# COMPARING AGRICULTURAL TRADE DEPENDENCY AND HOUSEHOLD FOOD EXPENDITURE IN SOUTH AFRICA

by

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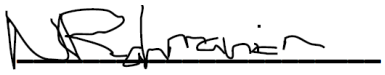

**Nura Rahmanian**

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# ABSTRACT

## COMPARING AGRICULTURAL TRADE DEPENDENCY AND HOUSEHOLD FOOD EXPENDITURE IN SOUTH AFRICA

by

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The question of food as a basic need has followed the human race for centuries on end in community after community, all of which have had to continuously re-evaluate its state of food security, occasionally restructuring and reorganizing systems of food production and distribution, as well as relationships and processes related to welfare and economics. In more recent decades the elements around food security became more formalised and in 1974, at the World Food Conference in Rome, food security emerged as a concept.

At its inception, it was proposed that food security could be attained through ensuring sufficient supply by boosting production and widespread distribution by liberalizing trade. South Africa's agricultural markets were highly regulated before the 1990s, and by the end of that decade they were completely deregulated and opened to the international market. Since then self-sufficiency has decreased in major goods, and dependency has increased, particularly for secondary food products. Still, South Africa continues to provide, by way of production and imports, an adequate supply of food to feed the country. However, at least 40% of the population is unable to meet its dietary needs because they cannot afford to buy the food made available.

This study helps to shed light on the relationship between trade dependency and food security in South Africa by looking at the impact of the former on domestic prices. This it does with

the use of a tool introduced in this thesis as the "Trade Dependency and Household Expenditure Share" graph. This graph was developed as follows: on the basis of the Income and Expenditure Surveys (IES) conducted by Stats SA every five years, food items most relevant to the South African population according to expenditure share of household food budgets were selected; in turn trade and consumption data for these food items were collected and on the basis of these, trade dependency figures were calculated; and finally, by mapping these figures against each other on a graph, the aforementioned tool was created.

Essentially, the graph represents movement toward or away from food security on account of movement toward or away from self-sufficiency. It can be reasoned to reflect this because of the understanding that shifts in self-sufficiency have certain implications for domestic control over food prices. To test this with the use of scenarios, the impact that shifts in the production levels of certain of these foods have on their commodity prices was tested using the BFAP sector model and the subsequent effect on consumer prices was established using the Error Correction Model (ECM).

The tests were conducted on one net exported food item, three net imported food items and two items that are traded under near autarky. Based on the scenarios, it was clear that where markets are connected to global trade, shifts in production had little influence on domestic prices. Albeit, when a nation is producing surpluses, goods are typically traded at export parity levels and are therefore significantly cheaper than goods traded at import parity. Under self-sufficiency, however, prices are determined by local supply and demand forces, and thus the nation has greater control over domestic prices. Although this thesis does not intend to advocate for complete self-sufficiency at all costs, results support the notion that safety nets and some level of protection with regard to the agricultural sector is necessary for attaining and maintaining national and household food security.

In the final analysis, what this study demonstrates is that a relationship exists between national self-sufficiency—and thus trade dependency—and household food security through the impact of the former on domestic prices. With this relationship established, the significance of movement toward or away from self-sufficiency of products on the "Trade Dependency and Household Food Expenditure Share" graph can be understood by the reader and policy makers as potential movement toward or away from food security.

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## List of Abbreviations

| | |
|---|---|
| BFAP | Bureau for Food and Agricultural Policy |
| BPPI | BFAP Poor Person Index |
| COICOP | Classification of Individual Consumption by Purpose |
| DAFF | Department of Agriculture, Forestry and Fisheries |
| DEP | Dietary Energy Production |
| DES | Dietary Energy Supply |
| ECM | Error Correction Model |
| FAO | Food and Agriculture Organization |
| GDP | Gross Domestic Product |
| GFSI | Global Food Security Index |
| GHS | General Household Survey |
| HSL | Household Subsistence Level |
| HSRC | Human Sciences Research Council |
| IES | Income and Expenditure Survey |
| IFSNP | Integrated Food Security and Nutrition Programme |
| ITC | International Trade Centre |
| LSM | Living Standards Measure |
| MLL | Minimum Living Levels |
| MTSF | Medium Term Strategic Framework |
| NAMC | National Agricutlural Marketing Council |
| OECD | Organisation for Economic Co-operation and Development |
| RAC | Regional Advisory Committee |
| RFSTP | Regional Food Security Training Programme |
| SAARF | South African Audience Research Foundation |
| SACU | Southern African Customs Union |
| SADC | Southern African Development Community |
| SAFJA | South African Fruit Juice Association |
| SAGIS | South African Grain Information Services |
| SASAS | South African Social Attitudes Survey |
| SMME | Small, Medium and Micro-sized Enterprises |
| SSR | Self-sufficiency Ratio |

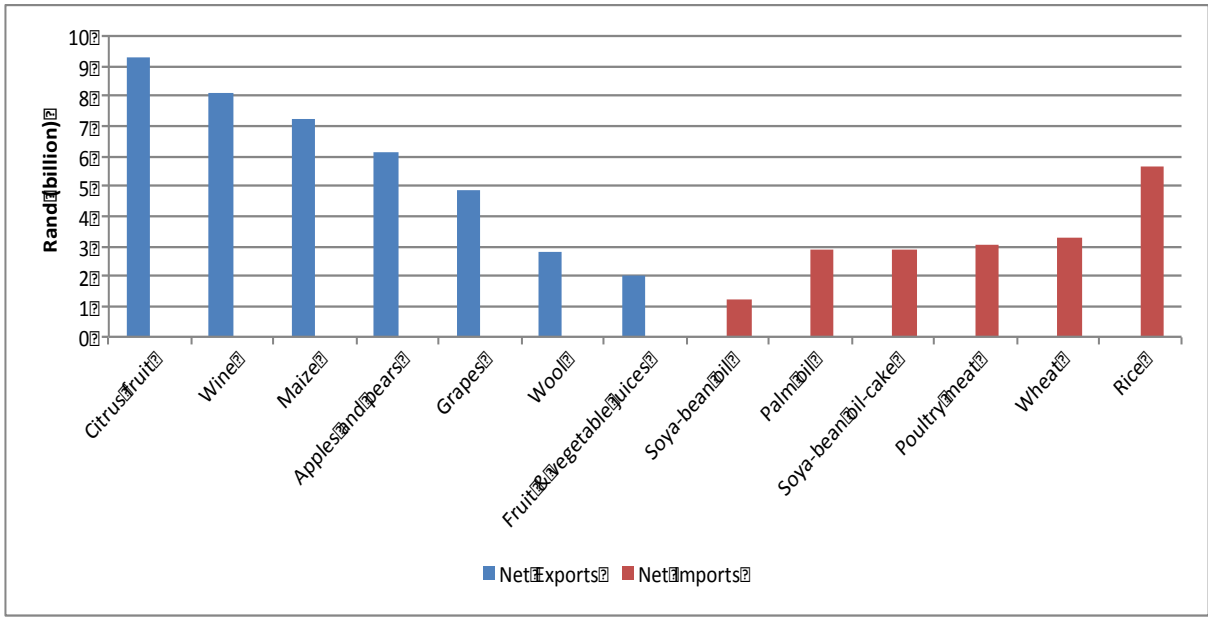
| | |
|---|---|
| Stats SA | Statistics South Africa |
| TAC | Total Allowable Catches |
| UN | United Nations |
| UNICEF | United Nations Children's Fund |

# CHAPTER 1:INTRODUCTION

Delegates assembled at the Rome World Food Conference of 1974 in an atmosphere of crisis. There was a sense of fear among them "that the world was entering a period of chronic food shortage," and "most discussion focused on the simple core issue of how global food production could be increased" (Gittinger, Leslie and Hoisington in Blignaut, 1989:7). The Universal Declaration on the Eradication of Hunger and Malnutrition was adopted at this conference, and stated that "every man, woman and child has the inalienable right to be free from hunger and malnutrition in order to develop fully and maintain their physical and mental faculties" (United Nations, 1975:5). It was decided then that sufficient international production and supply of food, in conjunction with distribution through trade, and the option of resorting to aid in times of dire need, would ultimately resolve the issue of food security (United Nations, 1975). Thus, at its inception, the concept of food security centred on availability and was connected to trade.

When looking solely at availability, by way of production and trade, researchers agree that South Africa is food secure (Government Communication and Information System, 2012; Jacobs, 2009; Labadarios, Steyn and Nel, 2011; Van Rooyen, Ngqangweni and Frost, 1996). Figure 1-1 is a figure of top agricultural products traded in South Africa, according to the value of the amount traded. It is reflective of some of the major foods available in the country. Those that are produced in surplus and partly exported are citrus fruit, wine, maize, apples and pears, wool and fruit and vegetable juices. In its production of wheat, poultry meat, soya-bean oil-cake, palm oil and soya-bean oil, South Africa falls short in terms of demand and has to partly import these products. As for rice, this is the only product in high demand in South Africa that is not produced locally and has to be fully imported.

**Figure 1-1 South Africa's net trade in 2013**




Source: ITC (2015)

When looking at Figure 1-1 in the context of food security, and considering food production and supply in countries connected to the international market, another relevant concern is what is actually consumed in the domestic market. According to the most recent Income and Expenditure Survey (IES) conducted by Stats SA, the 15 food items that take up the largest proportion of a typical household's food budget are poultry meat, beef, maize flour, brown bread, milk, white bread, aerated cold drinks, rice, white sugar, edible oils, mutton and lamb, boerewors and beef sausage, potatoes, eggs and cake flour. Table 1-1 summarizes these items and their respective expenditure shares (Stats SA, 2012b).

**Table 1-1 Top 15 food items according to household food expenditure share**

| # | Food Item | Expenditure Share |
|---|---|---|
| 1 | Poultry (including heads and feet) | 10,3% |
| 2 | Beef and veal (including heads and feet) | 6,0% |
| 3 | Mealie meal/Maize flour | 5,4% |
| 4 | Brown bread | 5,1% |
| 5 | Milk full cream and low fat fresh and long life | 3,8% |
| 6 | White bread | 3,3% |
| 7 | Aerated cold drinks | 3,2% |
| 8 | Rice | 3,2% |
| 9 | White sugar | 2,5% |
| 10 | Edible oils (e.g. cooking oils) | 2,2% |
| 11 | Mutton & lamb (including heads and feet) | 2,0% |
| 12 | Boerewors & beef sausage | 2,0% |
| 13 | Potatoes | 1,9% |

| | | |
|---|---|---|
| 14 | Eggs | 1,9% |
| 15 | Cake flour | 1,3% |

Source: Stats SA (2012b)

When comparing the items in Table 1-1 to the food products in Figure 1-1, important overlaps can be observed. While maize, which is third on the list in Table 1-1, is a net exported item, many of the other top items, such as poultry, breads which are made of wheat, rice and edible oils, are net imported items. Thus trade is significant for the supply of food items central to the food budget of a typical South African household.

## 1.1 PROBLEM STATEMENT

When the concept, "food security", emerged at the 1974 World Food Conference in Rome, it was defined separately from self-sufficiency and the hypothesis propagated was that in order to ensure food security, trade policy had to move away from self-sufficiency, toward liberalization. Studies have since shown that while countries competitive in the export market gained significantly from trade liberalization, many emerging markets have become increasingly dependent on crops that are their main source of caloric intake. On the other hand, countries with more protection have been able to regulate their exposure to international price changes and are thus less susceptible to food price increases (FAO, 2003; Otero, Pechlaner and Gürcan, 2013).

Under the apartheid government, from the 1940s to the 1990s, South Africa's agricultural sector was one of the most protected and regulated sectors in the economy. Producers competed in an environment isolated from international markets and world prices, domestic prices were guaranteed at a fixed price and affordable credit loans were made readily available by the government. By the end of the 1990s agricultural markets in South Africa were deregulated and agricultural trade was liberalized. While this has given South Africa access to a greater range of goods, it has also exposed its agricultural markets to international forces of supply and demand (Kirsten, Stander & Haankuku, 2011).

Exposure to these forces implies less control over domestic prices, particularly for those goods that are traded. For example, prices for net imported items are determined by the exchange rate and the import parity price, while prices for net exported items are determined

by the exchange rate and export parity price. Even with respect to goods for which South Africa is self-sufficient, trade often still takes place at a regional level with neighboring countries. These goods are categorized as goods traded under "near-autarky" and price determination for these good are also impacted to some extent by supply and demand forces beyond the South African border (Meyer, Westhoff, Binfield & Kirsten, 2006).

As already mentioned, researchers agree that South Africa supplies—by way of local production and global trade—sufficient food to feed the entire country. However, in the same breath it is often noted that many cannot afford to eat according to their dietary needs for an active and healthy life (Government Communication and Information System, 2012; Jacobs, 2009; Labadarios, Steyn and Nel, 2011b; Van Rooyen, Ngqangweni and Frost, 1996). Studies using a range of different measuring techniques have estimated that anywhere between 40% and 90% of the population is food insecure solely because of their inability to purchase sufficient quantities of nutritious foods (BFAP, 2013; Jacobs, 2009; Rose & Charlton, 2001; Stats SA, 2012a). Thus, for food security in South Africa, the determination of local food prices is an important concern when considering the production and supply of food.

## 1.2 OBJECTIVES

### 1.2.1 GENERAL OBJECTIVE

The general objective of this thesis is to help shed light on the relationship between trade dependency and food security in South Africa by looking at the impact of the former on domestic prices. This it will do by 1) reviewing relevant literature on food security, trade dependency, the agricultural market and price determination, 2) assessing briefly the agricultural sector in South Africa, 3) introducing the "Trade Dependency and Household Expenditure Share" graph as a tool for the reader and policy makers to be able to observe movement over time toward or away from self-sufficiency and 4) to use the Bureau for Food and Agricultural Policy (BFAP) sector model and studies which have employed the Error Correction Model (ECM) to show how movement toward or away from self-sufficiency implies movement toward or away from food security.

### 1.2.2 SPECIFIC OBJECTIVES

This study will use the 2005/2006 IES and the 2010/2011 IES to select food items most relevant to the South African population according to expenditure share of household food budgets and in turn collect the trade and consumption data for these food items in order to calculate the level of trade dependency. Using the expenditure share and trade dependency figures thus collated and calculated, the "Trade Dependency and Household Expenditure Share" graph will be developed.

Essentially, the graph will represent movement toward or away from food security on the basis of movement toward or away from self-sufficiency. It will do this with the understanding that shifts in self-sufficiency have certain implications for domestic control over food prices. In order to establish this understanding, the impact that shifts in production have on food commodity prices will be tested using the BFAP sector model—an econometric regime-switching model—and to in turn determine how a change in commodity prices effect a change in consumer price, results from studies which have employed the Error Correction Model (ECM) will be drawn on.

It should be noted that according to the FAO (2013d), food security measures can be grouped into at least six categories: availability, physical access, economic access, utilization, vulnerability and shocks. Given that this study will look at how the level of availability impacts economic access in South Africa, it concentrates on at least these two dimensions of food security.

## 1.3 OUTLINE OF STUDY

This thesis is divided into five chapters. The current provides some relevant background information, and introduces the problem statement and research objectives of the study. Chapter two will give an overview of global food consumption and production. Also, it will consist of a review of literature on food security and its measures, placing particular emphasis on those studies that relate trade dependency and food security. The final section of this chapter will look specifically at literature concerned with South Africa's food security status.

The third chapter will give an overview of South Africa's agricultural industry and give more detailed descriptions of certain commodity markets responsible for producing those foods ranking highest in household food budgets. The fourth chapter will calculate the trade dependency figures for the foods ranking highest in household food budgets and use these for the design of the "Trade Dependency and Household Expenditure Share" graph. Scenarios to examine the applicability of this tool will also be included in this chapter. The fifth and final chapter will contain a summary of the findings of this research and concluding remarks.

# CHAPTER 2:GLOBAL AND NATIONAL FOOD SECURITY

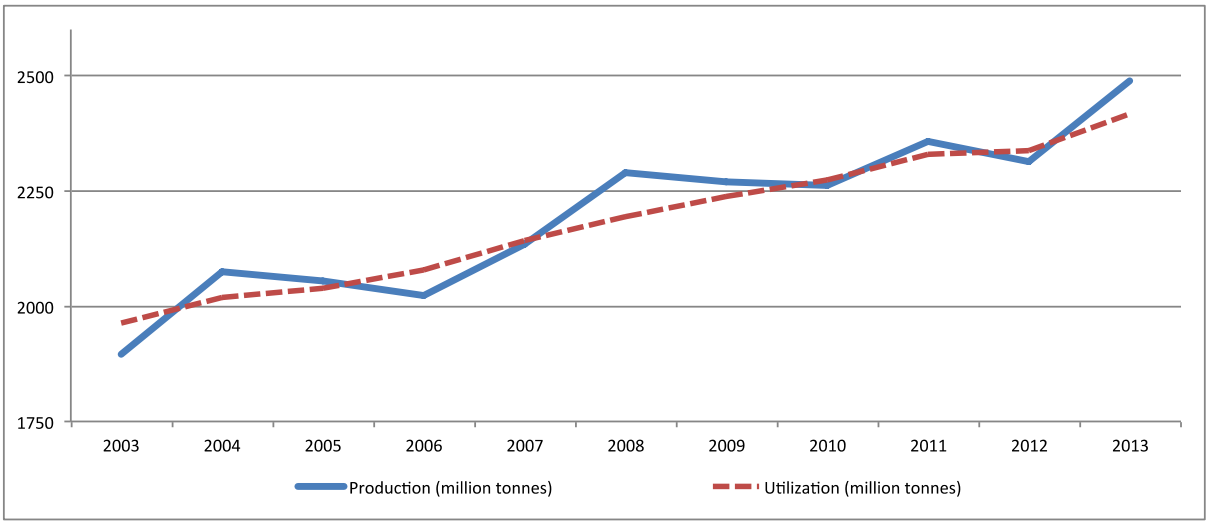
As mentioned in Chapter 1, this study will ultimately assess the impact that food availability in South Africa has on the economic accessibility of food. However, before looking at agricultural production and its impact on the cost of food in South Africa, it would be seemly to provide an overview of agricultural production and food price globally. This theme will cover the first section of this chapter, and, in order to understand what is being said about food security today internationally and in South Africa, will be followed by a literature review on food security at these two levels. Given the objectives of this study, the literature review will place emphasis on the relationship between food security, and trade dependency and self-sufficiency.

## 2.1 AGRICULTURAL PRODUCTION AND FOOD PRICE

World population, currently at seven billion, is projected to rise to 9 billion in the next four decades. In addition, 70% of the world's inhabitants are expected to reside in urban areas by this time. Population growth and urbanization, together with the anticipation that income levels will continue to rise, are said to be major factors in determining food demand in the near future. Additional factors that impact availability and affordability of food include biofuel production and the growth of the Chinese economy. A major concern that the world will be left with when contemplating the question of food security will be in relation to land: intensifying yield from current land use or increasing the expanse of land under agricultural production through greater use of water for irrigation (FAO, 2009).

In 2012 global cereal production stood at 2 312 million tonnes. With the expectation that course grain production will rise by 11% and that the maize harvest in the United States, the country producing the largest proportion of maize, will be greater by 27% in comparison to years experiencing drought, global cereal production is projected to stand at 2 489 million tonnes by the end of 2013. As can be seen in Figure 2-1, cereal utilization in 2012 was greater than production and calculated at 2 339 million tonnes. While it is expected that utilization will rise to 2 416 million tonnes, projected production is still greater, making a welcomed increase in ending stocks quite probable (FAO, 2013a).

**Figure 2-1 World cereal production and utilization**

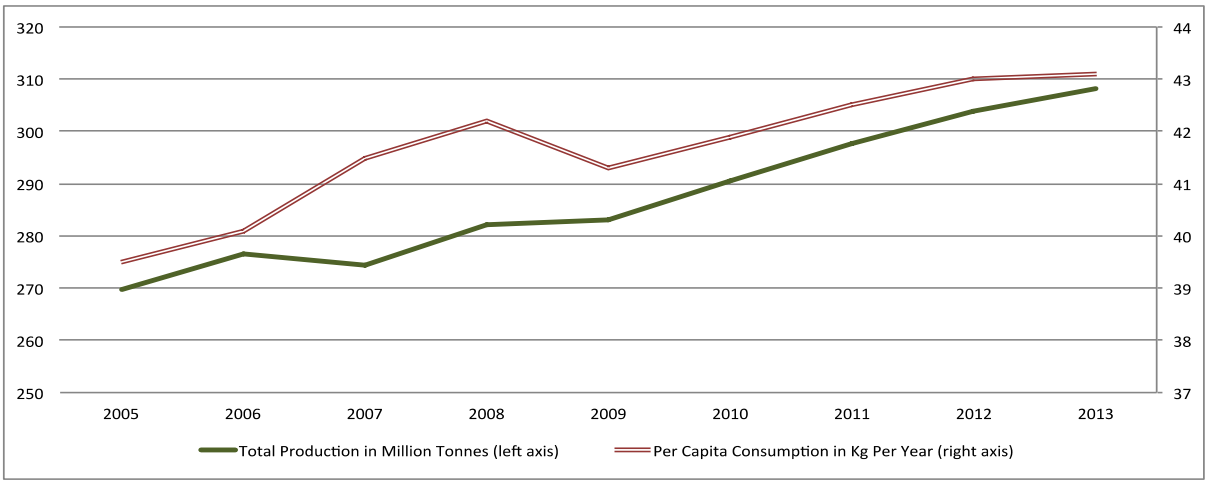



Source: Own graph, FAO (2013a) figures

Oilseed production in 2012 was at 453 million tonnes and is expected to increase to 477 million tonnes in 2013. Supply will increase at a lower rate due to low initial stock levels. Still stock-to-use ratios are projected to remain low compared to previous years, at about 15.5 for meals and cakes and 17.4 for oils and fats. Production of oils and fats in 2013 is set at 188 million tonnes, up by 2.9% from 2012, while supply, up by 2.7%, will be at 220 million tonnes. Meals and cakes should reach production levels of 118 million tonnes, up by 7% from 2012, and supply, up by just 2.5%, but still greater than production, will likely stand at 134 million tonnes (FAO, 2013a).

The two largest contributors to global meat production are pigmeat and poultry meat, with production levels in 2013 at 114 million tonnes and 106 million tonnes respectively. These two sectors are also the most dependent on concentrated feed and thus responsive to feed availability and prices. As can be seen in Figure 2-2, global meat production has been increasing quite steadily since 2005, with slight dips in 2007 and 2009. Per capita consumption has been a little less predictable, with a big hike in 2007 that continued to rise in 2008, followed by a dip in 2009, and a subsequent steady increase until 2012. Production in 2013 is expected to be at 308 million tonnes, just 5 million tonnes greater than 2012, while per capita consumption will likely remain at 43 kilograms per year as it was in 2012 (FAO, 2013a).

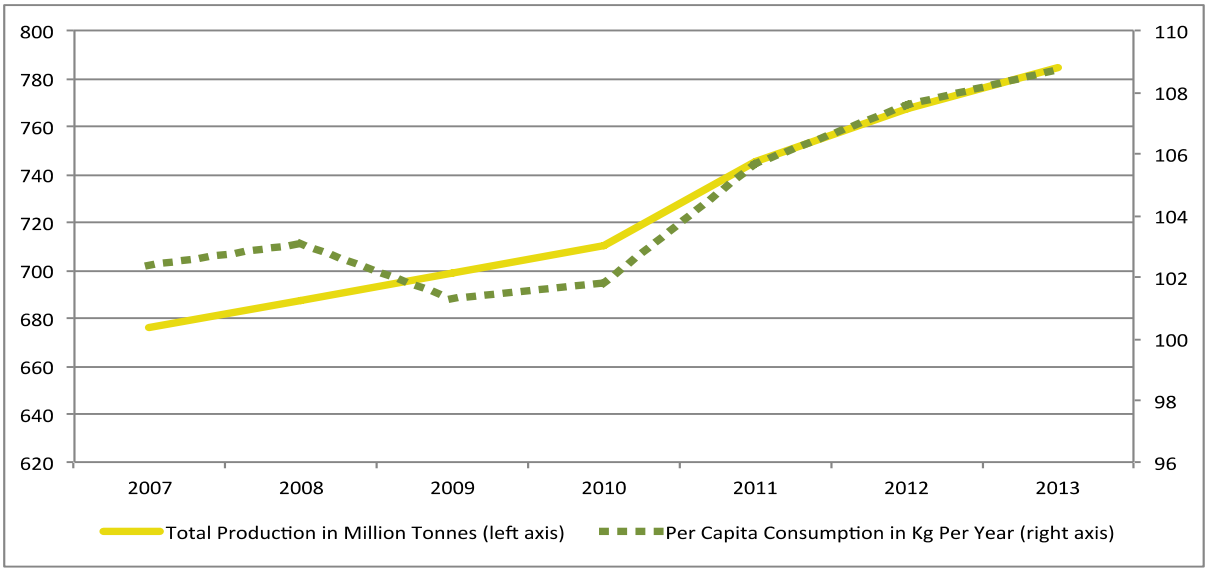
**Figure 2-2 Global meat production and per capita consumption**




Source: Own graph, FAO (2013a) figures

Figure 2-3 shows that milk production has been increasing relatively steadily, while per capita consumption has been a little less predictable. Milk production has gone from 676 million tonnes in 2007 to 767 million tonnes in 2012. Although an increase in production in the main milk exporting countries is expected to be limited, most countries, especially in Asia, are nevertheless expecting a rise in milk production. As a result, milk production is expected to reach 784 million tonnes in 2013. Measured in kilograms per year, per capita consumption is also expected to rise, however only slightly from 107 in 2012 to 108 in 2013 (FAO, 2013a).

**Figure 2-3 Global milk production and per capita consumption**




Source: Own graph, FAO (2013a) figures

According to Table 2-1 trends in food price indices appear to be more volatile than trends in production and even consumption or utilization. With regard to cereals, increased wheat production has led to lower wheat prices, a decrease in demand for rice has stabilized rice prices and, with supply of course grains exceeding demand, coarse grain prices will likely also be lower. Overall cereal prices have been decreasing since 2011 after it reached price levels nearly as high as those in 2008. Still prices are not as low as pre- and post-2008 (FAO, 2013a).

With greater production levels in oilseeds and lower consumption rates, prices have reached a low not reached since 2006. This decrease is mostly due to the decrease in the price of oils and fats, since the price of meals and cakes has increased dramatically since the end of 2011. Further price reduction is expected with the expectation that record high harvests in South America will enter the global market and that harvests in the Northern Hemisphere will be improved (FAO, 2013a).

Stagnancy in per capita meat consumption in 2013 is likely due to persistent high meat prices. Meat is one food category that has witnessed a steady increase in price with little backward movement. Ovine meat, making up the smallest portion of global meat production, is the only class of meat that has experienced an overall decrease in price since mid-2011. On the other hand, bovine meat prices as well as pig and poultry meat prices, the two largest contributing classes to total meat production, have seen increasing trends since 2009 (FAO, 2013a).

Despite overall increases in production, constricted export supplies has led to an increase in international dairy prices. These constrictions are as a result of decreases in production in principal exporting countries, such as New Zealand. Consequently, from a welcomed low in 2009, milk prices have reached a high in 2013 almost comparable to its record peak in 2007 (FAO, 2013a).

**Table 2-1 Price indices for major food commodities**

| Year | Cereals Price Index | Oils Price Index | Meat Price Index | Dairy Price Index |
|---|---|---|---|---|
| **2003** | 98,4 | 101,1 | 97,0 | 95,4 |
| **2004** | 99,1 | 103,5 | 104,9 | 113,1 |
| **2005** | 91,2 | 91,3 | 105,8 | 119,2 |
| **2006** | 103,9 | 96,0 | 101,2 | 109,3 |
| **2007** | 134,3 | 136,8 | 100,7 | 170,9 |
| **2008** | 175,6 | 167,8 | 113,2 | 162,2 |
| **2009** | 137,2 | 119,2 | 105,0 | 111,8 |
| **2010** | 137,4 | 146,1 | 114,6 | 150,8 |
| **2011** | 167,1 | 170,7 | 119,5 | 149,2 |
| **2012** | 161,3 | 150,6 | 117,0 | 126,1 |
| **2013** | 153,8 | 130,7 | 116,8 | 154,2 |

Source: Own table, FAO (2013b) figures

There are a number of factors that have and will impact the availability and affordability of food. One in particular that will be discussed in this chapter is biofuel production. Over the past decade policies around the world have increasingly promoted the use of biofuel. Many countries, such as the United States and the European Union, produce biofuels to increase their independence in terms of traditional energy sources. Other countries, such as Brazil, Argentina, Indonesia, Malaysia and Thailand, produce biofuels for export, diverting resources from food and feed crops that could contribute to domestic food supply. However, in countries like the United States the target blending rate of 10 percent has been met and the growth rate in the amount of maize that is utilized in the production of bioethanol is projected to decline sharply. Nevertheless, production will still increase over time and according to the 2013 to 2022 projections released by the OECD and FAO, ethanol and biodiesel production are expected to reach 168 billion litres and 41 billion litres respectively by 2022. This would require the use of 12% of world course grains, 29% of sugar cane and 15% of vegetable oil (FAO, 2013c).

Another factor impacting the availability and affordability of food is the growth in China's economy. By population, China is the largest country in the world; it is home to about 19% of the world's population. Of the 1.27 billion people living in China in 2001, approximately 14% were undernourished. China's food security and self-sufficiency policies have reduced

this number to 12% of the current 1.35 billion member population. Incomes and trade has increased making it possible for more people to afford food and also making available more food (FAO, 2013c; United Nations, 2013).

China's dependence on imports has doubled since 2001 from 6.2% to 12.9%. Furthermore, in relation to its population, China's land, water and agricultural labor resources are quite limited. While China has managed to increase agricultural production by 4.5% since 1978 and has taken steps to ensure that all land used for agricultural production remain allocated for that purpose, it is expected that increases in consumption in the coming years will continue to outpace increases in production at a rate of about 0.3% per year (FAO, 2013c).

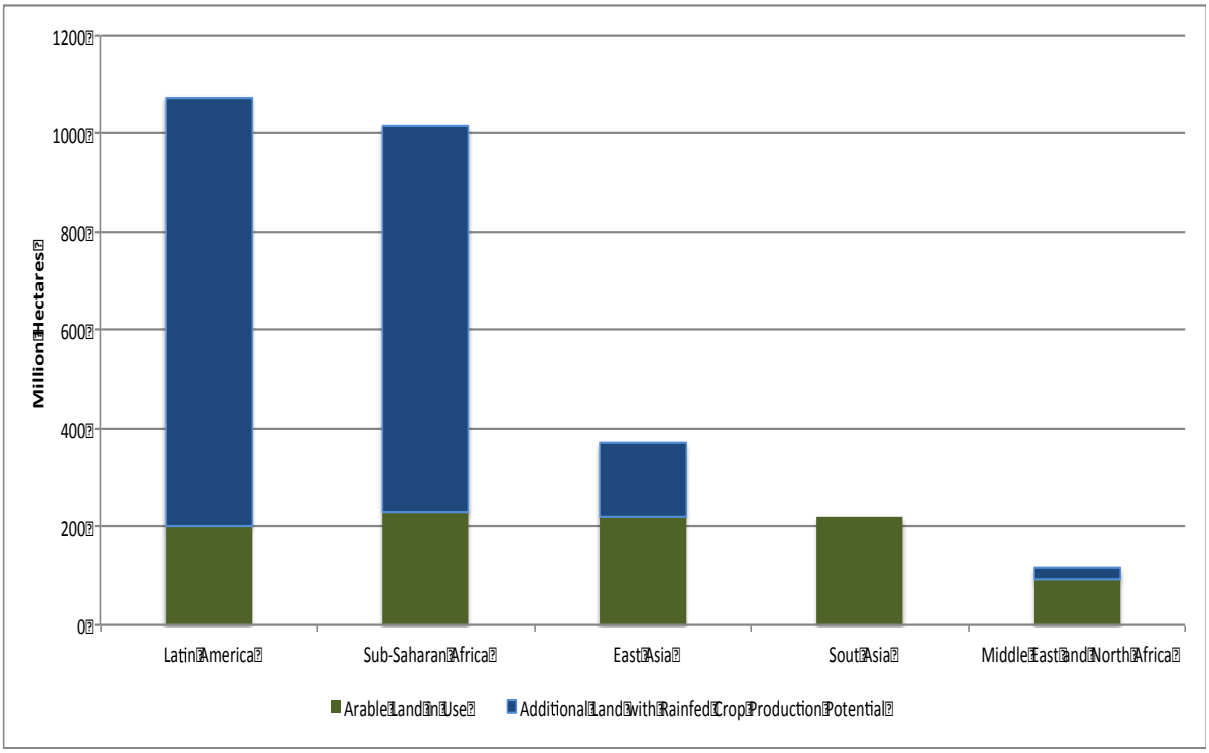
The OECD and FAO (2013c) anticipate that by 2022 China's milk production will have slowed considerably while its consumption of dairy products will have increased by 38%, demanding a 20% increase in dairy imports. Furthermore, imports of oilseeds will likely rise by 40% meaning that China will account for 59% of oilseed trade, and it is expected that China will become the world's largest per capita consumer of pig meat. If these projections are realized, there would be greater pressure added to global food production and this would then impact food prices.

As already mentioned, major factors that are expected to impact food production and food prices looking to 2050 are increasing world population figures, increasing income levels and intensification of urbanization. By implication some of the causes for concern are related to changes in lifestyle and consumption patterns. When taking into account income growth, diversification of diets in poorer countries is expected to accelerate: shares of grains and other staple crops will be declining; vegetables, fruits, meat, dairy and fish will increase; demand for semi-processed or ready-to-eat foods will increase (FAO, 2009).

Despite the expectation that the rate of growth for food and feed will decrease, forces working against this expectation include the expansion in the use of agricultural feedstock for biofuels, the issues raised in this chapter with respect to the Chinese economy and environmental degradation. It is anticipated that global food production will have to rise by 70% to meet demand in 2050. In terms of cereals and meat, this would require an increase by 1 billion tonnes and 200 million tonnes respectively (FAO, 2009).

It is expected that higher yields and increased intensity in cropping will account for 90% of the increase in crop production required to meet the rise in demand, while the remainder will be met by cropland expansion. Figure 2-4 illustrates potential cropland expansion in South America, Africa, the Middle East and Asia. This graph shows that the greatest proportion of land expansion would likely take place in South America and Sub-Saharan Africa (Bruinsma, 2009).

**Figure 2-4 Potential for cropland expansion**




Source: Own graph, Bruinsma (2009) figures

To meet demand in 2050, estimates reveal that land expansion in these regions of the world would have to be at about 120 million hectares. While total land expansion required is in fact 70 million, it is anticipated that 50 million hectares of land in North America, Europe and Australasia will be removed from agricultural production. While improved water use efficiency will likely decrease the rate of water withdrawal for irrigation, irrigation will probably still need to increase by at least 11% by 2050 (Bruinsma, 2009).

It is important to question the feasibility of cropland expansion, intensification of crop yields and increases in water use for irrigation: Much of the potential land for expansion is not

suitable for crops in highest demand, is under forests, is protected, or suffers from lack of infrastructure and other chemical or physical constraints. It is argued that fears that yields are reaching a plateau however are not warranted. To realize greater yields requires appropriate socio-economic incentives and access to technology. Prospects for water resources, on the other hand, seem bleak. While resources are sizeable, they are unevenly distributed, and are especially wanting for those countries that have reached their limit in terms of land availability (Bruinsma, 2009).

This brief overview is intended to offer a glimpse into the state of food availability and affordability and into food production prospects for the future. It makes clear that the answer to the question of global food security in the present and in the future is one that cannot be answered in unilateral terms. The complexity of the issue is highlighted through the discussions on the various impacting factors, such as biofuel production, China's economic growth and the need for land expansion, increased yields and greater access to water resources. The next section will look at food security as an evolving and complex concept.

## 2.2 FOOD SECURITY – AN EVOLVING AND COMPLEX CONCEPT

When the concept of food security first emerged, it was thought that food security could be achieved by boosting production and liberalizing agricultural trade. The emphasis on trade liberalization as a means for food security gained momentum in the 1990s when many African economies began to reverse anti-trade policies (Rakotoarisoa, Iafrate & Paschali, 2012). Arguments for trade liberalization were based on the theories of comparative advantage and competitive advantage. The theory of comparative advantage states that a nation has comparative advantage in the production of a good for which it has the lowest opportunity cost—meaning that the least amount of resources needs to be given up in the production of one good to produce an additional unit of another good. Thus, given that each country has a unique set of endowments, and that goods can be produced in one place at a cost lower than it can be sold in another, a logical corollary is trade (FAO, 2003).

Competitive advantage describes a situation where the absolute cost of a given good in a given market is lower than another. This is of particular importance in agricultural trade where government intervention distorts markets and as such, countries may be at a

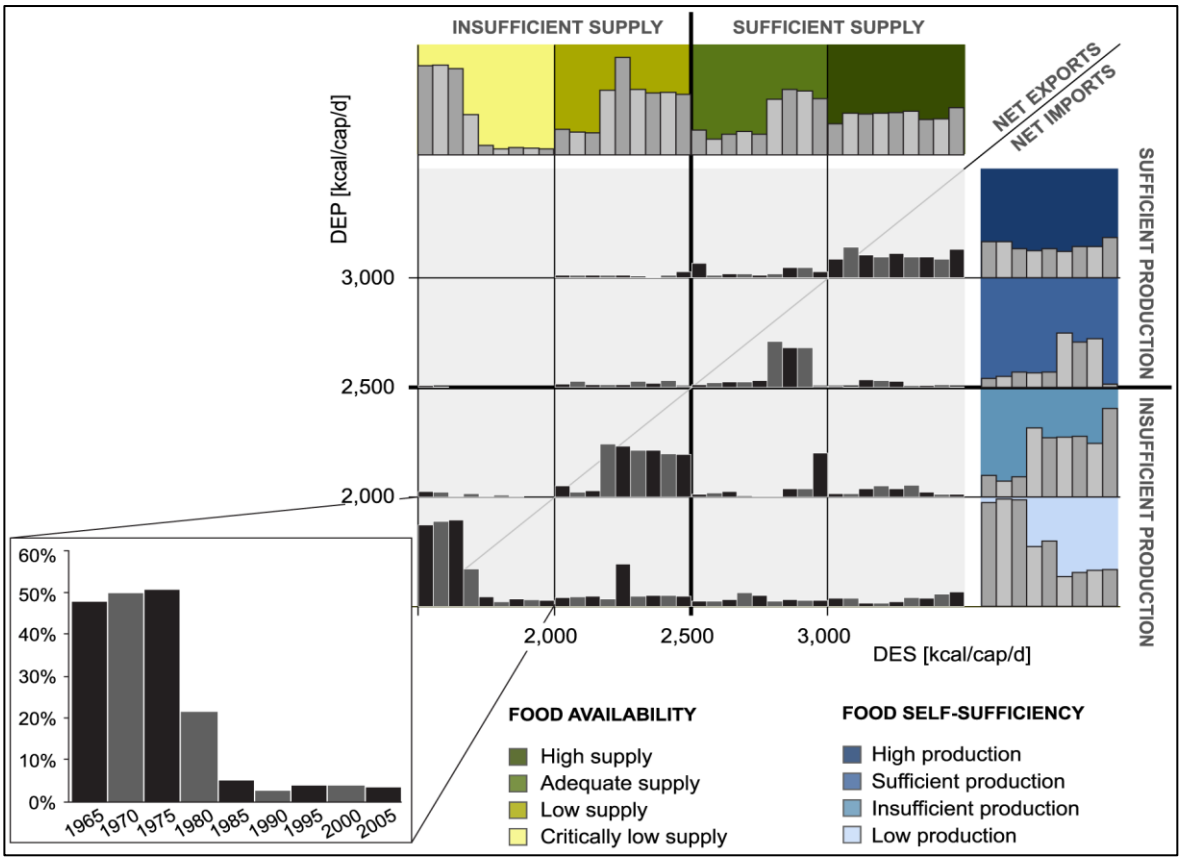
competitive advantage even when comparatively, they are not actually able to produce a particular good at a lower opportunity cost. Nevertheless, advocates of these theories argued that free trade would result in Pareto Optimal conditions where no country could be made better off without making another worse off, and that where necessary, those that gain from trade could compensate those that lose and still be better off. Thus, when applied, free trade was put forth as a prerequisite for the increase of welfare on a worldwide scale (FAO, 2003).

A number of studies have since been conducted to assess the relationship between trade and food security. What follows are the results of four such studies.

In a study on trade and global food availability, Porkka, Kummu, Siebert and Varis (2013) used the FAO Commodity Balances database to quantify dietary energy supply (DES) and dietary energy production (DEP) in order to calculate food availability, food self-sufficiency, food trade and composition of diets. This study was based on 1965 to 2005 data for approximately 170 countries and was based on 70 food crops and 24 animal source products. This research team found that the percentage of the global population living in countries with sufficient food availability—categorized as such where DES exceeded 2,500 kilocalories per person per day—increased from 33% to 61% from 1965 to 2005. Furthermore, overall per capita dietary energy supply increased by 20%.

Porkka *et al.* (2013) considered those countries with a DEP between 2 500 and 3 000 kilocalories per person per day self-sufficient. According to this threshold, they found that approximately 25% of the population lived in countries that were self-sufficient during the reference period, with an increase only between 1990 and 2000 to 45%. Figure 2-5 was created to compare findings for food availability and self-sufficiency. Consequently Porkka *et al.* (2013) concluded that food is generally produced to secure domestic supply and only secondarily for exports—this given that countries with sufficient production also had sufficient supply (upper right quadrant); dependence on food imports has increased somewhat since the number of countries with sufficient supply despite insufficient production (lower right quadrant) has increased incrementally; and that many countries with insufficient production are unable to import food to secure sufficient supply (lower left quadrant).

**Figure 2-5 Share of global population living in different food availability and food self-sufficiency categories**




Source: Porkka, Kummu, Siebert and Varis (2013)

The analysis of food trade found that in 1965 72% of the global population lived in net importing countries. Between 1990 and 1995 this figure dropped to 60%, but by 2005 increased to 80%. With regard to diet composition, Porkka *et al.* (2013) simply looked at adequacy in terms of share of animal products, measured as a diet with more than 15% of energy sourced from animals. They found that the percentage of the world's population living on such a diet increased from 33% to over 50% between 1965 and 2005.

Thus, overall, Porkka *et al.* (2013) found that while food availability improved over the reference period, food self-sufficiency did not change significantly, and it was therefore concluded that international trade has played an increasing crucial role in ensuring adequate national food supply. Their food trade results also confirmed this finding. Similary, according to their assessment of diet composition, a greater proportion of the world's population is consuming animal source foods.

In order to offer explanations for these findings, Porkka *et al.* (2013) ran correlations between the countries. They found that DES tends to increase when income increases, animal consumption seems to increase when income rises, DEP is higher where resources are in greater abundance, and countries with arable land tend to be net exporters. Given the many outcomes in the correlations that did not fit into the above trends, Porkka *et al.* (2013) concluded that while the relationship between economic development and food availability may seem relatively straight forward, the dynamics behind food availability, food production and trade are still not well understood.

Fader, Gerten, Krause, Lucht and Cramer (2013) also conducted a study connecting trade dependency to food security in relation to major crops, but in this case particular emphasis was placed on natural resource constraints. According to their analysis, almost 1 billion people use international trade to meet their demand for agricultural products, with North Africa, Arabia and the Andes hosting more than 50% of the dependent population. Of these, about a third would not be able to meet their demand locally even if all productive land and renewable water in their country were used for agriculture. Overall, 66 countries will not able to attain self-sufficiency due to water or land constraints. Also, 22 countries were found to be consuming food that would require more water to produce than found within their national borders and 62 countries were found to be consuming food that would require more land to produce than found within their national borders.

Fader *et al.* (2013) also looked at trends and determined that by 2050, with population growth, 5.2 billion people will be dependent on international trade for adequate food. Furthermore, 1.3 billion people in low-income economies—mostly in Africa—may be exposed to longer-term food insecurity if economic development in their countries does not enable improved productivity, cropland expansion and/or increased imports. Fader *et al.* (2013) advocate for productivity increases and cropland expansion as ways of avoiding increasing dependence on trade, stating as concerns both transport emissions and dependence on the volatility of other economies. At the same time, however, they acknowledge that other forces are at play, such as accessing goods only available elsewhere, making it possible to consume a seasonal good all year, as well as economic factors like comparative advantage, capital and labour costs, economies of scale and technology.

In the study conducted by Fader *et al.* (2013), the greatest vulnerability with respect to food security and trade dependency was found in Africa. Luan, Cui and Ferrat (2013) posit that a majority of the countries in Africa suffer from food shortages and undernourishment. They undertook to analyze food production and consumption on the continent at a continental and national level in order to determine self-sufficiency trends from 1961 to 2007. Luan *et al.* (2013) define self-sufficiency as the ability of a nation or region to sustain food production according to their required level and thus measure self-sufficiency using production and consumption data sourced from the FAOSTAT Food Balance Sheet database and population data sourced from the World Bank.

Luan *et al.* (2013) found that Africa's self-sufficiency ratio (SSR) declined drastically between 1961 and 1984, and then more gradually until 2007—see Figure 2-6 illustrating Africa's SSR. Overall, self-sufficiency declined from 1.0 in 1961 to 0.8 in 2007, because production could not keep up with consumption for an expanding population. It was found that decreasing trends mainly occurred in Northern and Southern Africa. According to Luan *et al.* (2013), out of nine countries in Western and Central Africa, Eastern Africa and Southern Africa—namely, Mali, Niger, Chad, Rwanda, Angola, Malawi, Zimbabwe, South Africa and Madagascar—that had a SSR above greater than 1 in 1961, only one—namely, Malawai—still has a SSR above 1.

**Figure 2-6 Self-sufficiency ratio of Africa**


Source: Luan, Cui and Ferrat (2013)

With respect to Southern Africa, Luan *et al.* (2013) stated that these countries possess relatively affluent natural resources. Whereas many of the other countries in Africa may have experienced declining ratios because of land or water limitations, they argued, that the increasing pressure on food security in Southern Africa is as a result of fluctuating food prices, chronic poverty, the effects of climate change, poor government and HIV/AIDS.

Luan *et al.* (2013) also ran additional analyses to determine the relationship between SSR and its fluctuation, as well as SSR and GDP. With respect to the former, they found that countries experiencing less fluctuation in their SSR were often those countries more able to maintain a balance between production and consumption in order to feed its people. Regarding the latter, they determined to classify countries into four categories: "high SSR-low GDP", "low SSR-low GDP", "high SSR-high GDP" and "low SSR-high GDP". The first class rely on home production to sustain food demand, but will not have the ability to import if need arises because of adverse environmental conditions. The second class is least food secure since it cannot meet its food needs and does not have the economic means to import food. The third class is of course the most secure and stable, while the final class, despite being unable to meet its own food demand, has the economic ability to import.

The final study on food security and trade that will be featured in this chapter is one carried out by Otero, Pechlaner and Gürcan in 2013. This study is particularly significant in that it puts forth the notion that trade liberalization, rather than leading to mutual dependency as was at first argued by international organizations, has led to what they refer to as "uneven and combined dependency". Otero *et al.* (2013) conducted an empirical analysis on food dependency in five emerging nations—Brazil, China, India, Mexico and Turkey—and compared their findings with assessments of dependency in two economically more established countries—United States and Canada.

Otero *et al.* (2013) found that while those countries already competitive in the export market benefited from trade liberalization, countries that were not already competitive came to rely more and more on food imports and became susceptible to food price increases on the global market. It seemed the extent of impact was based on the degree of openness adopted by the country. For example, Mexico was the only developing nation that unstintingly adopted the free trade regime and has in turn become dependent on developed nations for its basic food

needs. On the other hand, open markets for the United States and Canada have meant increases in imports of luxury foods with modest contributions to the global food market of local produce. This is a reflection of uneven dependencies.

Otero *et al.* (2013) also argue that food consumption patterns around the world are being homogenized for the economic gain of multinational agribusiness corporations. These multinational corporations, it is argued, operate with relative freedom in various national markets. Not only are they the source of biotechnology on which modern farmers have become heavily dependent, but they also control the distribution chain between production and final sale. That most of these corporations originated and are based in developed countries is a further reflection of the uneven pattern of worldwide capital accumulation. It is for this reason that Otero *et al.* (2013) argue that in addition to being uneven, food dependency has become combined, hence the term "uneven and combined dependency".

The above studies revealed that food dependency in the poorest countries intensified under open trade. While some believed this to be as a result of unfair trade policies and rules in developed countries, others saw the lack of competitiveness of the African agricultural markets as the root cause (Rakotoarisoa, Iafrate & Paschali, 2012). Rakotoarisoa *et al.* (2012) suggest that when, rather than if, developing countries integrate their agricultural sector into the international market, is the key question. They propose that the time will be right when markets function adequately enough that government support is not required.

Following free trade policies, regional trade agreements among African countries is a more recent evolution in African trade policy (Rakotoarisoa, Iafrate & Paschali, 2012). At a regional trade and food security conference in Southern Africa, past Minister of Agriculture of Lesotho, J.R.L Kotsokoane (1992), suggested that Southern African Development Community (SADC), which enables free trade between member countries, was formed because of the negative impact of international trade liberalization on food security in poorer, African countries. He saw trade liberalization as increasing food insecurity because he believed that surpluses from the developed countries were being dumped in developing countries as food aid and used as leverage to influence political and economic decisions of the recipient countries; and that low commodity prices in international markets were handicapping the economies of many developing countries.

At the early stages, then, trade was seen as necessary for redistributing supply and thereby achieving and maintaining food security. This is because food security was mainly thought of as a problem of availability. As the world food problem persisted, re-evaluation resulted in the conclusion that since food insecurity was experienced mostly by the developing world, which is by definition poor, economic accessibility or affordability may be another factor. The notion of affordability was introduced as early as 1977, when Samuelson (in Reutlinger, 1978) stated that in times of global crop failure those who might starve need to be provided with the financial resources to buy a share of the limited international supply.

In exploring the affordability, Valdes and Konandreas (1981) and Reutlinger (1978) provide evidence that the onus of ensuring a global state of food security should remain on the international community since worldwide financial resources were sufficient for devising financial schemes that would solve the problem of this added dimension. While Amiti (in Smith, Pointing & Maxwell, 1992:154) argues that nuances in the question of "accountable parties for the preservation of food security" become apparent at rural, national, regional and international levels.

Although Amiti (in Smith, Pointing & Maxwell, 1992) encourages us to look at food security in more specific contexts, he seems to elaborate solely on the same two broad questions: food availability and affordability. At a national level, he explores food availability by raising the question of storage and transportation, while for affordability he points out the need to ensure sufficient individual income generation and governments' capacity to earn foreign exchange. At an international level, he concludes that a salubrious relationship is necessary between policy-makers for the purpose of constructive discussions on production, price, trade and aid.

Thus a nation's ability to afford food came to be recognized as an important dimension to food security and the FAO expanded its definition of this concept when it stated that all people should have "both physical and economic access to the basic food that they need" (FAO, 1983:2). Through the amendment and endorsement of a revised definition of food security at the 1983 FAO conference, an equation emerged in which both the supply and demand sides of economics became protagonists in the quest for balance (FAO, 1983). This two-dimensional view of food security was gradually adopted by an increasing number of researchers, writers and policy-advisors (Badiane, 1988; Falcon, Kurien, Monckeberg, Okeyo, Olayide, Rabar, & Tims, 1987; Mellor, 1990).

The studies referred to suggest that affordability can be addressed by tackling poverty or by attempting to reduce the price of food. The latter, however, may have differentiated outcomes for consumers and producers. The FAO (2009) explains that high food prices is especially harmful to poor consumers who spend a large proportion of their income on food as these increases decrease their ability to buy other basic needs, such as health care and education. On the other hand, producers who are able to respond effectively can benefit greatly from high prices as this will boost profitability of the foods they produce.

The FAO (2009) suggest that large, unexpected price volatility is essentially what is most problematic for all parties—be it producers, consumers, traders or government. This is because such variations create uncertainty, present risk, and lead to sub-optimal decisions. Policies can be put in place to prevent or reduce volatility, or to mitigate its consequences. For example, during the economic crisis of 2007/2008 when the approximated number of hungry people rose from 820 million to 1 billion, options adopted by certain developing countries to curb food insecurity included a reduction of import taxes, increase in export tariffs, banning of exports, provision of cash transfers, increase in disposable income through a decrease in tax and support to farmers (FAO, 2009).

World food price volatility is most concerning for those countries that rely on imports to meet food needs. This is because it can impact their ability to finance imports via export earnings, and also because the volatility at international level is transferred to the country via the import price of the goods brought in (FAO, 2003).

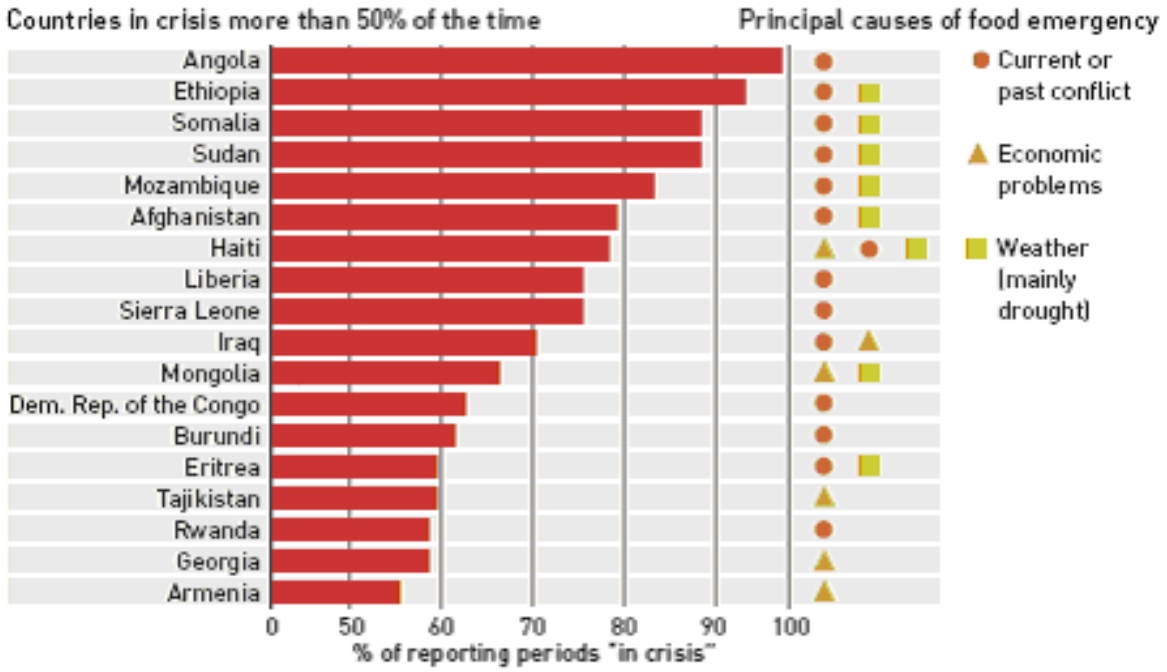
The nature of volatility in agricultural commodity markets is seen as exceptional because of the fact that output cannot be guaranteed, demand and supply elasticities in response to price in the short run are relatively low and because production in most cases take a long time. The second argument implies that prices have to shift by a larger order for the market to reach equilibrium again after a supply shock. The implications of production time are that farmers cannot respond to price changes in the short run and thus another layer of market variability is added given the lagged response (FAO, 2009). Given the sensitive nature of the agricultural market, the FAO (2009) suggest that in order to improve food security, governments need to invest in agriculture by implementing policies that increase productivity and resilience.

As understanding of the critical topic of food security progressively increased, the temporal dynamics of food security surfaced. When still seen essentially as an issue of supply and acquisition, phrases such as "on a yearly basis" (Siamwalla & Valdes, 1980:258), "at all times" (World Bank, 1986:1), "over both the short and the long run" (Falcon et al., 1987:2), "on a regular basis" (World Food Council, 1988:3), "throughout every season of the year" (UNICEF, 1990:2), could be found more and more in definitions of food security. Thus concepts such as transitory, chronic, baseline, cyclical, seasonal, predictable and unpredictable, came to be explored in efforts to describe this added dimension related to how food insecurity is experienced (Devereux, 2006).

Barret and Sahn (2001) point out that in the case of an abrupt decline in the ability to grow or buy sufficient food, a state of transitory food insecurity prevails. According to the FAO (2005a), an estimated five to ten percent of the third world experience transitory food insecurity at some point every year. Devereux (2006) classified causes that might lead to an abrupt decline, and consequently explained that transitory food insecurity as an outcome of extreme and relatively infrequent phenomena, such as natural disasters, economic downturn or conflict, will often be a parlous experience; on the other hand, seasonal harvests, for example, will more likely result in a mild form of transitory food insecurity. Gervais, Bryson and Freudenberger (2003) elaborate on the agricultural calendar as the cause for times of food insecurity in their discussion on periodic fluctuations in food availability: If the pattern of fluctuation in food availability is consistent, the trough period is referred to as cyclical short-term food insecurity, whereas unexpected shortages are denoted as temporary short-term food insecurity.

As can be seen in Figure 2-7, the FAO (2005a) posits that the weather, current or past conflict and problems related to the economic situation in a country, cause periods of food insecurity. According to this figure, a combination of conflict and weather seem to be associated with those countries experiencing longer periods of food insecurity, while those countries experiencing food insecurity less frequently seem to be those faced with economic concerns—suggesting that it may be easier to address economic concerns.

**Figure 2-7 Frequency and primary causes of repeated food emergencies**




Source: FAO (2005a)

Whether shocking, sudden, abrupt or temporary changes or shifts occur in some or other aspect of an existing balance, the state of transitory food insecurity is described this way because of its expected brevity (Department for International Development, 2002; FAO, 2003). Insight into chronic food insecurity follows.

Barret and Sahn (2001) describe chronic food insecurity as the lack of ability to consume a basic healthy meal on a consistent basis. Devereux (2006) points out that transitory food insecurity can lead to chronic food insecurity if limited assets are depleted to cope with the former. The notion of 'vulnerability' is therefore introduced to facilitate analysis of the ability to overcome a breakdown of food secure conditions. Dhur (in Devereux, 2006:7) argues that while vulnerability is borderline transitory or chronic food insecurity, the vulnerable would not have had to experience either to bear the label. With this argument, Devereux (2006) asserts that food security necessitates even the alleviation of vulnerability, adding that resilience is an important ingredient in maintaining a state food security. The following view presented by Gervais *et al.* (2003) on subsistence farmers is suggestive of what it might look like to alleviate vulnerability at the household level: when a family has little access to land, or other obstacles prevent their capacity to produce food, they are

continuously at risk of not meeting their food needs and are thus in a state of chronic food insecurity.

Taking resilience into consideration in defining food security is consistent with the following view: in the face of 'structural deficiencies', chronic food insecurity is difficult to avoid. An amalgamation of opinions on chronic food insecurity suggests that this condition is held to be the persistent inability to meet food requirements, quantitatively and qualitatively, due to slowly changing factors, or the want in resources to deal with shocks over a long period of time that inevitably leads to a new state of living characterised by continuous stress associated with constant concern over where the next meal may come from, if it comes at all (FAO, 2002; FAO, 2005a; International Fund for Agricultural Development, 1997; World Food Programme, 1998).

## 2.3 FOOD SECURITY IN SOUTH AFRICA

South Africa is a signatory to the Rome Declaration, which means that it must implement the 1996 World Food Summit Plan of Action and report its progress annually to the World Committee for Food Security. Also, South Africa participates in the Regional Advisory Committee (RAC) of the Regional Food Security Training Programme (RFSTP), which focuses on: strengthening the supply of food security training services; encouraging the demand for training and development; and sustaining regional markets for food security-related training services (Government Communication and Information System, 2012).

South Africa is a member of the Southern African Customs Union (SACU) and a signatory of the Southern African Development Community (SADC) Agreement. Free trade exists between member countries of both SACU and SADC. As a region, then, SADC and SACU are less affected by external market forces. Furthermore, these regions are less susceptible to food insecurity as a whole when considering that in a sense, local food crop production is shared (SADC, 2014).

At the forefront of the food security debate in South Africa at a national level stands Section 27 of the South African Constitution which guarantees, among other things, the right to sufficient food and water. Further in this Section it states that the government must work

toward the realization of these rights by legislation and programmes, and within its available resources (Studies in Poverty and Inequality Institute, 2007).

In line with such statements in its constitution, the government designed the Integrated Food Security and Nutrition Programme (IFSNP) in the early 2000s for the purpose of eradicating hunger by 2015. The implementation of this programme relies on collaboration between various government departments: the DAFF would play a key role in ensuring that food insecure populations gain access to productive resources, the Department of Health would take the lead in educating the public about food nutrition and food safety, the Department of Social Development would intervene with social security services where there are great barriers to meeting food security needs, such as disability or severe destitution, and so on (DAFF, 2002).

Also, the 2009 South African government set out twelve priority objectives for its tenure as part of its Medium Term Strategic Framework (MTSF), of which one was to have vibrant, equitable and sustainable rural communities contributing towards food security for all—an objective shouldered by DAFF. This approach is based on the belief that food security will contribute to equitable growth and competitiveness, which is said to in turn lead to economic growth (DAFF, 2012).

These efforts were reinforced when in 2013 the National Planning Commission (2013) under the Presidency placed food security together with sustainable rural development on its 15-item long list of priority issues in need of investigation. Furthermore, in South Africa's National Development Plan for 2030, action point 76 is to "identify the main elements of a comprehensive food security and nutrition strategy and launch a campaign" (National Planning Commission, 2011:70). In August 2013, the "National Policy on Food and Nutrition Security" was published (DAFF, 2013b). This policy identifies the following four strategic goals:

1. Increasing and better targeting public spending in social programmes effecting food security;
2. Increasing food production and distribution, including giving emerging farmers greater access to production inputs;

3. Taking advantage of Government procurement programmes to support smallholder farmers and community-based food production;
4. And making food security a determining factor in decisions regarding market intervention and trade measures.

It is important to note that despite these agreements and initiatives, and when compared to other 'developing countries', there are range of factors in South Africa that seem to dampen anxiety over potential food insecurity: high per capita income, the fact that this nation is not landlocked, relatively satisfactory transport infrastructure, that its constitution entrenches the right to adequate food and health care and that its foreign exchange policies make trade possible. Consequently, from an international perspective at least, South Africa's food security status is comparatively favourable (De Klerk, Drimie, Aliber, Mini, Mokoena, Randela, Modiselle, Vogel, De Swardt and Kirsten, 2004), as can be seen by the results of the Global Food Security Index (GFSI) (The Economist, 2013).

The GFSI, which incorporates various indicators under food affordability, availability, as well as quality and safety, ranked South Africa 39 out of 114 countries. According to this index, South Africa scored 61 out of 100, where the 100$^{th}$ country is considered the most food security in overall terms. This index also ranked South Africa 10$^{th}$ of the upper middle income countries, which is the second of four income classifications—the first is high income countries, the third lower middle income countries and the fourth low income countries (The Economist, 2013).

That South Africa is generally viewed as food self-sufficient also creates confidence around its food security status. However, when writing about food security in South Africa in the 1980s, Blignaut (1989) pointed out that the food problem and the hunger problem are two separate issues. He explained this by drawing attention to the association between hunger and poverty: That even in the face of food abundance, the poor are still vulnerable to hunger. Before looking at studies that assess hunger and food insecurity in South Africa more directly, let us look again at the studies referred to in the previous section on trade dependency and self-sufficiency, and consider what was found with respect to South Africa.

In the study conducted by Fader *et al.* (2013) which looked at trade dependency and food security with respect to major crops on the basis of natural resource constraints, the following

results were found with respect to South Africa: 3 to 8% of its population is dependent on external natural resources to meet its consumption needs and current food consumption is above its land boundary. The crops that were looked at were temperate cereals, maize, rice, tropical cereals, temperate roots, tropical roots, rapeseed, groundnuts, soybeans, pulses and sunflower. Also, a category of 'other crops' were simulated which included potatoes, sugar cane, oil palm, citrus, date palm, grapes, cotton, cocoa, coffee and others.

With respect to the prospect of low population growth, Fader *et al.* (2013) determined that self-sufficiency would be possible in South Africa, but that in the case of high or medium population growth, improved productivity and management would be necessary. Also, to avoid increasing dependence in the face of medium or high population growth, increasing productivity is said to be required, whereas in the case of low population growth South Africa could either increase productivity or expand use of natural resources to avoid increasing dependency.

Conclusions made by Porkka *et al.* (2013) were that self-sufficiency between 1965 and 2005 for an approximately 170 countries had remained relatively stagnant. However, they added that some countries had experienced a dramatic decline in self-sufficiency and named South Africa among these. Research done by Luan *et al.* (2013) was for the purpose of analysing food production and consumption on the African continent at a continental and national level between 1961 and 2007. With respect to South Africa they found that the self-sufficiency ratio had decreased from above 1 in 1961 to 0.75 in 2007. Luan *et al.* (2013) found that over the years South Africa's self-sufficiency ratio fluctuated at a rate between 0.15 and 0.4, and held an average above 1—which may be misleading, given the degree of fluctuation.

It seems then that South Africa is able to make available a sufficient supply of food either by local production or imports. While food supply has managed to keep abreast the growth in population, the nutritional status of certain individuals and groups remains weak. In 2001 Rose and Charlton (2001) developed what they referred to as an objective tool to measure household food insecurity. On the basis of information on nutritionally adequate subsistence diets in the Household Subsistence Level (HSL) series developed by the University of Port Elizabeth, five low-cost monthly food ration scales were created for the following categories: adult males (19 years and older), adult females (19 years and older), children of 1 to 3 years, children of 4 to 6 years and children of 7 to 10 years.

Rose and Charlton (2001) varied the ration scales according to ranges of minimum quantity required per month of the following food items based on the subsistence diet adopted by the Household Subsistence Level (HSL) series developed by the University of Port Elizabeth: skimmed milk powder, meat (red and chicken), pilchards, eggs, fresh vegetables, fresh fruit, margarine, cooking oil, brown bread, maize meal or samp, sugar or jam, peanut butter, beans or peas, coffee or tea, salt, dry spices and liquid spices. The cost of these five baskets was then combined with information from the 1995 IES on household composition to determine the amount the household should spend on food to ensure food security for that household—this then became the household's food poverty line.

Data from the 1995 IES on household spending was then used to assess the percentage of households above and below the food poverty line. Rose and Charlton (2001) found that on average South Africans spent 170% of the cost of a nutritionally adequate basic diet on food. Despite this average, it was determined that 42.6% still fell below the food poverty line. This study also found that the food poverty rate was 62% in rural areas and 27% in urban areas; that Gauteng spent 250% of the food poverty line while the Northern Cape spent just 118%; that food poverty in households with seven or more persons was experienced by 78% while those with just one or two persons by 17%; that while 39% of male-headed households were food poor, over half of female-headed households were in a similar position; and finally that 56% of households headed by black Africans were below the food poverty line while only 3% of households headed by whites were food poor (Rose & Charlton, 2001).

After Rose and Charlton (2001) drew out the above results, the following internal validation process was followed. First, the researchers substituted the basic subsistence diet developed by the HSL—with its associated food items, quantities and costs—with one developed by the Minimum Living Levels (MLL) series of the University of South Africa's Bureau of Market Research. With this substitution it was found that 50% of the population was below the food poverty line. Second, the researchers compared the food energy available to each household in the 1995 IES with each household's total energy needs. With this validation method the proportion of South Africa's population said to be food insecure was estimated at 55%.

Jacobs (2009), who aimed at identifying targets requiring food security support, proposes a similar measurement of food security on the basis of a household's ability to purchase what

he coined a "nutritious food basket" (Jacobs, 2009:411). The NAMC food basket was used as a base for selecting the food items that would make up this basket, prices were sought from Stats SA pricing data, the kilocalories associated with each item was taken from a study conducted by Temple and Steyn (2009) and average spending patterns on food were taken from the 2005/2006 IES. Jacobs (2009) then developed two baskets: a below average dietary cost basket and an average dietary cost basket.

In his assessment of food security, Jacobs (2009) used 2005/2006 IES data on food spending. Jacobs (2009) compared food spending patterns to the cost of the below average dietary basket as well as to the cost of the average dietary basket. He found that 73.2% of households did not spend enough on food to be able to afford a below average diet while 81.55% did not spend enough to be able to afford an average diet. The prevalence was higher in rural areas with 84.95% spending less than required for a below average diet and 90.49% spending less than required for an average diet.

The most recent Baseline released by BFAP (2013) introduced two categories of food poverty lines at the level of the household: the BFAP Poor Person Index (BPPI) daily food plate and the 'balanced daily food plate'. The former is designated as nutritionally inadequate and simply reflects a combination of food items (maize porridge, brown bread, sugar, tea and full cream milk) most commonly consumed by the poorest portion of the population. The latter is made up of three options that accommodate for variations in food expenditure levels. All provide the required dietary diversity while only option one provides adequate energy. Option two provides 82% of required energy intake levels and option three just 61% (BFAP, 2013). Table 2-2 contains a breakdown of costs associated with each basket:

**Table 2-2 Cost of food baskets**

| | **Cost Per Day Per Person** | **Cost Per Month Per Person** | **Cost Per Month Per 6 Member Household** |
|---|---|---|---|
| **BFAP Poor Person Index (BPPI) Daily Food Plate** | R 4.26 | R 130.00 | R 777.00 |
| **Balanced Daily Food Plate** | | | |

| | | | |
|---|---|---|---|
| Option 3: | R 25.00 | R 784.00 | - |
| Option 2: | R 43.00 | R 1,332.00 | - |
| Option 1: | R 74.00 | R 2,285.00 | - |

Source: BFAP (2013), own table

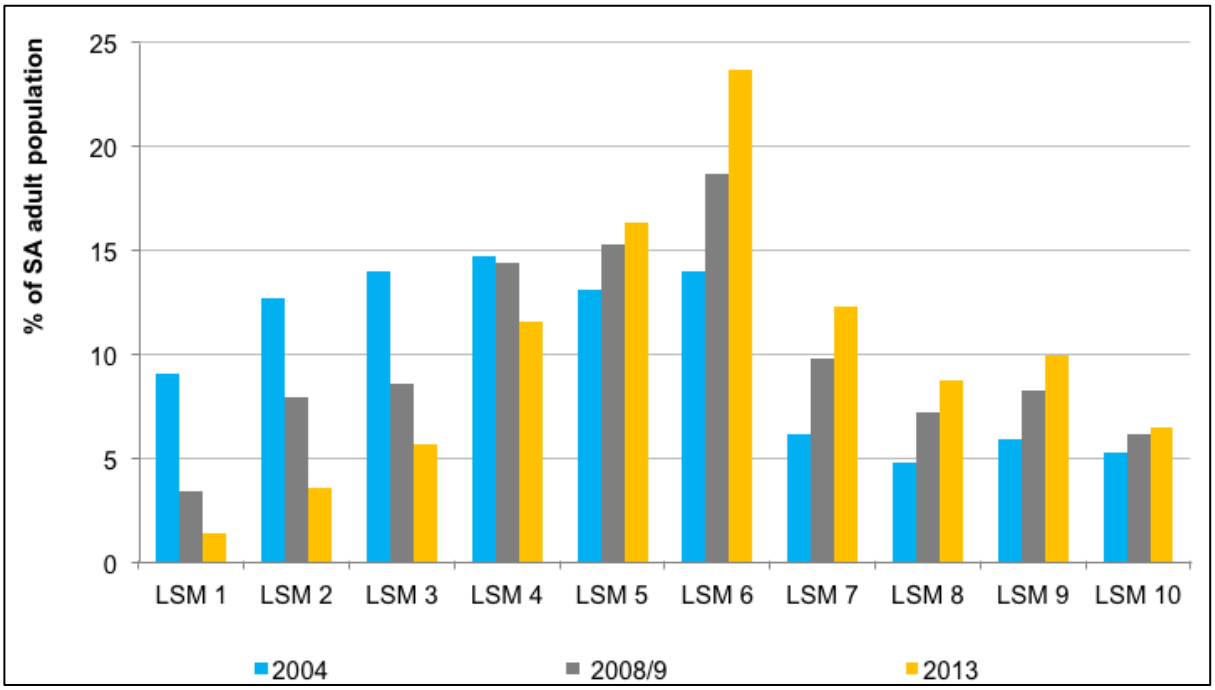
In order to assess the food security status of households, this analysis took into account various sources of income, household composition as well as food budgets. With regard to sources of income, BFAP (2013) considered old age pension rates of R1,200 per month, child grants at R280 per child per month, and the minimum wage rate of farm workers of R105 per day. BFAP (2013) used statistics from the most recent IES, which revealed that the first poorest 10% of the population spends 75% of their total income on food, the second poorest 10% spends 54% on food and the poorest 20% spends 31% of expenditure on food. Statistics from the 2011 General Household Survey was used with regard to household composition: the average household size in the poorest provinces (Limpopo and the Eastern Cape) is 5.9 and 99% of households have 1 or two adults. Possible combinations of households created were as follows: 0 or 1 pensioner; 0, 1 or 2 adults; 1, 2, 3, 4 or 5 children. The conclusion of the analysis revealed that only the BBPI food plate, poor in dietary diversity and energy intake, was economically accessible to all household compositions (BFAP, 2013).

In addition to income levels, urbanization is an important factor in considering food security because of its impact on food consumption patterns. The Living Standards Measure (LSM) market segmentation tool, developed and maintained by the South African Audience Research Foundation (SAARF) since 1989, can be used to measure shifts in income levels and urbanization. It divides South African consumers into 10 segments: LSM groups 1, 2 and 3 are categorized as poor consumers, hold less than 5% of total income and make up almost 11% of the population; LSM 4, 5 and 6 are labeled middle class or mass consumers, hold less than 30% of income and make up just over 50% of the population; LSM 7 and 8 are upper middle consumers, hold less than 30% of income and represent just over 20% of the population; and LSM 9 and 10 are categorized wealthy consumers, hold less than 40% of income and make up 16.5% of the population (SAARF, 2013).

Figure 2-8 portrays movement between the LSM groups from 2004 to 2008/9 and to 2013. This movement is referred to as ‘class mobility’. According to this graph the share of poor consumers has fallen, with a correlating increase in the share of consumers categorized as

average and wealthy. The share of consumers within the LSM 1 category alone has fallen by 85% since 2004. Food consumption patterns have shifted drastically over the past decade in conjunction with 'class mobility' (SAARF, 2013). Notably, the demand for certain food items is increasingly being motivated by indulgence. According to BFAP (2014), after indulgence is health, which in 2013 was just as strong a motivator in food choice as convenience.

**Figure 2-8 Class mobility in the South African consumer market**




Source: SAARF (2013)

A number of other surveys also shed light on South Africa's food security situation. The annual Stats SA General Household Survey (GHS) found that the North West Province suffers most in terms of food access, followed by the Northern Cape and then the Eastern Cape. In the North West, 34.6% have inadequate or severely inadequate access to food. In the Northern Cape this figure stands at 28.1% and in the Eastern Cape at 28%. Limpopo actually suffers least with 10.2% having inadequate or severely inadequate access to food. For Gauteng the percentage is at 18.4, for KwaZulu-Natal it is at 19.8, for the Western Cape at 21.3, for Free State at 23.7 and for Mpumalanga at 25.7 (Stats SA, 2012a).

Responses to questions in the GHS that are used to monitor food insecurity were initially limited to the experience of hunger. Based on these questions Stats SA (2012a) found that

12.6% and 10.8% of households and persons respectively were vulnerable to hunger. However, upon reflection it became clear that even if households or persons were not hungry, they may still be food insecure given their choice of food because of limitations in resources could compromise the nutritional dimension in the definition of food security that demands the consumption of an adequately diverse diet.

The 2008 South African Social Attitudes Survey (SASAS) conducted by the HSRC posited that 48% of households had sufficient food (Human Sciences Research Council, 2013). From 2010, when the GHS began to ask respondents about food choices made because of limitations in resources, Stats SA (2012a) found that 21.5% and 26.1% of households and persons respectively had complex access to food. As an example, an individual may be able to access food in sufficient quantities, but the food accessed may not be nutritious enough to ensure the healthy development of that individual. In such a case, then, the question of access to food is said to be complex and cannot be answered by simply asking whether or not the individual goes to bed hungry.

## 2.4 SUMMARY

Out of the approximately seven billion people living on the earth in 2013, over the past three years 12% could not meet their dietary needs and one eighth are likely to have experienced chronic hunger. While food production at a global level continues to increase, so do prices. Furthermore, a range of other factors continue to impact the food security situation globally, such as the growth in population, increasing income, urbanization, China's growing economy, greater demand for biofuels and climate change. With respect to supply, the areas where expansion in production are most probable are mostly situated in regions that are home to 98% of the world's hungry.

The complexity of the global food issue is becoming increasingly clear as researchers struggle to encompass all its dimensions in their measures, monitors and studies. To begin with, food security was thought of as an issue of availability. Trade liberalization was encouraged so as to ensure the free flow of supply—it was believed that this would ensure levels of supply commensurate with the needs of each population. However, some saw this as making poorer countries more dependent on imports for its food needs.

Poverty reduction and price volatility became questions of focus as affordability was introduced into our understanding of food security. And soon after, the definition of food security was complemented by concepts such as transitory, chronic, cyclical and seasonal, which have come to determine vulnerability and resilience with respect to food security.

While research suggests that South Africa is self-reliant in terms of food availability, it certainly does rely on imports to meet food demand. Thus, South Africa's self-reliance in terms of food is based both on local production and its economic ability to import food. Furthermore, studies have shown that South Africa is becoming less-and-less self-reliant over time with respect to local production.

In terms of access, the question of food security becomes far more complex. A number of researchers stress the prevalence of households that do not have enough money to buy food available in markets. Given the levels of income inequality and economic segregation in South Africa, looking at the connection between household income and the price of food is considered a key element in assessing the risk of more and more people falling into the category of food insecurity, or into the category of those vulnerable to becoming food insecure.

# CHAPTER 3:THE AGRICULTURAL SECTOR AND HOUSEHOLD FOOD EXPENDITURE IN SOUTH AFRICA

The introduction to this study highlighted the importance of the need to measure production against consumption when considering availability in the context of food security in South Africa. This chapter will offer a general overview of the agricultural sector in South Africa. Following this will be industry analyses of major agricultural industries according to the major food groups. The 2005/2006 and 2010/2011 household food expenditure shares on food items within each food group will also be included.

## 3.1 OVERVIEW OF SOUTH AFRICA'S AGRICULTURAL SECTOR

South Africa is home to almost 40,000 commercial farmers, who are responsible for approximately 60% of agricultural output (Louw, Chikazunga, Jordaan, & Biénabe, 2007). According to a series of surveys conducted by Stats SA (2007), the number of commercial farming units has decreased over the years from 57,980 in 1993, 45,818 in 2002 and 39,982 in 2007. Figures for subsistence and small-scale farming units are harder to come by. The Rural Survey of 1997 indicated that approximately 1.7 million people in the former homelands had access to land for farming purposes, that 93% of these households were engaged in subsistence farming, and that 6% actually sold crops (Statistics South Africa, 1999).

Close to 70% of South Africa's land is suitable for grazing, its coastline runs the length of 3 000 kilometres and it has eight commercial ports. South Africa's greatest limitations are in arable land—just 12% of South Africa's is said to be suitable for crop production—and fresh water. Farming units in South Africa are spread across seven climatic regions and produce a diverse range of agricultural products. Farmers engage in intensive crop production and mixed farming in winter rainfall and high summer rainfall areas, and cattle ranching in the bushveld and sheep farming in the arid regions (SouthAfrica.info, 2015). Some of South Africa's top commodities by production level are sugar cane, maize, milk, potatoes, wheat, grapes, oranges, chicken, apples and beef (FAOSTAT, 2011)

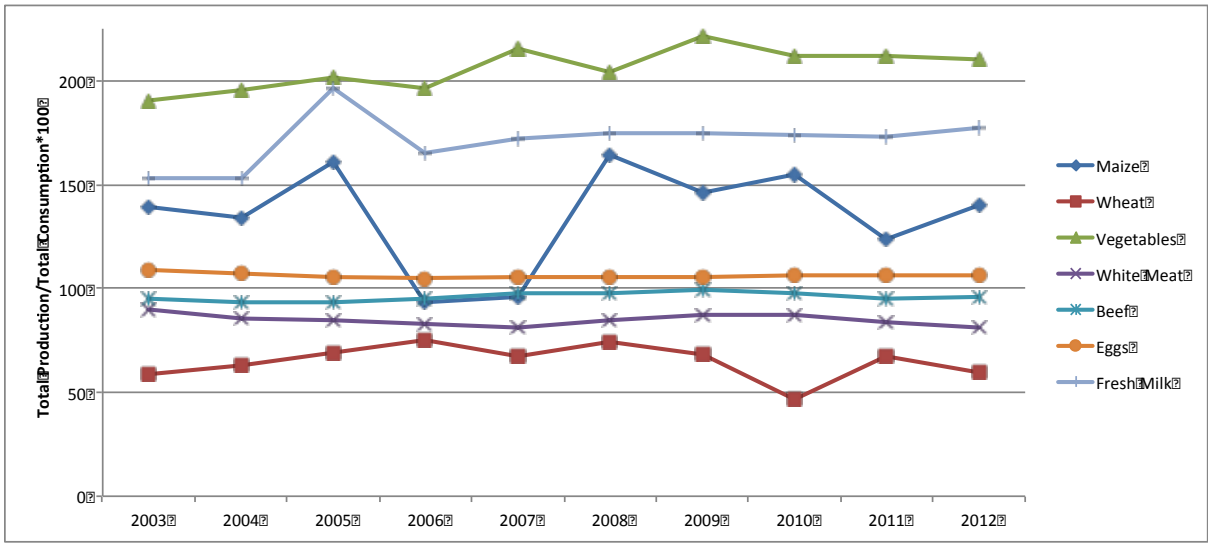
Prior to the 1990s, South Africa's agricultural sector was highly regulated. Marketing control boards were in place to guarantee viable profit margins to farmers, the state assisted further by providing land and subsidized credit, and labour laws were overlooked on commercial farms allowing for the exploitation of farm workers (Marcus, 1989). Since the abolition of the marketing boards in the 1990s, the liberalization of agricultural trade, and the implementation of minimum wages for farm workers, the sector has undergone shifts that have significant implications for the food security status of the country.

When connected to the international market, a nation cannot obstruct the influence of global forces of supply and demand. With advanced infrastructure, counter-seasonality to Europe, biodiversity and competitive input costs, South Africa is able to compete internationally in a number of commodity markets. Consequently, since deregulation, agricultural production in South Africa has increasingly come to be characterized by crops destined for export. From the 1980s to between 2000 and 2007, the share of field crops decreased from 40% to 30%, and the share of livestock from 55% to 44%. On the other hand, the share of horticultural crops rose from 18% to 26% (Kirsten, Stander & Haankuku, 2011).

Currently, South Africa is the world's 11$^{th}$ largest maize producer, 10$^{th}$ largest orange producer, 11$^{th}$ largest grape producer, 6$^{th}$ largest grapefruit producer, 8$^{th}$ largest pear producer, 13$^{th}$ largest lemon and lime prducer and 15$^{th}$ largest sugar cane producer, 5$^{th}$ largest chicory roots producer and 10$^{th}$ largest castor oil seed producer (FAOSTAT, 2011). Approximately 31.2% of exports were destined for countries within Africa and 29.9% for countries in the European Union (BFAP, 2013; Global Trade Atlas, 2013).

Figure 3-1 takes a closer look at select agricultural commodities from the perspective of self-sufficiency. Self-sufficiency indices—calculated by dividing production figures by consumption figures—are represented for the following commonly consumed agricultural commodities in South Africa: maize, wheat, white meat, vegetables, beef, fresh milk and eggs. This graph shows that South Africa produces at a deficit for beef, white meat and wheat. However, sufficient quantities of vegetables, fresh milk, maize and eggs are produced locally (DAFF, 2013a).

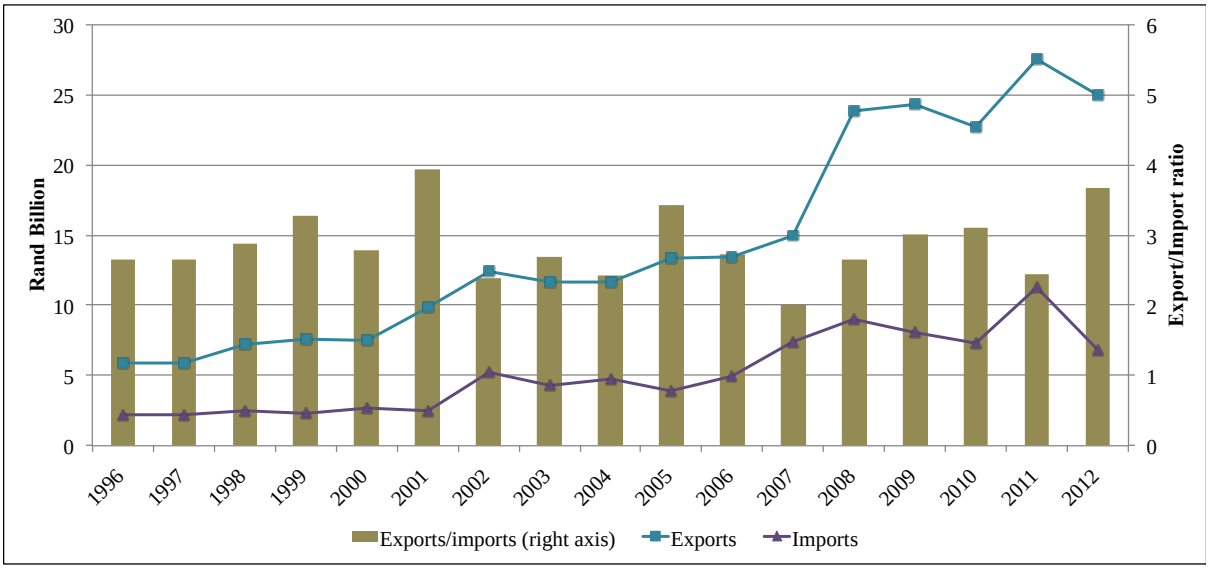
**Figure 3-1 Self-sufficiency indices of selected agricultural commodities**




Source: Own calculations and graph, production and consumption figures from "Abstract of Agricultural Statistics", 2013a

Despite the relative share in certain crops gaining over others, the primary agricultural sector in South Africa is quite strong. Figure 3-2 illustrates how trade in primary agricultural products, measured by value of quantity traded, has evolved since 1996. Both exports and imports have been on the rise and following seemingly similar trends. The export-import ratio bars seem to confirm that while there have been dips and peaks during the period represented, the general trend seems relatively constant (Global Trade Atlas, 2013).

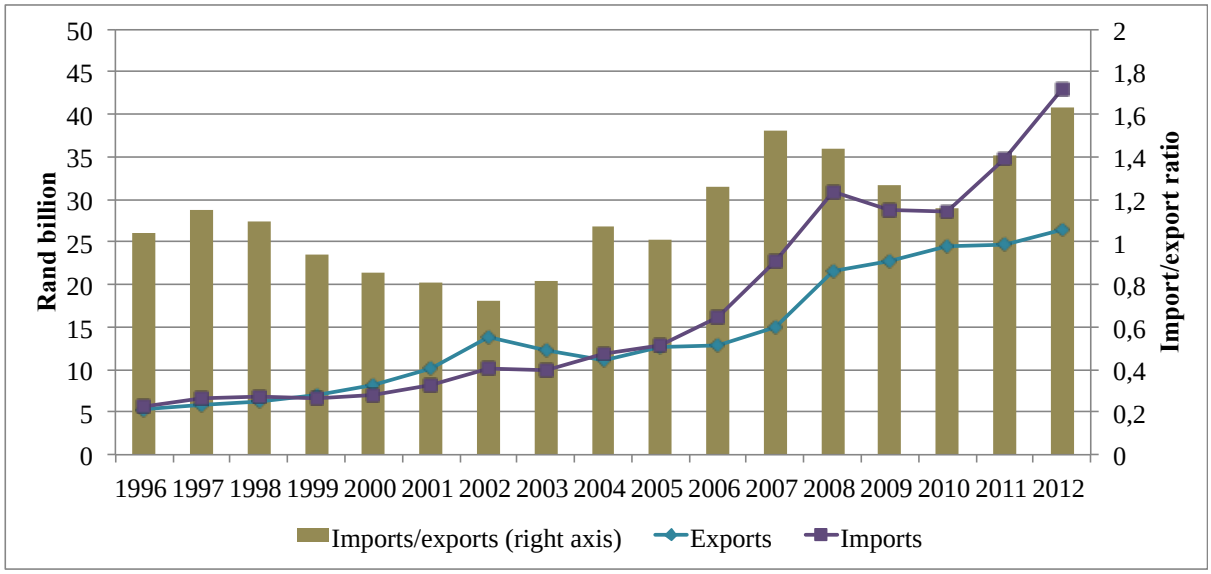
**Figure 3-2 Primary agricultural trade**




Source: Global Trade Atlas (2013) figures, own graph

Of note is the difference in the advancement of the secondary agricultural sector. The secondary agricultural sector is made of industries that add value to primary agricultural goods, and that ultimately produce the finished, usable products. Figure 3-3 illustrates trade activity for secondary agricultural products since 1996. According to the trend lines, both exports and imports have been increasing. The import-export ratio bar makes clear however that overall, imports have increased more than exports (Global Trade Atlas, 2013).

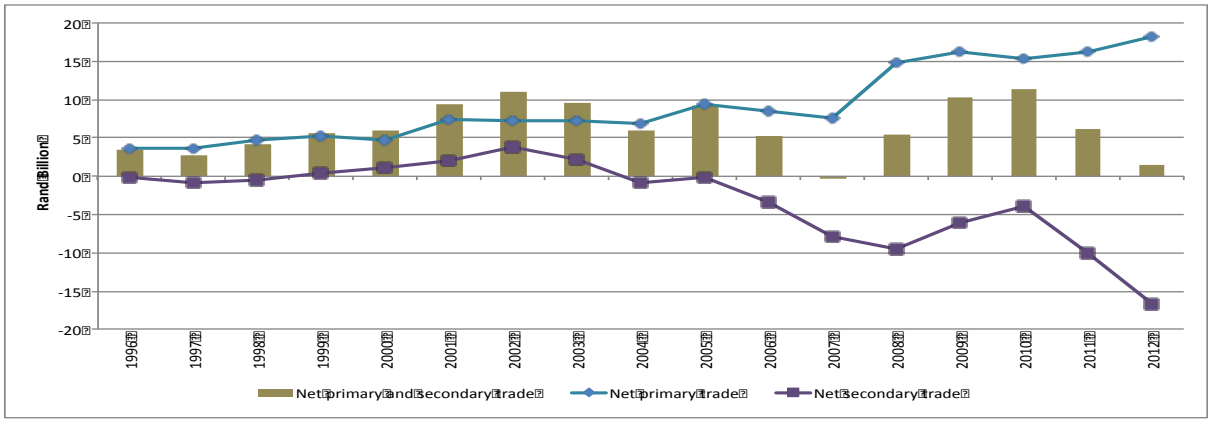
**Figure 3-3 Secondary agricultural trade**




Source: Global Trade Atlas (2013) figures, own graph

The bars in Figure 3-4 reflects total agricultural trade over this same period.

**Figure 3-4 Total agricultural trade**




Source: Global Trade Atlas (2013) figures, own graph

By way of example, Table 3-1 contains the trade values for 2012 only. It shows that in 2012 South Africa was a net importer of secondary agricultural products by over R16 billion and a net exporter of primary agricultural products by more than R18 billion. Thus, in 2012, South Africa was able to claim status as a net exporter of agricultural products because of the approximately R1.5 billion surplus afforded by its strength in primary agricultural exports (Global Trade Atlas, 2013).

**Table 3-1 Primary and secondary trade balance for 2012**

| | Imported Value 2012 (Thousand Rand) | Exported Value 2012 (Thousand Rand) | Trade Balance (Thousand Rand) |
|---|---|---|---|
| **Primary Agricultural Products** | 6 790 839,81 | 24 938 538,56 | 18 147 698,76 |
| **Secondary Agricultural Products** | 42 964 545,12 | 26 356 318,24 | -16 608 226,88 |
| **Primary and Secondary Products** | 49 755 384,93 | 51 294 856,81 | 1 539 471,88 |

Source: Global Trade Atlas, 2013

## 3.2 ANALYSES OF SELECTED INDUSTRIES

The following section consists of industry analyses of major agricultural industries. These analyses will be grouped according to the major food group they contribute to. The food groups that will serve as categories include staples, meat, fish, dairy and eggs, fats and oils, fruits and nuts, and vegetables and beans. Each section will begin with a brief presentation of the 2005/2006 and 2010/2011 household food expenditure shares on food items within each food group. In 2005 food expenditure was 28% of total expenditure and in 2010 food expenditure was 24% of total expenditure. Given that the expenditure share figures essentially cover the years 2005 and 2010, the production, consumption, trade, price and other figures relevant to each industry, as well as the descriptive analysis of each industry, will mostly be reflective of the status of the industries within this time frame.

### 3.2.1 STAPLES

Expenditure on staple foods accounted for about 26% of total food expenditure in 2005 and 24% in 2010. Table 3-2 ranks seven staple food items according to expenditure share of total household expenditure on staple foods in 2005/2006 and 2010/2011. These figures reflect that, with the exception of white bread, expenditure share on all staple food items have increased from 2005/2006 to 2010/2011. Movement in all cases was by less than 2 percentage points, with the exception of rice, which increased most significantly. Ranking has remained consistent, with mielie meal ranking first in both reference periods.

**Table 3-2 Staple food ranking according to share of total household expenditure on staple foods in 2010/2011**

| Food Item | 2005/2006 | 2010/2011 |
|---|---|---|
| Mielie Meal/Maize flour | 22,6% | 23,1% |
| Brown bread | 20,8% | 21,9% |
| White bread | 15,2% | 14,2% |
| Rice | 11,6% | 13,8% |
| Cake flour | 5,1% | 5,6% |
| Baked cereals | 3,8% | 4,9% |
| Pasta | 1,7% | 2,1% |

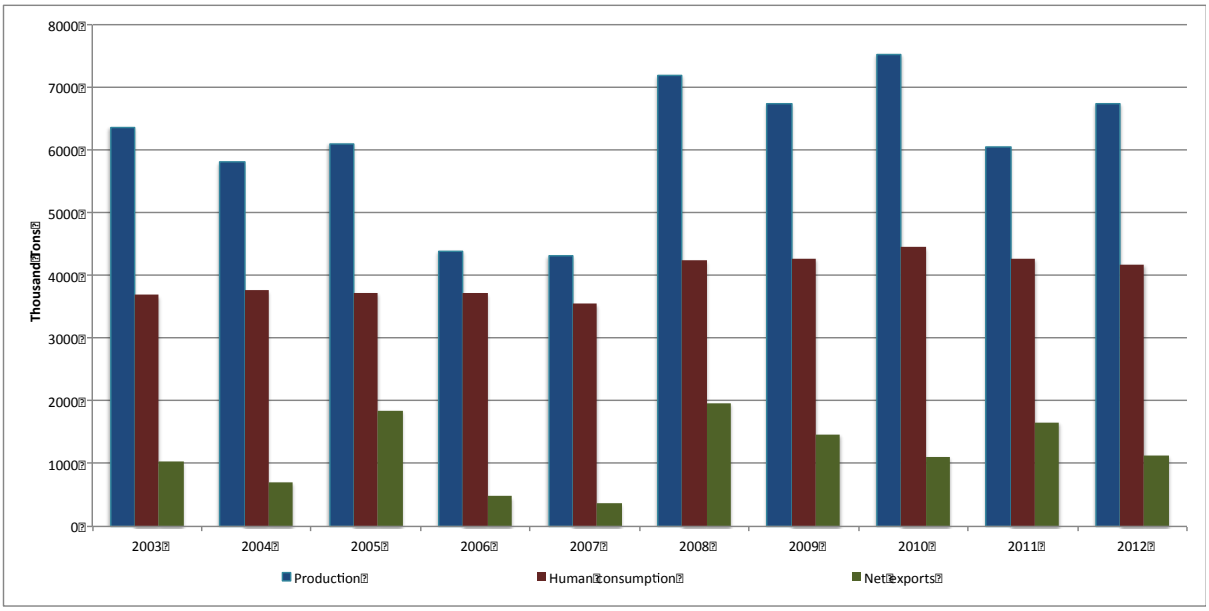
Source: Stats SA, 2006 & Stats SA, 2012b

Maize is said to be the most important grain crop in South Africa, and the South African maize industry is the largest maize industry on the entire continent of Africa. Notwithstanding occasional imports and the fact that at times yellow maize imports are greater than exports, overall maize production recurrently exceeds consumption, making South Africa a net exporter of maize. Commercial maize farmers—responsible for about 98% of the maize produced in South Africa—are estimated at about 9,000 (DAFF, 2014). Between 2 and 3 million hectares of land is under maize production in South Africa each year (BFAP, 2014).

South Africa produces about 11.5 million tons annually. Approximately 60% of the maize produced in South Africa is white maize, mainly for human consumption, translating to about 6 million tons per year. Yellow maize production is at about 4 million tons each year and is typically used for animal feed. Figure 3-5 shows that both human and feed consumption follow an increasing trend, although demand for maize as animal feed seems to be increasing

at a faster rate. Maize producers are responding by increasing yellow maize production in relation to white maize production (BFAP, 2014).

**Figure 3-5 White maize availability**

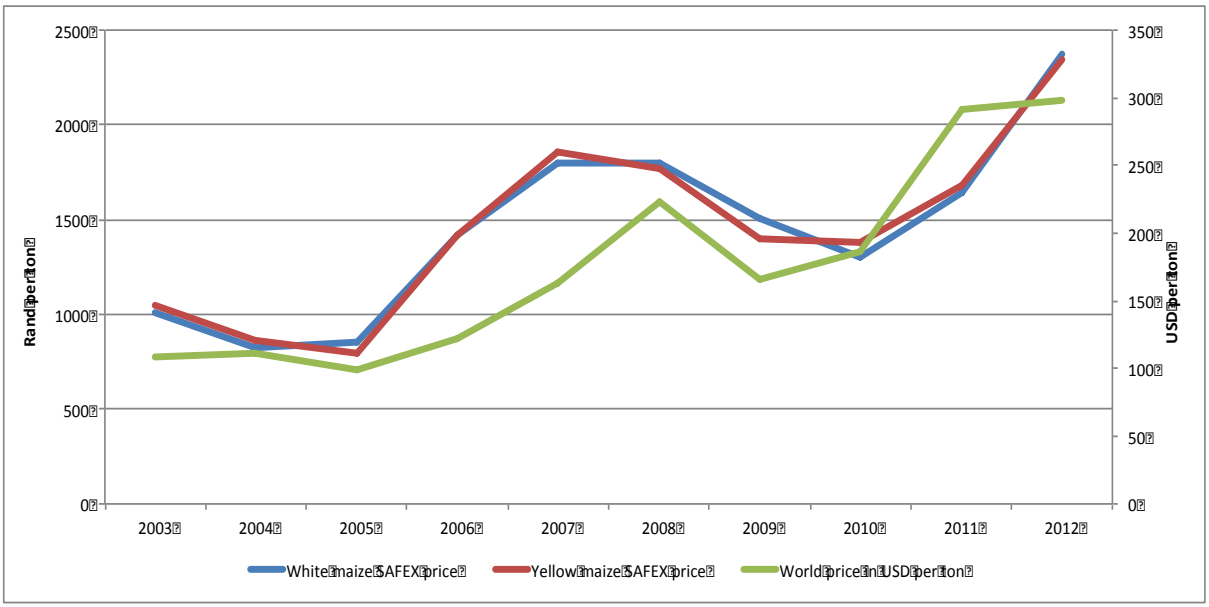



Source: BFAP (2014) figures, own graph

South Africa may import a few hundred thousand tons of maize yearly and generally exports about 2 million tons. Given that maize is a net exported product, domestic price is impacted by the export parity price and the maize market is connected to the international market. Therefore, while domestic demand and supply factors led to a decrease in price in 2010, an increase in the international price in 2011 impacted local markets such that domestic price subsequently rose (BFAP, 2014).

Figure 3-6 is reflective of international and local price trends for maize from between 2003 and 2012. Considering the period between 2005 and 2010, the commodity price of white maize increased by about 52%, while the price of maize meal increased by almost 72% (BFAP, 2014). To give an example of how this would have impacted prices at retail level: A 5kg bag of special maize meal increased from about R11 to R17 (NAMC, 2014).

**Figure 3-6 International and local price trends for maize**

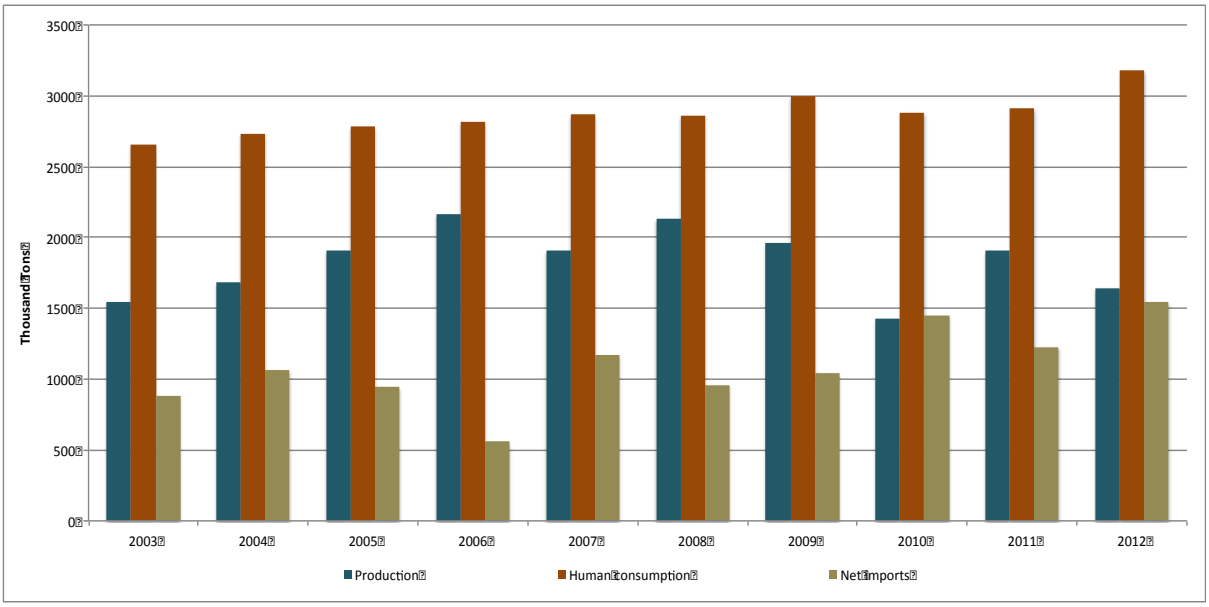



Source: BFAP (2014b) and World Bank (2013) figures, own graph

Wheat is the second most important grain in South Africa. Prior to the termination of the bread subsidy in 1991 and the close of the Wheat Board in 1997, producers were given more certainty in terms of marketing options and a greater total number of hectares was under wheat production. It has since decreased over time and South Africa consequently has to import approximately 50% of its domestic use. In the late eighties South Africa already moved from being a net exporter of wheat to a net importer of wheat. Still, this country is well equipped with millers and bakers, and growth in the bread industry is mainly due to the establishment of franchises and in-store bakeries (National Chamber of Milling, 2008).

Currently, South Africa is host to 3,800 to 4,000 wheat producers. Although wheat is produced throughout the country, the Western Cape, Free State and Northern Cape contribute approximately 81% of the wheat produced (DAFF, 2014). Anywhere between 400 and 600 thousand hectares of land is under wheat production annually. As can be seen in Figure 3-7, South Africa produces between 1,6 and 2 million tons of wheat each year, whereas consumption is closer to 3 million tons. In 2010, production stood at a low of 1,389 thousand tons and thus imports increased from about 1.2 million to more than 1.6 million tons (BFAP, 2014). Exports are negligible, at a few hundred thousand tons, and mostly destined for neighbouring countries (DAFF, 2014).

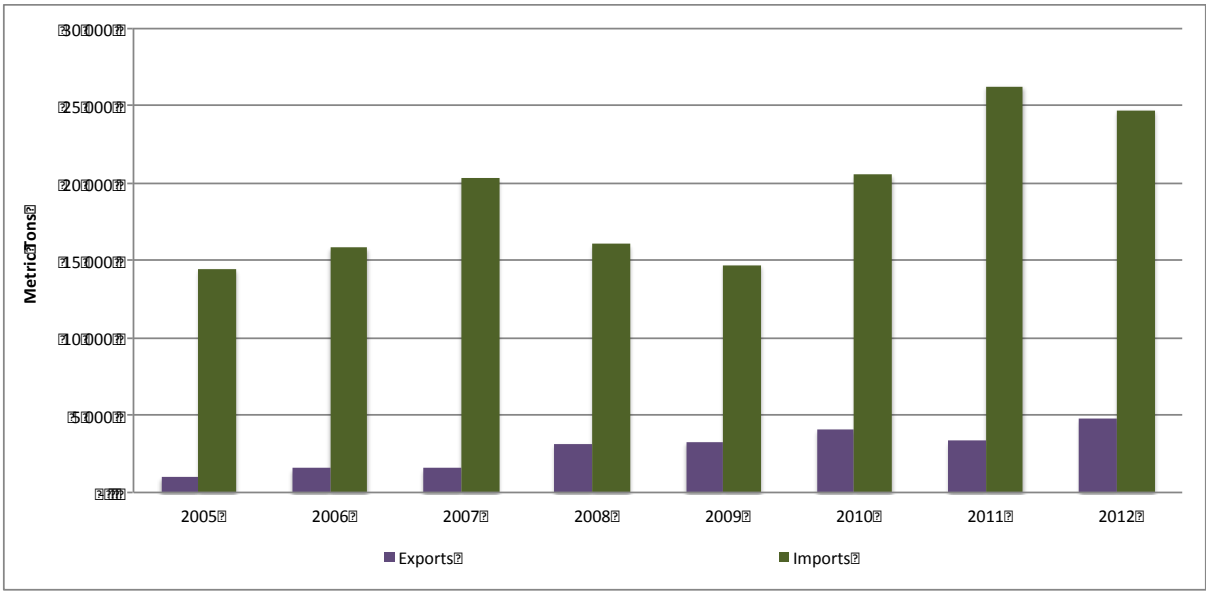
**Figure 3-7 Wheat availability**




Source: BFAP (2014) numbers, own graph

Seventy to 80% of milled wheat is used by bakers for bread production. Milled wheat is converted into bread flour, whole-wheat flour, white bread flour, cake flour, self-raising flour and industrial flour; small quantities of durum wheat are grown for the purpose of making pasta (DAFF, 2014). Figure 3-8 shows that South Africa is a net importer of pasta and thus relies on imports to meet local demand.

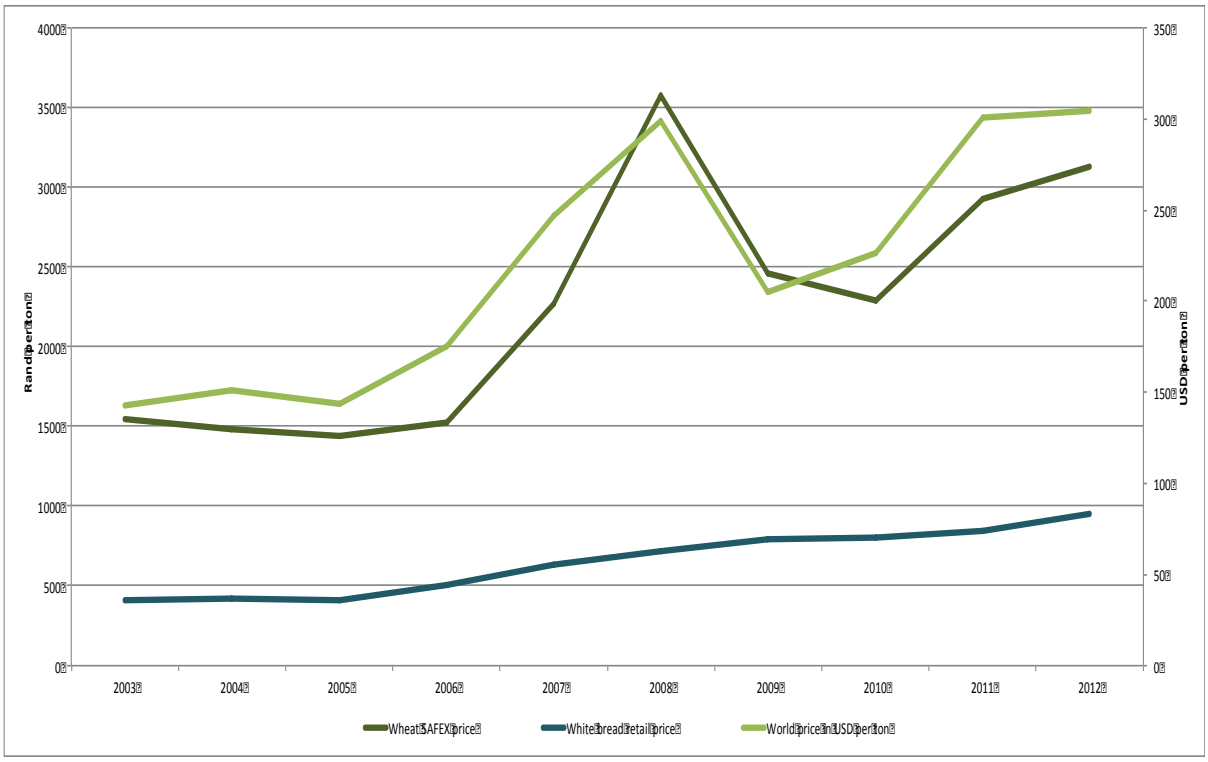
**Figure 3-8 Pasta trade balance**




Source: ITC (2015) numbers, own graph

Given that South Africa is a net importer of wheat, domestic price is determined by import parity price. Figure 3-9 shows these trends between 2003 and 2012. Between 2005 and 2010, the commodity price of wheat increased by almost 60% and the bread price by more than 90% (BFAP, 2014). Considering the wheat products listed, the following serves to illustrate the implications of this increase for the consumer: The price of a 700g loaf of brown bread increased from just over R4 to about R7, of white bread from close to R5 to almost R8 and a 2.5kg bag of cake flour from over R10 to more than R16. As an example of how the price of pasta has shifted: a 500g bag of spagetti increased from over R4 to over R9 (NAMC, 2014).

**Figure 3-9 International and local price trends for wheat and bread**

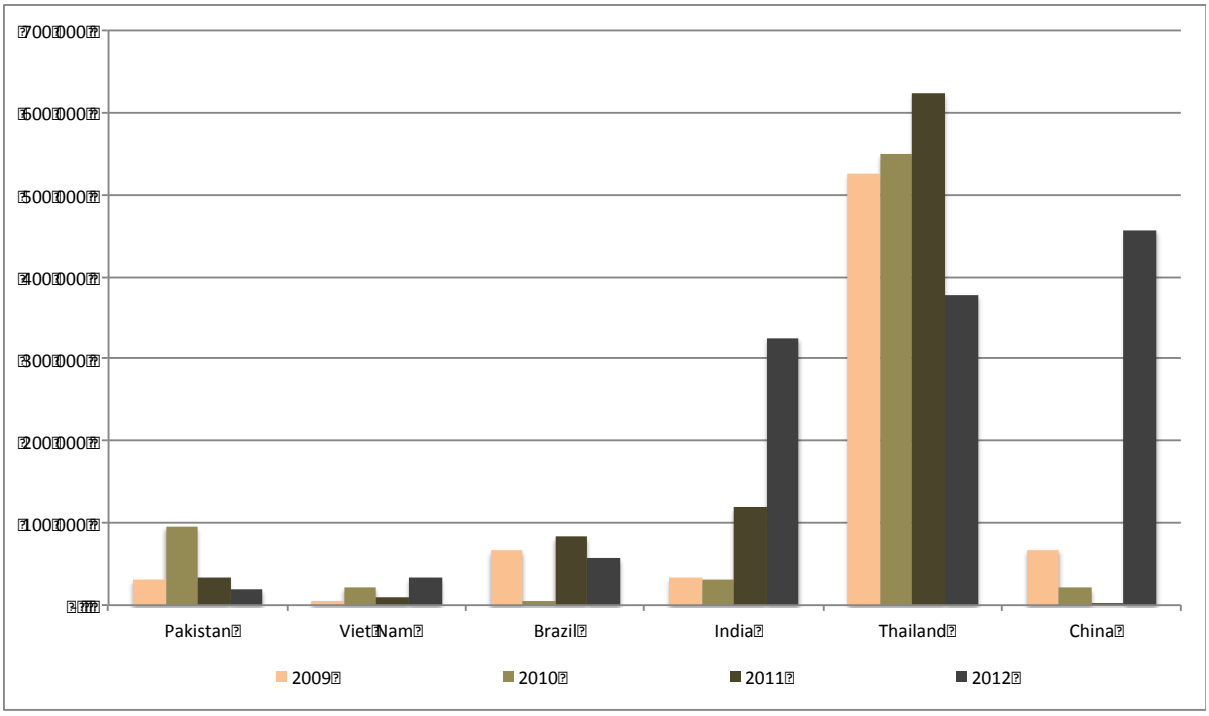



Source: BFAP (2014) and World Bank (2013) figures, own graph

South Africa does not produce rice. A key concern related to the production of this particular grain in a country like South Africa is water scarcity. Despite this, some are convinced that production of specific rice varieties requiring less water would be feasible if the required investment and support was provided (Lukhele-Olorunju, 2012).

There are about 40 companies that import rice to South Africa (Lukhele-Olorunju, 2012). As reflected in Figure 3-10, most of this rice comes from Thailand, India, Brazil, Vietnam and China. South Africa also exports some of the rice it imports, particularly to neighbouring countries, but also to other parts of Africa such as the Democratic Republic of Congo and Angola. Imports between 2005 and 2010 ranged from as low as 650 thousand tons to over 950 thousand tons. In 2010, imports were at 734 thousand tons, and exports at 31 thousand tons—thus just 4% of imports (ITC, 2015). Thus domestic consumption would have been around 700 thousand tons.

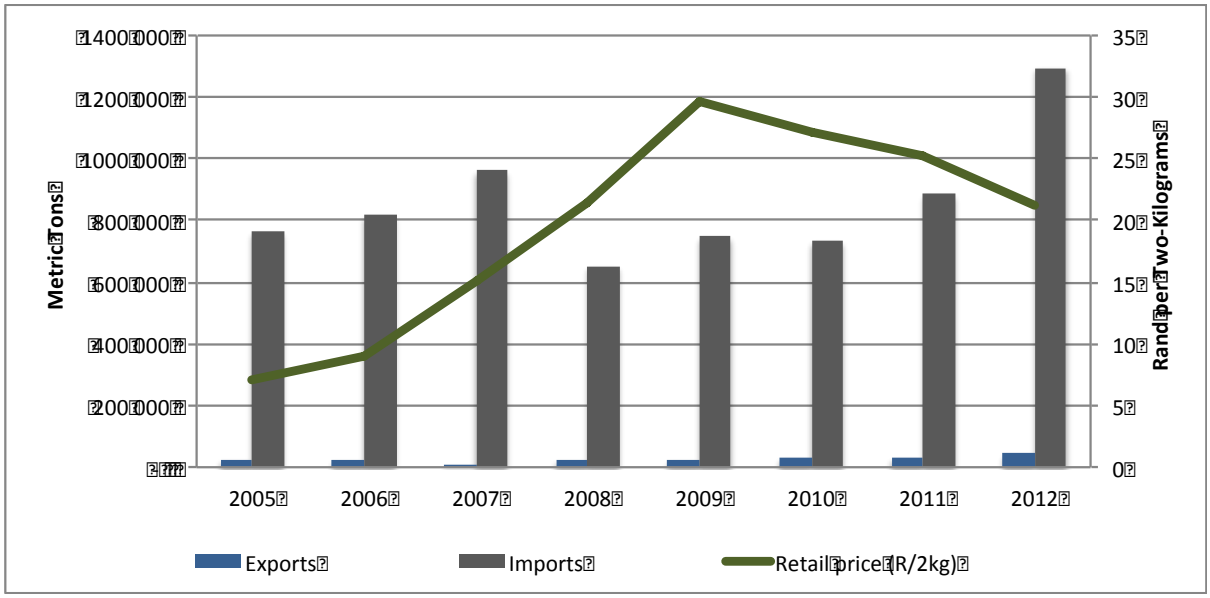
**Figure 3-10 Rice imports**




Source: ITC (2015) figures, own graphs

Given that South Africa relies on imports to meet demand for rice, the local price for rice is determined by the international market. The rice price is not as affordable as the staple, maize. Figure 3-11 shows that the price of rice experienced the greatest increase between 2005 and 2010—by about 280%. What this looks like at the retail level in terms of a 2kg bag of rice is an increase from about R7 to R27 (NAMC, 2014).

**Figure 3-11 Rice trade balance and local retail price**




Source: ITC (2015) and NAMC (2014) numbers, own graph

### 3.2.2 MEAT

Expenditure on meat accounted for about 23% of total food expenditure in 2005 and 20% in 2010. Table 3-3 ranks seven meat types according to expenditure share of total household expenditure on meat in 2005/2006 and 2010/2011. The figures reflect that expenditure share on five of the meat items increased from 2005/2006 to 2010/2011. Expenditure shares on boerewors and beef sausage decreased by 0.1 percentage points. Mutton and lamb experienced a more significant decrease of 2.6 perecentage points. Also of note is the increase of 2.2 percentage points in expenditure share on polony, viennas and other processed meat. Despite the movement, ranking has remained consistent, with poultry on top.

**Table 3-3 Meat ranking according to share of total household expenditure on meat in 2010/2011**

| Food Item | 2005/2006 | 2010/2011 |
|---|---|---|
| Poultry (including heads and feet) | 41,0% | 42,5% |
| Beef and veal (including heads and feet) | 24,4% | 25,0% |
| Mutton & lamb (including heads and feet) | 10,9% | 8,3% |
| Boerewors & beef sausage | 8,4% | 8,3% |
| Polony, viennas, other processed meat (e.g. russians) | 4,9% | 7,1% |
| Pork (including heads and feet) | 2,5% | 3,0% |
| Bacon | 0,3% | 0,9% |

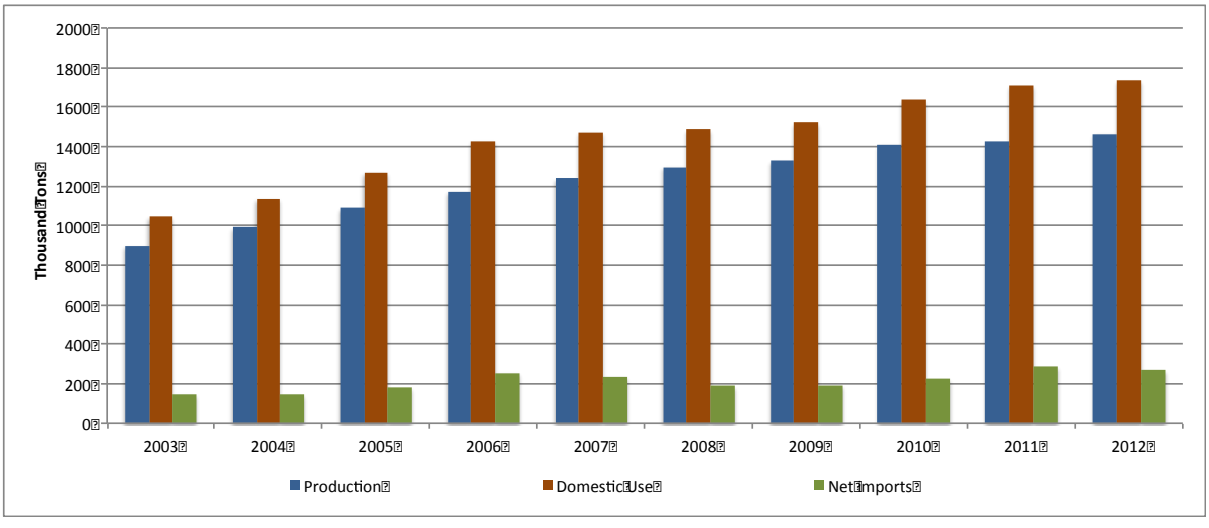
Source: Stats SA, 2006 & Stats SA, 2012b

Meat consumption at a global level has been on the rise. As an affordable and popular meat choice, poultry accounts for 50% of the increase in meat consumption (FAO, 2013c). Of total poultry-meat production in South Africa, broiler meat makes up 93,6% and is the main source of animal protein, reflective in the fact that poultry meat took up almost half of household expenditure on meat in both 2005/2006 and 2010/2011 (DAFF, 2014).

National production figures for chicken went from about 1,3 million tons to almost 1.6 million tons between 2005 and 2010, and production has been increasing since (BFAP, 2014). Broiler meat is produced throughout the country. The North West accounts for 24% of broiler meat production. Following this is the Western Cape, Mpumalanga and KwaZulu-Natal, producing 21%, 18% and 16% respectively. Broiler producers in South Africa rely on approximately 265 formal abattoirs that sell to large retailers and to SMME's (DAFF, 2014).

Figure 3-12 illustrates that there has been a steady increase in the production and domestic use of chicken. Still, chicken consumption levels are consistently greater than production levels, making South Africa a net importer of chicken. Consumption rose from 1.4 million tons to 1.8 million tons between 2005 and 2010. Imports between this time period ranged from 180 thousand to 260 thousand tons. These imports mainly come from Brazil. Nevertheless, South Africa also exports chicken—just under 8 thousand tons per year—mostly destined for neighbouring countries (BFAP, 2014; ITC, 2015).

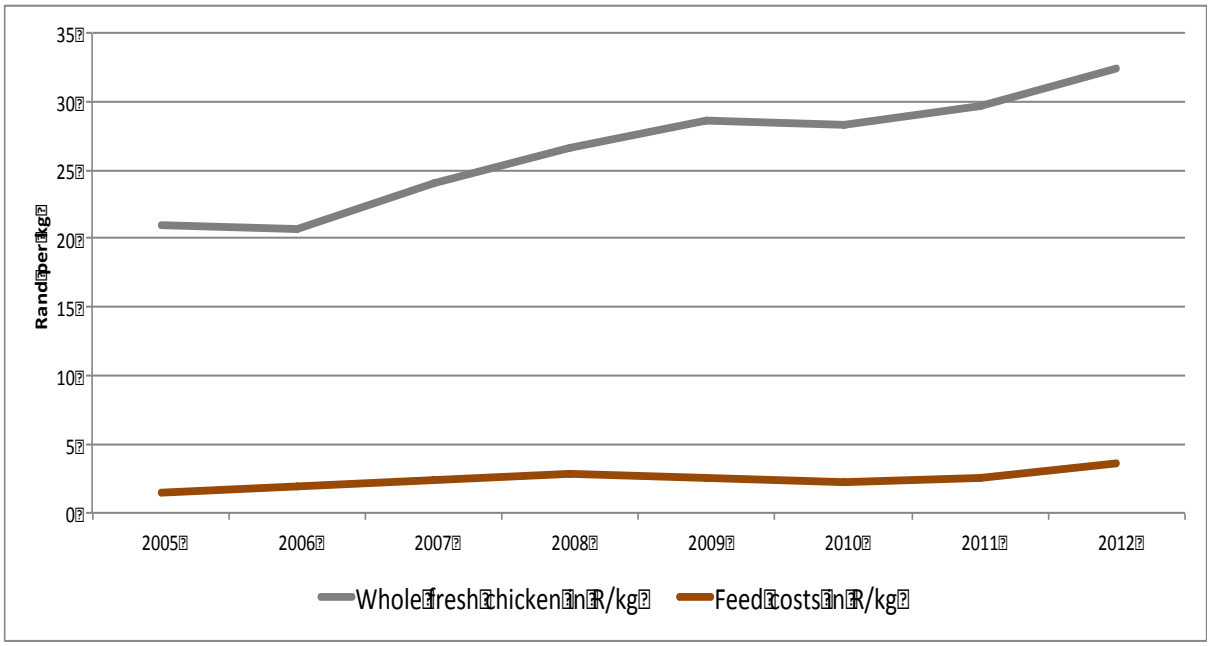
**Figure 3-12 Chicken availability**




Source: BFAP (2014) numbers, own graph

Given that South Africa relies on imports to meet demand for poultry, domestic chicken prices are greatly impacted by swings in the international poultry market. Furthermore, the poultry industry is South Africa's largest consumer of animal feed, and thus price levels for feed also have a large impact on the price of chicken (BFAP, 2014). Shifts in the price of whole fresh chicken per kg, as seen in Figure 3-13, can give a sense of how poultry price moved between 2005 and 2010. According to the NAMC (2014), this increased by about 33%, from approximately R21 to just over R28.

**Figure 3-13 Chicken and feed costs**




Source: BFAP (2014) and NAMC (2014) figures, own graph

Livestock is one of South Africa's largest agricultural sectors. Approximately 69% of South Africa's agricultural land is used for extensive grazing. There are approximately 50,000 commercial livestock farmers who own about 8.2 million cattle. This amounts to about 60% of the total cattle count. The approximately 240,000 emerging farmers and 3 million subsistence or communal farmers in turn own just 5.69 million cattle (DAFF, 2014).

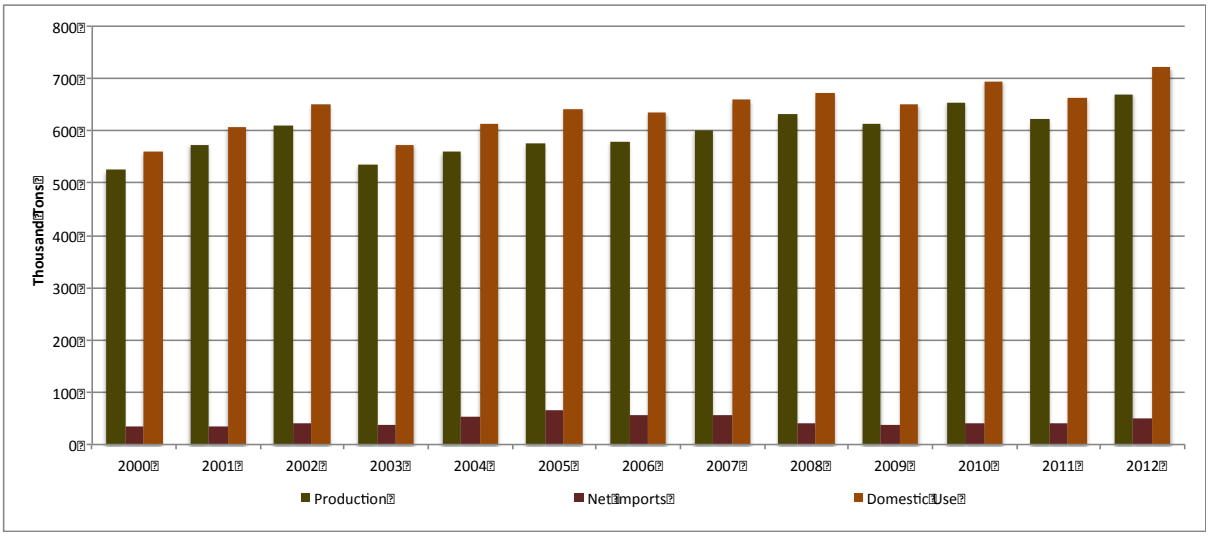
Since 1997, the red meat industry is said to operate under free market forces. Wholesalers often purchase live animals, slaughter them at an abattoir of the wholesaler's choice and thereafter distribute the packaged beef to retailers or to the public directly. The abattoir

industry has grown in number and capacity over time. Many are directly connected to feedlots and wholesalers. The South African beef supply chain is generally vertically integrated with feedlot, abattoir, processor and distributor under a single company (DAFF, 2014).

The Northern Cape—South Africa's largest province—accounts for about 36% of the country's land. Given that it is mostly classified as arid, cattle farming is common in this province (FAO, 2005b). Despite this, because other provinces have greater feedlot and abattoir capacity, and since South Africa's transport infrastructure makes it possible to move cattle and calves with relative ease to these other provinces, the Northern Cape only accounts for 6% of actual beef production. Mpumalanga is the greatest producer of beef contributing 22% to total production. Following Mpumalanga is the Free State, Gauteng and North West, accounting for 19%, 13% and 12% respectively (DAFF, 2014).

South Africa produced 655 thousand tons of beef in 2010—up from 576 thousand tons in 2005. Production levels have fluctuated since due to a combination of factors: bad weather conditions, forces of demand, level of imports as well as feed and calf prices. As can be seen in Figure 3-14, overall demand has been increasing over the years, and has remained above domestic production levels. Thus, South Africa is a net importer of beef, and mostly sources its beef from Botswana and Namibia. Consumption rose from 642 thousand tons in 2005 to 695 thousand tons in 2010. Imports declined from 77 thousand tons to 45 thousand tons, but increased thereafter. South Africa also exports anywhere from 3 to 10 thousand tons of beef annually to neighbouring countries such as Mozambique, Lesotho and Swaziland (BFAP, 2014; ITC, 2015).

**Figure 3-14 Beef availability**




Source: BFAP (2014) numbers, own graph

Beef trade thus typically occurs at a regional level. Nevertheless, given that South Africa relies on imports to meet demand, prices are determined by international forces. The auction price for beef increased from R15.99 per kg in 2005 to R23.61 per kg in 2010 (BFAP, 2014). Examples of what this looks like for a consumer at retail level follow: beef brisket price per kg rose from R31 to just over R45—a 45% increase; and beef chuck price per kg rose from R28 to R47—a 68% increase (NAMC, 2014).

South Africa is home to about 8,000 commercial sheep farms and 5,800 communal farmrers, who together hold an estimated 24.2 million sheep. Production levels are consistently below consumption levels, and South Africa is thus a net importer of sheep meat. Almost all imports are from Australia and New Zealand. South Africa also exports a small amount of its mutton—mainly destined for other parts of Africa, such as Angola, Mozambique, DRC and Seychelles (DAFF, 2014).

Domestic sheep meat production between 2005 and 2010 increased from 102 thousand tons to 126 thousand tons. Consumption rose from 150 thousand tons in 2005 to 177 thousand tons 2006, and thereafter declined gradually, arriving at 149 thousand tons in 2010. Limited exports from New Zealand between 2009 and 2011 caused an increase in international prices and this outweighed the appreciation in the Rand. With limited supply and high international prices, domestic lamb prices increased between this period, and thus domestic consumption

reached a low of 117 thousand tons in 2011. Given the drop in demand, farmers responded by decreasing production to 92 thousand tons (BFAP, 2014).

Import levels follow relative levels of production and consumption, making up for shortages as needed. Still, given sheep's status as a net imported item, exchange rates and international prices are the greater determinants of domestic prices. The average lamb auction price rose from R23.37 per kg in 2005 to R38.50 per kg in 2010 and continued on an upward trend thereafter (BFAP, 2014). Thus commodity price rose by 65%. At retail level, fresh lamb cost R44 per kg in 2005 and R74 per kg in 2010—an increase of 68% (NAMC, 2014).

Pork is also a net imported source of animal protein. Still, pork is produced throughout the country and contributes notably to the agricultural sector. South Africa is home to about 400 commercial producers and 19 stud breeders, rearing up to 1,572 million pigs at a time. Typically, 50% of pork production is used in the fresh meat market while the other 50% is processed (DAFF, 2014).

Production levels rose from 150 thousand tons in 2005 to 170 thousand tons in 2010. Consumption rose from 177 thousand tons to 192 thousand tons, and thus imports remained relatively stable at about 26 thousand tons. Most imports come from Canada and countries in Europe, such as Germany, Spain, France and Belgium. South Africa also exports some pork to neighbouring countries—anywhere from 1 to 4 thousand tons per year (BFAP, 2014; ITC, 2015).

Being connected to the international market as a net imported item, the international price plays a significant role in determining the local pork price. Pork auction price rose from R10.10 per kg in 2005 to R14.26 in 2010—a 41% increase (BFAP, 2014). The following examples illustrate the impact at retail level: fresh pork chops per kg increased from just over R28 to just over R49—up by 75%; pork sausage per kg rose from R30 to about R52—up by 73%; and ham per kg hiked up from about R50 to R94—up by 88% (NAMC, 2014).

### 3.2.3 FISH

Expenditure on fish accounted for about 3% of total food expenditure in 2005 and 2% in 2010. Table 3-4 ranks five fish according to expenditure share of total household expenditure on fish in 2005/2006 and 2010/2011. With the exception of frozen fish, expenditure share on fish items more or less doubled. Expenditure share on frozen fish dropped by 34,8 percentage points, taking it from first in rank to second in rank. Expenditure share on canned pilchards on the other hand increased by 19,9 percentage points taking it from second in rank to first in rank. Expenditure on fresh/chilled fish increased by 6,9 percentage points, on canned tuna by 2,2 percentage points and on fish fingers by 3,3 percentage points.

**Table 3-4 Fish ranking according to share of total household expenditure on fish in 2010/2011**

| Food Item | 2005/2006 | 2010/2011 |
|---|---|---|
| Canned pilchards | 21,2% | 41,1% |
| Frozen fish | 57,5% | 22,7% |
| Fresh or chilled fish | 6,1% | 13,0% |
| Canned tuna | 3,8% | 6,0% |
| Fish fingers | 2,0% | 5,3% |

Source: Stats SA, 2006 & Stats SA, 2012b

Production levels of tinned pilchards depend on landings allowed and attained by fishing companies, which are generally below required volume to meet demand. Prior to 2008 South Africa was a net exporter of tinned pilchards, but since then net imports have been on the rise in attempt to keep up with increasing demand and decreasing production. Consequently, more than 50% of raw fish and canned products are sourced from over a dozen canneries from Namibia, Morocco, the Americas and Asia (Hunter, 2013; Oceana Group, 2012).

Oceana Group is one of the larger key players in the canned fish industry and holds about 70% of market share. It cans fish products under the brands Lucky Star and Glenryck, the latter being a UK brand acquisitioned by Oceana Group in 2004. Of its canned fish, variants of pilchard are particularly popular. This company has been catching and canning pilchards since 1946 off St Helena Bay. Landings are generally below required volume to meet sales of Lucky Star products. More than 50% of its raw fish and canned products were therefore

sourced from over 14 canneries from Namibia, Morocco, the Americas and Asia (Oceana Group, 2012).

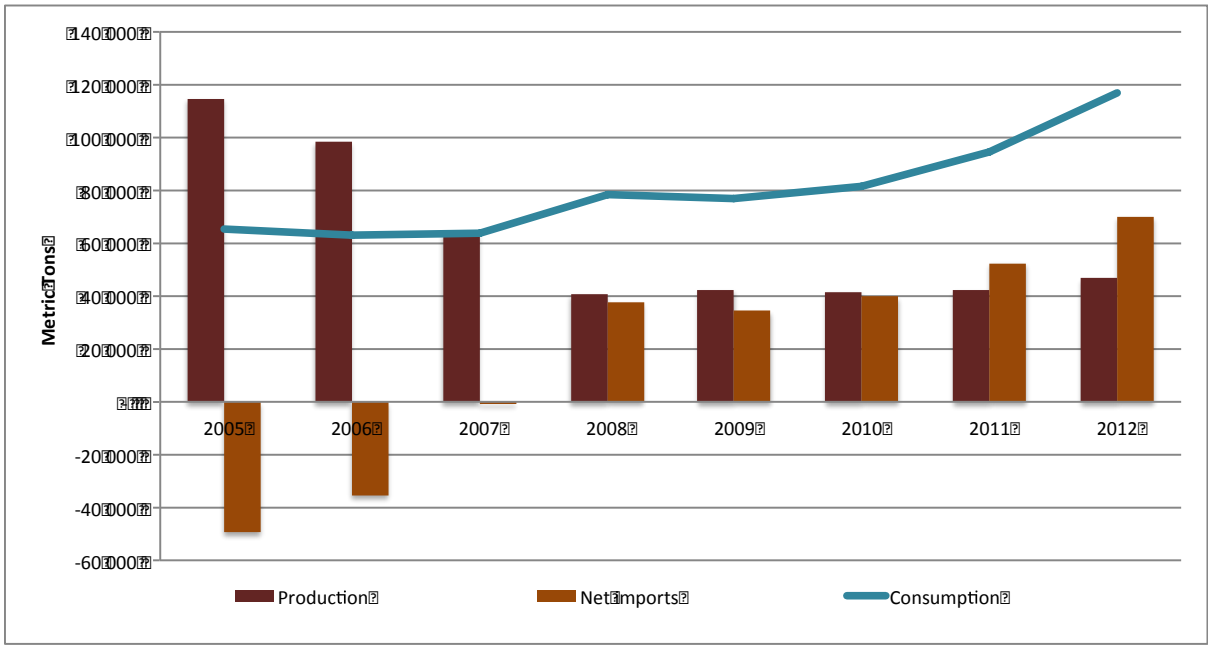
Another key player in the canned fishing industry is Pioneer Fishing, which has a cannery in St Helena and markets its processed canned fish under the brand, Sea Pride. The Pioneer Fishing Group has access to six vessels used to catch pilchards for the cannery or bait production and anchovies for the fishmeal plant. One of these vessels targets pilchards specifically off Port Elizabeth and Mossel Bay coastline (Pioneer Fishing, 2013). Atlantic Choice, part of the Globalfish group based in Cape Town, produces canned sardines, pilchards and tuna (Atlantic Choice, 2013).

Total Allowable Catches (TACs) for sardines (pilchards) has been decreasing since 2005 when it stood at 397,000 tons. In 2006 it was at 204,000 tons, in 2007 at 162,436 tons, in 2008 at 90,776 tons, and then for three consecutive years thereafter at 90,000 tons. In 2012 this figure rose for the first time since 2004 to 100,595 tons (DAFF, 2013c).

For processing, the head, tail and gut of the pilchard are removed. The fish is then cooked and the juice is drained before tomato sauce is added. From 1,000 kilograms of whole raw fish, then, approximately 55 cartons of canned fish are produced. Each carton contains 24 425-gram cans. This means that 55 cartons are equivalent to about 561 kilograms of canned fish. One can thus assume that 1,000 kilograms of raw fish can produce 561 kilograms of canned fish (Hunter, 2013).

With this conversion ratio figures for the following graph were calculated reflecting production in 2012 at 46,707 metric tons of tinned pilchards. With consumption at 116,571 metric tons, one can deduce that imports were at 69,865 metric tons (Hunter, 2013). As can be seen in Figure 3-15, prior to 2008 South Africa was a net exporter of tinned pilchards. Since then however, net imports have been on the rise in attempt to keep up with increasing demand and decreasing production.

**Figure 3-15 Availability and consumption of tinned pilchards**




Source: Hunter (2013) figures, own graph

The price of tinned pilchards has increased from about R6.50 per 425 grams in 2005 to about R12 per 425 grams in 2010—up by 85%. The price of tinned tuna has increased during this time from about R6.70 per 170 grams to R10.20 per 170 grams—up by 52% (NAMC, 2014). Of the tinned fish, tuna is therefore more expensive although it has not increased in price as much. Nevertheless, this explains its placement in the ranking above.

### 3.2.4 DAIRY AND EGGS

Expenditure on dairy and eggs accounted for about 10% of total food expenditure in 2005 and 9% in 2010. Table 3-5 ranks five dairy and egg products according to expenditure share of total household expenditure on dairy and eggs in 2005/2006 and 2010/2011. Only expenditure share spent on liquid milk increased notably—by 2,3 percentage points. While expenditure on sour milk increased by just 0,1 percentage point, expenditure on all other items have decreased, albeit by less than 1 percentage point in each case. Nevertheless, ranks have remained consistent, with liquid milk ranking first.

**Table 3-5 Dairy and eggs ranking according to share of total household expenditure on dairy and eggs in 2010/2011**

| Food Item | 2005/2006 | 2010/2011 |
|---|---|---|
| Milk (full cream and low fat, fresh and long life) | 38,5% | 40,8% |
| Eggs | 20,6% | 20,4% |
| Cheese (cheddar, gouda, other) | 10,9% | 10,6% |
| Yoghurt | 9,4% | 8,6% |
| Sour milk/maas | 7,6% | 7,7% |

Source: Stats SA, 2006 & Stats SA, 2012b

South Africa's dairy industry is the fifth largest agricultural industry in the country, and its production accounts for approximately 0.5% of world milk production. From 7,077 milk farmers in 1997 there are now only about 2,686 milk farmers. In 2012 these producers together held close to 740,000 dairy cows. Average milk production per cow per day is at about 17.3 liters (BFAP, 2014; DAFF, 2014; Milk SA, 2014).

Due to mild temperatures and good rainfall, coastal areas are more suitable for milk production. The Western Cape, host to 25.43% of producers each holding on average 200 cows, accounts for 26.6% of milk production. The Eastern Cape is home to only 11.69% of producers but with on average 450 cows this province accounts for 24.5%. KwaZulu-Natal has just 7.46% of the producers with about 367 per producer and contributes 23.6% to total production. The Free State accounts for 13.2% of production and the remaining provinces for less than 5% each (Milk SA, 2014).

South Africa's 155 milk buyers consist of a few larger processors at a national level, and a large number of smaller processors spread across the country. Approximately 89% of milk is sold in the formal market, 3% in the informal market, and the remainder is used for own consumption and calves. Sixty percent of dairy products are in liquid form with pasteurized milk and long-life milk making up 52% and 28% respectively of liquid dairy products produced (Milk SA, 2014).

Of the approximately 138 milk producers, just four account for 81% of production. The leading company in both fresh and long-life milk is Clover with a market share of 28.9% and 25.5% in these products, respectively. It purchases about 25% of South Africa's raw milk, has the largest chilled distribution network in South Africa, more than 600 trucks each delivering to about 8 customers per day, and in total 14,000 delivering points (Clover, 2013).

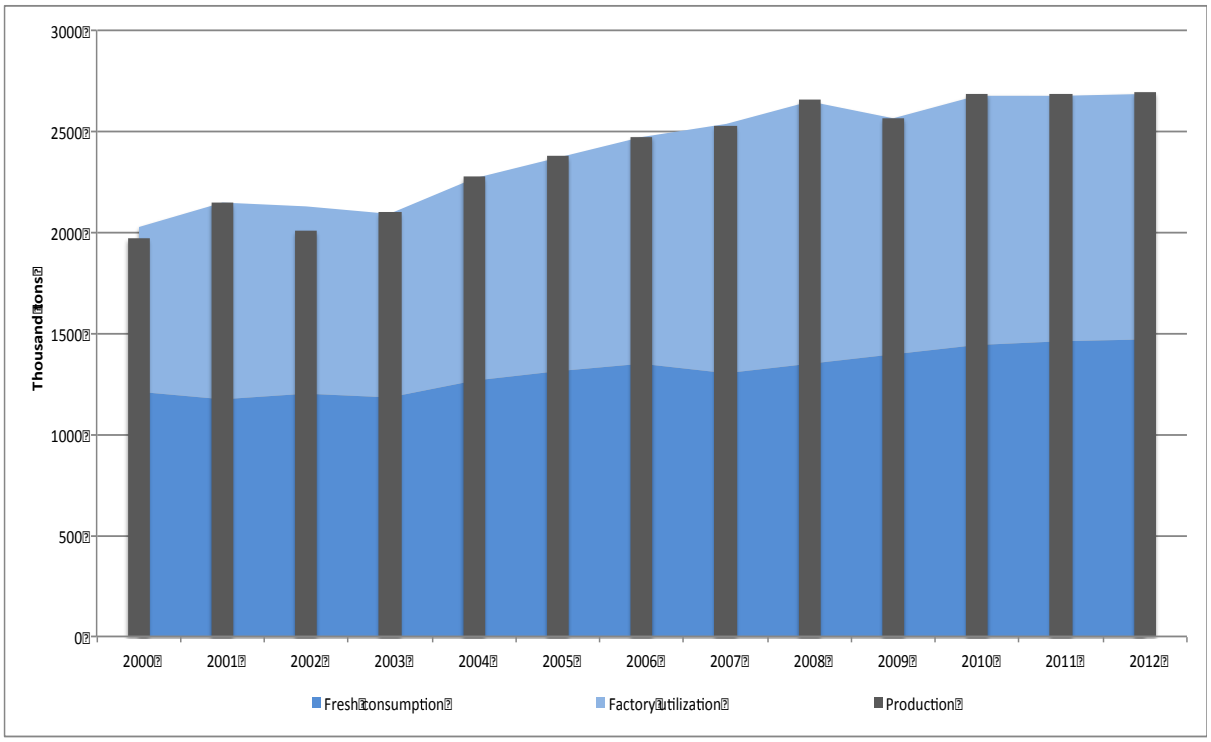
Parmalat's long-life milk brand is Bonnita and it holds just 1% of market share. Its fresh milk brand is Ever Fresh holding 6.1% of market share. In response to long-life milk's market share growing at a rate of 8%, while pasteurized milk's market share is only growing at 4%, Parmalat intends to increase focus at seven production facilities on the production of long-life milk (Euromonitor International, 2013; Parmalat, 2012).

DairyBelle, which holds 3.7% of market share, has factories across the country; however, its long-life and fresh milk products are produced at its factories in Cape Town, Pinetown and Bloemfontein. Other liquid dairy product brands include Bosparadys, Crystal Valley, Darling, Dewfresh, Douglasdale, Fairfields Dairy, House Brands, Jersey and Montic (DairyBelle, 2012; Euromonitor International, 2013).

According to DAFF (2014) pasteurized milk makes up 52% of liquid milk production, long-life milk makes up 28%, yoghurt makes up 13%, maas and buttermilk 5% and flavoured milk just 2%. Generally fresh milk trade witnesses far less activity when compared to long-life milk trade. In 2012 long-life milk imports amounted to 8,121 metric tons and exports to 6,214 metric tons making South Africa a net importer of long-life milk. South Africa is typically a net exporter of fresh milk however (ITC, 2015). This supports the argument that South Africa's relative strength lies in less processed goods, and in turn, that it is reliant on imports for more processed goods.

Figure 3-16 illustrates that fluid milk production has been increasing over the past decade. Production levels were at 1,970,321 tons in 2000 and at 2,692,142 tons in 2012. With net exports in 2012 at 3,4 tons, net supply stood at about 2,692,139 tons. In 2000 approximately 60% of production was for fresh consumption and 40% for factory utilization. However, over the years, these proportions have been shifting incrementally such that by 2012 approximately 55% was used for fresh consumption and factories used 45% (BFAP, 2014). This trend reflects an increase in demand for processed dairy products as a result of increased levels of income and changes in consumer preferences.

**Figure 3-16 Consumption, utilization and production of fluid milk**



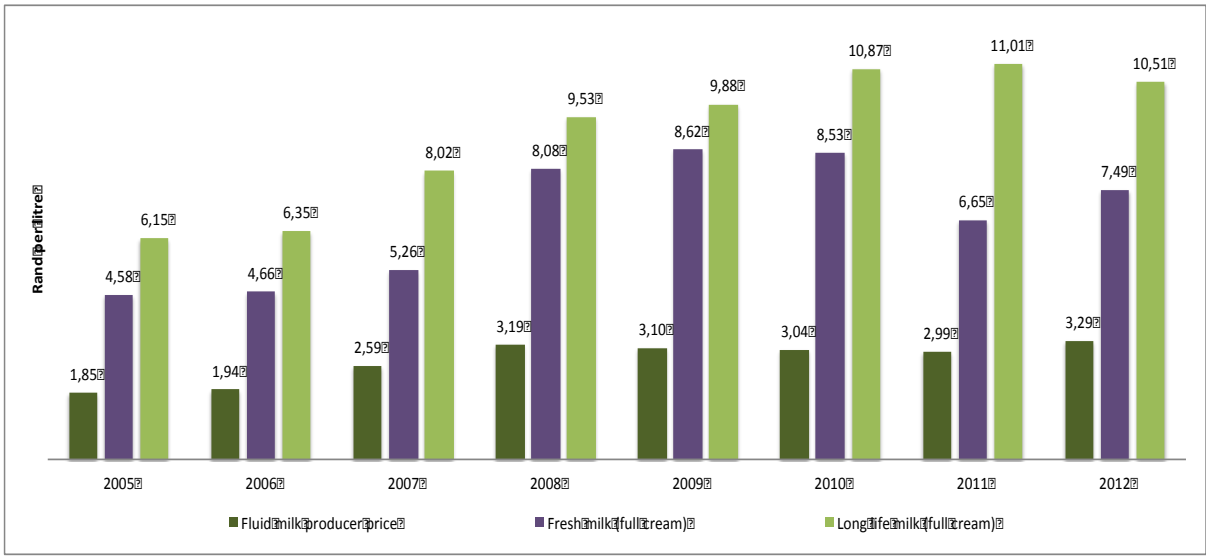

Source: BFAP (2014) figures, own graph

Only about 6% of world dairy production is traded. Consequently, price levels are acutely sensitive to circumstances impacting supply in major exporting countries. Within South Africa fresh milk prices are also volatile, but more so than prices of dairy products that can be balanced with shifts in levels of imports and exports, as can be seen in Figure 3-17 with the examples of fresh milk and long-life milk where trends in long life milk price do not follow the trends in fresh milk price (BFAP, 2014; NAMC, 2014).

Producer prices also impact retail prices by way of its impact on production levels. With the incremental decrease in producer price from 2008 to 2011, expansion slowed down and production remained relatively constant, as can be seen in the graph above. This resulted in higher prices in fresh milk in 2012 (BFAP, 2014).

Figure 3-17 reveals that the price of both fresh milk and long life milk has doubled over the past few years. Fresh milk cost R4.58 per litre in 2005 and R7.49 in 2012. Long life milk cost R6.15 in 2005 and R10.51 in 2012, (NAMC, 2014).

**Figure 3-17 Milk prices**

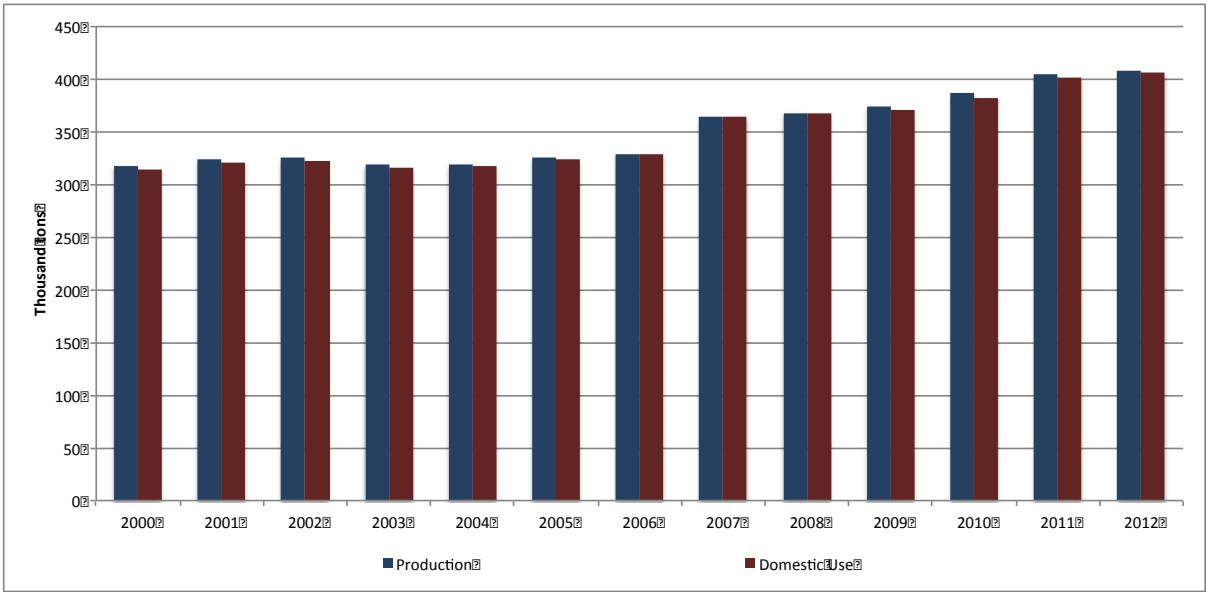



Source: BFAP (2014) and NAMC (2013) figures, own graph

Egg is the fourth largest animal product in agriculture in South Africa. Rearing of good quality pullets for egg laying requires cold temperatures. Hence, KwaZulu-Natal midlands seem to be the pullet rearing capital. The standard laying cycle is from 18 to 71 weeks of age. The laying flock count is 24.26 million. With a laying cycle of 18 to 73 weeks the laying flock-count is at 25.04 million. Commercial production is at around 412,200 cases—each with 360 eggs—per week (equivalent to about 448.2 million kg per year), while subsistence farmers produce about 18.8 million kg per year. The feed conversion rate is 2.2 kg per kg of egg (DAFF, 2014; SA Poultry Association, 2012).

Figure 3-18 allows for comparison between local production and consumption. Production since 2000 has mostly been slightly greater than consumption, making South Africa a net exporter of eggs. However, in 2006 and 2007, South Africa relied on imports to meet demand where net imports were at about 450 and 460 tons, perhaps because of a decrease in production in response to the dip in consumption in the preceding years. Overall both production and consumption has been increasing over the past decade. In 2000 production stood at 318,000 tons, consumption at 315,565 tons and net exports at 3,435 tons. In 2012, production was at 408, 286 tons, consumption at 406, 249 tons and net exports at 2,036 tons (BFAP, 2014).

**Figure 3-18 Egg production and domestic use**



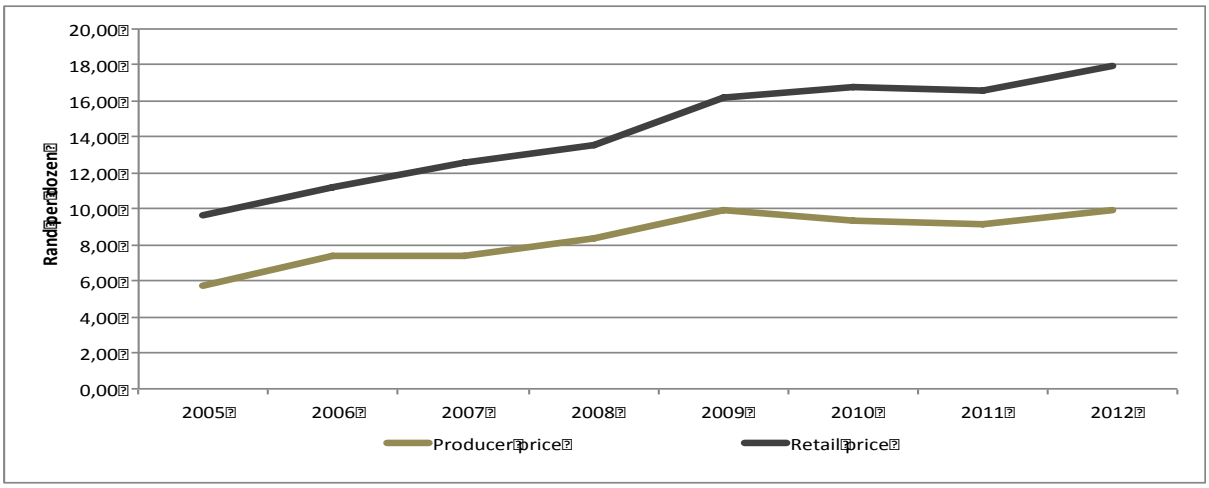

Source: BFAP (2014) figures, own graph

Share of egg production by province is as follows: Gauteng with 24%, Western Cape with 19%, Free State with 17%, KwaZulu-Natal with 13%, North West with 9%, Mpumalanga with 6%, Eastern Cape and Limpopo each with 5% and Northern Cape with 2% (DAFF, 2014).

There are about 267 commercial farms and 1,554 emerging producers. Nulaid holds 32% of the egg market share, Highveld holds 12%, and Eggbert holds 7%. SMME's and the developing sector account for the remaining 49% of the egg market share. Highveld markets eggs under the Top Lay Country Egg brand. Eggbert markets eggs under the Eggbert brand, but also sells to retailers such as Pick n Pay and Spar, who in turn market these eggs under their own brands (DAFF, 2014; Eggbert, 2013).

Figure 3-19 illustrates that the retail price for eggs, although almost double the producer price for eggs, follows closely the producer price. Over the past few years, the price for eggs has in itself almost doubled as well. In 2005 the production of a dozen eggs cost R5.73 and the retail price for a dozen eggs stood at R9.65. In 2012 a dozen eggs cost R9.94 to produce and could be purchased on the shelf for about R17.91 (BFAP, 2014; NAMC, 2014).

**Figure 3-19 Egg producer and retail price**




Source: BFAP (2014) and NAMC (2013) figures, own graph

### 3.2.5 FATS AND OILS

Expenditure on fats and oils accounted for about 3% of total food expenditure in both 2005 and 2010. Table 3-6 ranks five fat and oil products according to expenditure share of total household expenditure on fats and oils in 2005/2006 and 2010/2011. Ranking has remained the same with edible oils ranking first and even increasing in expenditure share by 4,4 percentage points. Expenditure share on margarine, which is second in rank, has decreased by 3,3 percentage points Expenditure share on olive oils has also decreased, although just by 0,2 percentage points. Conversely, expenditure share on peanut butter and butter have increased, though just by 0,1 and 0,4 percentage points respectively.

**Table 3-6 Fats and oils ranking according to share of total household expenditure on fats and oils in 2010/2011**

| Food Item | 2005/2006 | 2010/2011 |
|---|---|---|
| Edible oils (e.g. cooking oils) | 51,4% | 55,8% |
| Margarine | 30,8% | 27,5% |
| Peanut butter | 8,0% | 8,1% |
| Butter | 4,3% | 4,7% |
| Olive oils | 3,6% | 3,4% |

Source: Stats SA, 2006 & Stats SA, 2012b

Edible oils represent cooking oil, which in South Africa typically refers to sunflower oil. Soya bean oil and canola oil are also commonly produced in South Africa, and palm oil is popular in terms of imported food items (BFAP, 2014).

Sunflower has become the forth largest field crop produced in South Africa after maize,wheat and soyabeans. This follows the rapid expansion in soyabean production. Approximately 500,000 hectares of land is under sunflower seed production. Total production contributes about 3% to world sunflower seed production. By province the Free State accounts for the largest share of production claiming about 47%. The North West producing about 36%, and Limpopo producing 14% follows this. Mpumalanga produces just 2%, Gauteng 1%, the Western, Eastern and Northern provinces contribute less that 1% each, while KwaZulu-Natal does not produce sunflower seeds at all (DAFF, 2014).

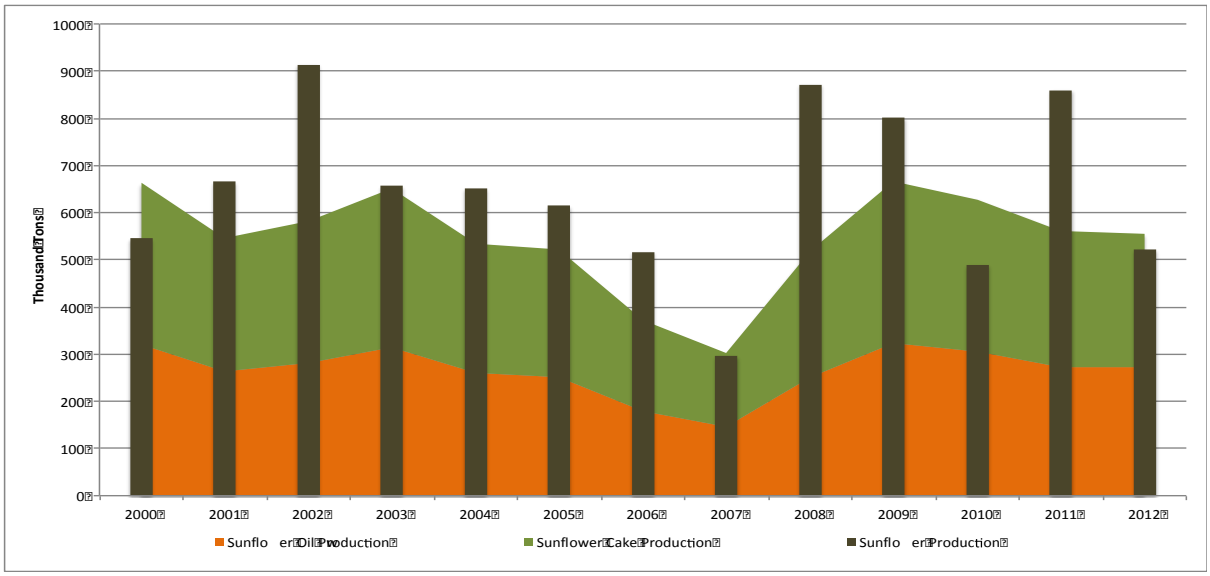
The main sunflower seed processing companies are Continental and Nola, which each can processes about 430,000 tons of sunflower seed per year. Willowton-Isando has the capacity to process 240,000 to 300,000 tons per year, Epko 200,000 tons, Willowton 144,000 tons and Elangeni Oil & Cake 48,000 tons. Crushing plants with relatively smaller capacity include Epic, Sealake Industries, and Capital Oil Mills (ITC, 2011).

The larger refineries responsible for the production of sunflower oil are located in Gauteng and KwaZulu-Natal. There are about 13 oil refineries in South Africa. Continental is responsible for about 22.86% of oil production; Willowton for 19.05%; Nola and Sealake for 9.52% each; Sun Oil, Sunola and UBR for 7.62% each; and Captial, Elangeni and Epko for 5.71%. Epic Foods, Hentiq 1320 and Nedan Oil Mills also contribute to sunflower oil production (DAFF, 2014; ITC, 2011).

South Africa's sunflower seed processing capacity is estimated at approximately 1.8 million tons. As can be seen in Figure 3-20, consistently over the past decade approximately half of sunflower seed production has been crushed for the purpose of producing crude oil and the other half for the purpose of producing oilcake. Most of the crude oil is converted into cooking oil through a process of refinement while oilcake is typically used for animal feed. Crude oil is also used to produce margarine, other foods and a small volume is converted to fuel, but mainly on an informal bases. While the industry does not import significant

amounts of the seed, crude sunflower oil is imported and in turn locally refined (DAFF, 2014; ITC, 2011).

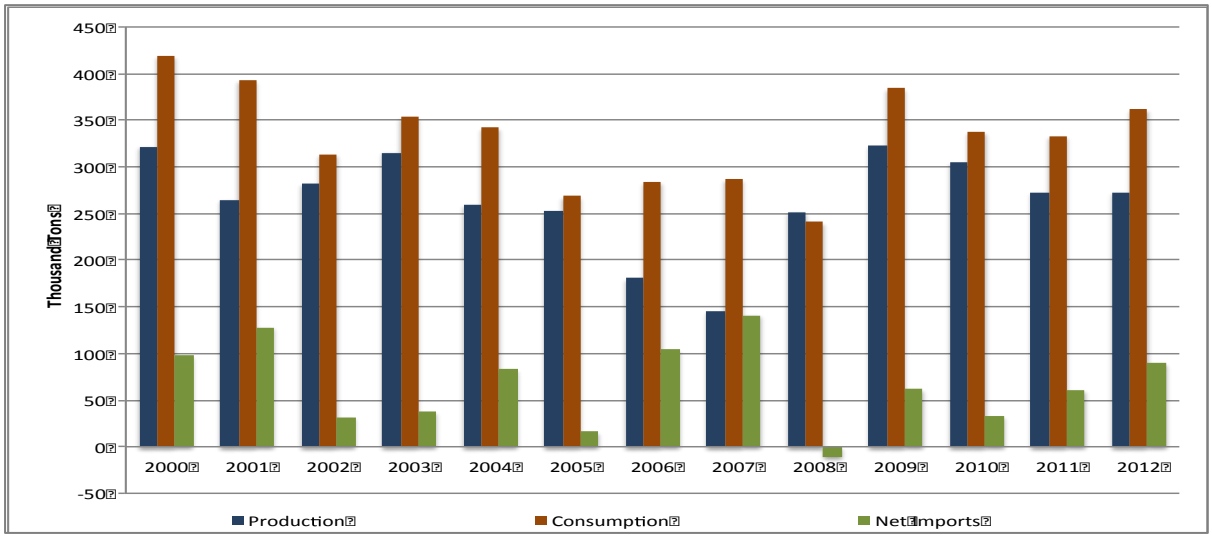
**Figure 3-20 Sunflower production**




Source: BFAP (2014) figures, own graph

Despite a shift in the trade balance in 2008, as reflected in Figure 3-21, South Africa also relies on imports to meet its demand for sunflower oil and is a net importer of sunflower oil. Production levels were at 272,550 tons in 2012. In this same year net imports were at 89,461 tons and consumption of 362,011 tons was thereby made possible (BFAP, 2014).

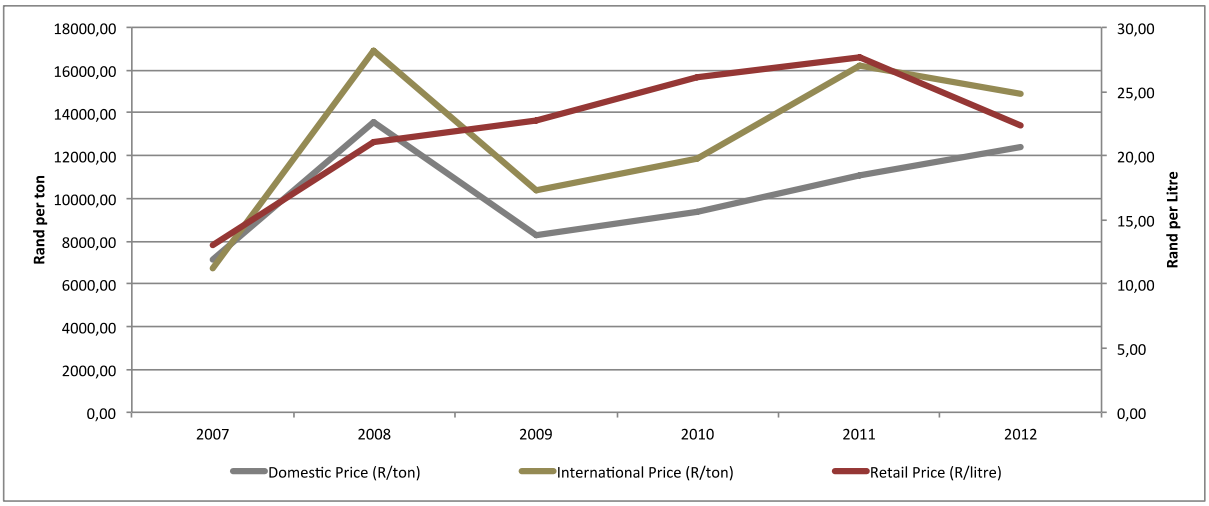
**Figure 3-21 Sunflower oil availability and consumption**




Source: BFAP (2014) figures, own graph

As a net importer of sunflower oil, South Africa's domestic prices are influenced greatly by international prices, as shown in Figure 3-22. In 2008 there was a hike in prices due to the economic crisis. This caused retail prices to almost double, from R12.98 per litre in 2007 to R21.02 per litre in 2008. While international and domestic producer prices dipped significantly in 2009, domestic retail prices continued to rise steadily until it reached R27.64 per litre 2011. In 2012, however, it decreased to R22.32 per litre following a dip in international prices, which slowed down the increase in domestic producer price (BFAP, 2014b; Index Mundi, 2013a; NAMC, 2014).

**Figure 3-22 International and domestic prices for sunflower oil**




Source: BFAP (2014), Index Mundi (2013a) and NAMC (2014) figures, own graph

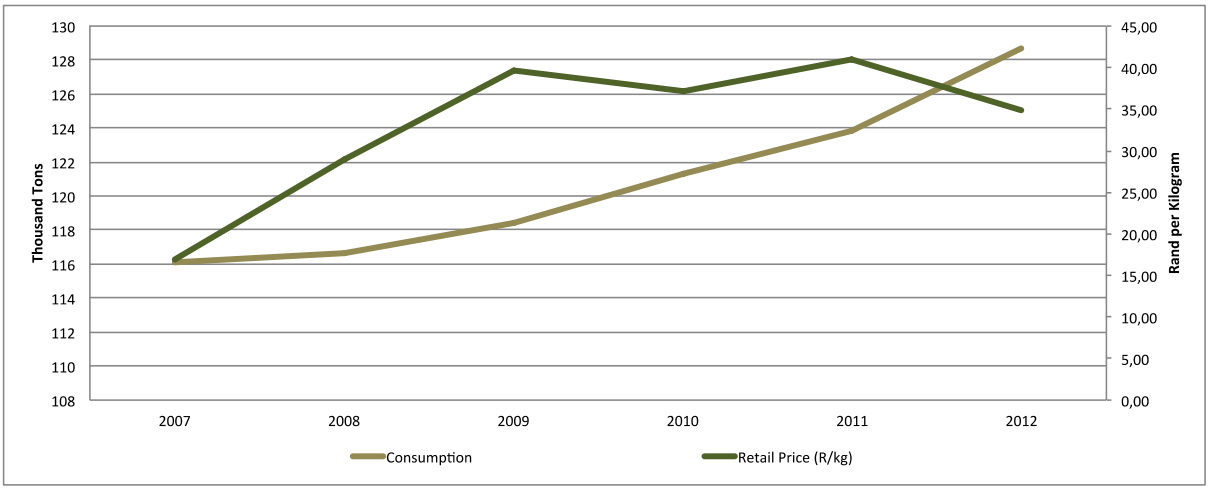
Margarine, a spread made from vegetable oil, was initially developed as a healthier alternative to butter. Consumption is retail inclined. Regional distribution has a metropolitan area skew. Gauteng, KwaZulu-Natal and Western Cape consume about three-quarters of the industry's output. Competition within the market is most evident in the lower priced, established bricks. Furthermore, consumers seem to choosing larger tubs, a sign of being more conscious of spending (Euromonitor International, 2013; Food Stuff SA, 2012).

The margarine market is well established with strong brands. Of all oils and fats the margarine brand Unilever's Rama held the greatest share in 2012 with 8.5%. Epic Foods' Cardin came in fourth with 6.6% and Unilever's Stork followed with 6.1%. Cape Oil & Margarine's Sunshine D came in sixth with 5.6%. Other common brands include Blossom,

Flora, D'lite and Butro. Despite its current capacity to meet demand, the South African margarine industry is expanding with new players and new brands (Euromonitor International, 2013; Food Stuff SA, 2012).

Figure 3-23 illustrates that margarine consumption has been consistently increasing since 2007. In 2012 quantity sold amounted to 128,700 metric tons to the value of R4,150,500 (Euromonitor International, 2013). The retail price of margarine has risen overall in the past few years as well, but not quite as steadily. In 2007 margarine cost R16.90 per kilogram and reached highs of R39.72 and R41.08 in 2009 and 2011 respectively. By 2012, retail price for margarine decreased slightly to R34.90 per kilogram (NAMC, 2014).

**Figure 3-23 Margarine consumption and retail price**




Source: Euromonitor International (2013) and NAMC (2014) figures, own graph

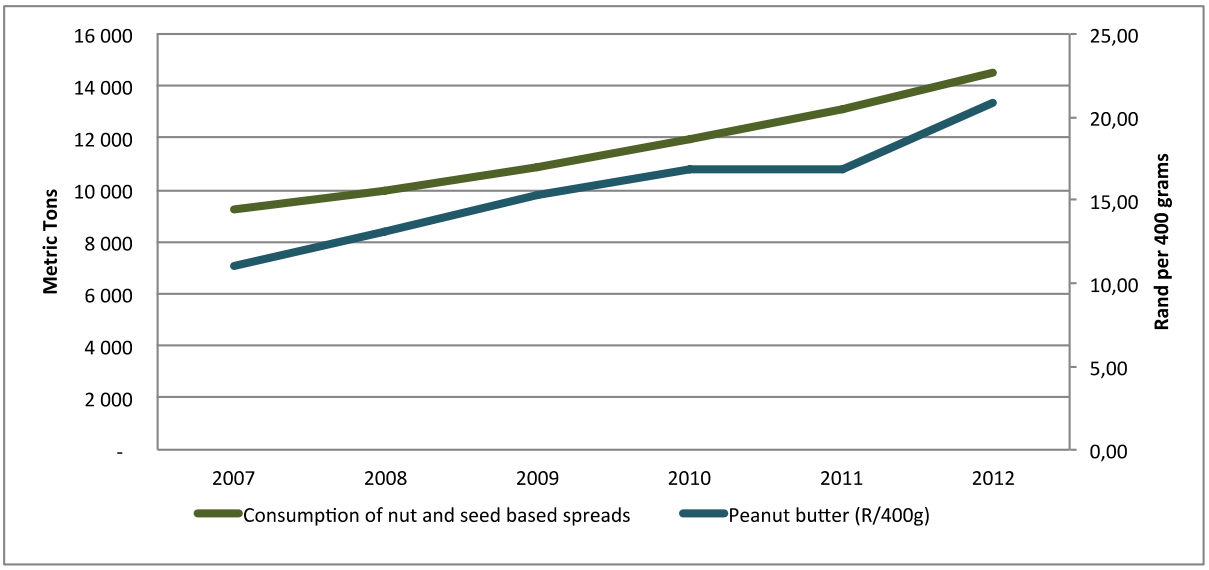
South Africa produced around 100,000 tons of groundnuts per year between 2007 and 2009, with lower levels of production in 2005 and 2006 at 84,000 and 66,000 tons respectively. In 2011, the country produced around 73,000 tons of groundnuts. The Free State is responsible for 40% of groundnut production, the Northern Cape for 31%, the North West for 25% and Limpopo for 4%. Approximately 70% of the groundnuts produced in South Africa are used for peanut butter production and direct consumption (BFAP, 2012; DAFF, 2014).

Tiger Brands' Black Cat peanut butter is the leading brand with 14% of market share for all spreads in South Africa. Together with other spreads products, Tiger Brands' stands as first in the spreads market with 28%. Third in the spreads market is Foodcrop, also because of its

Yum-Yum peanut butter brand, with 9% market share. Pick n Pay has about 4,2%, Unilever's Skippy has about 2%, and Thokomans Foods' Thokoman has about 0,7%. Together, these companies with peanut butter brands hold about 30% of the spreads market share (Euromonitor International, 2013).

As is clear from Figure 3-24, sales in nut and seed based spreads has continued to increase over the past years. Consumption in 2007 was at 9,246 metric tons and in 2012 amounted to 14,553 metric tons, equivalent to R649 million in terms of sales value (DAFF, 2014; Euromonitor International, 2013). The retail price for peanut butter in particular has also been increasing over the past few years, with a slight dip in 2011. In 2007 a 400-gram jar of peanut butter cost R11.02 and by 2012 almost doubled to R20.89 (NAMC, 2014).

**Figure 3-24 Peanut butter consumption and price**




Source: Euromonitor International (2013) and NAMC (2014) figures, own graph

### 3.2.6 FRUITS AND NUTS

Expenditure on fruits and nuts accounted for about 6% of total food expenditure in both 2005 and 2010. Table 3-7 ranks seven fruit and nut products according to expenditure share of total household expenditure on fruits and nuts in 2005/2006 and 2010/2011. The figures reflect that expenditure share on avocados has remained constant, on oranges has decreased, and on all other items have increased. Apple is first in rank and expenditure share change in relation to other items is greatest, with an increase by 2,5 percentage points. Expenditure

share on bananas increased by 1,5 percentage points and on oranges decreased by 2,2 percentage points. The increase in expenditure share on grapes by just 0,8 percentage points placed grapes above avocados in rank. Apart from this shift, the ranks remained the same.

**Table 3-7 Fruit and nuts ranking according to share of total household expenditure on fruit and nuts in 2010/2011**

| Food Item | 2005/2006 | 2010/2011 |
|---|---|---|
| Apples | 21,3% | 23,8% |
| Bananas | 19,0% | 20,5% |
| Oranges | 10,5% | 8,3% |
| Grapes | 4,1% | 4,9% |
| Avocados | 4,8% | 4,8% |
| Peanuts | 3,4% | 3,6% |
| Pears | 3,0% | 3,2% |

Source: Stats SA, 2006 & Stats SA, 2012b

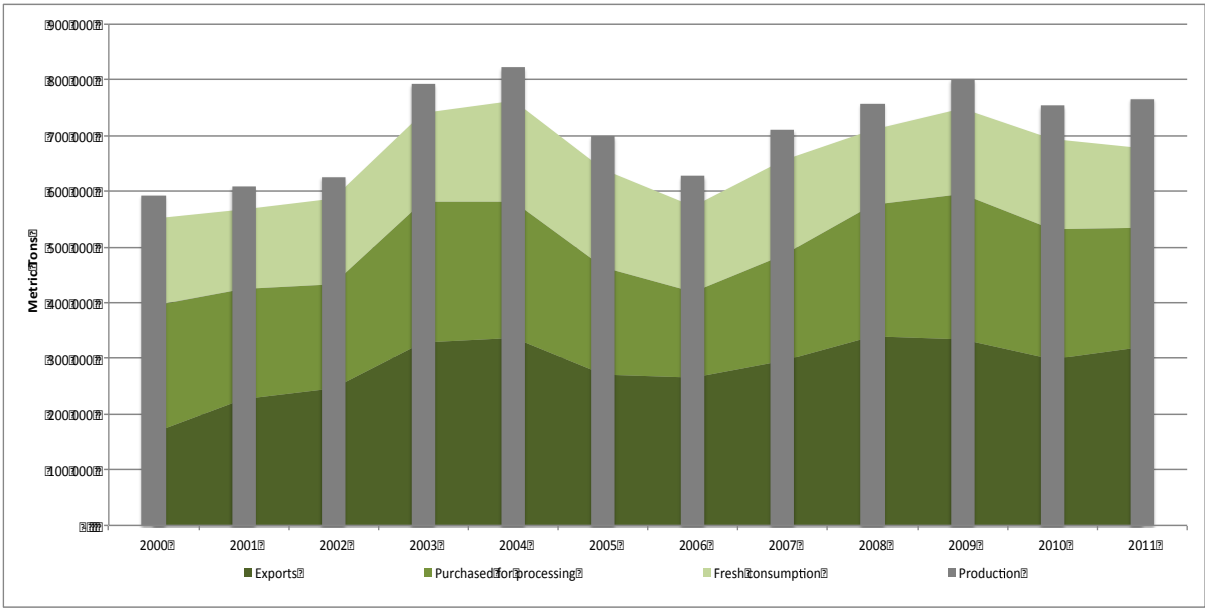
There are approximately 21,553 hectares of land under apple production in South Africa. This makes up 29% of total land under deciduous fruit production in the country. The largest apple producing areas in descending order are Groenland in the Western Cape (28%), Ceres in the Western Cape (26%), Langkloof Oos in the Eastern Cape (19%) and Viliersdorp (17%) in the Western Cape. Langkloof Wes, Vrystaat, Piketberg, Klein Karoo, Suid Kaap, Somerset West and Mpumalanga each make up 1% to 2% of land for apple production (DAFF, 2014).

Orchard age distribution is as follows: 33% at 25 years and older, 29% between 16 and 25 years old, 15% between 11 and 15 years old and 14% between 4 and 10 years old. Ten percent of the orchards are between 0 and 3 years old, a proportion that is necessary to ensure a consistent supply of replacement stock. Granny Smith and Golden Delicious are the most popular apple cultivars, followed by Royal Gala, Pink Lady or Cripps Pink, Fuji, Topred, Starkling, Early Red One and Braeburn (BFAP, 2014; DAFF, 2014).

As made clear by Figure 3-25, most of South Africa's apples are exported, mostly to the United Kingdom and Malaysia, with smaller proportions being exported to Benin and Angola. A significant portion of production is purchased for further processing and about 19% in 2011 remained for fresh consumption. Two opposing factors that have had a significant impact on supply are higher input costs and increasing yields. Nevertheless,

production has increased overall during the past decade, albeit with relative unpredictability. In 2011 production was at 766,622 metric tons and exports were at 318,993 leaving net supply at 447,629. The amount purchased for processing was 214,754 metric tons and the volume sold for fresh consumption was at 232,875 metric tons (ITC, 2015; Quantec, 2013).

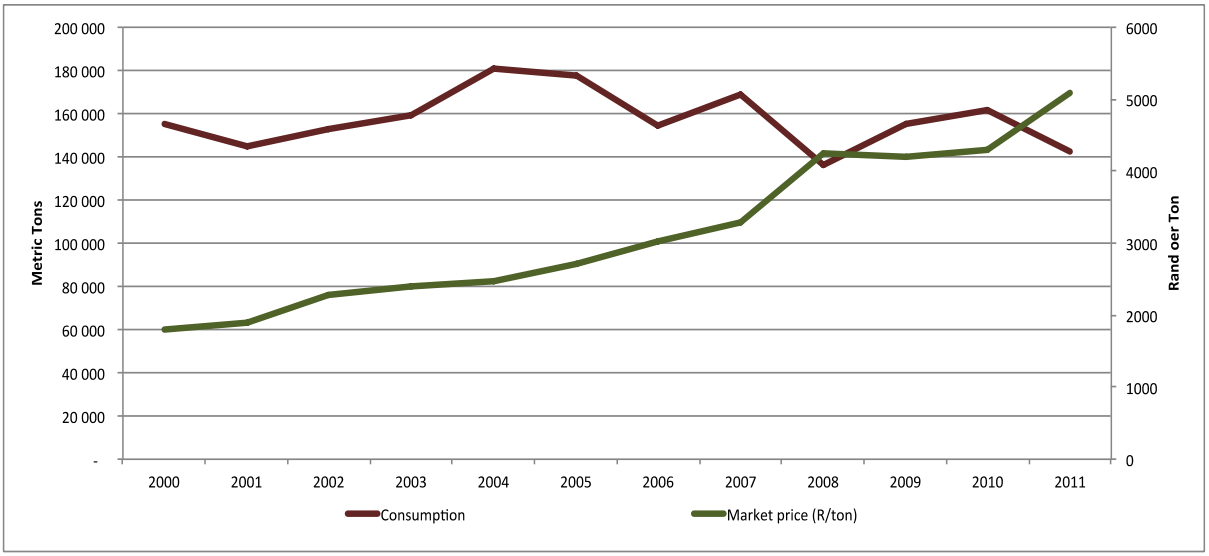
**Figure 3-25 Apple availability and consumption**




Source: Quantec (2013) figures, own graph

Figure 3-26 shows that unlike most of the commodities discussed thus far, consumption of fresh apples has experienced an overall decrease in the past decade, with greater proportions of production being allocated to the export market. While consumption followed an increasing trend between certain years, from 2000 when it stood at 155,548 tons, consumption was at a low of 136,209 tons in 2008. In 2011 consumption stood at 142,564 tons. Market price has on the other hand almost tripled over the past decade. Prices were at R1800 per ton in 2000 and reached R5089 per ton in 2011 (Quantec, 2013).

**Figure 3-26 Fresh apple consumption and retail price**




Source: Quantec (2013) figures, own graph

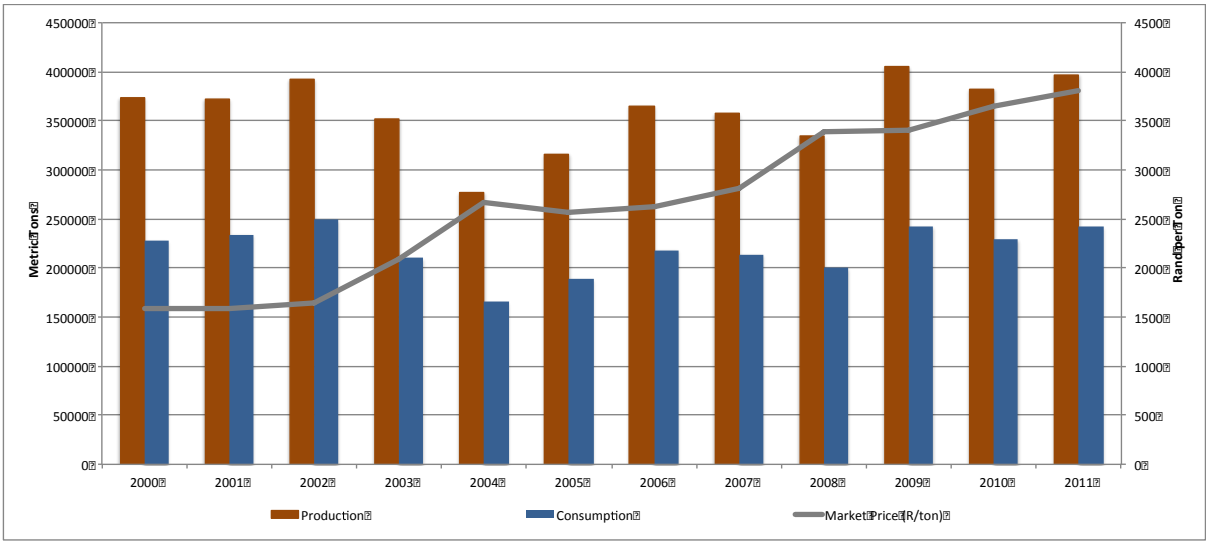
Banana is the most important subtropical fruit grown in South Africa, because of its gross value contribution to this fruit category. They are mostly planted for local markets or self-consumption. Production technologies used by commercial farmers are so different to those used by small-scale farmers that they are usually separated into two distinct economic activities. The latter makes minimum use of inputs and is labour intensive, whereas the former external inputs intensively and is technologically sophisticated (DAFF, 2014).

Total area under banana production in 2010 was at 11,360 hectares. Onderberg and Kiepersol, both in Mpumalanga, account for 36% and 22% of the area under banana production respectively. Levubu and Letaba, both in Limpopo, account for 12% and 8% respectively. The north coast and south coast of KwaZulu-Natal, make up 15% and 7% respectively (DAFF, 2014).

As seen in Figure 3-27, consumption levels of fresh banana have followed production levels closely over the past decade. Consumption typically stands at approximately 60% of production each year, regardless of fluctuations in quantity produced. Almost the entire proportion remaining is for local processing. Production in 2011 was at 397,287 metric tons and consumption was at 241,944 metric tons, which is not far from production and consumption levels in 2000, while dips and rises have been experienced in between. Prices on the other hand have steadily increased and more than doubled over the past decade. In

2000 bananas sold at R1580 per ton and by 2011 prices rose to R3814 per ton (DAFF, 2014; Quantec, 2013).

**Figure 3-27 Banana production, consumption and price**




Source: Quantec (2013) figures, own graph

Citrus is the third largest horticultural industry after the vegetable and deciduous fruit industries. This industry is comprised of oranges, easy peelers (soft citrus), grapefruit, and lemon and limes. South Africa produces Valencia oranges and Navel oranges. Together these two types of oranges make up 67% of total citrus production in South Africa (DAFF, 2014).

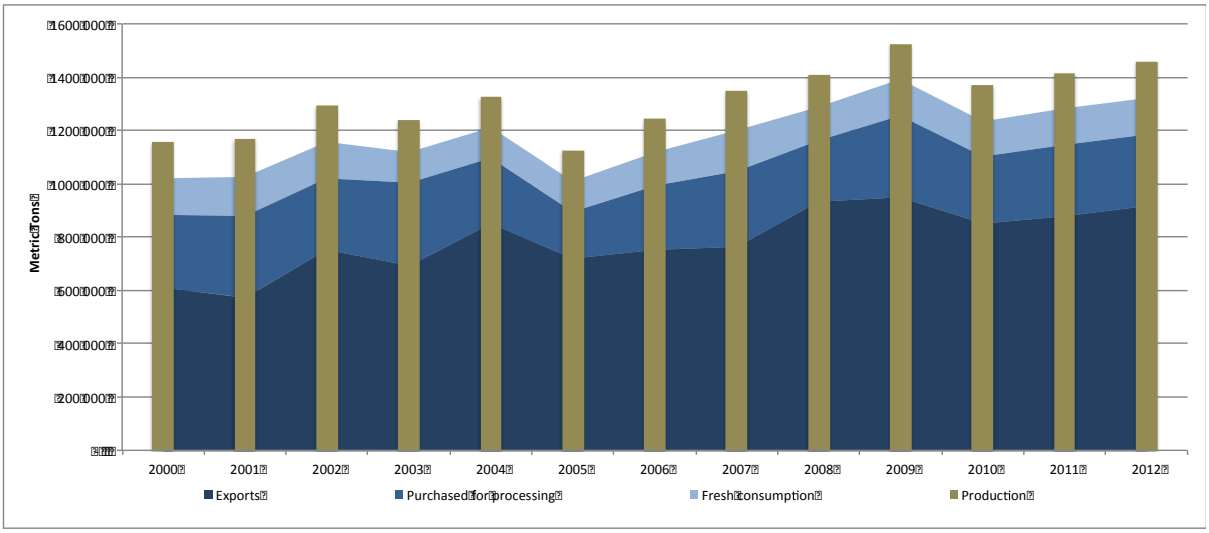
Valencia orange accounts for 41% of citrus production, covering 23,976 hectares of land. The warmer climate in Mpumalanga, Limpopo and KwaZulu-Natal, make these provinces more suitable for Valencia orange production. Farm sizes are larger and many farmers pack in smaller privately owned facilities. By province Limpopo contributes 49% to total Valencia orange production, Mpumalanga 20%, the Eastern Cape 14%, the Western Cape 9%, KwaZulu-Natal 4% and the Northern Cape 1% (DAFF, 2014).

Navel orange accounts for 26% of citrus production, covering 14,853 hectares. The 'cooler' Western and Eastern Cape provinces are considered more suitable for Navel orange production. Farm sizes are smaller and most citrus in these two provinces are packed by private companies. By province the Eastern Cape contributes 34% to total Navel orange

production, the Western Cape 26%, Mpumalanga 20%, Limpopo 12%, KwaZulu-Natal 5% and the Northern Cape 2% (DAFF, 2014).

Figure 3-28 reveals that of the quantity of oranges produced in South Africa, over 50% is allocated to the export market. These exports are mostly destined for the Netherlands, Russia and the Middle East. The smallest proportion—just 9.48% in 2011—is used to meet local demand in the fresh fruits market. Production in 2012 was at 1,458,311 metric tons and exports were at 914,699 metric tons leaving net supply at 543,612 tons. Oranges processed were 268,073 metric tons and consumption stood at 275,539 metric tons (Quantec, 2013).

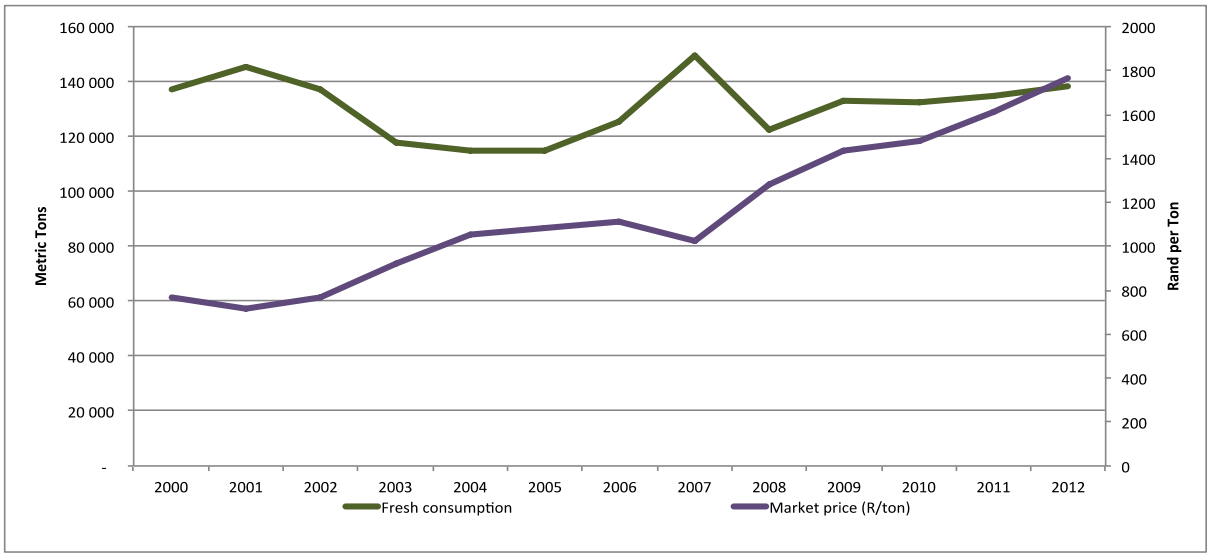
**Figure 3-28 Orange availability and consumption**




Source: Quantec (2013) figures, own graph

Like fresh apple consumption, fresh orange consumption has not followed much of a predictable trend. Figure 3-29 shows that there has been an overall decrease over the past decade. Larger proportions of production have been allocated to the export market over time. The increasing trend from 2005 was short lived: it reached close to 150 thousand tons by 2007 and then experienced a sudden drop in consumption during the economic crisis in 2008 when it stood at about 122 thousand tons. In 2000 consumption stood 137,056 tons and in 2012 consumption was at 138,273 tons. Market price has increased steadily and more than doubled. Prices experienced a slight dip when consumption was at its peak in 2007 when it stood at R1026 per ton. In 2000, however, prices stood at R765 per ton and by 2012 reached R1762 per ton (Quantec, 2013).

**Figure 3-29 Fresh orange consumption and retail price**




Source: Quantec (2013) figures, own graph

### 3.2.7 VEGETABLES AND BEANS

Expenditure on vegetables and beans accounted for about 10% of total food expenditure in 2005 and about 9% in 2010. Table 3-8 ranks seven vegetable and bean products according to expenditure share of total household expenditure on vegetables and beans in 2005/2006 and 2010/2011. When looking at the movement in expenditure share from 2005/2006 to 2010/2011, the figures reflect that shifts in expenditure share have been very small. Expenditure share on potatoes, the product first in rank, decreased by 0,2 percentage points, while expenditure share on onions, cabbage, potato crisps and baked beans in tomato sauce increased by 1,6, 0,2, 0,6 and 0,6 percentage points respectively. Expenditure share on tomatoes and dried beans remained constant.

**Table 3-8 Vegetables and beans ranking according to share of total household expenditure on vegetables and beans in 2010/2011**

| Food Item | 2005/2006 | 2010/2011 |
|---|---|---|
| Potatoes | 20,7% | 20,5% |
| Tomatoes fresh | 11,0% | 11,0% |
| Onions | 6,7% | 8,3% |
| Cabbage fresh | 5,8% | 6,0% |
| Potato crisps | 4,8% | 5,4% |
| Beans dried | 5,3% | 5,3% |
| Baked beans in tomato sauce | 4,6% | 5,2% |

Source: Stats SA, 2006 & Stats SA, 2012b

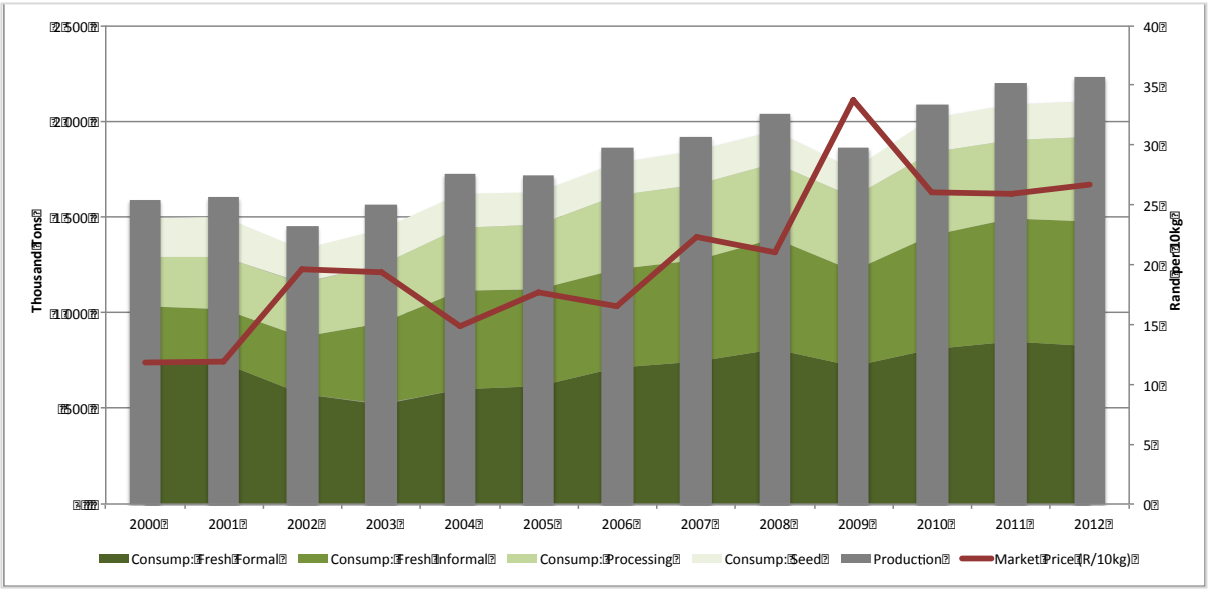
Potatoes are South Africa's most important vegetable. In 2011 approximately 52,563 hectares were planted in 16 regions: the eastern Free State accounted for 18% of hectares planted; Limpopo for 18%; Sandveld in the Western Cape for 13%; the western Free State for 12%; KwaZulu-Natal for 9%; Mpumalanga and the North West for 5% each; the Northern Cape for 4%; south-western Free State, north Eastern Cape and the Eastern Cape for 3% each; Loskop Valley, Gauteng and Ceres for 2% each; southern Cape for 0.3%; and the south Western Cape for 0.2% (Potatoes SA, 2014).

The region with the largest number of farming units in 2011 was Sandveld with 99. In total there are about 679 farming units. Potatoes are grown throughout the year. About 75% of the area planted is under irrigation. Where there is reliable rainfall—such as in the eastern Free State, Mpumalanga and the Eastern Cape—potatoes can also grow well in dry land. In 2011, of total production, 38% was distributed to the formal market and 30% to the informal market, while 17% was allocated for processing, 8% for seed and 7% for export (DAFF, 2014; Potatoes SA, 2014).

Productivity can be measured by output per hectare or output per kilogram of seed. For example, in 2012 Limpopo witnessed the highest output per hectare at 55,000 kg, while its output per kilogram of seed was at about 11 kg. On the other hand, the dry lands of the eastern Free State had a low output of 29,500 kg per hectare but 23 kg per kilogram of seed. Sandveld had an output per hectare of 49,300 kg and an output of per kilogram of seed of 13 kg. Nonetheless production has been increasing over the years and in 2012 South Africa produced approximately 2 million tons of potatoes (Economic News, 2012; Quantec, 2013).

Figure 3-30 illustrates that the greatest share of potato production is freshly consumed, be it in the informal or formal market. A smaller proportion is used for processing and an even smaller proportion for seeds. In 2000 South Africa produced in the range of 1,589 thousand tons. With the exception of a dip in 2009, since 2008 South Africa has produced more than 2 million tons reaching 2,229 thousand tons in 2012. South Africans consumed 1,479 thousand tons in this same year. Prices have been increasing as well. Potatoes cost R12 per 10 kilograms in 2000 and reached a high of R34 per 10 kilograms in 2009 when production decreased. Although market prices decreased to R27 per 10 kilograms, this level is not quite as low as levels pre-economic crisis (BFAP, 2014).

**Figure 3-30 Potato production, consumption and price**




Source: BFAP (2014), own graph

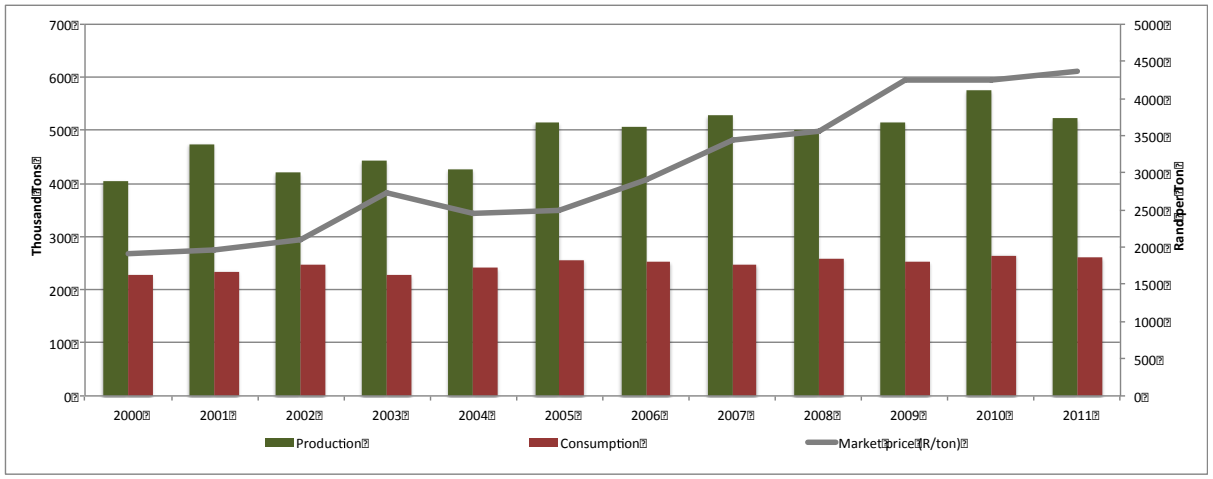
The tomato, the second most important vegetable in South Africa, is planted on about 6,000 hectares of land. There are approximately 695 producers in both the commercial and emerging sector. The commercial sector contributes 95% to total production. In addition to the farmers in these sectors, subsistence farmers, resource poor farmers and home gardeners commonly grow this vegetable (DAFF, 2014).

Production is limited during winter to areas that are frost-free or protected by tunnels. In Limpopo the 3,590 hectares under tomato production accounts for 75% of total area under tomato production. In Limpopo's northern lowveld 2,700 hectares is used for tomato production, and in the far northern areas 890 hectares. Onderberg are in Mpumalanga has 770 hectares under tomato production and the border are of the Eastern Cape has 450 hectares (DAFF, 2014).

Figure 3-31 shows that tomato production has witnessed fluctuations over the past decade although it has increased overall. Consumption on the other hand has remained relatively constant. The average South African household consumes five to ten tomatoes per week. Most of production is consumed fresh, either locally or in other parts of Southern Africa. Approximately 68% of exports are destined for Mozambique. Production in 2000 stood at

405 thousand tons, reached a high of 575 thousand tons in 2010 and amounted to approximately 522 thousand tons in 2011. Local consumption was at 228 thousand tons in 2000 and 260 thousand tons in 2011. Figure 3-31 depicts that price trends have also been mostly increasing over the past decade and have almost tripled. In 2000 price per ton was at R1914 and in 2011 this reached R4367 per ton (DAFF, 2014; Quantec, 2013).

**Figure 3-31 Tomato production, consumption and price**




Source: Quantec (2013) figures, own graph

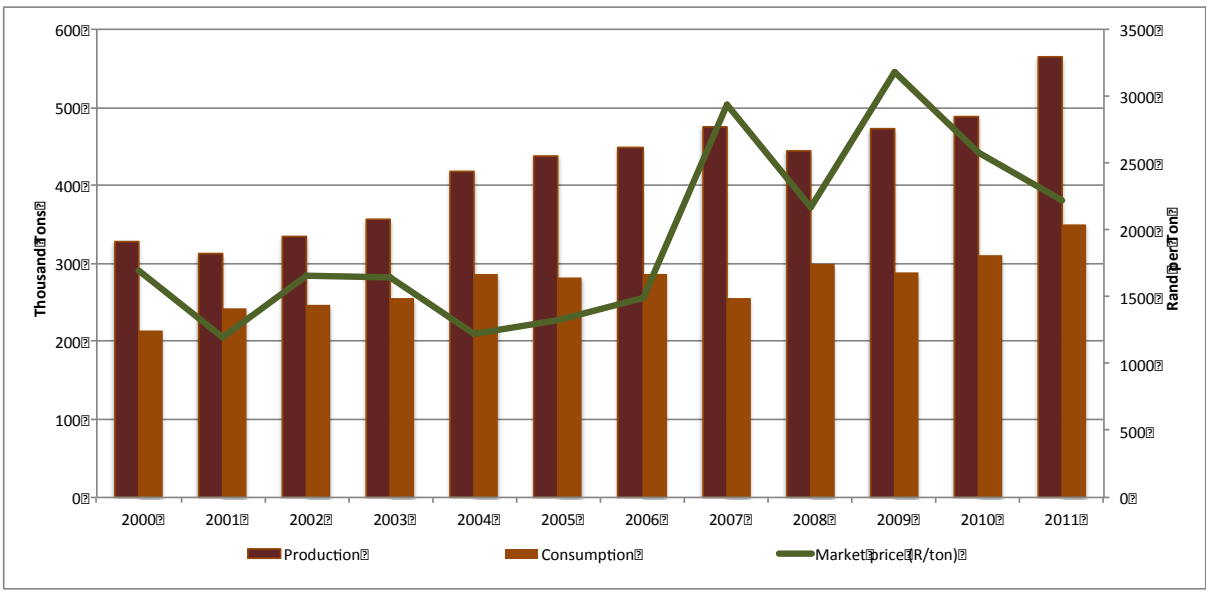
Onions are the third most popular vegetable in South Africa. The onion value chain can be broken up just as the value chain for cabbage was broken up. Although onions are produced in all provinces, production is concentrated in the Western Cape, Northern Cape, the North West and Limpopo. Fresh onions are available from late May/early June until late November while storage onions are available from November. Both types can be found in three colors: red, yellow and white. In 2010, about 60% of onion production was distributed through fresh produce markets. The remaining proportion went directly to wholesalers, retailers, processors, informal traders, exporters or consumers (DAFF, 2014).

Dutoit Vegetables in Ceres in the Western Cape, and Wildeklawer in the Northern Cape, are South Africa's leading onion producers. Wildeklawer is known as the largest onion producer. This producer has recently adopted a sweet onion cultivar that does not cause tears, and in addition, is said to contain various elements beneficial to health. Dutoit Vegetables has recently developed a new uniquely South African shallot called Shanion (DAFF, 2014).

South Africa is a net exporter of onions. Most onion exports are destined for Southern Africa, specifically Angola, Mozambique, Zimbabwe, Zambia and Namibia (International Trade Centre, 2013). Both production and local consumption has increased overall in the past decade, with a notable decrease in production in 2008 and in consumption in the preceding year. In 2000 South Africa produced 329 thousand tons of onions and consumed 214 thousand tons. By 2011 South Africa increased production to 564 thousand tons and consumption increased to 351 thousand tons, which is approximately 62% of production (DAFF, 2014; Quantec, 2013).

Figure 3-32 reflects these trends and also reflects the trends in prices over the past decade. This graph illustrates that prices have increased overall, but with great fluctuation. In 2000 market prices stood at R1700 per ton. They reached lows of R1192 per ton and R1229 per ton in 2001 and 2004 respectively. Thereafter, prices followed an upward trend and peaked at R2938 in 2007, dipped in 2008 and rose to R3182 in 2009. In 2011 onions cost R2217 per ton (Quantec, 2013).

**Figure 3-32 Onion production, consumption and price**




Source: Quantec (2013) figures, own graph

There are about 1,200 dry bean producers using approximately 42,000 hectares of land. Since beans are typically planted in rotation with other crops, area planted is limited and fluctuates

yearly. According to 2010/2011 figures, the Free State accounts for approximately 25% of dry bean production, Limpopo for 22%, Mpumalanga for 20%, the North West for 13%, KwaZulu-Natal for 12% and Gauteng for 5% (DAFF, 2014).

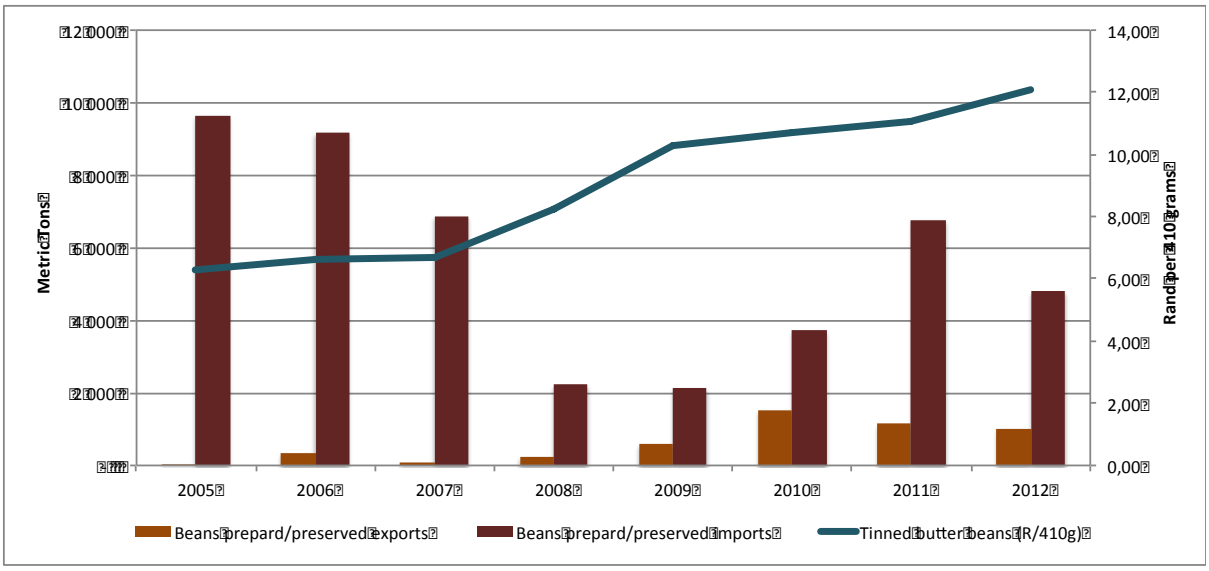
Dry bean producers generally sell their produce to end user consumers, agribusinesses, brokers, cooperatives, wholesalers, exporters, either through online trading on Beanex, or directly. About 15% of bean production is sold to canners. Canners are located in the Western Cape, KwaZulu-Natal and Mpumalanga. Giants Canning, based in Gauteng, is the largest canner and is responsible for more than 50% of bean canning. It supplies and manufactures house brands on behalf of all major wholesalers and retailers. Its own butter beans are marketed under the brand Divine. Other butter bean brands are Koo, Dursots, Tomango, All Gold, Goldcrest, Fiamma, Rhodes, Luisa (DAFF, 2014; Giants Canning, 2011).

The main types of beans produced in South Africa include Red Speckled beans, Small White canning beans and Large White Kidney beans. Given that consumer demand for convenience food has been increasing, the market for Small White canning beans has been growing. According to Euromonitor International (2013) total sales of canned/preserved beans amounted to 43,100 tons in 2012.

Figure 3-33 gives an indication of how much South Africa relies on imports to meet processed bean products. Although imports for prepared or preserved beans to South Africa have decreased over the past few years South Africa is a net importer of processed beans. In 2005 imports stood at 9,654 metric tons while in 2012 imports amounted to 4,809 metric tons. Exports have been increasing over the years from 46 metric tons in 2005 to 1,027 metric tons in 2012 (DAFF, 2014; ITC, 2015).

The price for processed beans has been steadily increasing since 2005. The example in Figure 3-33 is for tinned butter beans, which is commonly consumed in South Africa. In 2005 a 410-gram of tinned butter beans cost R6.29 and by 2012 had doubled, reaching R12.07 per 410-gram tin (NAMC, 2014).

**Figure 3-33 Trade and price for processed beans**




Source: ITC (2015) and NAMC (2013) figures, own graph

## 3.3 SUMMARY

The number of South Africa's commercial farmers has decreased significantly since the 1990s, but these farmers continue to be responsible for a major portion of food production in the country. Despite limiations in water and arable land, South Africa's landscape makes possible the production of a wide range of food products. Its advanced agricultural sector and counter seasonality with Europe also makes it competitive in the international agricultural market.

Since agricultural trade liberalization and the deregulation of the agricultural market, the proportion of crops produced for export has increased, meaning that the proportion of crops produced for local consumption has decreased. Still, South Africa is a net exporter of primary agricultural products and thus produces sufficient quantities for local demand for a large range of goods. On the other hand, much of its secondary agricultural products have to be imported and in this category, South Africa is actually a net importer of foods.

Maize, for which South Africa is a net exporter, is the most important staple food, followed by wheat, for which South Africa is a net importer. South Africa also relies on imports for pasta and rice. South Africa relies on imports to meet demand for poultry and beef, its two

most important meat products with respect to expenditure share. Much of South Africa's fish has to be imported also, even where final processing takes place locally.

With respect to dairy and eggs, South Africa is mostly self-sufficient. Regarding fats and oils, South Africa must import to meet demand for the less refined and the more processed products in this category. With respect to fruits, South Africa is mostly self-sufficient and exports much of its citrus. In the vegetables and beans category, South Africa is mostly self-sufficient for the fresh products, but relies on imports for the processed products.

The next chapter will close in on the top 13 food items with respect to household food expenditure share and consider how changes in production levels of these food items will impact their domestic price.

# CHAPTER 4:TRADE DEPENDENCY VERSUS HOUSEHOLD FOOD EXPENDITURE

As the literature review showed, the starting point for the assessment of food security is availability. Given that South Africa's market is connected to the global market, availability cannot be determined without considering trade. An overview of South Africa's agricultural sector and food trade balance has already been given in Chapter 3. This chapter will bring together household food expenditure figures and consumption and trade figures in the design of the "Trade Dependency and Household Food Expenditure Share" graph. The final section of this chapter will consist of scenarios based on the impact that shifts in production levels have on the commodity and retail prices of select foods within different trade regimes.

This chapter will begin with a description of the methodology used for the calculations of figures and designs of tools employed in this study.

## 4.1 METHODOLOGY

This section will begin by looking briefly at the methodology employed by Stats SA to conduct the IESs. Thereafter, the sources for the consumption and trade data for the top 13 food items according to expenditure share will be presented. The formula for trade dependency calculated on the basis of this data will then be considered. The approach to illustrating graphically the relationship between food expenditure share and trade dependency will be demonstrated. Finally, the methodology for assessing the impact of moving toward national self-sufficiency on domestic prices will be described.

### 4.1.1 STATS SA INCOME AND EXPENDITURE SURVEYS

The Stats SA IESs are conducted every five years. Since the Stats SA IES conducted in 2000, significant shifts have been made in terms of approach: Stats SA moved from using the Standard Trade Classification approach to classify items to the Classification of Individual Consumption by Purpose (COICOP) approach. The decision for this change was due to the fact that the COICOP is internationally recognized and thus findings could be compared with those of other countries. Also, in relation to methodology: From 2005/2006 Stats SA used

the diary approach in addition to the recall approach. These changes applied in both the 2005/2006 survey and the 2010/2011 survey (Stats SA, 2012b).

Still there are few differences between the 2005/2006 and the 2010/2011 surveys as well. These include sample size—24,000 dwelling units in the former and 31,419 dwelling units in the latter, household questionnaires—five modules in the former and just four in the latter, diaries—four weekly diaries in the former and two weekly diaries in the latter, as well as visits per household—six in the former and four in the latter. Aspects that remained consistent included the following: the acquisition approach was used to collect expenditure data on goods, the payment approach was used to collect expenditure data on services, the consumption approach was used to collect data on own production, the survey period lasted one year and the reference period for food expenditure was from September to August (Stats SA, 2012b).

In addition to these common aspects, both surveys used the 2001 Census to draw a sample with a combination of the stratified random sampling method and the multi-stage sampling method. Stratified random sampling implies that a sampling frame, in this case South Africa, would be divided into pre-determined strata and from these strata a random sample would be selected. Multi-stage sampling involves, over four phases, the repeated purposeful selection of a group, and for each phase, a random selection from which purposeful selection will be made. Both of these methods fall under the category of probability sampling (Yu, 2008).

Each IES questionnaire contains questions about sources of household income and covers the purchase of a wide variety of products and services. Each used a pre-coded questionnaire and targeted the head of the household, defined as the person who is the main breadwinner, or, if the main breadwinner did not live in the household, the decision-maker in the household (Central Statistics, 1997; Stats SA, 2006).

Trained fieldworkers asked household heads to recall expenditure for the prior month for some items, such as food items, and for the prior twelve months for other items and called upon the household head for face-to-face interviews. The pre-coded main questionnaire was split and conducted on separate visits during the survey month while the respondent was concurrently required to record all acquisitions in a separate diary for each of the weeks of the survey month; the diary was therefore collected on a weekly basis. The questionnaire

included only questions the respondents were asked to recall for the prior twelve months, since all other information, such as particulars on which foods were consumed on a day-to-day basis, would be recorded in the diary (Stats SA, 2006).

### 4.1.2 TRADE DEPENDENCY AND EXPENDITURE SHARE

The percentage share traded figures will be calculated using consumption and trade data. The South African Revenue Services (SARS) served as the source for all trade data while the sources for the consumption data are summarized in Table 4-1:

**Table 4-1 Sources for consumption data**

| # | Food Item | Source of Consumption Data |
|---|---|---|
| 1 | Poultry | SA Poultry Association (2014) |
| 2 | Wheat | SAGIS (2014) |
| 3 | Beef | BFAP (2014) |
| 4 | Maize | SAGIS (2014) |
| 5 | Milk | Milk SA (2014) |
| 6 | Aerated cold drinks | SABMiller (2012), SABMiller (2013) |
| 7 | Rice | ITC Trademap (2015) |
| 8 | White sugar | SA Cane Growers' Association (2014) |
| 9 | Edible oils | BFAP (2014) |
| 10 | Mutton & lamb | BFAP (2014) |
| 11 | Potatoes | Potatoes SA (2014) |
| 12 | Eggs | SA Poultry Association (2014) |
| 13 | Fruit juices | SAFJA (Richards, 2014) |

Source: Own table

While in most cases trade and consumption data for the various food items were readily available, additional legwork had to be done to determine either one or both figures for cold drinks and fruit juices. The approaches used are explained below.

Trade figures for cold drinks: It should be noted that with regard to South African trade, SARS only began accounting fully for trade with countries in the SACU region from 2013 onward (BFAP, 2014). Consequently, trade figures for cold drinks in 2005 and 2010 were compared to those in 2013, and a significant difference was noticed (increase in exports from 1,7 million litres in 2005, to 10,4 million in 2010 and to 152 million in 2013) (ITC, 2015). Given this difference, 2013 figures were used as these were assumed to reflect past trade patterns more accurately.

Consumption figure for cold drinks: Given that 2013 trade data was used, consumption data for 2013 was also sought. This was calculated using two SABMiller sources: one reporting that the Amalgamated Beverage Industries (ABI) division of SABMiller produces 90% of the cold drinks in South Africa (SABMiller, 2012:11) and the other giving a production figure for 2013 of about 1 837 million litres (SABMiller, 2013:33). The production figure was then calculated by dividing this latter figure by 0,9, a production figure of 2 041 million litres for South Africa was calculated. This figure was added to net trade to reach the consumption figure: 1 900 million litres.

These 2013 figures were used as proxy figures for cold drinks trade and cold drinks consumption in 2005 and 2010.

Consumption figure for fruit juice: As fruit juice consumption figures were hard to come by, 2013 consumption figure was used. This was provided by SAFJA (Richards, 2014), and is equal to 582 million litres. The associated trade data from SARS could not be used, as these were only available in tons, while the consumption figure was in litres.

The following approach was used to calculate fruit juice trade data: According to BMI (2013), 9,4% of fruit juice production in 2012 was exported. Thus, the fruit juice market is equal to 581 550 000 / (1 – 0,094) = 641 887 417. Thus exports amount to 9,4% of this figure, which equals 60 337 417 litres. According to the SARS trade figures, imports was 32,36% of exports in 2012. Thus, imports is equal to 60 337 417 * 0,3236 = 19 525 188. Thus net imports = 19 525 188 - 60 337 417 = 40 812 229 litres.

Net trade ($NT_t$) will be calculated by taking exports ($EX_t$) away from imports ($IMP_t$), as follows:

**Equation 4-1:** $NT_t = IMP_t - EX_t$

The consumption and net trade figures will be used to calculate trade dependency ($TD_t$) in the form of percentage share of each food item exported or imported. This will be done by considering the how much South Africa relies on trade for consumption ($CONS_t$), as follows:

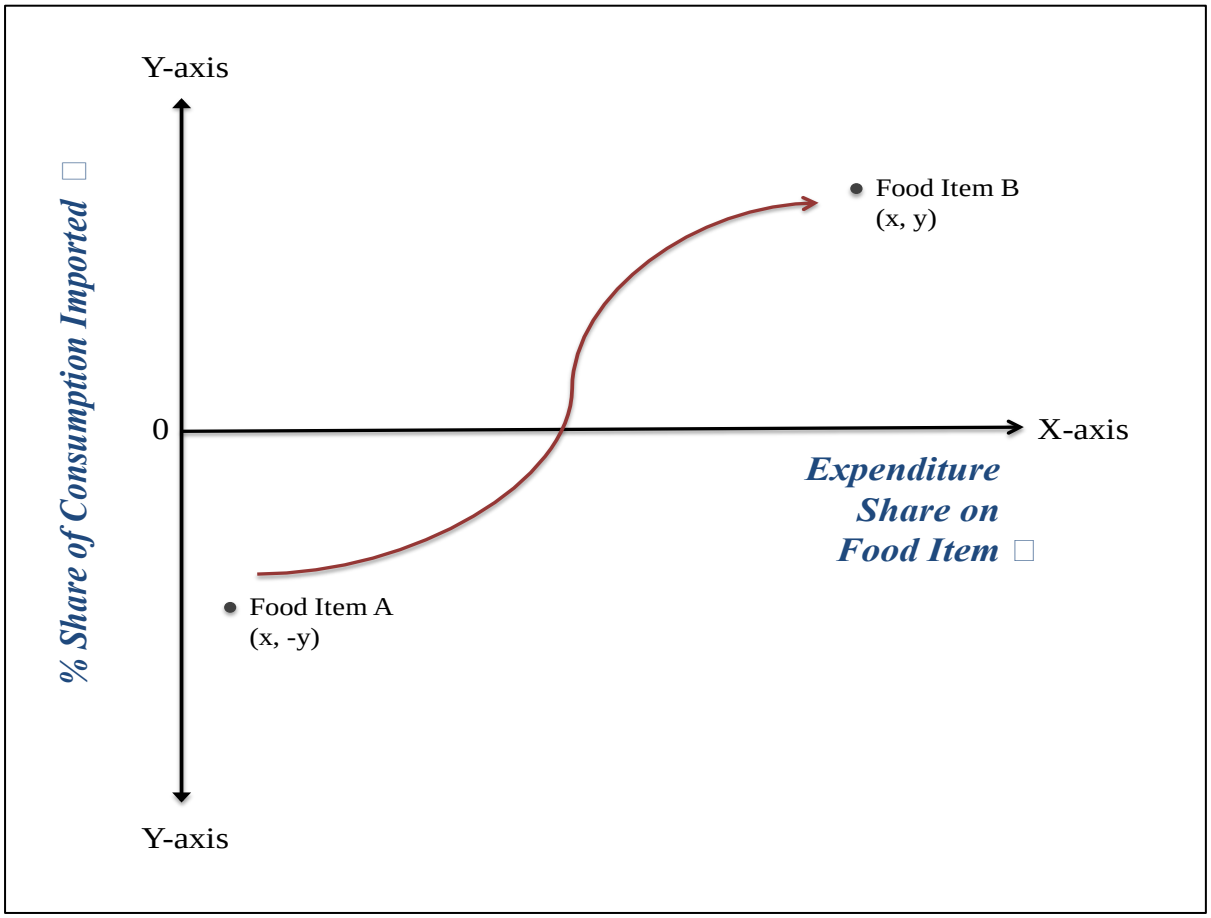
**Equation 4-2:** $TD_t = \frac{NT_t}{CONS_t}$

Therefore, for food items where South Africa is a net importer, the percentage share figure will be positive and for food items where South Africa is a net exporter, the percentage share figure will be negative.

In order to show pictorially the changes over time with respect to percentage share exported/imported and expenditure share on food for each food, these figures will be plotted on a graph: the expenditure share figure will be represented by the X-axis, while percentage share exported/imported will be represented by the Y-axis. Given that the percentage share figure of food items for which South Africa is a net importer will be positive, these will be positioned above the X-axis, and since the percentage share figure of food items for which South Africa is a net exporter will be negative, these will be positioned below the X-axis.

As can be seen in the schematic diagram in Figure 4-1, Food Item A is representative of a good that is net exported and that takes up a smaller relative portion of a household's food budget, while Food Item B is a net imported item taking up a larger relative portion of a household's food budget. Thus movement away from the bottom, left side of the graph, and toward the top, right side of the graph, implies increasing dependency on trade to meet consumption as well as increasing relevance to the household in terms of proportion of expenditure spent on food.

**Figure 4-1 Schematic diagram of the "Trade Dependency and Household Food Expenditure Share" graph**




Source: Own diagram

This graph will be referred to as the "Trade Dependency and Household Food Expenditure Share" graph.

### 4.1.3 PRODUCTION SHOCK AND PRICE TRANSMISSION

In order to determine how increasing national self-sufficiency will impact the price of selected net imported commodities, net exported commodities, and commodities under near autarky, a production shock will be run through the BFAP sector model—an econometric regime-switching model within a partial equilibrium framework (Meyer *et al.*, 2006). To determine how the change in commodity price will effect a change in the consumer price, the results from studies which have employed the Error Correction Model (ECM) will be used (Engle & Yoo, 1991; Gujarati, 2003). A brief explanation about each approach is necessary.

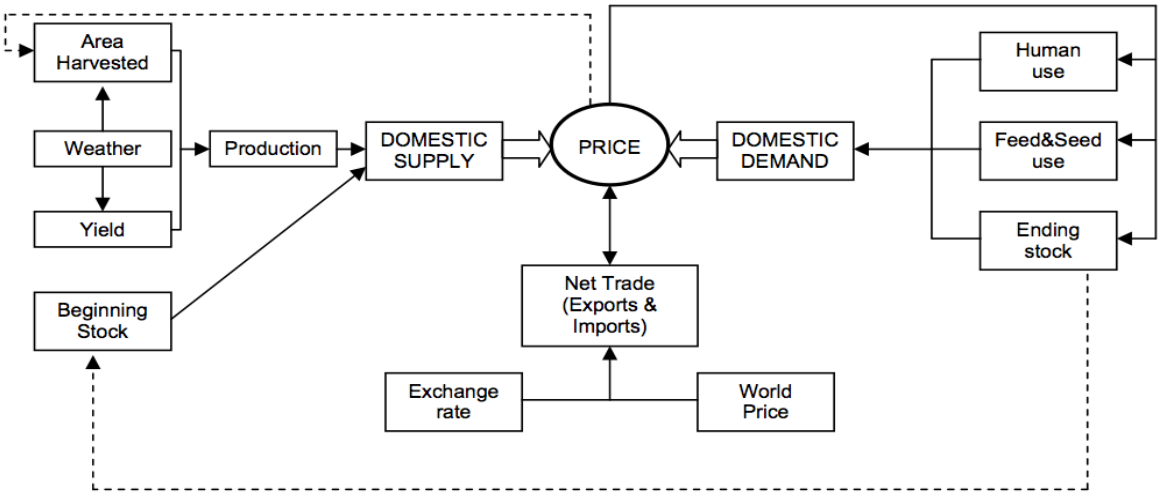
Van Tongeren, Meijl and Surry (in Meyer, 2006:21), define general equilibrium models as those accounting for interactions between various sectors, while partial equilibrium models are described as models that give particular attention to relationships between commodities. Thus, given that this study is considering the agricultural sector in isolation, a partial equilibrium model is preferred. These models are based on historic data and thus two key assumptions of these models are that the market structure does not change and is well understood and correctly specified (Davids, 2013).

Model closure in its most basic form solves for price when quantity demanded equals quantity supplied where quantity demanded is a function of price and income, and quantity supplied is a function of price and production costs. A more general approach may include ending and beginning stock levels, as well as international trade (Meyer, 2006). According to Meyer *et al.* (2006), however, most of these partial equilibrium models do not take into account various trade regimes within a particular commodity market and thus end up understating or overstating response to shocks. Furthermore, none of them accommodate for possible switches between regimes.

The BFAP sector model is a partial equilibrium model that takes into account varying equilibrium pricing conditions for a range of commodities under different trade regimes and allows for the possibility of shifts between these regimes. It categorizes the trade of net imported products under import parity, of net exported products under export parity and of products for which South Africa is self-sufficient, under near-autarky. The model then starts by solving at near-autarky where domestic price is set to the average of the import and export parity prices; as domestic price moves toward the import or export parity band, however, the model switches technique, thereby solving for a different regime (Meyer *et al.*, 2006).

The flow diagram in Figure 4-2 illustrates how price is discovered under near-autarky—mainly through the forces of domestic supply and domestic demand.

**Figure 4-2 Flow diagram of a commodity market in near-autarky**




Source: Meyer, 2006

The following net export demand ($NEXD_t$) equation and export supply ($EXS_t$) identity is used under this regime:

**Equation 4-3:** $$\boldsymbol{NEXD_t = f\left(\frac{P_{Dt}}{Avg(P_{IP,t}\&P_{EP,t})}, \frac{PROD_t}{CONS_t}, e_t\right)}$$

**Equation 4-4:** $$\boldsymbol{EXS_t = PROD_t - CONS_t - (BEGS_t - ENDS_t)}$$

Where:

$P_{Dt}$ is domestic price

$P_{IP,t}$ is import parity price

$P_{EP,t}$ is export parity price

$PROD_t$ is local production

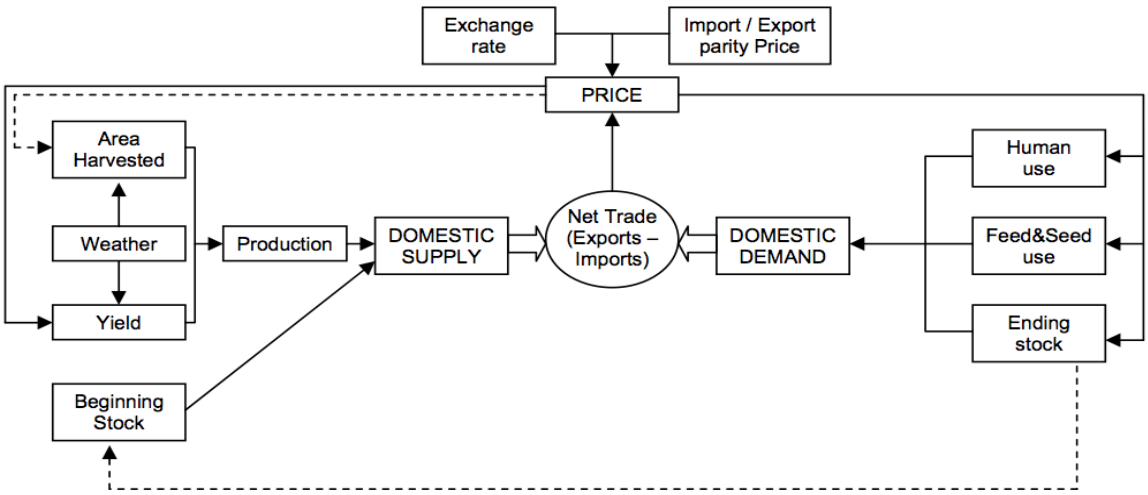
$CONS_t$ is consumption

The old domestic market price is then set to the difference between net export demand ($NEXD_t$) and ($EXS_t$), a difference resulting from market disequilibrium. The model is then solved iteratively, reaching the new market equilibrium price once the difference between net export demand ($NEXD_t$) and export supply ($EXS_t$) is zero (Meyer *et al.*, 2006).

Under import or export parity, domestic prices are linked to international prices with the assumption that the domestic market is integrated with the world market, and are thus

determined by the exchange rate and the import or export parity price. The flow diagram in Figure 4-3 illustrates this.

**Figure 4-3 Flow diagram of a commodity market in net export or net import parity**




Source: Meyer, 2006

Domestic price ($P_{Dt}$) is thus estimated as a function of the import ($P_{IP,t}$) or export parity price ($P_{EP,t}$), and net export demand ($NEXD_t$), as in the below equations:

**Equation 4-5:** $\boldsymbol{P_{Dt} = f\,(P_{IP,t}, NEXD_t)}$

**Equation 4-6:** $\boldsymbol{P_{Dt} = f\,(P_{EP,t}, NEXD_t)}$

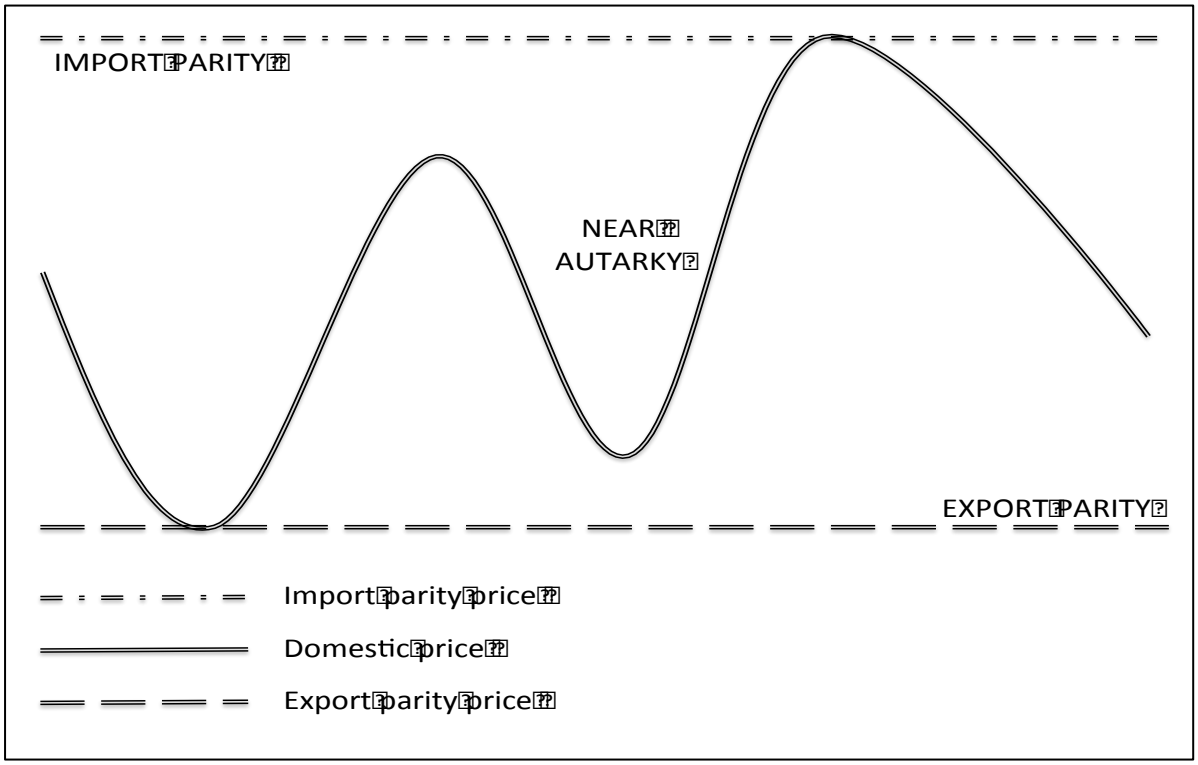
Net trade ($NT_t$) is used as the closing identity for the parity regimes, where the difference between beginning stock ($BEGS_t$) and ending stock ($ENDS_t$) is added to the difference between local production ($PROD_t$) and consumption ($CONS_t$), as follows:

**Equation 4-7:** $\boldsymbol{NT_t = BEGS_t + PROD_t - CONS_t - ENDS_t}$

Following domestic price in the diagram in Figure 4-4, net trade is expected to be zero under near-autarky, as domestic prices move toward import or export parity. Once domestic price reaches import or export parity, opportunities for arbitrage are expected to materialize. Important to note, however, is that for some of South Africa's commodity markets, a certain level of trade still occurs with neighboring countries at domestic prices, suggesting a type of

regional autarky. This provides further justification for this regime-switching model (Meyer *et al.*, 2006).

**Figure 4-4 The regime selector**




Source: Meyer, 2006

When looking at price transmission at a domestic level, from commodity price to retail price, the Granger causality is typically first used to determine causation between the producer prices and retail prices. The results of this test confirm that commodity and retail prices have one of the following relationships (Gujarati, 2003):

1. Unidirectional causality, where a change in commodity price precedes a change in retail price.
2. Unidirectional causality, where a change in retail price precedes a change in commodity price.
3. Bilateral causality, where a change in commodity price causes a change in retail price and vice versa.
4. Independence, where no causality is identified in either direction.

The estimation of elasticities for price transmission under the ECM then follows three steps: The long run relationship between the commodity price and retail price is quantified through the estimation of the Engle-Granger co-integration equation. The coefficient from this equation serves as the elasticity which determines the price transmission from commodity to retail price. The Engle-Granger co-integration test is used to confirm the existence of a long run co-integrating relationship. The residual series from this test have to be stationary to conclude that a significant long run co-integrating relationship is present (Gujarati, 2003).

The second step to this approach is the use of error correction mechanism that accounts for short run variations around the long run relationship. It thereby indicates in number of months how long it would take for a model to return to equilibrium levels after a shock (Gujarati, 2003). Finally, the Engle-Yoo step is used to adjust the coefficient in the Engle-Granger co-integration equation for initial bias (Engle & Yoo, 1991).

## 4.2 RESULTS

The previous chapter looked at the top food items according to expenditure share within seven food groups: staple foods, meat, fish, fats and oils, dairy and eggs, fruit and nuts, and vegetables and beans. Without regard for categorization by food group, the top 13 food items according to expenditure share are now being selected for further analysis, and are listed in the table below, along with their associated 2005/2006 and 2010/2011 expenditure share figures:

**Table 4-2 Food expenditure share on top 13 food items**

| # | Food Item | 2005/2006 Expenditure Share | 2010/2011 Expenditure Share | % Change 2005 to 2010 |
|---|---|---|---|---|
| 1 | Poultry | 9,86 | 10,26 | 4,06 |
| 2 | Wheat | 8,30 | 8,39 | 1,08 |
| 3 | Beef | 7,87 | 8,03 | 2,03 |
| 4 | Maize | 4,56 | 5,36 | 17,54 |
| 5 | Milk | 4,49 | 4,87 | 8,46 |

| | | | | |
|---|---|---|---|---|
| 6 | Aerated cold drinks | 3,28 | 3,24 | -1,22 |
| 7 | Rice | 2,34 | 3,19 | 36,32 |
| 8 | White sugar | 2,66 | 2,48 | -6,77 |
| 9 | Edible oils | 1,62 | 2,15 | 32,72 |
| 10 | Mutton & Lamb | 2,63 | 2,00 | -23,95 |
| 11 | Potatoes | 1,92 | 1,93 | 0,52 |
| 12 | Eggs | 1,92 | 1,88 | -2,08 |
| 13 | Fruit juices | 1,27 | 1,09 | -14,17 |

Source: Own calculations

Table 1.1 included the top 15 food items according to expenditure share. The above table is a modification of Table 1.1. Beef in the above table includes both "beef and veal" and "boerewors and beef sausage" from the top 15 items in Table 1.1; wheat includes "brown bread", "white bread" and "cake flour"; and milk includes "fluid milk", as well as "baby food", which according to Stats SA (2012b) is 16$^{th}$ on the list of items in a typical household's food budget. Also, fruit juices, which would be next in rank, have been included.

Expenditure is the price of a product multiplied by the quantity. Thus changes in expenditure between 2005/2006 and 2010/2011 result from changes in price, in quantity, or in both price and quantity.

The sources for the consumption and trade data have already been discussed in the methodology section and are being presented in Table 4-3 for 2005 and 2010:

**Table 4-3 Consumption and trade figures**

| | | **Consumption 2005** | **Net Imports 2005** | **Consumption 2010** | **Net Imports 2010** |
|---|---|---|---|---|---|
| 1 | Poultry | 1 426,8 | 176,4 | 1 814,6 | 232,5 |
| 2 | Wheat | 2 781,0 | 944,0 | 2 944,0 | 1 470,0 |
| 3 | Beef | 642,2 | 66,6 | 695,4 | 40,5 |
| 4 | Maize | 3 643,0 | -1 844,0 | 4 213,0 | -1 126,0 |

| | | | | | |
|---|---|---|---|---|---|
| 5 | Fluid milk | 1 396,6 | -7,0 | 1 545,4 | -6,3 |
| 6 | Cold drinks* | 1 900 937,0 | -139 951,9 | 1 900 937,0 | -139 951,9 |
| 7 | Rice | 738,2 | 738,2 | 702,7 | 702,7 |
| 8 | White sugar | 1 550,5 | -1 238,7 | 1 780,0 | -325,0 |
| 9 | Edible oils | 564,3 | 267,2 | 651,1 | 335,2 |
| 10 | Mutton&Lamb | 150,0 | 42,7 | 149,2 | 21,8 |
| 11 | Potatoes | 1 630,0 | -24,7 | 2 016,0 | -80,5 |
| 12 | Eggs | 324,3 | -1,0 | 382,9 | -3,6 |
| 13 | Fruit juices* | 581 550,0 | -40 812,2 | 581 550,0 | -40 812,2 |

*in 1 000 litres

Source: Various, see section 4.1.2

The formula for the percentage share traded figures was presented in the methodology section. Using this formula, the percentage share traded figures were calculated for 2005 and 2010 and are presented in Table 4-4:

**Table 4-4 Percentage share of consumption imported reflecting trade dependency**

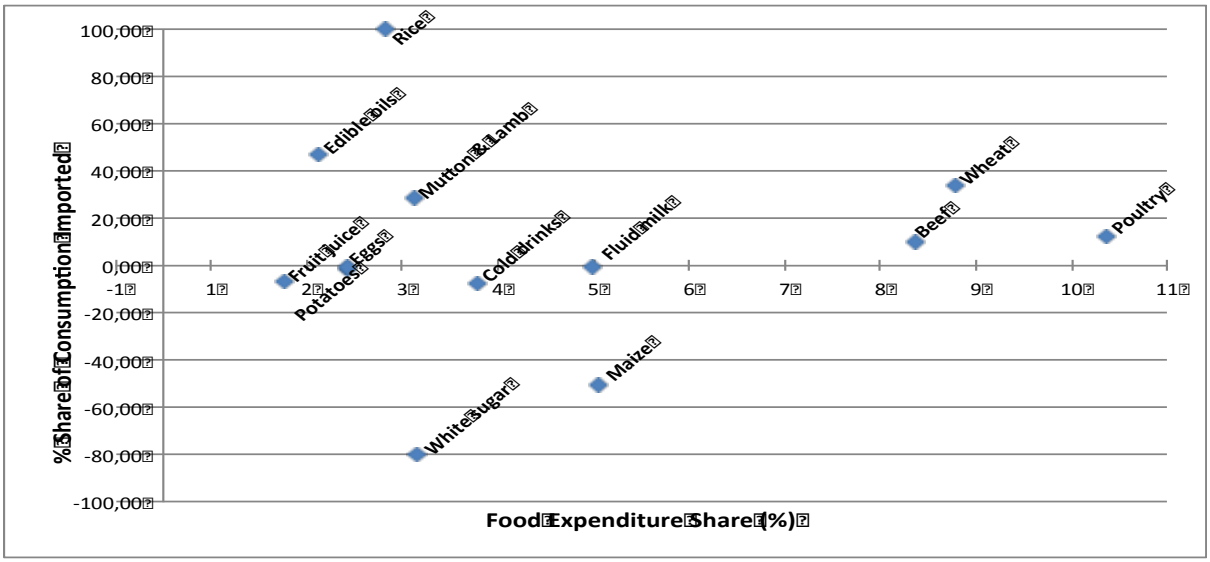
| | | **% Share of Consumption Imported 2005** | **% Share of Consumption Imported 2010** |
|---|---|---|---|
| 1 | Poultry | 12,4 | 12,8 |
| 2 | Wheat | 33,9 | 49,9 |
| 3 | Beef | 10,4 | 5,8 |
| 4 | Maize | -50,6 | -26,7 |
| 5 | Fluid milk | -0,5 | -0,4 |
| 6 | Cold drinks | -7,4 | -7,4 |
| 7 | Rice | 100,0 | 100,0 |
| 8 | White sugar | -79,9 | -18,3 |
| 9 | Edible oils | 47,4 | 51,5 |
| 10 | Mutton&Lamb | 28,5 | 14,6 |
| 11 | Potatoes | -1,5 | -4,0 |
| 12 | Eggs | -0,3 | -0,9 |

| | | | |
|---|---|---|---|
| 13 | Fruit juices | -7,0 | -7,0 |

Source: Own Calculations

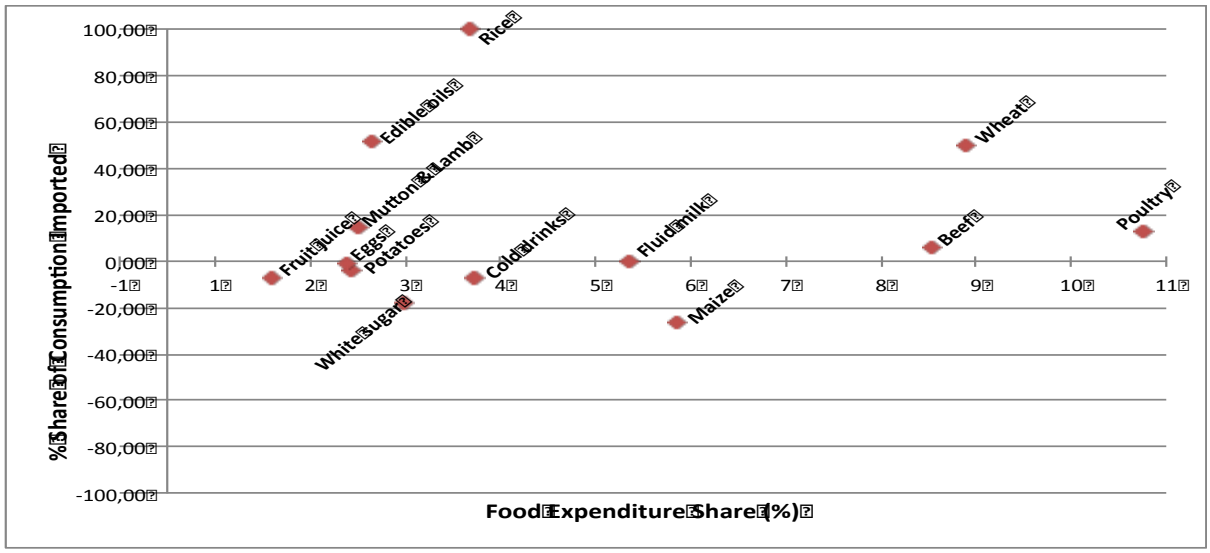
The above table is therefore reflective of the trade dependency figures for each of the 15 food items identified for further analysis for the years 2005 and 2010. The pictorial representations of the changes in these figures over time are shown in the graphs in Figure 4-5 and Figure 4-6.

**Figure 4-5 2005 "Trade Dependency and Household Food Expenditure Share" graph**




Source: Own graph

**Figure 4-6 2010 "Trade Dependency and Household Food Expenditure Share" graph**




Source: Own graph

In order to understand the significance of movement on the graphs between 2005 and 2010, and over time in general, the implications of increasing national self-sufficiency for the consumer will be considered. As seen in the previous chapter, self-sufficiency is calculated using production and consumption figures. Thus, shifting production levels while assuming that consumption levels will remain unchanged, will do this. The impact of these shifts on commodity prices and, in turn, retail prices will then be demonstrated.

Of the commodities discussed in the preceding section, at least one in each trade regime will be chosen for this exercise. These are chicken, beef and wheat, which are net imported items; maize, a net exported item; and fluid milk and potatoes, which are items under near-autarky.

With the use of the BFAP sector model, an econometric regime-switching model, the impact of a shock in the production levels on commodity prices was tested. To find the impact on retail price, the transmission elasticity was sought from previous studies that employed the ECM approach. Table 4-5 summarizes the results:

**Table 4-5 Impact on prices based on production shocks**

| Trade Position | Commodity | Shock in Production | Shock on Commodity Prices | | Transmission Elasticity | Impact On Food Prices | |
|---|---|---|---|---|---|---|---|
| | | | Absolute Change | Percentage Change | | Absolute Change | Percentage Change |
| Net Imported | Chicken | 10% ↑ | -R0.60 | -2.85% | 0.62[1] | -R0.37 | -1.77% |
| | Beef | 10% ↑ | -R3.54 | -10.46% | 0.29[2] | -R2.39 | -3.08% |
| | Wheat | 10% ↑ | No impact | No impact | No impact | No impact | No impact |
| Net Exported | Maize | 10% ↓ | R287.00 | 15% | 0.31 | R1.46 | 4.65% |
| Near Autarky | Fluid milk | 10% ↓ | R1.35 | 33% | 0.64 | R1.56 | 21.12% |
| | Potatoes | 10% ↓ | R10.76 | 32% | 0.47 | R8.40 | 15.04% |

Source: BFAP (2014), [1]Davids (2013), [2]Funke (2006)

## 4.3 ANALYSIS OF RESULTS

### 4.3.1 POULTRY

Poultry is South Africa's most important food item with respect to expenditure share, and at the same time a net imported food item. Both expenditure share and trade dependency increased only slightly between 2005 and 2010—expenditure share by 4,06% and percentage share imported by 3,6%. These increases shifted its position on the graph incrementally to the right and upward, despite a 30% increase in local production between the two reference years, which was evidently not enough to meet the increase in demand (BFAP, 2014).

Given that poultry is a net imported food the production shock would have to be positive to increase self-sufficiency. Furthermore, since broiler meat makes up about 90% of the poultry market in South Africa, the shock will be a 10% increase on chicken production in 2014. After a 10% shock, South Africa would remain a net importer of chicken meat, based on knowledge of the poultry sector model. After the shock, commodity price decreased by just 2,85% per kilogram. Based on the transmission elasticity calculated by Davids (2013) the retail price of whole chicken dropped by a slightly smaller margin: 1,77%.

The results from the shock indicate that although the local price would still be connected to the international market, a shift is expected to occur when production levels change. This is because a range of chicken parts and products are traded on the market and elasticities differ for each. The shift in price will thus likely make possible import substitution of higher priced cuts such as chicken breasts. South Africa would still rely on imports of processed chicken products, however, as well as lower cuts such as wings, thighs and drumsticks, which are consumed in larger quantities because of the demand on the part of the lower income population (Davids, 2013).

As a comparatively affordable source of protein, and thus the preferred choice during times of economic constraint, it is expected that demand for poultry will continue to increase. It is anticipated, however, that local production will not be able to keep up with increases in demand and that South Africa will thus have to increase imports (BFAP, 2014).

Consequently, it is expected that poultry with respect to expenditure share and trade dependency will increase over time.

### 4.3.2 WHEAT

Wheat is second in importance with respect to expenditure share and a net imported item. Between 2005 and 2010, wheat's position on the trade dependency and expenditure share graph shifted upward and slightly to the right. While the expenditure share figure for wheat only increased by 1,08%, the figure representing trade dependency rose by 47,10%. This can be explained by a 25% drop in production figures between 2005 and 2010, which resulted in South Africa relying on greater imports to meet demand (BFAP, 2014).

Given that South Africa is a net importer of wheat, production would have to increase to move it toward self-sufficiency. Thus, a 10% increase in production was tested and the results indicated that South Africa would remain a net importer and that local prices would continue to trade at import parity levels. Wheat can also be regarded as a homogenous product as opposed to a product like chicken meat, and thus there would be no impact on commodity price and in turn no impact on retail price.

International wheat prices have been on the rise and are expected to continue increasing, which should encourage farmers in the winter rainfall region to increase plantings. Nevertheless, the boost in plantings will likely not make up for the overall decline that will result from a shift in weather patterns in the summer rainfall regions and greater comparative income from other crops like soybeans and maize in these production regions (BFAP, 2014). It is therefore anticipated that wheat will move further toward the upper right hand corner of the trade dependency and food expenditure share graph.

### 4.3.3 BEEF

Beef is the third food item in rank in terms of expenditure share and, as with poultry and wheat, is a net imported item. Beef's position on the graph shifted to the right and downward: Expenditure share increased by 2,03% between 2005 and 2010 whilst trade

dependency decreased more significantly by 43,87%. The decrease in trade dependency was possible, in spite of an increase in consumption. This was due to the increase in beef production by approximately 14%—likely in response to an increase in demand due to the soccer world cup and an economic recovery (BFAP, 2014).

Despite the decrease in trade dependency in 2010, beef remains a net imported good and thus production has to increase to move it toward self-sufficiency. A 10% increase in production was thus tested and this resulted in a 10,46% decrease in carcass price per kilogram, moving South Africa away from import parity levels, toward autarky. This reveals that South Africa's stock could potentially be large enough to meet local demand. The impact on retail price was based on the transmission elasticity estimated by Funke (2006). Based on this elasticity, retail prices would have decreased by 3,08%.

Demand for beef has been unstable since 2008. At the same time, because of extreme weather conditions and market forces in neighbouring countries, the beef market has been experiencing volatility. With a greater number of cattle being slaughtered, beef imports will likely drop, but beef will remain a net imported item (BFAP, 2014). The overall impact will likely result in a decrease with respect to trade dependency over time.

### 4.3.4 MAIZE

Maize is fourth in rank with respect to expenditure share, and a net exported item. Maize's position on the graph moved upward and slightly to the right between 2005 and 2010: Percentage share traded increased by 47,2% between 2005 and 2010 and expenditure share by 17,54%. As can be seen in Table 5.3, this increase in trade dependency is because net exports decreased as local consumption increased. Nevertheless, production levels rose by 23% (BFAP, 2014).

Since maize production is at export parity in South Africa, the shock necessary to move it toward autarky was a decrease in production levels. A shock of 10% decrease in production was tested and this was sufficient to move South Africa toward autarky. It is important to note that South Africa remains self-sufficient but stock levels decrease enough as a result of the shock that South Africa would have to trade between export parity and import parity.

Commodity prices as a result of this shock would increase by 15% per ton, while the retail price of a 5 kilogram bag of special maize meal would increase by 4,65 percent—this according to a transmission elasticity estimated by BFAP (2014).

Maize farmers respond relatively quickly to changes in prices and thus plantings and production levels fluctuate regularly. Still, given South Africa's natural endowments and maize farming expertise, it is expected that South Africa will remain a net exporter of maize (BFAP, 2014). It is therefore unlikely that maize's position with respect to percentage share traded will change significantly.

### 4.3.5 FLUID MILK

Milk's position shifted slightly upward and to the right between 2005 and 2010. The percentage share traded figure increased by 18,28% and expenditure share by 8,46%. Production increased between these years by about 13%. Nevertheless, the increase in percentage share traded was as a result of a greater relative increase in consumption to net exports (BFAP, 2014).

According to the ITC (2015) South Africa is a net importer of long-life milk, and net exporter of fresh milk. In reality, however, fluid milk is not really a tradable good, whilst trade will occur in the form of milk powder. Therefore, milk prices are quite volatile, whereas milk powder trade can respond to short-term imbalances in the market and thereby experience more stability in terms of price (BFAP, 2014).

Volatility in the fluid milk industry can be understood by the following cycle with respect to production, consumption and price levels: A favorable milk-to-feed price ratio induces expansion in production; this leads to a decrease in the price of milk, increasing consumption; a price reduction precedes a drop in production; this eventually leads to an increase in producer price and a potential drop in consumption (BFAP, 2014).

Thus milk is trading at autarky within South Africa, and supply and demand is closely balanced. The shock tested was a 10% decrease in production. This was a major jolt on the industry and the commodity price of milk per litre increased by 33% and the retail price by

21,12%, according to a transmission elasticity estimated by BFAP (2014). Milk moved toward import parity, and since milk is more easily traded in its powdered form, the implications are greater reliance on milk powder for processed milk goods.

Despite the scenario tested, the dairy industry has been ever expanding over the years, responding to growing demand. South Africa's fluid milk farmers are thus believed to be equipped enough to respond to changes in the market (BFAP, 2014). Therefore, it is expected that percentage share traded with respect to fluid milk will remain relatively stagnant.

### 4.3.6 POTATOES

Expenditure share increased by 0,52 while percentage share traded decreased by 163,51%. Still, potatoes did not shift significantly on the trade dependency and food expenditure share graph. The explanation for the large drop in percentage share traded is as follows: After two years of decreasing prices, 2009 witnessed a hike in prices that motivated farmers to expand area planted. Thus, a larger harvest area and good yields led to an increase in production, which made possible greater exports and the drop in the trade dependency figure (BFAP, 2014).

The South African potato market is a closely balanced market and a shock in the production level will have a major impact on local prices. The shock tested was a 10% decrease, which resulted in a 32% increase in producer price per 10 kilogram bag of potatoes. At retail level, given the transmission elasticity calculated by BFAP (2014), this translated into a 15,04% increase per 10 kilogram bag. The reason the potato market is strongly influenced by production levels is because while processed potato products such as chips are traded, given the perishable nature of fresh potato, trade and stock of fresh potatoes is generally limited. Thus despite the drop in production, the South African potato market does not reach import parity levels, even though it may move closer to the import parity band and rely on more imports to meet demand for processed potato products (BFAP, 2014).

Although fresh potato prices decreased after 2009, yields continued to increase. Thus, despite changes in area under production in response to changes in price, farmers have been

able to continue to meet local demand. However, it is expected that increases in yields will not be able to compete with increases in demand over the long run unless area planted also increases. Therefore, it is anticipated that prices will increase at a faster rate and influence farmers to increase. When compared to other starches and across income groups, expenditure share on potatoes has remained relatively stable (BFAP, 2014). Overall, it seems potato's position on the trade dependency and food expenditure share graph will not shift significantly.

## 4.4 SUMMARY

This chapter addressed the central theme of this study: The relationship between food expenditure share and trade dependency. By using data from the 2005 and 2010 IES, the top 13 food items according to food expenditure share were selected. Consumption and trade data for each of these foods were collected and the trade dependency figure calculated. The food expenditure share figures and trade dependency figures were then plotted on a graph for 2005 and 2010. By comparing these graphs, the movement in the position of each food item could be seen pictorially between 2005 and 2010.

The significance of this movement was established by means of a few scenarios. Food items in each trade regime were selected and the impact of increasing self-sufficiency, which by definition results in a decrease in trade dependency, was tested. This was done by testing the impact on commodity price and retail price as a result of a 10% increase or decrease in production levels. In most cases increases in production resulted in decreases in retail price and in all cases decreases in production resulted in increases in retail price.

Given that an increase in self-sufficiency would result in a decrease in trade dependency, such a shift would move the position of a food item on the food expenditure share and trade dependency graph downward. Movement downward (upward) implies less (greater) reliance on imports.

With respect to expenditure share, an increase would move the food item to the right. Movement to the right (left) implies that the food item is of greater (less) importance to the consumer given that it takes up a larger (smaller) portion of the consumer's food budget.

Thus movement toward the upper, right corner of the graph represents an increase in the relative importance of the food as well as an increase in our reliance on external sources for the acquisition of the food. Table 4-6 summarizes the movement of the top 13 food items between 2005 and 2010, and highlights in red those that have moved toward the upper, right corner of the graph.

**Table 4-6 Summary of movement on the "Trade Dependency and Household Food Expenditure Share" graph from 2005 to 2010 by food group**

| **Food Group** | **Food Item** | **Movement: 2005 and 2010** |
|---|---|---|
| Staple foods | Wheat | ↗ |
| | Maize | ↗ |
| | Rice | ↗ |
| Meat | Poultry | ↗ |
| | Beef | ↙ |
| | Mutton & Lamb | ↙ |
| Dairy and Eggs | Fluid milk | ↗ |
| | Eggs | ↙ |
| Other | Aerated cold drinks | ← |
| | White sugar | ↖ |
| | Edible oils | ↗ |
| | Potatoes | ↘ |
| | Fruit juices | ← |

Source: Own table

# CHAPTER 5:SUMMARY AND CONCLUSION

Food security is a multi-faceted and evolving concept. At its conception, food security was seen as attainable through sufficient supply and distribution. Thus, trade liberalization was encouraged as a way to ensure that countries with an oversupply of food could provide countries with an undersupply of food. In this context, forces of competitive and comparative advantage were given room to operate. Studies have since shown that trade regimes that form in a free global market do not always result in economically efficient distribution and food security.

These studies showed that the adoption of trade liberalization impacted the level of trade dependency and self-sufficiency differently in various countries—in general, countries competitive in the export market gained economically and those less competitive became increasingly dependent on imports to meet food security needs. With respect to South Africa, each of the studies looked at showed that South Africa's self-sufficiency declined over the years. Thus, while South Africa continues to provide an adequate supply of food at a national level, this is only because of greater dependence on imported food.

In Chapter 3 we saw that in the staple food group category, at least 5 of the 7 food items represented rely on imports to meet quantity demanded. In the meat and fish categories, all 10 of the food items are partially imported. Within the fats and oils category all 5 rely on imports and in the vegetable and bean category about 5 of the 7 rely on imports. It is only in the fruit and nuts category that all 7 of the food items are mostly produced locally while in the dairy and eggs category 4 of the 5 items are mostly produced locally.

This level of dependence on imported goods has implications for the cost of food, which is of concern for South Africa because of its consequences on food security at the level of the household. Chapter 4 narrowed in on the top 13 food items according to household expenditure share on food, irrespective of food group, to illustrate the consequences.

The trade dependency figures, based on consumption and net trade data, were calculated for each of the top 13 food items—these are reflective of South Africa's self-sufficiency with respect to each of the food items in question. The expenditure share figures were then mapped against the trade dependency figures on the "Trade Dependency and Household Food

Expenditure Share" graphs for 2005 and 2010, illustrating pictorially the position of each food item in both years. By producing a graph for both 2005 and 2010, the movement in terms of the position of each food item between these years could be readily seen.

The movement of the position of the various food items on the graph from 2005 to 2010 is significant because it signals potential for a drop or rise in food security. This is in the context of shifts in self-sufficiency—and thus trade dependency, which impacts domestic prices. The impact on prices is of course different for each item and depends greatly on trade regime and market dynamics. In order to test the impact empirically, at least one item in each trade regime was selected from the top 13 food items—two net imported items, a net exported item and two items under near-autarky. In turn, using the BFAP sector model, the impact on commodity price, as these select food items move closer toward self-sufficiency, was calculated; subsequently, using previous studies which employed the ECM, the impact on retail price was determined.

With respect to the net imported items, a 10% increase in production was tested. Chicken remained a net imported item, but its price decreased slightly because of substitution for some cuts, and continued reliance on imports for others. For wheat—a product less divisible and for which South Africa is resource poor—there was no impact on price as the 10% increase was not enough to make South Africa self-sufficient, and thus international prices still determined domestic prices.

The net exported item selected was maize. A 10% decrease in production was tested and this was sufficient to move South Africa into near-autarky and resulted in an increase in commodity price by 15% and in retail price by almost 5%. A 10% decrease in production was also tested for those items under near-autarky. For fluid milk and potatoes, the increase in commodity price was about 30%, which is twice the increase in commodity price for the net exported item tested. At retail level it differed for each, however: fluid milk increased by about 21% and potatoes by about 15%.

Thus where commodities are traded on the international market, domestic supply and demand forces are not the ultimate determination of local prices and thus the nation has little or no control over setting prices. Still, this thesis does not intend to advocate for complete self-sufficiency. Trade generally occurs when goods can be produced in one place at a cost lower

than it can be sold in another. Given that each country is endowed with a unique set of resources, differences in the price of goods arise and trade relationships ensue. Where a comparative advantage exists in the production of a commodity, that commodity market can prosper within the domestic arena and abroad. Free trade policies allow for improved access to foreign markets where a surplus of goods can be exported and imports can be sought to make up for shortages.

When producers and consumers are worse off under free trade, however, it may be necessary to maintain or move closer toward self-sufficiency, so that international forces are not completely at liberty. Free market conditions may not always improve the food security status of a country and government intervention may be required in specific commodity markets. For example, where commodities can be produced in adequate supply but are not competitive, trade liberalization can have adverse effects on agricultural growth and the price of food. In order to prevent disruption to these domestic sectors, protective measures such as import tariffs, export incentives and subsidies in domestic production, can be used.

In the final analysis, what this study demonstrates is that a relationship exists between national self-sufficiency—and thus trade dependency—and household food security through the impact of the former on domestic prices. Also, it developed the "Trade Dependency and Household Food Expenditure Share" graph as a tool for the reader and for policy makers to be able to observe movement over time toward or away from self-sufficiency. Having established the relationship between this movement and household food security, trends toward the upper (increasing in trade dependency), right (increasing in relevance to the South African consumer) quadrant can be a signal for concern, as intervention may be required to ensure the sustained availability and economic accessibility of that good.

According to the findings of this study, the agricultural sector in South Africa should be producing foods in quantities commensurate with its comparative advantage positions. Determining these positions for each commodity and for the agricultural sector as a whole is beyond the scope of this study. Thus, a recommendation for future research would be to investigate the levels of production that would make sense for each sector given South Africa's resources, climate and technology, and food security needs. Another area of inquiry that could further expand on the findings of this study would be to look at how changes in domestic policy or border control measures would impact the industries within South Africa's

agricultural sector and, in turn, current measures of food security. On the basis of the knowledge sources drawn on for this study and the conclusions that were derived, this study supports the notion that safety nets and some level of protection with regard to the agricultural sector is necessary for attaining and maintaining national and household food security.

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