledge or information you know about rabbits?

Little knowledge about rabbits	1
More knowledge about rabbits	2
I do not know anything about rabbits	3

- (i) If you answered "little or more knowledge about rabbits", what is it that you know about rabbits?

22. Rabbit production potential: Could you please tell if you know the following about rabbits?

- (i) That a doe (female rabbit) could reproduce 15 times in a year more than most of the other related livestock could do and that rabbit's meat is used for consumption?

Yes	1
No	2

- (ii) That feeding rabbits is very cheap and that they could be fed by materials such as garden leaves, roadside grass, kitchen offal, etc?

Yes	1
No	2

- (iii) That rabbit manure can be used for vegetable growing?

Yes	1
No	2

- (iv) That rabbit skin is valuable and could be used for manufacturing clothes, thereby generating income for the producer?

Yes	1
No	2

SECTION C: Willingness to try different livestock enterprises

23. Having been made aware about the production potential of rabbits in question 22, what production attributes will make you to change your mind to try rabbit enterprise? (Could you please write them down)

24. Could you please rate this enterprise in terms of its production potential you were made aware of in **question 22** against other related or substitutable livestock.

Best	1
Better	2
Worse	3

25. If you were to try rabbit enterprise, how much money will you invest on it? Please write down the amount for the following:

Inputs cost(s)

Inputs

Willingness to spend

Doe/Buck	R
Self-constructed cage	R
Self-constructed nest box	R
Drinkers	R
Feeders	R
Feeds	R
Vaccine	R
1* Skilled labour (wage per month)	R
1* Unskilled labour (wage per month)	R

- (i) At what production scale will you try this enterprise?

Small scale	1
Large scale	2

26. If you answered "I will try rabbit enterprise at small scale", what factors will limit or prohibit you to try it at large scale? (Could you please write them down).

27. How many workers will you employ to run this enterprise?

SECTION H: Farming assets ownership

28. Please list all the implements or equipment that make it possible for the performance of the livestock enterprises you are engaged in on a farm? E.g. Tractors, Tillage implements, Dipping tanks, wheel barrows etc.

(Please complete the following table)

List all the implements you have on a farm	How much do you think it is worth? (Amount)	How much money do you spend to service this implement? (Amount)	For how long have you been using this implement? (Period)	Liabilities of the implement owned if any (Amount)
1.	R	R		R
2.	R	R		R
3.	R	R		R
4.	R	R		R
5.	R	R		R
6.	R	R		R
Other (Specify):	R	R		R

SECTION I: Non-Farming property ownership

29. Please list all the properties you own or a share of other assets such as: Shop, Bottle store, Rented hostels or any commercial properties.

List of properties	How much do you think it is worth? (Amount)	How much money do you spend for maintenance of this property?	Liabilities of the property owned if any (Amount)	How much money do you get monthly from this property? (Amount)
1.	R	R	R	R
2.	R	R	R	R
3.	R	R	R	R
4.	R	R	R	R
5.	R	R	R	R
Other (Specify):	R	R	R	R

SECTION J: Employment status of the household

30. Please complete the following table:

List all the people earning an income in the household*	Age	Sex	Income per month	Occupation
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				

* Only the position of the people in the family should be provided.

Thanks for your time!!!

APPENDIX C

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RABBIT PRODUCTION AND CONSUMPTION IN SOUTH AFRICA
QUESTIONNAIRE SPECIMEN FOR SENSORY TASTE ANALYSIS

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SECTION A: Personal information

Race	
Gender	
Age	
Occupation (i.e. Staff/Student)	
Tray number	

SECTION B: Ranked preference

Rinse your mouth with water before starting and between samples. You will receive **four coded samples**. Please taste the samples in the order presented, from left to right. Rank the samples from 1 to 4 in terms of preference, using the following scale:

1 = Like the most
4 = Like the least

Sample number	Rank*

* Ties are not allowed!!!

All samples and water may be expectorated into provided container.

Will you buy the product rated number one (liked most) when marketed in the shopping stores?

Yes	1
No	2

I will spend..... money for the product rated number one (liked most)

More	1
The same as other substitutable products	2
Less	3
Nothing for this product	4

Have you eaten rabbit meat before?

Yes	1
No	2

If not, is there a specific reason you can furnish with.....

Thanks for your time!!!!