Evaluating the competitiveness of the South African broiler value chain

National Agricultural Marketing Council
Promoting market access for South African agriculture

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Bureau for Food and Agricultural Policy
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Evaluating the competitiveness of the South African broiler value chain

A collaborative report by the Bureau for Food and Agricultural Policy and the National Agricultural Marketing Council

for the

The Bureau for Food and Agricultural Policy (BFAP)

The Bureau for Food and Agricultural Policy (www.bfap.co.za) links analysts with multi-disciplinary backgrounds to a coordinated research unit that informs decision making within the Food System. BFAP advises government, agribusinesses and farmers by providing analyses of future policy and market scenarios and measuring their impact on farm and firm profitability. BFAP acknowledges and appreciates the insight of all partnering institutions and industry specialists.

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Acronyms

AI	Avian Influenza
AFMA	Animal Feed Manufacturing Association
AGOA	African Growth and Opportunities Act
AMIE	Association of Meat Importers and Exporters
BFAP	Bureau for Food and Agricultural Policy
CBH	Country Bird Holdings
CAP	Common Agricultural Policy
CASP	Comprehensive Agricultural Support Program
DAFF	Department of Agriculture, Forestry and Fisheries
Dti	Department of Trade and Industry
EU	European Union
FAPRI	Food and Agricultural Policy Research Institute
FAO	Food and Agriculture Organization of the United Nations
FCR	Feed Conversion Ratio
GDP	Gross Domestic Product
GTAP	Global Trade Analysis Project
HS	Harmonised System
ITAC	International Trade Administration Commission of South Africa
ITC	International Trade Centre
IQF	Individually Quick Frozen
LEI	Lanbouw Economisch Instituut at Wageningen University
NAMC	National Agricultural Marketing Council
OECD	Organisation for Economic Co-operation and Development
PEF	Production Efficiency Factor
PSE	Producer Support Estimate
SA	South Africa
SADC	Southern African Development Community
SACU	Southern African Customs Union
SAPA	South African Poultry Association
SPS	Sanitary and Phyto-sanitary
USA	United States of America
USDA	United States Department of Agriculture
TDCA	Trade Development and Cooperation Agreement
UK	United Kingdom
WTO	World Trade Organization

Executive Summary

The South African poultry industry is an important subsector within South African agriculture. It is the single largest contributor to total gross agricultural production value and has significant up and downstream multiplier effects through its long, integrated value chain. In addition, it provides the most affordable source of animal protein to the South African consumer, which makes it critical to food security. Given its strategic national importance, increased imports in recent years have triggered questions on sustainability and international competitiveness.

The sector is characterised by a complex value chain, exhibiting high levels of integration and coordination. High capital requirements and clear benefits from economies of scale favour large scale production, and contract growing is a popular form of broiler production. The industry operates in a global market and over the past few years producers have struggled to compete in the midst of rising feed costs and, since 2010, imports have accounted for a rising share of consumption growth. Within this highly competitive commercial environment a significant number of small-scale poultry producers are also making a living, producing a small share of the national product.

In order to inform the debate around competitiveness and inclusivity, the general objective of this research was threefold: Firstly, to quantify the current levels of competitiveness of the industry in the global context, identifying the factors that underpin this position, and secondly to expand and refine BFAP's quantitative modelling framework, enabling a wider scope of policy analysis leading to informed recommendations related to sustainability and competitiveness. South Africa's economic development policy, expressed through the New Growth Path, emphasises a broader- based industrialisation path, characterised by greater participation of historically disadvantaged people, businesses and marginalised regions in the mainstream economy. Within this context, the third objective relates to examination of the impediments faced by developing poultry growers. An in-depth analysis of small-scale poultry production and marketing systems was performed, amongst others, to contextualise smallholder production within the commercial economy and outline limitations and opportunities for developing farmers to enter the commercial market, promoting inclusive growth.

The issue of competitiveness was approached in terms of value chain structure, as well as technical and economic efficiency at farm level, relative to other global producers. The integrated structure of the value chain, pricing structures, as well as the high levels of concentration derived from large and specific investment required to enter the value chain was found to be very similar to leading producers globally. At farm level, the technical efficiency of South African producers has improved significantly over the past 20 years and indicators such as the production efficiency factor and feed conversion ratios compare well in the global context, yet consideration of the costs results in a less favourable position in terms of economic efficiency. The cost of feed and day old chicks in particular was found to be significantly higher than leading global producers. Whilst this is a challenge to competitiveness, it was also noted that the rapid growth in imports did not originate from these lower cost producers such as Brazil and the USA. Instead the largest increase comprised bone-in portions from the EU, which are imported duty free and where the cost of production was found to be higher than in South Africa.

The inability to compete with these imported products is related to the value attached to different products by consumers in different parts of the world. Premiums obtained for chicken breasts in the EU allow producers to remain profitable even when a much lower price is obtained in the export market for bone-in portions. In South Africa however, the market is largely based on IQF pieces, which compete directly with imported bone-in portions, but the market for premium cuts is limited and producers therefore require a higher price for IQF pieces to remain profitable. Export possibilities for higher value products or whole birds could be considered, similar to the export of high value beef products into key Middle Eastern markets.

The modelling framework was expanded through the addition of representative farm level models, both for contracted and independent producers, allowing the impact of policy simulations to be quantified in terms of farm level profitability. Furthermore, the inclusion of transmission elasticities to retail prices, combined with the refinement of the meat demand system provided valuable improvements and refinements to the consumer side of the modelling system. It provided updated own and cross price elasticities, whilst also treating IQF pieces as a differentiated product from other chicken. This improved modelling structure has already been applied to policy related questions and provided critical inputs to the negotiations surrounding the renewal of the African Growth and Opportunities Act (AGOA). Multiple simulations were provided to the negotiating team relating to the impact of different quota levels for bone-in portions imported free of the normal anti-dumping duty from the US.

In light of the diversity evident in the size and structure of small scale broiler producers, investigations of the challenges faced by small scale broiler producers was approached as a benchmark analysis illustrating the cost of production and prices obtained by a range of small, medium and large scale producers in both the formal and informal value chains. It was found that whilst the inability to procure in bulk, combined with difficulties in chick placement planning, result in higher production costs and challenges related to consistent availability, producers in the informal value chain were also found to obtain a significant premium when marketing live birds directly to the consumer. Thus margins per bird were significantly higher in the informal value chain, yet lower margins per bird at a larger production scale can still provide a significantly higher income and the marketing model makes organic growth from small to large scale production very difficult. Many producers continue to operate well below the capacity of their housing facilities. Further challenges were identified related to ongoing support and mentorship of producers that are supported through construction of broiler or layer housing facilities.

Given the risks and investment requirements, entry into the formal value chain would typically need to be supported through off-take agreements (such as production contracts), where integrated holding companies take a significant share of the production risks away from the primary producer. This ‘commercialisation’ approach will however also expose emerging producers to significantly lower prices and growing competition from imported products. Challenges related to input cost and availability would be overcome and investment could ensue in order to increase volumes. As an alternative, a larger number of emerging producers could be better supported within the informal value chain, where opportunities were highlighted to grow demand, particularly in rural areas, where these small producers typically operate. The opportunity costs of commercial production were also evaluated

within the context of size and scale requirements to earn the equivalent of minimum wages in alternative industries.

The study suggests that in order to revitalise former investments and support developing poultry farmers to the benefit of both producers and rural consumers, not all small producers need to deliver into the formal poultry value chain. Development does not necessarily mean ‘large scale commercial’. In line with the Agri-parks ideology, the informal sector has a considerable role to play in development of the rural economy through production of local food. Optimisation of this chain to improve availability and reduce the cost of inputs (feed & day-old chicks) will narrow the current gap in production costs, allowing a less expensive end-product for rural consumers.

1. Introduction

The poultry industry is an important subsector within South African agriculture. It is the single largest contributor to total gross agricultural production value and has significant up and downstream multiplier effects through its long, integrated value chain. In addition, it provides the most affordable source of animal protein to the South African consumer, which makes it critical to food security. In the recent past, the industry has struggled to recover costs in the midst of rising feed costs and, since 2010, a growing share of growth in chicken consumption has been met by increased imports rather than domestic production. Figure 1 illustrates that while 72% of the growth in domestic chicken demand in South Africa from 2000 to 2010 was produced domestically, the balance was imported. From 2010 to 2015 however, domestic production growth slowed to the extent that only 47% of the growth in chicken consumption was produced domestically, with 53% being imported.

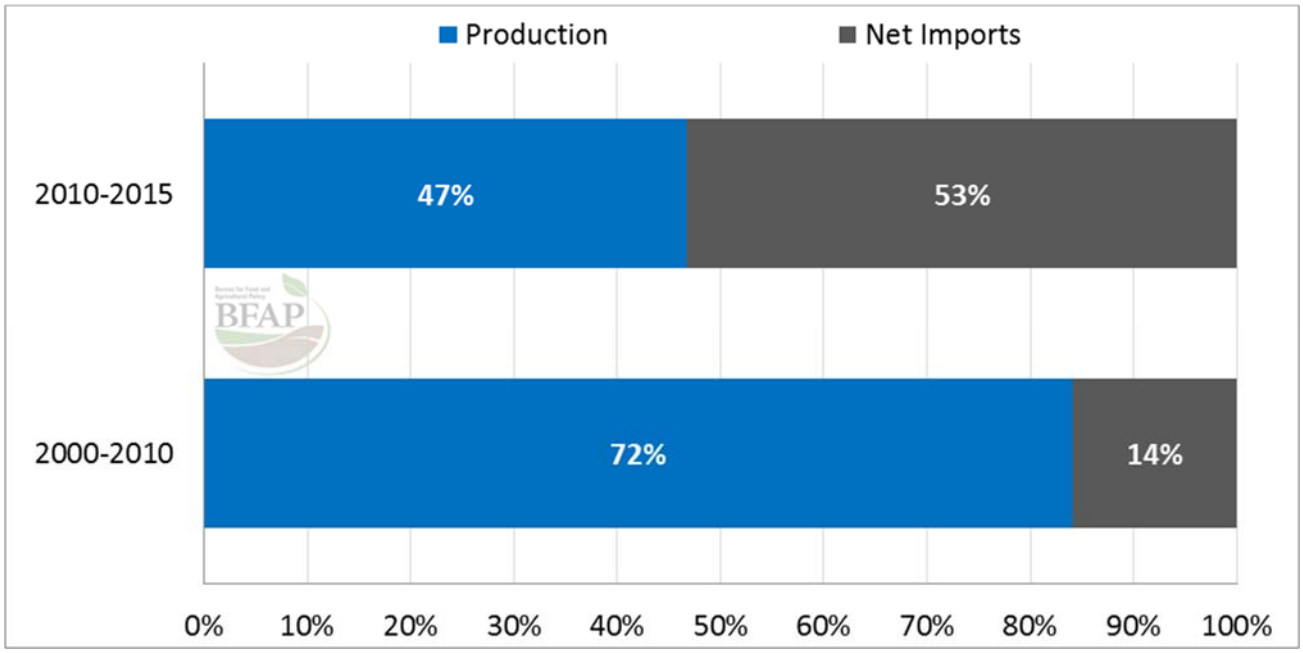


Figure 1: Contribution of production and trade to chicken consumption growth in South Africa

At the heart of the recent debates surrounding imports and the dilemma faced by the industry is the issue of competitiveness. While the importance of the broiler industry within the South African agricultural sector cannot be denied, its inability to enter into the global export market and to compete against surplus products sold within the global context raises concern regarding its long-term sustainability. Through the South African poultry association, the industry successfully applied for increased tariff protection in 2013; however Davids, Meyer and Louw (2013) indicated that the composition of imports, as well as the share of imports entering South Africa duty free from the European Union (EU) under the Trade, Development and Cooperation Agreement (TDCA), limits the impact of higher tariffs on domestic chicken prices. Recognising the importance of the industry for food security, as well as the fact that the cost of increased support to producers will be borne by lower income consumers, tariffs alone should not be the ultimate solution and hence the underlying factors that influence competitiveness need to be identified.

The industry remains highly dualistic in nature: on the one side are large scale commercial producers for whom scale is critical and competitiveness in the global context has become paramount, but on the other a significant number of small-scale poultry producers are also making a living, even though they produce a very small share of the national product. South Africa's economic development policy, expressed through the New Growth Path, emphasises a broader- based industrialisation path, characterised by greater participation of historically disadvantaged people, businesses and marginalised regions in the mainstream economy. Thus while the sector has been exposed to an increasingly globalised market it also faces the challenge of improving the efficiency and cost competitiveness of the small scale producers to enable inclusive growth going forward.

In light of the continued debates around the industry's sustainability, challenges related to transformation in an environment where economies of scale provide substantial advantages and its classification by the Department of Trade and Industry (Dti) as an industry in distress, the poultry industry was prioritised in a call for proposals dealing with competitiveness under the Agro Processing Competitiveness Fund. This report presents an integrated overview of the findings of three different studies conducted by the Bureau for Food and Agricultural Policy (BFAP) and the National Agricultural Marketing Council (NAMC). Thus the general objective of this research was threefold:

1) To quantify the current levels of competitiveness of the industry in the global context, identifying the factors that underpin this position.
2) To expand and refine the current quantitative modelling framework enabling a wider scope of policy analysis, leading to informed recommendations related to sustainability and competitiveness.
3) To examine the impediments faced by developing poultry producers, thus providing an in-depth analysis of small-scale poultry production and marketing systems, amongst others, to contextualise smallholder production within the commercial economy and outline limitations and opportunities for developing farmers to enter the commercial market, thereby promoting inclusive growth.

In line with the objectives of the research conducted by the different institutes, the remainder of the report is structured into four broad sections. Section 2 provides an overview of the South African broiler value chain, providing context to the sections that follow. Section 3 is focussed on competitiveness, identifying critical factors that enhance or constrain competitiveness throughout the value chain, whilst also providing an in-depth analysis of the technical and economic efficiency of South African producers at farm level relative to important global markets. Section 4 provides a number of quantitative tools, used to provide a baseline outlook for the industry at different levels of the value chain, as well as a number of different scenarios related specifically to trade policy. These scenarios are depicted in terms of a partial equilibrium analysis, focussing on the effects within the broiler subsector as well as a general equilibrium framework that quantifies the impact of changes in the poultry subsector across the broader South African economy. Finally, Section 5 focusses on transformation and inclusive growth, highlighting the challenges and opportunities for small scale, emerging producers, before conclusions are drawn in Section 6.

2. Overview of the South African broiler value chain

The South African broiler value chain is part of a global food system and can be described as a complex integrated structure of different chains interacting with each other. Whilst the integrated nature of the

global system provides South African producers with access to the best genetic material and production technology in the world, it also exposes domestic producers to international competitors. Feed remains the biggest single cost to producers, hence the efficiency and competitiveness of the value chain relies and depends on the efficient operation of other value chains such as maize and soybeans.

The commercial sector accounts for the bulk of domestic production, with subsistence production representing only 3% of the market respectively in 2015. Imports account for approximately 20% of domestic consumption, but have increased rapidly in recent years.

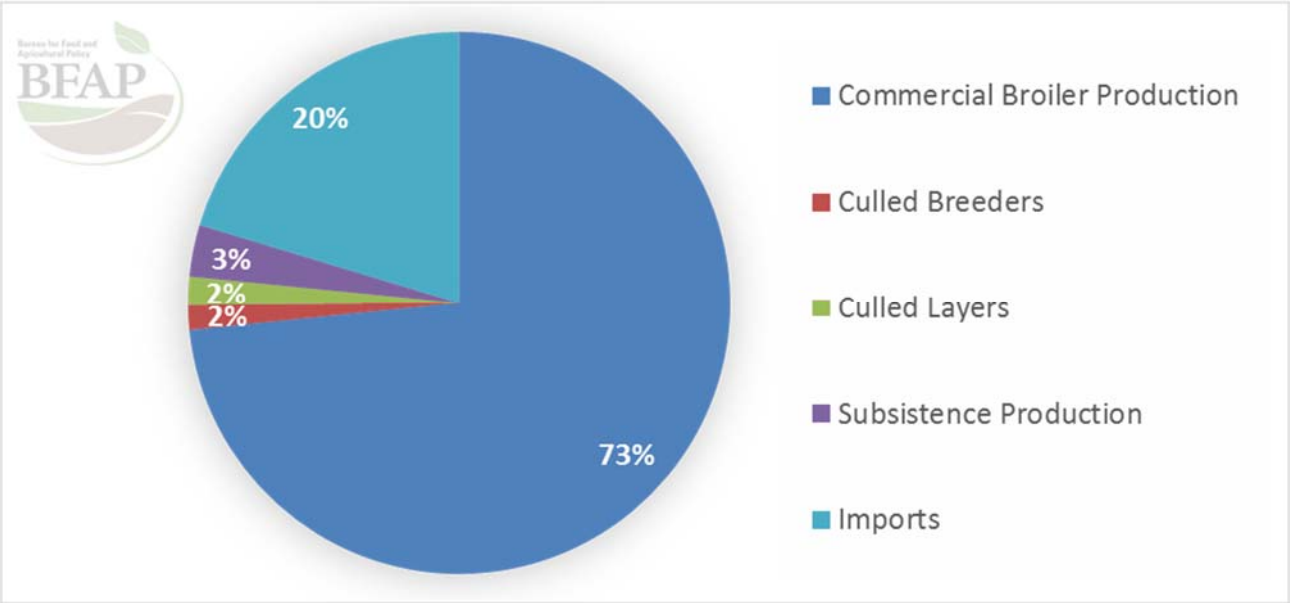


Figure 2: South African broiler consumption in 2015
Source: SAPA, 2016

Similar to leading broiler producers globally, the commercial value chain in South Africa displays high levels of integration and coordination. Significant investment is required into highly specific assets to produce efficiently, and consequently the market is highly concentrated, with a few big companies dominating production. The 5 largest producers account for almost 70% of total production and the two largest, RCL Foods and Astral alone, represent almost half of the market. Figure 3 provides a generic overview of this complex and sophisticated value chain, which can also be represented as individual company chains. These individual chains have been detailed in preceding reports and are included in Annexure A.

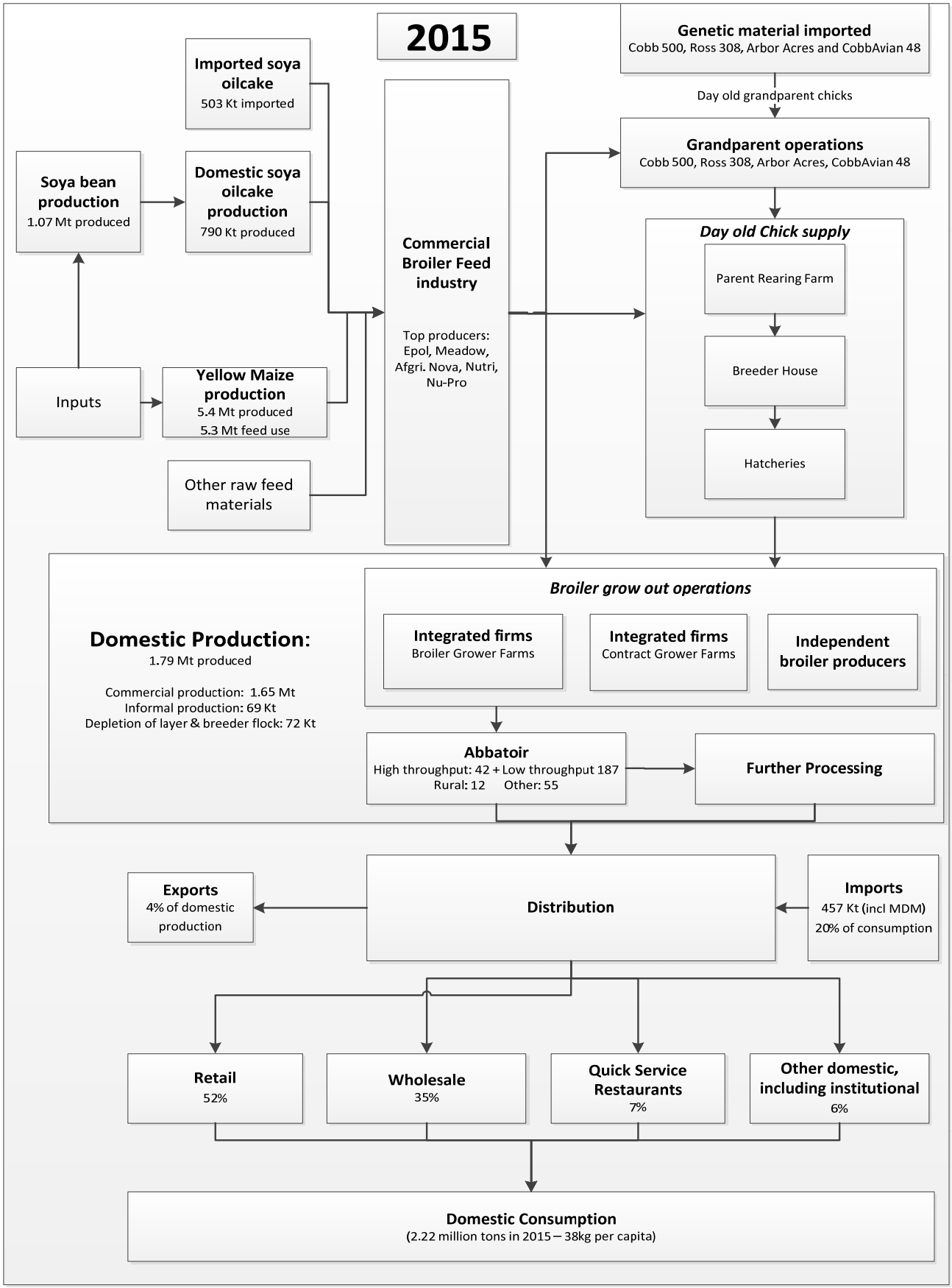


Figure 3: Structure of the South African broiler value chain in 2015
Source: Compiled from BFAP (2013), SAPA (2013), Davids (2014), NAMC (2007)

South Africa is a small player in the world market, contributing only 1.4% to global production, while accounting for only 1.7% of worldwide consumption between 2013 and 2015 (OECD-FAO, 2016). Given its relative size in the global context, as well as its level of integration in international markets, it is essential to understand the functioning of the South African broiler market within the global setting. As a net importer of poultry, changes in the international broiler market will influence the South African broiler industry (De Beer, 2009) and as such an understanding of the dynamics within the domestic broiler market must be guided by a brief review of global trends.

As an affordable and accessible source of protein, the consumption of poultry products has expanded rapidly worldwide over the past decade. Production has responded continually, expanding by an annual average of over 3% over the past 10 years, but remains concentrated in a few areas. In 2015, Brazil, the European Union (EU), the United States of America (USA) and China accounted for almost 60% of global production (Figure 4). Exports are even more concentrated, with the EU, USA and Brazil accounting for more than 70% of global export volumes.

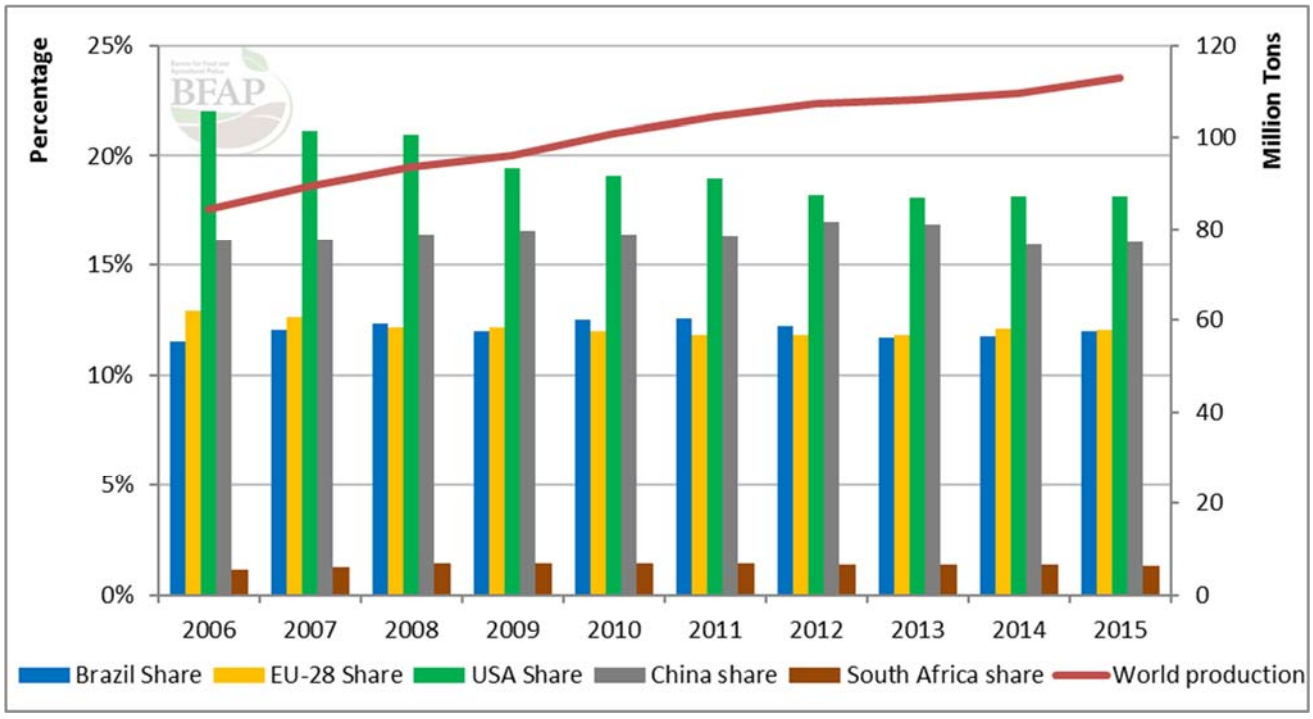


Figure 4: Global poultry production and share of selected producers
Source: OECD-FAO (2016)

South Africa is a small player in the global market and its level of imported products has increased in recent years. In line with global trends, consumption has expanded rapidly over the past decade, supported by rising incomes, dynamic class mobility and continued urbanisation. Production growth has however been significantly slower and Figure 5 indicates that chicken imports into South Africa have increased by an annual average of more than 10% since 2001, which has been one of the critical factors underpinning questions related to competitiveness. Rising imports would suggest that there is scope for expansion of domestic production if producers were able to compete more successfully with imported products.

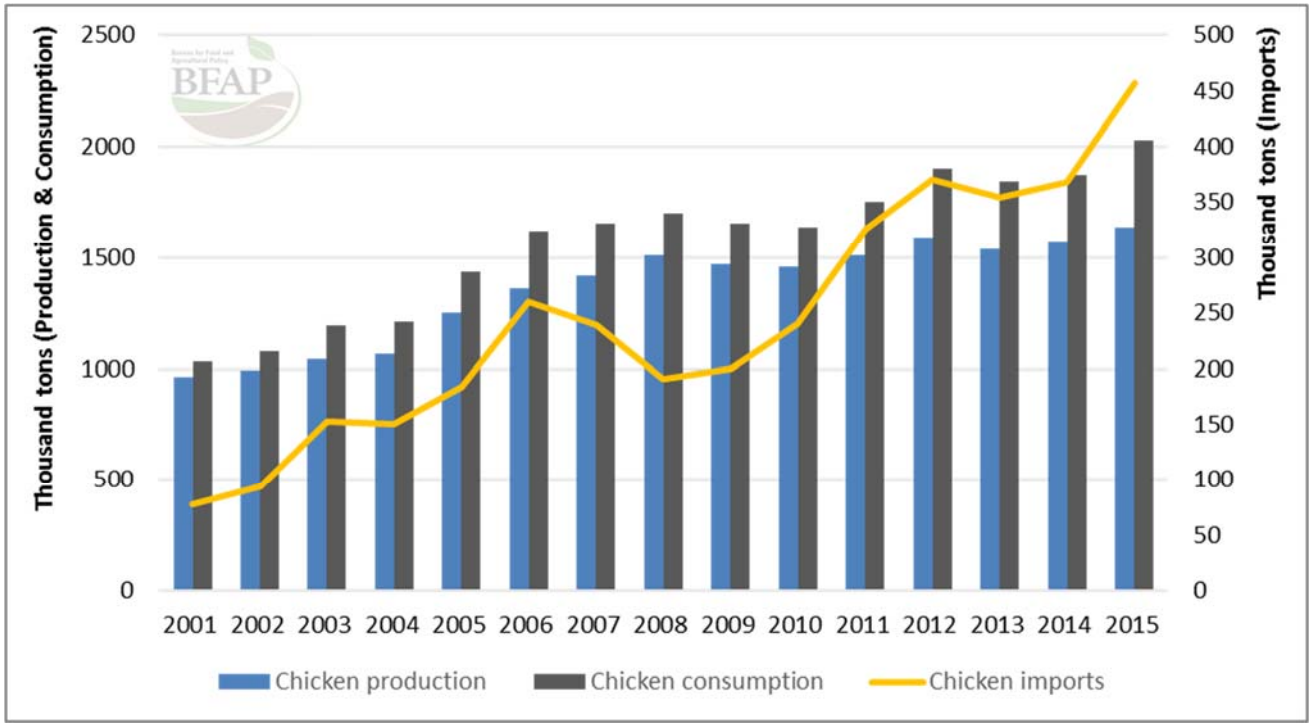


Figure 5: Chicken production, consumption and imports: 2001-2015
Source: SAPA, 2016

Products imported into South Africa are classified under the Harmonised System classification codes and the trend of rising imports comes despite the application of tariffs on imported products (Table 1). Imports originating from the EU and the Southern African Development Community (SADC) are duty free owing to preferential trade agreements.

Table 1: Import tariffs for chicken meat products applied by South Africa

HS Classification Code	Description	General Tariff	EU Tariff	SADC Tariff
02071100	Fowls, not cut in pieces, fresh or chilled	0 %	0 %	0 %
02071210	Fowls, not cut in pieces, frozen, mechanically deboned	0 %	0 %	0 %
02071220	Fowls, not cut in pieces, frozen, carcass with cuts removed	31 %	0 %	0 %
02071290	Fowls, not cut in pieces, frozen, other	82 %	0 %	0 %
02071300	Fowls, cuts and offal, fresh or chilled	0 %	0 %	0 %
02071410	Fowls, cuts and offal, frozen, boneless cuts	12 %	0 %	0 %
02071420	Fowls, cuts and offal, frozen, offal	30 %	0 %	0 %
02071490	Fowls, cuts and offal, frozen, other	37 %	0 %	0 %
02071490	Fowls, cuts and offal, frozen, other originating and imported from USA	Anti-dumping tariffs on products originating from the USA: 940 c/kg		
02071490	Fowls, cuts and offal, frozen, other originating and imported from the UK, Germany and the Netherlands	Company specific anti-dumping tariffs on products originating from the UK (12.07% and 30.99%), Germany (31.30% and 73.33%) and the Netherlands (3.86% and 22.81%).		

Source: SARS (2016).

3. Competitiveness of South African broiler production

The issue of competitiveness is far-reaching and relates to a number of factors including efficiency in the value chain and the marketing strategies employed by producers in different regions of the world. It can be measured at different levels, and the analysis undertaken by this study relies on two different approaches. The first was conducted by the NAMC and involved the circulation of questionnaires to a number of role players across different levels of the value chain with the objective of identifying the factors that enhance or constrain competitiveness across the value chain. This approach is mostly qualitative in nature and was followed by an in-depth quantitative review of technical and economic efficiency of primary producers, conducted by BFAP in partnership with the LEI, a research institute within Wageningen University in the Netherlands.

3.1. Factors influencing competitiveness in the broiler value chain

Factors that affect competitiveness within the broiler value chain can be separated into macro-, meso- and micro-environments. The macro environment refers to regulatory and administrative issues, global and domestic economic trends, as well as chance factors such as the exchange rate and the political environment. The micro environment relates to issues that can be managed by producers within the business environment, whereas the meso environment refers to the supporting functions and services within the value chain.

The results of a survey, conducted to determine the factors that enhance or constrain the competitiveness of poultry producers across different levels of the value chain, are presented in Figure 6, Figure 7 and Figure 8. Lower values are associated with factors that constrain competitiveness, whereas large numbers are associated with factors that enhance competitiveness.

Within the macro environment (Figure 6) the most important factors identified as enhancing competitiveness relate to Consumer tastes and preferences and the size of the export market, both regionally within SADC and the rest of the world. Factors identified as most constraining to competitiveness include changes in input cost levels, changes in administered prices and the import / export environment.

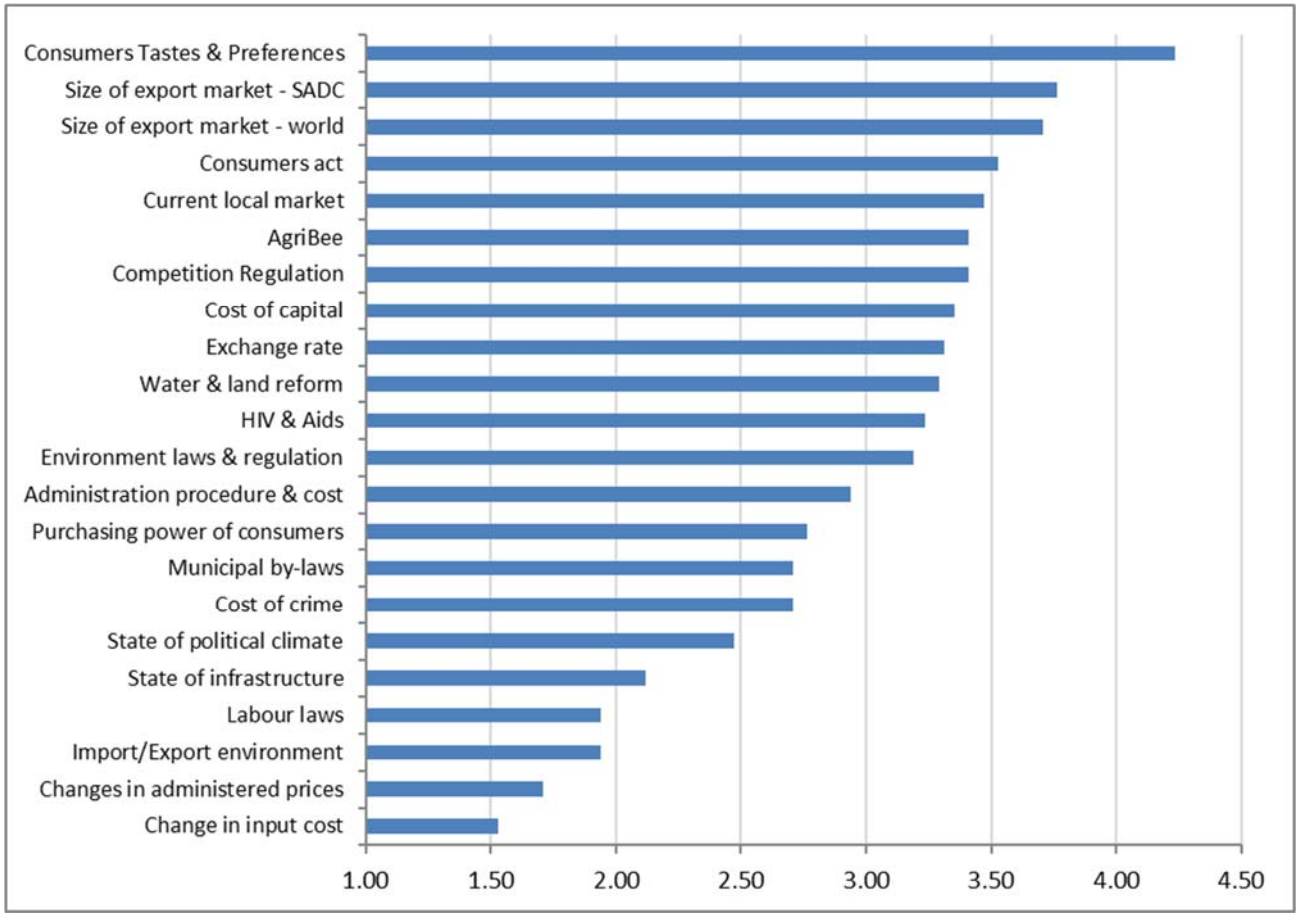


Figure 6: Macro factors that enhance or constrain South Africa's competitive position

Within the meso environment (Figure 7), the factors enhancing competitiveness were identified as biosecurity management, quality and availability of veterinary services as well as the quality and availability of domestically produced inputs. The factors identified as most constraining to competitiveness relate to access to government support, the price of domestically produced inputs and the quality and availability of imported inputs.

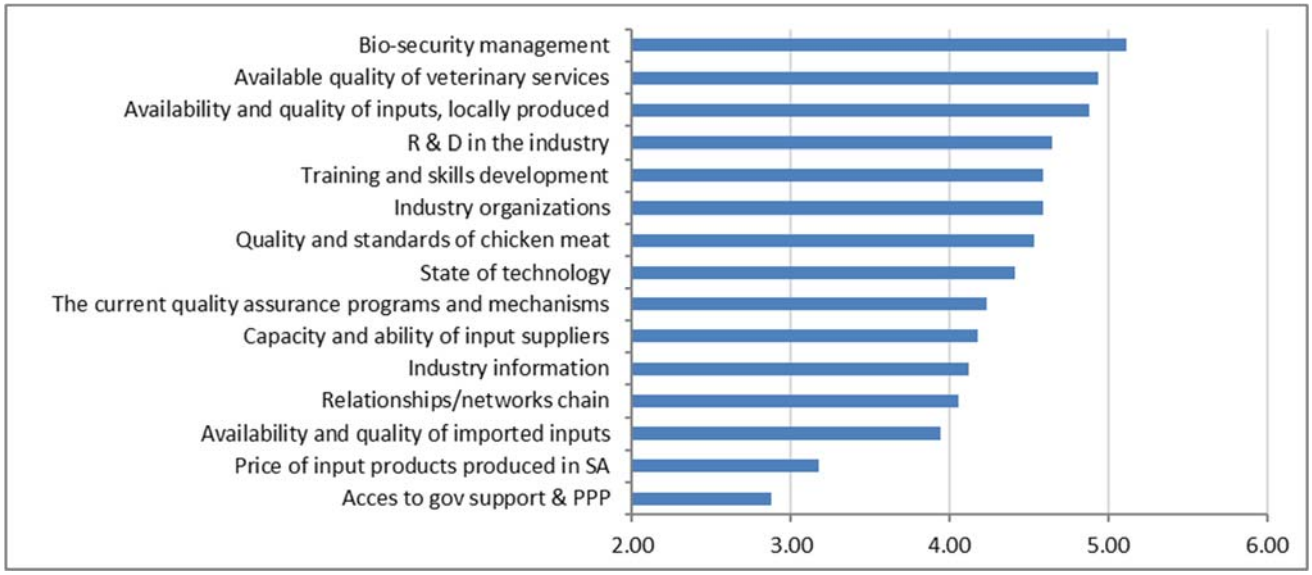


Figure 7: Meso factors that enhance or constrain South Africa's competitive position

Critical factors identified as enhancing competitiveness at micro level include the availability and quality of feed, as well as diversification strategies within businesses. Conversely the factors identified as being most constraining to competitiveness are pricing strategies, feed costs as well as the cost and consistency of energy supply. Further details related to the questionnaire and the relative importance attached to the different factors are provided in the third report submitted by the NAMC, attached as Annexure B.

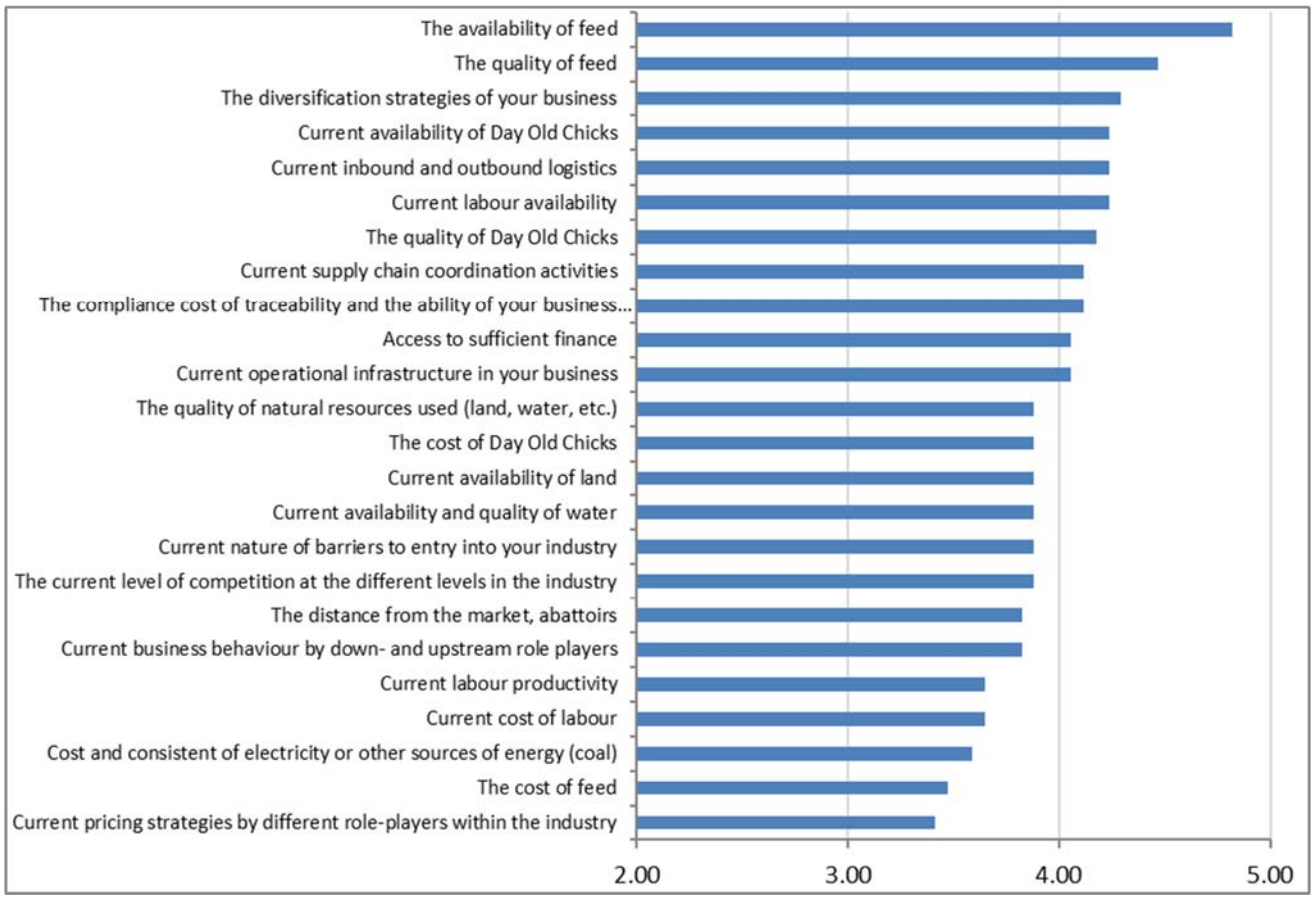


Figure 8: Micro factors that enhance or constrain South Africa's competitive position

In summary, the NAMC identified several factors with the potential to enhance the competitiveness of the industry:

- The cost of feed remains high and while oilseed processing capacity has increased significantly, domestic soybean production remains insufficient and utilisation rates in many crushing plants remains low, which reduces profitability in this critical sector
- The quality of feed: Feed plays a vital role in the industry. Although regulations exist on the quality of feed, respondents questioned if the enforcement of these regulations are sufficient
- Electricity supply: Consistent and affordable energy supply is critical to competitiveness at different levels of the value chain
- Price formation: Respondents identified the pricing strategy of different role-players as an important factor. Concern was expressed as to the transparency of such strategies.

- Water supply: The quality and availability of water plays an important role. How do local authorities comply with these phenomena and can they be held accountable for the deterioration of South Africa's water resources?
- Production cost: The current cost of productivity is also seen as a vital factor in the competitiveness of the industry. How can costs be decreased and labour productivity increased?
- Day old chicks: Affordable and quality day old chicks are vital for efficient production. South Africa is an importer of genetics, typically at grandparent level, which enables access to the best genetic pool globally. Given that imports occur at grandparent level, higher feed costs in SA also increases the cost of day-old chicks. Any possible action to reduce the cost without compromising quality will make domestic producers more competitive.
- Infrastructure. Some of the processing and feed manufacturing infrastructures are old and becoming inefficient. This is a constraining factor for the competitiveness of the industry.

3.2. Production cost benchmark

At primary producer level, competitiveness in the global context is considered in terms of efficiency, both technically and economically. Considering the main global exporters, as well as the origin of South African imports, a list of important countries was identified as benchmark against which the cost of producing chicken in South Africa could be compared. Thus the relative competitiveness of South African poultry production can be quantified. For the purpose of measuring the relative cost of production within a range of countries, information regarding technical productivity and the cost of production in 2013 for 15 countries was obtained from the LEI, a research institute within Wageningen University in the Netherlands. A survey was conducted on technical productivity and production costs in South Africa in 2013, in order to benchmark South African production costs against these international competitors. South African costs were converted to Euro values for comparability, using the average exchange rate recorded in 2013.

3.2.1. Technical efficiency

Several indicators exist for the measurement of technical efficiency in broiler production. The most commonly used indicators are feed conversion ratios (FCR), which provides a measure of the amount of feed required per kilogram meat produced, as well as a production efficiency factors (PEF), which combines multiple indicators such as slaughter weight, mortality, age and feed conversion into a single indicator.

Literature indicates that South African producers achieve high levels of technical efficiency (Davids, 2013; Lovell, 2012; Louw, Schoeman & Geyser, 2011), achieving PEFs that are comparable to top broiler producing countries such as Brazil and the USA. Technological improvement in both genetics and housing facilities, combined with improved management practices, has resulted in continuous improvements in the technical efficiency of South African producers over the past 20 years, as illustrated by declining FCRs and rising PEFs in Figure 9.

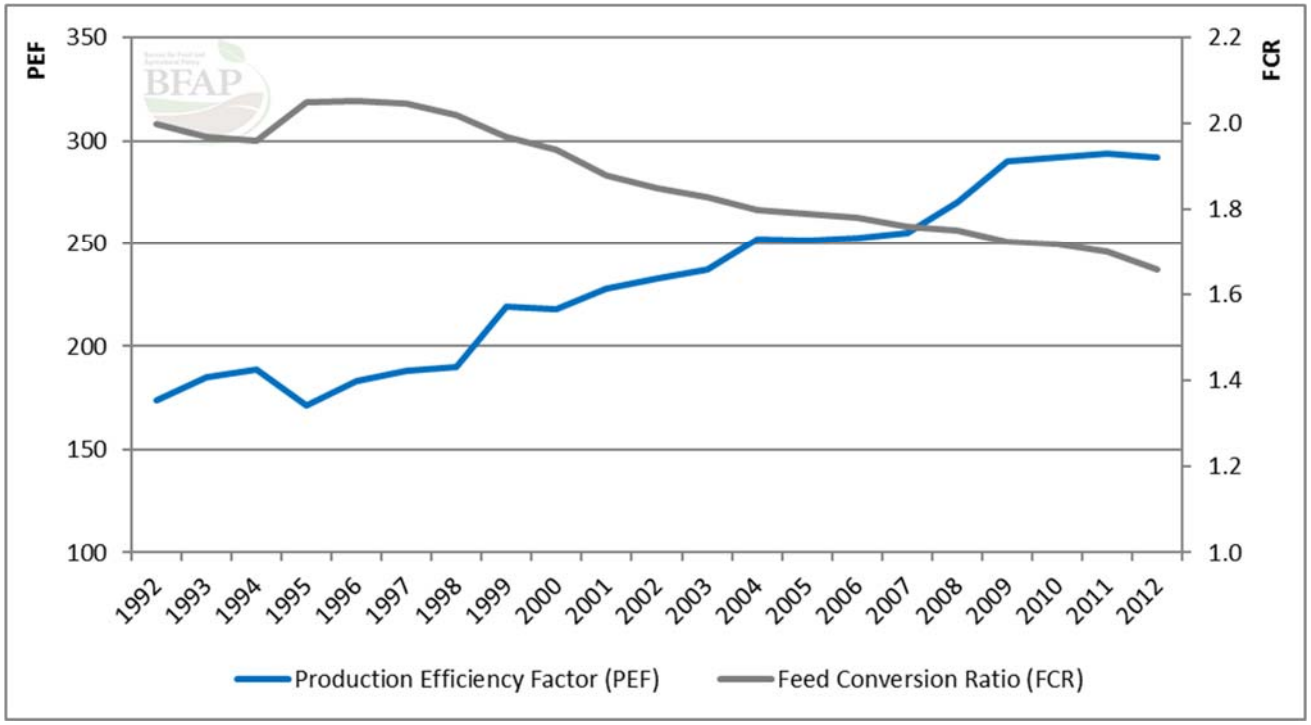


Figure 9: Improved efficiency indicators over time
Source: SAPA, 2013

As a universal measure of technical performance, the PEF would be a preferable indicator for a benchmarking exercise; however, availability of international data resulted in only FCR comparisons being possible. Global comparisons of feed conversion ratios however must also be accompanied by information on slaughter weights and ages, as the efficiency of feed conversion declines (indicated by a higher FCR) as the length of the production cycle increases (Van Horne, 2013). In this regard, the average live weight achieved by South African producers in 2013 (1.8 kg) is well below the average weight in the sample space of 2.3 kg, a fact dictated by the requirements of the market, particularly in the food service sector. Consequently, the FCR of 1.7 achieved by South African producers in 2013 is well below the sample average of 1.8.

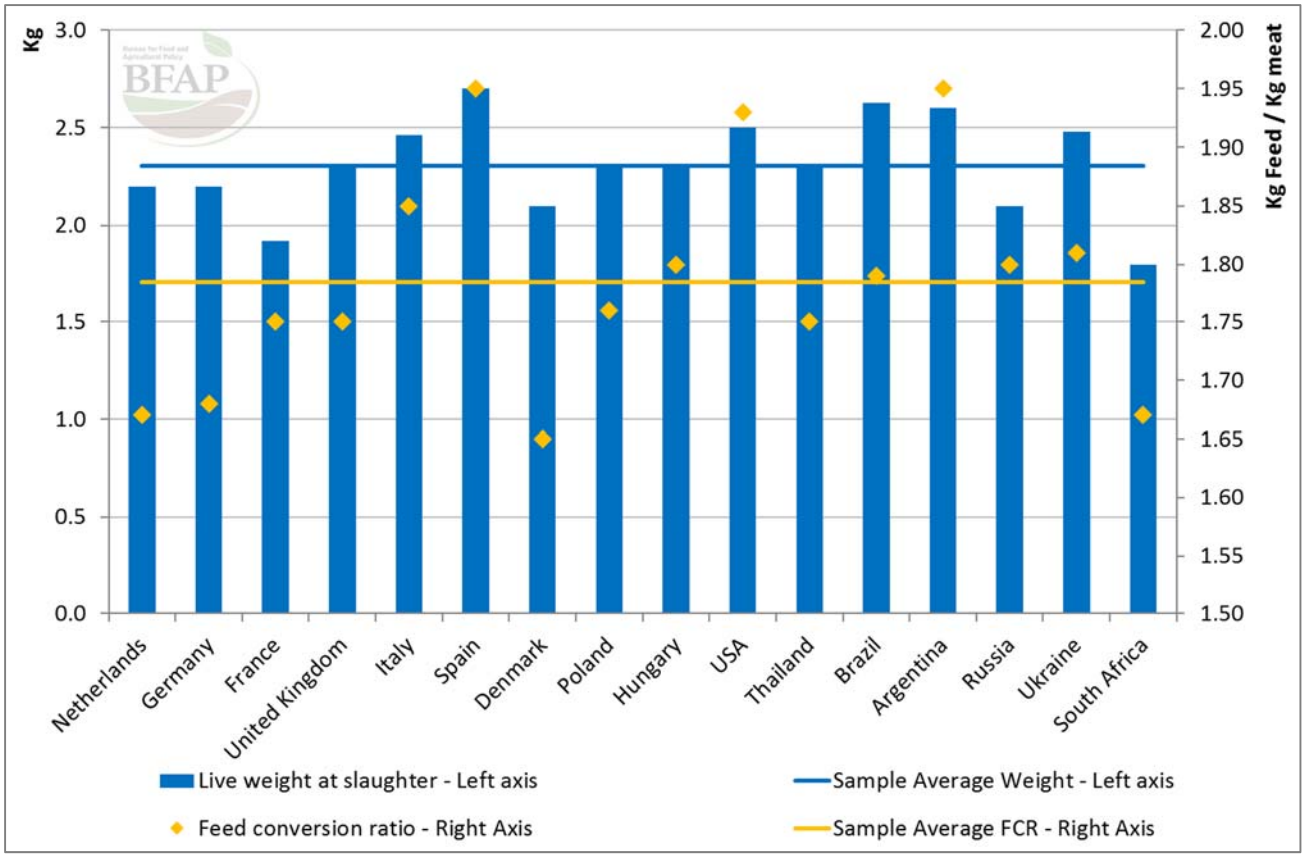


Figure 10: Technical efficiency of selected broiler producers in 2013
Source: Van Horne, 2014

The importance of technical efficiency in determining global competitiveness cannot be denied; however, the cost of production must also be considered, due to its impact on economic efficiency. Despite high levels of technical efficiency, Davids (2013) indicates that the economic efficiency of South African producers does not compare as well as technical efficiency in the global context, due to higher production costs.

3.2.2. Feed costs

As the single greatest contributor to variable production costs, the cost of feed remains the most important factor that influences the competitiveness of broiler producers. Feed costs account for up to 70% of variable production costs of broiler producers in South Africa. Figure 11 illustrates the relative cost of broiler feed in the various countries included in the study. Broiler feed costs are calculated as a weighted average of the different feed mixes used throughout the production cycle. The average cost of feed across the sample space was 352 Euros per ton, with South African feed costs recorded at 343 Euros per ton in 2013. From Figure 11, feed costs in surplus feed grain producing countries, such as USA, Brazil, Argentina and Ukraine, which tend to trade at export parity levels are lower. The average feed price within these four countries was 285 Euro per ton, well below the sample average. In contrast, most countries within the EU are net importers of oilseeds in particular and consequently, the average feed price within the EU amounted to 380 Euro per ton as a result of import parity pricing.

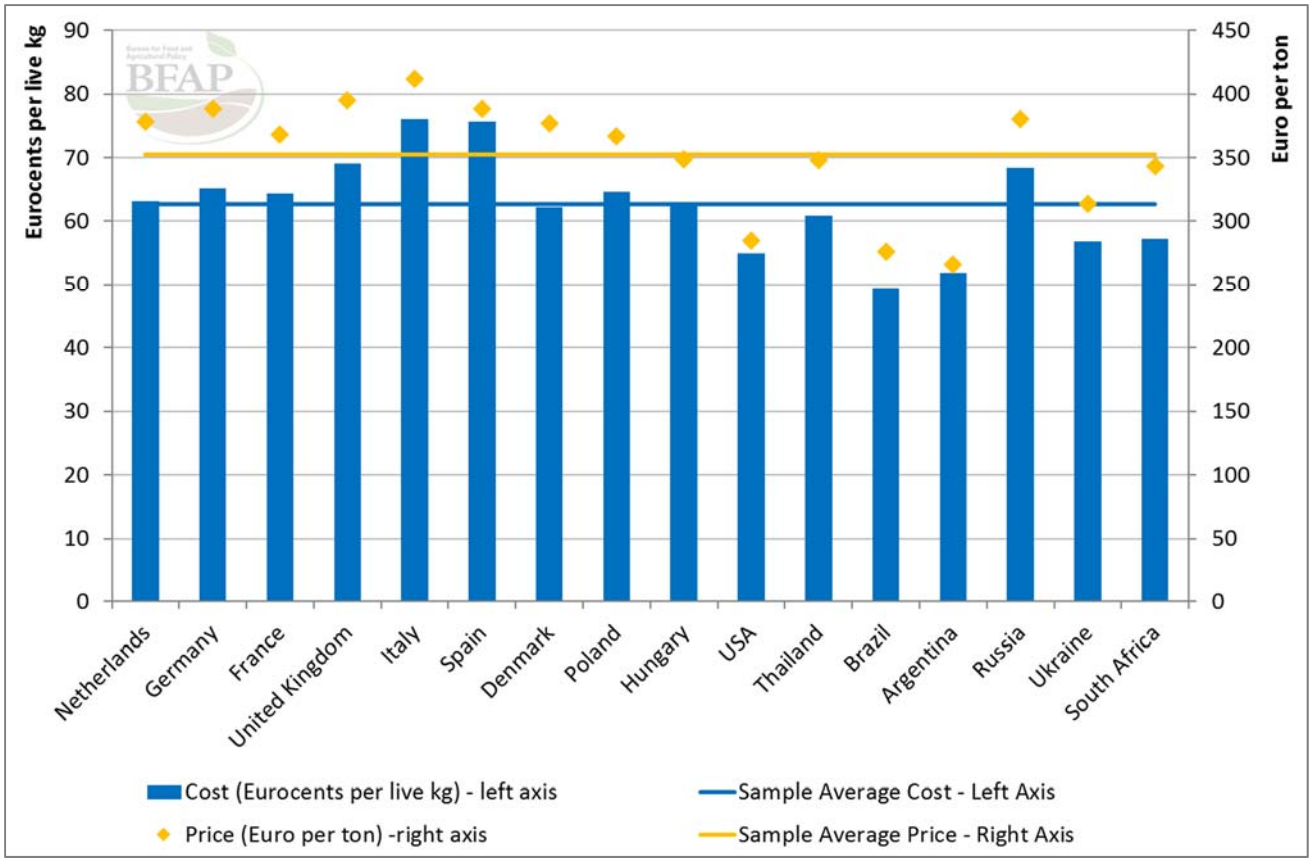


Figure 11: Feed costs of selected broiler producers in 2013
Source: Van Horne, 2014

Historically, South Africa tends to be a surplus producer of yellow maize, the single largest ingredient in broiler feed rations. It is only under severe drought conditions such as 2015 and 2016 that South Africa would import maize. However South Africa remains a net importer of soybean oilcake, resulting in protein meal prices trading at import parity levels. These prices are therefore well above those in net exporting countries (Figure 12). As a net importer of protein meal but exporter of maize, average feed prices in South Africa are close to the sample average, however South Africa produces a lighter bird than most other countries in the sample, which allows producers to optimise the feed conversion through a shorter production cycle. Hence considered in terms of cost per live kg chicken produced, South African feed costs remain below the sample average but not as low as production costs in the USA, Argentina and Brazil.

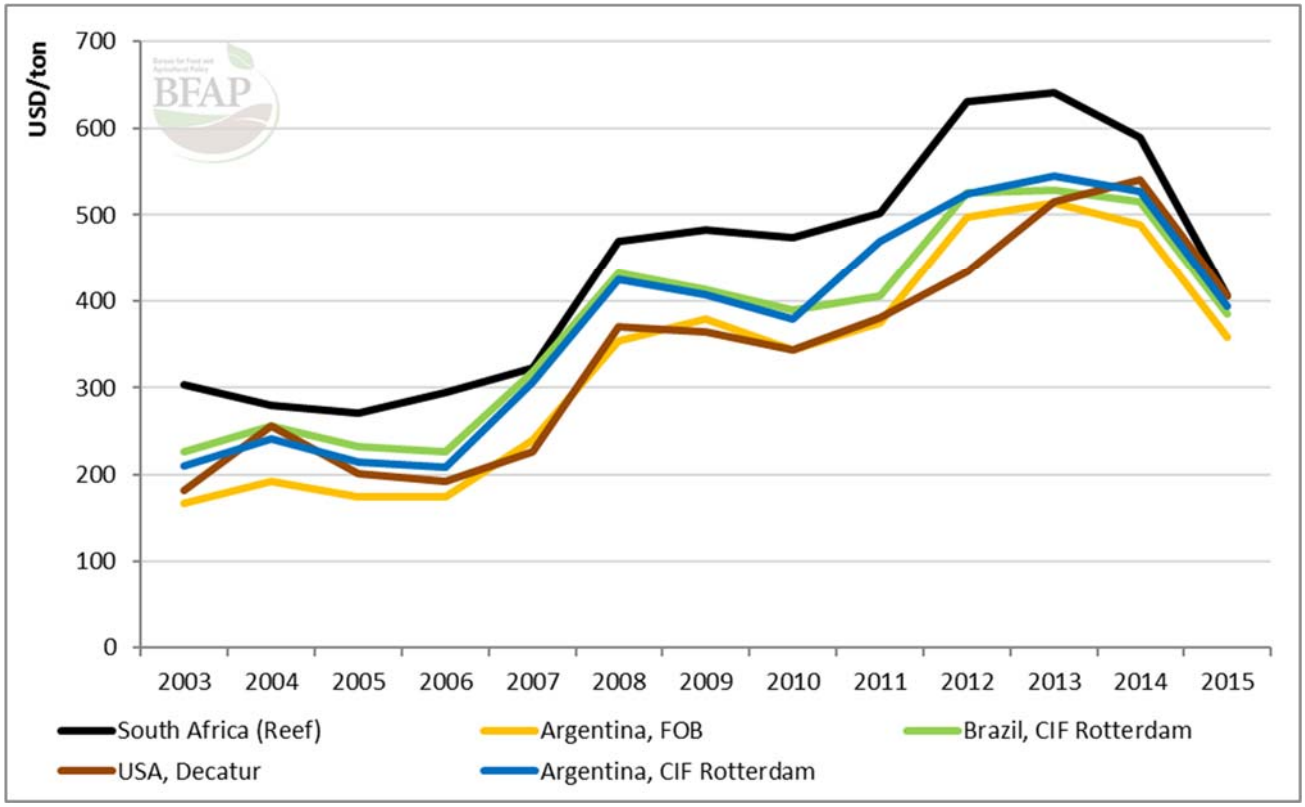


Figure 12: Protein meal prices in South Africa relative to net exporting countries: 2003-2015
Source: OECD, 2016; USDA, 2016

3.2.3. Day old chick costs

Following feed, day old chicks represent the second largest variable cost to broiler producers globally (Davids, 2013). South Africa imports genetic material, providing access to the best genetics globally on a continuous basis. Importing core genetics enables access to a larger and more efficient selection program than would be affordable domestically and has been a critical factor in the efficiency gains over the past decade. SAPA indicates that broiler breeders are imported into South Africa at great grandparent or grandparent level, as regulations prohibit imports of commercial day-old chicks and limit importation of parent level chicks. There is a prohibition on the importation of fertile eggs at any stage of the breeding cycle. As a result, the complete biological cycle involves the breeding and rearing of grandparent and parent stock prior to commercial day-old chick production and hence the complete production cycle requires 12-22 months to complete. Consequently, the cost of feed remains an important driver of day-old chick costs, effectively influencing the cost of production at two different levels of the value chain.

With genetic material being imported, the exchange rate represents another important component of day-old chick costs, as a depreciating exchange rate increases the cost of genetic material relative to the rest of the world. On a per chick basis, South African prices are in line with the sample average, but lower slaughter weights result in chick costs considered as a cost per live kilogram of chicken produced being amongst the highest in the sample space (Figure 13). On average, South African producers paid 28.4 eurocents per chick in 2013, compared to a sample mean of 30.3 Eurocents. Davids (2013) however indicates that the cost of day old chicks in South Africa is characterised by significant

variation, as some integrated companies deliver day old chicks at cost whilst other deliver at market value. The lowest day-old chick cost was recorded in the USA, at only 22.1 eurocents per chick, almost 25% below the South African price. Throughout the EU, day old chick costs remained similar at an average of 32.9 eurocents per chick.

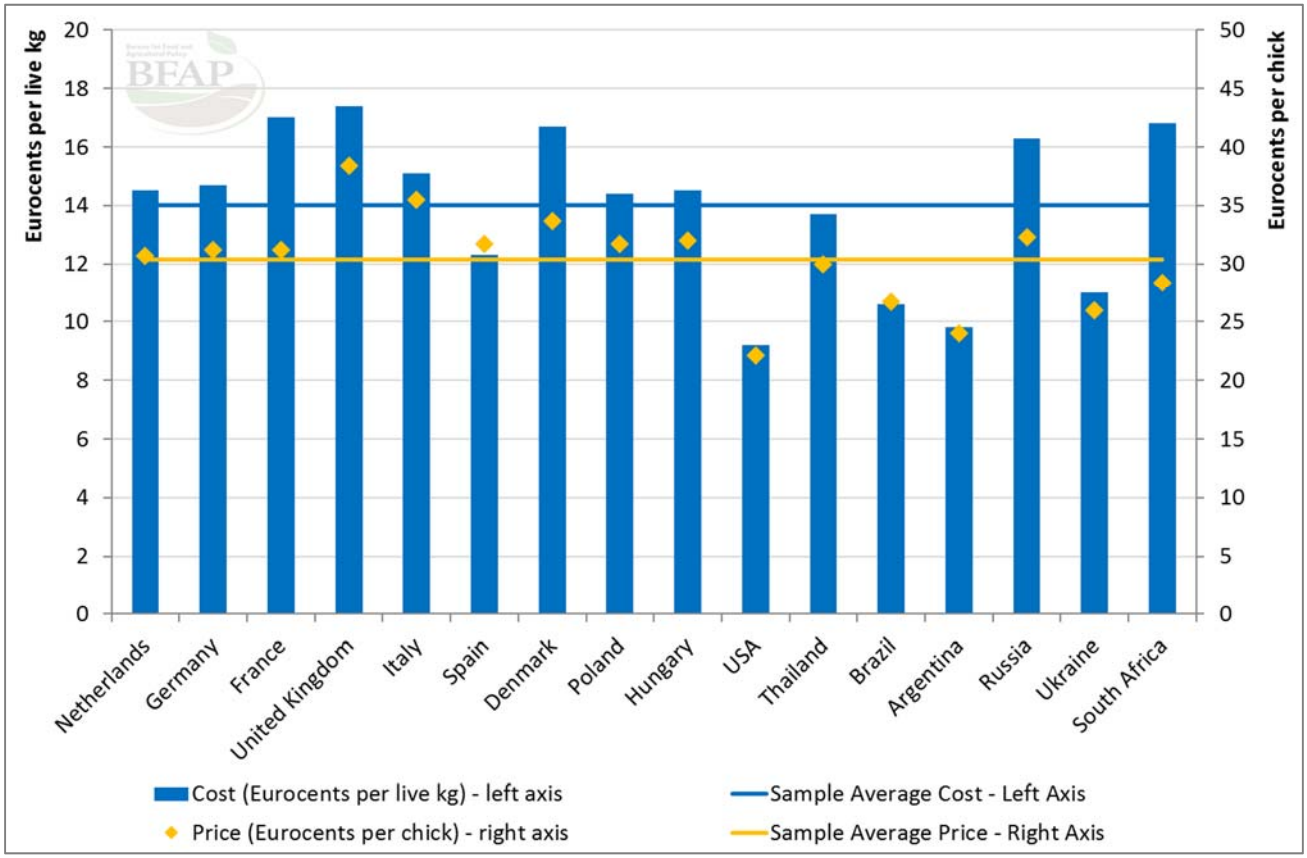


Figure 13: Day old chick costs of selected countries in 2013
Source: Van Horne, 2014

3.2.4. Housing and labour

Housing and labour costs represent a substantial component of total overhead costs related to broiler production. The cost of both housing and labour showed significant variation across the countries included in the analysis. In the case of housing, most of the variation can be attributed to differences in the level of investment required, differences in stocking density, as well as differences in interest rates applied. Figure 14 illustrates the differences in housing costs, as well as the average lending rate applied in the various countries included in the analysis. For this evaluation, housing costs are a combination of interest paid to finance the housing, maintenance of the housing and depreciation.

Van Horne (2013) indicates that stocking densities in the EU tend to be lower relative to the rest of the world, because of stringent animal welfare regulations, which increases the cost of housing. Furthermore, the subtropical climate in Brazil allows broilers to be kept in simple, open houses, reducing the extent of investment required into the housing system and hence also the cost of housing. Housing costs in the USA were marginally lower still than Brazilian housing costs, with lower interest

rates applied. Van Horne (2013) reports that animal welfare regulations in Brazil and the USA are less stringent compared to the EU legislation, allowing for increased stocking densities.

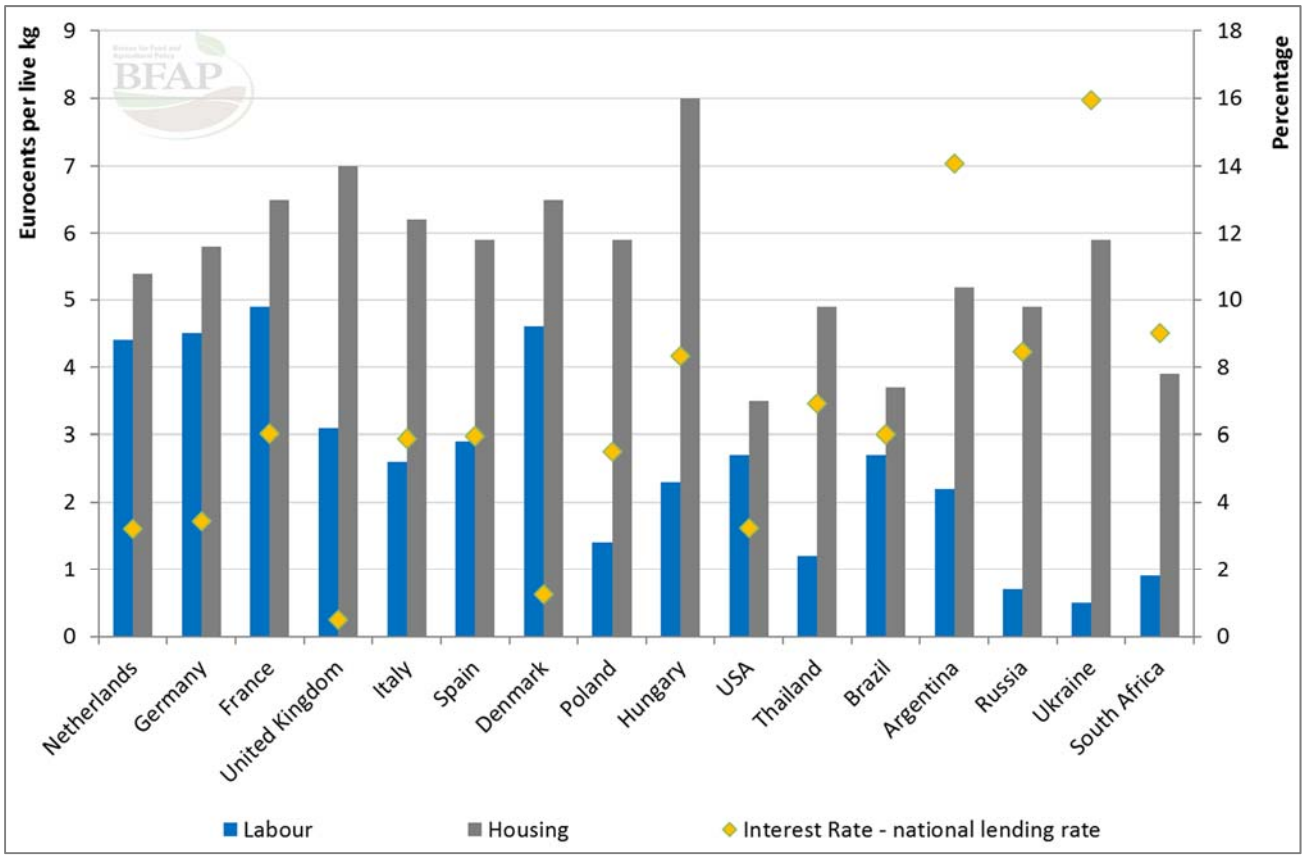


Figure 14: Housing and labour costs in selected countries in 2013
Source: Van Horne, 2014 and World Bank, 2014

The relative labour costs illustrated in Figure 14 reflect a combination of actual costs paid towards labour and the opportunity cost for a producer to be working on the farm, as opposed to earning a salary as a skilled worker. In addition, the reported labour costs include social security payments, resulting in higher labour costs for countries like the EU, where social security costs are high. Expressed as a cost per kilogram produced, the cost of labour reflects the total cost to company, hence differences in labour productivity are implicitly accounted for.

Labour costs in South Africa compare favourably to the levels reported in the USA, Argentina and Brazil, well below the EU average. Nevertheless, labour costs in South Africa remain significantly above countries such as Russia, the Ukraine and Thailand.

3.2.5. Aggregate primary production costs

During 2013, a period associated with relatively high feed grain costs globally, the combined cost of feed and day old chicks comprised the bulk of variable production costs in all countries included in the analysis. The share of feed and day old chicks in total primary production costs ranged from 76% to 86%, with the lower shares recorded in the EU, where labour costs are higher. Figure 15 illustrates the make-up of primary production costs in the various countries included in the analysis. In addition

to feed, day old chicks, labour and housing, the balance of costs are comprised of energy costs, sanitation costs, costs related to flock health such as vaccinations, and catching costs. Whilst energy and heating costs are lower in South American countries like Brazil and Argentina with favourable climatic conditions, little variation is evident over the balance of the sample space, implying that most of the variation in total production costs are attributed to feed, day old chicks, labour and housing.

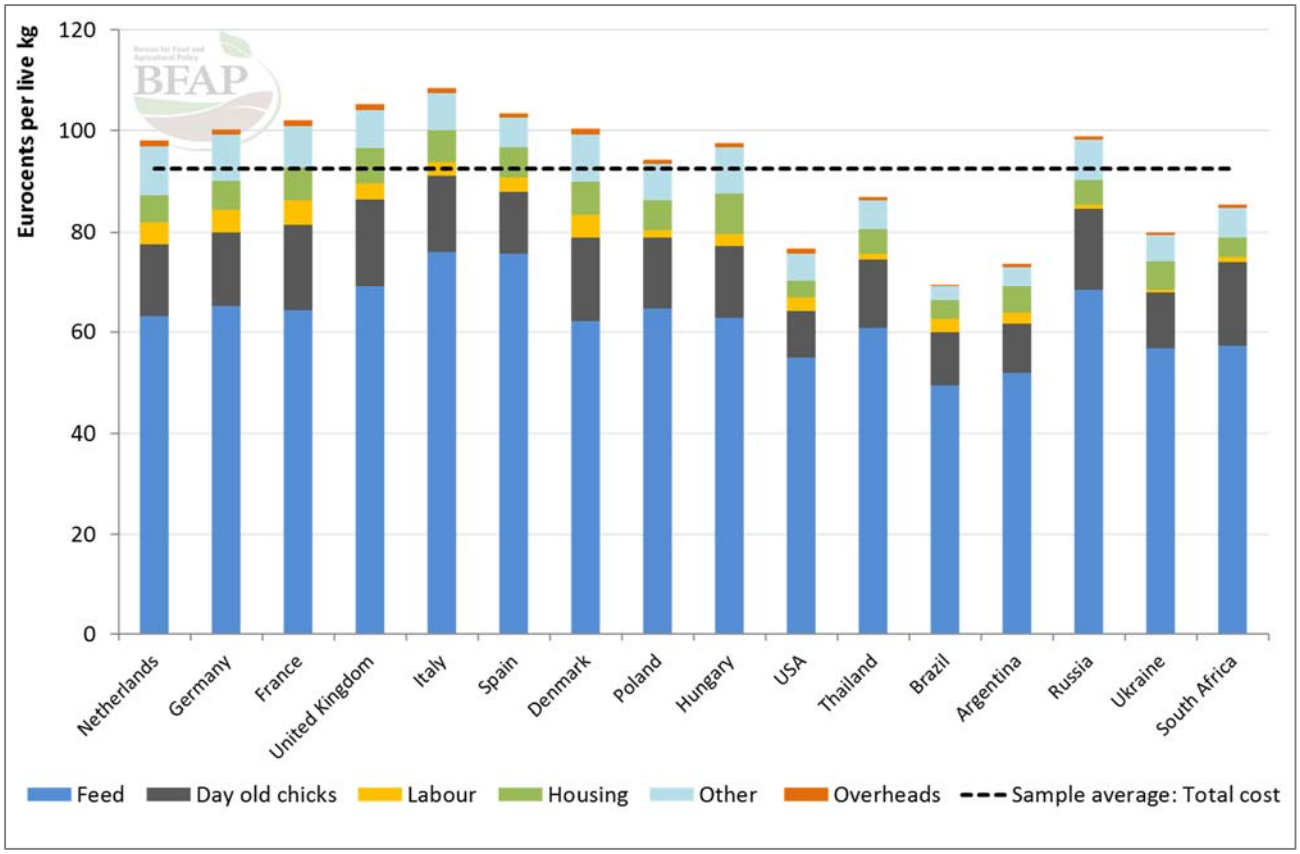


Figure 15: Aggregate primary production costs in selected countries in 2013
Source: Van Horne, 2014

3.2.6. Total production costs

Given the integrated nature of the poultry value chain globally, total production cost comparison should also include the cost of slaughter. Live chickens are not traded globally and hence global competition only becomes a factor post-slaughter. In this regard, global slaughter costs are calculated based on large commercial slaughter houses, with the final product being a broiler carcass. Carcass mass is considered to be 70% of the live weight delivered from the farm (Van Horne, 2013). In South Africa, the carcass mass is generally 72% of the delivered live weight (Lovell, 2014). In addition, South African producers have an added benefit as edible offal is sold to provide additional income, whereas this is not the case in the EU.

Figure 16 presents the global benchmark of total production costs including slaughter, for selected countries included in the study. Within the global context, the greatest components of slaughter costs are labour (30%) and buildings and equipment (40%), with the balance being comprised of transport, energy, water, quality control and offal disposal. While slaughter costs throughout the EU vary, the

use of similar modern technologies results in labour costs accounting for the bulk of variation across countries (Van Horne, 2013). In South Africa, labour and packaging accounts for the greatest share of total slaughter costs (50% between them), followed by energy, transport and sanitation.

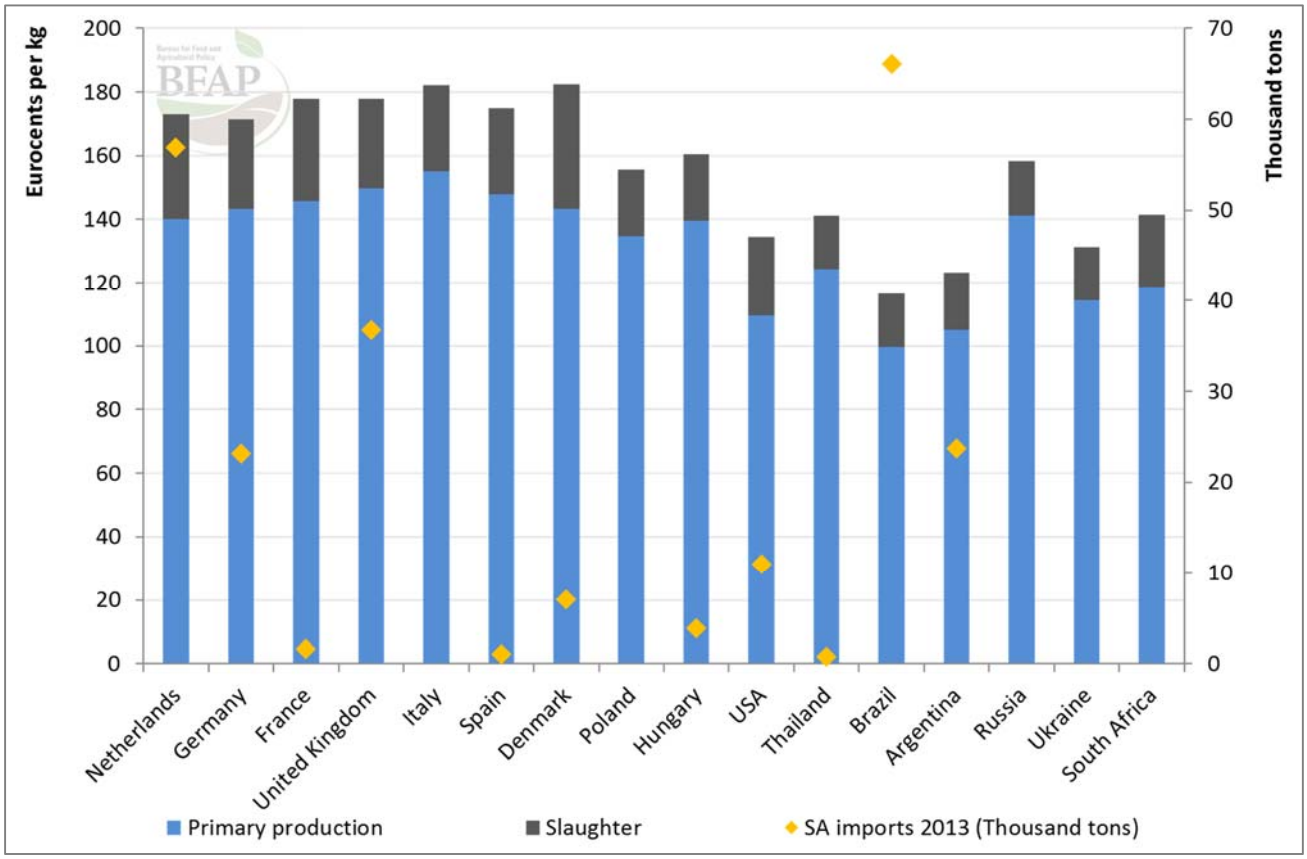


Figure 16: Total production costs in selected countries in 2013
Source: Van Horne, 2014

Figure 16 indicates that South Africa imports substantial quantities of chicken from countries such as the Netherlands, Germany and the UK, where production costs are higher. This would indicate that rising imports are not merely a result of differences in production costs, but that additional factors such as the policy environment and marketing strategies also need to be considered.

3.2.7. Policy environment

The policy environment in which producers operate is an important consideration in evaluating competitiveness and understanding differences in production costs. The policy environment impacts on producers at various levels: some countries support chicken production directly or indirectly through support of feed grain production. At the same time, regulations regarding animal welfare and environmental impact in certain countries raise the cost of production.

Producer support can take several forms ranging from direct subsidies to trade policy and, while governed by the World Trade Organisation (WTO), many support measures remain in place globally. As a single measure of support to specific industries, the OECD calculates annual producer support estimates (PSE) for various industries in OECD member countries as well as some additional non-

member countries. The PSE represents the annual monetary value of gross transfers from consumers and taxpayers to agricultural producers arising from policies that support agriculture (OECD, 2010).

Whilst many industries are supported, some governments in surplus-producing regions also apply taxes to the agricultural sector in the form of export taxes. Bouët and Laborde (2012) indicate that the main effect of export taxes is to decrease the domestic price of the good on which they are applied. When applied in the feed grain industries, these export taxes therefore provide further indirect support to domestic livestock producers in that the domestic price of raw feed materials will be lower than the price paid by importers for the same products. In this regard, the 32% export tax applied by Argentina on exported soya protein meal, provides a significant advantage to domestic producers in Argentina, relative to South African producers who import soya protein meal predominantly from Argentina. This tax was reduced by 5% in 2016 following a change of government. At the same time, the 20% export tax on maize in Argentina was removed completely.

The OECD PSE database indicates that producer support under the Common Agricultural Policy (CAP) applied in the EU is high relative to producers in the America's and South Africa. EU policy instruments within the poultry sector are aimed at structuring and safeguarding market prices within the sector, facilitating the marketing of products, establishing rules in trade with third party countries and providing stability for EU producers and processors (European Commission, 2014). While these policies are aimed at supporting the sector, Van Horne (2013) indicates that several domestic policies in the EU regarding animal welfare and environmental sustainability raise the cost of producing chicken in the region. As such, CAP provides income support to producers, assisting them in complying with sustainable agricultural practices.

Environmental regulation within the EU limits the amount of animal manure that can be applied to soil, effectively raising the cost of manure disposal. Further regulations regarding animal emissions require production permits for poultry production, as well as environmental impact assessments, which are costly to producers. Furthermore, the European Commission's framework for energy taxation also raises the cost of energy to producers (Van Horne, 2013).

Stringent food safety regulations in the EU related to hygiene, traceability and labelling places the primary responsibility for food safety on food service operators. Within the poultry sector, a high sensitivity to *Salmonella* levels necessitates testing and preventative measures at various stages of the value chain. In addition, regulations regarding products used in animal feed provide a framework to ensure that feedstuff does not pose a threat to human or animal health. In this regard, the use of meat and bone meal is prohibited in the EU and therefore, poultry feed costs, as well as the cost of offal disposal for abattoirs are elevated. In January 2006, the EU also banned growth promoting antibiotics in animal feed and the high prevalence of genetically modified hybrids being produced in the global soya market affects negatively the possible supply sources for feed materials imported into the EU (Van Horne, 2013).

Within developed economies such as the EU and the USA, factors such as animal welfare legislation, which governs housing conditions, feed and care of animals, is gaining importance. The establishment of minimum animal welfare standards comes at a cost to the industry however, as limitations regarding

the stocking density in broiler houses effectively raises the cost of housing per kilogram of meat produced. EU legislation limits the stocking density to a maximum of 33 kg/m^2 as well as establishing several conditions such as lighting, litter, feeding and ventilation requirements. In the USA, animal welfare standards for farmed animals is not regulated, however the national chicken council has established some criteria for the ethical treatment of broilers. Stocking densities are not advised to exceed 31.7 kg/m^2, however this is not legislated. Stocking densities in Brazil also vary according to the type of housing, but up to 38.7 kg/m^2 is permitted (Van Horne, 2013).

Additional measures, which are not directly supportive in monetary terms and therefore not accounted for in the PSE published by the OECD, are the use of non-tariff measures. Whilst not directly protectionist in nature, these measures and regulations still have the potential to influence trade (Kalaba, 2012). Sanitary and Phytosanitary (SPS) regulations for example are applied to protect the biosecurity status of importing countries and hence potential exporters must comply with these regulations in order to enter the market. As with other legislation, these SPS measures in the EU are stringent, often implying a cost of compliance for potential exporters into the region. Kalaba (2012) also indicates that non-tariff measures are used widely within the Southern African Development Community (SADC), impacting significantly on the cost of meat trade in the region.

3.3. Marketing structure and the role of trade

Considered in conjunction with the origin of imported chicken, Section 3.2 suggests that rising import volumes are not simply a result of a failure to compete in the basic cost structure. Thus Figure 17 presents a more detailed view of import growth since 2010, suggesting that the bulk of import growth is attributed to a single tariff line representing bone-in portions – particularly those imported free of duty from the EU.

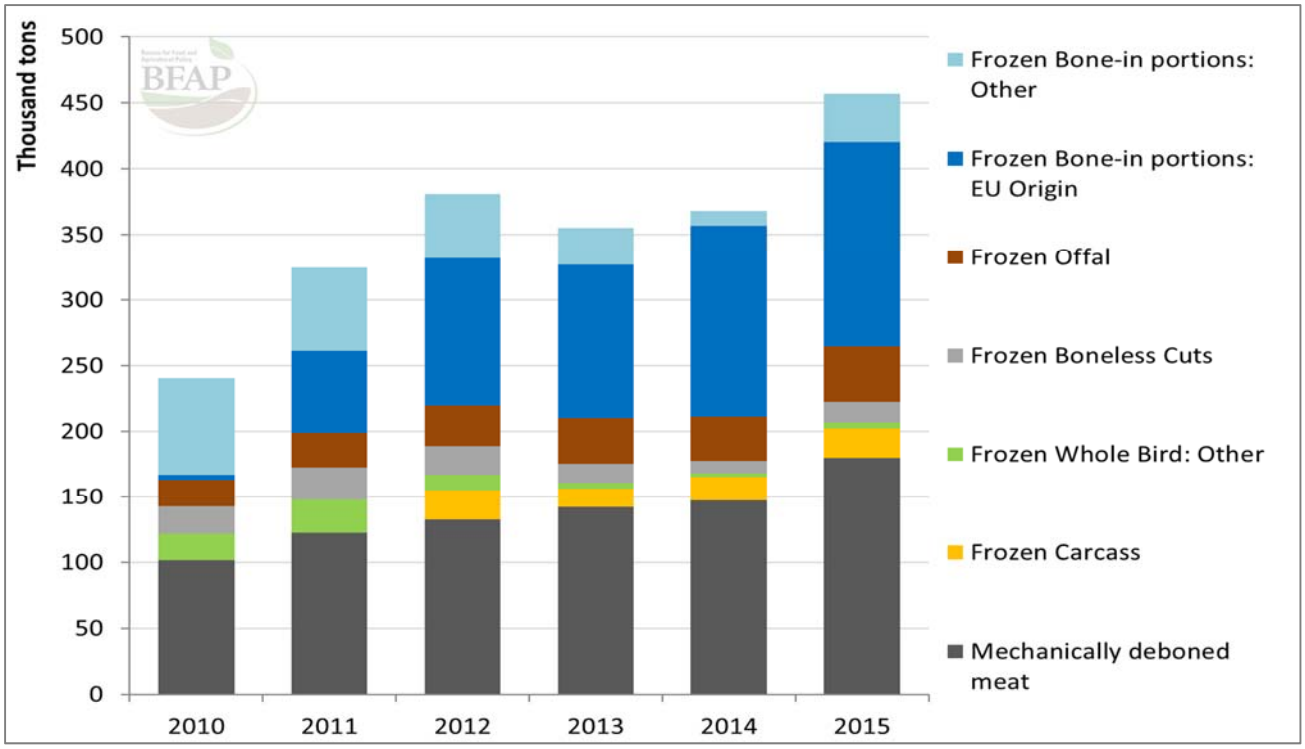


Figure 17: Composition of chicken imports into South Africa: 2010-2015
Source: ITC Trademap, 2016

Contrary to the EU, where producers obtain a significant premium for chicken breasts, the demand structure in South Africa favours bone-in portions. Thus producers in the EU and the US optimise carcass value by marketing breast meat at a premium domestically, whilst exporting some bone-in portions at very competitive prices. In the South African market producers are forced to compete on prices for these cuts, without obtaining the same premium for other parts of the carcass. Going forward, the abolition of traditional anti-dumping tariffs on a quota of 65 thousand tons of bone-in portions originating from the US to aid the renewal of the African Growth and Opportunities Act (AGOA) will expose South African producers to further competition in the production of these cuts.

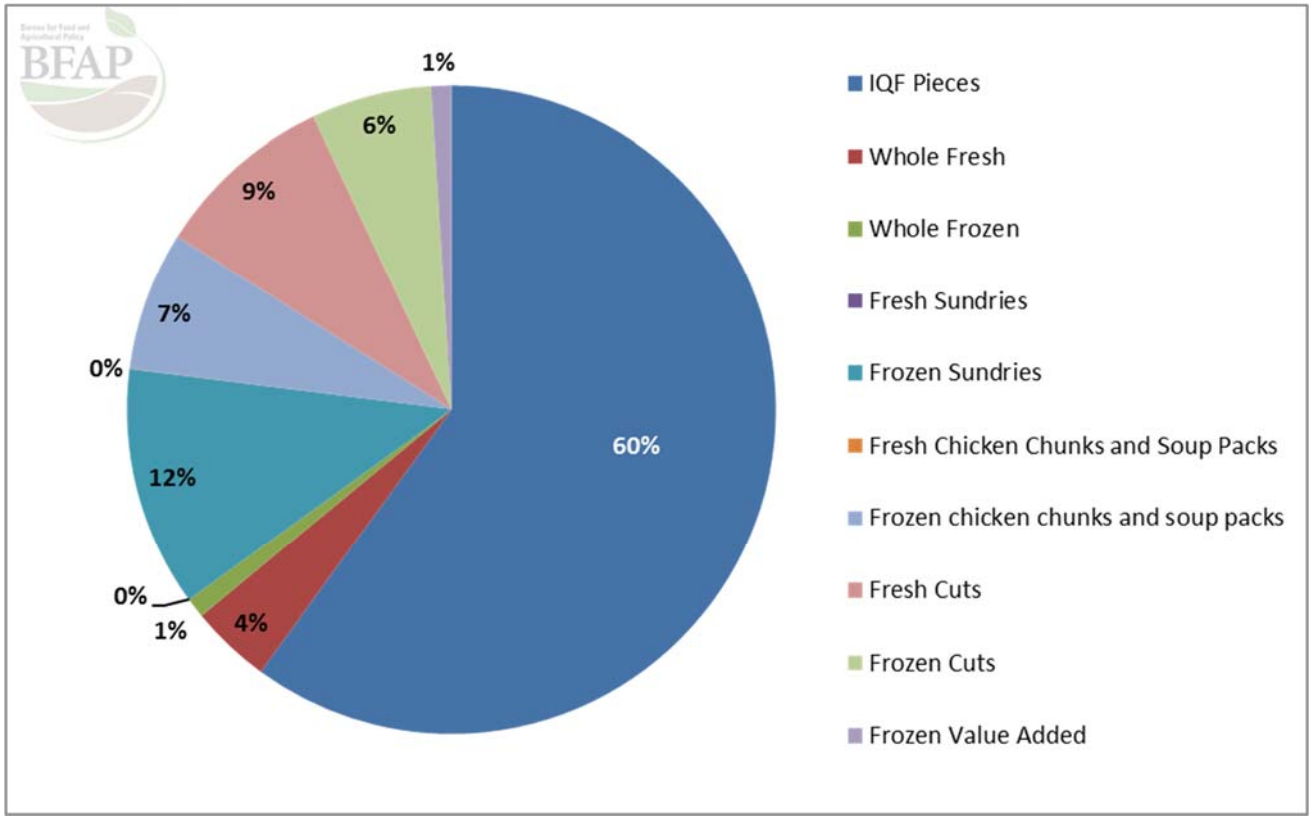


Figure 18: Poultry product marketing mix in South Africa
Source: South African Poultry Association, 2013

Faced with a demand structure biased to IQF pieces (Figure 18) and competitively priced bone-in portion imports arriving from countries with different demand preferences and value propositions, the possibility of balancing the domestic market through exports must also be considered. Possible exports of chicken breasts into high value markets will allow the production of a bigger bird, providing additional benefits in reducing the processing cost, as well as day old chick costs on a per kilogram produced basis. It will however also require a longer production cycle and hence some benefits will be offset by the implied reduction in FCR when growing birds bigger.

The beef sector in South Africa has been successful of late in obtaining a higher carcass value through exports of high value products, particularly into Middle Eastern markets. In order to export to critical markets such as the EU, sanitary and phytosanitary (SPS) protocols will have to be put in place. Furthermore, the information presented in Section 3 suggests that South Africa will not be able to compete with leading exporters such as Brazil and the US unless it is faced with favourable transportation rates to the destination of exports, or obtains preferential access into certain markets.

A legislative review suggests that the broiler industry is not in a favourable position regarding unilateral and bilateral commitments to imports and exports. Currently the bulk of exports is destined for neighbouring markets, but even some possible neighbouring markets are not accessible for South African producers for non-tariff reasons. On the other hand, South Africa has a fairly open import regime, with EU and SADC producers able to export to South Africa at preferential tariff rates.

Currently, SADC markets represent the main export destination, but the demand structure is similar to the domestic market and a true rebalancing will be dependent on accessing niche markets for white meat. Such exports are however completely underdeveloped and numerous importers of such products have stringent sanitary regulations that need to be met for exports to be allowed. Potential markets should however be identified, with the protocols to access these markets prioritised. In this regard, SAPA have established an export forum, but certain challenges remain. These include the lack of national residue monitoring programme by DAFF, lack of national antibiotic residue monitoring and reduction program by DAFF, implementation of meat inspection is required. Coordination between government and industry will be required to overcome such challenges in the shortest possible time.

Disaggregation of global trade patterns to white and dark meat presents a picture of key importers and exporters of high value products in the global market. Figure 19 suggests that the biggest importer of high value products is the EU, which is predominantly supplied by Brazil. Thus South Africa would need to be able to compete with Brazilian products in this market if access is opened. This seems likely only when transport costs are reduced relatively to exporters such as Brazil and the US, or alternatively where South Africa could gain preferential access into a market. European exports of whole birds to the Middle East have reduced following the removal of export subsidies, providing a possibility for South Africa to gain market share.

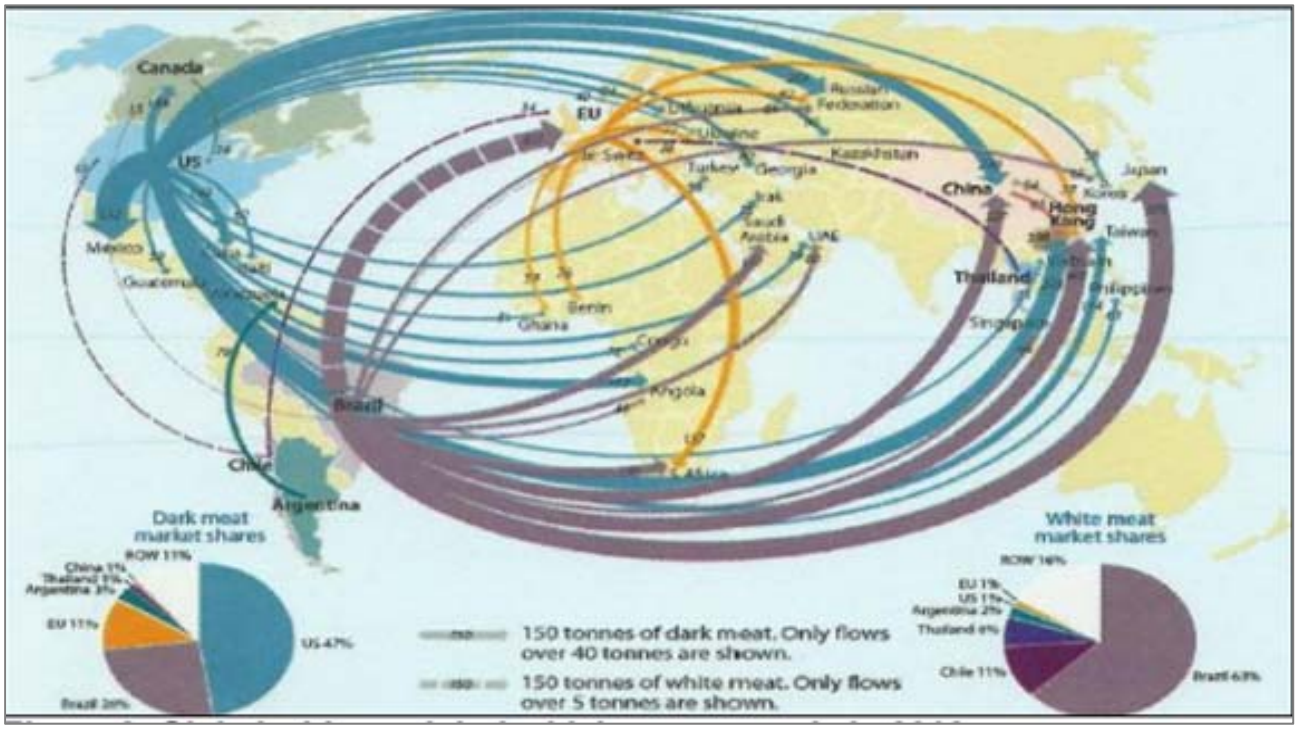


Figure 19: Global trade in white and dark chicken meat in 2012
Source: Rabobank, 2014

Many Eastern markets are located favourably for South Africa in terms of transport costs, however in many of these markets, the products demanded are very similar to those in South Africa. The product mix and current export suppliers to some of the bigger import markets is presented in Table 2.

Table 2: Product mix and current suppliers in large importing markets

Importer	Product Mix	Current export suppliers
Hong Kong	Dominated by chicken feet and wings	USA and Brazil
Japan	Preference for dark meats	Brazil and Thailand
	Partly prepared 'luxury meats'	European Union
	Partly processed meat for commercial use	Thailand and China
United Kingdom	White meat	Netherlands, Poland, Germany
Angola	Dark Meat	Brazil, USA
Saudi Arabia	Whole Birds	Brazil and France
Mexico	Dark Meat	USA
Russia	Dark Meat	USA
Europe	White Meat	Brazil

Presently, South Africa has access to few of these regions. Price competitiveness remains an important issue, however in regions such as the EU and SADC, South Africa has preferential market access under a number of trade agreements. Still other factors prohibit trade from occurring, which include:

- Several avian diseases are present in South Africa, most notably Avian influenza in the ostrich population and Newcastle disease, which does not need to inhibit trade if South African compartments are recognized for verification in the EU.
- Currently, South Africa does not have an independent meat inspection service.
- South Africa also does not have a formal residue monitoring plan or programme which tests for chemical contaminants such as veterinary drugs, pesticides or environmental compounds.

Particularly in the EU and throughout the SADC region, such non-tariff measures that impact on trade volumes are becoming increasingly relevant. These measures often represent somewhat of a grey area that could potentially impact on export market access and are a critical consideration when market access is considered.

4. Quantitative models for the South African broiler industry

A strong quantitative modelling framework is critical to informing decision making and enabling the optimal policy response to support competitiveness. Forward looking quantitative analysis in particular provides the opportunity to simulate results prior to policy implementation, supporting well informed decision making, as well as possible trade negotiations.

A number of simulation models have been used successfully for policy analysis. Broadly, such simulation models are categorized into general equilibrium and partial equilibrium models, each of which is characterized by specific strengths and weaknesses. In deciding which is more appropriate for specific analysis, analysts need to weigh the desire for broad sectoral and product coverage with the need to incorporate detailed and accurate coverage of particular markets and policies (Westhoff, Fabiosa, Beghin & Meyers, 2004). Partial equilibrium models have typically been preferred when the

analysis is conducted in a sector with a relatively small contribution to total GDP, which would allow the sector to be analysed in isolation from the rest of the economy. This enables detailed policy inclusion but assumes that while the sector is impacted by the rest of the economy its impact on other sectors is negligible. Alternatively, the general equilibrium framework represents the entire economy, capturing interactions between different sectors, but its aggregated nature limits the possibilities of detailed, sector specific simulations.

In South Africa, both modelling frameworks exist. Within the general equilibrium framework, current models available for use include the South African version of the INFORUM model (SAFRIM), as well as the Global Trade Analysis Platform (GTAP). Within the partial equilibrium framework, the existing BFAP sector model can be described as a dynamic, recursive partial equilibrium model of the South African agricultural sector. Presently the model includes 52 commodities and, for each commodity, the important components of supply and demand are identified and equilibrium is established in each market by means of balance sheet principles where demand equals supply. The model is solved within a closed system of equations, where grains are linked to livestock through feed, implying that a shock to the livestock sector will be transmitted to grains and vice versa.

4.1. Partial Equilibrium Analysis

The BFAP sector model has been used successfully to generate an outlook for the South African agricultural sector annually since 2004. For the purpose of this analysis however, a number of refinements were introduced to the model. The entire meat demand system was re-estimated as a linear approximation of an almost ideal demand system. Some of the results from the estimation are presented in Box 1. In addition to re-estimation of the own and cross price elasticities within this system, chicken products were disaggregated to remove IQF pieces from the rest of the chicken product mix. This allows for improved accuracy in simulating policies associated only with bone-in portion imports.

Box 1: Understanding meat demand dynamics in South Africa[1]

In order to enable an improved understanding of meat demand in South Africa, expenditure, own price and cross price elasticities were estimated using the Linear Approximation of an Almost Ideal Demand System (LA/AIDS) model for the South African meat complex. Poultry being the focus of the analysis, it was further disaggregated into IQF portions and other poultry products. Expenditure elasticities for IQF portions, other poultry products, pork, mutton and beef were 1.17, 1.24, 0.44, 1.07 and 0.8 respectively. The interesting and somewhat counter-intuitive result is the fact that the poultry products were classified as luxury products (associated with relatively expensive products) while it is widely known that poultry is the most affordable meat. Within the lower income groups where a significant share of poultry products are consumed however, it can be argued that poultry, as the only affordable choice of meat, can be considered a luxury relative

[1] Additional information related to the estimation methodology is available in Delport, Louw & Davids (2015), a paper presented at the annual conference of the Agricultural Economics Association of South Africa in 2015, attached as Annexure C

to traditional starches. These consumers depend on poultry products for any meat protein inclusion in their diets.

The compensated own price elasticities were estimated at -0.61, -0.43, -0.72, -0.96 and -0.11 for IQF portions, other poultry products, pork, mutton and beef respectively; meeting a priori expectations of negative own price elasticities. Cross price elasticities were particularly high between mutton and pork, possibly due the complicated nature of the South African pork market and the fact that higher income consumers or so-called established consumers consume the largest proportions of both mutton and pork. Other high cross price elasticities were the substitution effects between IQF consumption and the price of the other meat products. A study by Vermeulen and Schönfeldt (2015) confirms this substitutability as large proportions of South African consumers confirmed to substitute beef and mutton for poultry on the basis of affordability (or relative prices).

The framework was further strengthened by the inclusion of representative farm level models, which illustrate the impact of simulated price movements on producer profitability, whilst also allowing for stochastic modelling of risk faced by different types of producers. Furthermore, producer price impacts have been linked to consumer prices at retail level through the estimation of price transmission elasticities between producer and retail prices. This allows for the quantification of impacts on both producers and consumers directly. The calculated elasticity of 0.65 indicates that a 10% increase in the real producer price of IQF chicken pieces would lead to a 6.5% increase in the real retail price of chicken pieces. The long run relationship between producer and retail prices was found to be statistically significant.

The starting point for policy analysis within this framework typically involves the generation of a baseline, which represents a plausible benchmark against which alternative scenarios can be measured and understood. In this regard the baseline is not a forecast, but represents a single plausible scenario based on a set of macro-economic assumptions. The baseline outlook presented in this section is underpinned by the assumptions presented in Table 3. The model can also be used for partial stochastic analysis, which allows for the introduction of volatility in key output variables to generate a range of possible outputs as opposed to a single, deterministic view.

Table 3: Macro-Economic assumptions associated with the baseline outlook

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Millions											
Total population of SA	54.5	55.0	55.4	55.9	56.3	56.7	57.0	57.4	57.8	58.1	58.4
US $/barrel											
Brent Crude oil	50.8	39.6	48.0	54.7	57.6	58.5	60.3	62.2	64.1	66.0	67.9
SA cents/US Dollar											
Exchange rate	1277	1469	1369	1414	1438	1469	1500	1551	1604	1658	1715
Percentage Change											
Real GDP per capita	1.28	0.38	1.28	2.20	2.60	2.80	2.90	2.74	2.88	2.87	3.15
GDP deflator	4.63	6.08	6.17	5.70	5.70	5.70	5.70	5.89	6.11	5.53	5.57
Percentage											
Prime interest rate	9.4	10.6	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8

4.1.1. Industry Outlook

Having increased rapidly over the past decade as a result of growing income levels, continued urbanisation, rising living standards and ever increasing dietary diversity, meat consumption growth is expected to slow in the coming decade on the back of a more reserved income growth outlook. This slowdown is already evident in the post-recession period and since 2010, consumption growth for chicken and beef has slowed considerably, with pork being the only meat type where consumption growth accelerated in the past five years relative to the 2005 to 2010 period.

Affordability being an important consideration in a slower income growth environment, chicken consumption is still expected to outpace that of beef and sheep meat over the next ten years. Following growth in excess of 60% over the past decade, chicken consumption is projected to expand by 29% by 2025, equating to more than 500 thousand tons of additional chicken meat and almost 70% of additional meat consumed by 2025 relative to a 2013-2015 base period.

Globally the evolution of feed grain prices over the past three years has introduced stability into the livestock sector, which had been operating in an environment of particularly high and volatile feed costs over most of the past decade. However South African producers have been denied the same benefit by a combination of domestic weather conditions and currency depreciation. Intensive use of feed grains in the production system renders poultry production particularly vulnerable to rising feed costs. While such costs arguably represent an important factor affecting domestic price negotiation, the availability of competitively priced imports often constrains the extent to which meat prices follow feed costs.

Over the past 5 years, the price of IQF pieces, which comprise the bulk of the domestic market, has not increased to the same extent as feed products. As a basic indicator of profitability in the industry, the chicken to maize price ratio has trended downwards for most of the past decade and as a result of drought-induced high maize prices, reached an all-time low in 2016. Given a return to normal weather conditions and the associated decline in maize prices, a significant recovery is projected in 2017, before stabilising at levels similar to 2015 over the course of the next decade. This recovery places broiler production on a positive growth path over the outlook, but given that the meat to maize ratio remains well below the levels observed prior to 2011, the associated production growth also slows significantly. It is expected that production will only expand by 14% up to 2025 relative to the average level attained from 2013 to 2015, mostly as a result of productivity gains. This contrasts with a 29% increase in domestic demand, as consumption approaches 2.5 million tons by 2025. In line with the trend observed over the past 5 years, imports will therefore account for a greater share of consumption growth than domestic production.

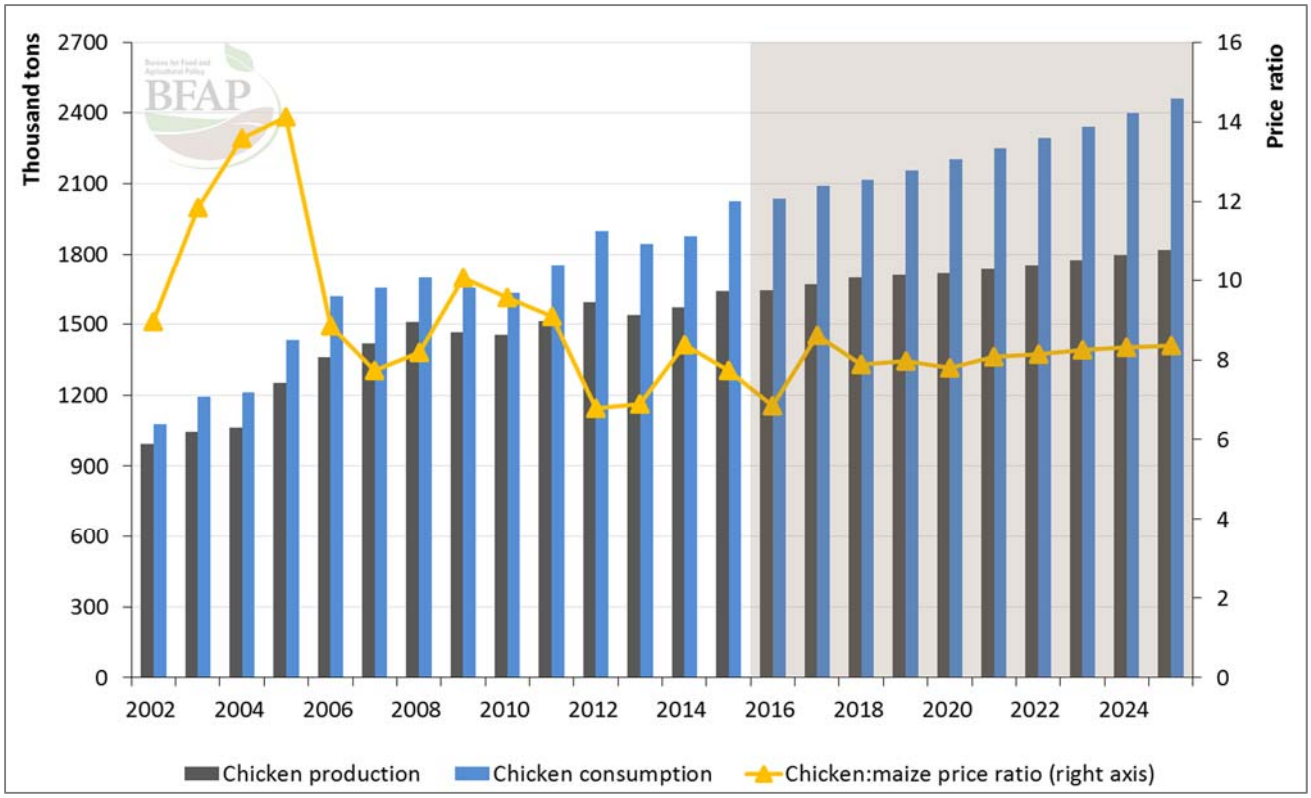


Figure 20: Chicken production, consumption and profitability: 2002 - 2025

The industry outlook presented is a single plausible scenario based on the macroeconomic assumptions presented in Table 3 and is based on an assumption of stable weather. Thus it presents a baseline against which alternative scenarios can be measured and understood, but does not specifically account for uncertainties associated with inclement weather conditions, or even macroeconomic variables such as the exchange rate. A partial stochastic analysis is therefore utilised to quantify some of this uncertainty. Variation is introduced into key specific variables in the model based on historic fluctuations around the mean. Thus, as opposed to specifying specific values for exogenous variables such as rainfall and exchange rate, the model is simulated 500 times, drawing these variables randomly from a given distribution. The range of these distributions is presented in Table 4.

Table 4: Volatility around the exchange rate and rainfall in 2017

	Mean	**Min**	**Max**
Exchange Rate (Rand/ USD)	14.50	12.53	16.80
Rainfall: Planting period	389.45	281.10	498.14
Rainfall: Growth period	523.37	374.34	651.17

The outcome of the stochastic simulation is presented as probability distribution functions in Figure 21 and Figure 22, which provide a range of possible prices for frozen chicken (Figure 21), as well as feed costs (Figure 22) associated with changes in the exchange rate and rainfall patterns.

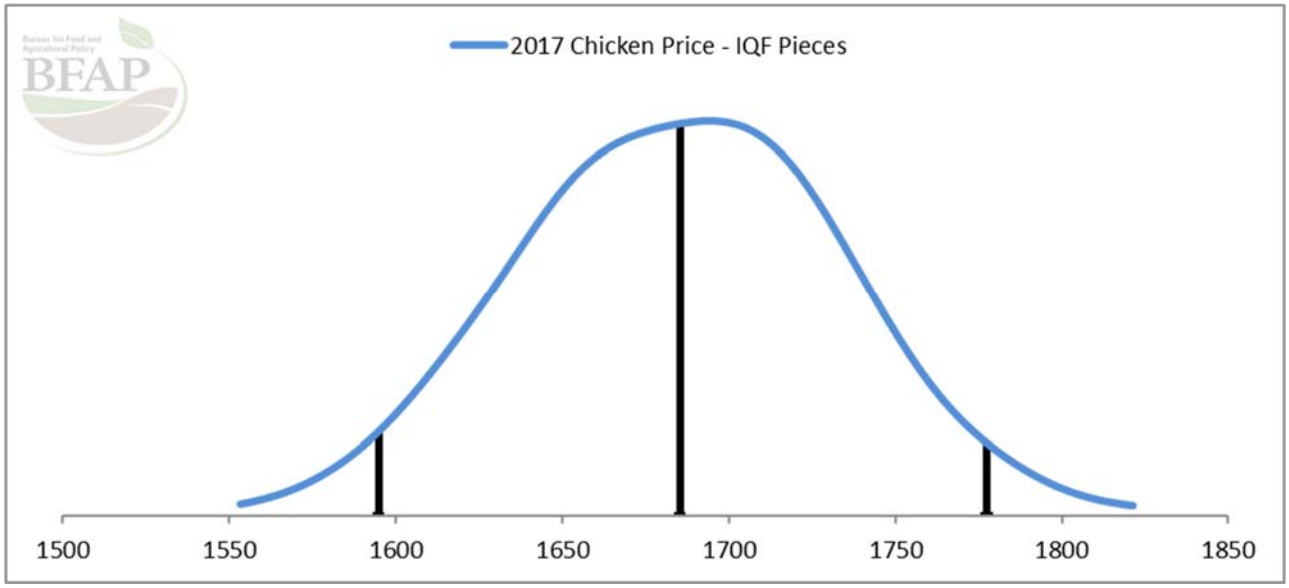


Figure 21: Probability distribution function of the producer price for IQF chicken in 2017

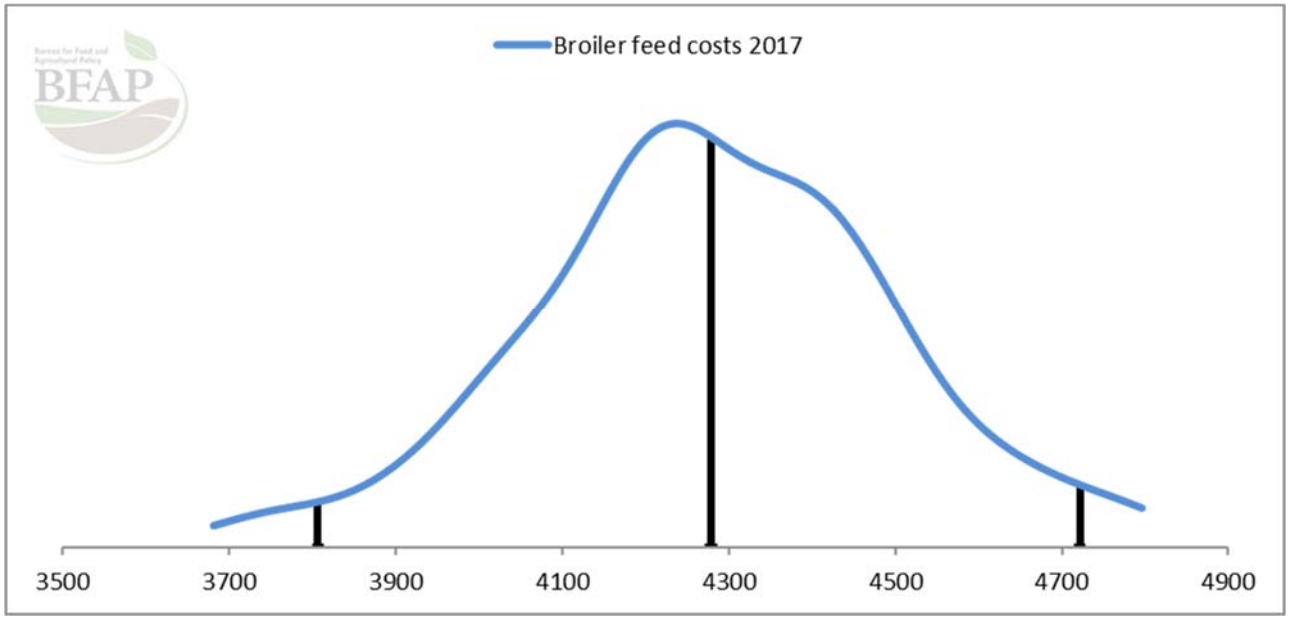


Figure 22: Probability distribution function of the average broiler feed price in 2017

4.1.2. Farm Level Implications

While the annual outlook publication presented by BFAP provides a sector-wide baseline, the modelling system did not previously include a farm-level financial simulation model for broiler production. This being the case, scenario analysis did not include the impact of alternative scenarios on farm-level profitability and hence sustainability, thereby limiting the scope of analysis and the information available to guide decision making regarding both policy and business (Strauss, 2005). In order to evaluate the impact of changes in price levels at farm level, two different producer level financial simulation models were developed, based on the structure of the value chain. These producer level simulation models are then linked to the BFAP sector model, allowing the simulation of profitability and also sustainability over the Outlook period. The farm level simulations are based on base data from 2013, adjusted by actual price and inflationary movements in 2014 and 2015. Thus the

results presented in 2014 and 2015 assume similar technical performance and placing schedules to that achieved in 2013.

The integrated structure of the value chain includes broiler producers that deliver on contract to integrated holding companies, who in turn supply inputs to the contracted producer. The level of integration in the chain is so high that the contracted grower passes a substantial share of his production risk on to the processor through a pricing system based on production costs, similar to the tournament pricing formula used successfully in the USA. This pricing system was described in Progress Report 2; attached as Annexure A, essentially the price paid for live birds at the end of the cycle is derived from the average cost of production, based on standard efficiency parameters. As a result, the risk of feed price increases is borne by the integrated company, which would be considered the producer of chicken meat, as opposed to the contracted grower who sells live birds. Independent producers that do not have the benefit of market certainty at a price determined by the cost of production would have to bear the risk themselves. Slaughter costs would have to be accounted for, while the price received will be determined by other factors such as supply and demand dynamics, as well as the price of substitute products such as imported chicken and alternative meats.

Within this context, two different producer simulation models were developed in order to represent both the contracted grower and the independent producer of chicken meat, where slaughter costs are also accounted for. Through stochastic modelling techniques, the risk implication of a contracted producer can also be compared to the risk profile of an independent, integrated producer. Given the role of integrated companies in the value chain, a third model could be developed for an average integrated company, which has its own abattoir and a substantial scale advantage. The development of this model would however be subject to the availability of historic data, which may be problematic given the competitive nature of the industry with only a limited number of integrated producers.

4.1.2.1. Contract grower

In line with global trends, contract growers account for a substantial share of broiler production in South Africa. Within the integrated value chain, the crucial broiler production stage is often contracted out, allowing for specialisation and hence maximising efficiency. At the same time, the contract grower model spreads the number of chickens produced in any given cycle over a number of farms, implying that possible disease outbreaks would be easier to control with quarantine measures. An outbreak on any one farm could be contained to that farm, reducing the impact on company throughput and is therefore an important consideration regarding biosecurity (Davids, 2013).

Broiler production requires significant investment in highly specific assets that cannot readily be used for another purpose. Consultation with industry role players indicated that in 2014 the investment required for a modern poultry house ranged between R3 million and R4 million, depending on the capacity and level of technology. A typical commercial production unit consists of 4-8 of these houses, producing approximately 300 000 chickens per cycle. Consequently, the contract grower model is popular as it provides incentive to make the required investment, by protecting the producer from input cost increases and thereby reducing the risk involved. Investment in technological improvement in turn improves production efficiency, reducing the cost of production.

Given the price formation mechanism used within the contract grower model, the linkage between the contract grower simulation model and the BFAP sector model differs from the linkage between the independent grower simulation model and the BFAP sector model. Within the contract grower model, broiler prices are linked to the projected input cost index, implying that the price received and the cost of key inputs like feed, move in the same direction. Following a stochastic simulation, where the model was solved 500 times, allowing for volatility in the feed price, Figure 23 illustrates the range of possible real net farm income (RNFI) levels, in 2013 terms. It represents the RNFI for a typical contract producer placing 290 000 broilers per cycle on the left axis and the corresponding return on investment (ROI) on the right axis.

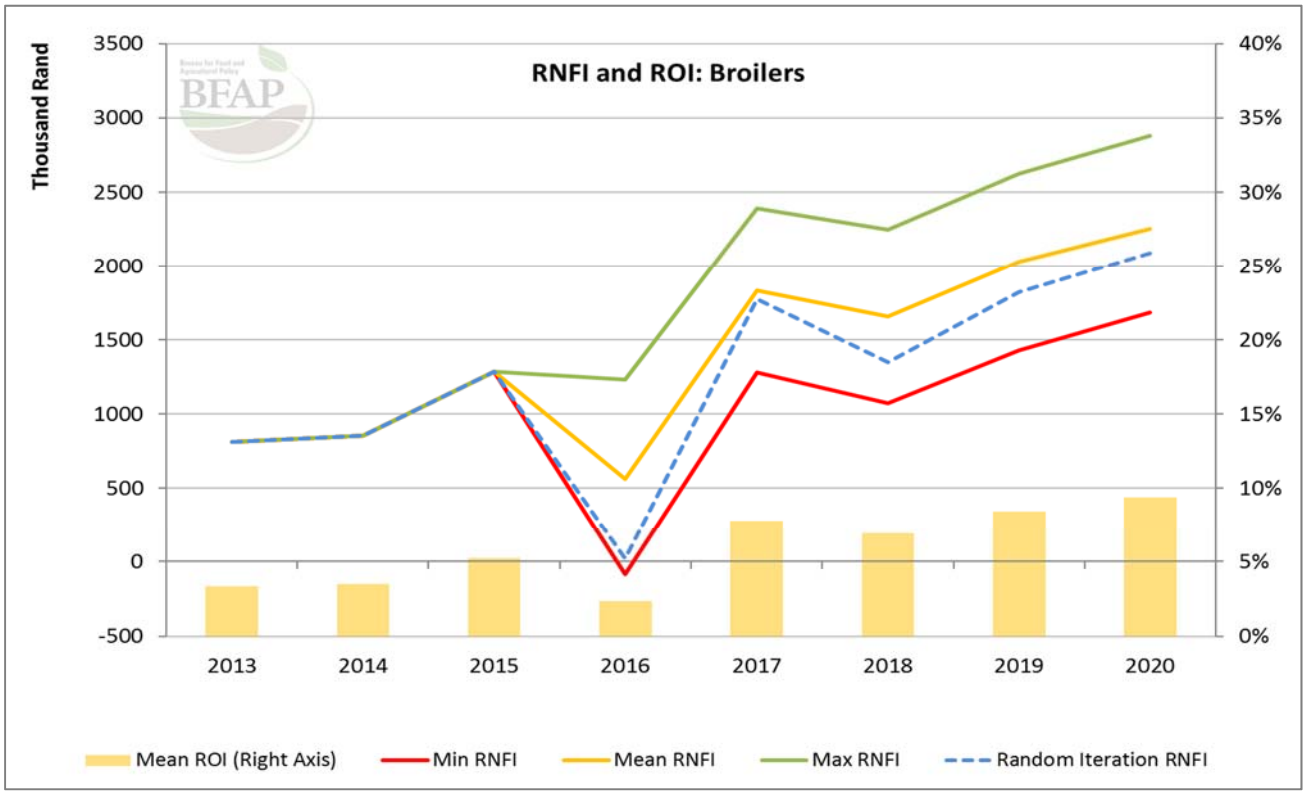


Figure 23: Stochastic range of real net farm income for the contract producer

Figure 23 further indicates that despite 2016 being a very tough year for broiler production, with feed prices reaching record levels and chicken prices increasing only marginally, the RNFI for the contract producer remained positive. It is important to note that the producer's remuneration has not yet been accounted for in the RNFI, while land and fixed improvements must still be paid from this revenue. Considering the size of the required investment, the return of 3% remains very low and is not sufficient for long run sustainability. Over the outlook period however, this projected return improves to almost 10% by 2020, which remains below industry aims for sustainable production.

The stoplight chart in Figure 24 pertains to the same contract producer and illustrates the probability of obtaining a ROI ranging from 7 to 10% from 2016 to 2020. The red bars illustrate the probability of an ROI below 7%, while the green bars illustrate the probability of obtaining an ROI higher than 10%. The yellow bars in the middle are indicative of a ROI between 7 and 10%.

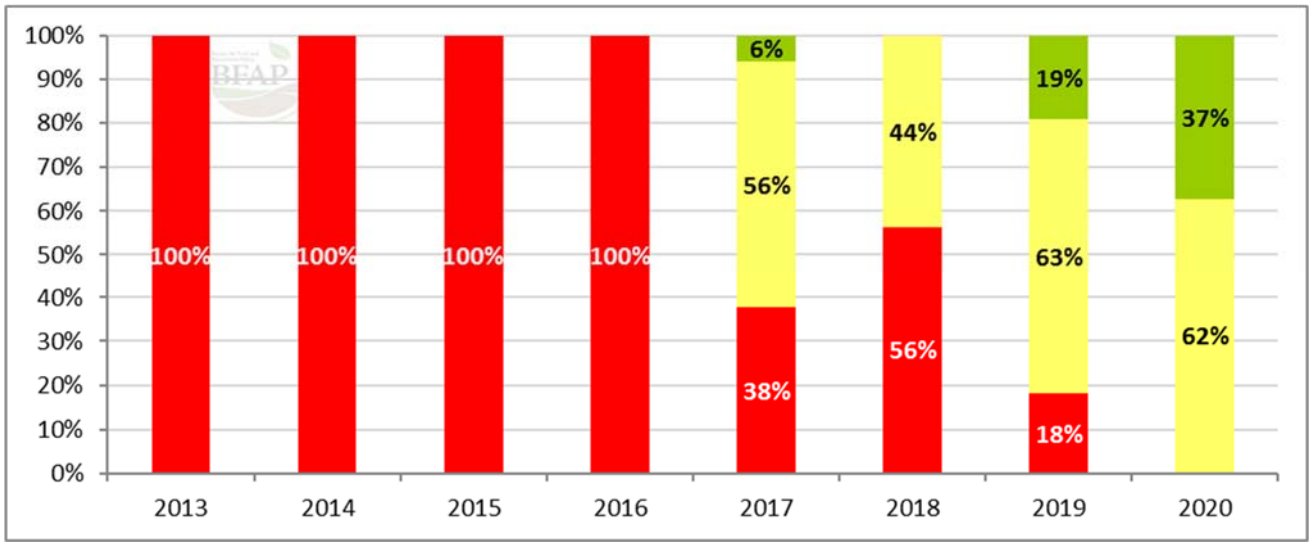


Figure 24: Probability of the contract producer obtaining a return on investment between 7 and 10%

4.1.2.2. Independent producer

Repeating the same simulations for an independent producer requires a different linkage between the BFAP sector model and the producer level simulation model. In this instance, the producers cost structure also accounts for slaughter costs and given the absence of a pricing formula, the projected price is linked to the chicken price projections at sector level. The stochastic simulation is then repeated, solving the model 500 times, introducing volatility both for the chicken producer price and the feed costs. As a result, the feed price and the chicken price will not always move together, raising the exposure to risk. The biggest difference for the independent producer as opposed to the contract producer is that the increased exposure to risk elevates the potential profit levels; however the risk of making a loss also increases substantially. Figure 25 presents the results of the stochastic simulation, with the same deterministic outlook as the contract grower, with the only difference being that the producer is exposed to volatility on the chicken price as well as the feed costs. The substantial increase in the difference between the minimum and maximum RNFI illustrates the higher possible return, as well as the increased risk exposure. In 2013, when feed prices reached record levels that were matched by a lesser increase in chicken prices, most independent producers recorded negative margins (Astral, 2014; RCL Foods, 2014). Looking ahead, a smaller independent producer such as the one modelled here will not be making sustainable returns on average in the long run.

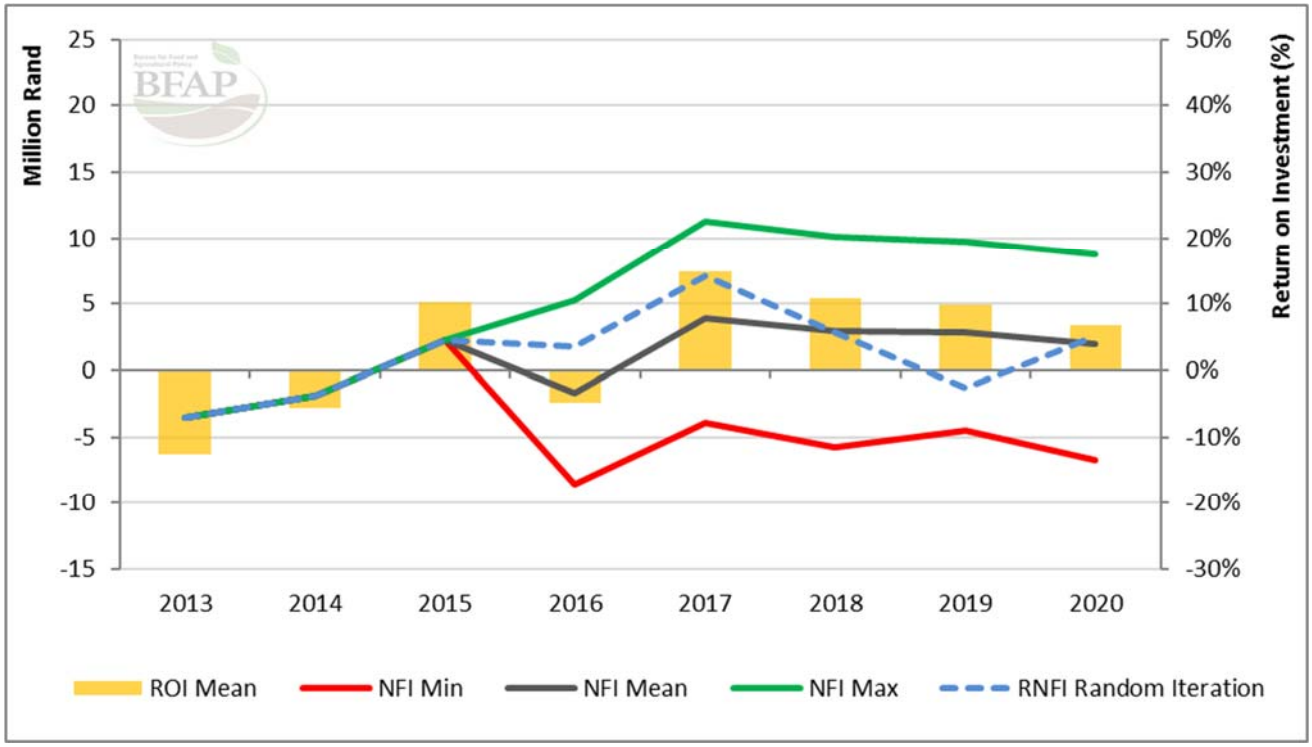


Figure 25: Stochastic range of real net farm income and return on investment for the independent producer

The stoplight chart in Figure 26 illustrates the probability of obtaining a ROI ranging from 7 to 10% from 2016 to 2020. The red bars illustrate the probability of obtaining an ROI less than 7%, while the green bars illustrate the probability of obtaining a ROI above 10%. The yellow bars in the middle relate to the probability of obtaining a ROI between 7 and 10%.

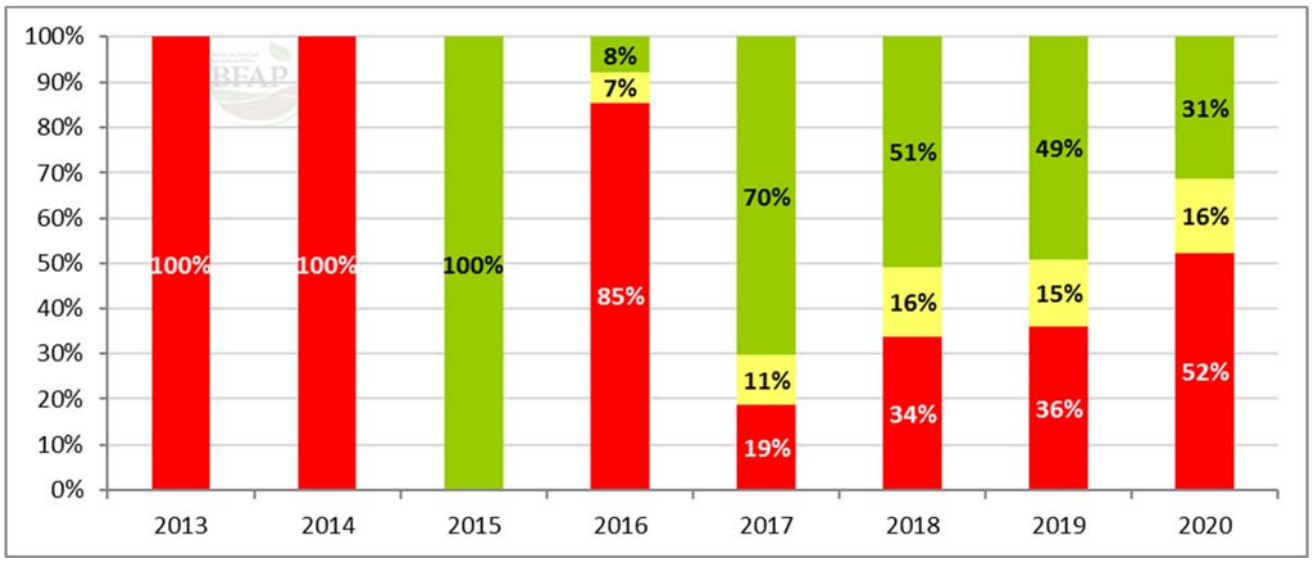


Figure 26: Probability of the independent producer obtaining a return on investment between 7% and 10%

A relative comparison between Figure 23 and Figure 25 clearly illustrates the difference in risk exposure, as well as the earning potential. From both figures however it remains clear that under the

assumptions of the baseline, the prospects for broiler producers over the outlook period are extremely tight and productivity will be critical if the producer is to remain in business. Weather conditions have a significant influence on the price of feed grains and, in this regard, a drought situation poses a much greater risk to independent producers relative to those producing on contract. While the stochastic analysis illustrated the wide range of possible outcomes over the next decade, the modelling framework presented here provides a tool to evaluate the impact of specific situations, or interventions on prices, production and consumption in the industry, whilst also illustrating the implications of the various scenarios on farm level profitability.

4.2. Application of the expanded partial equilibrium modelling framework

The refined and expanded modelling system has been used on various occasions to evaluate scenarios and support decision making. One of these was during the negotiations surrounding the renewal of the AGOA in 2015. Historically bone-in portions originating from the USA are subject to a general Most Favoured Nation (MFN) duty, as well as an additional anti-dumping duty of R9.40/kg. Within ongoing negotiations regarding the renewal of AGOA concessions regarding the removal of the anti-dumping duty were an important item under review. Consequently, the Agricultural Business Chamber requested BFAP to simulate the impact of a number of possible scenarios on the South African Poultry Industry. These simulations were in turn made available to the South African negotiations team to inform decisions.

Given that the majority of bone-in imports now originate from the EU, price differences were a critical consideration in the simulation. Though arguments could be made that US imports would simply replace a share of the EU imports and possibly not be additional to current import levels, the imports originating in the US would be significantly cheaper, thus depending on the size of the quota, a share of imports would be coming into South Africa cheaper than before, effectively lowering the average price of imported products over a year. Critically, the cost of US imports would be below that of South African IQF pieces. Whilst favourable for the consumer, the argument for the initial anti-dumping duties, which relates to the marketing dynamics presented in Section 3.3, allows US bone-in portions to enter the South African market below cost, harming the domestic industry. Within the broader context of preferential trade terms under AGOA for the rest of the economy, this was largely a case of how large the quota of US imports allowed to enter South Africa free of the anti-dumping could be.

After evaluating the historic trade patterns and the marketing dynamics underpinning price differences for bone-in portions, three different scenarios were tested and measured against the baseline outlook for the poultry industry at the time. The macroeconomic assumptions underpinning the baseline generated in 2015, as well as further details related to relevant price levels are available in the report, included under Annexure D. A brief description of the 3 scenarios, as well as critical results are provided below.

Scenario 1:

The current anti-dumping duty of R9.40/kg applied to bone-in portions originating from the USA is removed, implying that the only duty applied to products originating from the USA is the MFN duty of 37%. The exogenous world price is therefore adjusted downwards in line with relative price levels

for imports from the US and the EU, as provided by the Association of Meat Importers and Exporters (AMIE). This results in shifting the world price to USA price levels, as opposed to the EU price, which represents the current origin of most imported products. Imports originating from the EU remain duty free under the TDCA, however relative prices suggest that imports currently originating from the EU will be displaced by bone-in portions from the USA and consequently the 37% duty is applied to all bone-in portions.

Scenario 2:
The current anti-dumping duty of R9.40/kg applied to bone-in portions originating from the USA is removed, however a quota of 50 thousand tons is adopted, implying that 50 thousand tons of bone-in portions can be imported free of the anti-dumping duties, after which the current anti-dumping of R9.40/kg will become effective on additional imports. The extent to which imports under the quota will add to, or alternatively substitute existing imports will be dependent on quota allocations. If the bulk of the quota is allocated to new, emerging importers, a greater share of imports under the quota will be additive, as these new importers do not have existing market share to supply. In simulating the scenario, the exogenous world price was calculated as a weighted average, allowing for 50 thousand tons of in quota imports at the lower, US price level, while the price for remaining imports remains at the baseline level.

Scenario 3:
The current anti-dumping duty of R9.40/kg applied to bone-in portions originating from the USA is removed, however a quota of 120 thousand tons is adopted, implying that 120 thousand tons of bone-in portions can be imported free of the anti-dumping duties, after which the current anti-dumping of R9.40/kg will become effective on additional imports. The extent to which imports under the quota will add to, or alternatively substitute existing imports will be dependent on quota allocations. If the bulk of the quota is allocated to new, emerging importers, a greater share of imports under the quota will be additive, as these new importers do not have existing market share to supply. In simulating the scenario, the exogenous world price was calculated as a weighted average, allowing for 120 thousand tons of in quota imports at the lower, US price level, while the price for remaining imports remains at the baseline level.

The impacts of the three scenarios, measured against the baseline, are summarized in Figure 27. Whereas the line indicates the total sales realisation price of whole frozen chicken, the bars illustrate the percentage change in price for each individual scenario relative to the baseline. Over the 10-year projection period, complete removal of anti-dumping duties reduces the domestic chicken producer price by an average of 8.6% per year, while a quota of 50 thousand tons (Scenario 2) reduces the price by an average of 3.6% per annum.

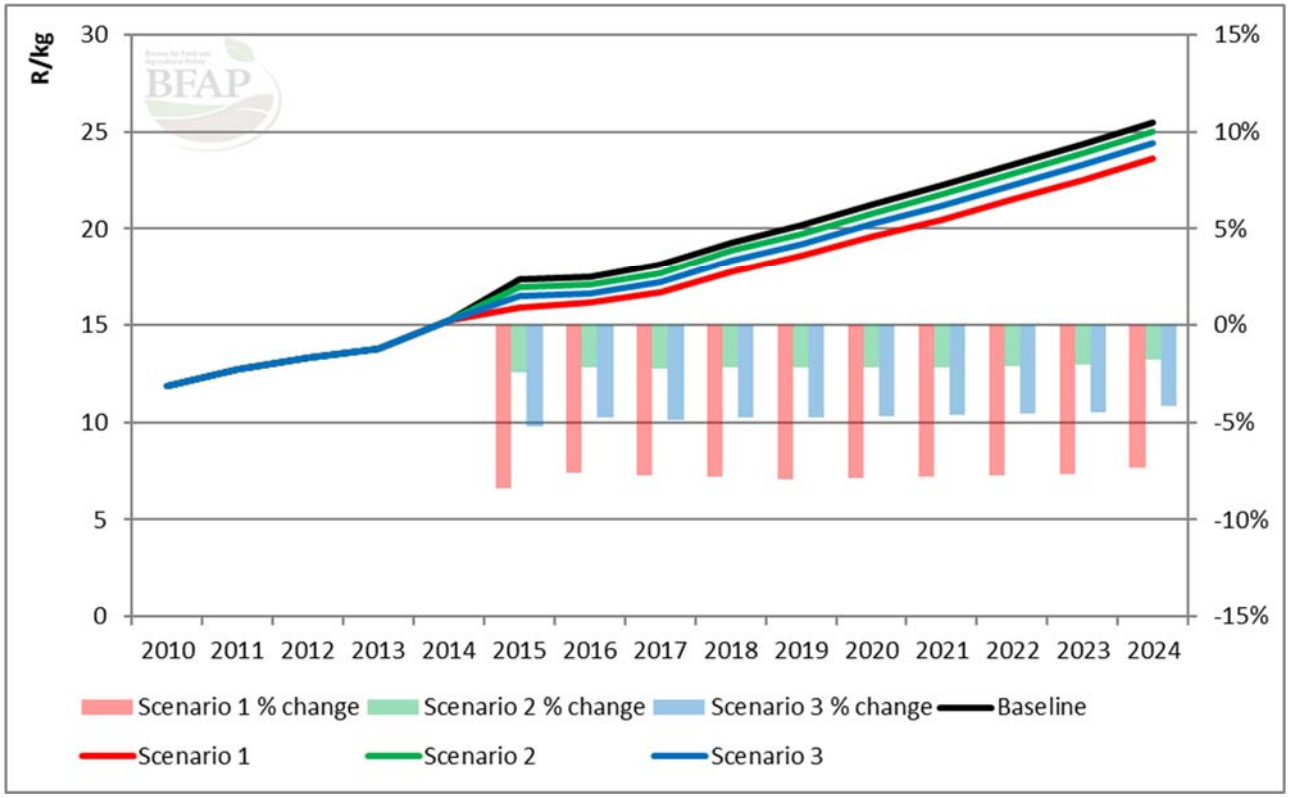


Figure 27: Impact of three different scenarios on the price of domestic IQF chicken pieces relative to the baseline

The implications of different price levels on producer margins is an important consideration, as production decisions remain grounded in profitability implications. Thus the introduction of the farm level system allowed for the simulation of the different price impacts on producer profitability. In the absence of data regarding large integrated companies, the producer level simulations related to a hypothetical, independent producer, based on the survey of production costs conducted in this study. The simulated producer raises approximately 300 thousand broilers per cycle, with a feed conversion ratio of 1.7, which represents the national average obtained in South Africa in 2013. In contrast to a typical contract producer, who sells live broilers to the integrated company for slaughter, the independent producer modelled in Figure 25 also accounts for slaughter costs, as would be the case for large, integrated companies. The model assumes that broiler houses are financed at a prime interest rate of 9.25%, over a 10-year period. Figure 25 indicates that under scenario 1, producer margins remain negative until 2018, turning positive for the first time in 2019.

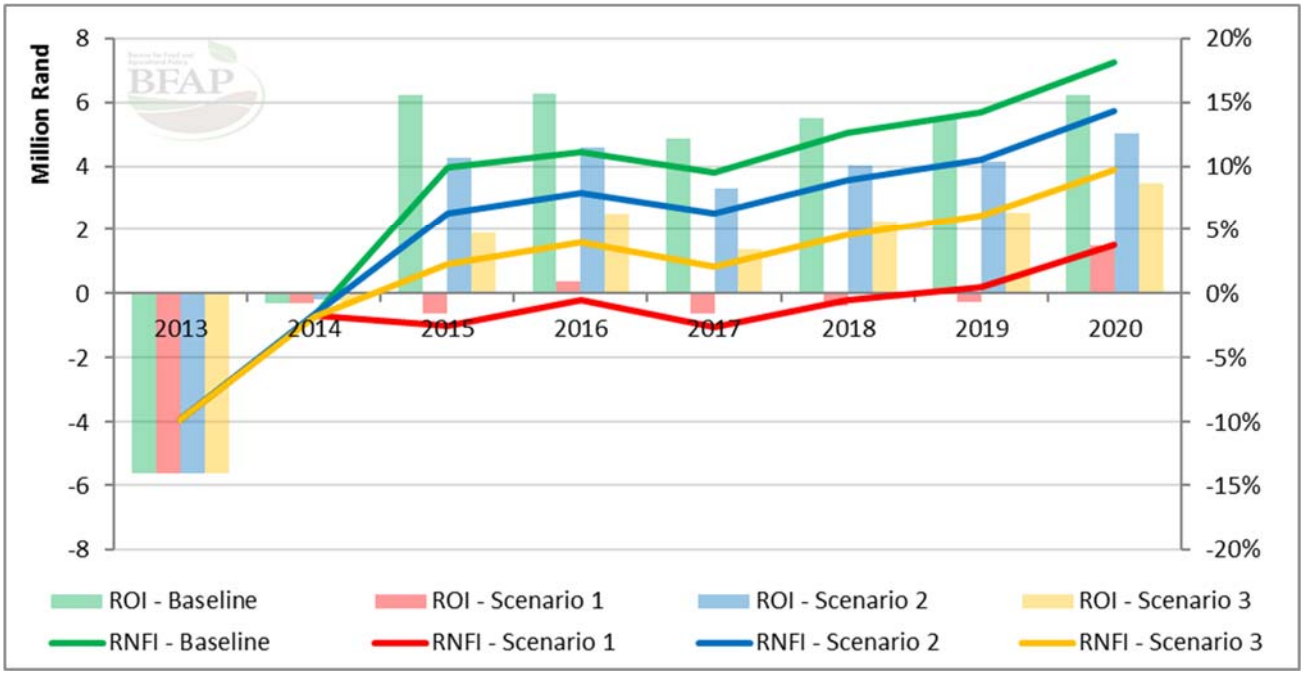


Figure 28: Nominal net farm income and return on investment for an independent producer

In a scenario where financing costs are no longer applicable, producer margins would improve, however this scenario is not sustainable at average efficiency levels and some producers will exit. Producers that have a more favourable debt structure, as well as those producing more efficiently will probably be able to continue producing. Mitigation strategies will include further concentration and vertical and horizontal integration in the industry. It is unlikely that there will be any expansion in domestic production under scenario 1. Furthermore, smaller, emerging producers with a less favourable cost structure and scale benefits will be unable to produce sustainably under this scenario.

The simulations related to AGOA provided an application of the newly introduced system from a producer's perspective. Additional considerations include the impact on the consumer, who would have access to more affordable protein. In this regard, the estimated price transmission elasticities can be applied to illustrate the impact on retail prices. These retail prices are presented in Figure 29.

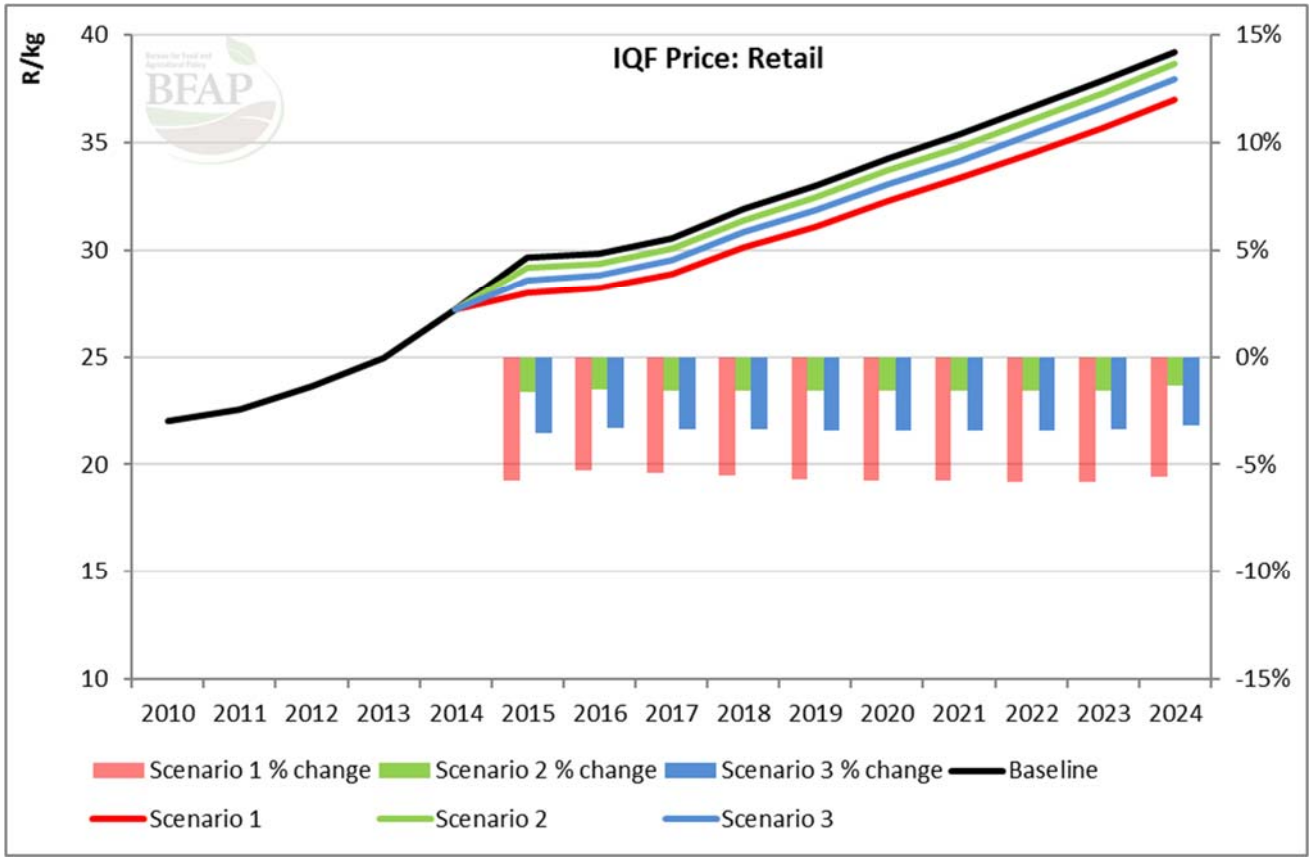


Figure 29: Impact of three different scenarios on the price of domestic IQF chicken pieces relative to the baseline at retail level

The scenario simulations conducted for the AGOA negotiations is a single application to highlight the models use in practice, but a number of different simulations can be conducted at fairly short notice given that the system is maintained. Furthermore, the disaggregated nature of poultry products in the framework allows for detailed simulations, such as the possible introduction of general tariffs on bone-in portions originating from the European Union.

4.3. Economy wide analysis

As an alternative to the partial equilibrium analysis presented in Section 4.1, quantitative modelling can also be conducted within a general equilibrium, or economy wide framework. General equilibrium modelling provides analysts with greater sectoral coverage, however it comes at the cost of detail in policy inclusion, specifically when detailed simulations are required within a specific subsector. Different modelling tools can also be used in combination, generating results that can be evaluated within the context of the strengths and weaknesses of different approaches.

Given the poultry industries contribution to agricultural GDP, the NAMC conducted different economy wide simulations regarding the relaxation of tariff protection in the broiler industry, which could be used to supplement the detailed partial equilibrium analysis conducted by BFAP. Whilst tariff adjustments are simulated in a much broader context, such an analysis is able to provide implications of different policies on macro-economic factors such as labour, as well as quantifying the impact of changes in the broiler subsector on other sectors in the economy. The analysis was conducted based

on different modelling systems ranging from a static input-output approach to the bottom up dynamic approach of the SAFRIM model and a computable general equilibrium (CGE) model.

4.3.1. Input-Output analysis

Input output analysis provides a static view of the impact that tariff relaxation in the broiler subsector would have on the South African economy. The net effect on GDP and employment was found to be negative, implying that the economy would be worse off in terms of economic growth and employment creation if the current tariff protection applied in the broiler industry were to be relaxed. Simulations indicate that the GDP will decrease by R 3491 million and about 25 237 potential jobs can be lost. The negative impact on the economy is created by reduced investment, reduction in the local production of broilers and the decrease in government revenue resulting from tariffs. A partially offsetting positive impact on the economy arises from the price reduction of broilers in South Africa and its positive effect on the intermediate and final consumers of broilers.

Further detail on the analysis is provided in Annexure E, but it should be noted that the broiler industry has a notable macroeconomic impact, particularly in the North West, KwaZulu-Natal, Mpumalanga and Gauteng. Thus negative changes in the viability of the sector will have a notable effect, particularly among communities in these areas that depend on the broiler sector to earn a living.

The broiler industry lends itself to a start-up industry for small and emerging farmers due to established grower support, existing broiler processing facilities and immediate access to market provided by industry structure. The sector has the potential to contribute to the revitalisation of rural economies, which is further detailed in Section 5.

4.3.2. SAFRIM Model

The economic impacts were also simulated within the SAFRIM general equilibrium modelling system, which can be classified as dynamic and multi-sectoral, providing forward-looking analysis through a bottom-up approach. Macro-economic aggregates are built up from detailed industry or product levels. The methodology of the approach is detailed in Annexure E, which provides a report by Conningarth Economists, acting as consultants to the NAMC.

The various impacts in this analysis relate to loss in investment by the broiler industry, reduced production (operational cost and profits) in the broiler industry, loss of government income from relaxing the import restrictions and a positive effect on the buying power of the private consumer due to a reduction in the price of broilers. The results highlight that the positive effects consumers will receive due to cheaper broiler prices will be outweighed by the negative effects on the broiler industry. The net result is a net loss of R -224 million in GDP and a reduction in -20 693 jobs. The analysis concluded that the broiler industry in South Africa would benefit from safeguards against imported products delivered into South Africa at very competitive prices due to carcass valuation dynamics.

4.3.3. Computable General Equilibrium Model

The NAMC further simulated a similar scenario through a CGE framework, indicating that relaxation of tariff protection will reduce the demand for endowments such as land (-1.9%) and labour (-2.61%). Capital investment was also found to decline by 2.61%. Resources are substituted towards alternative sectors as detailed in Table 5.

Table 5: Resource substitution from poultry to alternative sectors

Sector	Change in Land	Change in Skilled Labour	Change in Unskilled Labour	Change in Capital Investment
Red Meat	0.41%	0.05%	0.05%	0.05%
Cereals	0.07%	-0.014%	-0.014%	-0.014%
Other Grains	0.25%	0.08%	0.08%	0.08%
Processed Food	0.48%	-0.07%	-0.07%	-0.07%
Textiles	0.48%	0.03%	0.03%	0.03%
Light Manufacturing	0.56%	0.04%	0.04%	0.04%
Heavy Manufacturing	0.57%	0.05%	0.06%	-0.05%
Capital goods & services	0.57%	-0.03%	-0.03%	-0.03%

On the outputs side poultry, cereals and grains and processed meat output will decrease by 5.49%, 1.4%, and 1.8% respectively. All the other industries indicate an increase, with the highest being in the heavy manufacturing industry with an increase of 4.9% and 1.9% in the light manufacturing industry.

The household demand for imported poultry products increases by 0.64%, which is below expectation, however the relatively low transmission of prices from producer to consumer levels arising from supply chain costs provides a possible explanation. Possibly for the same reason, demand for alternative (higher priced) red meat products increases only marginally (0.0008%), significantly less than other grains (0.0043%) and processed food (0.0126%). Textiles decrease by 0.0088%, extraction products by 0.0001%, light manufacturing goods by 0.17%, heavy manufacturing goods by 0.0137% and other services by 0.015%.

The effect on the demand for household products arising from tariff relaxation are as follows:

- Poultry – negative 0.4827%
- Red meat & livestock – positive 0.0205%
- Cereals & grain – positive 0.0009%
- Other grains – positive 0.0054%
- Processed food – positive 0.0068%
- Textiles – positive 0.0034%

- Extraction – negative 0.0013%
- Light manufacturing – positive 0.001%
- Heavy manufacturing – negative 0.001%
- Other services – negative 0.0586%

Total domestic sales at the retail level will decrease by 0.55%, whilst red meat sales increase by 0.0396%. Demand for oil seeds and grains will also decline because it forms part of the broiler value chain as feed. The demand for locally processed food will change due to the reduction in domestic poultry processing.

The poultry meat trade balance is reduced by 70.44%. Industries that will benefit from the relaxation of tariffs are the red meat industry (4.3%), cereals & grains (0.27%), other grains (6.9%), processed food (5.57%), textiles (2.59%), light manufacturing (14%), heavy manufacturing (35.89%) and other services (7.49%) The net effect is positive 4.16%.

All the sectors show positive export demand coefficients regarding exports which implies that when tariffs are relaxed exports will increase. The highest increase in exports would be in the red meat livestock sector of 0.96%. Red meat exports are increasing to Africa and the Middle East. Poultry exports would increase by 0.36%. Most of the South African exports of chicken meat are to its neighbouring countries like Lesotho and Swaziland. The lowest increase in exports is the extraction sector of only 0.02%.

Apart from the poultry trade balance the CGE analysis indicated that the magnitude of the impact on the rest of the economy was fairly small. This is not surprising given that agriculture represents less than 3% of the total South African GDP. Nonetheless, it does not imply that the industry is unimportant: the drought experienced in 2016 provided a prime example of the importance of a sustainable agricultural sector in South Africa Thus the importance of the broiler sector in South Africa does not rest on its contribution to GDP, but instead on its role of ensuring affordable protein for lower income consumers, as well as its up- and downstream linkages to the rest of the agricultural sector. Such linkages allow it to underpin job security for thousands of South Africans, whilst ensuring stability in the greater agricultural sector.

5. Transformation and Inclusivity in the South African Poultry Sector

Contrary to the concentrated commercial broiler industry, many small-scale producers account for 7% (4% commercial smallholders and 3% subsistence) of the domestic chicken market in South Africa. The Department of Agriculture, Forestry and Fisheries (DAFF) has a list of approximately 2264 identified small-scale or developing poultry farmers, of which Silverpath Consulting, a firm appointed by SAPA, identified 647 producers to be surveyed quarterly. Amongst others, the quarterly survey aims to create awareness of common industry concerns. Surveys were conducted telephonically and in 2013 it was found that 222 of the 647 producers identified by Silverpath were no longer involved in poultry production. Data were collected from 425 poultry farmers for the three quarters from 4Q2013 to 2Q2014. These farmers were also DPFO members at the time. The DPFO was one of the four

subsidiary bodies within SAPA, but the four bodies (chick producers, small farmers, broiler producers and layer producers were reorganised into two bodies in 2015, one for producing meat and one for producing eggs for commercial sale. Thus the DPFO members have been integrated into the relevant broiler or egg producer organisations.

The level of representativeness of this sample in relation to the total developing poultry farmer population is not clear. While the sample is quite sizable relative to the DAFF 'population' list, the manner in which farmers were selected and added is not clear and it is possible that indications like provincial distribution might be slightly misleading. This database however represents the best data available for developing poultry farmers in South Africa and though some findings need to be viewed in context, the data do supply a valuable glimpse into the characteristics of developing poultry producers.

Figure 30 supplies a spatial summary of the 3Q2014 survey when 498 farmers were interviewed. The vast majority of developing broiler farmers seem to be situated in Limpopo (31%), KwaZulu-Natal (21%) and Gauteng (15%). This is in contrast with commercial broiler production where more than 65% of national production takes place in Mpumalanga (19.68%), North West (24.74%) and the Western and Northern Cape (20.80%).

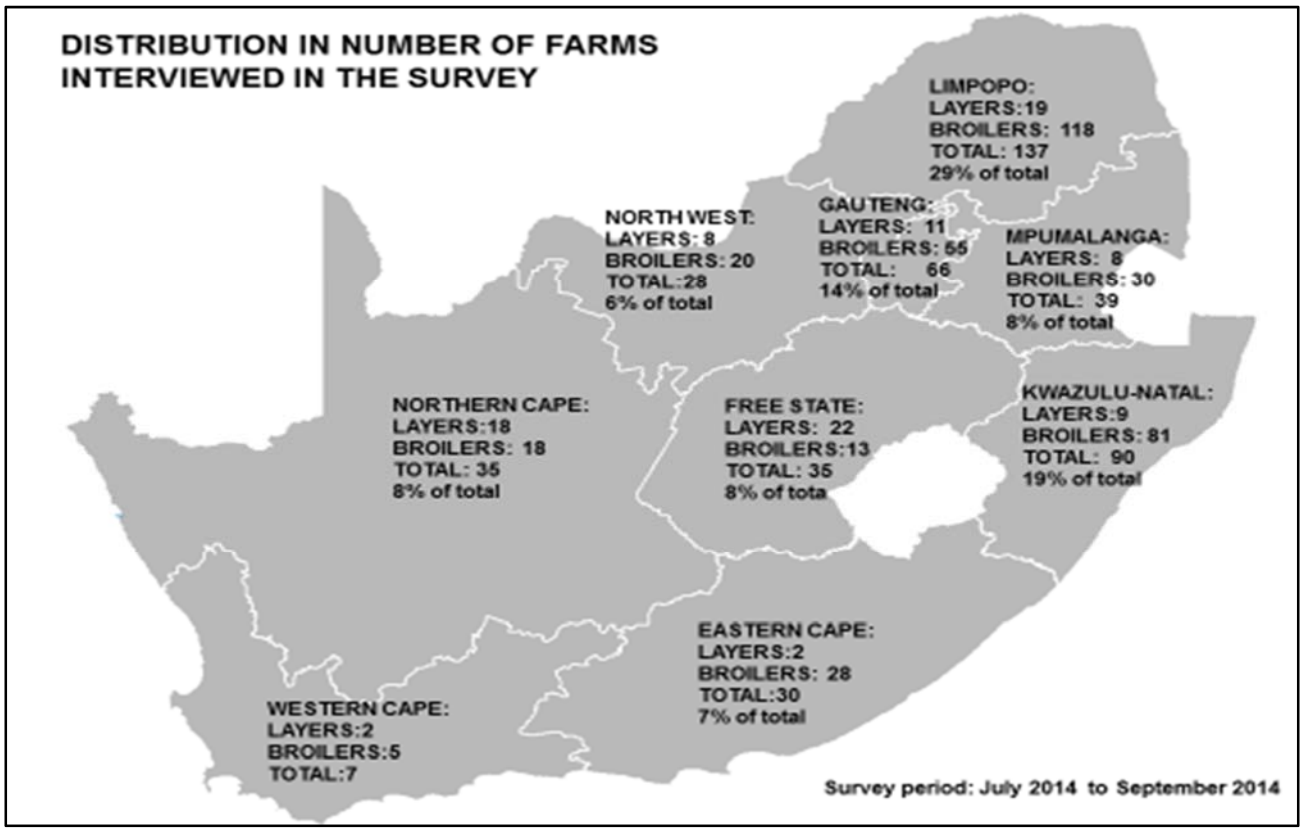


Figure 30: Distribution of developing poultry farmers interviewed
Source: Silverpath, 3Q2014 report

When imported products are not considered, SAPA (2013) estimates indicate that small scale commercial production accounts for 5% and subsistence production for 4% of total domestic chicken

production in South Africa. SAPA classifies small scale commercial broiler farmers as those producing less than 40 000 broilers per cycle. Whilst small in the context of this industry, producers of 40 000 broilers per cycle would still requiring substantial capital investment into housing facilities. Based on small farmer indications, as collected by Silverpath, the vast majority of small-scale poultry producers are considerably smaller, with 75% of farmers in the Silverpath small-scale broiler farmer sample (308 farmers) placing less than a thousand chicks per month (Figure 31). More than 50% of small-scale broiler farmers place less than 500 chicks a month and when the last quarter survey of 2014 was done close to 60% of the survey sample held 500 or less chicks (32% held 200 or less).

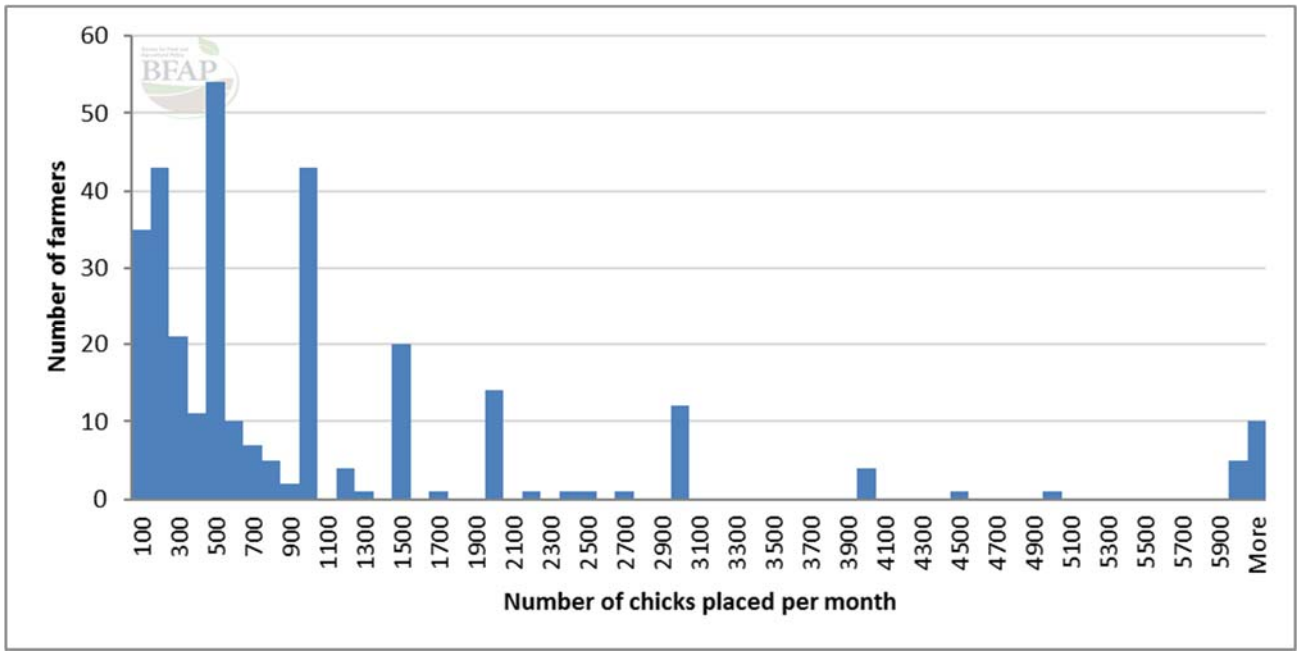


Figure 31: Number of developing farmers and chicks placed

Capacity indications supplied by the small-scale farmers however indicate that nearly 70% the surveyed broiler farmers have chicken housing facilities larger than 500 birds. In fact 64% have housing facilities with a capacity exceeding 1000 chickens.

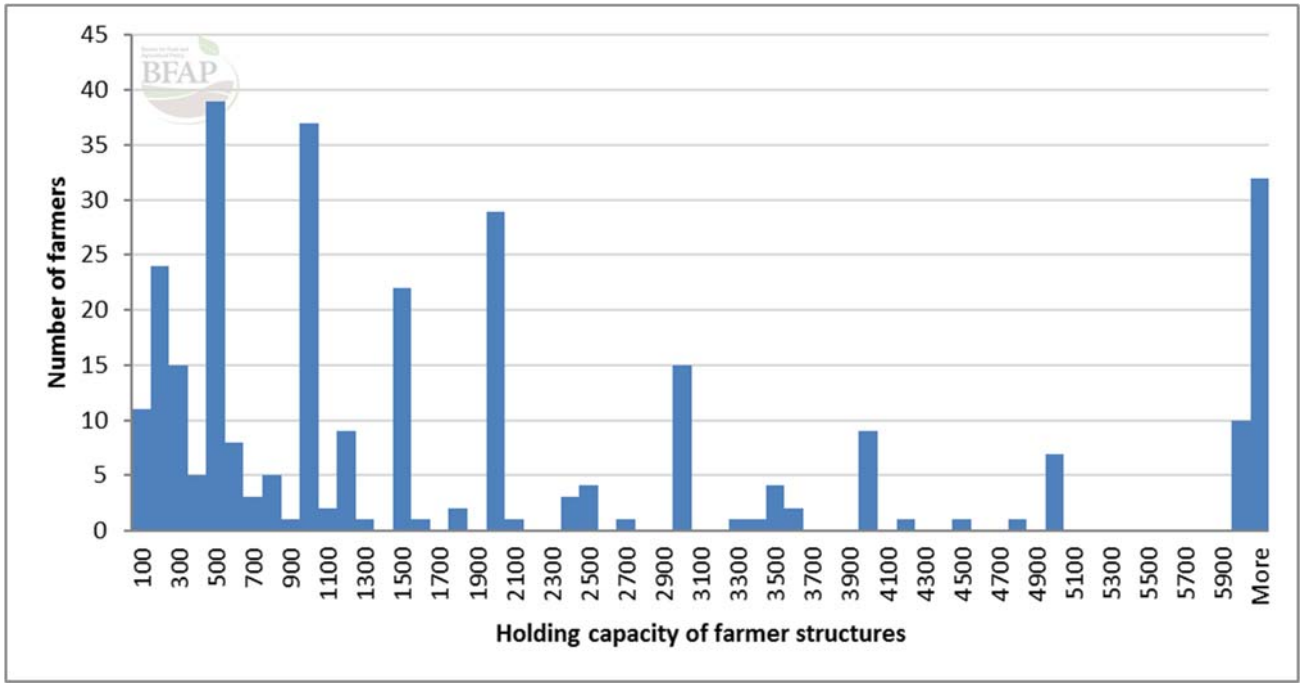


Figure 32: Number of developing farmers and holding capacity

Based on Silverpath Consulting's third quarter 2014 report, the small-scale farmers in their survey sample have a combined capacity of 3 658 300 birds per cycle but only 2 667 200 broilers had been placed at the time of the survey.

Similar to the commercial value chain, contract growing represents an important share of production, with 15 contract growers in the sample accounting for around 65% of broiler production by developing farmers (SAPA, 2014). These contract growers are situated in Limpopo, Gauteng, Mpumalanga and North West and their average size is 41 113 birds. The smallest contract producer in the sample places 21 000 birds per cycle and the largest producer places 1200 00 birds. Despite their small number, the substantial share of total production indicates that contract growers represent the bulk of production by emerging producers. The balance of producers operate independently and as such do not have the same access to inputs as well as market surety that is characteristic of contract production. More egg producers seem to be operating closer to capacity - 59% of the sample group of 54 had 500 or less layers.

Given the diversified nature of producers within the sample, the earning potential from poultry farming must be contextualised in terms of operational size. Specific consideration will be given to a number of distinguishable small-farmer categories (Table 4), comparing profit levels of producers within these sub-classifications to that of large-scale commercial producers, whilst highlighting challenges and opportunities for these producers.

Table 6: Sub-classification of small scale broiler producers in South Africa

Small scale - live	Small scale production, typically around 500 birds per cycle, marketed live, directly to consumer
Small scale - slaughtered	Small scale production, typically around 1 000 birds per cycle, slaughtered at maturity, marketed directly to consumer
Medium scale - live	Medium size production, typically around 10 000 birds per cycle, staggered placement, marketed live, directly to consumer
Medium scale - slaughtered	Medium scale, staggered placement, live sales, both directly to consumer and to abattoir who will market slaughtered birds
Medium scale contracted	Medium to larger scale contract grower

Source: SAPA Discussions

5.1. Value chain structure: Emerging producers

Developing producers form part of the commercial value chain in the sense that they procure some of their inputs from commercial, integrated producers. However limited access to these inputs remains a concern and a substantial share of the emerging value chain remains independent and isolated from the intrinsic efficiencies of the commercial chain. Given the wide range of diversity across the value chain, generic representation is challenging. Figure 33 represents a flow diagram illustrating the broad structure of the chain.

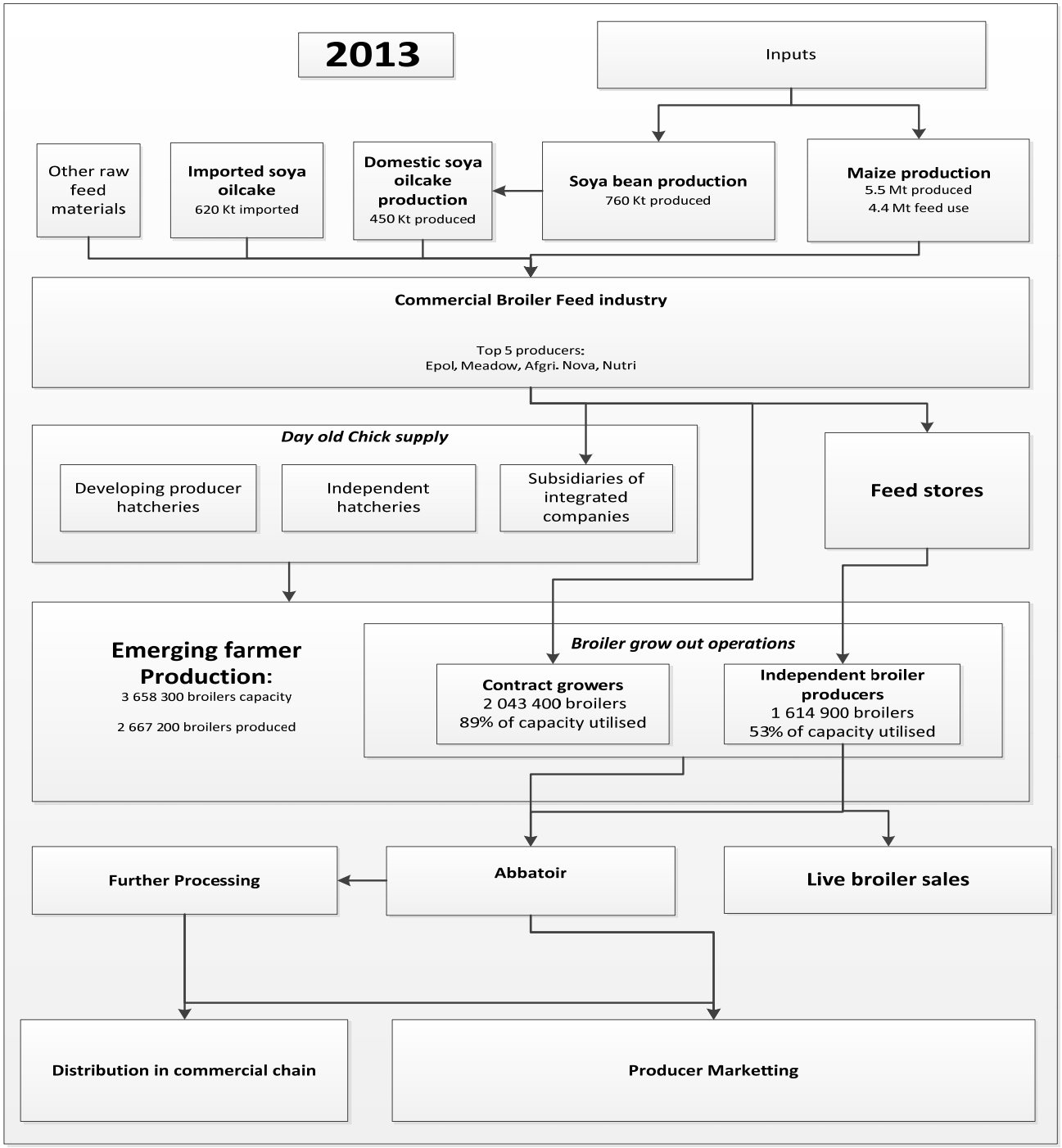


Figure 33: Generic Structure of the emerging producer value chain

Whilst a generic chain is useful, the reality is that the value chain looks very different for independent producers and those that deliver on contract to large integrated companies. The substantial gap between the scale of operation of small independent producers and producers delivering on contract for integrated companies highlights the challenges of growing gradually within this system. Limitations on the number of chickens that can be marketed successfully at any one time have inhibited the expansion of independent producers, necessitating a substantial investment to increase scale to the acceptable level for contract production. Few emerging producers have access to the credit required to make such an investment. Consequently, market access and scale superimposes a dualistic nature on the industry where small scale growers remain focussed on live bird production and larger commercial

growers deliver into a vertically integrated chain that processes and distributes broiler products. Nevertheless, both types of producers essentially are commercial, with vastly different supply chains, each with unique challenges.

If producers were to move from the independent production chain into the mainstream system to produce on contract for corporate companies, this gap will need to be breached through innovative practices and possible support and intervention targeted towards this purpose. Costs such as food safety testing and catching are relatively higher for smaller batches, whilst chick and feed delivery costs are also higher. Given the nature of the contract growing model, which provides growers with inputs as well as an assured off-take market, the system can provide a solution to many of the current challenges faced by small, independent producers. The current pricing model (referred to in literature as tournament pricing), which effectively results in a competition between different producers, represents its own unique challenges in this context if new entrants are unable to acquire top range production and housing technologies required to produce at high levels of efficiency. Alternatives, such as a separate "tournament," may need to be considered, at least for an interim period of introduction, which allows for experience and improvement in efficiency. Within this context of having to compete based on technical efficiency, the importance of mentoring cannot be overemphasised.

5.2. Relative production costs

Following a survey of typical production units based on the categorisation presented in Table 6 the technical performance data as well as key variable production costs, disaggregated to the extent that data availability allows, is presented in Table 7. In order to illustrate the relative costs of production related to various types of small scale producers, as well as larger commercial producers, BFAP conducted detailed interviews with a small number of production entities. Similar to the methodology applied by international institutions such as the agribenchmark initiative only a small number of participants were interviewed allowing for a more detailed discussion compared to a large scale, statistically representative survey. Participants were chosen based on the categorisation presented in Table 6 and while no single producer can be considered representative of small scale production at large, the participants were chosen strategically so that surveyed production units are considered to be representative of the specific categories of small scale production that are presented. In addition, the same cost elements are presented for large scale production units within the current commercial value chain. Within this comparison the cost of labour and overhead costs such as the cost of land and buildings have not been accounted for. Accurate disaggregation of poultry-specific labour expenditure is problematic and government assistance to developing farmers complicates overhead expenditure comparisons.

Table 7: Technical and production cost data for small and large scale broiler producers in South Africa

	Small Scale Live Sales	Small Scale Live Sales	Small Scale - Live and Slaughtered	Staggered - Live and Slaughtered	Staggered Placement - Live	Small Contract Grower	Large-Scale Commercial production (Contract)	Large-Scale Commercial production (Independent)
Number of Chickens	394	600	1500	9500	9900	25000	290 000	1 440 000
Number of houses	1	2	1	9	7		6	30
Length of growth cycle in days	42	42	42	35	38	36	34	34
Length of vacant period in days	21	14	7	14	7	14	14	14
Length of total cycle	63	56	49	49	45	50	48	48
Mortality %	3		20	2.5	20	6	4.8	4.8
Average live mass at end of cycle in kg	2.2	2	2	1.8	1.7	1.8	1.8	1.8
Cost of production per bird								
Bedding	NA	0.43	0.17	0.44	0.08	0.48	0.11	0.11
Catching	NA	NA	0.08	NA	NA	0.31	0.09	0.09
Cleaning	NA	NA	0.75	NA	NA	0.16	0.09	0.09
DOC's	6	5.5	4.5	7	5.1	4.64	3.41	3.41
Transport of DOC	1.02	NA	0.17	0.53	NA	NA	NA	NA
Electricity	4.57	0.25	NA	0.25	0.24	0.24	0.14	0.14
Feed	14.89	15	26.18	20	24.24	19.52	11.70	11.70
Heating	1.22	NA	NA	NA	0.05	0.72	0.22	0.22
Medicine and vaccinations	0.67	0.33	0.17	0.2	0.01	NA	0.13	0.13
Repairs and Maintenance	NA	NA	NA	NA	NA	NA	0.16	0.16
Other diverse costs						NA		
Transport of at end of cycle	0.76	NA	0.45	NA	0.07	0.16	0.07	0.07
Slaughtering Costs	NA	NA	3.9	0.83	NA	NA	NA	2.86
Total Production Cost (R/Bird)	29.12	21.52	32.47	28.42	29.79	26.23	16.31	19.17
Income = Price(R/bird)	65	35	50	38	40	22.14	19.58	21.38

Consideration of the production costs reported by the various producers clearly illustrates the advantages of scale in reducing the per-unit cost of production. Nonetheless, establishment costs related to large-scale production requires substantial investment in highly specific assets. As such, production units tend to be financed, adding additional dimension to both the cost and risk structures. Consequently, large scale producers tend to produce on contract for large, integrated companies, guaranteeing a market for large numbers of marketable chickens that are sold at a near-optimal time in the production cycle. Within this integrated producer structure, large diversified companies take on a significant portion of the producer's risk, providing inputs and guaranteeing a market for the end product within a pre-determined pricing structure.

This pricing structure is essentially based on production cost for average efficiency within the group of producers. By implication, the pricing structure benefits producers that are able to attain higher levels of technical efficiency, at the expense of those with lower efficiency levels, driving rapid efficiency gains over time. Whilst consideration of production costs within the pricing structure reduces the risk for the contracted producer, who is effectively paid for his services in raising day-old chicks for the company, integration into this value chain also results in the producer receiving a much lower price for live chickens relative to smaller producers that market directly to consumers. Integrated companies, as well as various other players in the value chain, such as distributors and retailers, add value to the products before they reach the end consumer. When small scale producers market directly to consumers, prices are comparable to retail prices in store, as illustrated by Figure 34. Furthermore live sales include the offal, edible and inedible in the per kg basis, whereas shop birds do not.

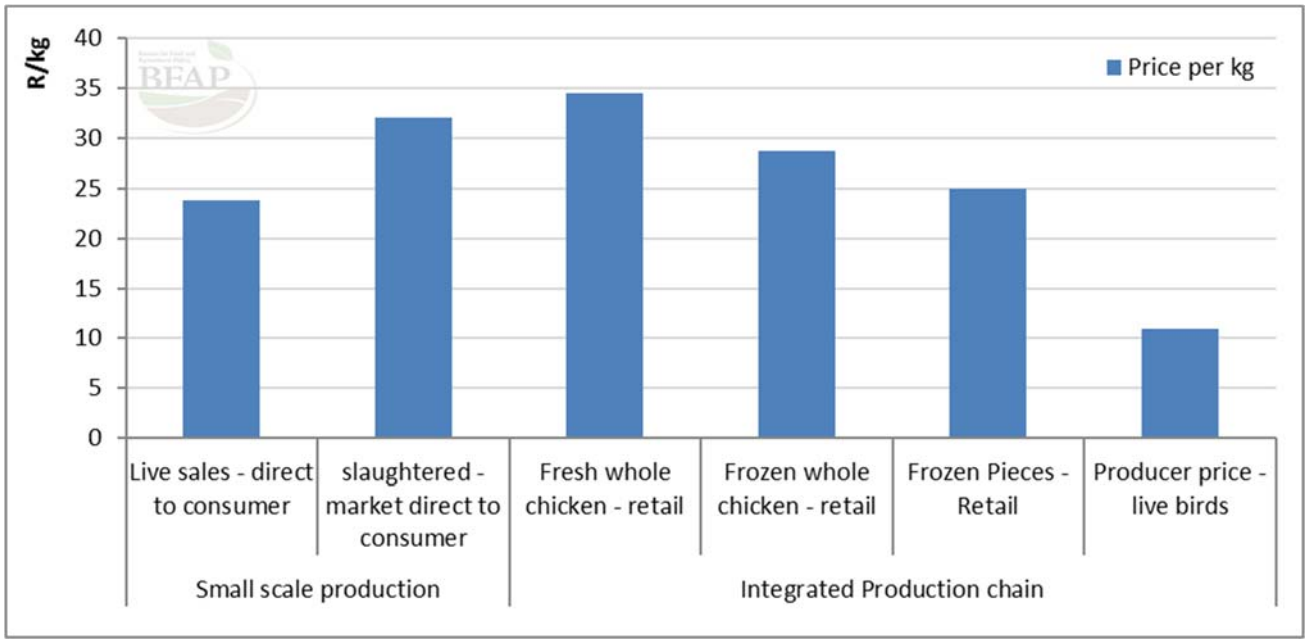


Figure 34: Relative prices received per kg (Quarter 3, 2104)

5.3. Perspectives on operational size

Considering the average gross margin obtained by the different emerging producers, as an example of a plausible margin that can be obtained, a first step in considering the commercialisation of small scale

producers is to establish the potential earnings from different sized operations. A measure of the opportunity cost of producing broilers on a full time basis could be the operational size that would allow producers to break even with minimum wage levels in alternative industries.

Gross margin calculations are presented for the identified small-scale producer categories, based on BFAP's surveys and representative farm approach. The average gross margin per bird calculated for an emerging farmer amounts to R11.26. In calculating this average, the very small scale producer (<400 birds) as well as the small scale contract grower is excluded, since their gross margins deviate substantially from the other four types. The prices obtained by the very small scale producer are very high relative to the rest of the sample and considering the length of his production cycle, as well as the final marketing weight which is almost 30% higher than the other producers in the sample, his production practices are not considered to be typical and hence are excluded from the calculation. The contracted producer is also excluded, as the marketing strategy is very different from the independent producers considered in the study. Producers delivering on contract should be considered separately as they are effectively already part of a formal commercial value chain.

Table 8 considers the gross margins obtained by the various small scale producers, calculated as the difference between the revenue obtained and the directly allocable variable production costs per chicken. These margins were aggregated to income levels for the different operational sizes of the respondents. The income levels are further adjusted for mortality rates which were quite high for selected respondents.

Table 8: Gross margins obtained by small scale broiler producers

	Small Scale Live Sales	Small Scale Live Sales	Small Scale - Live and Slaughtered	Staggered placement - Live and Slaughtered	Staggered Placement - Live	Contract Grower
Price(R/bird)	65.00	35.00	50.00	38.00	40.00	22.14
Total Variable Production Cost(R/Bird)	29.12	21.52	32.47	28.42	29.79	26.23
Gross Margin (R/bird)	35.88	13.48	17.53	9.58	10.21	-4.09
Gross Margin per cycle	14 137	8 090	26 292	91 047	101 118	-102 282
Gross Margin Per cycle (Mortalities Included)	13 713	8 090	21 034	88 771	80 893	-108 419
Gross Margin (R/bird) (Mortalities Included)	34.80	13.48	14.02	9.34	8.17	-4.34

As contextualisation of these income levels, Table 9 presents the required operational size that would result in income from broiler production breaking even with income levels from various other sources (as proxied by relevant minimum wage levels documented by the Department of Labour), as well as the South African poverty line.

Table 9: Size required for break-even income levels from alternative sources

	Monthly Income	Annual Income	Birds per year	Birds per cycle (6.5 Cycles p.a.)	Birds per cycle (4.5 Cycles p.a.)
South African Poverty Line (2008 value)	515	6180	549	84	122
Farm Worker (Minimum Wage)	2420	29045	2581	397	573
Hospitality Sector (Minimum Wage)	2751	33012	2933	451	652
Taxi Drivers (Minimum Wage)	2847	34164	3035	467	675
Entry Level Mine Worker	6000	72000	6397	984	1422

Source: Department of Labour (2014)

In order to break even with a minimum wage of a farm worker, a poultry producer would require approximately 400 birds per cycle. This is based on the assumption that there are 6.5 production cycles in a year. In some instances, small scale producers with less sophisticated heating systems would not produce during the winter (especially on the Highveld) since mortality rates resulting from the harsh climate are simply too high. Assuming that no production takes place during May, June, July and August, there are only 4.5 production cycles within a year. This would require around 75 birds more per cycle to break even with the minimum wage of a farm worker. Breaking even with the salary of an entry level mine worker would require 984 birds per cycle for a full year's production, a figure which rises to around 1400 if no winter production takes place. Based on these comparisons and the number of birds held by small producers (Figure 31), less than 40% of the broiler farmers surveyed by Silverpath earn more than a farm worker – assuming that poultry farming is their only income source.

An interesting and relevant size to consider is 1500 birds per cycle. Interviewed respondents indicated that corrugated iron broiler houses are commonly received by small-scale broiler producers as a grant in the Comprehensive Agricultural Support Program (CASP). The capacity of this type of housing is approximately 1500 birds per cycle and as a result, the income that can be earned from such a structure is represented in Table 10. As with prior calculations, a gross margin of R11.26 per bird was assumed.

Table 10: Income levels obtained from 1500 bird capacity CASP grant broiler house

	CASP Broiler house grant (6.5 cycles per year)	CASP Broiler House grant – no winter production (4.5 cycles per year)
Possible earnings (R/ month)	9 145	6 331
Possible earnings (R/ year)	109 739	75 973
Number of birds per year	9 750	6 750
Number of birds per cycle	1 500	1500

From Table 10 it is apparent that a producer receiving this type of grant would be able to generate a monthly income that is comparable to that of an entry level mine worker. There are however some caveats associated with this. The aforementioned grant only provides the structure with no heating, lighting or feeding fixtures. Due to the lack of these fixtures there is usually a high mortality rate associated with these structures. From the analysis it is clear that, with the right training and access to heating, lighting and feeding fixtures, a small-scale CASP broiler housing beneficiary could earn a

comparatively good living. Funds and/or grants should therefore be channelled to make these basic structures more functional and efficient.

5.4. Challenges and limitations in the current production system

The production systems employed by emerging producers has distinct advantages. In marketing products directly to consumers, producers obtain a substantial premium for their chickens and despite the inflated production costs, margins per chicken are far higher than those of large scale commercial producers. Nevertheless, the production system also has its own challenges.

Given the scale and location of production, continuous, reliable access to affordable, quality inputs remains a challenge, as does market access for marketable birds. Sale of live birds directly to consumers represents somewhat of a niche market, hence producers do not compete directly with retail stores. There is, however a distinct limit to the number of birds that can be marketed at the same time. When a large number of chickens reach maturity at once, there is no guarantee of an immediate market for all of them and when a share of the already marketable chickens are fed until sale, the cost of production increases. This represents a significant market risk for the producer, which essentially arises from the nature of the product.

When unable to market the chickens themselves, producers have the option of selling live chickens to the abattoir, which will then undertake the marketing of the carcasses. This represents the same outlet as that of large scale, contracted producers, and hence the price received for marketable broilers will be market related. Given the large number of birds that need to be sold at once and the limited number of abattoirs in close proximity to producers, individual producers have little bargaining power regarding the price. Furthermore, the cost of production of these small-scale producers is higher than that of commercial contract producers with scale advantages and as a result the abattoir price, as opposed to the live sales price, could potentially leave producers with little or no profit margin.

As an alternative to live sales, producers have the option of incurring the additional slaughter costs themselves and then marketing the carcasses in order to obtain a higher price. Initial surveys indicate that the costs of slaughter amount to approximately R4 per chicken. Producers still market the slaughtered broilers themselves and again face the challenge of a large number of broilers that have to be marketed informally. Producers in this instance would need refrigeration and storage facilities for the time required to market all carcasses, which presents another limiting factor to the scale at which such a marketing system can be employed.

Producers considering expansion therefore find themselves in somewhat of a catch 22 situation. Unable to procure inputs in bulk due to the limited size of the operation, their input costs are significantly higher than those of commercial, contracted producers. Whilst able to compete in the live bird market, the realistic number of chickens that can be marketed at a single time limits the size of the operation, making gradual, organic growth from a small scale to a large scale commercialised production system very challenging. Producers wishing to enter large scale commercial production will likely need to be contracted in order to secure financing and will have to achieve a certain scale to make production within this very competitive system viable. In addition, the pricing mechanism

used within contract production implies that skilled producers, as well as access to good production technology are required in order to remain competitive. Consequently, substantial investment in highly specific assets is required and while returns can be considerably higher than in small scale production both the size of the required investment (financial) and the associated production risks are much greater. As a result, a system of contracted production, which displaces some of the common production risk onto large, integrated companies, has evolved globally. Within this structure, a continuous supply of quality inputs is secured within the company structure, whilst a market for grown out birds is guaranteed. The cost of inputs is subtracted from the price paid for marketable chickens, easing cash flow for the contracted producer.

Broiler production is not the only option in the poultry sector and a large number of smaller egg producers are also making a living in the sector. The progress report on transformation and inclusivity details the challenges and opportunities in small scale egg production, with a short synopsis included in Box 2. Many small scale egg producers face similar challenges to broiler producers in terms of input procurement, but imported products have a much smaller role in meeting demand and whilst cash flow management may be more challenging, Box 2 indicates that organic growth from small scale to larger scale egg production systems may be more easily achieved.

Box 2: Challenges and opportunities in small scale egg production in South Africa

Egg production in South Africa has expanded substantially over the past decade, surpassing 440 thousand tons by 2014. As in the broiler industry, rising feed costs over the past three years has applied pressure on producer margins; hence the bulk of the almost 40% expansion in egg production occurred prior to 2012, remaining largely stagnant since then. In 2015 South African consumers on average consumed 150 eggs per capita which is considerably lower than consumers in developed and even developing countries (Argentina = 256, USA = 261 and Mexico = 352). A return to normal weather conditions and the associated decline in feed grain prices looks set to improve profitability in the medium term, and given the affordability of eggs as a protein source, the industry will have sufficient room for expansion in the coming decade.

In contrast to the broiler industry, SA is largely self-sufficient in egg production and imports account for less than 1% of domestic egg consumption. In 2015 SA exported eggs at a value of R227.7 million (10.5 % higher than 2014) to mainly Mozambique (56%), Zimbabwe (12%), Angola (10%) and Swaziland (9%).

Similar to the broiler industry, the layer value chain is integrated, with public as well as private companies accounting for a substantial share of domestic production. The DPFO, as it was in 2013, indicated that established commercial producers account for 95% of domestic egg production in South Africa, with small commercial producers accounting for only 2% and subsistence farming for a further 3%. The classification of egg producers currently used by SAPA classifies a small scale commercial producer as a producer housing less than 50 000 hens per cycle. According to a 2014 SAPA DPFO survey of 54 small-scale egg producers, 59% of farmers had 500 or less layers, only four farmers bought their feed in bulk (as opposed to 50 kg bags) and 63% sold their eggs

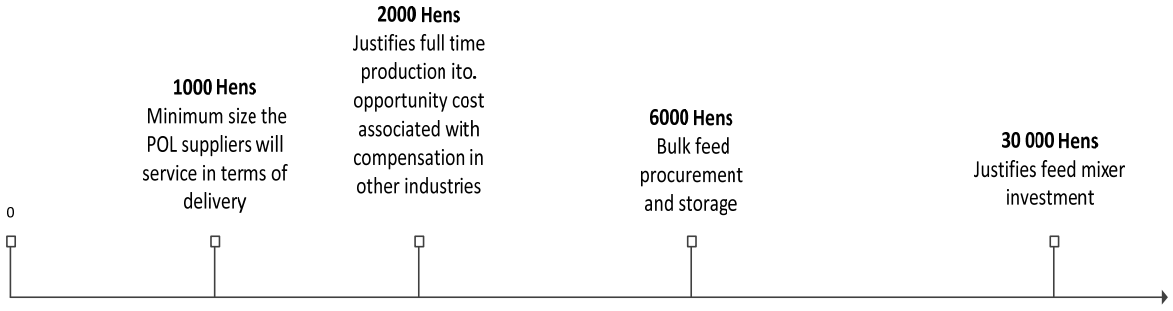
within the local community. A 2015 SAPA survey found 68 farmers holding 253 000 hens but with facilities available to house 470 600 hens.

Farmers indicated that their biggest challenges relate to market access for their eggs and high production costs linked to their inability to procure inputs in bulk. Production cost and unit size specific income comparisons comprehensively discussed and presented in the progress report focussing on transformation and inclusivity showed that for a small-scale egg producer to earn an income comparable to that of an entry level mine worker, at least 1883 hens are required, when the residual value of the spent hen is not accounted for. If the value of the spent hen is included, this number decreases to 961 hens with an initial point-of-lay hen investment of R57 660 (i.e. 9.6 times the monthly 'salary' of R6000).

It seems reasonable to argue that all enterprises that are smaller than 1000 layers are classified as non-commercial and enterprises between 1000 and 2000 layers could be classified as enterprises on the cusp of commercialisation. It is however expected that most operations below 2000 layers are operated on a part-time basis with other enterprises or off-farm revenue supplementing the farmers' income.

Other factors however also influence the critical size determination:

- Based on discussions with pullet suppliers the minimum size for them to service a producer, in terms of deliveries, is 1000 pullets, but in principle this also depends on the distance from the supplier.
- A critical size in terms of feed procurement was identified as 6 000 birds as this number requires about 16 tons of feed / month, this feed can be stored in a relatively small silo and in terms of delivery logistics is just more than half a truck load.
- Another critical size, in terms of feed procurement, is when a layer producer can make use of a feed mixer and mix his own feed rations. Calculations show investment in a feed mixer will only start making economic sense for an egg production enterprise larger than 30 000 birds.



Egg production in South African is regionally focused with only one large company and a second cooperative marketing eggs country wide. As a result of this, policy interventions aimed at facilitating transformation in the industry should also consider regional market dynamics. The progress report on transformation and inclusivity showed that the Eastern Cape, KwaZulu-Natal, Limpopo and the Northern Cape have room for additional egg production. This along with a general policy drive geared towards enabling increased maize production in the former homeland areas of the Eastern Cape and KwaZulu-Natal, could provide an environment conducive to the establishment of emerging egg producers.

5.5. Opportunities in the dualistic industry

Whilst live bird sales are associated with numerous challenges, significant opportunities exist if an accessible market can be found for these birds. Out of the sample of 308 small scale farmers that do not produce on contract only six indicated that they sold their final products to supermarkets, butcheries etc. which by implication would require the final product to be slaughtered. The rest of the sample indicated they sell to the community, informal markets, and at pension and grant pay points. In this instance it seems safe to assume that a large proportion of these sales are live bird sales. If this ratio is superimposed on broiler production in general, the following can be deduced:

- According to SAPA (2014) 5% of total broiler production is produced by small scale farmers. Of this, 65% is produced by contract growers (based on Silver Path sample calculations)
- For the remaining 45% only approximately 2% deliver to formal institutions such as supermarkets/ butcheries/ casinos, which would require slaughter. The remainder of the farmers sell in the live chicken market. It is assumed that respondents indicating that they sell to the community, at pension pay points or in the informal market, can earn a higher profit by selling live birds, since no slaughtering or storage costs are incurred.
- In absolute terms, this would amount to live bird sales of around 200 000 birds per cycle or approximately 1.3 million live birds per annum. This calculation is based on numbers reported in the Chicken Census / Provincial Distribution of Chickens (SAPA, 2014) which was used as a proxy for supply in each province.
- A breakdown per province, on supply and demand is reported in Table 11. As a demand proxy two different series are considered. The first is the percentage of total South African expenditure on chicken meat per province. This was calculated from the Income and Expenditure survey 2010/2011. The second is a calculated value of live birds consumed per province based on the assumptions made above.

Table 11: Provincial Supply and Demand of broilers

Province	% of total broiler birds	% of total expenditure on chicken meat	Calculated number of live birds sold per year
Eastern Cape	6.4%	10%	83 200
Free State	5.5%	8%	71 500
Gauteng	7.3%	14%	94 900
KwaZulu-Natal	13.4%	12%	174 200
Limpopo	2.3%	14%	29 900
Mpumalanga	19.6%	10%	254 800
North West	24.1%	10%	313 300
Western Cape	21.2%	16%	275 600
Northern Cape	0.1%	6%	1 300
Total South Africa	100%	100%	1 298 700

Whilst providing some quantification of the number of live birds sold in the South African broiler industry, the calculations come with some caveats. Firstly, the extent to which the sample conducted by Silverpath can be considered representative of the entire industry remains unclear. Secondly, there is no clear indication from respondents, to the Silverpath Survey, on whether they sell slaughtered or live chickens. The proportions that are used above are based on assumptions that producers can earn a

higher profit in the live market than for slaughtered birds because they do not have to incur slaughtering costs and storage/refrigeration cost. As a result, if respondents indicated that they sell to the community or informal market it was assumed that they sell live birds. It might however be the case that significantly smaller number of the respondents sells in the live market. It is therefore advocated that Silverpath Consulting add an explicit question to their survey on whether they sell live or slaughtered birds and if they do both, to give the proportion of each of the components. Thirdly, the proportion of live bird sales to slaughtered products sales might differ between the different provinces. A lack of data on this has however necessitated the average national proportions to be superimposed on the various provinces for the calculations shown in Table 11

In order to identify opportunities from the data presented in Table 11, it needs to be related to demand for live birds in South Africa. Gauging the demand for live birds also requires more assumptions. As a result it was assumed that demand for live birds would primarily be driven by households without access to electricity and/or refrigeration. A representation of households with access to these amenities is presented in the Table 12.

Table 12: Share of households with electricity and refrigeration per LSM group

	LSM 1	LSM 2	LSM 3	LSM 4	LSM 5	LSM 6	LSM 7	LSM 8	LSM 9	LSM 10
Share of households with in-home electricity	27%	35%	69%	93%	98%	99%	100 %	100 %	100 %	100 %
Share of households with in-home refrigerator	0%	4%	46%	75%	92%	97%	99%	99%	99%	100 %

Source: South African Audience Research Foundation All Media and Products Survey, 2012

From Table 12, it is expected that demand for live birds will be driven by LSM 1-4 since nearly all the households in the higher LSM classes have access to electricity and refrigeration facilities. The key question now becomes how many households are in LSM 1-4, how they are dispersed spatially (around South Africa) and what is the possible market for live birds. Statistics South Africa reported that there were 14.978 million households in South African in 2014. Based on the population distribution per LSM, shown in Table 11, the number of households in each LSM is presented in Table 13.

Table 13: Number of households without electricity or refrigeration

	LSM 1	LSM 2	LSM 3	LSM 4	Total
SA population in LSMs (2013)	1.40%	3.60%	5.70%	11.60%	
Number of households	209 692	539 208	853 746	1 737 448	3 340 094
Number of households without electricity and/or refrigeration	209 692	517 640	452 485	434 362	1 614 179

Source: South African Audience Research Foundation All Media and Products Survey (SAARF AMPS) 2012 and own calculations

For illustrative purposes, if each of these households were to buy one live chicken per month it would amount to 1.6 million live birds being required per month or 19.2 million live birds per year. This is

substantially more than the production calculations on what is currently sold as live birds. This can be disaggregated further by regarding specific provinces. In terms of LSM 1 almost 90% of the households are located in the Eastern Cape and KwaZulu-Natal. Similarly, for LSM 2 and 3 almost 70% present of households are located in these two provinces and around 10% of these households in Limpopo. In terms of LSM 4, 66% of households reside in the three province mentioned above.

Numerous respondents to the Silverpath survey indicated that they sell broilers or broiler products at pension and grant pay points. According to the General Household Survey conducted in 2013 by Statistics South Africa, 40% of individuals in the Eastern Cape, 38.7% of individuals in Limpopo and 37.2% of individuals in KZN, benefitted from some form of social grant. Mobilising small scale production and distribution to grant pay out points in these provinces has the potential to generate success stories in that it will link small scale production with a vibrant market demand.

5.6. Inclusion of smallholders in the formal value chain

As illustrated by the description of the emerging producer value chain contained in Section 5.1, a wide variety of producers is prevalent within the poultry value chain in South Africa. These producers represent a range of different production scales and the ultimate target market also differs widely. Initial surveys and interviews identified a number of producers that operate on a very small scale marketing live chickens directly to the consumer at a substantial premium relative to the price of a chicken carcass. As an alternative to operating independently and bearing the risk of both price and input cost fluctuations a number of emerging producers have entered the contract growing system of large, integrated companies. In order to produce successfully within this system however, a certain scale is required for the operation due to the substantial investment required to remain competitive within the broiler production tournaments that determine the profit of individual producers.

The substantial gap between the scale of operation of small independent producers and producers delivering on contract for integrated companies highlights the challenges of growing gradually within this system. Limitations in the number of chickens that can be marketed successfully at any one time have limited the expansion of independent producers necessitating a substantial investment to increase scale to the acceptable level for contract production. Few emerging producers have access to the credit required to make such an investment. Consequently, market access and scale superimposes a dual nature on the industry where small scale growers remain focussed on live bird production and larger commercial growers deliver into a vertically integrated chain that processes and distributes broiler products. Nevertheless, both types of producers essentially are commercial, with vastly different supply chains, each with unique challenges. If producers were to move from the independent production chain into the mainstream system in order to produce on contract for corporate companies, this gap will need to be breached through innovative practices and possible support and intervention targeted towards this goal.

Recognising the importance of transformation within the industry, a number of corporate companies engaged in the commercial broiler and laying value chain have expressed a willingness to engage in transformational activities. Although not exhaustive, some of the present activities or ‘success stories’

serve as examples of what large commercial companies are undertaking in order to facilitate transformation in the industry at present:

- Rainbow Chicken Ltd. developed a blue print for community based broiler production in KwaZulu-Natal. Here they provide technical support and inputs to communities to produce broilers for live sale or own consumption.
- Afgri – Lotolo Trust: This is an initiative near Cullinan in Gauteng, a beneficiary trust that consists of approximately 30 members. The members pooled grants from government in order to set up operations that are large enough to achieve the scale required to grow commercially for Afgri. Afgri supplies inputs and technical advise and are actively involved with the management of the trust. It is envisaged that the trust will deliver 400 000 birds per cycle.
- The Kuipers Group are undertaking joint ventures with farmers that received government grants but are struggling to turn a profit due to capacity issues relating to technical or financial knowledge. The Kuipers Group supplies the venture with feed and other inputs and is actively involved in the management of the farm. They also make an initial capital investment in order to ensure that the facilities are in a condition to produce effectively. The eggs that are produced are graded and marketed by the Kuipers Group. There are currently initiatives like this in Gauteng and the Eastern Cape.

These examples serve to illustrate that there are limited initiatives undertaken by large commercial companies to integrate smaller growers into the value chain, allowing them to grow into large commercial producers that enter the traditional value chain. But there seems to be a general consensus that entrance into the commercial chain requires substantial initial investment in terms of growing infrastructure and capacity which renders growth from medium scale to large scale near impossible without some form of support. For commercial companies to assist medium growers, with the ultimate objective of becoming a large commercial producer, substantial financial resources would be required. With the margins of these companies having been under severe pressure or even negative in recent years, it seems fair to assume that their involvement in transformational issues will be limited to engagement where the costs and risks are kept to a minimum.

5.7. The way forward in transforming the sector

Within the context of the information presented in prior sections, there are basically two possible ways in which a developing farmer can be integrated into a commercial value chain. The first is to become a contract grower for one of the large corporate companies. The second is as an independent grower within a unique, if somewhat unconventional, value chain. An independent grower might have more scope for variation in terms of the size of his enterprise but will ultimately face more risk and variation in his bottom line. In addition, much uncertainty remains as to the agents in this independent value chain. In this regard, further research is required on the functioning, cost structure and marketing strategies of independent abattoirs in order to improve the understanding of the extent to which independent producers are able to deliver to these abattoirs. Once this is known, an optimal size for independent growers can be determined through simulation.

The second option for integration into the commercial chain is to become a contract grower for one of the corporate companies involved in poultry production. Here it is important to understand the

technical and production cost structure of a developing producer *vis a vis* a commercial producer. It is known that developing farmers are at a disadvantage in terms of production costs. It is however expected that developing farmers will pay less for their initial capital investments and might also expect a lower return on investment than a large scale commercial farmer. This could possibly offset the premium paid on production costs. As with the independent growers the objective will be to determine the optimal size at which these farmers should function and the level of support required to move current producers to this size.

6. Conclusions

The poultry industry represents the largest agricultural subsector in South Africa and it has a wide footprint through its long and complex value chain. It employs 10% of the agricultural workforce and accounts for the greatest share of animal feed demand in South Africa. Therefore, it has a significant influence on other subsectors such as the production and processing of grains and oilseed production. Over the past few years, profitability in the sector has come under increasing pressure due to rising feed prices combined with increasing imports of competitively priced bone-in portions. These dynamics have called into question the sectors ability to compete in an increasingly global market, prompting concerns related to its long term sustainability.

Broiler production in South Africa is dualistic in nature. At one end of the spectrum there are large scale producers with technically sophisticated operations which require large capital investments. These producers function in a highly integrated value chain with small per unit margins. On the other end of the spectrum there are small scale and emerging producers that produce mainly live birds marketed directly to the end consumer and obtain margins that are significantly higher on a per unit basis than that of their commercial counterparts. One of its biggest challenges going forward therefore relates to achieving inclusive growth, in line with the targets set out in South Africa's New Growth Path which emphasises a broader- based industrialisation path, characterised by greater participation of historically disadvantaged people, businesses and marginalised regions in the mainstream economy. The fundamental competitiveness of the poultry value chain will be critical to achieving these goals.

This study set out to evaluate the competitiveness of the poultry value chain - both the extent of its ability to compete in the global context, as well as the factors underpinning its competitive position. Upon doing so, it also expanded and refined the current quantitative modelling framework employed in the industry enabling a wider scope of policy analysis to inform recommendations related to sustainability and competitiveness going forward. Acknowledging the challenges of achieving greater participation of small scale producers in an industry where economies of scale have become paramount, it also strived to examine the impediments faced by developing producers. Thus it provides an in-depth analysis of small-scale poultry production and marketing systems, amongst others, to contextualise smallholder production within the commercial economy and outline limitations and opportunities for developing farmers to enter the commercial market, promoting inclusive growth.

The issue of competitiveness was approached in two ways and a number of factors were identified that constrain competitiveness, with the cost of feed and the cost of day old chicks representing the two most significant factors inflating domestic production costs. While South Africa's cost of production

was found to be higher than leading global producers such as the USA and Brazil, it was well below that of the EU. In normal years, South Africa is a net exporter of maize, but remains a net importer of protein meal, whereas leading global producers such as the USA and Brazil also export protein meal, which reduces feed costs for their domestic producers. This difference in feed costs also contributes to the cost of day old chicks. Most of South Africa's core genetics are imported at grandparent level, implying that chickens have to be raised domestically before producing commercial chicks.

Considered in conjunction with the composition and origin of imports, the production cost analysis indicated that higher production costs alone are not the sole reason for rising imports, leading to questions related to marketing. The bulk of import growth over the past five years was attributed to bone-in portions from the EU, where the cost of production was found to be higher than in South Africa. Contrary to the EU, where consumer prefer and pay a premium for chicken breasts, the South African market is dominated by IQF pieces. Having obtained a premium domestically for higher value cuts, producers in the EU and the USA are then able to supply bone-in portions into the South African market at very competitive prices whilst remaining profitable. Domestic producers struggle to compete at these prices given that they do not obtain a premium for parts of the carcass. Going forward, producers would need to investigate the possibility of obtaining a premium for higher value cuts in selected export markets, or alternatively consider a more value added approach which implies that products do not compete directly with these imported cuts.

In order to broaden the scope of quantitative decision making tools, the study also included numerous additions and refinements to the current BFAP partial equilibrium modelling framework. Representative farm level models were introduced, enabling the simulation of different policy options not only on market prices, supply and demand, but also to illustrate impacts more directly on farm level profitability. This framework was applied very successfully to provide information to the team negotiating the renewal of the AGOA agreement. Furthermore, the estimation of transmission elasticities from producer to retail prices enables the extension of impact analysis to consumer level. Estimation of a meat demand system which considers IQF portions independently from other chicken provided valuable information regarding consumers' response to such price changes not only in the chicken sector but also in substitute meat products.

To supplement the detailed partial equilibrium analysis and industry outlook presented by BFAP, the NAMC also conducted different general equilibrium simulations, which offer a broader sectoral coverage. In line with agriculture's small share in total GDP, the impact of changes in the poultry industry on other sectors of the economy was relatively small. The aggregate economic impact of reducing current tariff protection in the poultry subsector was however found to be negative in both of the simulations conducted with the SAFRIM and CGE models.

The industry outlook indicated that a return to normal weather conditions will allow some recovery in the sector, but the chicken to maize price ratio presented as a proxy for profitability does not return to levels observed in periods of strong production growth. Thus future production growth is significantly slower than consumption, with imports continuing to expand if the status quo is maintained. The limited growth projected is likely to occur mainly from continued productivity gains, which will be critical for the sustainability of the sector. Stochastic risk analysis indicated that the risks faced by

contracted producers is significantly lower than that of independent producers who are more exposed to short term divergences between chicken and feed prices. Whilst large integrated companies absorb a substantial share of the production risk for contracted producers, long term profitability remains critical as a withdrawal of such companies from the sector will also leave such contracted producers with few alternatives and lead to significant job losses.

Within the highly competitive broiler production environment many small scale producers are also making a living. These small scale independent producers face many challenges related to surety of market as well as the consistent supply of affordable inputs. The cost of key inputs such as feed and day old chicks was shown to be significantly higher than that of larger outfits. However, a substantial premium is received on the sale of live birds directly to the consumer, which compensates for this to some extent. The reality remains however that for several farmers to increase the scale of production to the extent where marketable birds are delivered to an abattoir, this premium will no longer be available (lower price due to an increase in local production) and as such, the cost of production will need to be competitive.

International literature clearly illustrates the benefit of producing broilers on contract as opposed to independently; however, in a situation where access to start-up capital is limited, independent production of chickens for the live market allows for greater flexibility in production scale as well as higher margins per chicken produced. If these small-scale producers are to make the switch into the mainstream, integrated value chain however, they will have to bridge the gap in production scale to reach a size that is acceptable and sustainable within the reduced risk and resultant lower per unit margins associated with contract production. Given the gap in production size, this switch is unlikely to be possible without some form of support to facilitate the successful transformation, and if the cost of such support is to be borne in part by corporate companies these companies must be strong financially.

Sustainable entry into the formal mainstream value chain is unlikely to be successful unless large, commercial producers are allowed to compete on a level playing field with their international counterparts. The creation of an enabling environment for large corporate companies to produce profitably and sustainably is paramount to enable them to assist in the facilitation of transformation. Given the projected growth in consumption over the next decade, the expansion of domestic production should be prioritised, in order to grow the possible market that emerging producers are able to enter. In this regard, continuous depreciation of the exchange rate will be of concern to the industry. Whilst recent depreciation has afforded the industry with some protection by raising the cost of imported products, a substantial share of production technology is imported and hence continued depreciation of the exchange rate will also increase the cost of expansion.

Despite the commercial situation, the informal sector does present some opportunities. In terms of demand it could be an attractive market with scope to grow given the right incentives. With the right support and associated improvements in productivity and cost reductions this informal sector has the potential to make a significant contribution to the revitalisation of rural economies as well as food security in these regions. Given the drive for expanded grain production in the Eastern Cape in

particular, the establishment of a vibrant poultry sector in this province could serve as an off-taker to the envisioned grain cultivation expansion drive by government.

Inclusive growth within the poultry sector has been prioritised within the Agricultural Policy Action Plan (APAP). However, previous government investments have generally not yielded the desired returns, and multiple recipients of such support continue to produce well below capacity. This report suggests that, in order to revitalise former investments and support developing poultry farmers to the benefit of both producers and rural consumers, not all small producers need to deliver into the formal poultry value chain. Initiatives such as Agri-parks may provide farmers with additional opportunities in terms of possible abattoirs to deliver to, but a substantial market for live birds provides opportunities in the so-called informal value chain as well. Optimisation of this chain to improve availability and reduce the cost of inputs (feed & day-old chicks) will narrow the current gap in production costs, allowing a less expensive end product for rural consumers.

In line with the Agri-parks ideology, small scale producers have a considerable role to play in development of the rural economy through production of more affordable local food. Government can contribute to development of the informal sector by:

- Consulting and partnering with commercial companies in the development of small scale producers, providing comprehensive support related to decision making, technical support, inputs and marketing
- Strategic linking of Agri-park decision-making to areas with grain / feed / poultry potential and demand
- Providing a conducive and enabling environment for both corporate and informal production and marketing
- Investment in rural transport, storage and processing infrastructure to reduce feed costs and improve market access

To conclude, the poultry sector's contribution to agricultural production value, food security and stability in the agricultural sector cannot be underestimated. Continuing in the current trajectory is however unlikely to provide the growth needed to maintain this footprint and if the bold goals for inclusive growth are to be achieved in future, its sustainability must be prioritised. This report highlights some critical challenges and presents a number of considerations that would enhance the industry's competitiveness and long term sustainability, whilst also providing a range of quantitative tools that can be employed to evaluate different options and interventions.

The research has already been applied in the sector, informing negotiations related to the renewal of AGOA as well as providing critical input into the discussions surrounding the Agricultural Policy Action Plan (APAP) and Operation Phakisa currently under way for Agriculture, Land Reform and Rural Development. Furthermore, the work has been presented at different academic conferences and industry related events. Two academic articles related to competitiveness and the meat demand structure have been submitted to the Agrekon journal, whilst an article related to the development of small scale producers was submitted to the Development Southern Africa journal.

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