

PORK AND BROILER INDUSTRY SUPPLY CHAIN STUDY WITH EMPHASIS ON FEED AND FEED RELATED ISSUES

By André Louw, Mariëtte Geysers & Jacques Schoeman



Disclaimer

“Information contained in this document results from research funded wholly or in part by the NAMC acting in good faith. Opinions and points of view expressed herein do not necessarily reflect the official position or policies of the NAMC. The NAMC makes no claims, promises, or guarantees about the accuracy, completeness, or adequacy of the contents of this document and expressly disclaims liability for errors and omissions in the contents hereof. No warranty of any kind, implied, expressed, or statutory, including but not limited to the warranties of non-infringement of third party rights, title, merchantability, fitness for a particular purpose or freedom from computer virus, is given with respect to the contents of this document in hardcopy, electronic format or electronic links to such. Reference made to any specific product, process, service by trade name, trade mark, manufacturer or any other commercial commodity or entity are presented for informational purposes only and do not constitute or imply approval, endorsement or favouring by the NAMC.”

Sectional inputs were contributed by:

Almarie Nordier

Anneri Jordaan

Bokang Tlali

Gerhard Troskie

Melissa van der Merwe

Special word of appreciation for the participation, valuable inputs and funding from the following organisational in the respective industries:

SAPA with Kevin Lovell,

SAPPO with Simon Streicher

and

AFMA with Dewet Boshoff and their members

Executive Summary

The animal feed industry is of strategic importance to the beef, milk, poultry, sheep and pork and other animal and pet industries in South Africa. These sub-sectors are major buyers, processors and suppliers of processed commodities to the retail sectors and the final consumer markets. These markets are exposed to various risks including input commodity price volatility, high capital requirements, the inherent business and climatic risks of different sub-sectors and various other challenges. These factors have a major impact on decision making, from large to micro role players in the agricultural supply chain, especially in the feed and livestock markets. They have to cope with price cost squeezes from a buyer and seller's point of view. The feed industry in general forms part of the value chain of these industries as feed is a major component of production costs in the value chain.

The industries that this study focused on was the animal feed industry with special emphasis on the pork and broiler feed industries. Studies in this relation on these two sub-sectors in the industry were limited and in certain instances outdated. The objectives of this study were as follows:

- To identify and explain the dynamics of the international and domestic feed industry from a strategic, economic and supply chain point of view
- To identify the various stakeholders and role players in the pork and broiler sub sectors and feed industry (including structures, size, market share, etc)
- To identify the factors that restricts and/or enhances the competitiveness and profitability within the feed production supply chain
- To determine the impact of the feed industry on the pork and broiler supply chains
- To determine the level of price volatility of inputs for the feed industry
- To address risks and risk mitigation strategies such as hedging
- To explore possible business models in the feed industry
- To make recommendations to the National Agricultural Marketing Council (NAMC) regarding key issues identified in the study

To understand these problems, a value chain analysis of feed in the pork and broiler industry, including all the links was analysed. Special attention was given to the different players in the input and feed (own and manufactured) industries. Feed costs contribute to high meat and broiler prices and the different aspects surrounding these costs was analysed to identify the degree of change within feed components. The framework that this study used was based on the concept of analysing each industries Structure, Conduct and Performance in a supply chain context. This assisted to identify the key issues and constraints that are faced by feed manufacturers pork and poultry producers on a continuous basis.

Within these industries the following methodologies were used to identify the impact that is faced by the industries given the outcome of the measured challenges. For the purpose of the industry backgrounds desktop studies were conducted to structure the current workings of the industries. To answer certain research questions, structured questionnaires were used to get an objective view from industry role players of what the current trends and issues are in the industry. Within the Structure, conduct and performance framework the following methodologies were also used and followed:

- Vertical integration within the Animal Feed Industry of South Africa
- Porter's analysis on the barriers to entry
- Price volatility
- Supply chain analysis and introduction to the Supply Chain Operations Reference (SCOR) model
- Risk analysis within the Feed and related Pork and Broiler industries

The following section is a brief summary of the study objectives and findings that was analysed within this study. The summary is as follows:

1. To identify and explain the dynamics of the international and domestic feed industry from a strategic, economic and supply chain point of view (pp. 52-104)

Within the feed industry the following subjects were overviewed giving the current as well as long term trends for this industry on an international as well as a domestic level. Under the international overview the following subjects were reviewed:

- Supply and demand
- International stock levels
- Raw material prices
- Imports & exports
- Global protein levels & demand increases
- Global feed projections
- Current trends in the feed industry
- Future trends in the feed industry

Under the domestic feed overview (for South Africa) the following subjects were reviewed:

- Dynamic perspective
- Domestic stock levels
- Imports & exports
- Animal consumption of feed
- Issues within the feed value chain
- Feed regulations & legislations
- Sustainability within the feed supply chain

2. To identify the various stakeholders and role players in the pork and broiler sub sectors and feed industry (including structures, size, market share, etc)

The following is a summary of the roles that each of these organisational bodies in the three sectors play and the major companies identified within the industry are given below.

The role of the Animal Feeds Manufacturing Organisation (AFMA) (p. 152)

The Animal Feed Manufacturing Association's (AFMA) role is to represent members of the feed manufacturing division. AFMA has an important liaison, co-ordination and information role between government and the feed industry. They advise government when necessary with regard to policy changes and legislation or other changes that can affect their members. AFMA is currently enjoying recognition as the national role-player being part of all forums related to animal feeds and the grain value chain. These include the various forums, both governmental and private sector where AFMA fulfils its rightful role as one of the leading decision makers (AFMA, 2009). AFMA members are responsible for 55 percent of the national animal feed production (AFMA, 2009).

The role of the South African Pork Producers Organisation (SAPPO) (p. 223)

The South African pork producers are structured under Provincial Producer Organisations which are governed by the South African Pork Producers Organisation (SAPPO I, 2009). These organisations are responsible for all issues related to the South African pork industry. The different portfolios within the SAPPO organisation are responsible for animal health, promotions, emerging farmer's growth and sustainability, statistics, industry protection, research, communication and information (SAPPO I, 2009). Under SAPPO the Premium Pork Producers (PPP) is the organisation for the northern region representing 60 percent of South African pork producers. The other four organisations are for the Free State, Western Cape, KwaZulu-Natal, and Eastern Cape regions (SAPPO I, 2009). Pork producers are organised under these regional organisations. From these producers, 75 percent are home mixers of feed (SAPPO I, 2009) while 25 percent (situated in the Western Cape region) buy commercially mixed feed subjected to the availability of raw feed materials.

The role of the South African Poultry Association (SAPA) (p. 207)

South African Poultry Association (SAPA) is one of the key role players in the poultry supply chain. It was established in 1904 in Kimberley mainly as a body to promote and coordinate the broiler industry and later the egg industry. SAPA is crucial to the growth and development of the poultry industry in general. As its mission and vision is to be an industry driven organization that addresses collective issues and to create a milieu within which members can become world class competitors in the food market, SAPA is a representative of broiler farmers both small scale and commercial farmers. It is concerned about the representation and assistance of farmers in different aspects such as the day-old chick supply industry, the egg industry and the broiler industry. It is further characterised by a huge sub-continental impact.

Within the feed manufacturing industry there is a relative high level of market concentration present between the five main manufactures; Meadows, Epol, Afgri Foods, Nova Feeds and Nutri feeds. From the data gathered through the interviews conducted with the major feed manufacturers that participated in this study, the following results were obtained with respect to the structure of the companies as well as the industry. The legal status of more than 90 percent of the large feed companies are under the control of holding companies and feature as an extension of the vertical integration and value adding in the corporate structures **(pp.151-167)**

Due to the ongoing investigations by the competition commission the true market shares of each feed manufacturer as well as holding company is based on figures obtained from sources dated in 2005 and older. However the size between the different manufacturers could be established and was reported.

3. To identify the factors that restricts and/or enhances the competitiveness and profitability within the feed production supply chain (pp. 151-234)

The following factors were identified in the feed pork and broiler industries as restrictions currently being faced in doing their business. The issues regarding the infrastructure to feed manufacturers refer to the cost and competitiveness in doing business. Good infrastructure assists in being able to optimize

the feed industry at a higher level of operations. The issues as indicated below have the following impacts on the feed manufacturers:

- Weak road infrastructure: deliveries not on time and at a much higher cost than on rail, a danger due to heavy vehicles that can cause accidents due to badly maintained roads.
- Weak railway systems: Increase in road freight and higher costs
- Water: Good quality and quantity is required for operations to work optimally
- Electricity: The lack of power means that machinery do not operate with a result of increase costs of doing business
- Communications: A major lifeline to any industry that wants to succeed in business

The following factors were grouped from the questionnaires that restrict or enhance the business competitiveness within these industries. Some of these factors and issues have been discussed as key risks in the industry. The issues within the feed industry are listed as follows:

- Management of price volatility of raw ingredients
- Availability of good quality raw ingredients especially soya oil cakes
- Economies of scale (lower unit cost)
- High commodity prices
- Dumping of Brazilian agricultural commodities
- Shipment delays
- Procurement of raw ingredients
- Transportation and general infrastructure of roads/rail etc.
- Marketing principles
- Lack of regulated control of additives and antibiotics

The factors and issues that restrict the competitiveness for broilers growers are listed below as identified in the structured questionnaires:

- The quality and consistency of feed and associated raw components
- Changes in technology and innovation

- Electricity supply, price and availability
- Input prices other than feed cost e.g. interest rates, labour, running costs etc.
- Payment structure as given by contract growers
- Market degradation in the poultry markets
- Transport and road infrastructure
- Diseases and the control and containment of outbreaks
- Imports and the inability to control dumping of poultry products in South Africa
- The level and skills of management and the team and farm structure

The factors and impacts that were identified in the structures questionnaires that restrict the competitiveness in the pork industry are listed below:

- Environmental impact studies that needs to be done to expand current operations
- Weak demand for pork meat, especially during the swine flu epidemic recently experienced
- Transparency of the true price of pork meat per kg. Currently the prices of pork are determined by the abattoirs as well as the contractors, but these prices differ in principle, and no accurate standard between the two exists.
- Dumping of pork meats from subsidised countries
- Quality of raw feed ingredients
- Feed raw material price volatility
- Managing and the control of disease outbreaks
- Market access for non-contract producers
- Managing cash flow in this industry. Unlike with the broiler growers, own feed mixers and even premixed purchases must be paid before remuneration is received by the producer for pigs delivered.
- Availability, price and quality of fishmeal.

4. To determine the impact of the feed industry on the pork and broiler supply chains (pp. 202-234)

The supply chain analysis that was conducted for this study showed the size that the feed industry plays in the production of porkers and broilers. Feed cost account for more than 70 percent of the total cost of production for both pork and broiler producers. The findings were those structural shifts in the feed industry and especially where feed manufacturers are part of the holding company chain, that the impact on the growers is extreme. The 'control' that the holding companies have over the contract growers is a growing concern to farmers. The trend is that growers experience less freedom to choose a feed supplier that is more beneficial for them. Binding contracts further restrict the competitive negotiation power of broiler growers when feed procurement is done.

The price fluctuations on raw commodities are a further issues and impacts heavily on the supply chain. When prices increase of raw commodities, producers in especially the poultry industry feel the effect immediately, and only get compensated on a later stage for the increase in prices. The multiplication effect further downstream is that the consumer ends up paying substantially more for an increase in cost early on in the production process.

5. To determine the level of price volatility of inputs for the feed industry (pp. 151-234)

In this study the impact that changes in the volatility of raw commodity prices have on the supply chain was studied. From the structured questionnaires the participants indicated that price volatility is a major concern not only for own feed mixers on a farm level but also to large corporate feed manufacturers. The result is that strategic decision making is compromised in that sound financial decisions cannot be made on a procurement basis.

6. To address risks and risk mitigation strategies such as hedging (pp.151-234)

Risk management focused specifically in detail on the macro as well as the micro risk levels. On a macro risk level the following risks were analysed by use of subjective opinions by role players in the industries as well as the organisational boards such as AFMA, the organisational board for the animal feed industry, SAPPO, the organisational board for the pork industry and SAPA the organisational board for the poultry industry. These risks are:

- Export risks
- Political risks
- Economical risks
- Social risks
- Technological risks

On a micro risk level the following risks were also analysed within the underlying industries. These risks are:

- Environmental risks operational
- Product market risk
- Financial risks
- Input risks

From the questionnaires the following risks could be statistically scored to indicate the impact that role players in the industries feel can have on their business.

The table below summarises the impact on risk on the feed industry.

Risk impact assessment from the feed manufacturer's perspective

Risk	Impact (5=high-1=low)	Probability (%)	Standardised scale of impact
Political	3.7	58	214.6*
Financial & economic	4	74	296*
Labour skills	2.8	48	134.4
Labour strikes	4	30	120
Business	2.5	40	100
Price volatility of feed	4.5	86	387*
Food safety	4.3	30	129
Power outages	4.2	64	268.8*
Inventory	3.8	42	159.6
Theft & security	1.5	42	63
Disposable income of consumer	2	50	100
Customer, Competition & Supply	3	64	192*
Environmental (e.g. waste management)	1.8	26	46.8

Source: Interviews, 2010

The summary below illustrates the risks for the pork industry.

Risk impact levels and probabilities for pork producers

Risk	Impact (5 high-1 low)	Probability (%)	Standardised scale of impact
Political	3.2	42	134*
Financial & economic	3.4	66	227*
Labour skills	2.9	30	86
Labour strikes	3.0	20	60
Business	2.5	38	95
Price volatility of feed	4	64	256*
Food safety	2.9	33	95
Power outages	2.8	37	102
Inventory	2.2	37	81
Theft & security	2.3	34	77
Disposable income of consumer	2.2	27	59
Customer, Competition & Supply	2.4	38	93
Environmental (e.g. waste management)	2.6	34	88

Source: Interviews, 2010

The summary below was obtained from the poultry industry:

Risk impact levels and probabilities for the broiler industry

Risk	Impact (5high-1low)	Probability (%)	Standardised scale of impact
Political	2.8	43	121
Financial & Economic	3.1	54	170*
Labour skills	2.8	32	87
Labour strikes	3.5	20	70
Business	2.6	32	81
Price volatility of feed	3.1	53	163*
Food safety	2.9	39	116
Power outages	3.8	56	214*
Inventory	2.3	23	52
Theft & Security	2.6	44	116
Disposable income of consumer	1.9	22	43
Customer, Competition & Supply	2.8	39	107
Environmental (e.g. waste management)	2.1	31	64

Source: Interviews, 2010

From these statistical findings the following general conclusions could be made that needs to be addressed as key issues for the feed industry as well as the sub-sectors. Price volatility was seen as the major risk that has the largest impact on daily operations and planning structures. The raw commodity components that make out feed rations are maize, soya beans, sunflower seeds, wheat and additives. These commodities except for the additives which are vitamin, mineral and growth stimulants based, are traded on the SAFEX grain market. The prices for these commodities are thus formed on this market. The impact that sudden short term changes in large parity bands of these commodities were analysed and the impact thereof explained in this study. The general remark was risk hedging on the markets is a strategic method to discount a percentage of short term risk, but not to illuminate commodity risk entirely.

7. To explore possible business models in the feed industry (pp.194-201)

The ever changing business environment is forcing industry leaders to adapt and changes their business models to accommodate these changes and to achieve a strategic advantage over other rivals.

“Business must build their own capacities to work effectively for sustainable development, and engage in strategic alliances with other enterprises, financial service providers, government agencies development practitioners and communities” (IIED, 2009). This should apply to organisational bodies such as AFMA, SAPPO and SAPA as well.

Although each business and industry have a different approach to these core principles, at the end the value added to the business as well as the supply chain and final customer remains paramount. Agriculture today faces huge challenges. Cooperation and co-creation of new knowledge markets is essential in the debates concerning the future of agribusiness, agriculture and the environment. Most issues require involvement not only from the business community and knowledge institutions, but also different levels of government and a diverse set of societal organizations.

Organisations and businesses of the future will have to adapt and change their current core business models and short sighted visions of the present. This is to be able to facilitate the following and ongoing changes in the business and market environment, and answer to questions raised on the future of the feed industry and the pork and broiler industries.

The following issues can impact on the South African agricultural landscape and new questions needs to be asked about the future environment in which they operate:

- Correcting the structural imbalance of maize exports, soyabean and wheat imports in SA agriculture
- The impact of government policies on various aspects of agriculture and economy of SA

- EU farm subsidies will phase out
- USA exports will be competitive given the devaluating currency
- South Africa will have a strong currency because of other structural weaknesses in other countries
- Agricultural growth markets will shift with the realignment of exchange rates
- In the past there has been too large focus on traditional markets. This lead to increasing the South African concentration risks
- The South African agricultural industries are under pressure. The increase in economies of scale as well as capital intensity, yield increases and diversifying can result in lower numbers of small scale shareholders because they have difficulty to establish themselves in the current market environment – a dichotomy in terms of establishing more emerging farmers.
- The lack of agricultural policy guidelines will change the way in which markets are shaped
- The impact of the emerging BRIC countries, and how these countries will handle imports and exports
- The impact of China on the world, and how this impact will change exports and imports
- The current state of the South African infrastructure. The lack of maintenance and infrastructural development will result in decreased competitiveness and higher costs to the consumers
- The environment and green movements are becoming a major concern to all. This needs to be factored into the strategic thinking of organisations to address value adding without damaging the environment
- The alliances and relationships formed within the supply chains as well as the ownership of an entire supply chain structure
- The continuous investigation of the Competition Commission and the impact on businesses. If the Competition Commission keeps focussing on individual large businesses (being highly integrated on all levels in the supply chain) the result may be that these groups may source from outside companies.
- Continuous talk on land redistribution and the nationalisation of farm land in South Africa
- The lack of appropriate governmental involvement in creating a sustainable growing agricultural sector without down grading methods
- Ownership arrangements into BEE

Feed manufacturers, holding companies, pork producers, contract and independent broiler growers are all links in the supply chain that needs to develop an acceptable business model to focus not only on the current market environment but also to create value to customers in the future. The SWOT analysis of these industries assists in forming the core foundation and structure of the business model.

Without this vision structure to expand upon and revise continuously, a business will not be able to create sustainable growth for the future.

8. To make recommendations to the National Agricultural Marketing council (NAMC) regarding key issues identified in the study (pp. 248-264)

The following recommendations followed from the informational analysis of this study and can be viewed as guidelines for industries in panel discussions and annual general meetings. These highlights must be used in setting up strategic plans for future expansion and development of the underlying industries. Certain challenges and changes will persist, but returns will be forthcoming if innovative thoughts and methods come from industry leaders.

These recommendations are as follows:

- Need to adapt business models for the challenges and changes in the future. Business in 2020 will not be the same as today. These strategic changes can be adapted by taking into account the vision of the future business models as earlier explained.
- Structural problems: imports exports/ maize, wheat, soya. Currently South Africa is a net exporter of maize. However, South Africa also imports large quantities of chicken meat and soya per annum. Farm development is necessary to increase the current production capacity to be able to use these net surpluses available and lower imports thus stimulating local production of soya beans.
- Protection from other countries that dump on South African markets. Intervention by especially government is required to ensure that imports are regulated and not detrimental to the local industries.

- Africa as alternative source to expand. The future of capital investment lies in less developed countries such as Africa. Large natural resources are available and high effective demand exists due to over population and high poverty levels.
- Importance of feed and food safety. Regulations must be maintained and controlled to ensure that feed and food are safe for human as well as animal consumption. Government support and self regulation is required.
- Industries must be pro-active regarding new consumer bills and traceability issues that mainly originated in the European Union. If industries do not comply with new bills set in place, then it could potentially lead to loss of exporting markets.
- Price volatility in the grain market has escalated worldwide and market participants need to adjust to higher volatility levels. Participation by all role players (hedgers, speculators and arbitrage traders) is necessary to ensure a well functioning futures market. Although suggested, no study to date could label speculators as a reason for the larger volatility in futures markets. The participation of speculators is very much needed in a relative small market (such as South Africa) to ensure that all supply and demand variables are factored into the price. Price volatility will remain and this necessitates effective price hedging strategies even more. It is important that grain organisations, such as Grain SA will ensure a vibrant and well-functioning cash market. Without effective cash market, hedging strategies might be limited.
- Relationships with the Competition Commission (CC) need to be fostered to ensure that there is clear understanding and guidelines regarding business conduct, management information, benchmarking, policy issues, etc.
- Vertical integration and concentration along with economies of scale are an economic fact in the world and is necessary for capital investment support and growth. However the relationship with the Competition Commission must be strengthened to understand the issues at stake in this regard.
- Self regulations should be allowed. Under the appropriate policy restrictions and guide lines self regulation, if controlled correctly, can result in industry growth and a higher level of global competitiveness?
- Government should be put under pressure regarding the future of land reform and nationalisation. Currently, investor confidence is being impacted upon which creates uncertainty and limits investments for future growth and international partnerships.
- Low skills level is a major concern for the future and need to be addressed.

- Also at BBBEE level the situation on skills is a critical issue for the future. There are no incentives for students to study the desired fields necessary to maintain the high skill levels required.

The general remark for the based on the outcome of this study is that these three agricultural industries are dynamic, well structured and organised by competitive and educated members. However there still remains a lack of core trust in certain instances. For these industries to be able to grow a sustainable path together in the supply chain, they will have to trust one another and adapt the individual businesses to form a unity rather than separate entities.

Table of Contents

Executive Summary	4
List of Figures	23
List of Tables	26
Chapter 1: Introduction, scope & objective of study	28
1.1 Purpose of research	28
1.2 Methodology	30
1.2.1 Structure, Conduct and Performance framework.....	31
1.2.2 Vertical integration within the Animal Feed Industry of South Africa.....	35
1.2.3 Porter analysis (Barriers to entry).....	36
1.2.4 Price Volatility.....	37
1.2.5. Supply Chain Analysis.....	38
1.2.6 Risks analysis within the Feed and related Pork and Broiler industries.....	39
1.3 Report structure and scope of study	40
Chapter 2: Literature review	44
2.1 Industry background	44
2.2 Previous studies conducted	48
Chapter 3: Industry outlooks	55
3.1 Feed industry	55
3.1.1 Introduction.....	55
3.1.2 Global feed overview.....	55
3.1.3 South African feed overview.....	66
3.1.4. Feed supply chain analysis.....	78
3.2 Pork industry	107
3.2.1 Background to study.....	107

3.2.2 Global pork overview	108
3.2.3 South African pork overview	124
3.2.4 Pork supply chain analysis.....	128
3.3 Poultry industry	132
3.3.1 Introduction to study	132
3.3.2 Global poultry overview.....	133
3.3.3 South African poultry overview	141
3.3.4 Poultry supply chain analysis.....	150
Chapter 4: Data analysis and interpretation.....	153
4.1 Feed industry analysis	153
4.1.1 Structure of the major feed manufacturers in this industry.....	153
4.1.2 Conduct in the feed industry	169
4.1.3 Performance in the feed industry	189
4.1.4 SWOT analysis for the feed industry	193
4.1.5 Business models of the future.....	196
4.1.6 Supply Chain Operation Reference (SCOR).....	204
4.1.7 Prices and price volatility	209
4.2 Poultry industry analysis	219
4.2.1 Structure in the poultry industry	219
4.2.2 Conduct in the poultry industry	225
4.2.3 Performance in the poultry industry	232
4.2.4 SWOT analysis for the broiler industry	236
4.3 Pork industry analysis	238
4.3.1 Structure in the pork industry	238
4.3.2 Conduct in the pork industry	244
4.3.3 Performance in the pork industry	248
4.3.4 SWOT analysis for the pork industry	249

Chapter 5: Conclusions and Recommendations	252
References	269
Annexure A	286

List of Figures

Figure 1: The general Structure, Conduct and Performance paradigm.....	31
Figure 2: Detailed Structure Conduct and Performance paradigm.....	32
Figure 3: Evaluation of a vertically integrated industry.....	35
Figure 4: Porter framework	36
Figure 5: Graphical representation of the risk management process.....	40
Figure 6: Schematic representation of this feed project phases	41
Figure 7: The Role of the Feed Industry in the Supply Chain	45
Figure 8: Animal feed industry, 2008	46
Figure 9: Global population estimates and projections	56
Figure 10: Outlook for world crop prices to 2017	59
Figure 11: Ethanol production projections to 2017 for major countries	64
Figure 12: South Africa's total agricultural trade with the world (2007 – 2009) (Figures in Billions of Rand).....	72
Figure 13: Yellow maize prices (R/ton)	73
Figure 14: Expected meat consumption growth from 2005-2017.....	78
Figure 15: Meat consumption shifts	79
Figure 16: Market share of the five main feed consumers	80
Figure 17: Schematic illustration of interest rate impact.....	81
Figure 18: Annual feed volumes by company	83
Figure 19: Commercial production of animal feed	89
Figure 20: Own farm premix production of animal feed	91
Figure 21: Triangle of sustainability	104
Figure 22: Relative importance of the sustainability components over the last twenty years.....	106
Figure 23: World meat production and trade.....	109
Figure 24: Global meat and poultry consumption (1985-2025).....	109

Figure 25:	Meat per capita consumption.....	110
Figure 26:	Pork consumption growth by country.....	111
Figure 27:	Pork per capita consumption forecast.....	111
Figure 28:	Growth in global pork consumption.....	112
Figure 29:	Imports as a percent of pork consumption.....	113
Figure 30:	World top pork exporting countries	119
Figure 31:	Comparison of U.S hog farm production cost by farm type.....	120
Figure 32:	Pork export market share	121
Figure 33:	Major pork importing countries (2000 to 2018)	122
Figure 34:	Pork production, utilisation and returns (2006 to 2014)	126
Figure 35:	Innovative products categories	127
Figure 36:	World Broiler meat production growth (2005 – 2010)	133
Figure 37:	The annual percentage change in production of poultry meat for the top three producing countries (Brazil, China and the United States - 2006 to 2010)	134
Figure 38:	World Broiler Meat consumption growth (2005 to 2010).....	135
Figure 39:	Percentage share of top three poultry consuming countries (2005 to 2010).....	136
Figure 40:	Expected US retail and 12-city wholesale price for broiler meat (2008 to 2018).....	137
Figure 41:	Production of Animal Products in 2007/2008.....	142
Figure 42:	Poultry Production for the period 2006 - 2014	143
Figure 43:	Consumption of Animal products in South Africa (2000 to 2008).....	143
Figure 44:	Per capita consumption of chicken (2006 – 2014)	144
Figure 46:	Broiler feed prices from 2006 to 2008.....	145
Figure 48:	Broiler total realisation price (2006 to 2014)	147
Figure 49:	Origin of South African imports for the 2008 year.....	148
Figure 50:	Imports of Broiler meat and corresponding percentage changes (2006 to 2014)	148
Figure 51:	Outline of the different role players within the animal feed industry	153
Figure 52:	Response to changes in the organisational charts from the 2009 annual reports.....	155
Figure 53:	Perceptions of the level of vertical integration in the feed industry (rank 5 high to 1 low)	156
Figure 54:	Geographical representation of Meadow feed mills in Southern Africa.....	158
Figure 55:	Meadow Feed's division within Astral Foods	159
Figure 56:	Ordinary share holding of Rainbow.....	160
Figure 57:	Average broiler production per week (million).....	160
Figure 58:	Demographical distribution of Rainbow's infrastructure and feed plants.....	161

Figure 59:	Outline of Afgri	162
Figure 60:	Locations of Afgri Foods facility distribution in South Africa	165
Figure 61:	Pioneer foods corporate structure.....	166
Figure 62:	Geographical distribution of Nova feed activities	167
Figure 63:	Integration of Country Bird Holdings	168
Figure 64:	Geographical representation of CBH activities	169
Figure 65:	Porter's 5 forces model of competition.....	170
Figure 66:	Availability of potential market partners/competition	179
Figure 67:	Production share between the top five feed producing companies.....	189
Figure 68:	Revenue & operating profit for Astral.....	190
Figure 69:	Expansion of current operations in the next 2-3 years.....	193
Figure 70:	SWOT analysis for the South African feed industry	194
Figure 71:	Business Model Template	197
Figure 73:	SCOR model representation.....	207
Figure 74:	White and yellow maize spot prices, Nov 2007-Jan2010.....	210
Figure 75:	A model of the principal causes of the crisis	212
Figure 76:	SAVI Index of white maize traded on SAFEX (from January 2002 to February 2010) .	216
Figure 77:	Average monthly price volatility	218
Figure 78:	Example of a typical broiler supply chain	220
Figure 79:	South African Broiler Industry Profile	221
Figure 80:	Level of vertical integration in the poultry as indicated in questionnaires.....	230
Figure 81:	Share of top five poultry producers in 2009	235
Figure 82:	Top five poultry producer's capacity	236
Figure 83:	SWOT analysis of the South African broiler industry	237
Figure 84:	Simplified pork supply chain in South Africa	240
Figure 85:	SAPPO's organisational structure.....	241
Figure 86:	South African pork abattoir distribution in 2009	242
Figure 87:	Generalisation of the global pork supply chain	243
Figure 88:	SWOT analysis for the South African pork industry	250

List of Tables

Table 1:	Integrated role players in the feed, pork and broiler industry to be interviewed	30
Table 2:	World real GDP growth of 2009 and 2010, 2011 estimates	56
Table 3:	Developing countries GDP growth of 2009 and 2010, 2011 estimates	57
Table 4:	Five leading countries compound feed production for 2008 (in tons).....	61
Table 5:	Feed sales from 2004/2005 to 2008/2009 (Tons).....	68
Table 6:	National Animal feed production during 2007/2008 (Tons).....	70
Table 7:	Total protein consumption as per animal industry.....	75
Table 8:	Projections of protein demand for four different scenarios (2010 and 2020).....	76
Table 9:	Main food groups and LSM groups 1,6 and 10.....	77
Table 10:	Challenges for the feed industry	87
Table 11:	Oilseed and oilcake imports (tons).....	92
Table 12:	Fishmeal imports (tons)	93
Table 13:	Sorghum imports (tons)	93
Table 14:	Maize exports (tons)	95
Table 15:	Global pork production and consumption in 1000 metric tons (carcass weight equivalent) 114	
Table 16:	Brazilian pork supply and utilisation in thousand metric tons (2008 to 2018).....	115
Table 17:	China pork supply and utilisation in thousand metric tons (2008 to 2018).....	116
Table 18:	European Union (EU) pork supply and utilisation in thousand metric tons (2008 to 2018) 117	
Table 19:	Russian pork supply and utilisation in thousand metric tons (2008 to 2018).....	117
Table 20:	U.S. pork supply and utilisation in thousand metric tons (2008 to 2018).....	118
Table 21:	Pork price projections in U.S. dollars per metric ton (2008 to 2018).....	121
Table 22:	Global pork trade (2008 to 2018).....	123
Table 23:	South African pork statistics (2006 to 2014)	125
Table 24:	Percentage share of countries exporting broiler meat to the rest of the world	138
Table 25:	Percentage share of countries importing broiler meat from the rest of the world	139
Table 26:	Main feed stakeholders their holding company and locality in the feed industry.....	155
Table 27:	Percentage market share of broilers per feed manufacturer.....	157
Table 28:	Impact measurement of price volatility on commodities.....	178

Table 29:	Infrastructural ranking in business environment.....	180
Table 30:	Performance indication of own feed manufactured.....	181
Table 31:	Current risks at Macro level	183
Table 32:	Current risks at micro level	186
Table 33:	Risk impact assessment from the feed manufacturer's perspective	188
Table 34:	Rainbow 2008/09 financial results	191
Table 35:	Afgri's historical financial information.....	192
Table 36:	Historical volatility of the maize contract traded on CME (percentage).....	214
Table 37:	Historical volatility of the white maize contract traded on SAFEX (percentage).....	215
Table 38:	Provincial distribution of broiler farms in South Africa	223
Table 39:	Percentage market share of producers in the broiler industry.....	224
Table 40:	Ranking of current feed supplier	231
Table 41:	Risk impact levels and probabilities for the broiler industry.....	232
Table 42:	Price structure comparison between different grower organisations.....	233
Table 43:	Risk impact levels and probabilities for pork producers	248

Chapter 1: Introduction, scope & objectives of study

The animal feed industry is of strategic importance to the beef, milk, poultry, sheep and pork and other animal and pet industries. These sub-sectors are major buyers, processors and suppliers of processed commodities to the retail sectors and the final consumer markets. These markets are exposed to various risks including input commodity price volatility, high capital requirements, the inherent business and climatic risks of different sub-sectors and various other challenges. These factors have a major impact on decision making, from large to micro role players in the agricultural supply chain, especially in the feed and livestock markets. They have to cope with price cost squeezes from a buyer and seller's point of view. The feed industry in general forms part of the value chain of these industries as feed is a major component of production costs in the value chain.

The following sections discuss the purpose, methodology, scope and structure of the feed supply chain study, with emphasis on the pork and broiler sectors. The research is conducted on behalf of the National Agricultural Marketing Council (NAMC).

1.1 Purpose of research

Producers face various challenges on a daily basis within a dynamic, ever changing environment that increases risk to such a degree that in order to be able to farm sustainably, a competitive advantage in the form of lower cost and higher quality produce must be established. Primary production is relatively concentrated, implying that farmers are price takers on the input and output sides.

Significant barriers to entry exist in the value chain. These barriers include high capital requirements, relevant experience and track record, the significance of research and biotechnology in the provision of seeds, and economies of scale in other major inputs such as fertilizer, through to the costs of establishing large grain silos, large-scale milling operations and sophisticated logistics and infrastructure. Such barriers to entry make it difficult for new and smaller entrants to compete with existing market players.

The main issues within this study are the number of players in feed inputs, manufacturing and procurement, the competitiveness and profitability within the animal feed supply chain and the overall impact on the pork and poultry markets. At-home feed manufacturers in the pork industry account for more than 60 percent of the total industry pork feed industry (Streicher, 2010). Input factors further upstream in the supply chain (e.g. maize and soya from farmers) are researched on a procurement process basis by producers, to optimise profit through hedging and to discount risk efficiently to lower cost. In this way a degree of competitive advantage can be established in both the pork and broiler industry. Policies and methods of effective price hedging must be set in place to ensure sufficient grain stocks at the best possible prices. Farmers in general do not know how to discount their risks and are very vulnerable in this regard.

The purpose of this project is to:

- To identify the various stakeholders and role players in the pork and broiler sub-sectors and feed industry (including structures, size, market share, etc)
- To identify the factors that restrict and/or enhance the competitiveness and profitability within the feed production supply chain
- To determine the impact of the feed industry on the pork and broiler supply chains.
- To determine the level of price volatility of inputs for the feed industry
- To address risk mitigation strategies, such as hedging
- To explore possible business models in the feed industry.

To understand these problems, a value chain analysis of feed in the pork and broiler industry, including all the links, needs to be analysed. Special attention is given to the different players in the input and feed (own and manufactured) industries. For example, an agribusiness (co-operative) is a major buyer, manufacturer and seller of feed whilst there are other players whom are independent. Feed costs contribute to high meat and broiler prices and the different aspects surrounding these costs must be analysed to identify the degree of change within feed components. This will help to solve the problems of high consumer cost and to give a better understanding of the possible future impact.

1.2 Methodology

In order to understand the impact of the feed industry on the pork & broiler industry supply chain, the further impact on producers, and eventually the consumer market, this study will focus on the agro-feed industry. Interviews with structured questionnaires will be conducted to obtain information from pork and broiler producers, feed manufacturers and the major role players and organisations within the relevant industries. Strategies to mitigate risks need to be explored in order to develop an updated feed supply chain structure in which all the links are clearly defined and understood and information is included as required to assist emerging markets and industries involved. The following sections explain the structure of the study.

Table 1 below gives the key role players that will be interviewed for purposes of this study.

Table 1: Integrated role players in the feed, pork and broiler industry to be interviewed*

Organization	Holding Company	Feed manufacturers	Producers	Butcheries (Pork & Broilers) & feed associates
AFMA SAPPO SAPA	Astral Rainbow Pioneer Foods Afgri Supreme	Meadows Epol Nova Feeds Afgri Feeds Allem Brothers Smaller manufacturer (1) Alltech	Country Bird (3) Rainbow (3) Tydstroom (5) Daybreak (3) Early Bird (3) Independent producers (4) Pork farmers (12)	Butcheries (4) AFMA Animate & Animal Health Other (3)
Respective totals of interviews				
3	5	6	33	6

***Columns to be read vertically**

Note: Questionnaires will be adapted for the different market segments that are going to be interviewed. In total, 53 interviews were conducted in the feed, pork and broiler industries. A generic questionnaire is available in Annexure A.

1.2.1 Structure, Conduct and Performance framework

By examining the structure conduct and performance relationship of the animal feed industry one will understand all the particular factors that underline the functioning of this industry within South Africa. Figure 1 below indicates the general Structure, Conduct and Performance paradigm. According to this figure the paradigm starts at the basic conditions along with the structure of the industry and its sub-sectors. This impacts the firm's decisions, and each decision will influence the conduct which then determines the performance of the industry. Changes that occur at the conduct level will not only impact on the performance of the industry but will also have an impact on the basic conditions, rerouting to the start of the paradigm. This is repeated as performance levels and feeds back to both the conduct level and basic conditions of the paradigm (Marion, 1976).

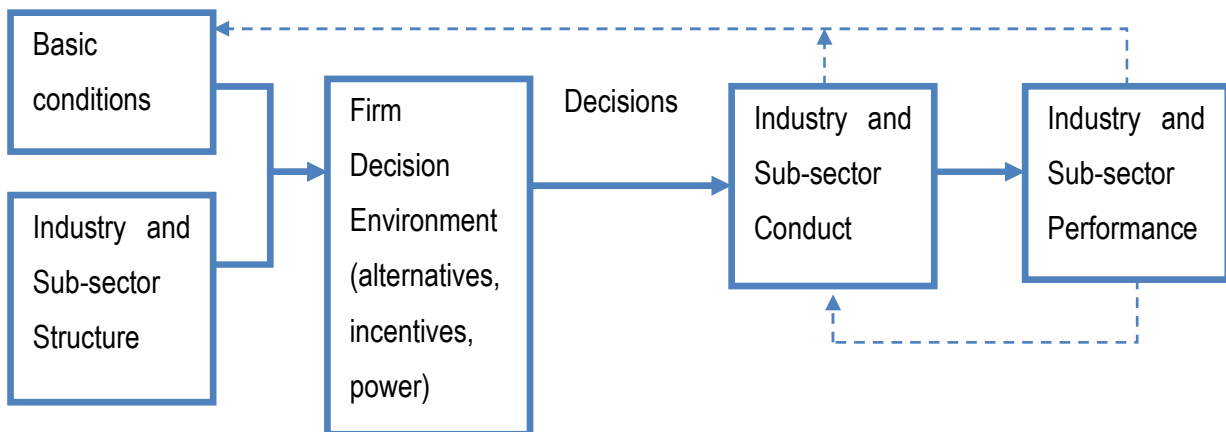


Figure 1: The general Structure, Conduct and Performance paradigm

Source: Based on Marion, 1976

The standard Structure, Conduct and Performance paradigm asserts that there is a direct relationship between the degree of consumption and the degree of market concentration among firms. This is supported if there is a positive relationship between market concentration (measured by the concentration ratio) and performance (measured by profits), regardless of efficiency (measured by market share) of the firm. Thus firms in more concentrated industries will earn higher profits than firms operating in less concentrated industries, irrespective of their efficiency (Shaik *et al.*, 2009).

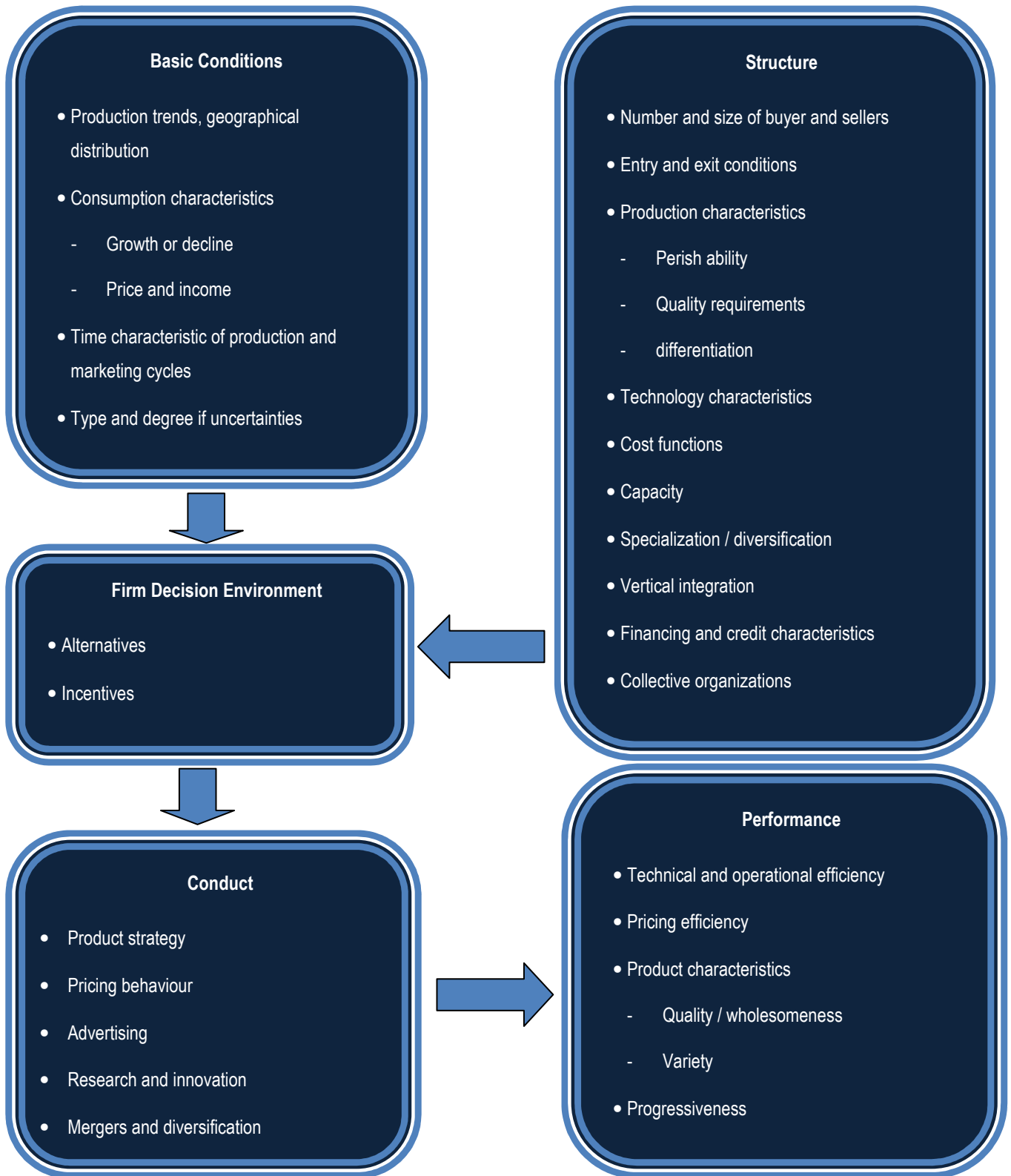


Figure 2: Detailed Structure Conduct and Performance paradigm

Source: Based on Marion, 1976

Figure 2 above illustrates the detailed Structure, Conduct and Performance paradigm and will be examined in the section that follows and is based on the work of Marion (1976).

Basic Conditions

This is the first step in the evaluation of an industry and consists of the production trends to determine when production will increase or decrease, geographical distribution of the main animal feed producers in South Africa and why they chose that specific region. The consumption characteristics determine if there will be growth or decline in the demand levels for animal feed and what the price and income levels is that impact the demand curve. Time characteristics of the production market will determine how quick the animal feed industry can react and adjust to changes in the market and within the industry and whether it should increase or decrease production. The type and degree of uncertainties is determined by animal feed's price patterns and random shocks that can affect the demand and supply of animal feed. The last condition to consider in the evaluation is the legislation and governmental policies, to establish what acts the animal feed must comply with and how changes in those policies can influence the industry.

Structure

In conjunction with the basic conditions, structure impacts the firm's decisions and is part of the first evaluation step. It consists of the number of buyers and sellers to evaluate the size of the market. It also examines the barriers to entry in the industry, the characteristics of animal feed and the technological characteristics of the industry. The capacity of the industry will have an influence on the structure along with any specialization in animal feeds.

The structure of an industry can be seen as the way in which the role players relate and interact with one another based on the different levels of competition, vertical or horizontal integration, centralized, functional divisions (top-down); decentralized; matrixes, networks and holding company structure (McKinsey, 2010). By examining the structure of the feed industry the barriers to entry will become clear. One will then observe the complete picture of where a newcomer has to position itself in the large industry in order to be competitive and if it is possible to reach that position.

Firm's Decision and Environment

The decisions of the firm with any alterations, modifications of the control and influence of firms are determined equally by the basic conditions of the industry and the structure.

Conduct

The manner in which the industry functions is influenced by the decisions of the firms. This determines the product strategy, how prices will be determined, what type of marketing and advertising the industry or firm will use. It also impacts on research and innovation along with risk management practices.

The code of conduct section of a company is a set of conventional principles and expectations that are considered binding on any person who is a member of a particular group. If we know what each company strives for and what goals they have set out then the assumptions of the future can be drawn for the feed production industry.

Performance

The performance of the industry is the last building block in the Structure, Conduct and Performance paradigm and is determined by the conduct of the industry. The performance of an industry consists of the technical and operational efficiency to evaluate whether the operations performance at its optimal levels or if better technology is needed to increase the production. Price efficiency is also assessed to establish if the price level is correct for the supply and demand balance. The product characteristic in the form of quality

and variety and the barriers to entry into the market forms the last evaluation of the industry. The comparison of the growth and profitability of each company will indicate relative performance.

To be able to incorporate this structure, conduct and performance paradigm on the feed industry, the two sub-sectors will be divided into the pork and broiler industries and discussed separately.



Figure 3: Evaluation of a vertically integrated industry

Source: Marion, 1976

1.2.2 Vertical integration within the Animal Feed Industry of South Africa

In the South African feed industry there are a small

cause further vertically integrated systems in the industry's structure and lead to vertically consistent incentives in the firms' decisions and coordinate behaviour in the conduct that will in the end cause an improved match of supply and demand in the industry at whole (Marion, 1976).

1.2.3 Porter analysis (Barriers to entry)

In the following approach, Porter's 'Five Forces' model was used to determine the attractiveness of the feed industry in terms of the competitive environment it faces in a South African context. This can be done by indicating what changes have occurred in each of the components that make up the competitive environment in which the industry operates. The Porter framework is illustrated in Figure 4 below and it shows the determinant forces that drive industry competition.

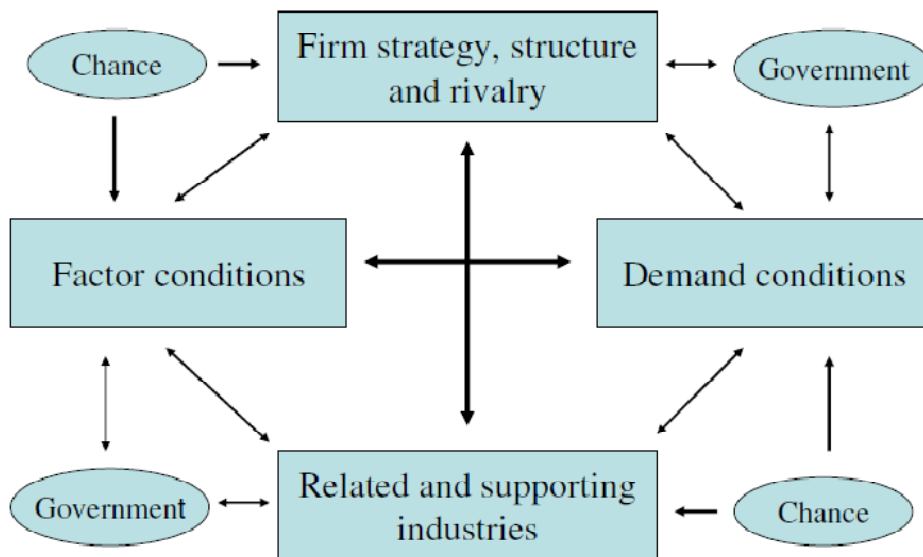


Figure 4: Porter framework

Source: Esterhuizen, 2006

The firm's strategy, structure and rivalry refer to relationships, networks, barriers to entry, pricing strategies, economies of scale etc. Factor conditions refer to the power of the supplier and specifically to distance from the market, access to finance, input costs, availability of land and water etc. Demand conditions refer to

purchasing power and disposable income, size and growth of the market, growth of the informal market, changing consumer trends etc. Relating and supporting industries refer to issues such as logistics, reliability of input suppliers, the state of technology, R&D, skills development etc. The issues relating to government include labour laws and regulations, municipal by-laws, food safety issues, bio-security management, the import and export environment etc. Chance events are occurrences that are often beyond the control of the business and relate to exchange rate, crime, HIV/AIDS, the political environment etc.

1.2.4 Price Volatility

Volatility provides a measure of the possible variation or movement in a particular economic variable. It provides a measure that describes the tendency of a commodity, for example the maize market, to move either up or down and to what extent the anticipated move could be. In essence it is a fear factor. If the price jumps by large amounts in a short space of time then the volatility of the market will be high. If the market movement is small, steady and predictable then the volatility will be low. Lack of predictability and uncertainty associated with increased volatility may influence both producers and consumers. High volatility may limit the ability of consumers (processors) to secure supplies and control input costs.

Two measures of volatility are used (European Commission, 2009):

- Historical (realised) volatility is based on observed (realised) movements of price over a historical period. Historical volatility tells us how volatile an asset has been in the past. It represents past price movements and reflects the resolution of supply and demand factors.
- Implicit volatility is the markets' view on how volatile an asset will be in the future. It represents the market's expectation of how much the price of a commodity is likely to move and tends to be more responsive to current market conditions.

Historical volatility is a statistical measure of the volatility of a futures contract, security, or other instrument over a specified number of past trading days. It is an indication of past volatility in the marketplace. Historical volatility is calculated as the annualized standard deviation of the first difference in the logarithmic values of nearby futures settlement prices. Mathematically,

$$Volatility = STDEV_{Day1}^{Day2} \left(LN \frac{SettlePx T}{SettlePx T-1} \right) * \sqrt{252}$$

The South African Volatility Index (SAVI) for white maize is based on the forward looking option volatility which therefore means it provides a transparent reference tool for the market to better understand the potential uncertainty in the market. It therefore measures the implicit volatility of the white maize contract. In essence, the JSE measures the market volatility in three months from today, every day. The index serves as a transparent volatility indicator. Because it is a forward looking indicator and not based entirely on the historic values but rather more on participants' opinions, one will be able to notice that as people get more fearful of market conditions, the value of the indicator will start to rise.

1.2.5. Supply Chain Analysis

To develop a supply chain, the Supply Chain Operations Reference (SCOR) (Supply-chain Council, 2006) method is used in conjunction with conventional tree diagram supply chains to assist with the flow of information from different role players and stages. This method enhances the understanding of the process from 'farm to fork' and helps to better understand what is expected within a competitive and sustainable market.

SCOR is a modelling structure method that identifies the different processes and role players that are involved in the formal value chain and how they interact with one another at a horizontal or vertical level. The data collected in the surveys will be tested and quantified to establish the relevance within this study, and to give the agricultural industry a better knowledge of the different role players, their market concentration, structure, conduct and performance, and how these inter-linkages impacts on the industry.

1.2.6 Risks analysis within the Feed and related Pork and Broiler industries

Risk management for the purposes of this study will be divided into a macro and micro level. All identified risks which have an external impact on the daily operations of the feed industry will be classified as Macro risks. Macro risks will further be divided into a Political, Economical, Social, Technological and Environmental risks (Louw, 2007). Micro risks, will have an internal impact on the feed industry in that these types of risks are unique to and affect the long term sustainability of the industry. Micro risks, therefore will be divided into Operational, Product Market, Financial, Input and Export risks. The following figure provides a clear understanding of the whole risk management process for the proposed study.

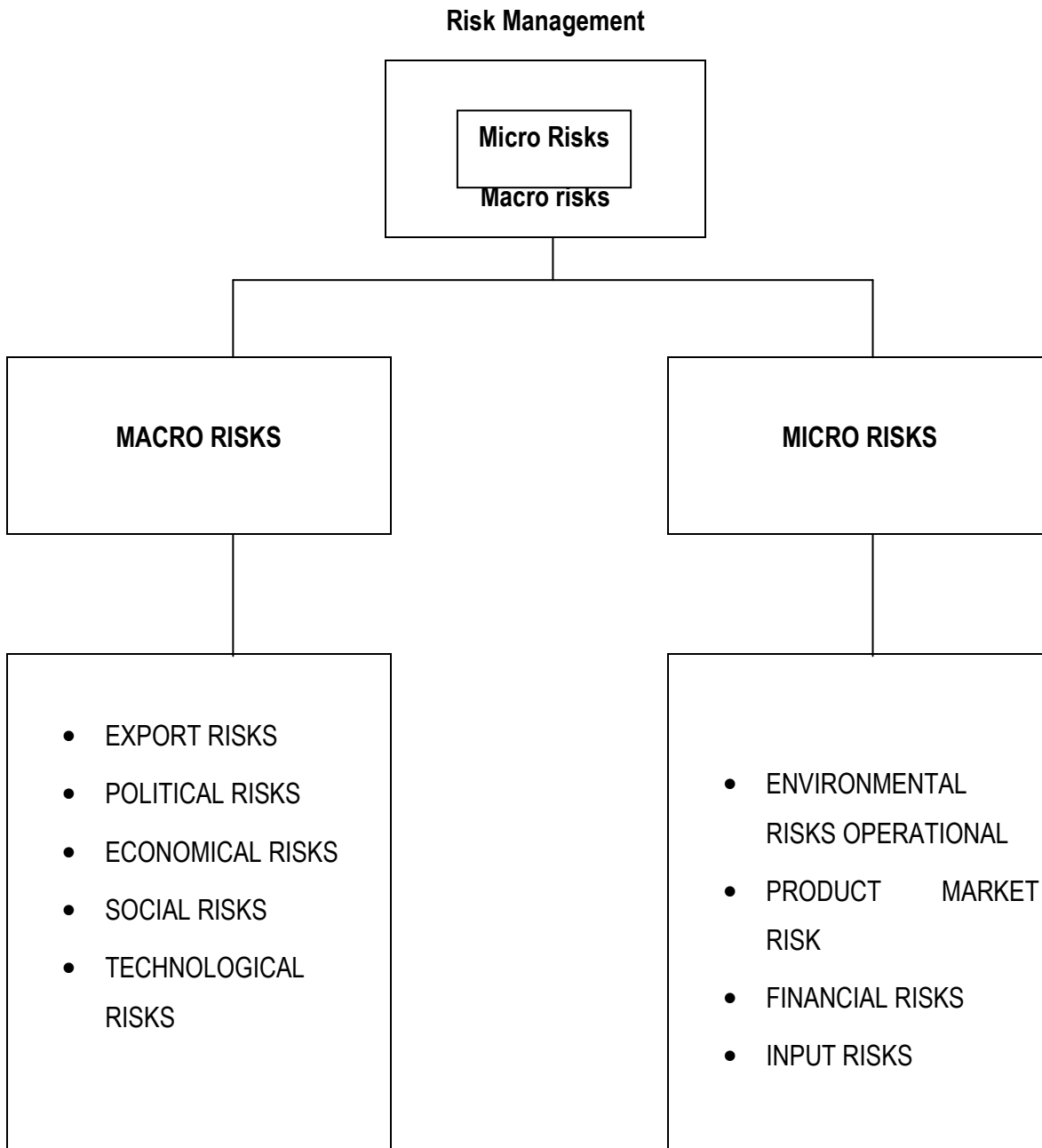


Figure 5: Graphical representation of the risk management process

Source: Own representation, 2010

1.3 Report structure and scope of study

This project will be completed in three (3) phases over a time period of six (6) months. Figure 6 below is an illustration of the different segments that will be covered in the different project phases and in final report.

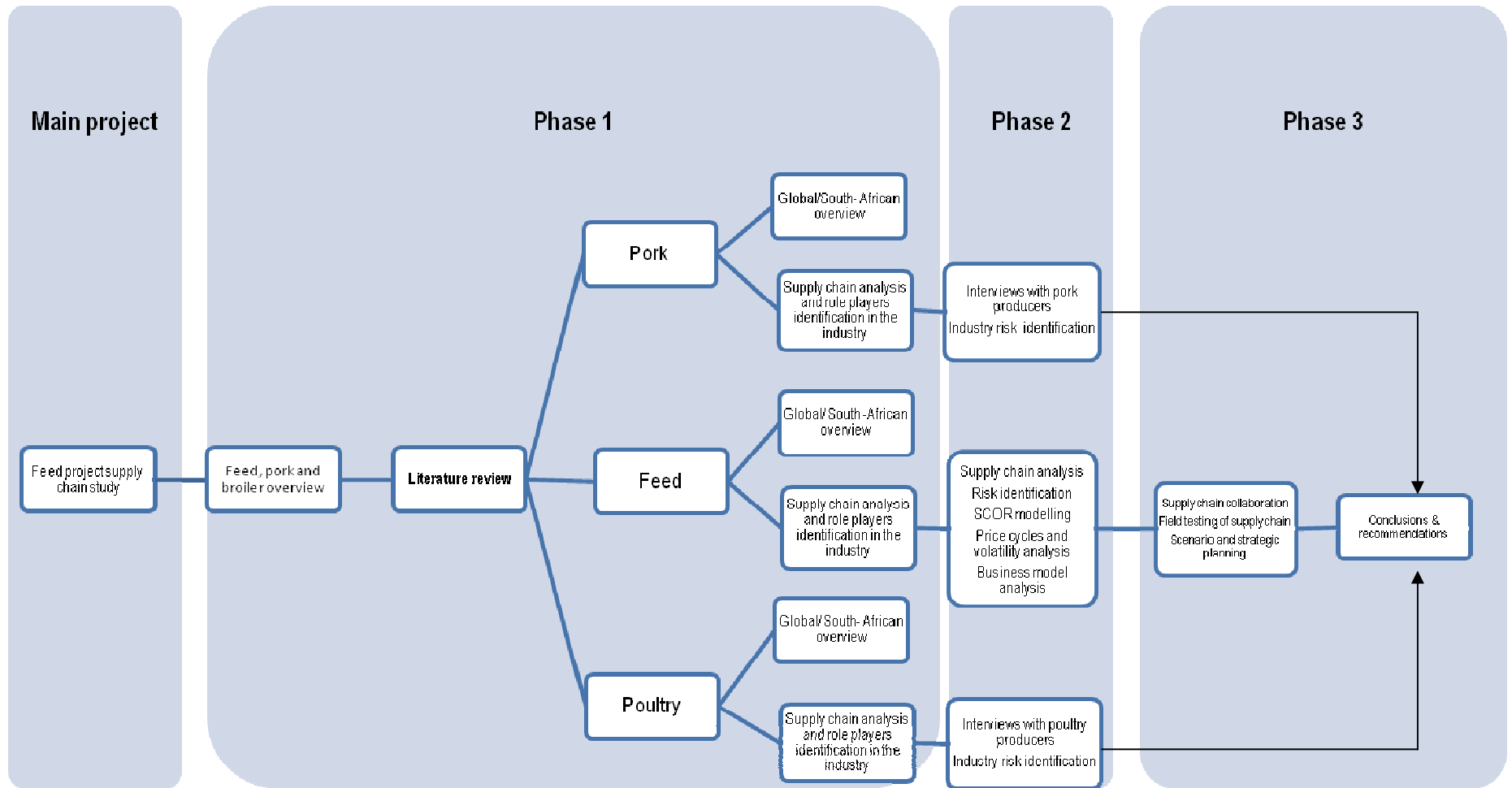


Figure 6: Schematic representation of the feed project phases

Each phase will add a different and more collaborative dimension regarding the scope, structure and performance of the feed industry.

The scope of this project is to provide:

- An international and domestic feed industry overview
- Industry overviews of the pork and broiler sub-sectors
- Conduct supply / value chains in the pork and broiler industries
- Research in input commodities and the link between input suppliers to feed manufacturers, producers, buyers and consumer
- Identify the risks in the feed industry
- Identify the level of concentration in the feed industry and whether this is in favour of the industry
- Identification of the current and future issues in the three sub-sectors
- Identification of the links between the commodities, feed and producers
- Evaluate the competitiveness of the industry
- Research and understand the role of contracting in the pork and broiler sub-sectors
- Understand the role of contracting regarding feed inputs
- Differentiation between the free market trade and contract markets
- Identify the different business models in the three sub-sectors with respect to structure, conduct and performance
- Identify price cycles with respect to seasonal trends in the input and substitutive meat markets
- Scenario analysis of what the impact can be if the proposed planting reductions as proposed by GrainSA are put in place
- Issue analysis with respect to the availability of domestic ingredients vs. imported ingredients and impact on the industry
- International impact overview study on the South African pork and broiler industry with respect to imports of inputs, and how competitiveness in procurement methods can be used to an advantage.

This study will only cover the broiler industry and not the eggs, day old chicks and emerging farmer sub-sectors with respect to the feed issues.

Outlay of study

As given in table 1 above as well as in figure 1, an overview of the international markets will be done for feed, poultry and pigs, followed by an overview of the South African markets. Interviews will be conducted with various stakeholders in the industry. This will include supply chain analysis as well SWOT and risk analysis. Finally conclusions will be drawn and recommendations made for this study.

Chapter 2: Literature review

The purpose of this literature review is to identify previous research studies that have been undertaken that pertain to the focus of this study. This is to prove that this feed study will make a worthy contribution to the feed, pork and broiler industry as well as to illustrate that this study is not a duplication of other studies.

2.1 Industry background

The feed industry is of extreme importance for the poultry, pork, beef and milk industry. This industry faces many risks in various sub-sectors. The feed industry plays a major role in production costs, contributing 80 percent of all costs in broilers. Internationally, the feed industry is represented by International Feed Industry Federation (IFIF) and Food and Agricultural Organization in the United Nations (FAO). The leading consumption and production regions in the world are the USA, European Union (EU), Brazil and China. In South Africa the feed industry is represented by the Animal Feed Manufacturers Association (AFMA). They represent the industry in matters where it is necessary to enhance or protect the interest of the feed industry (NDA, 2009). AFMA is also the representative of the IFIF in South Africa. The IFIF, which is a strong voice for the feed industry worldwide, is exploring work in feed in Africa. Their annual report creates insights into South African feed industry as well as current feed statistics (Briedenhann, 2009).

Figure 7 illustrates the interrelationship in the feed industry between the different stakeholders involved in the animal feed supply chain.

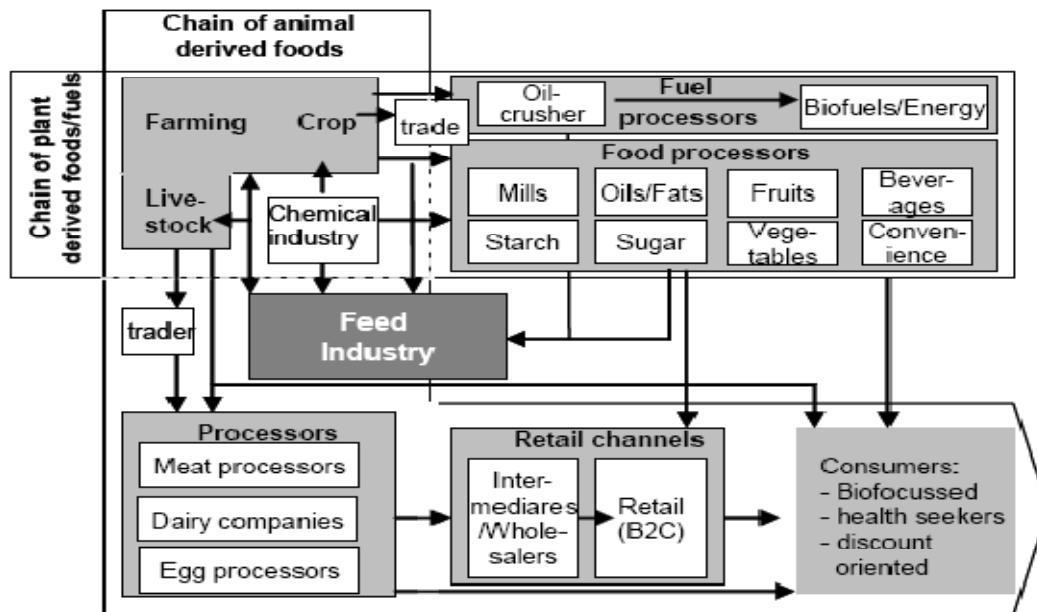


Figure 7: The Role of the Feed Industry in the Supply Chain

Source: Broring, 2009

The number of firms or companies and concentration in the feed and animal sector is relatively high in South Africa (Mather, 2005). This results in a situation where small and medium agricultural enterprises such as feed and poultry are not able to take part and get actively involved in the national market. Even though Mather (2005) shows that since 1960, the liberalization of agricultural markets has opened a few opportunities for small and medium enterprises; there are still a number of emerging farmers who are characterized by inadequate access to the agricultural market.

Figure 8 below is a diagrammatical representation of all the role players in the feed industry. The levels of integration between different role players in this complex yet very dynamic industry as well as the different legislation applicable to each stage in the feed manufacturing and distribution process are noteworthy.

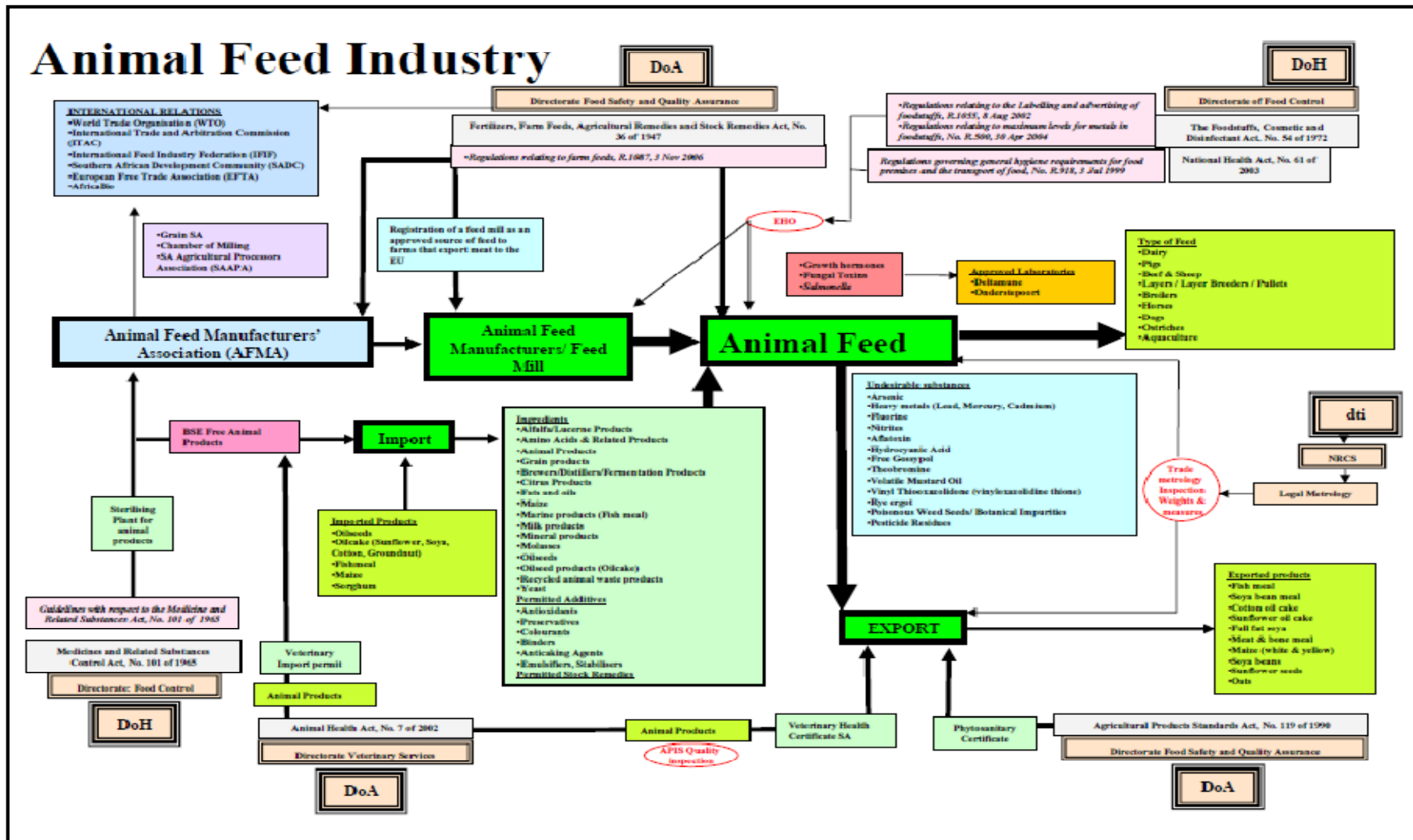


Figure 8: Animal feed industry, 2008

Source: Köster, 2008

According to Ramburuth (2009), the following measures can be taken in order to include the excluded small and medium enterprises:

- Reduction of long terms contractual agreements between the giant bodies in feed and animal sectors. This will assist in reducing the prevailing dominance.
- Involvement of the state will be crucial to promote the development of small and developing farms/firms in the feed and animal sector.
- The role of industries' organizations also has to be examined to promote equality and competitiveness in both the feed and animal sectors.
- An understanding must be introduced between the government, public and private organizations to enhance agricultural productivity.

The South African Department of Agriculture's Act no. 36 of 1947 is currently under review. South Africa tends to primarily follow EU regulations and guidelines on animal feeding, partly to ensure that its export markets in the EU and elsewhere remain open and profitable. Changes to EU (international) regulations and guidelines resulted in consultations between AFMA and Act 36 to debate its local applicability. The South African regulations and guidelines may be amended by Act 36 once consensus is reached. It is encouraging to note that the consultation processes between Act 36, Act 35 and AFMA are continuously improving (AFMA, 2009).

Poultry and pork fall under the four major meat types, along with beef and sheep meat, and are thus extremely important in providing protein for the ever increasing human population. Currently, the world population is estimated at 6.7 billion people and forecasts expect that in 2030 it will rise to 8.5 billion. Furthermore, increasing demand away from cheaper grains and towards more expensive meat means that more raw materials for feed must be produced (IFIF, 2007). The main ingredients for feed are maize (55.2%), soya beans (20.4%), sunflower seeds (3.9%) and wheat bran. With the biofuel initiative, a substantial amount of grain may end up being directed to ethanol production (Kanengoni, 2008), and better management of the feed supply-chain and intensive research on feed for food is thus required.

The South African pork industry, which is small in global context, is dynamic, well organized, and compares favourably with the rest of the world in terms of production figures (SAPPO I, 2009). The South African Pork Producers Organization (SAPPO) acts as a representative and lobbyist of all matters regarding the pork industry in seven (7) different portfolios. Similarly, the South African Poultry Association (SAPA) is the organization that monitors and lobbies on behalf of the registered poultry producers. This includes the broiler, day old and egg producers. The present study is focused on only the broiler industry i.e. chickens that are produced for meat production.

According to Jon Ratcliff (2008) the feed industry is facing challenges and a big focus is on nutritionists to maintain cost effective solutions without compromising performance. The challenge arises from escalating costs, and also from associated problems of supply, volatility, and optimization.

2.2 Previous studies conducted

There are numerous studies and publications regarding the feed, pork and broiler industries individually as published in journal articles and popular agricultural magazines. Most of these studies focus on animal nutrition and health, diseases, types of feed, feed mixes and production costs. Examples of such studies are Poultry Meat Production (Miltons, 1994); Principles of Poultry Science (Rose, 1997); The Science and Practice of Pig Production (Whittemore, 1998). Many scientific studies have been done on the different ingredients in feed, their implications, substitutes, contamination, enzymes and proteins for example: Biotechnology of the Feed Industry, Alltech's Symposiums (2000-2009). Studies and analyses of the four major feed production countries exist, but these do not necessarily cover all of the challenges, faced by various stakeholders, including market size, structure, and market share of the global or South African industry. Many supply chain studies have been conducted on beef e.g. The Economist Intelligence Unit, (2008), Labuschagne (2007) and Groenewald (2008). These could act as guidelines in our project. There are also numerous studies on biofuels and their application to global food and feed production-IFIF: Sustainability Issues 2009; Sterling (2007). Limited studies have been done on the complete feed supply chain for the pork and broiler industry, analysing it in detail; most only focus on a small area of the chain. As a result, this report focuses on supply chain studies that impact on the broiler and pork feed industry. Conclusions and recommendations will be supplied at the end of the overview.

The study by Visser in 2004 focused on the pig supply chain. In this study the consumer was fundamental to the supply chain and an in depth review of the meat market surveys for the period 1970 to 2000 was undertaken. The central theme was: "How to reconcile meat quality, genetics and the consumer with bio-economic pig production in the South African pig supply chain" (Visser, 2004). Verbeke, (2001) in "Possibilities to improve characteristics, consumer perception and acceptability of Pork" undertook a further analysis on breeding, farming, feeding and slaughtering. The following points in the feed analysis were focused on:

- The protein and animal feed dilemma
- Feed production levels
- Mineral and pre-mix market
- The Pharmaceutical Industry
- Vulnerabilities pertaining to the South African Pig Industry

Although these studies are of great value, it should be noted that the main fundamental of this study is not on the consumer, but on the total feed supply chain concerning pork and poultry. It will enhance our research in the pork segment, but we will elaborate and conduct wider studies into the supply chain from an economic and strategic point of view. A study conducted by Willemse (1994) highlighted the economic implications of an alternative marketing system for yellow maize on the South African animal feed industry. The most important objectives were to define and analyse:

- Raw material requirements for the most important livestock industries
- The supply and demand of raw materials on a regional basis
- The yellow maize marketing system and the economic implications thereof on the livestock industry
- Detailed analysis on production, consumption and price trends of the main protein stock feed sources in South Africa and internationally
- Evaluation of the economic implications of the deregulation of the maize board

Although this study was extensive, the information is outdated. The maize market is significantly different to what it looked like in 1994 prior to deregulation. Since then new feed regulations have been implemented globally and nationally: new trends and challenges are faced today which have not been previously dealt with. As with most studies, this did not cover the entire supply chain of the feed industry. It focused on maize and livestock in general and does not contain specific research on the pork and poultry feed industries.

In a presentation for Cargill: “Challenges for feed beyond 2010” (Ferrari, 2009) focused on:

- The growing world population’s impact on meat consumption
- Total global feed production
- Overview of all the components in the market environment for the feed industry
- Feed industry mission beyond 2010
- Consumer foods and trends
- Health, safety and traceability of food and feed

One of the main challenges the study brought to light was the importance of traceability to ensure food safety so that the consumer is offered the chance to know exactly where their food comes from and where controls take place along the supply chain. The study also raised the challenge of environmental sustainability in that we should seek to minimize the environmental impact of feeding animals. A small section was dedicated to biofuels, but with no elaboration on the real impacts on the feed industry. In the discussion of the feed industry market the following issues were highlighted:

- Volatility
- Financial crises
- Ingredients availability
- Livestock
- Food trends

- GMO
- Climate change
- Oil and energy costs
- Biofuels
- Emerging countries increased demand
- New feed regulators

World population growth is one of two underlying factors that drive the feed business. Closely related to the growing world population, is the rise in income which is putting further strain on meat demands. These heightened concerns further augment the pressure on protein demand for human and animal consumption (IFIF, 2009).

The IFIF annual report 2008/2009 gives a general overview of the global feed industry and also deals with current issues, challenges and achievements. IFIF also does industry profiles annually and gives a short overview of what happened in the South African feed industry during the past year and predictions for the following years to come. Their analysis showed that the South African feed manufacturers are price takers and the trend follows the volatility within raw material prices. If the prices of commodities rise, feed prices also have to increase. Although they give insightful and current statistics, there is no in depth information regarding the industry supply chain.

GIRA Foods (2008), a research and consultancy company, published an article “The Long Term Strategic Trends in World Meat Markets from 1990-2015 for poultry, beef, pig meat and sheep meat in 2007”. The principle objective of this research programme was to provide long term (2010 - 2015) vision and scenarios of future world meat markets for consumption, production, foreign trade and price formation. This implies the following sub-objectives: to analyze, by region and meat type, the influences on meat demand, prices and consumption in terms of the following issues:

- Saturation and substitution between meats
- Fundamental demand preferences and shifts - in context of the image of each meat and relative prices

- Population growth and income influence
- Trend of urbanisation
- Lifestyle and religion
- To analyze by region and by meat types the factors influencing present production structures:
- Physical : pasture and feed availability and cost
- Technology and other factors contributing to productivity gains : labour, land, management
- Alternatives to meat production : cereals, soy and the impact of biofuels
- Subsidy regimes
- Capital and corporate structures : groups, coop, collectives
- Consumption proximity: preferences, cold chain, logistics, etc.
- Producer & processor vertical and horizontal integration
- Environmental and animal welfare issues to assess the dynamic forces for change on the meat sectors
- Forecast future production and consumption resulting from the above
- Derive the resultant trade flows and the major changes in volume and direction
- Analyse future trends in producer prices per region as a function of production, distribution and demand changes.

According to GIRA (2008), the global system of meat production and primary processing has fundamentally changed in the past 10 years: the platform from which we face the future has changed and some issues which affect the future have changed as well. These changes will have a direct impact on the regional and global meat markets in the next 10-15 years. Some key political factors include the liberalization of Russia, rising Chinese economic power and evolving trade policy; WTO and bi-lateral agreements, CAP Reform, EU enlargement and Mercursor. The key factors faced from an economic standpoint are the US trade deficit, differential economic growth rates, currency changes, bio fuels and energy prices. From a biological perspective, the impacts which animal diseases have on international trade and the production costs involved are critical. They also report that corporate restructuring has taken place regionally and global

M&A amongst processors, retailers and input suppliers. Changing scale economies and changing power in the meat chain and risk management practices are also addressed.

The study teaches valuable lessons, because it has an international view of meat market trends. It is important to examine and include, exactly what corporate restructuring took place, how the economies of scale are different and who are the changing powers in the meat supply chain. The Feed link internet site (www.feedlink.com, 2010) stated that representative supply chains for the feed industry should be formulated. They state that once representative supply chains have been well characterized, researchers will be able to build computer models that can simulate and digest data to assist in decision making and risk management in the supply chain. This will enable accurate traceability and will also identify hot spots where risk for unwanted mixing is possible.

Leach (2003) of the South African Pork Industry conducted a summary of the entire industry of the commercial sector as well as the commercial farming sector. South Africa produces around 165 000 tons of pork per annum, while China, the leading country in pork production, produces 43, 2 million tons per year. This causes our market to be affected by the international players. This has a very destabilising effect. South Africa also faces challenges with competing with international feed prices. This is especially true in the case of Brazil that is producing their raw material much less expensively, which directly makes their meat prices more competitive for the international markets.

The National Pork Producers Association of the United States published an article in 2007 that stressed how important it is that Congress, and the hog industry must have a mutual understanding on what is going on in the hog market structure. This must be done so that significant changes can be made in legislation and market structures to overcome challenges in the industry, so that it has a positive effect on all stakeholders. It is evident from this article how important information is, regarding the feed and meat industry so that informed decisions can be made. The study to be conducted on the feed and feed related issues of the pork and poultry industry will be able to set a solid ground for South Africans, where different parties would be able to learn from it and be able to make informed decisions regarding the legislation (Animal Feed Act no. 36 of 1947) that is under review.

AFMA publishes articles in the magazine Matrix on feed and feed related issues concerning both the pork and broiler industries..The articles are very topic specific and some of the articles will definitely broaden and add value to our references. The following articles from AFMA (Matrix) are of value for the purposes of this study:

- Facing the Feed Industry Challenges, September 2008
- Ensuring food and feed safety in 2010 and beyond, December 2008
- Amendment to the regulations of Act 36 of 1947- heavy metals, December 2008
- Global feed raw material supply- current and future, December 2008
- Preface: Feed raw material price volatility and availability presents a challenge for the Feed Industry, June 2007
- Technology implications for global feed industry with changing ingredient supply, June 2008
- Opportunities and challenge ahead of the poultry industry, July 2008

On each section of literature, there has been numerous applicable studies conducted in the supply chains of the pork and broiler feed industry and what has an impact on it. No literature was found that included a detailed analysis of the entire supply chain, its stakeholders and role players, from an economic and strategic point of view that combined the structure, conduct and performance in the South African feed industry. Numerous articles were published stating that a revised supply chain analysis is needed to enhance the feed industry and also to identify critical areas in the chain that need strategic management and controls. In light of the review of Act 36, this study could assist role players in making more informed decisions. This study will also address some new challenges emerging in 2010 and onwards.

Chapter 3: Industry outlooks

3.1 Feed industry

The following section will focus on the outlook of the feed industry globally as well as in South Africa.

3.1.1 Introduction

The following section will focus on the feed industry from a global and South African perspective. The purpose of the inclusion of overviews is to investigate the business environment currently being experienced in the feed and adjoining industries. The current and future trends will be highlighted on a statistical as well as on an economical basis. To be able to study the current feed supply chain, the key components in the chain will be addressed. Feed related issues and concerns will be identified and how these issues influence the business of feed role players in the value chain.

3.1.2 Global feed overview

The following section will focus on the global feed overview.

3.1.2.1 Supply and Demand

Despite the economic recession of the past years, the demand for protein based foods remained high due to the rise in world population and an increase in income of citizens in developing countries.

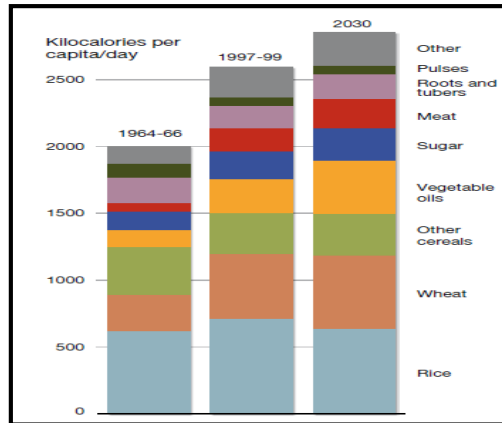
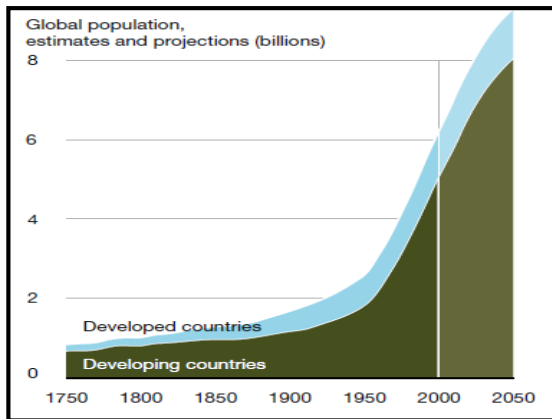


Figure 9: Global population estimates and projections

Source: Nellemann *et al*, 2009

On a daily basis, an extra 230 000 people are added to global food demand (Nellemann *et al.*, 2009). The estimated population in 2050 is 9.2 billion people (De la Rosa, 2008). Asia, mainly China and India, will account for the largest population increase.

Table 2: World real GDP growth of 2009 and 2010, 2011 estimates

	2009	2010	2011
Real GDP	-2.2%	2.7%	3.2%
R. GDP (PPP)	-1.0%	3.4%	4.0%
Exports	-13.9%	4.2%	6.2%
Imports	-13.7%	4.5%	6.4%

Source: World Bank, 2010

Table 3: Developing countries GDP growth of 2009 and 2010, 2011 estimates

	2009	2010	2011
Real GDP	1.2%	5.1%	5.8%
R. GDP (PPP)	1.9%	5.4%	6.0%
Exports	-12.3%	6.2%	7.5%
Imports	-11.4%	6.8%	7.5%

Source: World Bank, 2010

As is evident from Table 2 and Table 3 the world real Gross Domestic Product (GDP) in 2009 had a negative 2.2 percent growth and developing countries real GDP a positive 1.2 percent growth. The estimated growth in 2010 of world real GDP is 2.7 percent and for developing countries a staggering 5.1 percent (World Bank, 2010). GDP is the total market value of all final goods and services produced in a country in a given year, equal to total consumer, investment and government spending, plus the value of exports, minus the value of imports (Investor Words, n.d.). Developing countries experienced a growth in their commodities in the latter half of 2009, this growth resulted in the upswing of the positive GDP growth thus income growth. An increase of income leads to greater diversity in foodstuff demands. More exactly, a move away from cereal or plant-based products to higher consumption of livestock such as poultry, pig, aquaculture and dairy products is expected (Australian Farm Institute, 2008). China and India experienced economic growth with higher disposable income, resulting in a shift away from cereals and rice to meat and meat products. As the demand for animal products increases, the feed grain demand increases.

Providing adequate supplies in agricultural trade is a constant challenge, mainly due to the volatility and unpredictability of agricultural trade. Agriculture is a long term trade, thus the supply is fixed for the period between harvests, regardless of the demand or price for the specific commodities. Production yield depends on many aspects, including unpredictable weather, finances, access to markets and equally volatile economics. It also depends on the interest rate since production inputs, required to produce yields, depend on the producer's ability to obtain and sustain credit loans and markets. If no credit is granted, the producer will not be able to deliver the projected yields as inputs will be limited to cash purchases.

During the past decade, the yields of feed grains improved. This occurrence correlated to an increased use of highly effective fertilizers. Yields for feed grains however have nearly stabilized partly as a result of low and declining investment in agriculture. The future for feed grain producer's looks brighter with demand rising and the constant uncertainties of supply set to keep prices above historical averages (Reid, 2009). To balance out the supply and demand differences in feed grains, a better market in GMO's is required. The GMO debate has come a long way from the earlier seen "Frankenstein foods" to current crop improving qualities that will neither be harmful for humans nor the environment. It was one of the main debates at the third Global Feed and Food Congress held in Mexico on 20 April 2010.

3.1.2.2 International stock levels

The world cereal production for 2009/2010 period stands at 2 230 million tons which represents a 1.3 percent growth from the 2008/2009 period. This 1.3 percent growth is relatively weak compared to the previous rate that stood at 4 percent. The world food consumption of cereals for the 2009/2010 period stands at 1 042 million tons which is a 1.4 percent rise from the 2008/2009 period. The total feed usage has increased by less than 1 percent for the 2009/2010 period (FAO, 2009). Combining these cereal stock statistics for the 2009/2010 period shows a decline of 1.4 percent and global reserves at roughly 7 million tons. Despite this small decline there will not be any significant variation in the global stock-to-use ratio of 23 percent (FAO, 2009).

3.1.2.3 Raw material prices

Raw materials are unfinished goods that manufacturers use to produce completed products for the utilization of consumers. For feed manufacturers some of the raw materials are cereals, oilseeds, animal products, fish meal and others. At present the raw material market is in a very good state for the producer. Record high prices result from a constantly growing demand and a relative stable supply. Every additional ton consumed is reflected in the increasing prices on the world market. Figure 10 shows the changes in raw material price indices.

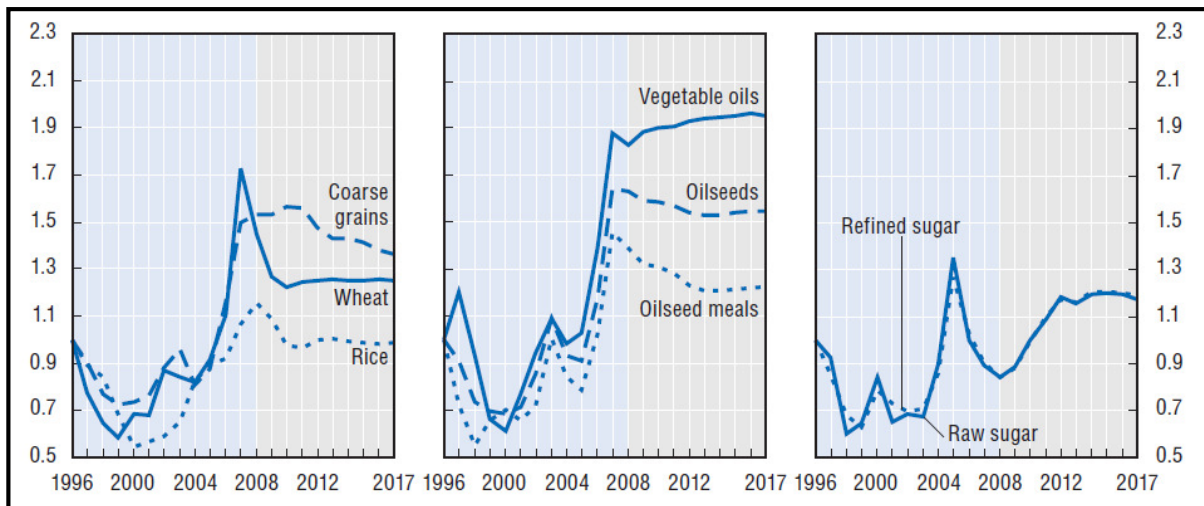


Figure 10: Outlook for world crop prices to 2017

Source: FAO, 2008

3.1.2.4 Imports/Exports

The trend to globalise agriculture is increasing annually. International trade in agriculture is one of the most important factors in world demand, supply and prices of raw materials and feed. It refers to the export of feeds by firms to foreign based buyers, importers, over international borders. Improved transportation, technology, industrialization, commercialization are all playing a role in the international trade system. International trade is a major source of income not only for the feed companies and farmers. Without international trade, countries will be limited to the raw materials and the prices within their own borders.

The World Trade Organization (WTO) appears committed to removing all “barriers” to international trade, to achieve “free trade,” and thus, removing all “economic boundaries” among nations. Once the economic boundaries are removed, cultural boundaries will become further blurred, and ecological boundaries will be left open to economic exploitation. Cultural and ecological diversity are considered obstacles to economic progress. A truly global economy will allow greater geographic specialization, greater standardization of processes and products, allowing global corporations to achieve even greater economies of scale (Kerd, 2004).

3.1.2.5 Global protein levels & demand increases

The increase in demand for protein levels in livestock is due to numerous factors, including the fast growing world population, growth in income especially in developing countries, changes in lifestyles and foodstuff preferences and escalating urbanization. Growth in specific livestock sectors such as poultry is also impacted by global drivers, such as ever-increasing consumer health concerns, additional fast food outlets and the fast urban lifestyle that increases the on-the-move and convenience food demand.

The high demands for livestock material were met by the increase in productivity of livestock production. Production increased due to the escalation in numbers of intensive systems and the commercialization of farms, especially poultry and pork. Industrialization of farms also plays a vital role in providing the adequate supply of livestock by being more selective in the breed of the animal with high production traits (FAO, 2009).

3.1.2.6 Global feed projections

It is estimated that globally, about 1 billion tons of animal feed is produced every year, including 600 million tons of compound feed. More than 80 percent of this feed is produced by 3 800 feed mills, and 60 percent of the world total is from 10 countries (Changchui, 2002).

As the demand for protein levels increase, feed projections will also increase. The production of livestock increases to sustain a supply equal to the demand and bring the world to an economical equilibrium state. When production systems intensify and farms intensify the feed demands will grow even higher. With intensification the livestock per area will increase and natural forage will not be able to sustain the required growth rate for livestock. Additional feed will be required in order to supplement the low natural forage. Feed demand will thus increase with intensifying farming and the development of more feedlots.

3.1.2.7 Current trends in the feed industry

United States of America, European Union, China, Brazil and Mexico are the 5 leading countries in feed production as seen in Table 4 below.

Table 4: Five leading countries compound feed production for 2008 (in tons)

	USA	European Union	China	Brazil	Mexico
	(Tons)				
Total poultry	58 200 000	48 891 000	68 775 500	32 300 000	13 853 642
Total turkey	10 980 000	-	-	-	-
Total dairy	19 430 000	-	-	-	4 450 000
Total beef/sheep	23 200 000	39 462 000	5 705 200	7 300 000	2 550 000
Total pigs	23 740 000	52 228 000	45 769 200	15 400 000	3 886 036
Total aqua	-	-	13 387 700	320 000	230 000
Total other	11 950 000	9 989 000	3 028 500	3 380 000	1 230 000
Total	170 000 000	150 570 000	136 666 100	58 700 000	26 199 678
IFIF Grand Total					
World Total Compound Feed Production (Calculated from various sources)					

Source: IFIF, 2009

United States of America

A large proportion of livestock feed is produced on the farms themselves. Over the last decade two aspects shifted the feeding practice, namely the increased use of pre-mixes and the growth in integrated pork and poultry industries. According to the IFIF, the annual production of feed is 170 million tons (as indicated in Table 4). With an average cost of feed ranging from US \$200 – US \$230/ton the annual sales is estimated at US \$ 35 billion (IFIF, 2009).

European Union

Pig feed accounts for the largest share with a 35 percent of 150 million ton feed production. Pig feed producers had to cut back by 10 percent due to the economic recession. Poultry feed is 32 percent of the

market, and an unchanged output is expected in the future as the consumer will increase consumption of cheaper meat types and thus stimulate poultry production. This will nullify the economic recession's impact. Ruminant feed will be the most affected of all the feeds in the European Union, for the reason that the milk market prices have dropped dramatically and production of milk was lowered (IFIF, 2009).

China

The domestic feed industry is developing at a dramatic rate. While the world impact of the economic crises is depressing the global production projections, it is not affecting China's local production in any way (IFIF, 2009). China has a \$35 billion dollar/year animal feed industry. The main protein source of China is pork and accounts for 63 percent of all consumed meat, it is expected to grow 22 percent from 2009 to 2013. China is particularly focused on food safety due to the 2003 SARS outbreak. In June 2009 a new Food Safety law was implemented to increase the standardization and food safety. Domestic production is

Jourbet (2008) further shows an increase in consumption in the year 2005/2006 to 2006/2007 as a result of increased consumption of livestock products such as milk, pork, beef and poultry.

This is a good sign for producers. However, the question remains how long this will go on under the prevailing circumstances of high feed prices in South Africa. In the long run, it will be more expensive for consumers to purchase meat and meat products. This further implies that meat consumption is likely to be reduced as a result of high and/or increasing meat prices. That being the case, the challenge that is facing South Africa is to overcome increasing feed prices as these impact negatively on the prices of final products such as meat and other livestock by-products. In 2009, world compound feed manufactured was estimated to be 640 million tons (Briedenhann, 2009). This was as a result of reduced feed usage around the world, South Africa included. This situation validates the previously discussed case of high feed prices in South Africa which might lead in to a reduced productivity by livestock farmers and further result in reduced meat consumption country wide.

The projections for the feed section are aimed at determining the future status of feed consumption by South African farmers using the current period as the base. According to Jourbet (2008), the protein consumption in 2006/2007 amounted to 1 806 thousand tons. This is divided between three products, namely fish meal which accounted for 29 163 tons, poultry by-products with a contribution of 94 376 tons and lastly gluten 60 with contribution of 26 060 tons. On average, fish meal, poultry by-products and gluten 60 accounted for 1.65 and 1.4 percent of the total protein consumption in 2006/2007, respectively. It can be devised from these figures that poultry by-products had the largest share of the total protein consumption looking at the years 2006/2007 as the base (Jourbet 2008). This is also indicated in the table 8 below which shows the protein source per animal species.

Table 7: Total protein consumption as per animal industry

Total Protein Consumption per Animal Species 2006/2007 (Tons)										
Species	Soy Oil Cake	Full-fat Soy	Sunflower Oil Cake	Cotton Oil Cake	Canola Oil Cake	Gluten 60	Canola Full-fat	Fish Meal	Poultry By-products	Total
Broilers	348281	255640	0	0	0	26040	2000	13838	84946	730745
Broiler breeding hens	108513	0	9287	0	134	0	0	0		117934
Laying hens	170476	0	32078	10047	287	0	0	0		212888
Sheep	0	0	18377	2933	0	0	0	0		21310
Cattle	0	0	37610	98783	0	0	0	0		136393
Pigs	137050	0	50736	0	9038	0	0	14023	9430	220277
Dairy	54338	0	160106	17633	6405	0	0	0		238482
Ostriches	2015	0	2467	2210	2832	0	0	0		9524
Other	75889	0	40529	650	304	0	0	0		116596
Total	896562	255640	351190	132256	19000	26040	2000	29163	94376	1806227

Source: Jourbet (2008)

The projected protein consumption, where 2005/2006 was used as the base year, was 1 481 379 tons which is low compared to that of 2006/2007 which is 1 806 227 as indicated on the table above. This shows that there has been an improvement in consumption of protein from 2005/2005 to 2006/2007 with an increase of 324 848 tons from 2005/2006 to 2006/2007. Table 8 further shows that soya oil cake is the highest in terms of animal consumption with the total consumption of 897 thousand tons, followed by sunflower oil cake (351 000 tons) and full-fat soy (255 000 tons). This indicates that soya oil cake and sunflower oil cake form the largest component of animal feeds followed by the other feed components.

According to Jourbet (2008), the projected protein demand for 2010 and 2020 is high as compared to the previous projections such as that of 2005/2006. This is as a result of the increase experienced in the consumption of animal products in recent years which is attributed to an increase in population not only in South Africa but also on a global scale. Briedenhann (2009) further shows that there has been increased consumption in South Africa due to an increase in disposable income which further resulted in an increase in the *per capita* consumption of meat, milk and eggs. Projections for 2010 and 2020 have been based on four scenarios as shown on the Table 8 below.

Table 8: Projections of protein demand for four different scenarios (2010 and 2020)

SCENARIO	BASE YEAR 2006/2007	ANNUAL GROWTH FROM BASE YEAR	2010	ANNUAL GROWTH FROM BASE YEAR	2020
	tonnes	%	tonnes	%	tonnes
Scenario 1	1 806 227	3,45	2 068 342	3,26	2 830 993
Scenario 2	1 806 227	-0,13	1 797 182	1,98	2 375 971
Scenario 3	1 806 227	2,20	1 970 260	2,14	2 430 010
Scenario 4	1 806 227	-0,97	1 737 042	0,91	2 050 143
(i)	Scenario 1:	High income growth and retaining protective tariffs.			
	Scenario 2:	High income growth and phasing out protective tariffs.			
	Scenario 3:	Low income growth and retaining protective tariffs.			
	Scenario 4:	Low income growth and phasing out protective tariffs.			

Source: Jourbet (2008)

As seen from table 9 above, high income growth and retaining tariffs are expected to have a higher annual growth of 3.5 and 3.3 percent for 2010 and 2020 respectively from the base year 2006/2007, followed by low income growth and retaining protective tariffs which are expected to have an annual growth of 2.2 and

2.1 percent for 2010 and 2020. High income growth and the phasing out of protective tariffs and low income growth, and phasing out tariffs are on the other hand expected to have a negative annual growth of - 0.13 and - 0.97 for 2010 respectively from the base year 2006/2007 and a positive annual growth of 1.98 and 0.91 percent for 2020.

Before economic stability and recovery

The economic recession is slowly but surely having an impact on South African households. As unemployment increases and local population increases, there are fewer finances available per person for food. This will lead to a fall of LSM groups for households. Households will have to cut back on the luxury items and starts to concentrate on obtaining the essentials again.

Table 9: Main food groups and LSM groups 1.6 and 10

Main food group	LSM 1	LSM 6	LSM 10
	%	%	%
Grain products	32.9	15.8	9.6
Meat products	37.4	35.1	27.8
Fish products	0.3	2.6	3.3
Fats & oils	3.7	3.3	2.3
Milk products & eggs	3.3	8.0	9.4
Vegetables	13.1	11.9	9.4
Fruit & nuts	0.9	4.3	6.2
Sugar products	4.1	3.7	3.6
Non-alcoholic beverages	2.7	3.6	5.4
Miscellaneous food	1.6	5.2	6.1
Prepared food	-	6.5	16.9
Total	100.0	100.0	100.0

Source: Nhlapo-Hlope, 2009

Table 9 shows types of food consumed by different LSM groups. The highest LSM group, LSM 10, is spending most of their income on meat products; they are not only spending it on any meat products but mainly healthy meat like poultry and even fish. This LSM group can afford to be picky and choose the healthiest options available.

LSM 6 spends more income on grains and fruit and LSM 1 spends 37.4 percent of their income on meat the highest of all the LSM groups' consumption on the meat market. As households move down the LSM regime more income will be spent on grains and meat but since meat prices are expected to become higher, even if the higher percentile of income is spent on meat less will be obtained. This phenomenon will continue until local economic crises are under control and recovered completely.

After economic recovery

When the economy recovers a bright future is in sight with increases in employment, expansion of the middle class- otherwise known as the black diamond effect, lower inflation, lower interest rates and expansion of consumption of luxury items. Meat demand will increase dramatically as seen in Figure 14 below; beef with 18 percent growth, poultry 36 percent, lamb at a staggering 57 percent and pork 15 percent by 2017.

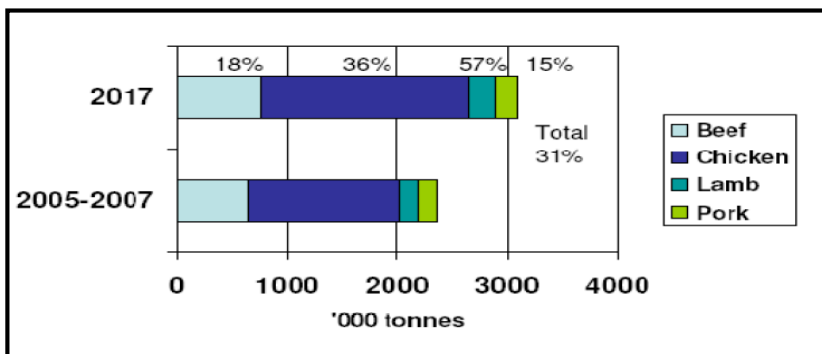


Figure 14: Expected meat consumption growth from 2005-2017

Source: Lovell, 2008

3.1.4. Feed supply chain analysis

The following section will focus on the feed supply chain in South Africa with special focus on the key role players. Special emphasis was also put on the current supply chain issues as well as on the challenges that are being faced in the supply chain.

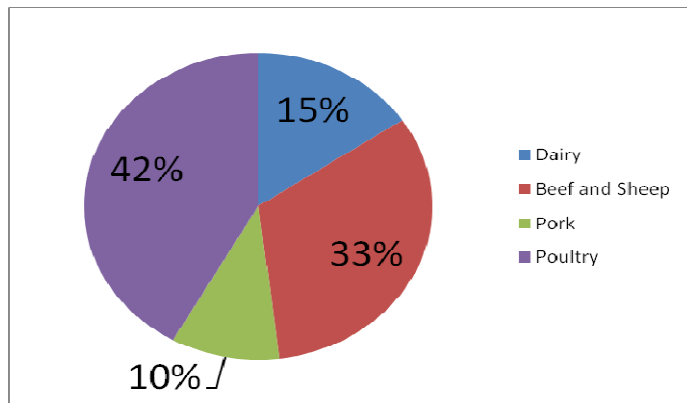


Figure 16: Market share of the five main feed consumers

Source: Based on AFMA, 2009

3.1.4.2 Issues within the feed value chain

The following are currently some of the main issues within the formal feed manufacturing business (Boshoff, 2009):

- The current economic recession impacts on capacity utilization: a price cost squeeze and lower return on assets (ROA) for feed manufacturers.
- Prices of soy beans are high due to international demand and lower supply due to the Argentinean drought.
- Government capacity: There is a backlog regarding the registration of feeds and raw materials as required by legislation. There is also none or a limited data basis available.
- Quality of imported products (e.g. vitamins, additives) is suspect due to the lack of inspection services.
- Transportation of raw materials is a major issue due to transport by road and lack of transport infrastructure by rail.
- Lack of capacity due to lack of training and development material through AgriSETA.
- Food health and safety
- Additives in feed mixtures
- Traceability issues

General economical influences

The main economical influences on any value chain are the exchange rates with respect to exports, the interest rate for the purpose of capital expenditure, the unemployment rate and changes in the disposable income of final consumers. With the present economic recession, interest rates increased which led to expansion plans being put on hold (Investor Words, n.d) and capacity utilisation decreased (the effect is shown in Figure 17). The potential employment rates decreased that caused a lower national disposable income and led to a decrease in demand for food and services.



Figure 17: Schematic illustration of interest rate impact

Source: Adapted from Mankin, 2007

Logistical issues form part of the economical life cycles that occur. The cost of transport and the maintenance of infrastructure tend to increase considerably as seen in the latest economical recession. The following section will focus on the impact that these issues have on the feed industry in the supply chain.

Freight & transport

Approximately 6 million tons of grain related commodities, as listed below, are transported by Transnet annually. A wide range of wagon types are available for transport of produce in this industry:

- Bulk maize
- Bagged maize
- Bulk wheat
- Sunflower seed
- Soya beans

- Oilcake
- Sorghum
- Maize meal
- Flour
- Bran
- Molasses
- Beans
- Barley and
- Other grain products

The major grain distributors that make use of railway transport are millers, cooperatives, grain traders, third party logistics companies and shipping lines. Transnet is planning to invest R24 billion in freight transport between 2007 and 2012. This expenditure plan will improve railway freight transport significantly with new locomotives for general freight, a new container terminal at Ngqura, between East London and Port Elizabeth, expansion at the Port of Durban and Cape Town (Transnet, 2008).

Rail freight charges will lead to higher costs for transporting raw materials but it will enable the feed manufacturer to advertise that environmentally friendly freight transport is being utilised. With a global shift of consumers to support “green” companies, competition has increased. For the feed manufacturer to remain competitive it has to modify regulations to be more ecologically aware - even if the cost of the feed increases the clientele will increase due to this modern global trend. Clientele are willing to pay more for environmentally friendly products and services, since they view it as a contribution to the environment.

Over 80% of goods in South Africa are transported by roads. Competitive and efficient national and regional road transport stimulates trade and tourism and is a major contributor to economic growth and employment (RFA, n.d). Road freight price are volatile due to the sudden rise and fall of oil prices that causes increases and decreases in fuel prices. Other issues are that Transnet cannot meet the full demand of the industry and that many participants are forced to make use of road transport. This causes additional costs, both hidden and opportunity costs. One of the feed industry’s motivations for road transport is the

accessibility. However, not all the feed manufacturers are located near to railways. This creates the need for railways to collaborate with road freight transport. Road freight transport plays a vital role in the production cycle even though the risks are high due to theft, accidents and price volatilities. On the positive side the distances of road transport is usually less than railway transport and the delivery time can be faster.

Barriers to entry

A major issue of concern for the Competition Board in South Africa is the perceived high concentration of feed manufacturers. Figure 18 gives the market size and share of the major feed manufacturers as calculated by De Beer (2009). Although the data is for 2005, it still gives a good indication of the level of market concentration in the feed industry.

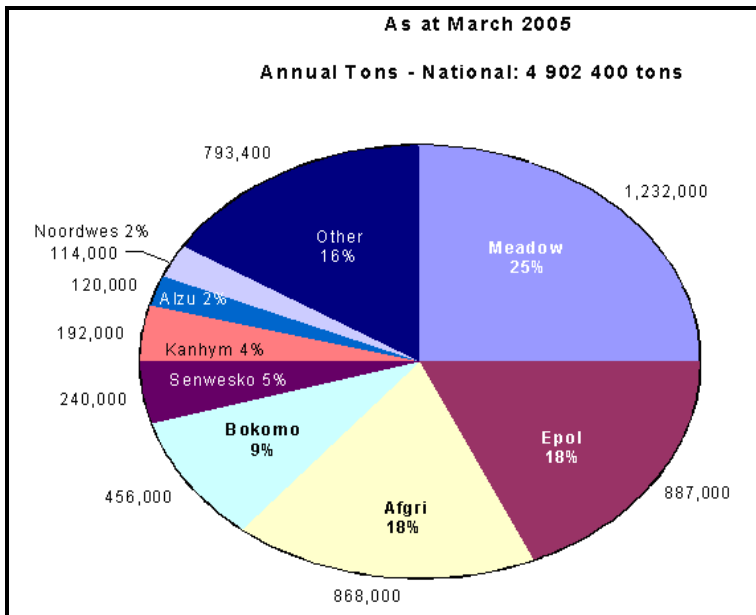


Figure 18: Annual feed volumes by company

Source: De Beer, 2009

More than 70 percent of market share is attributed to four (4) companies. Barriers to entry for the smaller feed manufacturers are:

- The dominating feed manufacturers can be price setters with market control, not price takers

- The industry could be able to maintain long periods of abnormally high profits
- The feed products can be relative homogenous
- Perfect knowledge of own price and demand between the manufacturers whilst consumers have imperfect knowledge of price and demands for animal feeds
- In order to effectively enter the feed industry the large capital investments are required in obtaining the necessary resources and infrastructure.
- Feed margins will be under pressure for the foreseeable future and will return to more moderate levels in the short term as supply and demand economics dictate (Roosendaal, 2009).
- With the review of Act 36 of 1947, regulations for feed legislation will change stipulating that all feed manufacturing plants must be registered, including own farm mixed on a farm level. Government does not have the current capacity to deal with all the registrations of mixing facilities. The pork industry opposes this Act due to the impracticality and manpower required to govern it. There is also none or limited data basis available for registered animal feeds (Boshoff, 2008).
- Production of meat in is consolidating to produce corporate farms with improved scales of economy and increased professionalism. They have in turn increased bargaining power with their supplying feed companies. The demand for tailor-made feed is increasing while the demand for 'one size fits all' type feed is falling. The impact on the feed company is often reduced plant efficiency. Inventories are made up of increasing numbers of tailor-made orders, usually in low volumes, which subsequently leads to complicated production schedules and increasing bottle necks in throughput (Cardy-Brown, 2006).

Market issues and attractiveness

The market attractiveness of the feed manufacturing industry depends on (Friedman, 2007):

- The size and growth rate of the market; the demand will increase dramatically for livestock as South Africa's economy recovers from the recession and growth in the livestock production leads to feed demand increases.

- In order to feed the animals that will supply the meat for a growing world population, feed grain production will have to increase. The use of grain for food use is expected to increase by 45 percent by 2030, while cereal consumption for animal feeds will increase by 60 percent. (Gilbert, 2007).
- Economic factors for investment purposes along with interest rates. Since one of the barriers of entry is large fixed amounts for infrastructure, the moment a company can afford the loans, expansions and emerging feed manufacturers will rise.
- Technological factors in conjunction with availability of raw materials. South Africa's stock levels are high which means that raw materials are available for feed manufacturing.
- Competitive factors accounting for the bargaining power of suppliers. An emerging company entering into the market has very high bargaining power since the feed industry is an oligopoly market.
- Environmental factors; the new trend to go green and limit the impact feed companies have on the environment.

Farmer's perspectives on animal health & safety

For centuries family farmers have been raising livestock for human consumption. They are conscious of their responsibilities towards the animals in their care. Indeed good animal welfare practices reward farmers with good animal productivity. Animal welfare must be safeguarded in the production of farm animals in the breeding process when designing housing, feeding and production systems as well as during transport and slaughter (IFAP, 2008). As the distance between farmers and consumers grows with increasing urbanisation, consumers know increasingly less about the way farm animals are raised. However consumers do care about the quality and safety of their food, how their food is produced and how farm animals are treated. Increasingly they require assurances that the well-being of animals is being taken into account in livestock farming practices (IFAP, 2008). Farmers realize that animal's welfare has also become a global concern in the context of increasing market globalisation. They recognise that the adoption of and respect for internationally harmonized minimum standards for animal welfare requirements are necessary to maintain consumer confidence in livestock products. Indeed, the high costs for animal welfare compliance will be rewarded with better opportunities for international trade (IFAP, 2008).

Feed Additives

EU Food Safety (2009) defines feed additives as: "... products used in animal nutrition for purposes of improving the quality of feed and the quality of food from animal origin, or to improve the animals' performance and health ...". In CAC/RCP in The Code of Practice on Good Animal Feeding the following points were highlighted:

- Feed additives and drugs used in medicated feed should be assessed for safety and used under state conditions of use as pre-approved by the competent authorities
- Borderlines between feed additives and veterinary drugs used in medicated feed may be set to avoid misuse
- Feed additives should be received, handled and stored to maintain their integrity and to minimize misuse or unsafe contamination
- Antibiotics should not be used in feed for growth promoting purposes in the absence of a public health safety assessment.

Feed additives tend to fall into certain categories which describe their action in the feed or in the animal. These different types of feed additives are: nutritional additives, sensory additives, technological additives, zootechnical additives, coccidiostats and histomonostats. The safety of human and animal life falls on the shoulders of farmers to procure feed from accredited dealers, and to purchase antibiotics and other additives only on a prescription basis. This is another part of the traceability elements that consumers look for in a product to know exactly what went into the manufacturing of their food.

Table 10 illustrates some of the challenges which the feed industry faces on different levels of the supply chain with special reference to the procurement side.

Table 10: Challenges for the feed industry

(A) Raw material and production-related challenges	(B) Farm-level-related challenges	(C) Consumer market-related challenges
<p>Raw material supply:</p> <ul style="list-style-type: none"> § Agricultural raw materials are becoming increasingly volatile § Shortages of certain minerals (e.g., feed phosphates) § Unapproved new soybeans leading to a potential protein shortage in the EU 	<p>Customer structure:</p> <ul style="list-style-type: none"> § Consolidation process of farms: Customer-structure becomes important (high degree of farms with potential to survive is needed) § Vertical integration plays a dominant role § Buying centre of farmers with increased bargaining power are increasingly widespread 	<p>Control of retailers:</p> <ul style="list-style-type: none"> § Retailers are increasingly active in controlling the supply chain (e.g., labelling "GMO-free") § In certain cases retailers even establish quality schemes for specific production programmes (e.g., obligatory feeding scheme for dairy farmers)
<p>GMO-free products:</p> <ul style="list-style-type: none"> § Access to GM-free raw materials § Involving NGOs to ensure that the feed industry follows environmental guidelines (responsible soy programme) 	<p>Customer loyalty:</p> <ul style="list-style-type: none"> § Customer loyalty programmes from different feed suppliers § Relationship marketing becomes increasingly important 	<p>Consumer behaviour:</p> <ul style="list-style-type: none"> § Consumers are very price sensitive but at the same time are postulating animal welfare standards, which lead to increasing production costs
<p>Quality control during processing and production:</p> <ul style="list-style-type: none"> § Separate production facilities for each species § Within a species, separate production facilities for GM and non-GM feed 	<p>Knowledge base:</p> <ul style="list-style-type: none"> § Farmers are increasingly knowledgeable, which requires a knowledge sale force § Prevention of diseases, the contribution of feed to animal health and welfare require feed companies to build related knowledge 	<p>Outbound quality control:</p> <ul style="list-style-type: none"> § Quality control is increasingly important for feed production § Ensuring compliance with environmental concerns like greenhouse gas impacts of feed (e.g., reduction of methane emission from dairy cows)

Source: Broring, 2009

Commercial mixers

Commercial feeds are specifically formulated feeds to provide all the daily nutrients required for optimizing production of animals. It is specific ratios of proteins, energy and supplements, vitamins and minerals, mixed together as formulated by the manufacturer. Commercial mixes can either be mass production or a custom mix for a particular client. Animal nutritionists are responsible for the formulation of feed mixes that will result in optimal production.

The safety, quality and traceability of feed are associated with raw materials that need to be procured from authorised dealers with proof of quality and traceability. This is the reason for the strict regulations of commercial mixes. Any registered commercial mix must comply with Act no 36 of 1947. The Act encompasses the registration of the mix, appeals if registration was not successful, all the requirements for animal feed, the labelling and containers in which the mixes are packed, the invoices for selling animal feed, advertisements, imports, manufacturing establishments, restricted and controlled substances, inspections (Department of Agriculture, 1947 and updated Regulations). If the commercial mix meets the terms of the Act then it will be a registered mix for the specific registration period and can be sold to the general public as an animal feed. This Act was implemented and regulated by the Department of Justice, National Prosecuting Authority along with the Department of Agriculture, Fishery and Forestry. Any lack of compliance with this Act will enforce the NPA to prosecute and let justice be served. Even though the NPA is overloaded with cases and government does not always have the capacity to enforce and regulate these Acts, this is still a criminal offence and will get the necessary attention as decided by a senior national prosecutor.

Act no. 36 of 1947 is currently under review. South Africa tends to primarily follow EU regulations and guidelines on animal feeding. Changes to EU (International) regulations and guidelines resulted in consultations between AFMA and Act 36 to debate its local applicability. The South African regulations and guidelines may be amended by Act 36 once consensus is reached. It is encouraging to report that the consultation processes between Act 36, Act 35 and AFMA are continuously improving (AFMA, 2009). The commercial animal feed manufacturing process supply chain is illustrated in Figure 19 below which indicates the flow of raw material in the feed production process.

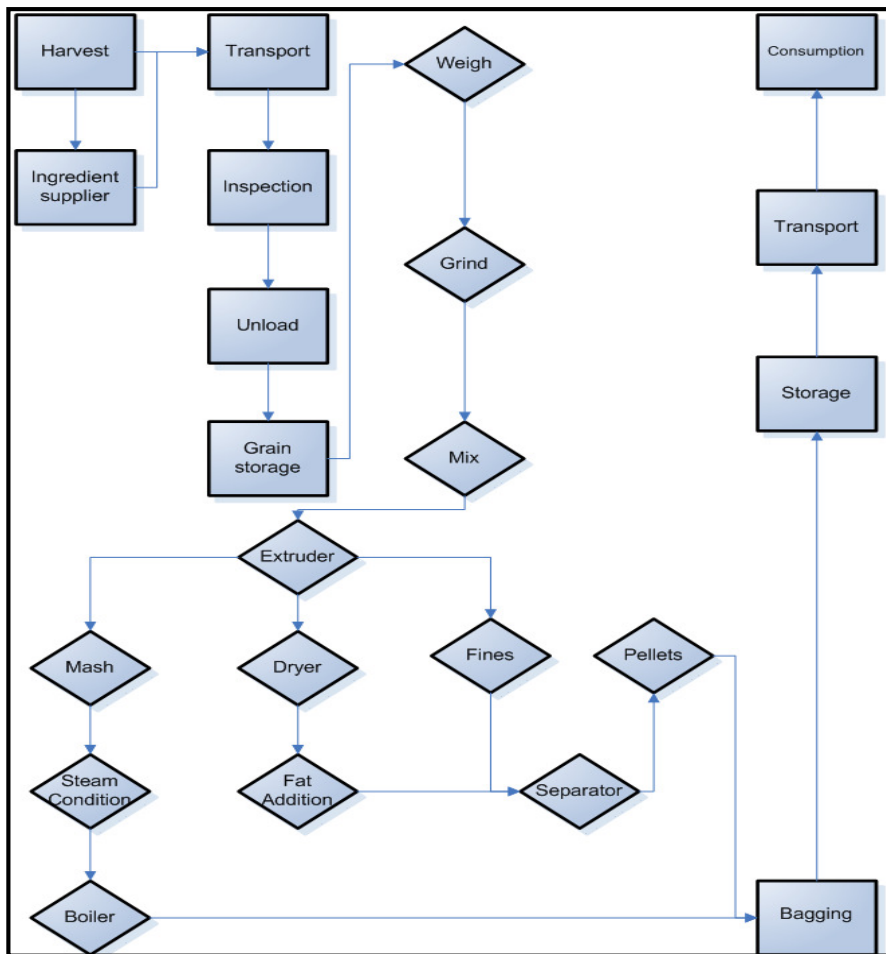


Figure 19: Commercial production of animal feed

Source: Based on K oster, 2008

The production process begins with the production of raw materials on farm level. Raw material can either be sold to an ingredient supplier or directly of the feed manufacturer. The ingredient supplier can work in two ways; on a buy and sell basis where the suppliers buys the commodities from the producer and sells the raw materials to the feed manufacturing plant or on a commission basis, where the supplier asks for a commission percentage from the producer to sell the commodities to the feed manufacturers. After the feed manufacturing plant has bought the raw materials it is transported via road or railway freight transport. Between the transport process and unloading an inspection commences to make sure that the raw feed is of good quality and in the right quantities. As soon as the raw materials get the green light at the inspection it is unloaded and stored in grain silos on the manufacturing plant.

As the need arises the raw materials are collected from the grain silos and entered into the manufacturing process where it is weighed, ground, mixed, extruded and divided into mash, fines and normal. The mash gets steamed conditioned and boiled before it reaches the bagging sector. The normal size materials are dried, fats are added then it's separated into pellets and sent to be bagged. The fined is joined with the normal dried feed at the separator.

At the bagging station the feed is bagged into manageable sized bags, labelled and branded. The feed bags are stored until it is bought by livestock producers. It is then transported to the producer and consumed by the specific livestock. In an interview with Lovell (2010), CEO of SAPA, he mentioned that about 95 percent of poultry feed are bought from commercial mixers. On the pork front, only 25 percent procure feed from commercial mixers (SAPPO I, 2009). These pork farmers are mostly situated in the Western Cape and KwaZulu-Natal region where raw materials are less available in the regions.

Own farm mixers

Own farm mixes are specifically formulated for the farmer with all the required nutrients to obtain the best possible production. Feed ingredients are either pre-purchased raw materials or produced on the farm. Good quality feed can only be obtained if you use top class feed ingredients and raw materials. Currently own farm mixers do not have to comply with all the regulations of Act no. 36 of 1947, but as soon as the new Act 36 is fully instated then mixing facilities must comply with all the regulations of the Act to ensure that the animal product can be certified as safe, by the Department of Health.

Figure 20 below indicates the diagrammatic flow of feed in the production process of own farm animal feed manufacturers.

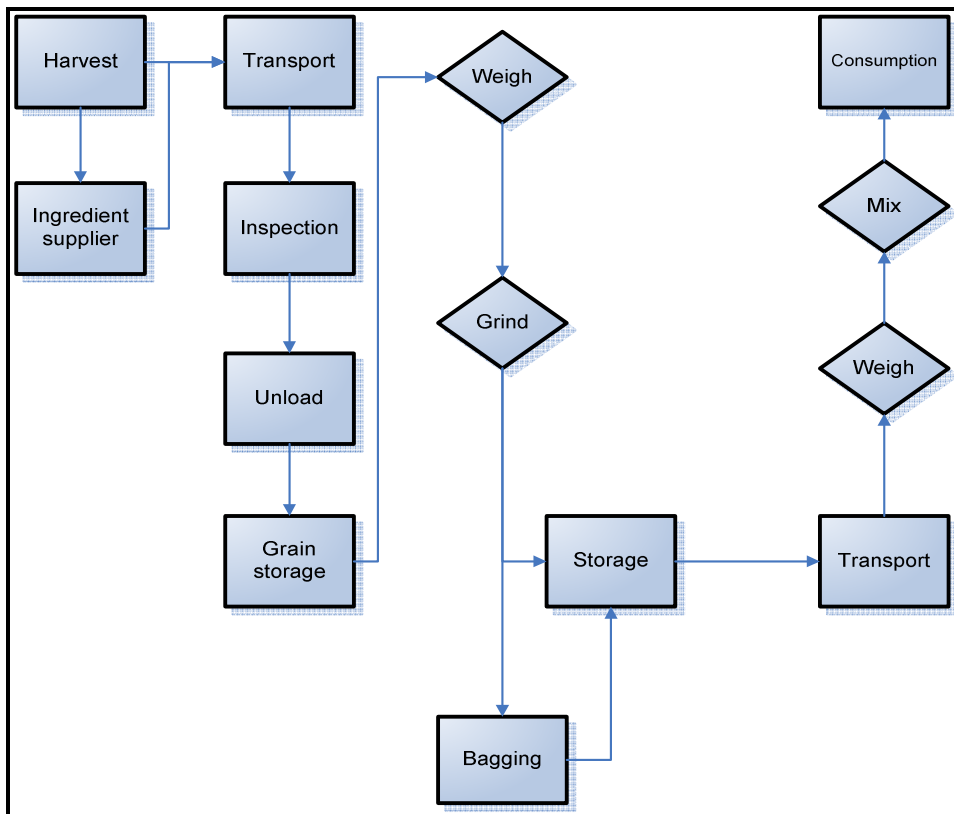


Figure 20: Own farm premix production of animal feed

Source: Based on Kóster, 2008

Contracting

Contracting starts at retail level, where the retailer needs a guaranteed and consistent supply of quality animal products such as poultry, pork or beef in order to assure the satisfaction of the client's needs. The retailer then signs a contract with a livestock producer that will supply the amount agreed upon to the retailer, this will ensure both the retailer of delivery and the producer of payment that minimizes risk.

After the required feed amount is calculated, based on the number of animal products agreed upon with the retailer, the livestock producer can sign a contract to guarantee feed deliveries. The feed production type will determine with whom the contract is closed. If the producer uses commercial mixes, a feed supplier can be contracted. In the case of own feed then an ingredient supplier or raw material producer is contracted, depending on the own feed production cycle. Contracting will ensure feed, ingredient or raw materials deliveries to the producer and payment to the feed manufacturer, ingredient supplier or raw material

producer respectively. The feed manufacturer can contract an ingredient supplier or directly contract the raw material producer to ensure delivery of ingredients for feed production.

Imports/Exports of raw materials for feed production

This following section will focus on the imports as well as exports of raw feed ingredients to South Africa.

Imports

The following are raw feed ingredients that need to be imported to South Africa due to low levels of availability or quality levels.

Oilseeds and oilcakes

Table 11 below shows a drop in imports of soya oilcake during 2008/2009, not reaching the million ton mark as in 2007/2008. The decreased import is mainly due to a reduction in imports of soya beans of more than 125 thousand tonnes, which can be attributed to a dramatic increase in domestic soybean production of 507 thousand tons compared to 282 thousand tons in the previous season. South Africa experienced significant exports of South African soybeans in 2009.

Table 11: Oilseed and oilcake imports (tons)

CAKE / SEED	TONNES SEED + OILCAKE	CONVERSION RATE	OILCAKE 2007/2008
Sunflower oilcake*	48 835	100%	48 835
Sunflower seed*	46 188	42%	19 399
Groundnut oilcake*	-	100%	-
Soya oilcake*	925 270	100%	925 270
Soya beans *	5 377	80%	4 302
Cotton oilcake*	81 778	100%	81 778
Cotton seed ⁽¹⁾² *	40 301	50%	20 151
Other seeds *	22	50%	11
Other oilcakes *	-	100%	-
TOTAL IMPORTS	1 147 771		1 099 745
LOCAL PRODUCTION (EX TABLE 4)			565 181
GRAND TOTAL - Table 4 + 4.1			1 664 926
* Source: Department of Customs & Excise			
1. Cotton Seed Processors (Pty) Ltd			
2. Cotton SA. These figures include seed that entered the country from Swaziland as lint for processing. Crushed product also includes seed from SADC Countries (website: www.cottonsa.org.za)			

Source: AFMA, 2009

Fishmeal

The estimated fishmeal production in South Africa, the total requirement and the potential imports and exports are shown in Table 12. Despite favourable fishmeal quotas fish catches in 2009 were poor and it is likely that the availability of fishmeal could be significantly reduced (AFMA, 2009). As seen in the table below the import requirement for fishmeal is 50 thousand tons.

Table 12: Fishmeal imports (tons)

SA requirement	120 000
Export	-
Total requirement	120 000
Local production: (RSA)	70 000
Shortage	50 000
Import requirement *	50 000
Source: SA Fish Meal Marketing Company & Oceana Brands * Imports from Namibia and elsewhere	

Source: AFMA, 2009

Sorghum

Grain sorghum usage in animal feed has become extremely limited (AFMA, 2009). With this in mind, the crop production of sorghum in South Africa is adequate to meet the demand requirements. No imports are necessary for sorghum currently as indicated in Table 13 below.

Table 13: Sorghum imports (tons)

	USAGE 2005/2006*	USAGE 2006/2007*	USAGE 2007/2008*	USAGE 2008/2009*	EST. USAGE 2009/2010*
Malting	102 900	95 600	89 000	87 000	85 000
Meal	87 900	86 200	95 000	92 000	100 000
Rice and grit	100	100	0	0	0
Animal feed	9 000	13 000	10 000	8 700	22 000
Pet foods	9 000	6 700	8 000	6 000	7 000
Exports ***	38 200	27 800	27 300	37 000	35 000
Released to end consumers	2 100	1 900	2 400	1 700	1 700
Withdrawn by producers	3 700	3 200	3 700	5 000	3 700
TOTAL REQUIREMENT	252 900	234 500	235 400	237 400	254 400
Imports	5 000	9 900	31 700	0	0
Crop estimate ⁽¹⁾					262 000
Sources: * SAGIS (20/05/2009) ** Grain South Africa - 24/07/2009 *** Exports include both products and grain (1) GSA - Estimate					

Source: AFMA, 2009

Plants, plant products and related materials are capable of harbouring quarantine pests, which if they enter South Africa with imported commodities and establish, may endanger the South African agricultural, horticultural or forestry sectors. Similarly, pests that occur in South Africa may endanger countries to which exports are destined for (Department of Agriculture, 2006). To prevent pest and phyto-sanitary outbreaks all imported commodities must comply with the Agricultural Pests Act 36 of 1983. If any animal products are imported into South Africa then a veterinary import permit must be obtained in order to assure the compliance with Animal Health Act 7 of 2002. This will also certify that the animal products are not contaminated with Bovine Spongiform Encephalopathy (BSE) before they enter the production cycle and contaminate the whole cycle.

Exports

The following raw ingredients are exported by South Africa.

Maize

The availability of maize during the 2007/2008 marketing season continued its increasing trend with 8.19 million tons being available for marketing. This trend was maintained and 4.5 million tons more maize was available in the 2008/2009 marketing season, totalling 12.7 million tons. Considering the 2008/2009 crop estimate which decreased by ± 1.1 million tons to approximately 11.6 million tons production, it is expected that no maize will be imported. Exports in 2009/2010 are also expected to reduce. With the 2008/2009 crop this would be the 3rd time within the past five reporting seasons that more than 11.5 million tons was produced, resulting in South Africa becoming a sustainable exporting country (AFMA, 2009).

Table 14: Maize exports (tons)

LOCAL	2004/2005	2005/2006	2006/2007	2007/2008	2008/2009
White ⁽¹⁾	5 805 000	6 540 700	4 187 400	4 315 000	7 480 000
Yellow ⁽¹⁾	3 677 000	4 909 300	2 430 600	2 810 000	5 220 000
Developing Agriculture ⁽¹⁾ : White maize	170 890	202 755	0	0	0
: Yellow maize	57 180	63 193	0	0	0
Imports ⁽²⁾	219 000	360 000	964 348	1 065 968	1 120
TOTAL	9 929 070	12 075 948	7 582 348	8 190 968	12 701 120
Exports ⁽²⁾	832 000	2 241 000	687 500	492 173	533
Sources: 1. Crop Estimate Committee (CEC) (28/07/2009) 2. SAGIS (20/05/2009)					
Note: Developing Agriculture from 2006 included in White and Yellow					

Source: AFMA, 2009**3.1.4.4 Feed regulations & legislation**

The purpose of this section is to discuss the regulations and legislations governing the feed industry in South Africa. There are a number of important acts that act as guidelines to safety of animal feed and food for human consumption. Apart from other important bodies, such as government departments, which are the key drivers in safeguarding the rules and guidelines of feed and food safety, animal feed manufacturers should also take part in feed safety. This can be made possible by the formation of integration between the government departments, feed manufacturers, researchers and experts in the South African feed industry.

Traceability

Traceability is one of the growing concerns around the world, not only in the poultry sector but in other agricultural sectors. Traceability has not only become an important issue in the supply of agricultural commodities such as poultry products; it further improves the supply management and quality control of agricultural products. According to Mayet (2006), traceability has a broad definition due to the fact that the agricultural or food sector is a broad and dynamic sector and traceability is a tool that is or can be applied to the entire agricultural or food sector in general, not only in the context of international trade but also in local perspective. It is described as the ability to track the origin, location or history in general of one particular product.

In the United States, traceability is defined in terms of depth, breadth and precision, where depth refers to the extent to which the traceability system can track the necessary information of a particular product, either backwards or forward (TADCA, 2008). Not very different from depth, breadth describes the necessary information collected about a specified product and precision describes the accuracy of the traceability system in pinpointing the characteristic of a particular product. GMOs form the important part of animal feed as well as the food sector in South Africa. It is therefore important to highlight the importance of the traceability paying close attention to the GMOs.

Taking an example of the EU countries, Van Hofwegen, *et al* (2005) show that according to regulation EC 1829/2003, food and animal feed containing GMO must not:

- Have extreme effects on human and/or animal health, and further on the surrounding environment.
- Mislead the consumer
- Differ from the food which is intended to replace to the extent that its normal consumption would be nutritionally disadvantageous for the consumer.

Bearing in mind that the GMOs can be a threat to the human and animal health, the above points are very important for the producers to take into consideration. Furthermore, the prohibitions about GMOs set by the EU countries do not differ significantly to those of other countries around the world. For example, in South Africa, according to section 15(1) of the feed stuffs, cosmetics and disinfectants Act of 1972 (Act number 54), the GMOs must have all the necessary information in such a way that consumers would not be misled with regard to the contents of feed stuff they purchase. Furthermore, in South Africa, like other countries in the EU, GMOs must have traceability systems with which they can be traced from the producer to the consumer.

However, according to Mayet (2006), there has been limited action on the issue of GMOs following the commercialization of certain GM foods imported, marketed or released into South Africa in as far as labelling is concerned. This gives the impression that South African consumers are exposed to the risk of not having a choice when it comes to the current South African GM foods. According to Mayet (2006), there are several multinational companies which can make shipments of grains around the world and do not

need to abide by the standards for traceability, segregation and accountability under the following conditions

- Mixtures of non-GM grains where the same commodity has been genetically modified
- Approved GMOs
- Mixture of non GMO cultivars where the same commodity has not been genetically modified
- Bulk shipments on non-GMO mixed with GOMs.

Labelling plays an important role in the South African feed supply chain. Mayet (2006) indicates that seven years after South Africa began to grow GM crops; the Department of Health published some regulations relating to the labelling of food stuffs which would better provide the public with the necessary information on the GM foodstuffs in terms of foodstuffs, cosmetics and disinfectants, Act No. 54 of 1972. The Act seems to adopt much of the United States model. It should however be noted that South African labelling regulations do not apply to the GM foods that are currently imported, marketed and released in South Africa, except in the case of significant dissimilarities in the final food product (Mayet, 2006).

South Africa has some regulatory bodies such as the Perishable Products Expert Control Board (PPECB), which was established in 1926 as a body assisting the Department of Agriculture in monitoring the quality certification and cold chain management services in relation to the production exportation of perishable agricultural produce in South Africa. PPECB is therefore an important body which works hard at ensuring that the South African regulations on traceability issues are complied with. Mayet (2006) further shows that there are other acts, such as APS Act, which help in the facilitation of compliance to the standards and requirements in relation to traceability of food products in South Africa.

Good Manufacturing Practice (GMP)

Referring to Agricultural Products Standards Act No.119 of 1990, one of the most important issues that need to be taken into consideration is the quality of feed that should be adhered to in order to give an assurance that feed safety is met. According to K oster (2009), South Africa must adhere to global norms and standards if competitiveness is to be achieved and also ensuring traceability as a minimum

requirement by first world importers. GMP is not only important in ensuring feed safety, but it also addresses a number of important issues in the South African Feed industry some of which are:

- Trade and production of compound feed
- Simple and moisture rich animal feed
- Animal feed ingredients
- Premixes

Some of the focal points of GMP which contribute to working hard towards the above points are feed hygiene, control of undesirable materials, generic control measures for production, trade and transport and management of veterinary medicines and additives.

Sources of Protein

Compared to other sources of protein such as pork, beef and mutton, poultry (broiler) is one of the cheapest sources of protein in South Africa. The broiler (under poultry) industry is a major supplier of protein in the SA market followed by beef. With the current global economic crisis, there is increased demand for poultry and pork as consumers shift from beef to less expensive sources of protein.

The rise in poultry meat consumption also implies an increase in feed production. However, feed costs are of major concern to the industry as a result of price volatility of maize and soya which are the major raw materials of the broiler feed. The feed industry is competing with biofuels and furthermore, low stock to usage rates drives the cost of feed. This results in smaller profit margins (Vauquelin, 2009). As mentioned in the previous section, one of the major concerns in the poultry industry is the increasing prices of feed. One of the possible ways to mitigate the escalating feed prices is through contract farming where poultry farmers need to get into contractual agreements with feed companies and other companies that can assist them lower production costs. This will further help by improving the flow of necessary information between the farmers and different key role players involved in the poultry supply chain

Feed Acts

According to Briedenhann (2009), South Africa tends to follow the EU regulations and guidelines when it comes to animal feed. The resulting changes to the international regulations and guidelines brought about the consultation between AFMA and Act 36 of 1947 to debate the status of its local applicability. AFMA and Act 36 have also been working on the amendments of the regulations concerning the undesirable substances in feed as well as the allowable levels thereof as Act 36 deals with the matters that affect the animal and pet feed in South Africa.

The GMOs' Act 15 of 1997 is the act that regulates the use and development of GMOs in South Africa, including import and export of living GMOS (Briedenhann, 2009). Due to the fact that this act protects the local feed manufactures from the global imports of GMOs, most if not all the animal feed manufacturers are in support of this act as it helps in ensuring that animals and humans would not be exposed to harm while also protecting them from large GMO exporting countries. A number of precautions have to be undertaken when it comes to the manufacturing of animal feed in South Africa. Ionic elements have to be under the specified concentration or feed content in to be acceptable by the national standards according to the government regulations. For example, according to Act No 36 of 1947, elements including arsenic, lead, fluorine, mercury, nitrites, cadmium, copper, zinc, moniliformin, mycozenolic, zearalenon and other elements likely to be found on food should not exceed the certain maximum content in mg/kg of the farm feed. These regulations are helpful in ensuring that feed safety is adhered to in South Africa while also ensuring quality feed produce for animal industry within the country.

Köster (2008) further indicated that feed quality is important to the extent that if it is not met, several effects will be experienced which include the following:

- Feed sales will drastically be reduced
- Consumer confidence will also be low
- There would also be a negative impact on the companies participating in the food chain

Animal feed forms part of the feed supply chain. It should therefore be understood that apart from the regulations pertaining to quality assurance, medicine on the other hand plays a crucial role in the development of animal industry. The government has a right to amend the necessary acts that could help the animal industry in general attain the necessary food security in South Africa according to Medicines and Related Substances Control Act No. 101 of 1965. According to this Act, labelling of medicine is one the priorities as this will help trace the origin of certain medicines when necessary. Furthermore, if labelling is done properly by medicine manufacturers, this means that guidelines and regulations according to this Act will be adhered to, which further implies quality medicine to the animals and human beings in general.

Overlapping with the Medicines and Related Substances Control Act No. 101 of 1965 is the Animal Health Act No. 7 of 2002. The main objective of this Act is to provide for measures which promote animal health and animal diseases, which regulate the importation and limited exportation of animals and related substances therewith. Through the regulation of animal importation and exportation, the Act plays an important role in South African quality assurance and further encourages quality animal feed for improved animal production performances in general.

The importance of Medicines and Related Substances Control Act No. 101 of 1965 and the Animal Health Act No. 7 of 2002 are seen not only in the animal sector but also in the feed industry. With reference to this Act, the quality of animal products is dependent on the necessary feed and medication given to the animals. This therefore means that if animals are healthy in terms of medication, they are able to feed properly and adequately, and this results in a positive impact on the feed industry as more feed may be sold to the producers. The importance of hygiene should not be isolated from the quality and improved standards of animal feed.

Regulations governing general hygiene indicate that in order for an individual to handle food and food stuffs in the specified food premises, there should be a certificate of acceptability. This validates the issue of quality when it comes to the animal feed manufacturers in South Africa. The requirements of the Hygiene and Agricultural Product Standards Act No. 119 of 1990 further emphasize the importance of quality of animal feed and food in general where there are punitive measures applicable to anyone who validates the requirements. By encouraging good quality and high products standards, Act No.119 of 1990 and the Regulations Governing General Hygiene Requirements for Food Premises and transport of Food No. R 918

of 1999 plays an important role in the feed industry. By following the products standards, feed safety and consumer confidence can be achieved and this further implies that more sales can be experienced in animal feed industry.

Tariffs and Rebates

South Africa is one of the African countries with a considerable amount of poultry products importation (DoA, 2008). Despite the fact that South Africa is importing both pork and poultry products from other countries, it is also characterized by the exportation to other countries. As one of the larger sectors in South African import/exports, one of the feed components- such as soya bean, had been under temporary rebate and is used for the extraction of soya bean oil for the purposes of biodiesel production. According to the International Trade Administration Commission of South Africa (ITAC), Report number 239 of 2007, soya oil cake can be classified under the subheading 2304.00 and is subject to the rate duty of 6.6% *ad valorem* in the general column and is duty free in the European Union and Southern African (SADC). Soya oil cake was further considered for the temporary rebate after the government discussed and received different views with regard to the recommendation of temporary rebate for soya oil cake (ITAC, 2007).

ITAC had previously approved the a temporary rebate for SACU producers of biodiesel on soya beans and this was as a result of experienced shortages in the SACU market. On the other hand, AFMA disagreed that the temporary rebate for soya beans for the manufacturing of biodiesel be approved. Their main emphasis was that it would not be fair to approve a rebate on soya bean without reducing the duty on soya oil cake.

The creation of a rebate for soya bean therefore meant giving the users some kind of monopoly in the supply of soya oil cake which would have a negative impact on the price rate at which poultry farmers would buy the feed. The higher prices would be to the disadvantage of poultry producers and subsequently the consumers of poultry products.

Quality control and Assurance

Quality is an important concept when it comes to both animal feed and poultry products. According to Van Hofwegen *et al* (2005), the EU is one of the large producers of poultry meat with an average of 8.7 mega

tons per year. This is a comparably large production when considering the production of other developing countries, especially the African countries which do not make even the half of that. The fact that there are stable and conducive production conditions under which the EU countries produce plays an important role in further improving the productivity and hence consumption of chicken meat. The presence of farming contracts also plays a crucial role in the upliftment of sector performance (Van Hofwegen, *et al* 2005). The reason behind this is the fact that the responsibility among the involved role players in the chain is evenly shared and this further improves production performance and quality in general.

Quality is described by Van Hofwegen, *et al* (2005) as comfort, security, safety, individuality as well as variety. In the process of preparing products to the final consumers, the consumers do not know nor do they understand the effect that expensive feed can have on the producer side, instead they expect the final product to be up to their expectation and with a right quality. It is therefore important to highlight the importance of quality in as far the global productivity is concerned, both in a case of broilers and pork, as this can improve the consumption of both chicken and pork in the future. In order to achieve quality, the final product has to be adjusted to the dynamic consumers' preferences and their changing lifestyles. On the other hand, improved production technology has to be put in place to keep improving the quality of the final product to the needs of the consumers at the present time and in the future. Information flow also plays an important role in the chain that involves the key role players in the production cycle. Should there be a lack of information at a specific point or department; production of a particular product is likely to be of poor and inconsistent quality.

This further implies that the future growth of that particular product is highly unstable. Every stakeholder in the production cycle has a role to play and if stakeholders fail to share the necessary information with other stakeholders, the future of the product could be in jeopardy (Köster, 2009).

Ability to monitor

There are a number of key role players that can be identified in the poultry production process. These range from the production side through to the consumption side. All of these are largely dependent on one another. The ability to monitor quality in the poultry value chain requires not only expertise but also commitment by the parties involved in the whole process from the production to consumption of poultry

products. Furthermore, this is caused by the exclusion of poultry farmers by agricultural policy makers within the countries in question. The possible solution to this problem is to engage in sufficient information dissemination that will keep the poultry farmers posted with regard to issues that they need to know in terms poultry issues and possible changes in the agricultural policy within the respective countries.

The proper dissemination of information to the poultry farmers by the experts and agricultural policy makers can help improve the insight of the concerned farmers and further improve the productivity and consumption of poultry meat in developing countries (Gueye, 2009). Gueye (2009) further shows that a few poultry farmers in the developing countries have direct contact with experts such as researchers and policy makers. This makes it difficult for those farmers without this access to acquire the necessary knowledge with respect to their farming enterprises. This can have a negative impact on poultry productivity in the near and far future.

The reasons for the lack of contact with the experts according to Gueye (2009) are as follows:

- Few researchers and technicians dealing the matters relating to poultry farming value chains across the countries
- A vast number of poultry farmers within the respective countries are often dispersed
- Poor transport facilities
- Long social distances between the farmers and the researchers and the farmers
- Different economic environment under which the researchers and the farmers operate

It is therefore crucial that policy makers, agricultural researchers and agricultural experts involve key poultry role players in every decision making process held. This will help empower the producers while also improving their knowledge, understanding and further help them be up-to-date with new national regulations, legislations and production standards.

3.1.4.5 Sustainability within the feed industry supply chain

Sustainable development hinges on a combined focus of its impact on society (people), the environment (planet) and to its economic value (profit). Increasingly, it is being recognized that people, profit and planet dimensions are interlinked and an important challenge for public and private policy is to take them jointly into account (Kambewa, 2007). Figure 21 illustrates this in concept widely known as the 'triple bottom line'.

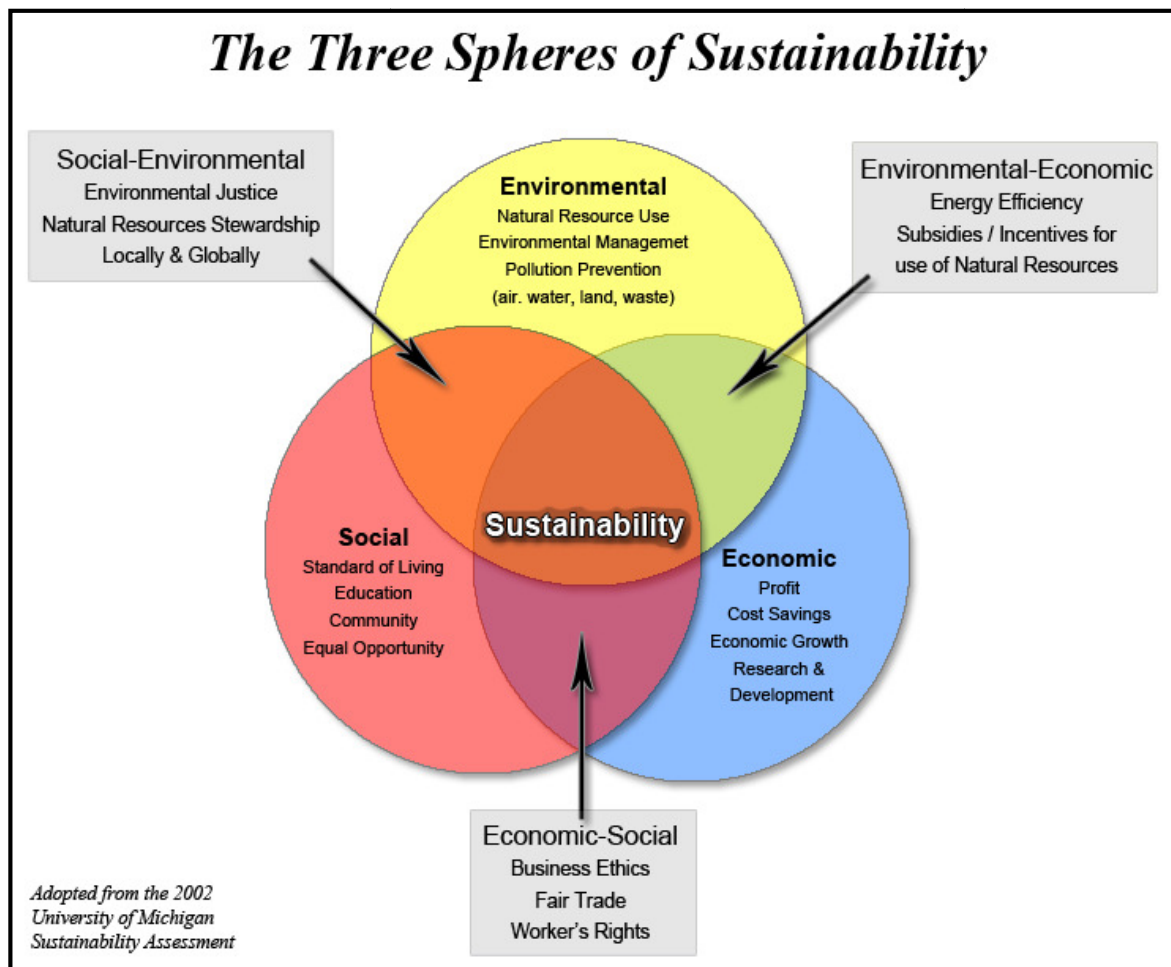


Figure 21: Triangle of sustainability

Source: University of Michigan, 2002

According to Afgri (2009) sustainability issues are gaining more and more momentum and attention in South Africa. Companies are realizing that they cannot be truly successful if the communities among them

are living in poverty, hunger and environmental degradation. According to SIK (2008) the following areas should be highlighted in terms of sustainability:

Social responsibility:

- Health and wellbeing
- Human capital development
- Role of the company in the society
- Rural development
- Labour practises

Economical viability and governance:

- Fair distribution of revenues
- In the food industry
- Efficiency of resource use
- Risk and crisis management
- In the raw material sourcing
- Prevention of corruption and bribery

Environmental concerns:

- Food affects the climate:
- Extensive dependence on fossil fuels of total energy
- Food chain uses about 20% of total energy
- Contributes to about 30% of the Global Warming Potential
- Accounts for more than 25% of highway transport
- Food chain accounts for 50% of high phosphorus and nitrogen leakage
- Cadium and heavy metals in soils and dioxin in fish.
- Available agricultural land
- Biofuels.

Sustainability in the supply chain focuses on care for the environment, animal welfare, consumer food issues and meeting the increasing demand for food that is safe, healthy, and produced without damage to either the environment or other species (WHL, 2006). This is very important as research has shown that for every one (1) percent increase in disposable income, two (2) percent more is spent on animal protein in poorer countries (IFIF, 2009). The increase in the world population and rising disposable incomes are the driving source behind increased demand in the meat industry. More meat consumption requires more production which in turn requires more feed production, especially grain. Then again the focus should not only be on the environment but also on the other two components, i.e. economics and social, which are equally important. The world population is increasing substantially in developing countries, which raises a red flag; supply chain management of feed and food is crucial, especially in the developing countries, including South Africa (AFMA, 2009).

Figure 22 shows the structural shift in importance between the three (3) pillars of sustainability (environmental, social and economic) from the mid 1980's to the year 2000.

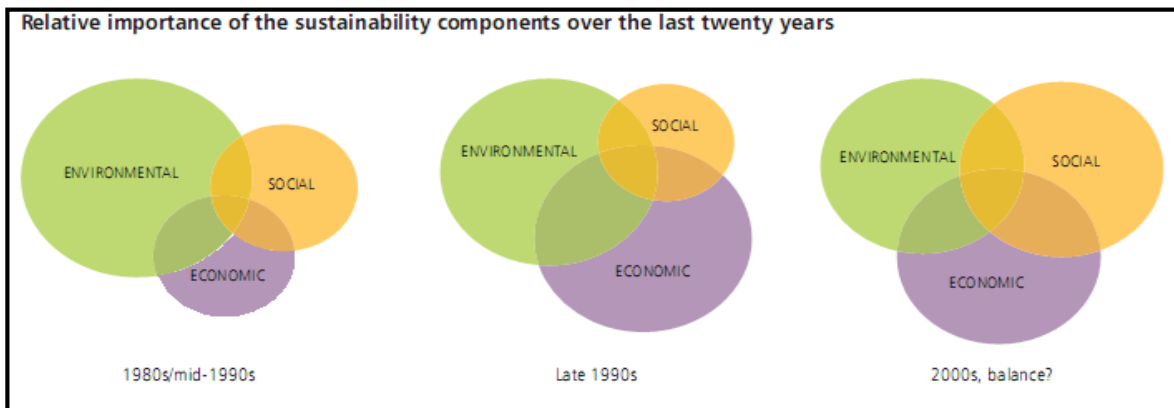


Figure 22: Relative importance of the sustainability components over the last twenty years

Source: Colantania, 2009

Another sustainability concern is that the resources are not used efficiently. The World Health Organization estimates that there are 1.3 billion overfed people, primarily in developed nations, and 0.8 billion underfed people, primarily in third world undeveloped countries. Food is unevenly distributed in the world because of trade tariffs, poor infrastructures, and government policies (IFIF Sustainability Report, 2009).

Afgri Limited has focused more on economical and social sustainability the past two years, so that long term growth can take place. They have shed light on the importance of training their employees continuously, so that they can reach their full potential and add value to Afgri. An equal opportunities system has been implemented, so that BEE restructuring can take place. The importance of health and safety is important as well as programs for members of Afgri with HIV/AIDS. Trained First Aid and fire control employees have been appointed to avoid any accidents that could take place.

Over the years environmental sustainability has become more and more important. Issues relating climate change, available land for agriculture, water availability and waste management are increasingly in the media. The other two pillars: social sustainability and economic sustainability (profit) should not be forgotten. These factors play just as big a role as environmental sustainability. With the ever increasing world population, especially in developing countries, strategic and economical management is critical in the feed and food markets. South Africa is a developing country and competitive markets in the animal feed markets, will ensure that optimal production takes place, as well as long term growth. This can only occur once thorough information is available regarding the feed supply chain and its challenges.

3.2 Pork industry

3.2.1 Background to study

This section focuses on the pork industry on a global and domestic level. In this section, the consumers of feed, specifically the pork producers for this section, are analysed to determine the structure, conduct and performance of the industry and supply value chain to create a better understanding of the feed industry. The current challenges, changes, opportunities and risks that are expected in these individual industries will also be identified. The outcomes of these studies are of fundamental importance to the industry and must be reviewed on a regular basis to be able to adapt to the ever changing environment and consumer behaviour patterns. The world and technological advancement gives the agricultural environment new meaning to methods of food production and control to ensure bio-safety and sustainable development.

3.2.2 Global pork overview

The section below focuses on the global pork industry. To be able to construct a successful South African supply chain, the market environment is studied and the issues and challenges in the global pork market context must be identified and understood.

Dynamic perspective

For the South African pork producers to be able to compete with larger more traditional and advanced countries in changing markets, they will have to adapt to global changes within the pork and related industries such as the feed, health and processing industries. It is integral to maintain focus on the economic and strategic aspects globally with regard to the pork industry so as to note the changes and to be able to exploit new and emerging markets. The international markets have large market shares to influence the current economic and structural environment in the pork industries. These markets must therefore be taken into account when determining what the possible structural and other changes for the South African domestic pork market could be.

Pork Global Supply, Demand & Consumption levels

Figure 23 gives the global shifts of production and trade observed from the year 2000 and the levels that can be expected up to 2018. Beef, pork and poultry are substitutes for one another and the changing consumer behaviour will be a key driver in production of these three commodities. Although pork is currently the world's largest consumed animal food commodity, poultry demand is growing rapidly as an alternative meat source to pork and beef. In figure 24 below the rapid growth rate in poultry production and trade (green section) can be compared to the slower growth in pork production (yellow section). Beef production is shown to be stable across this time series.

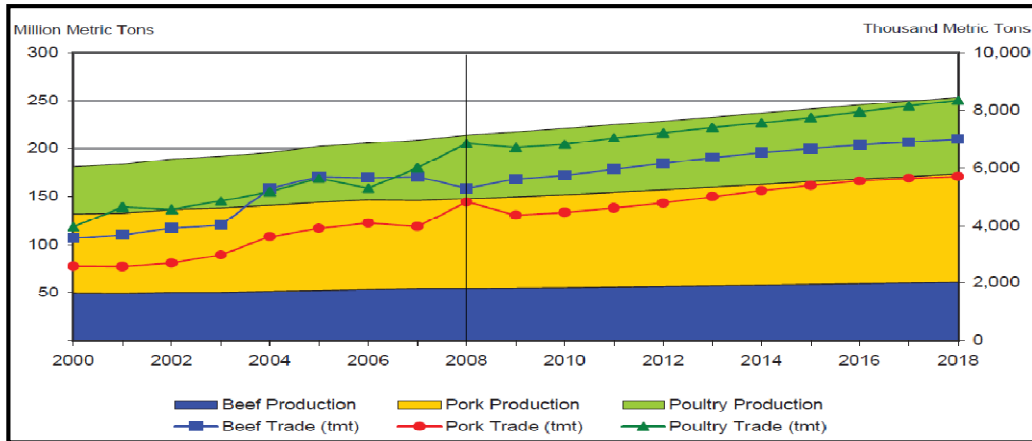


Figure 23: World meat production and trade

Source: FAPRI, 2009

Figure 24 illustrates the change in global meat and poultry consumption. In 2005, pork consumption was 40 percent followed by poultry (30%) and beef (25%). Market analysts anticipate that these percentage market shares will have changed by 2025 to pork consumption of 39 percent, poultry (33%) and beef (23%).

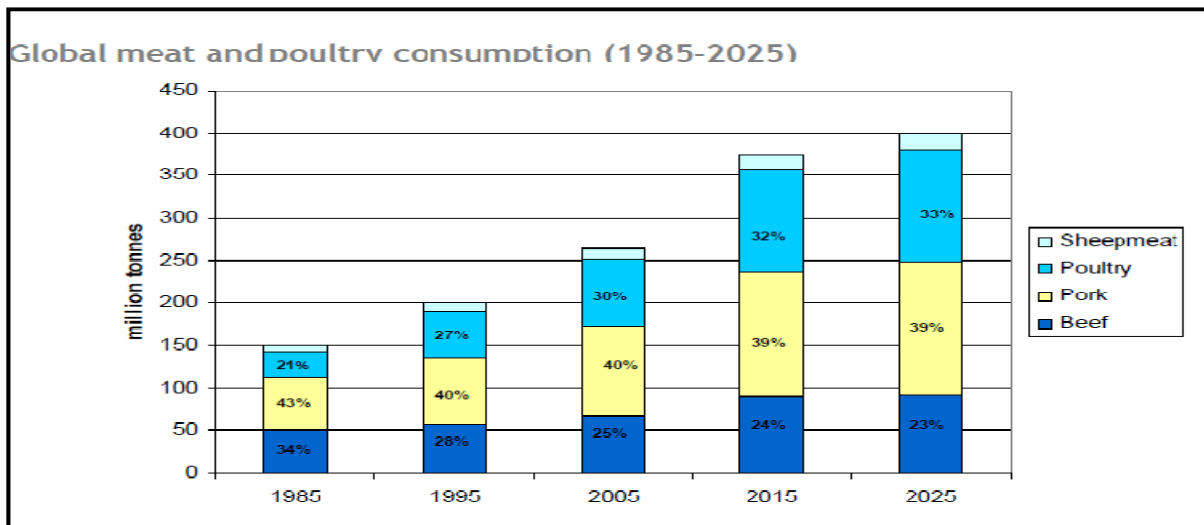


Figure 24: Global meat and poultry consumption (1985-2025)

Source: World Meat Congress in Cape Town, 2008

According to FAPRI (2009), expected growth in global pork trade will increase annually by 3.5 percent to reach 5.7 million tons of pork in 2018. Production growth is expected to be 1.9 percent per annum with a total global pork production of 112.95 million tons expected in 2018. Changes in the demand for pork

globally impacts on prices and profitability of pork because of the allocation and availability of feed resources between human and animal feed. An increase in the demand for pork, although slow, can be seen in the Figure 25. The global markets are shifting from beef to pork and poultry as the latter are considered cheaper and healthier alternatives.

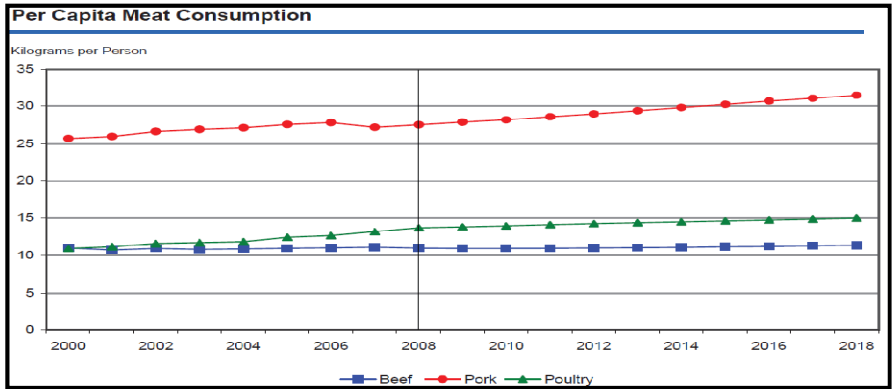


Figure 25: Meat per capita consumption

Source: FAPRI, 2009

The per capita consumption per annum for the following major pork producing and consuming countries in 2009 is as follows (FAPRI, 2009):

- Brazil - 12.5kg
- China Midlands – 34.6kg and Hong Kong – 69.7kg
- Europe – 42.6kg
- Russia – 21.9kg
- USA – 28.8kg

Figure 26 illustrates the change in growth in total pork consumption by country for the period 2003 to 2017. China presents the best opportunities for imports from exporting countries. This makes it the “market of the future”. The rise in the demand for more pork in China as well as Sub Saharan Africa is due to rapid population growth. The lack of production capacity and resources are important issues when additional pork imports are considered.

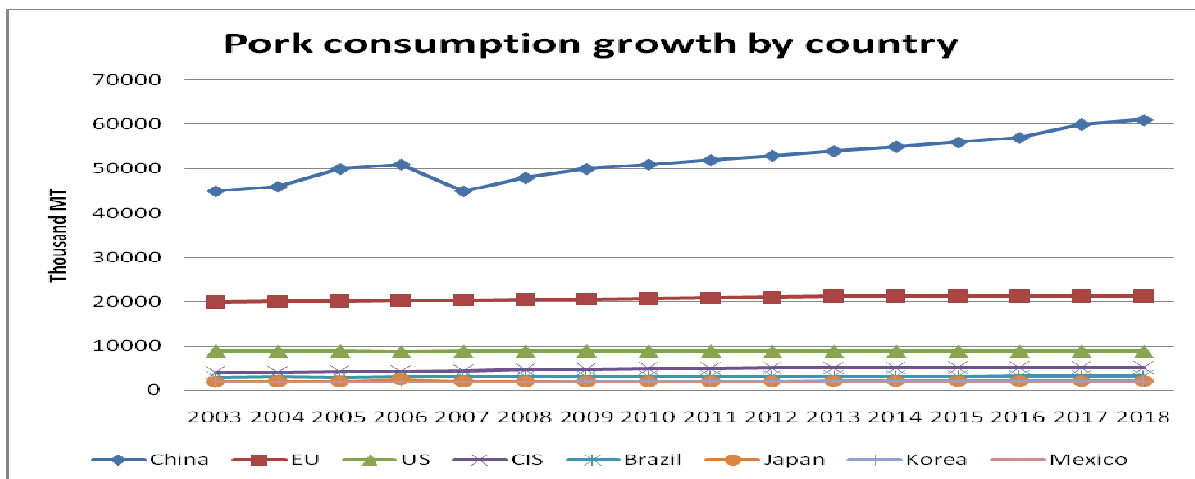


Figure 26: Pork consumption growth by country

Source: Adapted from OECD, 2008

Figure 27 is the per capita consumption of pork meat forecast for individual regions from 2003 to 2017. China, Korea and Russia show positive growth, whilst the other countries are expected to grow at a significantly slower pace.

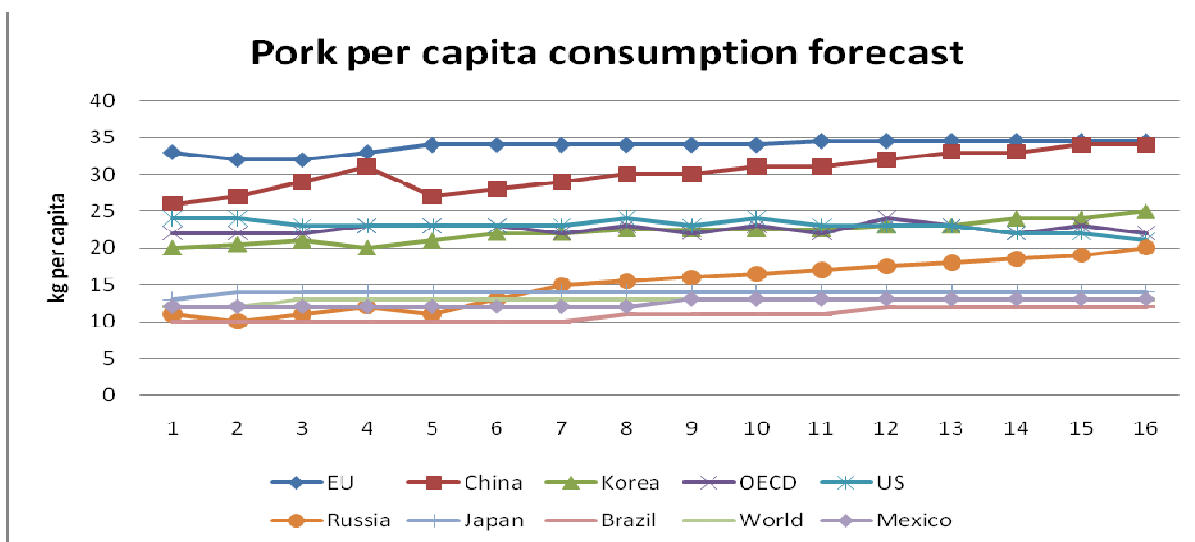


Figure 27: Pork per capita consumption forecast

Source: OECD, 2008

Growth in the global consumption of pork is given in Figure 28. Projections until 2017 indicate that consumption in China (the world's largest consumer of pork) will increase by 30 percent. Consumption growth in the U.S. is expected at more than 9 percent and for the EU a 5 percent increase. Projections for the rest of the world show growth of 21 percent until 2017. Production and technological advances will have to change and adapt to meet this demand increase for pork. With this increase in the demand for pork, the demand for feed will further be driven to be able meet the increase in demand.

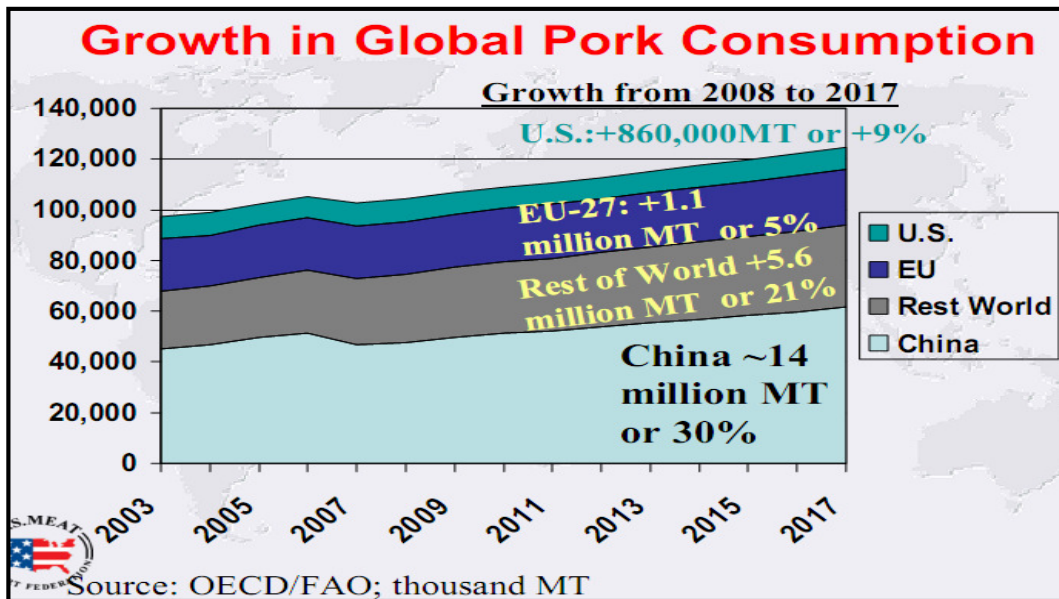


Figure 28: Growth in global pork consumption

Source: OECD, 2008

This worldwide increase in demand for pork, and pork products will further increase the imports of countries that cannot meet the demand needs. South Africa is seen as a relatively small producer compared to the U.S. and the EU. The opportunities to exploit new markets and trade partners (both in imports from the U.S. and exports to African countries) are becoming more important. Figure 29 shows the changes that can be expected in imports from the major importing countries of pork globally. Projections are that Japan will import around 7 percent more in 2017 than in 2008. South Korea's imports for the same period will increase with more than 15 percent and South Africa's imports will increase by 8 percent.

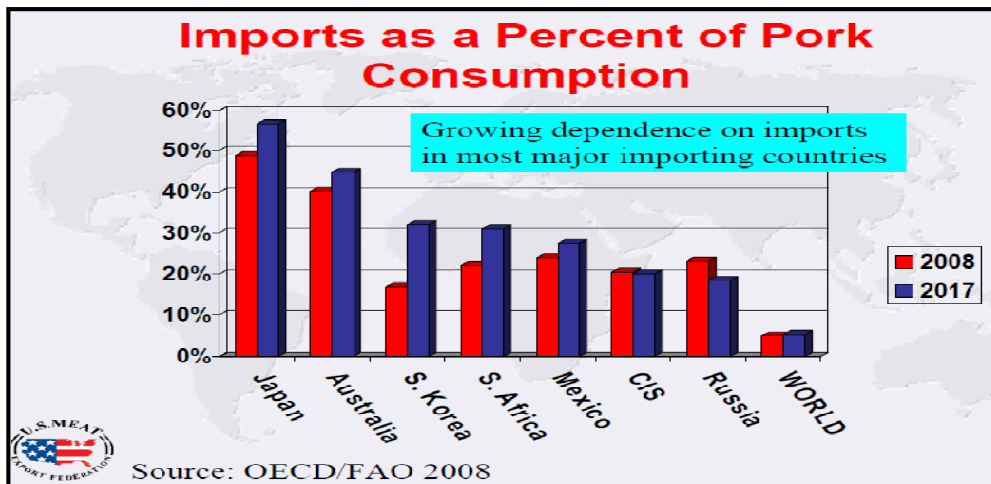


Figure 29: Imports as a percent of pork consumption

Source: OECD, 2008

Table 15 below gives the statistical overview of the global pork production and consumption of the major pork producing regions. Global pork production in 2009 was 100 236 thousand tons, with consumption was 100 022 thousand metric tons for the same period. The USDA (2009) expects production in 2010 to increase by 1 647 thousand tons to 101 883 thousand tons and consumption to increase by 1 845 thousand tons to 101 867 thousand tons.

Table 15: Global pork production and consumption in 1000 metric tons (carcass weight equivalent)

	2005	2006	2007	2008	2009	2010
						Oct
Production						
China	45 553	455	42 878	46 205	48 500	50 300
EU-27	21 676	21 791	22 858	22 596	22 000	21 900
Brazil	2 710	2 830	2 990	3 015	3 123	3 249
Russia	1 735	1 805	1 910	200	2 205	2 290
Vietnam	1 602	1 713	1 832	1 850	1 850	1 850
Canada	1 765	1 748	1 746	1 786	1 790	1 660
Japan	1 245	1 247	1 250	1 249	1 285	1 270
Phillipines	1 175	1 215	1 250	1 225	1 225	1 225
Mexico	1 195	1 158	1 152	1 161	1 150	1 175
Korea, South	1 036	1 000	1 043	1 056	1 016	1 009
Others	5 336	5 504	5 714	5 726	5 646	5 770
Total Foreign	85 028	86 516	84 623	87 929	89 790	91 698
United States	9 392	9 559	9 962	10 599	10 446	10 185
TOTAL	94 420	96 075	94 585	98 528	10 236	101 883
Total Domestic Consumption						
China	45 139	46 051	42 726	46 412	48 300	50 300
EU-27	20 632	20 632	21 507	21 025	20 800	20 750
Russia	2 486	2 639	2 803	3 112	2 954	3 039
Brazil	1 949	2 191	2 260	2 390	2 478	2 549
Japan	2 509	2 452	2 473	2 487	2 494	2 487
Vietnam	1 583	1 731	1 855	1 880	1 894	1 889
Mexico	1 556	1 538	1 523	1 605	1 664	1 700
Korea, South	1 311	1 420	1 502	1 519	1 415	1 430
Phillipines	1 198	1 239	1 275	1 270	1 267	1 268
Taiwan	944	928	926	945	958	963
Others	6 081	6 378	6 619	6 906	6 783	6 935
Total Foreign	85 388	87 199	85 469	89 551	91 097	93 310
United States	8 660	8 643	8 965	8 806	8 925	8 557
TOTAL	94 048	95 842	94 434	98 357	100 022	101 867

Source: USDA, 2009

The following sections are statistical extracts and forecasts done by FAPRI (2009) on the global pork industries consumption, production and trade for the largest pork production and consumption regions. Brazil, China, Europe, Russia and the U.S. were compared to indicate the changes that can be expected in their business. These countries were responsible for more than 86 percent of global pork production in 2009 and account for more than 83 percent of domestic pork consumption (FAPRI, 2009).

Table 16: Brazilian pork supply and utilisation in thousand metric tons (2008 to 2018)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Pork Production	3 055	3 283	3 400	3 574	3 651	3 758	3 843	3 931	4 023	4 110	4 195
Beginnings Stocks	-	-	-	-	-	-	-	-	-	-	-
Domestic Supply	3 055	3 283	3 400	3 574	3 651	3 758	3 843	3 931	4 023	4 110	4 195
Consumption	2 380	2 478	2 550	2 608	2 677	2 727	2 776	2 823	2 869	2 921	2 977
Ending Stocks	-	-	-	-	-	-	-	-	-	-	-
Domestic Use	2 380	2 478	2 550	2 608	2 677	2 727	2 776	2 823	2 869	2 921	2 977
Net Trade	675	805	850	966	975	1 031	1 067	1 108	1 154	1 189	1 218

Source: FAPRI, 2009

Table 16 above shows the projected Brazilian pork balance sheet from 2008 to 2018. In 2009, Brazil produced 3 283 thousand tons of pork and consumed 2 478 thousand tons. Brazil is a net exporter of pork, and exported 805 thousand tons in 2009. Forecasts show that production can increase by 2.9 percent, and consumption can grow 2.05 percent annually. Brazil's long term growth in productivity is partially due to improvement and investment in infrastructure in the pork industry (FAPRI, 2009). The increase in production puts more strain on the use of feeds and competition for human consumption as well as for the making of bio-energy. Brazil is fortunate to be able to produce pork more cheaply than South Africa due to the availability of raw feed ingredients and lower feed costs.

Table 17: China pork supply and utilisation in thousand metric tons (2008 to 2018)

Chinese - Mainland Meat Supply and Utilization	-	-	-								
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Pork											
Production	44	46	47	49	50	51	53	54	56	57	59
Beginning Stocks	593	100	550	015	424	881	344	816	299	808	300
Domestic Supply	44	46	47	49	50	51	53	54	56	57	59
Consumption	44	46	47	49	50	52	53	55	56	58	59
Ending Stocks	875	273	676	169	625	154	676	195	725	260	770
Domestic use	0	0	0	0	0	0	0	0	0	0	0
Net Trade	44	46	47	49	50	52	53	55	56	58	59
	875	273	676	169	625	154	676	195	725	260	770
	-282	-172	-126	-155	-201	-273	-332	-379	-426	-452	-470
Chinese - Hong Kong Meat Supply and Utilization	-	-	-								
-	-	-	-								
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Pork											
Production	123	126	127	126	124	121	120	119	118	117	117
Beginning Stocks	0	0	0	0	0	0	0	0	0	0	0
Domestic Supply	123	126	127	126	124	121	120	119	118	117	117
Consumption	490	492	493	496	500	506	512	516	521	523	525
Ending Stocks	0	0	0	0	0	0	0	0	0	0	0
Domestic use	490	492	493	496	500	506	512	516	521	523	525
Net Trade	-367	-366	-365	-370	-376	-385	-392	-398	-403	-406	-408

Source: FAPRI, 2009

Table 17 above shows the projected Chinese pork balance sheet from 2008 to 2018. China is the world's largest producer and consumer of pork meat. Per capita consumption for central China is 34.6kg and for the Hong Kong region 69.7kg. The higher consumption in the Hong Kong region is due to the high population density. Production in 2009 was 46 226 thousand tons and consumption for the same period was 46 765 thousand tons. China became a net importer of pork in 2008 (FAPRI, 2009) and imported 538 thousand tons of pork in 2009. Forecasts show that the production, as well as the consumption, of pork in China will increase by more than 2.6 percent annually.

Table 18: European Union (EU) pork supply and utilisation in thousand metric tons (2008 to 2018)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Pork											
Production	22 300	22 160	22 113	22 081	22 189	22 302	22 406	22 520	22 654	22 751	22 827
Beginning Stocks	99	0	0	0	0	0	0	0	0	0	0
Domestic Supply	22 399	22 160	22 113	22 081	22 189	22 302	22 406	22 520	22 654	22 751	22 827
Consumption	20 924	20 921	20 967	21 054	21 137	21 205	21 277	21 349	21 415	21 506	21 611
Ending Stocks	0	0	0	0	0	0	0	0	0	0	0
Domestic use	20 924	20 921	20 967	21 054	21 137	21 205	21 277	21 349	21 415	21 506	21 611
Net Trade	1 475	1 239	1 146	1 027	1 052	1 097	1 129	1 171	1 239	1 245	1 216

Source: FAPRI, 2009

Table 18 above shows the projected European Union (EU) pork balance sheet from 2008 to 2018. The EU is the world's second largest producer of pork, with Germany being the major production region and also exporter to other European regions. In 2009, a total of 22 160 thousand tons of pork was produced in the EU. Consumption for the same period was 20 921 thousand tons. The EU is a net exporter of pork and exports in 2009 were 1 239 thousand tons. According to FAPRI (2009), the EU is losing market share due to their "appreciating currency and strict animal welfare and environmental regulations" (FAPRI, 2009). Forecasts for pork production in the EU indicate a slow growth of only 0.2 percent per annum and consumption is expected to grow by 0.3 percent annually.

Table 19: Russian pork supply and utilisation in thousand metric tons (2008 to 2018)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Pork Production	2040	2176	2221	2255	2291	2335	2378	2427	2481	2537	2594
Beginnings Stocks	0	0	0	0	0	0	0	0	0	0	0
Domestic Supply	2040	2176	2221	2255	2291	2335	2378	2427	2481	2537	2594
Consumption	2979	3013	3058	3106	3152	3180	3199	3216	3233	3254	3267
Ending Stocks	0	0	0	0	0	0	0	0	0	0	0
Domestic Use	2979	3013	3058	3106	3152	3180	3199	3216	3233	3254	3267
Net Trade	-939	-837	-837	-851	-861	-845	-821	-789	-752	-717	-673

Source: FAPRI, 2009

Table 19 above indicates the projected Russian pork balance sheet from 2008 to 2018. As with Brazil, Russia is also a large producer and consumer of pork but they do not have the same production capacity. In 2009 Russia produced 2 176 thousand tons, and consumed 3 013 thousand tons of pork. Although Russia is a net importer of pork, forecasts indicate a decline in imports towards 2018. Growth in production is expected to be 2.2 percent per annum while consumption is expected to grow by only 0.8 percent per year.

Table 20: U.S. pork supply and utilisation in thousand metric tons (2008 to 2018)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Pork Production	10604	10343	10299	10423	10571	10819	11093	11374	11630	11749	11857
Beginnings Stocks	243	290	287	283	287	292	301	311	320	329	332
Domestic Supply	10847	10633	10586	10706	10859	11111	11395	11685	11950	12078	12189
Consumption	8762	8888	8731	8774	8839	8953	9093	9275	9465	9530	9602
Ending Stocks	290	287	283	287	292	301	311	320	329	332	335
Domestic Use	9053	9175	9014	9061	9131	9255	9404	9595	9794	9862	9936
Net Trade	1794	1459	1572	1645	1728	1856	1991	2090	2156	2216	2252

Source: FAPRI, 2009

Table 20 shows the projected U.S. pork statistics. They are the third largest producer of pork globally. Pork production in 2009 was 10 343 thousand tons with consumption of 8 888 thousand tons during the same period. Net exports of pork was 1 459 thousand tons. The U.S. market is regarded as one of the major exporters of pork to various regions globally. Forecasts for U.S. pork consumption predict a slight growth of 0.83 percent annually and growth in production of 1 percent per year.

“Mexico, Brazil and nations at the Pacific Rim are important markets for the long run growth of US pork exports. Because Brazil is not recognized by all countries, especially Japan and South Korea, as being free of foot-and-mouth disease (FMD) the ability of pork producers to compete with other pork exporting countries are weakened. As a result Brazil only exports to Asia, Russia and Argentina. US pork products may soon be competitive in the exporting market despite high grain prices. The long run competitiveness will however be determined by environmental regulations and especially production costs relative to other competing countries, because production costs are likely to be reduced in countries with integrated pork industries” (University of Pretoria, 2009).

Figure 30 below illustrates the changes in pork exports for the six major exporters in the world as well as the forecasts from to 2017.

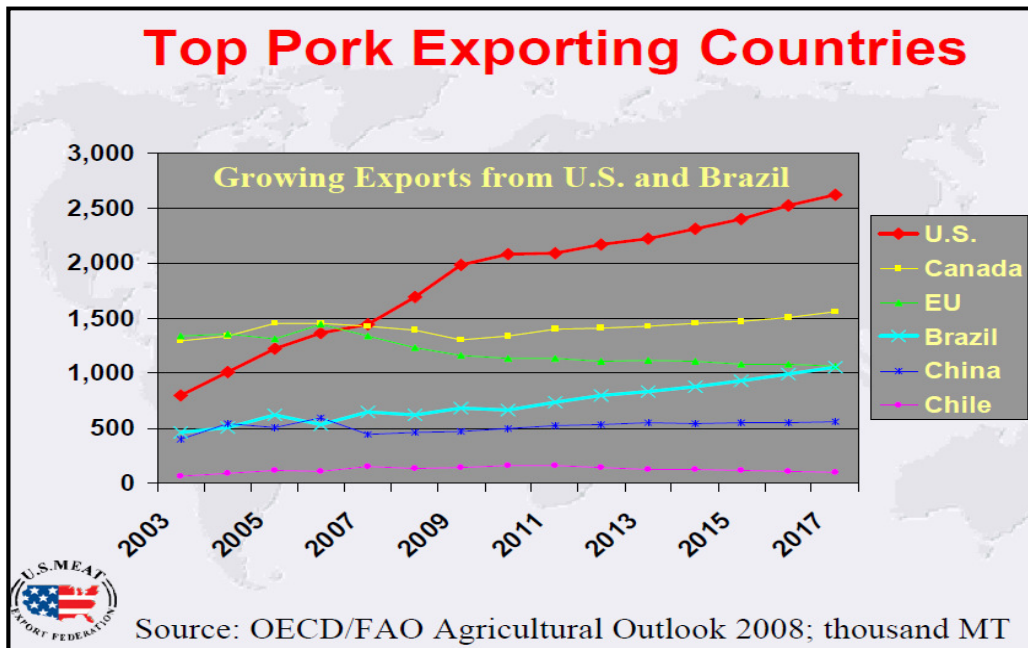


Figure 30: World top pork exporting countries

Source: OECD, 2009

Pork prices & trends

Pork production costs are composed of different farming activities that take place during the time that the pigs are born until they are finished and prepared, ready for slaughter. Figure 31 shows the different farming types and stages in pork production. The share allocations of a specific activity's costs are indicated for each stage. Feed consists of between 33 to 42 percent of the total production cost in a pork production cycle. The cost for a live animal on average accounts about 32 percent of total costs. Other costs included in the price are overheads, labour, marketing and veterinary costs. Figure 31 applies to the U.S. hog production cost structure (Lowe & Gereffi, 2008). The South African structure differs slightly in the weights of production costs due to subsidies that are paid to American farmers. In South African pork production the share of feed cost is almost 70 percent of total production costs (Streicher, 2010).

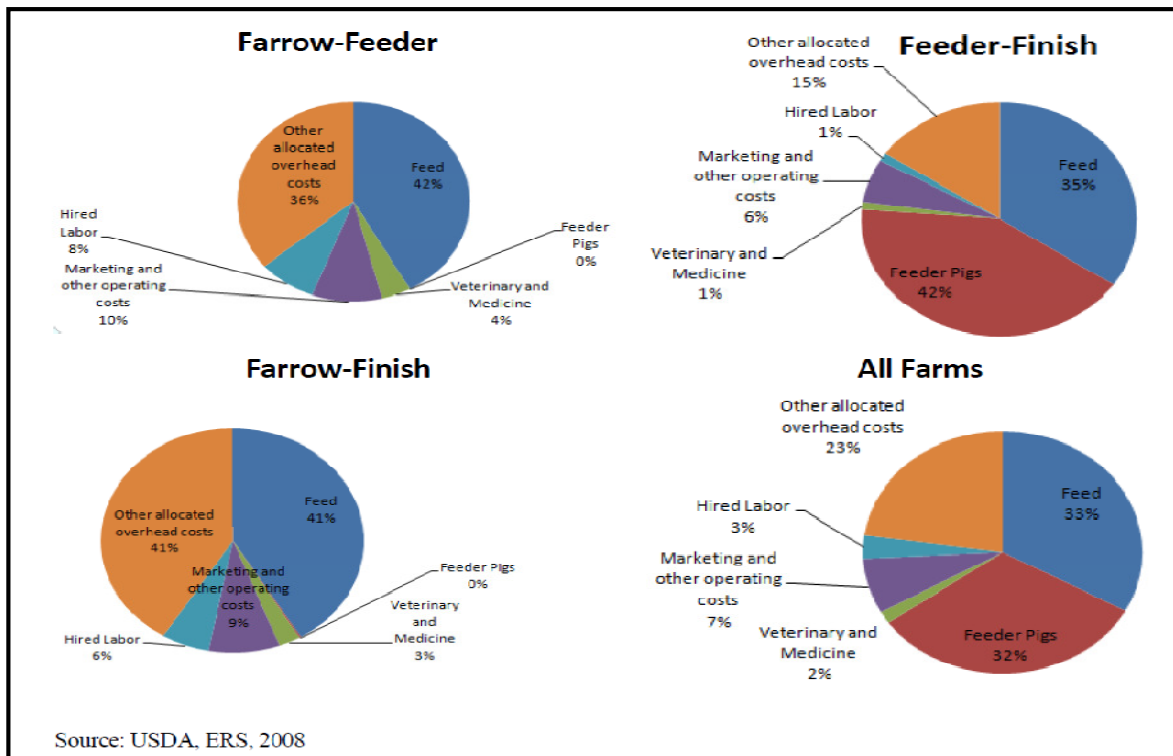


Figure 31: Comparison of U.S hog farm production cost by farm type

Source: Lowe & Gereffi, 2008

Table 21 gives the pork price projections in U.S dollars per metric tons. The national based price for barrow and gilts with a 51 to 52 percent lean equivalent was US\$ 1 078 per metric ton of pork. The U.S. retail for the same period was US\$6 528 per metric ton and the Ontario hog index US\$ 1 228 per metric ton. The Japanese wholesale price in 2009 was US\$ 5 242 per metric ton. The pork price projection changes, as forecasted by FAPRI (2009), indicate a possible growth of 1.5 percent per annum for the barrow and gilts. The U.S. retail is expected to increase by 1.74 percent and the Ontario hog index by 1.3 percent. Growth for the Japanese wholesale price is expected to be 1.5 percent per year. These overall increases in prices are explained by the global growth in demand for pork and pork products.

Table 21: Pork price projections in U.S. dollars per metric ton (2008 to 2018)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Pork											
Barrows and Gilts National Base											
51-52% Lean Equivalent	1055	1078	1169	1213	1240	1208	1190	1183	1176	1204	1238
U.S Retail	6474	6528	6876	7311	7589	7552	7507	7452	7425	7569	7828
Ontario Hogs Index	1220	1228	1330	1371	1402	1357	1340	1339	1331	1364	1410
Japanese Wholesale	5020	5242	5452	5685	5775	5725	5716	5736	5748	5833	5928

Source: FAPRI, 2009

Global pork imports and exports

In 2009, the U.S. was the top pork exporting country followed by Canada and the European Union. However, pork exports from Brazil are increasing to a large degree and may compete with the U.S. export market share of pork in future. Figure 32 gives the changes in pork export market share for these countries as well as a forecast of how the markets can shift in the future. Expectations are that the U.S. and Brazilian markets will grow in exports while there will be a decline in market share for the EU and Canadian markets.

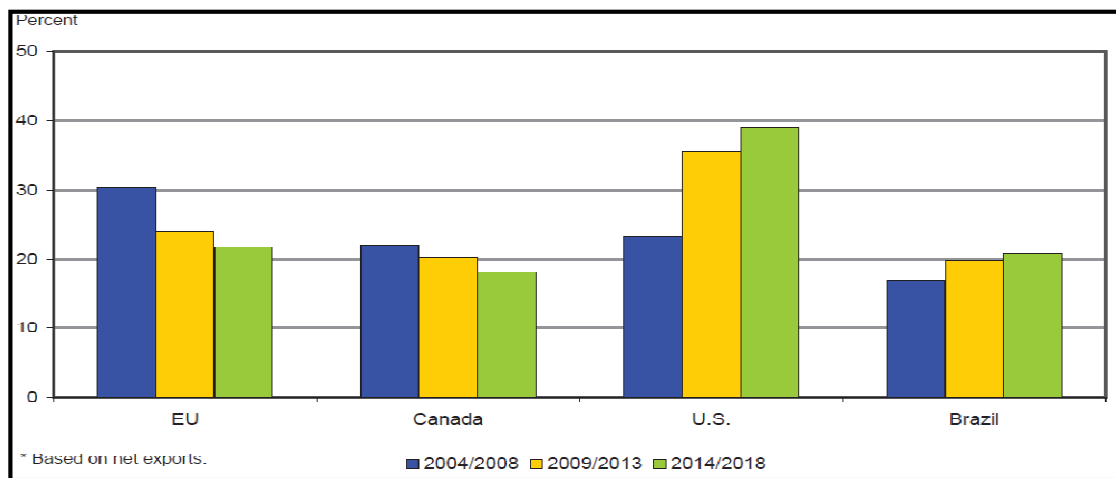


Figure 32: Pork export market share

Source: FAPRI, 2009

Forecasts indicate that the net exports from 2008 to 2018 will grow by 5.5 percent per annum to 1 218 thousand tons for Brazil. Growth for the U.S. can be expected to be 2.1 percent per annum to 2 252

thousand tons, and for Canada at 1.5 percent. The EU is expected to show negative growth of 1.7 percent per annum to 1 216 thousand tons in 2018.

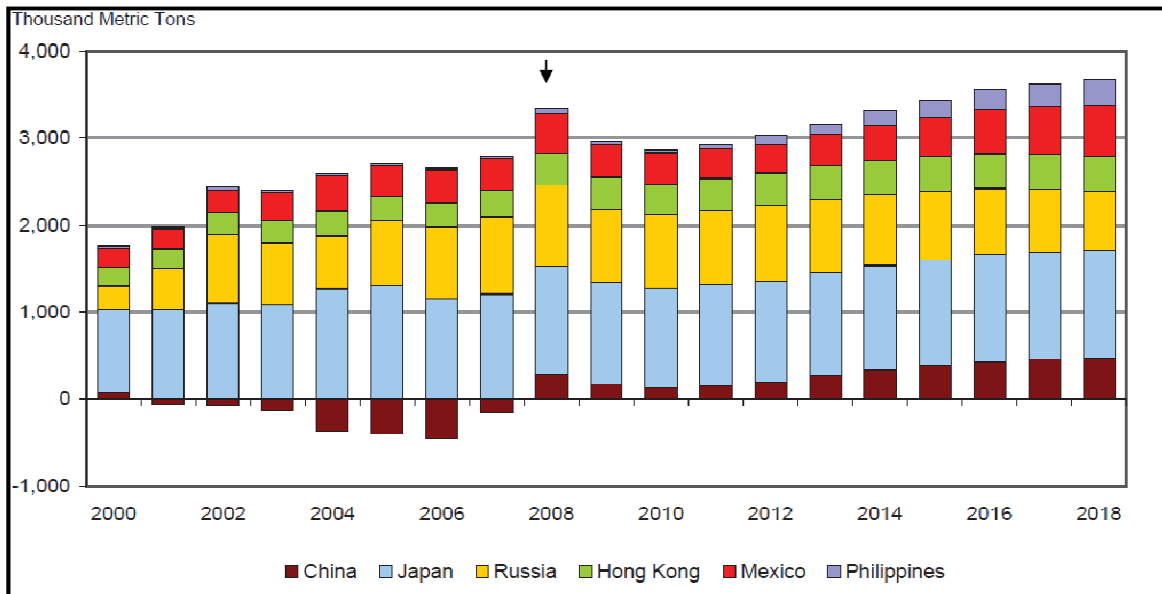


Figure 33: Major pork importing countries (2000 to 2018)

Source: FAPRI, 2009

Figure 33 compares the change in imports as well as forecasted changes expected for the major importing countries of pork globally. In 2009, Japan was the largest importer of pork in the world importing 1 184 thousand tons. Russia was the second largest importer (837 000 tons) and Mexico (371 000 tons) the third largest. China became a net importer of pork in 2008 and forecasts indicate that they will remain a net importer for the future. FAPRI (2009) expects that the Japanese exports will be relatively the same pending 2018. The growth in the Chinese imports is expected to grow by 4.75 percent annually but a decreasing growth of 3 percent is expected for Russia.

Table 22 gives the statistical overview of the global pork net imports and exports as well as the forecasts up to 2018.

Table 22: Global pork trade (2008 to 2018)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Net Exporters	(Thousand Metric Tons)										
Australia	-102	-97	-120	-142	-157	-166	-171	-174	-175	-177	-179
Brazil	675	805	850	966	975	1031	1067	1108	1154	1189	1218
Canada	860	859	884	951	1007	1007	1010	1006	994	986	1015
European Union	1475	1239	1146	1027	1052	1097	1129	1171	1239	1245	1216
Other CIS †	-6	-14	-39	-50	-54	-56	-54	-51	-47	-41	-36
Thailand	0	2	2	4	1	-2	-3	-4	-2	-1	-2
United States	1794	1459	1572	1645	1728	1856	1991	2090	2156	2216	2252
Total Net Exports •	480	4368	4461	4600	4768	4993	5197	5375	5543	5636	5702
Net Importers											
Argentina	39	44	49	54	63	68	73	78	82	86	92
China - Hong Kong	367	366	365	370	376	385	392	398	403	406	408
China - Mainland	282	172	126	155	201	273	332	379	426	452	470
Indonesia	0	0	0	0	0	0	0	0	0	0	0
Japan	1248	1184	1155	1169	1167	1187	1208	1227	1246	1247	1245
Mexico	455	371	356	335	329	360	401	447	505	547	587
New Zealand	2	5	7	7	7	8	8	9	10	10	11
Other Eastern Europe ‡	13	12	9	8	7	6	5	5	6	7	8
Paraguay	0	-4	-6	-7	-5	-2	1	3	5	5	4
Philippines	54	37	37	53	93	122	157	191	225	263	304
Russia	939	837	837	851	861	845	821	789	752	717	673
South Korea	444	450	495	500	498	521	548	577	608	618	617
Taiwan	19	15	14	15	19	25	33	41	50	51	51
Ukraine	140	71	110	114	135	147	156	160	159	160	158
Vietnam	39	34	79	110	130	146	151	154	151	151	154
Rest of World	656	659	662	667	671	677	682	688	693	697	702
Total Net Imports	4804	4368	4461	4600	4768	4993	5197	5375	5543	5636	5702
Barrow and Gift Price, National				(US Dollars per Metric Ton)							
Base 51-52% Lean Equivalent	1055	1078	1169	1213	1240	1208	1190	1183	1176	1204	1238

Source: FAPRI, 2009

3.2.3 South African pork overview

The South African pork industry, although relatively small in comparison to the rest of the world, is a dynamic and well organised industry with production and productivity figures on par with leading countries abroad (SAPPO I, 2009). Increases in productivity in the South African pork industry are expected to grow by 15-20 percent in the next five years.

According to SAPPO I (2009) there are currently 103 000 sows and around 7 000 boars that are managed by 400 individual pork producers producing more than 165 000 ton of pork per annum. These farms range in sizes from 50 sows to the larger commercial farms with 7 000 sows. SAPPO I (2009) reported that approximately 250 agribusiness units (all with more than 500 sows) produce 80 percent of the country's pork. In total, an average of 2.2 million pigs are slaughtered annually in South Africa of which 55 percent is processed and 45 percent is sold to the fresh meat market (SAPPO I, 2009). Fresh pork is supplied to butcheries (53 percent), supermarkets (34 percent) and 13 percent to grocery stores. According to Kirsten *et al* (2009), the per capita consumption of pork in South Africa is on average 3.7-3.8kg.

It is estimated that the average pork feed rations with respect to production cost allocations are a combination of 70 percent maize, 20 percent soy and the balance of 10 percent account for additional supplements such as additives, antibiotics, vitamins and growth hormones. On average, a sow is expected to deliver 20 piglets per year, but due to technological advances in veterinary health and manipulation, sows deliver even up to 26 piglets per year (Streicher, 2010). The sow with her piglets consume on average 6.1 tons of feed per annum. The South African pork industry consumed more than 618 thousand tons of animal feed per annum (Streicher, 2010). In South Africa, 75 percent of pork producers are own (home) mixers, while the remaining 25 percent purchase ready mixed or commercial feed from feed manufacturers. The latter pork producers are more concentrated in the Western Cape region and KwaZulu-Natal. They purchase ready mixed feed or commercial feed due to the lack of maize and other essential grain (raw feed materials) and protein supply in this region (SAPPO & Viljoen, 2009).

Dynamic perspective

The following section will focus on the economic as well as the strategic aspects within the South African pork industry. This section highlights the links between the different industry role players and global leaders and gives a high level view of value and strategic chains. Feed remains the focus area in this value chain. Due to the competition between feed and food for human and animal consumption it is important to take note of the industry structure and be able to build and understand the relationships. Comparison with the rest of the world will reveal the small percentage impact the South African pork industry has on world changes.

Table 23 gives a statistical overview of the domestic South African pork industry.

Table 23: South African pork statistics (2006 to 2014)

	2006	2007	2008	2009	2010	2011	2012	2013	2014
Pork	Thousand tons								
Production	157.2	152.8	162.8	164.7	166.8	166.9	167.5	167.1	167.4
Domestic Use	177.8	173.3	179.2	172.1	174.2	174	174.6	174.5	175.2
Imports	20.5	23.2	18.9	27.2	11.2	11	11	11.2	11.5
Exports	0	2.7	2.6	3.8	3.8	3.9	3.9	3.8	3.7
	c/kg								
Average carcass price	1214	1415	1605	1626	1450	1849	1972	2054	2200
	Ratio								
Pork-maize price ratio	8.6	7.6	9.1	10.6	11.5	10.4	11	10.5	10.8

Source: BFAP Baseline, 2009

In 2009, the domestic demand for pork was 172.1 thousand tons, 4 percent lower than in 2008. It is projected that this demand will increase in 2010 by 1.2 percent due to the stabling of the economy after the recession and a consumer shift towards healthier foods. The impact of the soccer world cup in 2010 will increase the demand for pork products further. More pork was produced in 2009 (164.7 thousand tons) than in 2008. Projections towards 2010 are that production will increase to 166.8 thousand tons.

BFAP (2009) expects average consumption will not decrease considerably as a result of the recent swine flu scare but as SAPPO indicated they increased awareness measures (by measure of advertisement and awareness programmes) to ensure that the consumer perceptions did not change in favour of other substitutive protein sources.

Average prices for 2009 were calculated at R16.26/kg and the price estimation for 2010 on average is R14.5/kg. Projections are that the carcass price per kg will increase steadily by 6.2 percent per annum to R22.00 in 2014. On average, the slaughtered mass in South Africa is 70kg (SAPPO I, 2009) but the demand for heavier pigs with additional mass of between 5-15kg per pig slaughtered is increasing. The world demand is also changing towards heavier pork carcasses. This shift in consumer patterns again reinforces the importance of the feed industry and feed formulations for faster and healthier growth. In the USA and Denmark the average slaughtered mass is 87kg and 77kg respectively (Leach, 2006). To get these heavier pigs, the feed rations must be adapted to gain additional growth. For pigs to be fed longer the income received must be more or equal to the marginal cost spent to feed the pigs for a longer period.

Figure 34 gives the projected pork production, consumption as well as the pork to maize price ratio until 2014 for South Africa.

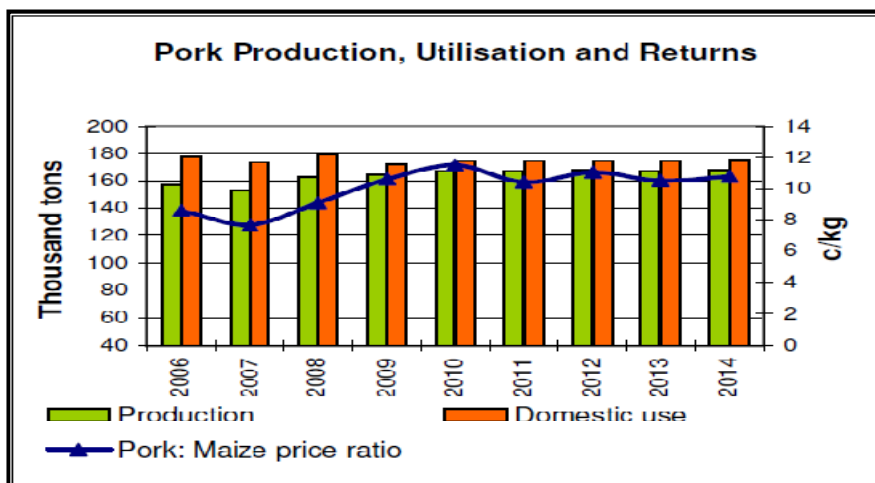


Figure 34: Pork production, utilisation and returns (2006 to 2014)

Source: BFAP Baseline, 2009

Imports & Exports of pork meats

Historically, South Africa has been a net importer of pork meats. On average, 27 214 tons per annum are imported of which specific cuts such as ribs account for more than 70 percent of imports (SAPPO I, 2009). According to SAPPO I (2009), in 2007 imports was mainly from Europe (65 percent) and from Canada (28.5 percent). In 2009 the total imports of pork were about 30 000 tons (Snyman, 2009). The Premium Pork Producers group is of the opinion that if sustainable exports- mainly to Africa, can be managed by the South African pork industry, an income of more than R43 million can be expected in 2013 (Stoltz, 2009).

Domestic protein levels & demand increases for pork feeds

Figure 35 illustrates the change that is being experienced in the South African consumer markets. The general reflection is that there is a strong demand and tendency towards dairy, condiments and animal protein products. As the demand for more of these forms of products increases, the demand for animal feed will increase to be able to sustain the demand for these animal protein groups.

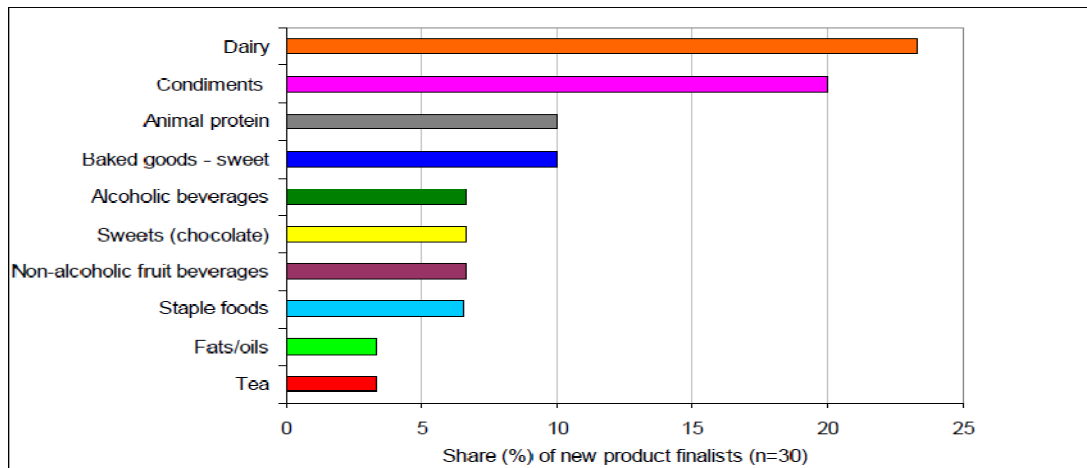


Figure 35: Innovative products categories

Source: BFAP Baseline, 2009

As with poultry and beef, the input costs are mainly captured in the maize prices (70 percent) with soya (20 percent) and other additives (10 percent) rounding the mixture off. Production cost is expected at R2052/ton of feed in 2010 (BFAP, 2009). Pork prices must average between R 13 to R15 per kg to have a profitable pork farm business. The demand for more protein based foods for both human and animal consumption is raising questions whether South Africa has the capacity for expansion and still be able to supply the additional needs for protein based foods.

3.2.4 Pork supply chain analysis

This section focuses on the supply chain components in the pork production industry and how the different elements combine with the feed industry supply chain to form an integrated supply chain in the analysis of the current pork supply chain in South Africa. Major role players in the industry are identified and analysed to determine the structure and ultimately the market concentration and competitiveness within this industry. Numerous issues in this supply chain will be identified, assessed on a current and future basis, as well as the impact of issues on the pork supply chain industry.

The constant changing global environment raises concerns about the impact current as well as future risks may have on the pork industry supply chain and its future sustainability. A thorough risk assessment will determine and highlight the main risks in the supply chain and the potential impact these risks may have on

the industry. A SWOT analysis will also be done to assist in the industry's strategic positioning. This analysis will be supported by the consensus opinions of key members in the pork supply chain and also indicate how they view the future of the South African pork industry. All these elements contribute to the feed supply chain analysis to form the total value added supply chain for the feed, pork and poultry industry.

3.2.4.2 Key issues within the pork value supply chain

Within the pork industry the opportunity for growth, the market (end consumer) and sustainable development remain the key objectives. Dave Ford (2009) of the SA Feedlot Association endorsed the view that 'before you decide to produce, you have to ensure that there is a market that will buy your product on offer'. He also stated that to ensure business survival, the product should be differentiated from other producers. According to Streicher (2010), the relationships and trust between the producers and abattoirs must be assured of consistent supply of quality produce to avoid unnecessary structural breaks in the value chain. Currently there is a lack of trust and relationships between the pork producers and the abattoirs (Streicher, 2010).

Streicher (2010) also indicated the following critical issues within the South African pork context:

- Input costs
- Imports (or dumping) putting further strain on domestic pork prices
- Pork diseases entering the country through imports
- Assembly costs of new and expansion of facilities
- Environmental legislations
- Provincialisation of state veterinary services
- Measures put in place to prevent global warming

Leach (2006) highlighted certain areas in the South African pork industry that have the highest potential for future growth and possible risks. Within the feed industry, the supply of good quality feed and proteins are of major concern to the industry, not only for animal health but also for human health. Boshoff (2009)

confirmed this growing concern. Volatility in the prices of proteins increases the challenges faced to still be able to produce pork at profitable levels (Briedenhann, 2009).

The opportunities for growth in the South African pork industry were indicated by Leach (2006) and Streicher (2010). However, because of the very small pork industry in South Africa which contributes only 0.2 percent of world pork production (Visser, 2004), the industry is extremely vulnerable to changes in the global market and its impact on the domestic industry. Cheap imports and “dumping” of pork on the South African market poses as a major threat to the local pork industry. The South African industry cannot produce at the same price levels as these countries where government subsidises producers.

The changes within the consumer markets will remain a concern to the industry. The diets of people change as well as their willingness to pay for goods and services. SAPPO advertises on a regular basis the ‘goodness of pork’ to enhance the image of the industry and to maintain market share. Visser (2004) explored the issues related to the acceptance of biotechnology in society. Growth hormones, antibiotics and various other additives are being developed to assist framers in producing faster growing and healthier pigs. However Visser (2004) found that there still are ethical concerns from different consumer perceptions. Animal welfare is also a major concern regarding the treatment of pigs during production stages, during transport and before slaughter.

Other issues within this industry are health and safety issues, development and research within the pork industry, the involvement of more BEE programmes (Visser, 2004) and enhancing the social development structure within the pork production supply chain. Information in the form of data capturing, archiving and the sharing and distribution of information is a major concern. The information on pig numbers and progress, feed and feed related statistics, as well as current and future trends are now being collected, processed and financed by industry related organisations such as SAPPO, SAPA and AFMA.

A further issue within the pork industry is the free trade agreement between SADC country members (Streicher, 2010). Not only is this a growing concern but also a major threat to the South African pork industry. Exporting countries now have a passage to export to SADC members other than South Africa and

those pork imports can find their way to the South African consumer. The regulation of disease spreads is also becoming more difficult with an open border policy.

Urbanisation, although it can be seen as a positive attribute to the pork industry is becoming an environmental issue. Streicher & Lovell (2010) indicated that the majority of pork and poultry farms are located within a 100km radius of the markets. With the growth in urbanisation, these farms and people move more closely to one another. “Environmental issues such as the carbon footprint and soaring energy costs are challenges facing all industries. In our industry new legislation regarding water consumption and especially waste disposal will have to be taken extremely seriously by pig producers. Logic tells us that old pig units on very small properties close to streams and rivers face threats of closure” (SAPPO II, 2009).” These biological issues are forcing affected farms to either close down or relocate due to gases and biological waste materials.

3.2.4.3 Barriers to entry

Pork producers face diverse challenges on a daily basis. With the dynamic, continuous changing environment and increasing risks, a pork production farm must be able to have a competitive advantage in the form of higher productivity, quality produce and sustainable farming. Primary production is relatively un-concentrated, meaning farmers are prices takers on the input as well as the output side. The existence of barriers to entry in the pork value chain is significant.

The following barriers, as mentioned by Hofstrand (2007), are not only applicable to the pork supply chain but also to various other industries in the agricultural sector, in the global as well as South African market context:

“Economies of size – The need for a large volume of production and sales to reach the cost level per unit of production for profitability are a barrier to entry

Capital intensive – A large capital investment per unit of output in facilities tends to limit industry entry

Intellectual property – Patents and other types of proprietary intellectual property are very effective in limiting industry entry

High switching costs – The tendency for buyers of an industry's products to be reticent about switching to a new supplier tends to limit entry

Established brand identity – Industries dominated by branded products are difficult to enter due to the large amount of time and money required to create a competing branded product

Permitting requirements – Industries where permitting and licenses are required to establish production tend to have limited entry

Government standards – Industries where rigid industry standards exist tend to have limited entry”

These entry barriers are incorporated in the pork industry and stated by Streicher (2010) as:

- Erection costs of facilities and equipment (+/- R40 000 per sow)
- Impact assessment studies to allow a new or expansion of a pig farm larger than 250 pigs
- Raw material prices
- Consumption of pork meat in South Africa
- Financial assistance of capital and production costs

In 2009, there were 14 pork producers supplying porkers on a contract basis to processors such as Eskort and Enterprise (SAPPO I, 2009). Abattoirs seldom contract farmers to supply them with pigs. The majority of abattoirs procure their meat on a free market supply basis (Streicher, 2010). Contracting lowers the level of financial risks in a farm business, but to contract the farm business must have economies of scale to supply to the contractors' needs. In order to be able to grow to such a large business size, the barriers include capital requirements, relevant experience and track record, the significance of research and biotechnology in the provision of seeds and health, and economies of scale in other major inputs such as fertilizer, through to the costs of establishing large grain silos and large-scale milling operations.

In some instances branding and marketing pose significant barriers, as do access to prime retail space, suitable sites for new stores, capital outlay and retailing experience. Such barriers mean that existing market players have an incentive not to respond fully to the changes in market dynamics such as increased

demand, but to benefit through increased profit margins. Conversely, their position would be weakened by new entrants attracted by the higher returns present in the pork market.

3.3 Poultry industry

3.3.1 Introduction to study

Poultry is one of the largest growing sectors within the agricultural sector (See Figure 36 and Figure 41). Both small scale and commercial business entities are involved in breeding (breeders), rearing of chickens (broiler production), and the feed suppliers. Furthermore, the poultry industry provides meat which is preferred by almost all cultures and is of good quality and affordability. In South Africa, the poultry farming business has been in existence for a long time. The industry got formally organised in 1904 when farmers came together to form the South African Poultry Association (SAPA) in Kimberley. The main objectives of SAPA were to co-ordinate and promote broiler production and later to stage egg laying tests, and to provide an instrument to voice the feelings of the industry. Since then, it has worked tirelessly to enhance production and marketing of poultry products while ensuring that quality of the produce is adhered to by the members as well as consumers.

The following section will focus on the international as well as on the domestic overviews. The current supply chain structure with the role players, key issues and barriers to entry will also be discussed. The purpose of these overviews is to determine the current business environment and also to highlight the market concentration between different components within the feed and poultry supply chain.

3.3.2 Global poultry overview

3.3.2.1 Supply, Demand & Consumption levels

World production for poultry meat is expected to increase by 3 percent to 73.7 million tons for the year 2010. This increase follows a period where world production of poultry meat has increased at a rate of 2.6 percent. Figure 36 gives an indication of the increases in world production that the poultry industry has experienced from 2005 onwards (USDA, 2009).

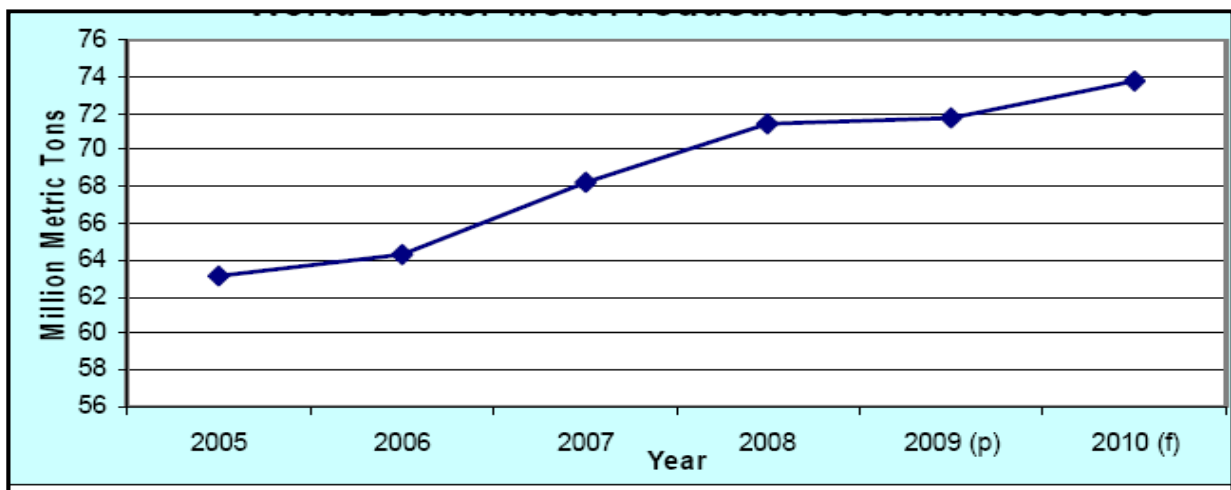


Figure 36: World Broiler meat production growth (2005 – 2010)

Source: USDA, 2009

World production is largely driven by the top three producing countries which are the United States, China and Brazil, with combined produce of 54.5 percent of world production in 2009. The United States remains the world's largest producer, with a share of 22.3 percent of world production in 2009. The second largest producer is China, representing 16.9 percent of world production, with Brazil contributing 15.3 percent to world production in 2009. This increase in world production is largely driven by higher consumption and higher levels of production in Brazil and China. It is forecasted that Brazil and China will increase production by 4 and 3 percent respectively for the year 2010, a high rate given the world wide recession. The high increase in production for Brazil is largely driven by strong exports and a high domestic demand. This is also the case for China where domestic demand increased substantially, spurred on by an economic expansion.

Figure 37 below depicts the annual growth changes of the top three producing countries of poultry meat for the period 2006 to 2009 with a forecasted value in 2010 (USDA 2009).

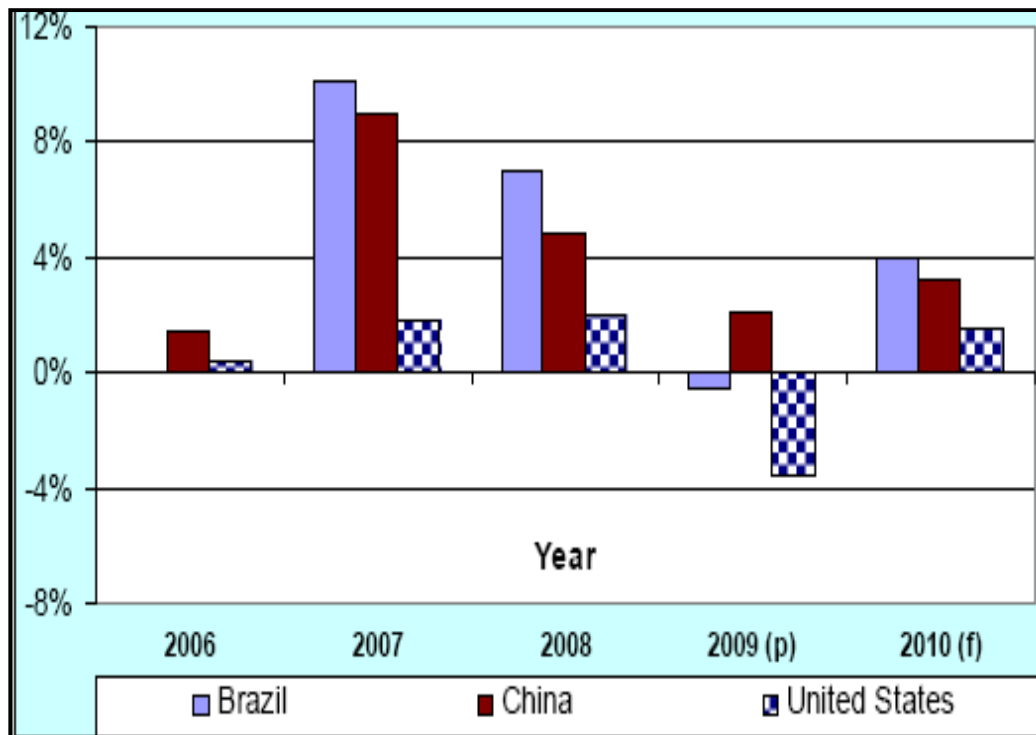


Figure 37: The annual percentage change in production of poultry meat for the top three producing countries (Brazil, China and the United States - 2006 to 2010)

Source: USDA, 2009

It is eminent from figure 38 above that Brazil and China outpaced the United States annually in percentage terms, even though the United States still holds the position as the world leader in poultry meat production. There was a decline in production for the United States and Brazil during 2009, with China still increasing year on year. This however, is expected to change, with the top three countries showing signs that their annual percentage change could be positive again. It is therefore expected that world production will increase by 3 percent per annum as mentioned before. With the increases in poultry production, it is inevitable that the demand for feed will also increase. A shortage in feed production will lead to higher competition within the livestock sectors for feed.

In short, world supply is largely influenced by the top three producing countries. It is expected that these three countries, especially Brazil and China, will expand production. The United States is starting to show signs that their contribution to world production is on the decline, opening new opportunities for countries like China and Brazil and even the EU to gain some market share and market power in the poultry industry.

This increase in world production is in line with world consumption of poultry meat. Consumption of poultry meat has been increasing at a pace of 2.7 percent per year from 2005 onwards, as can be seen in Figure 38 (USDA, 2009).

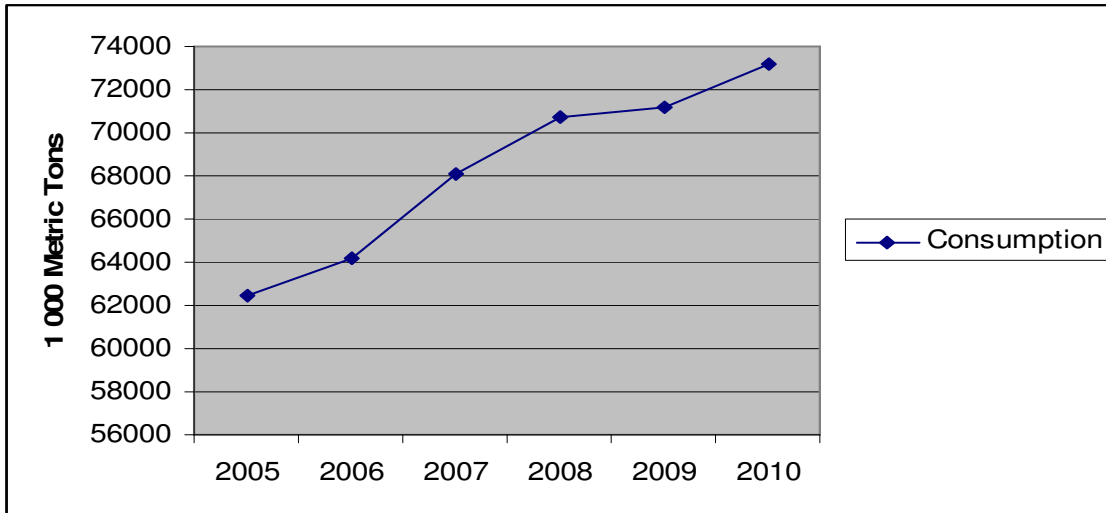


Figure 38: World Broiler Meat consumption growth (2005 to 2010)

Source: USDA, 2009

The top three consumers of poultry meat are the United States representing 18.3 percent of world consumption, China contributing 17.2 percent of world consumption and lastly the EU which has a share of 12.09 percent in the year 2009. These three countries have a combined market share in world consumption of nearly 50 percent (USDA, 2009). Figure 39 illustrates how the top three countries' share of world consumption has changed over recent years.

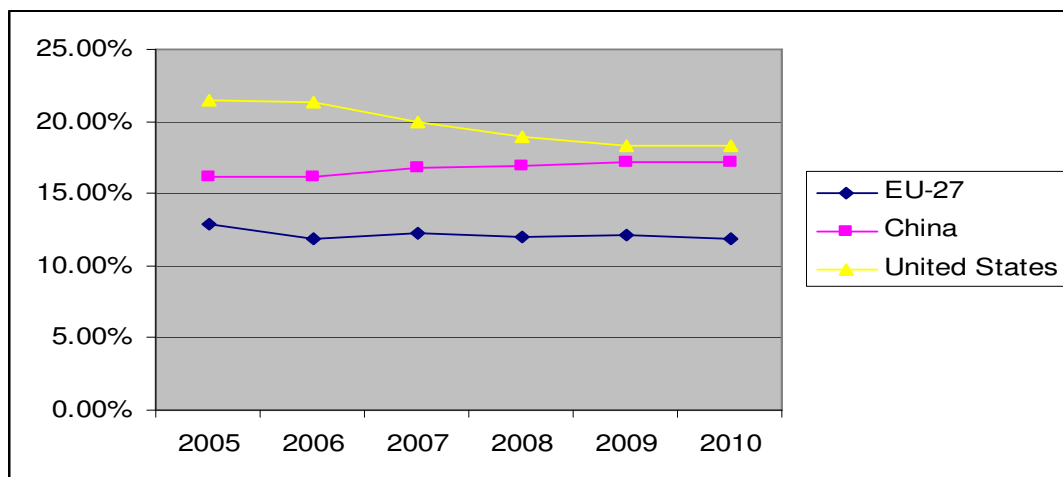


Figure 39: Percentage share of top three poultry consuming countries (2005 to 2010)

Source: USDA, 2009

Of the top three countries only China has been increasing its share of world consumption of poultry meat. The United States and the EU have steadily been losing its share in consumption of poultry meat in the world. As was mentioned in the feed overview, India is expected to become one of the biggest consumers of feed in the world. It can therefore be assumed that their consumption of broiler will also increase. The USDA (2009) support this assumption, as India's consumption of broiler meat has been growing at a rate of 5.7 percent per annum from 2005 to 2010 (2010 being a projected figure).

These three countries dominate the world poultry market through their population numbers. In per capita terms, the United States is the only one of the top three countries that is in the top five in per capita terms, with a per capita consumption in 2009 of 42.6 kg per year. It is expected that the United States will increase their consumption to 43.3 kg per capita in 2010. China, the world's second largest consumer of poultry meat lies 25th in the world in per capita terms with a per capita average in 2009 of 9.1 kg per year. This value is expected to improve only slightly to 9.4 kg per year. The EU, the world's third largest consumer of poultry meat, holds the 20th position in the world in terms of per capita consumption. The EU's per capita consumption in 2009 was 17.5 kg per year; again this value is expected to increase only slightly to 17.6 kg per year (USDA, 2009).

The top three consuming countries (United States, China and EU) are outpaced in per capita terms by countries like Kuwait, United Arab Emirates, Saudi Arabia and Malaysia. These countries together with the United States hold the top 5 positions in per capita consumption terms of the world. Kuwait's per capita consumption in 2009 was 72.5 kg, followed by United Arab Emirates with 61.7 kg per capita in the same year, Saudi Arabia with 41.3 kg per capita and then Malaysia achieving 37.3 kg per capita for 2009 (USDA, 2009). As mentioned before, the top three consuming countries dominate the world broiler meat market purely through their population size. According to the PRB (2009), China is the largest country in population terms with 1.3 billion people; the EU has a population size of 499 million people and the United States has a population of 307 million people.

3.3.2.2 Poultry prices & price cycles

In assessing world poultry prices it is important to analyse the prices of broilers in the United States. As mentioned, the United States is the largest producer of broiler meat and, as will be explained in the next section, the second biggest exporter of broiler meat in the world. It is expected that the broiler prices in the United States have an impact on the world broiler prices. In assessing the United States broiler prices distinction must be made between retail and wholesale prices. In Figure 40 broiler prices for the United States are illustrated.

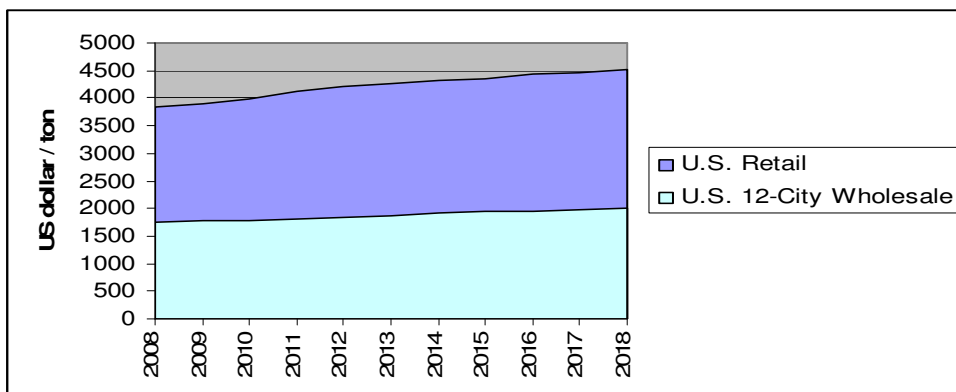


Figure 40: Expected US retail and 12-city wholesale price for broiler meat (2008 to 2018)

Source: FAPRI, 2009

The US retail and wholesale price for broiler meat is expected to increase annually by 1.5 percent and 1.2 percent respectively from 2008 to 2018 (FAPRI, 2009). Although the United States' retail and wholesale prices have been increasing, farmers are still struggling to offset the high feed prices. This results in a decrease in profit margins. According to Food and Agricultural Policy Research Institute (FAPRI, 2009),

chicken and turkey producers have experienced a decrease in their output-to-feed price ratio for the third consecutive year.

3.3.2.3 Imports/Exports

World broiler trade is expected to grow annually at a rate of 3.1 percent with a likely value of total trade reaching 8.34 million metric tonnes in the year 2018. Brazil and the United States are the big role players in terms of exports and constituted 50.4 percent and 40.9 percent of world exports respectively in 2009. In Table 24 the relative percentage share of countries exporting broiler meat to the rest of the world is specified (FAPRI, 2009).

Table 24: Percentage share of countries exporting broiler meat to the rest of the world

	2009	Share in 2009	2018	Share in 2018
Exporters	Thousand metric tonnes	%	Thousand metric tonnes	%
Argentina	117	1.7	175	2.1
Brazil	3 384	50.4	4 201	50.4
Canada	42	0.6	22	0.3
New Zealand	19	0.3	17	0.2
Thailand	354	5.3	496	5.9
United States	2 748	40.9	3 425	41.1

Source: FAPRI, 2009

From Table 24 it is evident that Brazil and United States will remain the biggest exporters of broiler meat with their combined relative market share in world exports expected to remain at 80 percent. It is however expected that the United States will lose market share, with Brazil entering new and more markets. The reason for the expected growth for Brazil stems from a reduction in world avian influenza concerns, coupled with aggressive promotional efforts in overseas markets (FAPRI, 2009). This resulted in an increase in Brazilian broiler exports to Hong Kong, Japan, the United Arab Emirates, the EU, Saudi Arabia and Venezuela. Contrary to this trend, the United States' exports are expected to decline following the drop in Russian imports. United States exports to countries like China, Mexico, Canada, Cuba and the Ukraine are likely to remain strong (SAPA, 2009).

The biggest importers of broiler meat are Russia, China, Japan, Mexico and Saudi Arabia. The share of these five countries in world imports combined adds up to 44 percent of all broiler meat imports in 2009. It is expected that these five countries' share in world imports will remain the same and make up 44.6 percent of world broiler imports by the year 2018.

Table 25 shows the relevant shares of the major broiler meat importing countries.

Table 25: Percentage share of countries importing broiler meat from the rest of the world

	2009	Share in 2009	2018	Share in 2018
Importers	Thousand metric tonnes	%	Thousand Metric tonnes	%
Russia	1 212	18.1	1 092	13.1
Japan	687	10.2	746	9
Mexico	371	5.5	669	8
Saudi Arabia	482	7.2	600	7.2
China	202	3	612	7.3

Source: FAPRI, 2009

Russia's share in world imports of broiler meat will decline by approximately 5 percent from 2009 to 2018. This expected decline in imports is a result of an increase in local production that will grow at a rate of 4.1 percent annually over a period where consumption is expected to increase at a rate of 2 percent annually. Local production will increase at a faster pace than local consumption, thus reducing the need for imports in the future. It is therefore expected that Russia's imports would decline at a rate of 1 percent annually (FAPRI, 2009).

On the contrary, Mexico's share in world imports of broiler meat is expected to increase by 3 percent annually from 2009 to 2018. This results from Mexico's new trade policy where global tariff rate quotas and prohibitive out-quota rates are removed making it more appealing for countries to export broiler meat to Mexico. China's import of broiler meat is expected to increase at a rate 5 percent annually over the decade increasing their imports to 612 thousand metric tonnes in 2018. This will make China the fifth biggest

importer of broiler meat in 2018 (FAPRI, 2009). The biggest reason for China's increase in imports is their high consumption of broiler meat. As was mentioned before, China is the second biggest consumer of broiler meat. Their production of broiler meat is however expected to increase at 3 percent per year but with the high consumption levels imports of broiler meat are the only solution to keep up with demand (USDA, 2009).

3.3.2.4 Current challenges and issues

The following section focuses on the issues and challenges within a global context in the poultry industry.

High feed prices

The high feed prices continue to create challenges for farmers around the world. These high feed prices affect the profit margins. The challenge is to counteract these losses in profits.

The use of antibiotics

The debate continues over whether the use of antibiotics in animal production affects human and animal health. According to a recent article published by the Economic Research Service (2009), the use of antibiotics in animal production could lead to the animals and humans becoming resistant to the antibiotics. This in turn will create new challenges to the broiler industry as production could decline. The major risk according to Lovell (2010) with the use of antibiotics is that at the end of the day the decisions on using antibiotics lies with the politicians who have a very negative view on this matter.

High costs

Countries are faced with high transport costs, especially when exporting broiler meat. According to FPD (2004), freight rates are expected to continue to climb. Other costs include insurance, fuel, terminal charges and even container prices.

Unpredicted preferences and demands of consumers

Consumers' preferences are unpredictable and constantly changing according to trends and fads. They demand innovative and humane methods and conditions on poultry farms (Poultry Site, 2008). The current consumer trends tend towards products that are healthy, convenient and ethical and/or environmentally friendly (BFAP, 2009).

Quality of water

According to World Poultry (2008), the quality of water in the future will play a significant role in the production of broiler meat. In recent times water has become scarce. This impacts broiler farmers' profit margins.

Diseases

The ongoing outbreak of diseases (avian influenza & Newcastle) and the ability to control these diseases is of major concern for all in the broiler sector (SAPA, 2009).

3.3.3 South African poultry overview

The poultry industry continued to grow with a turnover of R24 664 billion in 2008 at producer level. Poultry meat contributed R18 624 billion of the industry turnover at producer level, with the egg and chick industry contributing R6 039 billion and R3 095 billion respectively. The South African poultry industry, as producers, is responsible for the highest contribution (19.4 percent) of the South African agricultural GDP. They also contribute 43 percent of all animal products production in South Africa (SAPA, 2009). Figure 41 shows the size of production of animal products for the period 2007/2008. This figure clearly indicates the size of the poultry industry relative to the other animal related industries. The beef industry, which produced in the region of 800 000 tons for the specific period, is the second largest producing industry, followed by the pork industry and the mutton and goat industry.

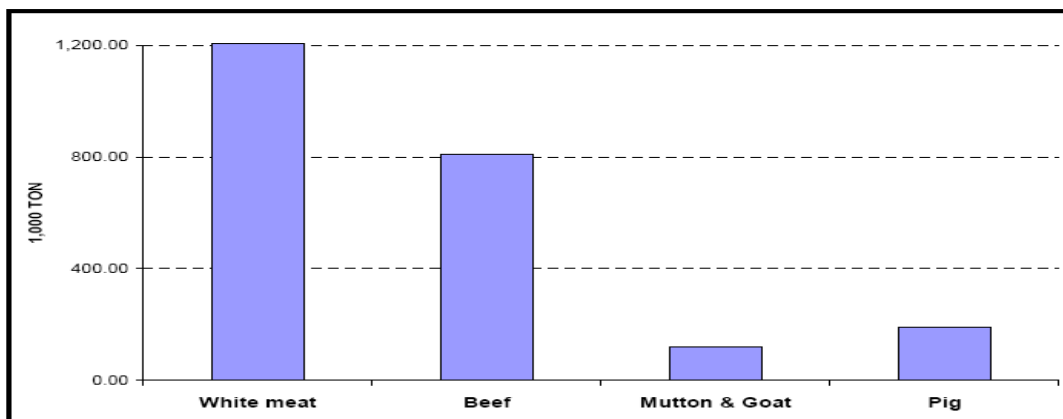


Figure 41: Production of Animal Products in 2007/2008

Source: SAPA, 2009

3.3.3.1 Supply/Demand & consumption levels

According to BFAP (2009), an upward trend in production of chicken meat will continue into the future, with an expected production in the year 2014 exceeding 1 400 thousand tons, as can be seen in Figure 42 . To achieve this production level, the poultry industry must grow in production at an annual average of 1.64 percent from 2009 to 2014. As will be discussed later, this low percentage increase in production is insufficient to meet domestic demand. The South African poultry industry will therefore rely more on imports than what was previous expected - an escalating issue in an economy that is characterised by highly volatile exchange rates.

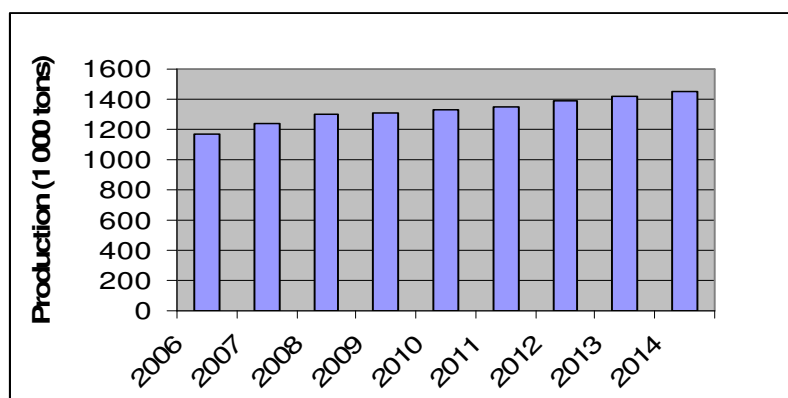


Figure 42: Poultry Production for the period 2006 - 2014

Source: BFAP, 2009

The need for a high level of production stems from the high demand for poultry meat. SAPA (2009) states that the broiler industry produced 1 310 983 million metric tonnes in 2009. “More poultry products are being consumed than all other animal protein sources combined. The poultry industry provides 61.4 percent of animal protein consumed in SA” (SAPA, 2009). In Figure 43 the high consumption levels of poultry products relative to other protein sources are illustrated.

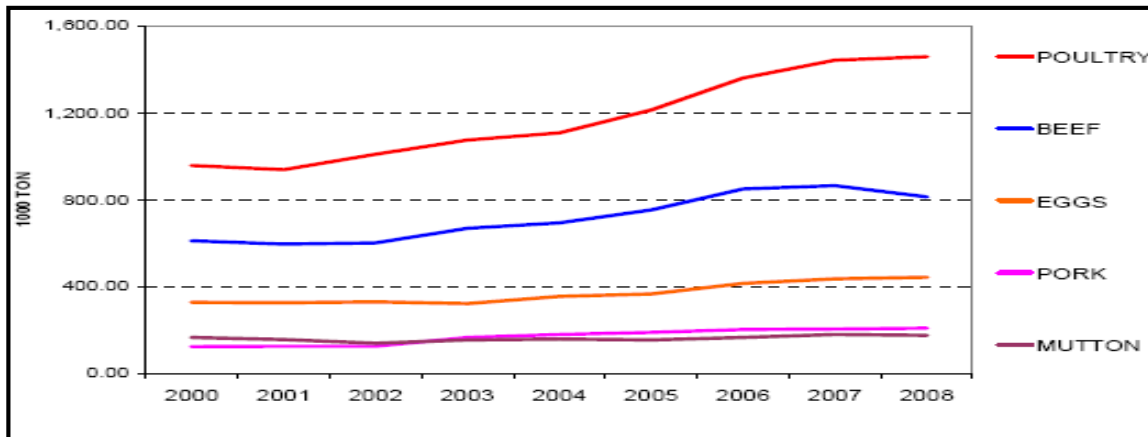


Figure 43: Consumption of Animal products in South Africa (2000 to 2008)

Source: SAPA, 2009

The total domestic use of poultry meat in South Africa was 1 463 000 ton for 2009 (BFAP, 2009). The high domestic use of poultry far outpaced domestic production; hence the high levels of imports. It is expected that domestic consumption of poultry meat will increase at an annual rate of 2.6 percent for the period 2009 to 2014. If that is the case, total domestic use in the year 2014 for poultry meat could exceed the 1 700 thousand tons per year supply, i.e., 260 000 tons more than is locally being produced. Various studies have postulated that the increase in many products, in this case the increase in consumption of broiler meat, is spurred on by the new black middle class (BFAP, 2009). However, this increase in domestic use of poultry products will stay constant for the next couple of years, following the world wide recession where consumers are exposed to lower disposable incomes and high food prices. After this two year period it is probable that the per capita consumption levels of poultry will increase as the shock of the world financial

crisis will be in the past. Figure 44 represents the expected per capita consumption for chicken meat for the period 2006 – 2014 (BFAP, 2009).

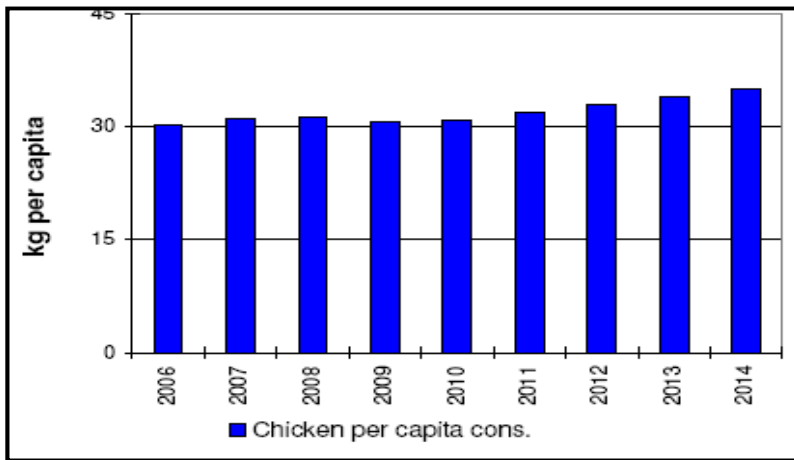


Figure 44: Per capita consumption of chicken (2006 – 2014)

Source: BFAP, 2009

In short, domestic demand far outpaces domestic production. In Figure 45 the domestic demand is graphed against domestic supply of poultry meat, to illustrate the shortages that South Africa may expect in the coming years. According to SAPA (2009), South Africa consumed 30.71 kg per capita per annum in 2009. If no measures are taken to increase broiler meat production, increases in consumer prices can be expected as South Africa will depend more on imports which are affected by volatile interest and exchange rates.

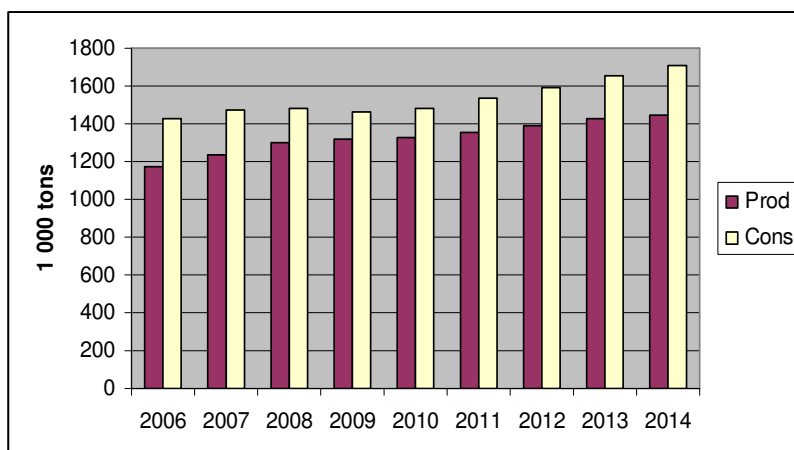


Figure 45: Domestic Consumption relative to Domestic Supply of Poultry meat (2006 to 2014)

Source: BFAP, 2009

3.3.3.2 Poultry prices & price cycles and future projections

In assessing poultry prices it is important to take the input prices of broiler farms into account. According to the Poultry site (2008), feed represents 69 percent of the cost of producing poultry meat. Feed prices in turn are directly dependant on the white and yellow maize prices, which together with soya form the main raw materials in poultry feed. SAPA (2009) reports that South Africa's total consumption of white and yellow maize in 2008 was approximately 9 million tons of which the poultry industry consumed 25 percent. Therefore, the white and yellow maize prices have a significant impact on broiler farmers' input prices. In Figure 46, broiler feed prices from the period 2006 to 2008 are depicted.

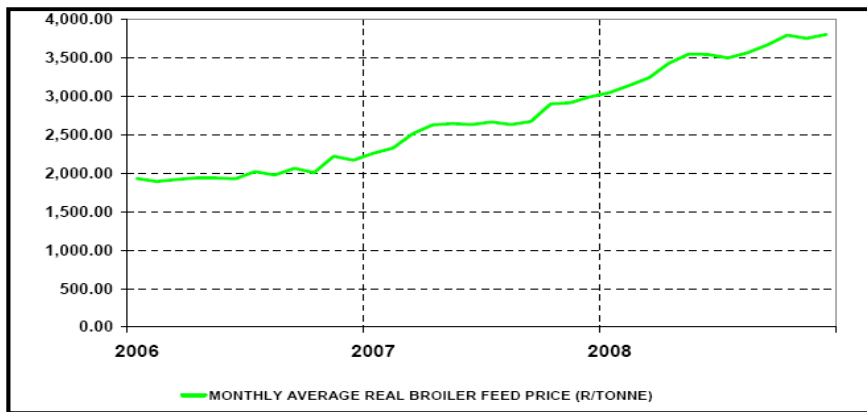


Figure 46: Broiler feed prices from 2006 to 2008

Source: SAPA, 2009

In percentage terms, the average broiler feed price has been increasing from 2006 to 2008 by approximately 24.9 percent per annum. The confirmed broiler feed price for July 2009 was R3 248.42 per ton, as reported by SAPA (2010). The industry's fear is that broiler farmers could find themselves in a situation where they cannot recover these increases in feed prices with current producer prices. The percentage changes in broiler feed prices and broiler producer prices are shown in the figure below (SAPA, 2009).

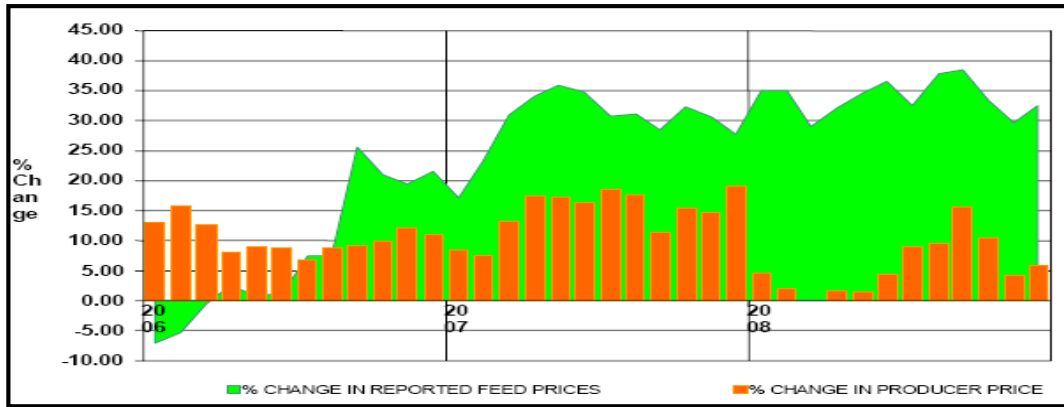


Figure 47: Percentage change in broiler producer price and broiler feed price (2006 – 2008)

Source: SAPA, 2009

Figure 47 clearly illustrates how producer prices have not kept up with feed prices, resulting in the situation discussed above where broiler farmers cannot recover the high feed price. According to SAPA (2009), 36 percent of the United States maize production could be allocated to ethanol production by the year 2015. If this is the case, broiler farmers can expect even higher feed prices stemming from a likely increase in world maize prices.

Figure 48 gives an indication of the expected total realisation prices of broiler meat from 2006 to 2014. It is expected that broiler prices will increase from 2009 onwards at a constant rate. As was mentioned before, it is likely that consumption would outpace production of poultry meat in South Africa. This will lead to an increase in South African poultry prices in the future.

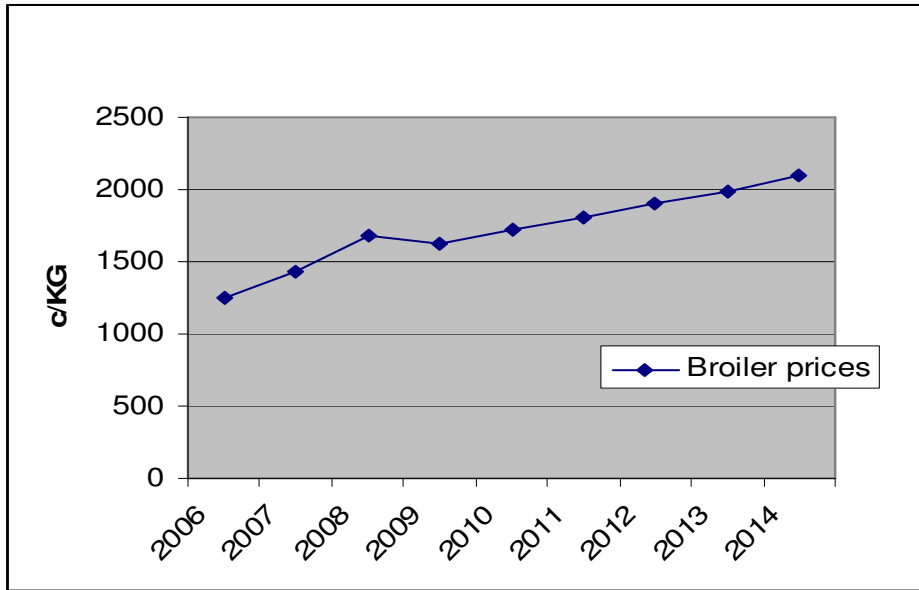


Figure 48: Broiler total realisation price (2006 to 2014)

Source: BFAP, 2009

3.3.3.3 Imports/Exports

As previously discussed, South Africa cannot supply enough poultry meat to satisfy domestic demand and therefore needs to import. During 2008, South Africa imported 12.8 percent of domestic use; this value is expected to increase to 15 percent in 2014 (BFAP, 2009). Brazil is the country from which South Africa imports the most, followed by Argentina, Australia, United States and Canada. As can be seen in Figure 49, these countries combined represent 96.5 percent of South African poultry imports (including turkey meat) of which Brazil's share is 75.8 percent. Broiler meat represents 86.1 percent of all poultry imports, the remaining being turkey products (SAPA 2009).

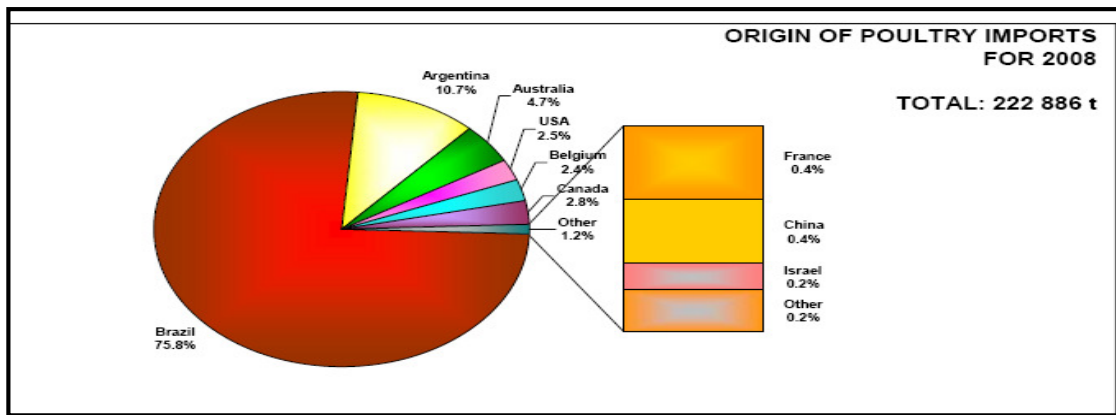


Figure 49: Origin of South African imports for the 2008 year.

Source: SAPA, 2009

Imports of broiler meat have declined by 12.1 percent per annum from 2006 to 2009, following production expansion since 2006. This figure is however projected to increase from 2009 onwards, as the difference between local production and consumption is likely to increase. Figure 50 gives an indication of the possible trend in imports for broiler meat from 2006 to 2014 (BFAP, 2009).

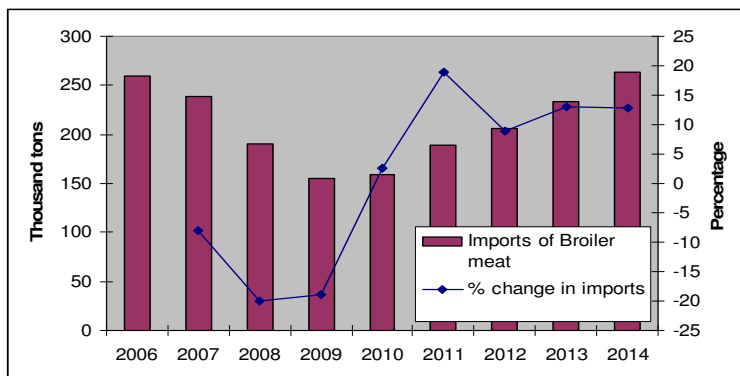


Figure 50: Imports of Broiler meat and corresponding percentage changes (2006 to 2014)

Source: BFAP, 2009

It is clear that South Africa cannot export broiler meat. Of the total production in 2009, only 0.5 percent was exported, mainly to Africa. It is expected that this export share of production will decrease in the future as local demand for broiler meat increases (BFAP, 2009).

In conclusion, South Africa is expected to stay a net importer of broiler meat, the reason being that local production cannot keep up with local demand. Hence, broiler meat needs to be imported. This difference between local demand and supply will increase in the future, leading to more imports, a concerning result, as imports are affected by volatile currencies, interest rates and a world that is still trying to find solutions for the world financial crisis.

3.3.3.4 Current issues and challenges in the South African poultry industry

The focus on this next section is on the issues and challenges within the context of the South African poultry industry. Although many of these issues have been mentioned as global issues, they are very much applicable on the domestic poultry industry.

Input costs (feed costs)

As already discussed, feed prices represent approximately 69 percent of broiler input costs. According to NAMC (2009), feed price volatility adversely impacts the broiler industry. This volatility in feed prices creates new challenges that need to be overcome.

High imports

As previously discussed, South Africa imported 12.8 percent of domestic use in 2008. This value is likely to increase to 15 percent in 2014. The high imports will expose South Africa to challenges in the form of highly volatile exchange rates, interest rates and food security.

Diseases (Newcastle and Avian Influenza)

The ongoing outbreak of diseases creates challenges for farmers in the broiler industry (SAPA, 2009).

Food safety practices

At the retail level, more and more emphasis has been put on the quality of food and food safety issues. This creates challenges in the form of high barriers to entry. Small-scale farmers cannot afford the infrastructure to satisfy all the safety practices that are required at retail level. Food safety practices also

create constraints in terms of exports as all exporting destinations require that all safety practices must be complied with (SAPA, 2009).

Access to reliable energy/electricity

Electricity tariff increases will affect all South Africans including the agricultural sector. The broiler industry, which is characterized by high electricity usage in the form of production, processing, packaging and cold chains will also be affected and will create serious challenges for the future. The price of energy will also create challenges for farmers as the oil price is likely to increase to \$100 a barrel which will increase the energy price substantially (SAPA, 2008).

Climate Change

Climate change will increasingly result in new and more adverse challenges for the whole agricultural sector, including the broiler industry. Changes in climate (temperature and humidity) will result in lower production levels in the broiler industry (SAPA, 2008).

Bio-security issues

A major concern is the safety of human and animal life. Imports and exports of poultry increase the risk of spreading diseases and endangering a country's borders.

Quality of feed and feed mixes

Quality and traceability are major concerns to the poultry industry as well. The new feed act (if instated) will better control the procurement and milling of animal feeds to ensure that it is of high quality and is in accordance with HACCP, QACCP and ISO standards.

3.3.4 Poultry supply chain analysis

Some important aspects need to be considered when it comes to the analysis of the poultry supply chain. These include potential growth, competitive pressures and advantages, performance and benefits of an industry. These factors need to be identified and analysed in order to understand the dynamics of different phases (from production to consumption – farm to fork) through which a product passes in the process of

adding value (Kotler & Keller, 2009). The issue of value chain analysis was first proposed by Michael Porter as a tool used primarily for establishing and maintaining the product value through successive product stages which include production, operations, services, logistics, outsourcing, marketing and sales (Kaplinsky & Morris, 2000). This section focuses mainly on the supply chain of the poultry industry in South Africa where different role players in the industry, production and operations of the different industry role players, services offered by the identified role players, growth and sales of products are to be discussed.

The process of Supply Chain Analysis

To successfully conduct an analysis of the poultry industry, it is important to understand the subsequent steps involved in value addition. The first and important step of the analysis is the identification of the major role players in the production process. These include, among others, breeders, farmers who do the actual production, feed manufacturers/suppliers, input suppliers such as the day-old chick hatcheries, SAPA and other role players who are actively involved in the poultry industry. After the analysis of the core competencies, the production figures and performances of the major role players in the supply chain of poultry industry will be identified and recommendations made for a value adding strategy in the industry where possible (Kaplinsky & Morris, 2000)

Barriers to entry

Barriers to entry are the unified characteristics that define the specified industry. Most of the medium and small enterprises in South Africa are characterized by a number challenges within the feed and poultry industry in general. According to Mather (2005), certain agricultural industries including the poultry industry, which was not previously controlled by marketing boards, were susceptible to over concentration of ownership. The presence of technical barriers has therefore played an important role in minimizing over concentration of many industries in South Africa, specifically, the poultry and feed sections. This section determines the barriers to entry in the case of food and animal industries. The possible and important barriers to entry in the case of feed animal industries can identified as follows:

Direct and indirect cost advantage

Indirect costs are the costs that can be incurred by the feed manufacturers and/or the producers in a given enterprise. Small and medium sized agricultural enterprises are vulnerable to the costs mainly because of the relatively small scale with which they operate as opposed to commercial enterprises.

Access to inputs

The extent to which small and medium agricultural enterprises have access to inputs validates the direct costs that could be incurred by the small and medium enterprises. Small and medium enterprises have inadequate access to the necessary agricultural inputs due to the fact that they do not have long standing contractual agreements with input manufacturers. For example, few emerging farmers have contracts which can help them minimize the input costs that can be incurred while commercial farmers are vertically integrated with input suppliers such as Afgri, Epol Astral, Meadow and other input suppliers.

Government policy

There should be solid coordination between the government sectors and the private sectors which will help in improving fair competition within the industry and further assist small and medium feed and animal enterprises to develop and participate in the national market.

Economies of scale

As a continuation to access to inputs, economies of scale validate the fact that commercial farmers have an advantage over emerging farmers because of the economies of scale. Emerging farmers are not able to explore the market in the same way or to the extent that commercial farmers can due to the quantity they produce which is coupled with the high costs of production.

Capital requirements

One of the main concerns in the emerging agricultural enterprises is that of capital. This means that for an emerging farmer or enterprise to grow, there has to be a sufficient amount of capital investment, which will help the farmer grow and commercialize. The lack of capital prohibits emerging farmers from entering the competitive market as they would like, not to mention the global market.

Chapter 4: Data analysis and interpretation

4.1 Feed industry analysis

4.1.1 Structure of the major feed manufacturers in this industry

In this section the structure and different role players within the animal feed industry are discussed. In figure 52 below, the role players consists of AFMA agricultural businesses, feed companies, processors and consumers. Each role player has a specific role or represents a certain percentage of the market share. The higher the percentage market share, the higher the level of power and control possible in the market. Within the feed manufacturing industry there is a relative high level of market concentration present between the five main manufactures; Meadows, Epol, Afgri Foods, Nova Feeds and Nutri feeds.

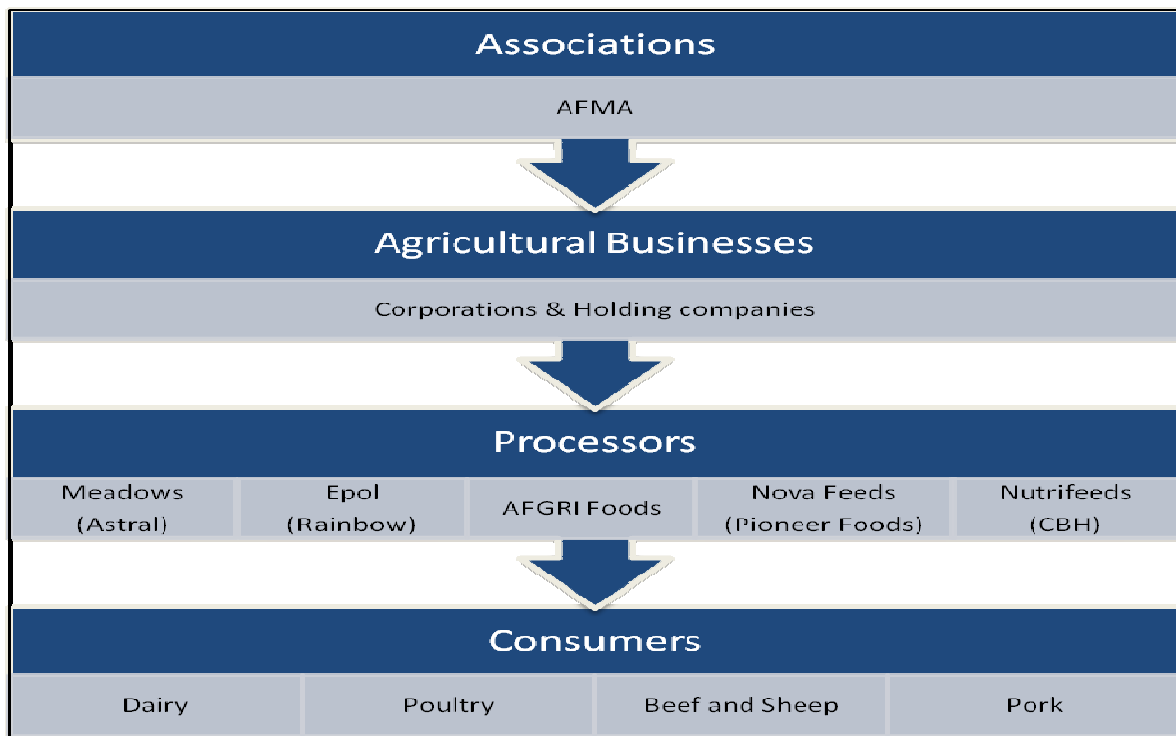


Figure 51: Outline of the different role players within the animal feed industry

Source: Own figure based on AFMA, 2009

Role of the Animal Feed Manufacturing Association (AFMA)

The Animal Feed Manufacturing Association's (AFMA) role is to represent members of the feed manufacturing division. AFMA has an important liaison, co-ordination and information role between government and the feed industry. They advise government when necessary with regard to policy changes and legislation or other changes that can affect their members. AFMA is currently enjoying recognition as the national role-player being part of all forums related to animal feeds and the grain value chain. These include the various forums, both governmental and private sector where AFMA fulfils its rightful role as one of the leading decision makers (AFMA, 2009). AFMA members are responsible for 55 percent of the national animal feed production (AFMA, 2009).

Role of Grain South Africa in the feed industry

Grain SA provides commodity strategic support and services to South African grain producers to support sustainability. The organisational structure within Grain SA was formed out of NAMPO (maize), NOPO (soybeans, sunflower and groundnuts), the WPO (wheat, barley and oats) and the SPO (grain sorghum) (Grain SA, 2010). Grain SA in the feed industry is the link between the feed manufacturers and the grain producers. It provides information for both parties by supplying them with strategic commodity bargaining; strategic commodity information, market information, production information, production environment information, external information, input product information, marketing information, macro environment information. Grain SA also partakes in lobbying, strategic commodity research co-ordinating and agricultural development projects (Grain SA, 2010)

Processors

In this section the focus is on the company structures of the five main feed stakeholders in the feed industry and how subsidiaries fit into their holding companies. It forms part of the structure, conduct and performance principles to be used later in this report.

Table 26: Main feed stakeholders their holding company and locality in the feed industry

Feed company	Holding company	Locality
Meadow feeds	Astral Foods	Gauteng
Epol	Rainbow	KwaZulu Natal
AFRI Foods	AFGRI	Gauteng
Nova Feeds	Pioneer Foods	Paarl
Nutri Feeds	Country Bird Holdings	Bloemfontein
Sovereign	Sovereign	Port Elizabeth
Supreme	Supreme	Bloemfontein

Source: Lovell, 2010

From the data gathered through the interviews conducted with the major feed manufacturers that participated in this study, the following results were obtained with respect to the structure of the companies as well as the industry. Certain information was extracted from financial information and statements available to the public. The legal status of more than 90 percent of the large feed companies are under the control of holding companies and feature as an extension of the vertical integration and value adding in the corporate structures. From Figure 52 it can be seen that 67 percent of the response indicated that the organisational charts still corresponds with the charts as given in the 2009 annual reports. Most of the corporate structures will be discussed later in this section.

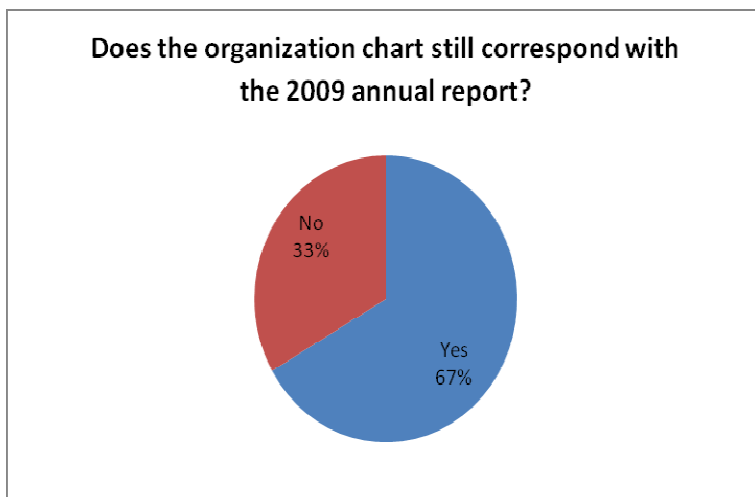


Figure 52: Response to changes in the organisational charts from the 2009 annual reports

Source: Interviews, 2010

The workforce employed in these companies range from 51 workers for the smaller companies to more than 2 000 workers for the larger companies. Job creation is a high priority in these companies, and they are of the opinion that skilled workers add significant to the value proposition of the feed and holding companies. The main line of feed production for the five feed manufacturers as mentioned above, are the manufacturing of poultry, dairy, pig, horse, dog, fish and additional feeds. From these lines poultry and dairy made up 68 percent of feed manufactured and sold under animal feed in 2008/09 (AFMA, 2009).

Figure 53 shows the perception of the feed companies on how they feel the feed industry is vertically integrated. More than 80 percent indicated that the level of integration was very high, and this is because of the intensity in which business is being done at present. From the interviews the mutual feeling was that in order to survive, you must be able to control the supply chain, as not to lose market share to your main rivals.

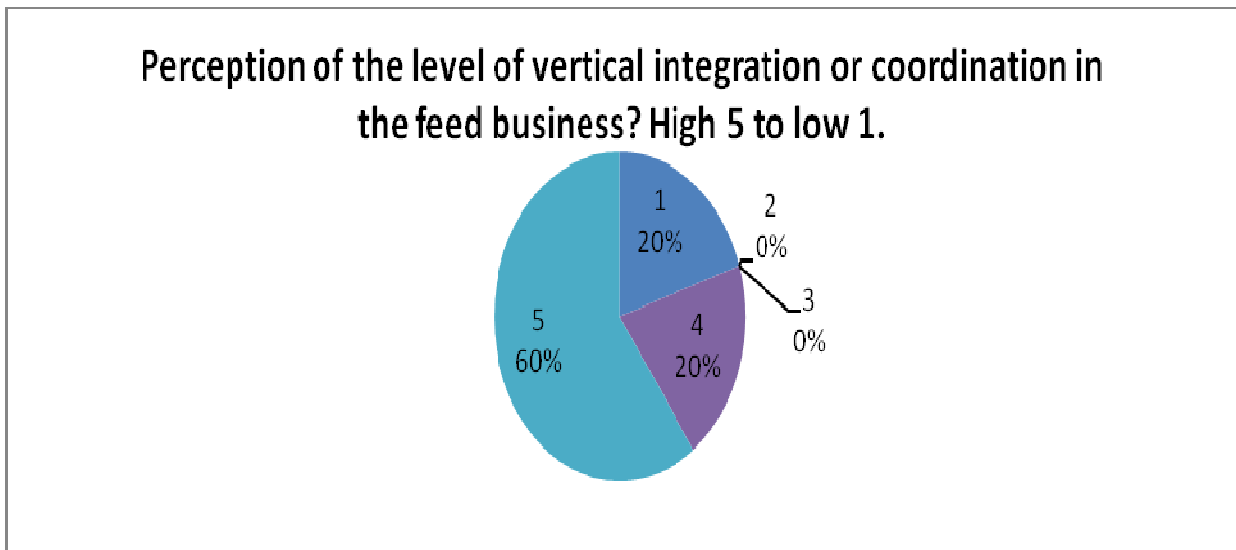


Figure 53: Perceptions of the level of vertical integration in the feed industry (rank 5 high to 1 low)

Source: Interviews, 2010

This next part will give a brief overview of the structure of the five main feed producers in South Africa. Together these manufacturers contribute more than 80 percent of total feed sales per annum. Table 27 below shows the percentage market share in 2005 for the individual feed suppliers to broiler breeders. The

Competition Commission restricts the publication of the latest figures due to an ongoing investigation in this industry.

Table 27: Percentage market share of broilers per feed manufacturer

Producer	% Market share		
	Layers	Broiler Breeders	Broilers
Meadow	20	41	24
Afgri	19	11	24
Epol	24	36	33
Senwes	3	8	9
Alzu	7	-	1
Kanhym	11	-	-
Others	16	4	9
Total	100	100	100

Source: **AFMA & Roberts, Competition Commission Board, 2005**

Meadow Feeds as a division of Astral Foods

The vision of Meadows is: “To be the preferred feed supplier” and the mission: “Meadows will manufacture, distribute and market quality feeds that will consistently create prosperity amongst its stakeholders” (Meadow feeds, 2010).

Eleven strategically placed feed mills in Southern Africa are technologically well equipped to produce and distribute a wide range of specialised feed products for all feed requirements. The South African operations as seen in Figure 54 below consist of mills located in Randfontein, Delmas, Welkom, Paarl, Port Elizabeth, Pietermaritzburg, Ladysmith and a speciality mill in Richmond (Astral Foods, 2009). The African operations consist of a feed mill in Lusaka (Zambia), a 33 percent shareholding in a feed mill in Port Louis (Mauritius) and an 80 percent shareholding in an operation in Maputo (Mozambique) (Astral Foods, 2009). Meadow, regarded as the market leader in animal nutrition, is certified with regard to ISO 22000/05, ISO 9001/00 Manufacturing Practice (GMP) and Hazard Analysis and Critical Control Points (HACCP) at all of its major

feed mills. This together with 20 key quality management disciplines provides them with a complete traceability process in line with the European Union food safety standards (Astral Foods, 2009).



Figure 54: Geographical representation of Meadow feed mills in Southern Africa

Source: Meadows, 2010

Figure 55 below gives the ASTRAL holding company structure with Meadows included in the organisational chart.

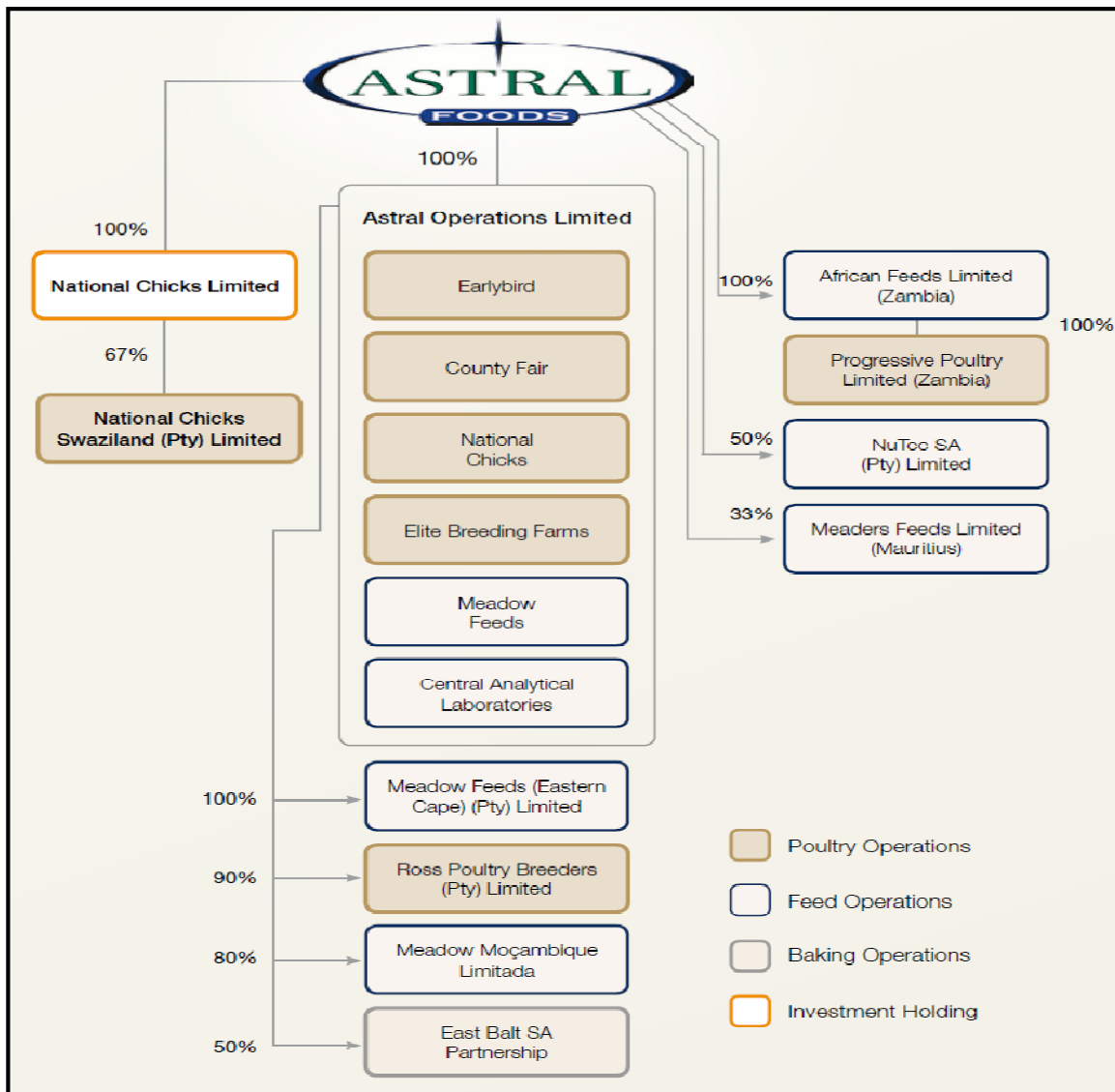


Figure 55: Meadow Feed's division within Astral Foods

Source: Astral Foods, 2009

Epol as a division of Rainbow

Epol is the feed division of Rainbow chickens. Epol forms part of the total assets of Rainbow. They contribute a significant part of the overall cost chain of Rainbow. Their raw material procurement strategy has enabled Epol to be priced competitively despite inflationary pressures. Figure 56 illustrates the ordinary shareholding structure of Rainbow as the largest producer of poultry meat in South Africa (De Beer, 2009).

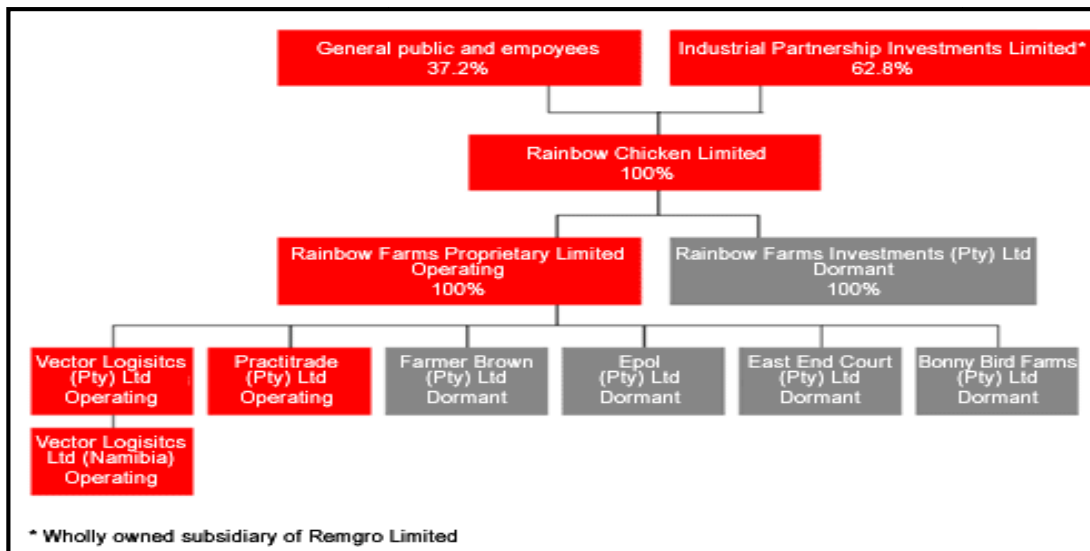


Figure 56: Ordinary share holding of Rainbow

Source: De Beers, 2009

Figure 57 shows the per week production of broilers for the main poultry producers in South Africa.

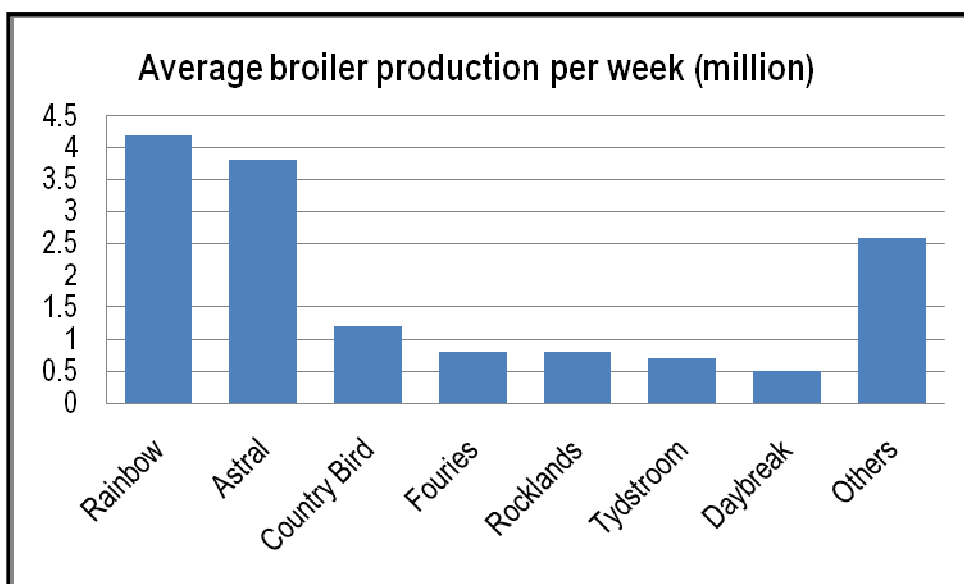
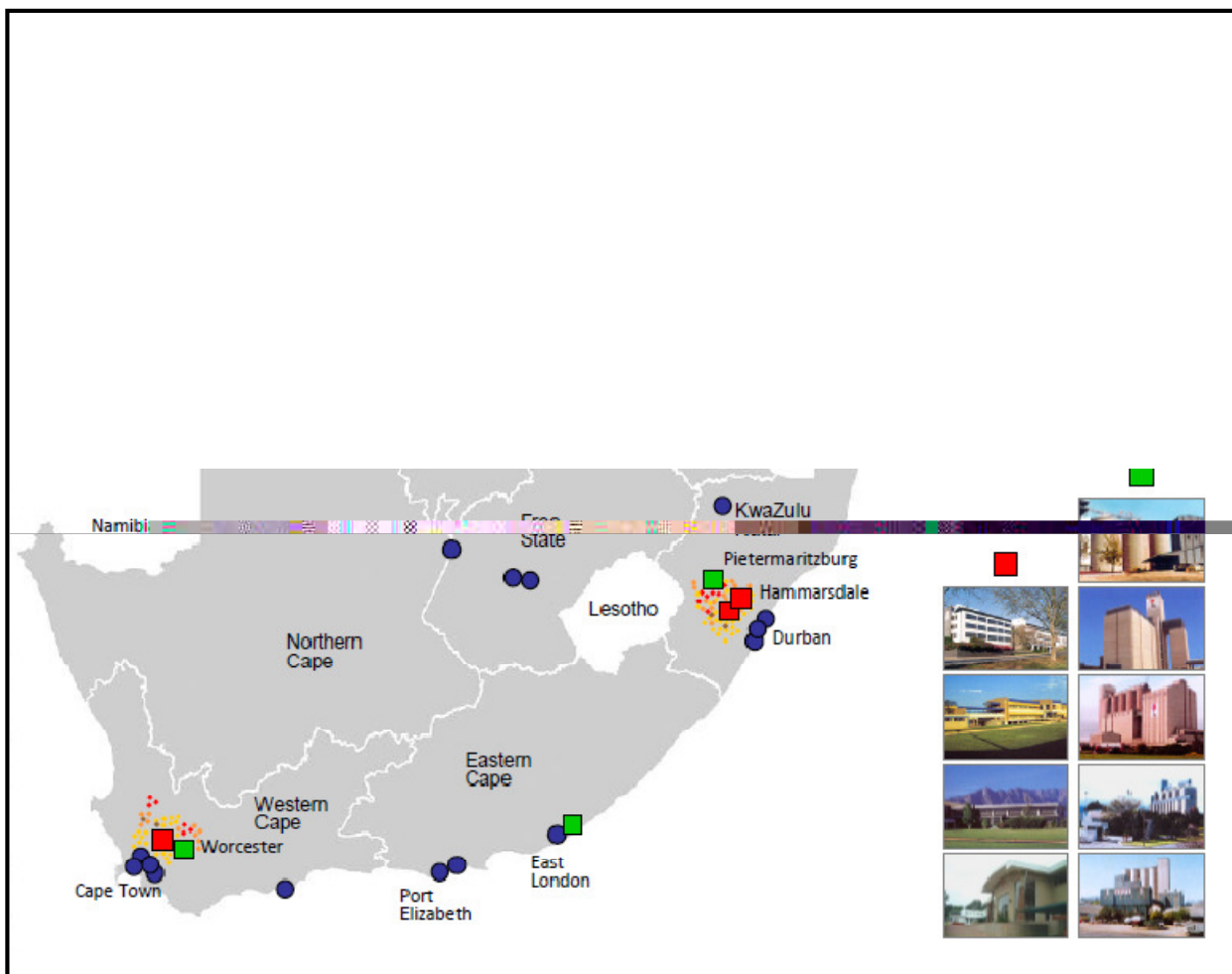


Figure 57: Average broiler production per week (million)

Source: Rainbow, 2009

DDE / \$ " ' # 7("" \$ # # -!"" \$ "; 1(H
 "" < & ;("" <(" ' " ' # "" \$
 ' # ! ! ! G#" ! ! " ' #
 # !* " ' - " (5' >H\$ " ' # " \$!
 "" / \$: * " ' G#" ! ' "" # '# \$! "
 ! (% ' ##" ' !



) < & 1 & 2
 : 1 & "";

A>

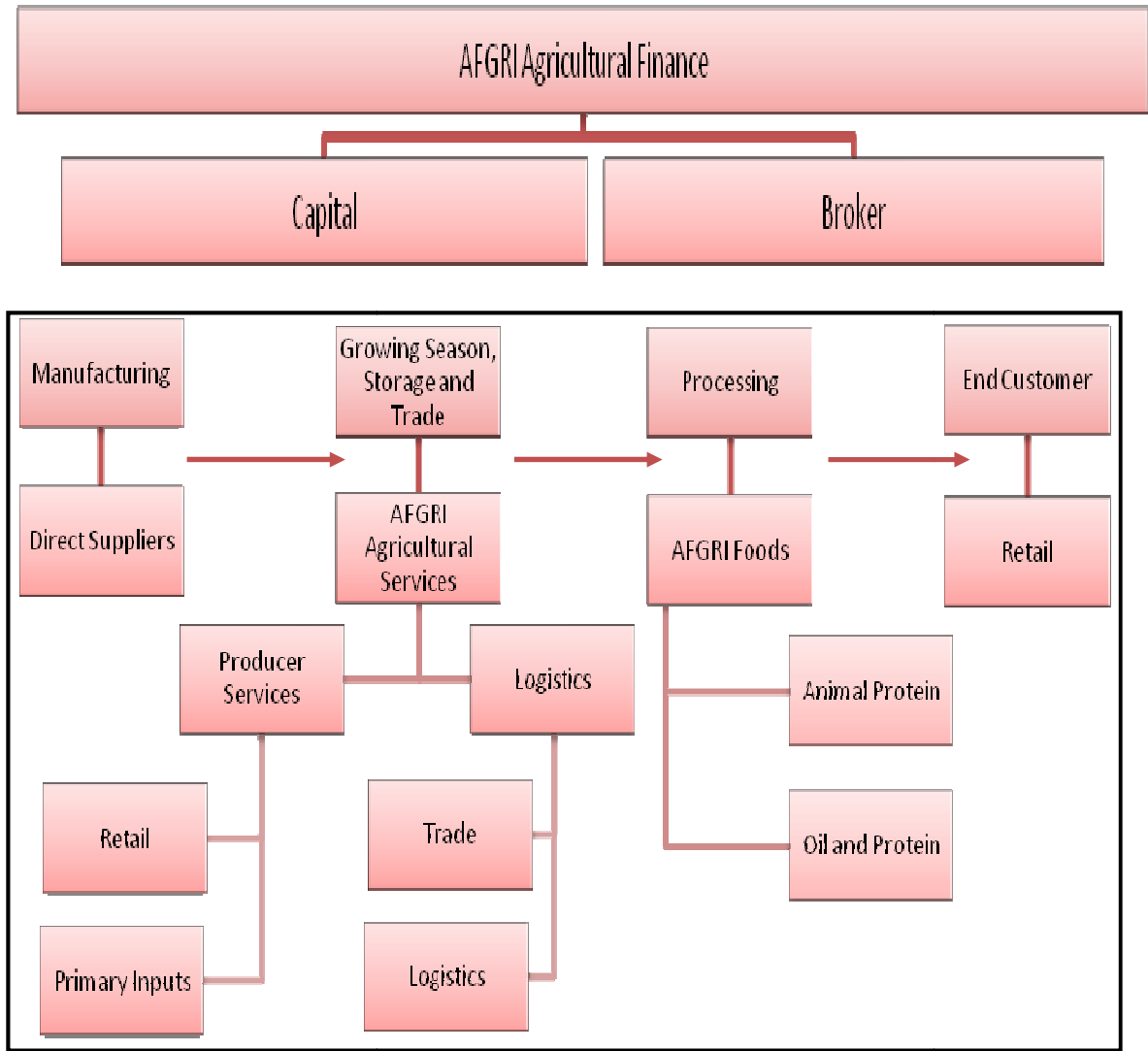
((9

5' >E \$ " '* \$! " !' " ! " ' (

! ' ' \$! ### ' ! "" #

! * " " ' ! " ! ' " ! ! " "

! " (



) :: + (

: 8 () "";

(()

9

! #" ' !' &# " # * ! ! ! # (
!' &# " +#" ## # * ! ! ' " "*" ;!'
5 DDE<

8 %

, ' !' - ' ! " ' ! ' " " G
5GN + ' \$ ' "" ' * * \$ " ! ! #
!' ;!' 5 DDE<

*

, ! ' ! # ' " " # " #" ! " "
! ! ' " "*" " !' # # (
!' \$ " * - ! \$ # # ! ' ' '
" * ;!' 5 DDE<

((

\$
6 ' ' ' !' : 3 * # * ! "" # #
! ! " #(, - # \$ ' ' #: "\$
"* " ! ! \$ (* * #
* ' ## ! ;!' 5 DDE<

7

, ' ! " # * \$!' : " ' ' * "" \$ #
!' ' # '(!' : * " ' ' "" "

! " " ' \$ -
" + !;! 5 DDE<(

()

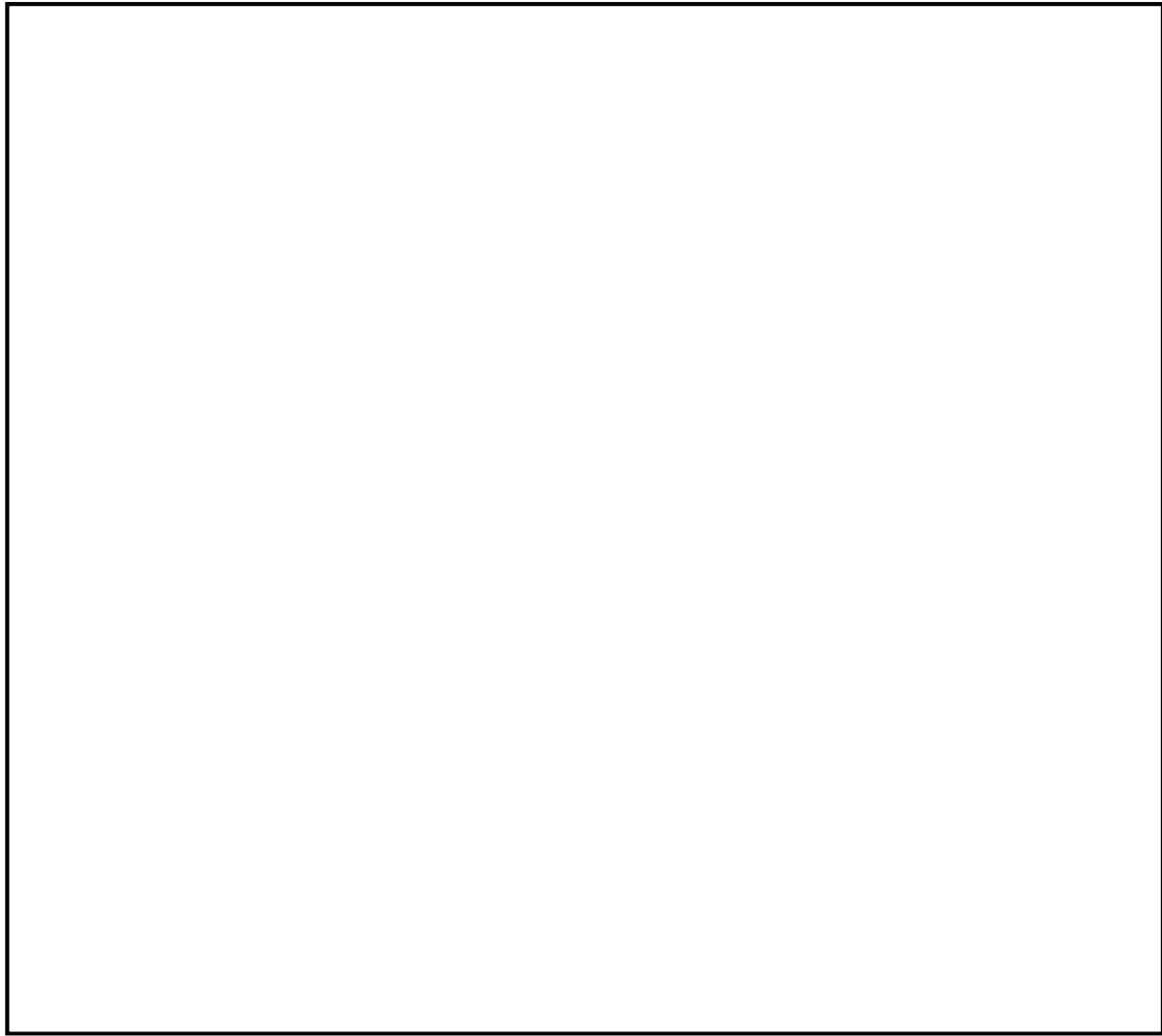
! 5 #" * " " * ' ' " " !#
' \$" ! ! "*" - (6 \$ -5 -
#! ' # " # # '! 9 " K5# !
" - ;! 5 DDE<(

1

! : ' " # * ' " # * ' ! ' " "*"
' ! !# ' " "# (" " ;
& 5 & < " \$! ' "#\$";! 5 DDE<(

C

& (
5' AD ' # \$! * !!(! ##"
" ' # !\$ " - ""
! ! '# (

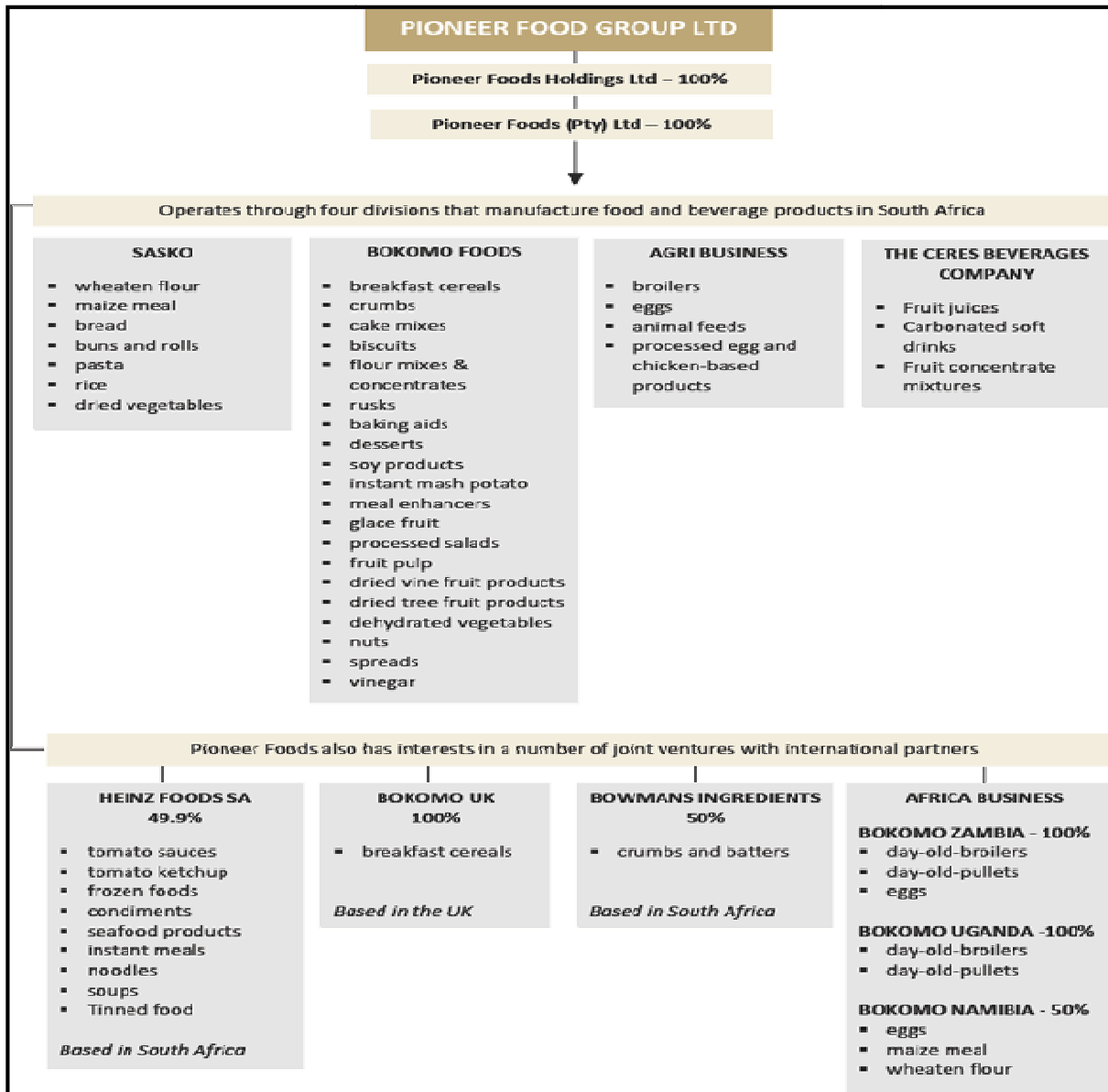


) /": 7 () & ()
: ("";

=) : ,)
%* 5 * !3 5 (! ' ! # " !
(, ! ! ' # \$ - ' " !
! ' . " # ; 3 5 DDE<(, * "
' " " " * " (J * '
' ! ## ' (, ' \$ ' * ""
! ## ' DDH # ! (, * " * \$ % ." %* 5

! ' " (, " * ! ' " "\$ ' 7 # ! / 7E1
 "" DDH / >EE "" DD;3 5 DDE<

5' A ' " !3 ! ' #(3 % *
 ! "" , \$ " # (



) /: ,
 : , " "

Geographical distribution

Figure 62 below shows the distribution of Nova feed activities in South Africa. Activities are concentrated mainly in Pretoria, Malmesbury and George regions.



Figure 62: Geographical distribution of Nova feed activities

Source: Nova feeds, 2010

Nutri Feeds: a division of Country Bird Holdings

Nutri Feeds is a division of Country Bird Holdings, as shown in Figure 63. Nutri Feeds is a leading animal feed manufacturer in South Africa and a global role player in the animal feed industry. They produce a complete range of animal feed products for chickens, turkeys, pigs, ostriches, dairy cattle, beef cattle and sheep. These products are distributed through 280 outlets in South Africa and exported to Lesotho, Botswana and Namibia for a wide range of animal species that includes products for poultry, horses, dairy, pigs, game, sheep, beef, ostriches and animal licks (Country Bird Holdings, 2009). Nutri Feeds, has become one of the first animal feed producers in the world to achieve both ISO 9001 and ISO 22000 certification from two independent certification bodies – QMI and DQS. Nutri Feeds is also the first animal feed producer in South Africa to achieve OHSAS 18001 certification (Country Bird Holdings, 2009). Nutri Feeds grew with 17 percent in their profit after tax from R10 million in 2008 to R12 million in 2009 (Country Bird Holdings, 2009).

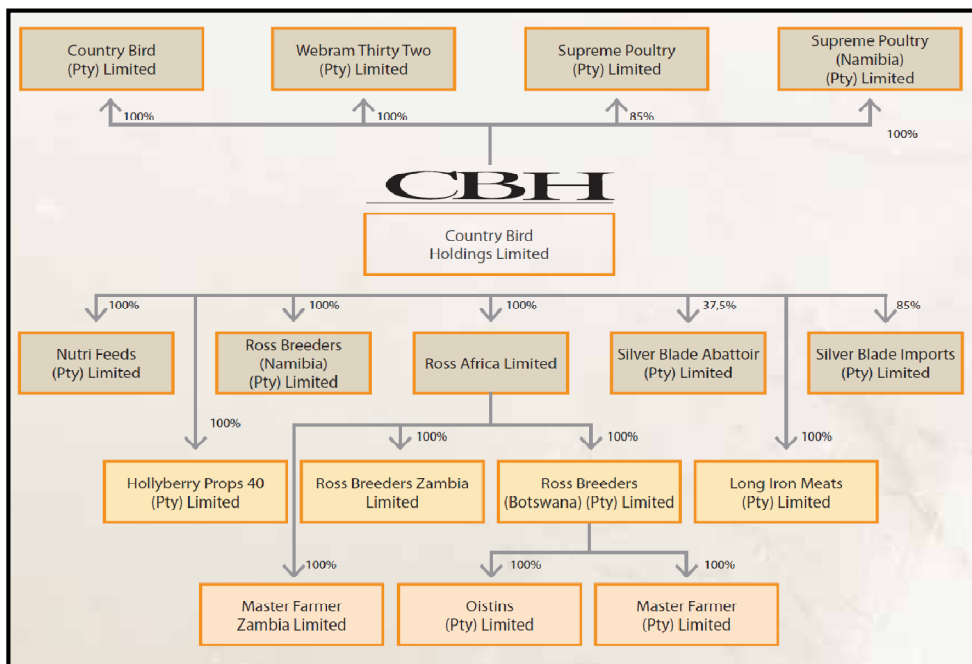


Figure 63: Integration of Country Bird Holdings

Source: Country Bird Holdings, 2009, Geographical distribution of CBH

Figure 64 below shows the geographical distribution of Country Bird Holdings activities in Southern Africa.



Figure 64: Geographical representation of CBH activities

Source: Country Bird Holdings, 2010

4.1.2 Conduct in the feed industry

The following section focus on the conduct within the feed industry.

Porter analysis of the feed industry with reference to the pork and broiler industries

Porter is well known for the ‘diamond model’ that explains the competitive strength of nations and by implication their industries. The diamond model illustrates four broad elements: firm strategy, structure and

rivalry, demand conditions, related and supporting industries and factor conditions. The feed industry with its numerous competitors will be explained by way of Porter's diamond model.

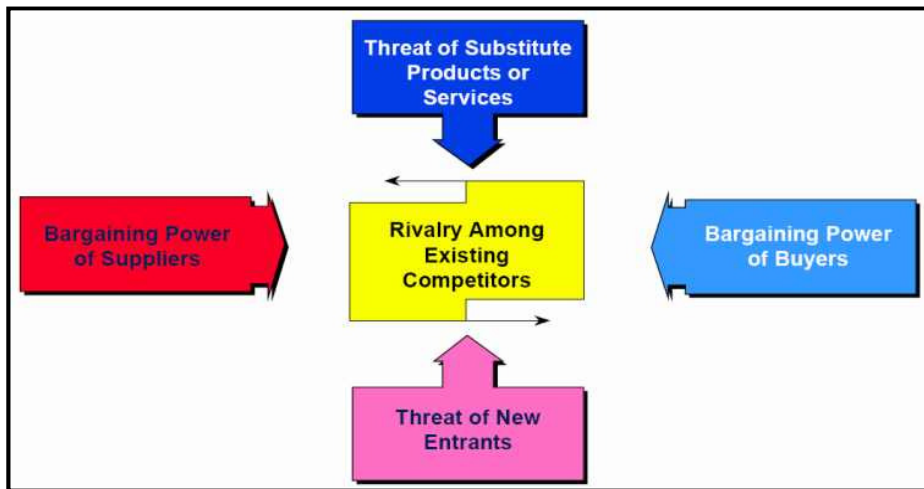


Figure 65: Porter's 5 forces model of competition

Source: Filling the Gaps, 2008

Factor Conditions

The production factors needed for a feed company to be successful in the feed industry include:

- High capital requirements
- Input cost
- The availability of space and water
- Productivity, cost and availability of labour
- Access to finance
- Infrastructure and operational infrastructure
- Cost and agreement on traceability
- Distance to the market
- Access to prime retail space

Demand Conditions

The demand conditions capture the nature and degree of demand within the nation regarding processed various feeds produced by feeding companies. These conditions are:

- Purchasing power
- Changing consumer trends
- Growth of informal market
- Size and growth of market
- Registration of all feeds
- Difficulties in producing tailor made feeds

Related Industries

The factors that influence the continuation, degree and the international competitive power of various other industries in a country that aids the feed sector are:

- Logistics
- Quality and availability of imported and local inputs as well as reliability of input suppliers
- State of technology, training and skills development
- State of research and development and the availability and quality of information in the industry
- Importance of experience

Corporate Strategy, Structure and Rivalry

Corporate strategy, structure and rivalry entail the circumstances in the home market that influence the ways in which corporations are created to grow with proper management. Generally local feed producing companies that fight for survival locally have a better chance to compete internationally.

- Relationships and networks
- Supply chain coordination
- Regulations and standards
 - Animal welfare and other environmental factors

- Importance of traceability regarding feed additives, drugs and antibiotics
- Sanitary and phyto-sanitary barriers
- Level of competition
- Business behaviour
- Nature and activities of industry organizations
- Pricing strategies – large feed companies can be price setters
- Diversification strategies

Porter also developed a five forces model of competition to analyze the determinants of competitiveness in a given sector. Porter uses barriers to entry, bargaining power of suppliers and buyers and the threat of substitutes to explain the rivalry within a particular sector or industry. In this report Porter's model will be used to explain rivalry in the pork and poultry industry respectively summarizes Porter's five forces of model competition.

Rivalry in the pork and poultry industry

Rivalry

- Concentration and volume of competitors
If competing pork and poultry producers are more concentrated and if there are large numbers of the same product producers in the meat processing sector the rivalry between them will increase.
- Industry growth rate
If the industry itself grows at a faster rate the number of competitors will increase to bring about this growth rate and rivalry between competitors will thus increase.
If however the revenue of the industry increase and the number of competitors stay the same the rivalry among competitors will decrease.
- Capacity utilization and expansion
The pork or poultry producer that optimally uses its existing capacity and the producer that has the necessary capital to expand its business will have a competitive advantage over the producer that

doesn't. This increase in the ability to expand and optimally utilize expansion will lead to an increase in rivalry.

- Hedging against price risk

Farmers who hedge against price risk, especially the risk of loss with the volatility in the maize price, have a competitive advantage to farmers who do not know how to discount their risks.

Barriers to entry (Threat of new Entrants)

- Economies of scale

Larger pork and poultry farmers have economies of scale; as the cost per unit decreases as the size of the farm increases.

- Switching cost

Switching cost is the cost of switching suppliers in the feed industry. This is a relatively high barrier to entry.

- Capital requirements

Starting a pork or poultry farm is a very capital intensive procedure and the capital requirements are frequently one of the strongest barriers to entry.

- Access to distribution channels

Access to distribution channels to get pork and poultry from the farmer to the slaughter house and to get the meat from the slaughter house to the retailers and consumer is often hampered by high transportation costs and poor logistics.

- Governmental policies

Governmental policies regarding health and safety, traceability, the use of GM products and other standards and policies are another barrier to enter the pork and poultry producing industry.

- Farmers are price takers

Because pork and poultry farmers are price takers on the input and supply side of the supply chain they have limited bargaining power.

- Permitting requirements

The need for a license to produce tends to increase rivalry as this limits the number of entrants into the market.

- Food safety practices

The high cost of implementing and maintaining food safety practices increases rivalry in the pork and poultry sector.

- Bio-security and traceability

The protection of human and animal life from diseases is a major concern and the importance of traceability is becoming increasingly important for a pork or poultry farmer to be internationally fit for trade.

- Access to inputs

High access to inputs reduces the rivalry that there exist between pork and poultry farmers.

Bargaining power of Buyers

- Buyer concentration, volume and information

The concentration and volume of the buyers as well as the information that they have regarding a specific product often influence the power that they have to influence the demand and thus prices of pork and poultry products.

- Ability to backward integrate

The ability of the buyer to buy directly from the farmer instead of through supermarkets increases the buyer's ability to bargain.

- Availability of substitutes

The buyer's bargaining power will increase as the amount of substitutes increase.

- Price sensitivity

Buyers are less sensitive to price changes in inferior or normal goods, like meat and most other foodstuffs, than to price changes in luxury goods.

- Product differences

A variety of available products increase the bargaining power of buyers, this makes it easier for them to switch between products.

- Brand identification

It is difficult to enter an industry that is dominated by branded products due to the vast sums of money, time and effort that went into the process of establishing a well know brand name.

Bargaining power of Suppliers

- Concentration

The more pork or poultry farmers there are in a certain region the higher the rivalry and the lower the bargaining power of a single farmer. The higher the level of concentration of feed suppliers, the higher the level of rivalry which could be positive for producers.

- Supplier's knowledge of product's value to the buyer

An increased knowledge of what the buyer requires from a specific product increases the farmer's ability to bargain for higher prices. Specialized products can be sold at a premium or can be produced for a niche market.

- Product standardization and differentiation

The bargaining power of farmers increases as soon as products become standardized and differentiated with sufficient volumes.

- Threat of forward integration

Pork and poultry farmers that deal directly with consumers have an advantage and increase bargaining power to farmers that lack this.

Threat of Substitutes

- Relative price performance of substitutes

Cheaper substitutes for pork and poultry products will be preferred especially if quality are not given up on. Farmers who produce pork and poultry products cheaper will thus have a competitive advantage to those who cannot afford to produce these products more cheaply.

- Buyer propensity to substitute

The success of cheaper substitute products however doesn't only depend on the product itself but also on the buyer or consumer's ability and willingness to substitute the one product for the other.

Issues within the animal feed manufacturing industry

During the interviews conducted with feed manufacturers and associated industries, interviewees were asked to list the main issues and challenges that they currently experience in their industry. Ranks were assigned to the issues where 5 are a main issue and 1 low. The following issues as given by various manufacturing organisations of the animal feed industry as well as AFMA were considered to be high priority and ranked between 4 and 5 and given in order of importance:

- Management of price volatility of raw ingredients
- Availability of good quality raw ingredients especially soya oil cakes
- Economies of scale (lower unit cost)
- High commodity prices
- Dumping of Brazilian agricultural commodities
- Shipment delays
- Procurement of raw ingredients
- Transportation and general infrastructure of roads/rail etc.
- Marketing principles
- Lack of regulated control of additives and antibiotics

The following issues and concerns were also raised by interviewees, but were ranked lower than the above mentioned issues:

- Cost of doing business
- Accurate forecasting of prices and demand

- Imports of e.g. additives and soya oil cakes
- The approvals of GMO based raw ingredients
- Sustainable electricity supply and cost
- Water quality
- Availability of skilled workforce
- Effectiveness of the business in the industry
- Cross border supply chain
- Subsidies of feed offered in other countries
- Finished product quality risk
- Minimum residual levels in final product e.g. chicken meat
- Feed to yield high performance and be cost efficient
- Critical handling of feed batches not performing in the field
- Keeping up with technological innovations
- Constant improvement of feed formulations by food scientist
- Under constant review of the competition commission

These issues and challenges form part of the daily operations of feed manufacturers that need to be considered in order to keep a satisfactory level of competitive business, management and growth

Procurement of raw feed ingredients

The procurement of maize as a raw ingredient by feed manufacturers accounts for more than 60 percent of the total feed rations. Other feedstuffs procured are soya oil cake (which is mainly imported), hominy chop, wheat bran and sunflower. Because of the scale in which these ingredients are needed, more than 60 percent of these ingredients are purchased on a contractual basis from the market such as SAFEX and other grain suppliers and agencies. Hedging on SAFEX can range from 3 to 9 months in advance to reduce the risk of sudden price changes and to be assured of adequate stock levels available to supply the demand.

Chop and brain are mainly sourced as by products in the manufacturing process of maize meal and flower at milling plants. Additives, minerals and growth stimulants are procured from specific suppliers and added to the feed mixture in accordance to governing regulations and advice from food scientists and specialists.

During the interviews the question was asked what the impact of price volatility of the following raw ingredients would have on is operations. Answers were ranked from high (5) to low (1). The results are given in the table below.

Table 28: Impact measurement of price volatility on commodities

Commodity	Average rank
Maize	4.8
Soya	4
Sunflower	3.75
Vitamins	3
Additives	3
Other	2.5

Source: Interviews, 2010

In general the impact is moderate to very high for certain main raw ingredients such as maize and soya's.

The availability of market information on potential market partners/competition

Figure 66 gives the opinions of the interviewees on the level of availability of market information on potential market partners and competition. About 67 percent felt that information is moderately available, and 33 percent felt that the availability of such information is good.

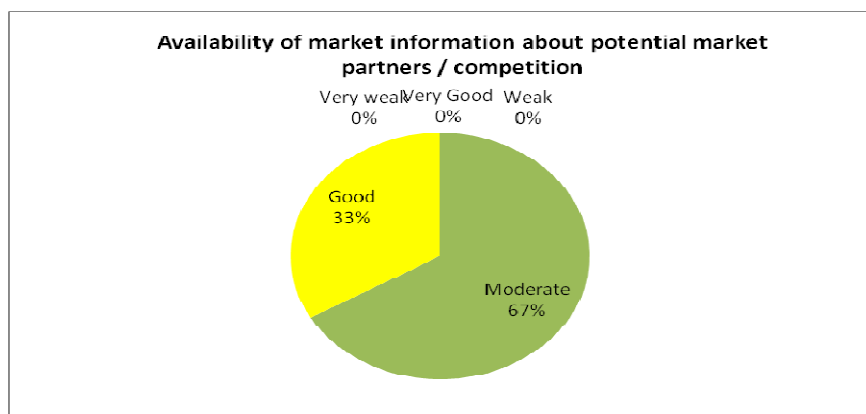


Figure 66: Availability of potential market partners/competition

Source: Interviews, 2010

Other types of information that feed manufacturers require, and made available to them were the following:

- Different markets
- Industry profit margins
- Constant product development information
- Sources of inputs
- Split in terms of the different species
- Available volumes of raw feed ingredients available

Industry rating of the infrastructure

The following ratings were obtained on the infrastructure in the immediate area of doing business for the feed manufacturers. The rankings assigned was 5 for very good, and 1 for very weak. The results are given in

Table 29 below:

Table 29: Infrastructural ranking in business environment

Infrastructure	Average rank
Roads Primary	3
Roads Secondary	1.8
Railway	1
Water quality	3.5
Water availability	4
Electricity	2.5
Communication	4

Source: Interviews, 2010

The issues regarding the infrastructure to feed manufacturers refer to the cost and competitiveness in doing business. Good infrastructure assists in being able to optimize the feed industry at a higher level of operations. The issues as indicated above have the following impacts on the feed manufacturers:

- Weak road infrastructure: deliveries not on time and at a much higher cost than on rail, a danger due to heavy vehicles that can cause accidents due to badly maintained roads.
- Weak railway systems: Increase in road freight and higher costs
- Water: Good quality and quantity is required for operations to work optimally
- Electricity: The lack of power means that machinery do not operate with a result of increase costs of doing business
- Communications: A major lifeline to any industry that wants to succeed in business

Performance of own feed manufactured

Feed companies were asked to rank the current performance of their feed on the following criteria. Ranks assigned were 5- very high and 1- very low. The results are summarized in Table 30.

Table 30: Performance indication of own feed manufactured

Performance indicator	Average rank	Std.dev
Quality of feed	4.6	0.55
Cost of feed	3.2	1.30
Delivery on time	3.8	0.84
Quality of service	4	1.73
Consistency of service	3.8	1.64
Support services	4.4	0.55
Health	4.6	0.55
Feed efficiency	4.4	0.55
Additives	4.25	0.50

Source: Interviews, 2010

The averages indicate that feed manufacturers rank their performance on their feed as well as their service very high. The standard deviations per performance indicator ranged between 0.5 and 1.73 indicating a very small deviation in the rankings of the manufacturers.

Institutional environment in the feed industry

During the interviews the question was asked: “What impact does the institutional environment have on your business?” The following responses were raised by participants.

- **New Feed Bill:** Feed manufacturers feel that this will manage and ensure safer food to both animals and the end consumers. The aim of this bill is to register all feed formulations down to farm level to insure safety and high quality feeds.
- **GMO issues:** There still are debates on the issues of GMO’s and whether they can be used or if they are safe for human and animal consumption, as well as how the use of GMO and non-GMO products will be governed

- AgriBEE: The concept of AgriBEE is not new to the industry; however it still does not create unity for the industry.
- Competition Board Act: The feed industry is under review of the Competition Commission to see if there are indeed issues that need to be raised and companies investigated. The main issue for companies under review is the long lead times that it takes for these cases to be completed. The result is that these companies under review do not feel the urge to expand if they could be penalised for unlawful market manipulation.
- Consumer Bill: This bill focuses on the consumer, the safety of foods delivered to consumers and traceability. Feed manufacturers must be certified to deliver good quality feeds that are not harmful to animal or human life.
- Environmental Impact Studies: These studies usually take a long time to conduct and process and can restrict the process of expansion by feed manufacturers.
- Import/Export restrictions: The lack of import restrictions from subsidised countries to South Africa makes the business uncompetitive for the local industries that do not have the support from government as with these subsidised countries.

Risks in the feed industry with impacts on the pork and broiler sub-sectors

The following are general risks that are applicable on the feed as well as producers of pork and broiler growers. These risks are compiled from interviews as well as reports by the various organisations involved in this sector. The risks are divided between macro and micro level risks.

Table 31: Current risks at Macro level

Risk	Risk Background
Risk at Macro-Level	
Political Risk	
Change of legal framework	The legal framework in any country depicts the way in which business is done and structured. Changes in legislation impacts any business in a positive or negative way and can ultimately have an impact on investment confidence and profitability.
Changes in government priorities	An established governmental environment is crucial for the sustainability of businesses, any changes in the fiscal and monetary policies and priorities of government can impact a business or business venture negatively.
Decrease in government spending	A decrease in government spending impacts the level of demand in the economy negatively - therefore spending by consumers can decrease
Changes in the direct and indirect tax structures.	Changes in a country's tax structures impacts on disposable income of the consumers and business and can impact on sales. If government should decide to tax the sales of maize or white meat, then it affects the disposable income of consumers even further.
AgriBEE	BEE plays an increasing important role in South Africa. Not having competent BEE partners can impact a business negatively. Currently the requirement to be BEE compliant has not been raised as a requirement to receive a grower's contract.
Education and Training	The success of a business depends on the level of quality of its human capital. A country's inability to maintain a high quality school system creates problems for all businesses in terms of capacity building, service delivery and other aspects of the economy.
Economic Risk	
Globalization	Globalization changed the way in which businesses are conducted. It creates opportunities for business to exploit world markets; however it also created new competition for existing businesses.
Inflation	Inflation can affect a business in many ways. If the cost of inputs increases at a more rapid pace than the business' income, the business will experience a loss in profitability.
Interest rate changes	High interest rates have a negative impact on a company's ability to repay debt or other loan instruments which in turn decreases profitability. It impacts on consumers' disposable income and buying patterns. Also impacts on investments ROI.

Volatility of exchange rate	Volatility in exchange rates for importing and exporting companies can have a harmful effect on the profitability of the company. It is crucial to make use of hedging instruments to offset the negative impact.
Credit crunch	The current world wide recession and credit crunch impacts on the consumers' perception of the economy, spending patterns, disposable income, employment, etc and this can result in the decrease of demand. and investment
Changes in international trade structures	The global international trade environment is vibrant and ever changing. Not adjusting to these changes will result in a loss of export opportunities.
Infrastructure	Roads, railroads, harbours, communication, water systems, etc are all required investments by government at a certain standards. If not available or maintained it impacts on investment confidence.
Economic development	The stage of economic development of a country will determine the products, quality and services that can be marketed.
Urbanization	The migration from rural areas to urban areas changes demand patterns and quantities in both areas hence impacting the sales and profitability of businesses. It also puts pressure in infrastructure and employment.
Eskom (load shedding)	Load shedding or the lack of sustainable electricity in South Africa is a reality that creates problems for businesses in terms of service delivery, transportation, communication, etc which in turn has negative impact on profitability.
Socio-Economic risk	
Changes in consumer trends	It is vital for companies to keep up with the ever changing consumer trends in order to ensure competitiveness and sustainable profits. Changes in consumer trends can impact on sales/ profits. For example, the need by consumers to consume organic products. How should a company adapt to this?
Changes in disposable income	Changes in disposable income which can occur due to taxation, interest rates, etc will dampen the consumption expenditure and spending patterns of consumers - demand changes for certain products.
Unemployment	High levels of unemployment in a country/region will decrease disposable income thereby decreasing demand which in turn decreases sales and ultimately profits.
Changing demographics	A decreasing growth rate of a country will affect the speed at which the consumer base grows hence will consumer demand decrease. Changes in the age structure of a country have implications in terms

	of spending and saving patterns, which in turn can impact consumer demand negatively or positively.
Infrastructure	Business can conducted in an environment that lacks a high-quality infrastructure. Not having a world-class infrastructure could impact on competitiveness.
HIV/Aids	HIV/AIDS is a serious threat for countries in terms of population growth, lower productivity and lower income levels. It again impacts on the demand for food.
Ethical/religious trends	Ethical or religious trends determine the demand of certain products. A company's should identify such trends and needs.
Security, corruption and theft	Security, corruption and theft presents a wide range of risks for businesses that all conclude in a loss of profit.
Technological Risk	
Lack of new production methods	New production methods (using technology) can increase productivity and decrease cost of production. A company's lack of innovation in terms of production creates a risk in the long run.
Lack of investment in research and development	This results in the lack of innovation for new products and new product development
Environmental Risk	
Water quality & availability	Adequate quality water is essential for fresh produce businesses. In recent times, water has become scarce. It can impact on business profits and confidence.
Pollution	Pollution creates external costs to all businesses. Polluted water for example needs to be purified before use. Polluted water can cause unnecessary risks and higher input costs.
Climatic & natural risk / global warming	Climatic changes and natural disasters are predicted to increase in future creating uncertainty. This requires more proactive thinking, innovation and costs.
Transport system	The supply chain of fresh produce has to be fast and responsive to deliver a product of high quality to markets across the world. Not having a high-quality transport system will hamper these objectives.

Risk at Micro level

Table 32 provides certain risks from a marketing point of view that have an impact on the operations of broiler growers and pork producers as well as the operations of the holding and independent feed companies. These risks are all in the contextual framework of the macro risk environment.

Table 32: Current risks at micro level

Risk	Risk Background
Risk at Micro – Level	
Operational Risk	
Loss of market share	Requires meeting & exceeding requirements of all stakeholders at different levels in the value chain; innovation & leadership; need to improve quality to compete with contract requirements of retail sector.
Stakeholders with different agendas	Lack of alignment in terms of strategic and operational goals. Different stakeholders with different objectives.
Food safety	An international & domestic requirement. Impacts on business, consumers & suppliers. Requires that necessary control systems are in place.
Systems failures	IT forms an integral part of the inward & outward logistics, the payment system, financial & business information systems needs to be up to date & well maintained. Requires well trained staff.
Machinery break-down	Not having high quality, well maintained, accessible machines (slaughtering equipment. etc) can dampen the future expansion.
Power outages	Contingency plans need to be implemented in the case of power outages. The operations still need to function as efficiently as possible in the case of load shedding
Security risk	The risk of theft and security and safety plays a vital role in terms of the current
Product Market Risk	
Competition increases	New competition between retailers means other growers have a risk in terms of a loss of suppliers or customers

Supply decreases	The supplier base can decrease and this is a serious risk that needs to be dealt with. A loss in terms of suppliers of consistent quality & quantity can lead to the market becoming stagnated and predictable. With the recent increases in production costs, the lack of sufficient supply becomes a reality.
Sudden demand changes	The demand for produce can change significantly in a short time period. This creates risk in terms of adequate supply of produce and supply shortages. For example, the day to day sales of produce can change dramatically, one day you will sell one unit of a specific produce and the next day you can sell forty units of the same produce.
Price volatility	A function of global prices and seasonality, inconsistent supply of quality & quantity impacts on the risk of stakeholders on the market.
Lack of innovation and differentiation of products	The value adding, processing and branding of all products needs to be in line with the developments and changes of consumer trends – risk of not doing it.
Lack of communication	The lack of communication between management and other parties involved in the organisation creates risk in terms of the strategic management. Internal communication between parties also needs to be refined and addressed.
Mismanagement	Issues of bad leadership, lack of vision, innovation, trust, corruption, lack of correct information and payment systems all add to this problem.
Financial risk	
Interest rate changes	Sudden changes in interest rates create risks in terms of credit repayment.
Capital cost changes (interest costs)	Capital cost can change or increase which creates the risk in terms of adequate capital resources necessary to expand.
Default on debt	Depending on financial structuring, default on debt is possible due to the above risks.
Control of overheads	The risk of not controlling overheads can lead to deficiencies in the functioning, service levels.
Cash flow problems	Out of cash or cash flow problems can lead to management problems, payment problems, loss of suppliers, problems with service delivery, security, etc.
Fraud at top management level	Corruption requires good governance, internal management control & audit systems

Inadequate marketing	The effective marketing of value proposition to the public is critical for the development and sustainability of the holding companies.
Input Risk	
Labour strikes	Relationships with labourers and unions to be nurtured
Key employees leave	Contract of key senior management expire simultaneously. Requires effective succession planning.
Supplier fails	Supplier base to be protected. Could imply contracting. They want trust in the system, i.e. infrastructure/ logistics, price, information, demand and payment on time.

The opinions expressed in

Table 33 were from the feed manufacturers regarding the subjective but informed views of participants on the impact that certain risks will have on the feed industry and the subjective probabilities that these risks will occur. Feed manufacturers were asked in the interviews to rank the impact that the risk may have on their business from 5, being very high to 1 having a very low impact. The probabilities were then multiplied with the average impact ranking to indicate the most important risks given the scale of impact as well as the probability for that risk to occur. The largest risks were fluctuations in price volatility (387) which has a severe impact on the business cost of the industry. Financial and economic risk (296) was the second largest risk impact followed by power outages (269) and political risks (215). Growers felt that these risks could severely cripple their farm business and restrict production expansions and profitability.

Table 33: Risk impact assessment from the feed manufacturer's perspective

Risk	Impact (5=high-1=low)	Probability (%)	Standardised scale of impact
Political	3.7	58	214.6*
Financial & economic	4	74	296*
Labour skills	2.8	48	134.4
Labour strikes	4	30	120
Business	2.5	40	100
Price volatility of feed	4.5	86	387*

Food safety	4.3	30	129
Power outages	4.2	64	268.8*
Inventory	3.8	42	159.6
Theft & security	1.5	42	63
Disposable income of consumer	2	50	100
Customer, Competition & Supply	3	64	192*
Environmental (e.g. Waste management)	1.8	26	46.8

Source: Interviews, 2010

4.1.3 Performance in the feed industry

The performance of any industry is assessed by determining over time how the industry is evolving and expanding and adapting to meet those changes. The following section will focus on how the feed industry with its different larger organisations performed over the past years, and how they perceive the future.

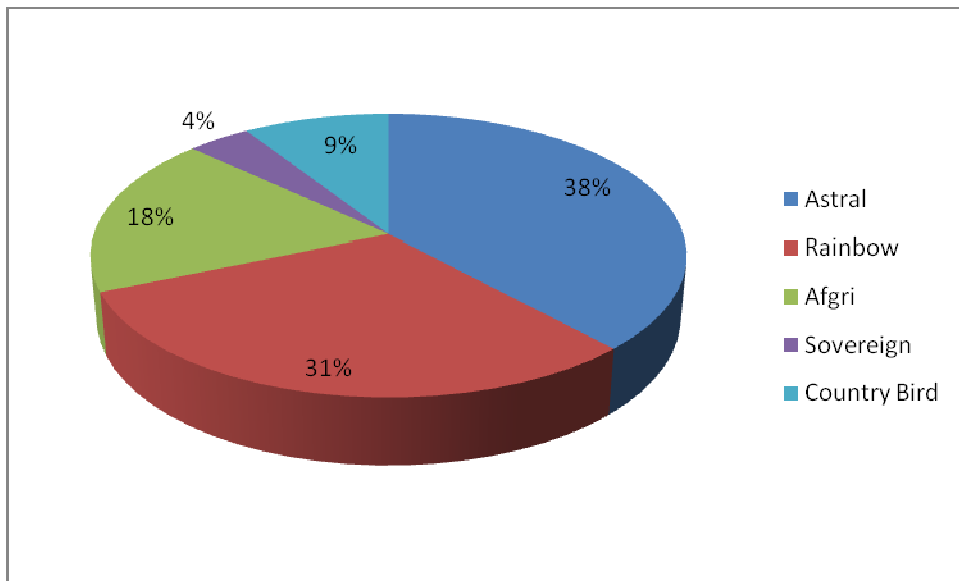


Figure 67: Production share between the top five feed producing companies

Source: Adapted from Afgri Investors Presentation, 2009

Figure 67 above shows the levels of production by the top five broiler producers' feed companies per annum in percentage market share given the feed output production levels Astral produced 1.5 million tons (38%) of feed followed by Rainbow with 1.2 million tons (31%), Afgri (720 000 tons) (18%), Country Bird (360 000) (9%) and Sovereign's (156 000 tons) (4%).

Meadows

Due to consolidations, Meadow Feeds' volumes declined by 8 percent, yet revenue remained at the same level as the prior year at R5.1 billion. The division's operating profit showed a marked decline of 22 percent to R299 million compared to the prior year (2008: R385 million) and operating margin for the feed division was 5.8 percent for the period under review (Astral Foods, 2009). Production of consistently high quality feed together with substantive quality control and monitoring systems, remains a core focus area of the division, hence its strong market position. Figure 68 below shows the revenue and operating profit for Astral foods, with the feed (Meadows) and the poultry section growths for 2008/09.

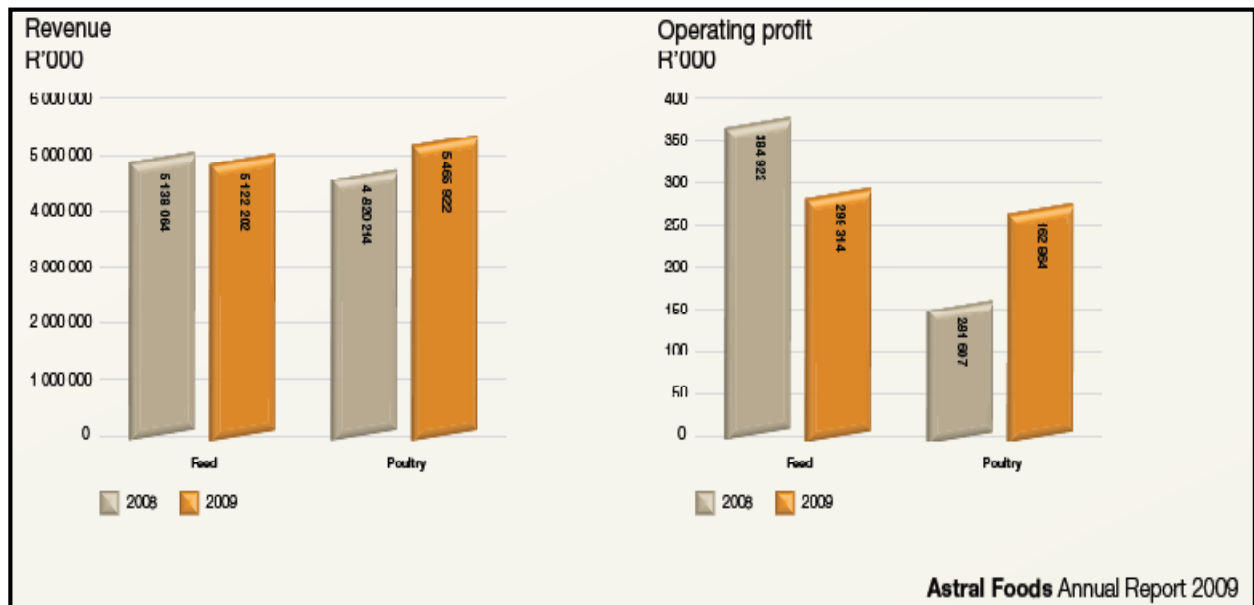


Figure 68: Revenue & operating profit for Astral

Source: Astral Annual Report, 2009

Epol

Epol's raw material procurement strategy has enabled them to be priced competitively despite inflationary pressures (Remgro, 2007). Rainbow's performance has been impacted by a second year of significant feed cost increase which could not be fully recovered in broiler realisations. Feed prices have increased 34 percent over the past 2009 financial year (Rainbow, 2009). Rainbow's growth in revenue was 14.4 percent, while the EBIT from 2008 to 2009 was considerable lower as seen in Table 34.

Table 34: Rainbow 2008/09 financial results

2009 Highlights					
Statutory		2008	2009		
Revenue	Rm	5955.3	6811.4	+	0.144
Headline EBITDA	Rm	901	575.8	-	0.361
Headline EBIT	Rm	764.6	425.2	-	0.444
Effective Tax Rate	%	33.6	28.1	+	0.055
Headline earnings	Rm	528.1	318.8	-	0.396
Cash generated by ops	Rm	617.2	594.5	-	0.037
Net cash	Rm	509.9	528.1	+	0.036
Dividends per share	cents	68	68		
Capex spend	Rm	315.5	293.1	+	0.071
NAV per share	cents	805.9	853.3	+	0.059
Return on equity	%	25.3	13.2	-	0.121
Adjusted for non-recurring items IAS39 impact					
Headline EBITDA	Rm	876	705.2	-	0.195
Headline EBIT	Rm	739.6	554.6	-	0.25
Headline earnings	Rm	524.6	385.5	-	0.265

Source: Rainbow Annual Report, 2009

Afgri

Table 35 below shows the financial history for Afgri's animal feed and Daybreak operations from 2004 to 2008. EBIT margin growth in 2008 for daybreak was 3.1 percent and for the feed section growth was 7.1 percent. Overall growth in EBIT for Afgri in 2008 was 6.0 percent.

Table 35: Afgri's historical financial information

R'000s	2004	2005	2006	2007	2008
REVENUE	1 917 960	1 889 520	1 787 204	1 986 263	2 936 624
Daybreak	292 930	312 906	328 227	378 269	657 271
Animal Feeds	1 268 733	1 314 569	1 080 540	1 180 140	1 747 399
Nedan	356 297	262 045	378 437	427 854	531 954
EBITDA	114 781	117 228	171 171	210 337	223 502
Daybreak	12 935	27 647	60 695	74 860	48 045
Animal Feeds	86 260	88 270	87 796	105 287	137 374
Nedan	15 586	1 311	22 680	30 190	38 083
EBIT	98 001	97 541	155 858	173 056	177 299
Daybreak	10 222	22 944	58 278	51 552	20 075
Animal Feeds	75 465	77 052	78 106	94 299	124 386
Nedan	12 314	-2 455	19 474	27 205	32 838
EBIT MARGIN	5.1%	5.2%	8.7%	8.7%	6.0%
Daybreak	3.5%	7.3%	17.8%	13.6%	3.1%
Animal Feeds	5.9%	5.9%	7.2%	8.0%	7.1%
Nedan	3.5%	-0.9%	5.1%	6.4%	6.2%

Source: Afgri, 2009

During the interviews feed manufacturers were asked to comment on their vision of expansion for the future. In total 67 percent of feed manufacturers felt that they are positive on expansion in the future. The 16 percent that were very negative on expansion was due to institutional risks and the review board of the Competition Commission that are causing problems in their industry.

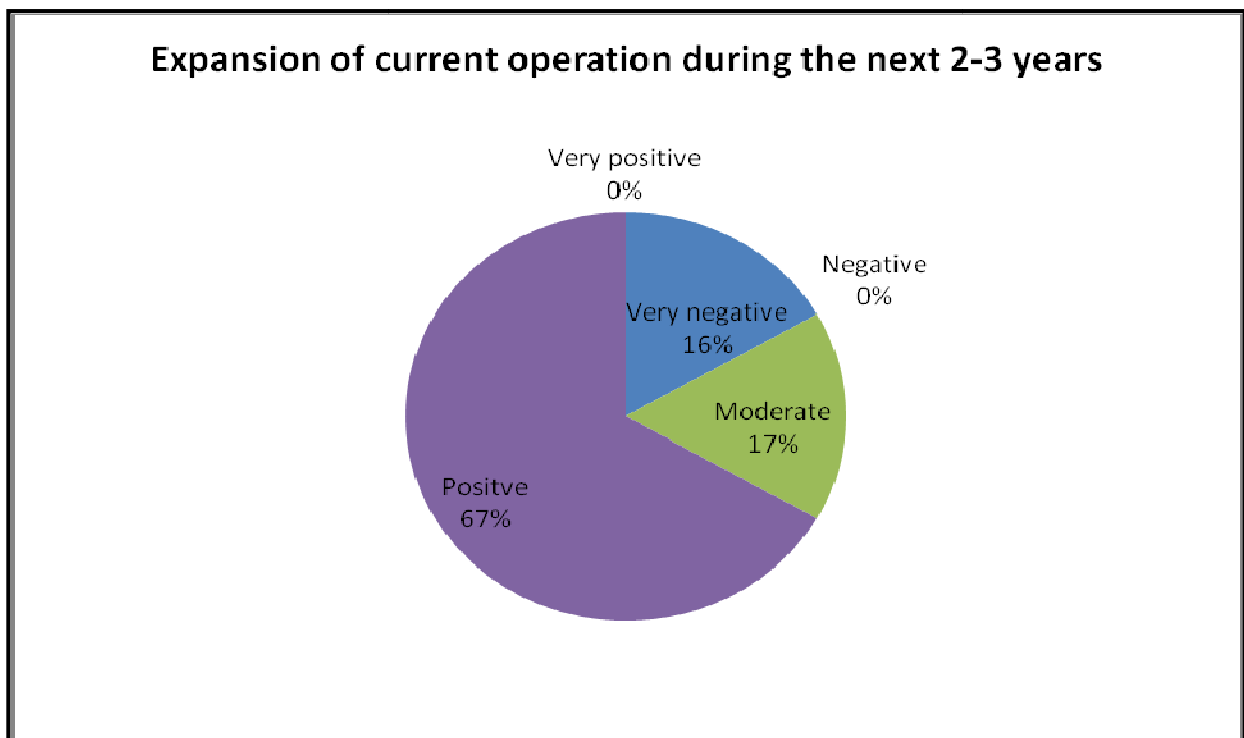


Figure 69: Expansion of current operations in the next 2-3 years

Source: Interviews, 2010

4.1.4 SWOT analysis for the feed industry This following section will focus on the Strengths, Weaknesses, Opportunities and Threats (SWOT) of the feed industry. The SWOT for feed must be seen in conjunction with the pork and broiler SWOT analyses as a strategic method or focus point for agro food businesses and farmers to position them in the industry in such a way as to fill the caps of opportunities and close the possibilities of threats. These swot analyses were combined from different role players and industry leaders on how they perceive the level of strategic thinking in their own organisation or business. The changes being experienced in the external (as well as the internal) markets forces industry leaders to think and strategise proactively as to not fall in the pitfall of losing market share or investor interest.

Figure 70 below is the SWOT model obtained and grouped between the different members interviewed from various feed manufacturers. These SWOT's are a group of the most important elements that needs to be considered in order for the industry (as well as individual businesses) to focus on and adjust their

businesses models accordingly. Note that a discussion on business models and the future of it will be added later in this report.

<p style="text-align: center;">Strengths</p> <ul style="list-style-type: none"> • Well trained personnel in organisation • Cultural qualities through which organisations do business • Well known trademarks and customer basis • Part of the integrated business structure • Quality, control and technological innovation 	<p style="text-align: center;">Weaknesses</p> <ul style="list-style-type: none"> • Price volatility and the effect lower down the value chain • Procurement of good quality raw ingredients • Old levels of technology • Availability of capital for expansions • Not assured for buyers for the feed manufactured
<p style="text-align: center;">Opportunities</p> <ul style="list-style-type: none"> • Technological advancement • Growing markets in especially Africa • Increased value adding through integration • Growth in the chicken industry resulting in increased demand for feed • Conversion of low quality protein to better quality with the help of enzymes 	<p style="text-align: center;">Threats</p> <ul style="list-style-type: none"> • The supply of electricity • Infrastructure not maintained by governmental departments • Changes in legislations and the effect of the competition commission • GMO issues and how it will be managed • Uncertainty of agriculture when focussed on the political involvement

Figure 70: SWOT analysis for the South African feed industry

Source: Interviews, 2010

As seen in the figure above the most predominant issues were highlighted. Although unique and specifically given by individual feed manufacturers, these issues form the basis for all manufacturers. To present a generalised SWOT analysis gives the opportunity for the industry to experience harmonization

between the different feed manufacturers. The aim of the Competition Commission is to ensure that accurate information is made available to all thus also promoting this concept.

The highest strength that came forward was the core culture of the businesses and how their perceived to do businesses that added value to their business and striving towards their vision and mission. This quality along with a well established brand name mend that they had a firm customer basis to supply to. To be able to achieve economies of scale this quality in a business is essential. However smaller manufacturers are not excluded from this phenomenon. The larger a business becomes, the more gaps exist of niche market and special more specific opportunities. This along with a good product and service will provide a platform for any business to survive if managed correctly.

The strongest weak point for feed manufacturers was the fluctuations in prices of raw feed ingredients. This along with the procurement made it difficult to adjust feed prices to still be competitively priced without losing market share. More than 80 percent of grain raw ingredients are purchased on contractual basis ranging from 1 to 9 months. The result is that prices contracted in the past have to be discounted to today. The main scenario explained by feed manufacturers was that given they procured maize at R1600/ton six months ago and the current maize price is R1100/ton, then they can't lower their manufactured feed prices for the current market conditions. The events in the past impacts on the prices offered today. Thus pig producers and broiler growers may feel that they are paying too much, but they are only focussing on the short term view.

The two main opportunities that feed manufacturers will have to look to expand is the level of technological advancement (to be on par with international trends and standards) and to look into expansion opportunities into Africa. The potential for growth in Africa is tremendous and could possibly create various prosperous opportunities. Resources are available but the utilisation, control and management of these resources lack, thus resulting to inefficiency. If feed manufacturers can use these resources and export products, then than impact of international imports from e.g. Brazil can be countered and a sustainable

growth created. By being able to manufacture feed close to the African producers, ensures job creation and increases in food production thus lowering the food security issue.

However, along with these great prosperous opportunities lies an old enemy namely governmental governance. The impact of policy, legislation changes, talks on nationalisation and the inability to maintain infrastructure serves as the largest threat to feed manufacturers. Before expansion can take place into Africa, the general infrastructure impacting on local business will firstly have to be upgraded and maintained. Expansion costs money, and investors will only invest if they feel that risk is being minimised or managed.

The purpose of this SWOT analysis was to give insight into how feed manufacturers needs to think and plan scenario's on what could possibly happen in the industry and external environment and to be prepared for such possible business changing events.

4.1.5 Business models of the future

Organisations and industry need to be able to engage successfully in the rapidly changing current and future business and market environment. Continuous business models and structure development is required to be able to cope with changes and to be able to ensure sustainable growth. Figure 71 below is a representation of the elements needed for a business model to be able to function successfully given that all three aspects are included into the strategic knowledge of thinking in an organisation.

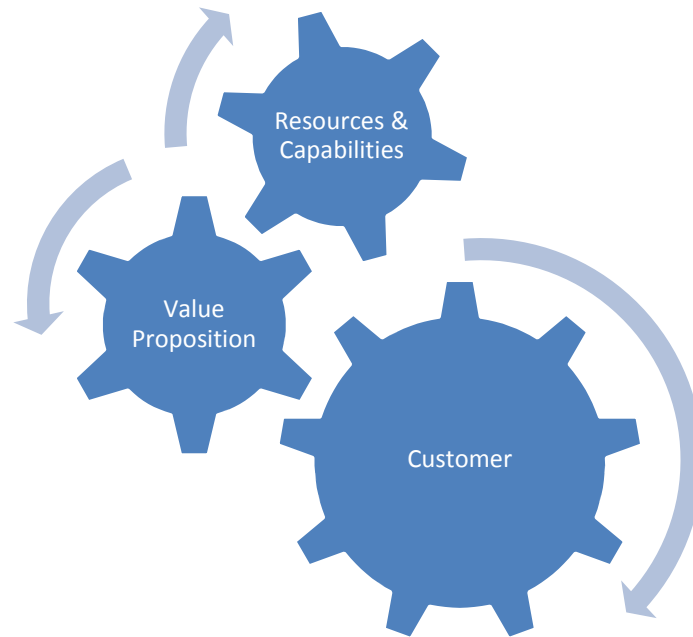


Figure 71: Business Model Template

Source: Abell, 2009

Based on the model of Abell (2009) management of a business must focus on the three segments as follows:

- Customer: Who is the customer that the business will be serving in the future?
- Value proposition: What will be offered to the customer in the future?
- Resources & capabilities: How will the 'offer' to the customer be delivered and value added in the processes

The development of business models for the future should focus on the customer with the environment and sustainability as the core for decision-making and strategy. The IIED (2009) stated:

Pearson (2010), a renowned futurologist shared his personal view on how the world of business can look like in 2020. The following trends were discussed by him:

- “The increasing political and economic dominance of emerging markets will cause global companies to rethink and customize their corporate strategies.
- Climate change will remain high on the agenda as companies seek to explore resource efficiency to improve the bottom line and drive competitive advantage.
- The financial landscape will look vastly different as increasing regulation and government intervention drive restructuring and new business models.
- Governments will play an increasingly prominent role in the private sector as demand for greater regulation and increasing fiscal pressures dominate the agenda.
- In its next evolution, technology will be driven by emerging-market innovations and a focus on instant communication anytime, anywhere.
- Leaders will need to address the needs and aspirations of an increasingly diverse 21st century workforce.

The way that business leaders plan for — and respond to — these trends over the next decade will help determine who the market leading companies of tomorrow will be.” (Pearson (Ernest & Young), 2010).

Professor Mohammed Karan addressed the conference of the Agricultural Business Chamber (ABC) congress 2010, held in Somerset-West in the Western Cape on behalf of the National Planning Commission (NPC). The NPC have a vision towards 2025 to look at agriculture in a new light. They are currently searching for a new paradigm for agriculture. The main focus of the strategic planning according to Prof. Karan (2010) is to answer ‘what is urgent’ and ‘what is important’. Thus the NPC will focus on the following:

- Cry the beloved countryside
- Rediscover our role in the economy
- Getting past the ethical issues and stigmas
- The viability and role of the small scale farmers
- Assisting new entrants
- How to help the poor do better
- Serious lack of transformation
- Trust and contracted arrangements

- Implicit subsidization and multi-functuality
- The food security conundrum
- Water
- Competition issues
- Extending into Africa
- Public research quovadis
- Future of family farms
- Private equity in agribusinesses
- Education and professional development
- Nature of growth
- Gender
- Climate change

If the NPC can succeed in finding effective solutions to overcome these paradigms, then agriculture in South Africa can grow sustainably. However in the mean time, agribusinesses will have to adapt their business models to make provisions for these paradigms as well.

“Business must build their own capacities to work effectively for sustainable development, and engage in strategic alliances with other enterprises, financial service providers, government agencies development practitioners and communities” (IIED, 2009). This should apply to organisational bodies such as AFMA, SAPPO and SAPA too.

As indicated by the IIED (2009) the following key principles incorporated in the three elements of a business model need to be joined in strategic planning:

- “...the ‘value proposition’ of a business model for sustainable development needs to be considered in terms of financial, environmental and social values.”

- “...the company needs to look not only at value creation and capture for itself and its customers, but also value distribution throughout the market chain.”
- “The more effective the long-term business model for sustainable development are designed and implemented via collaboration.” (IIED, 2009)

Although each business and industry have a different approach to these core principles, at the end the value added to the business as well as the supply chain and final customer remains paramount.. Agriculture today faces huge challenges. Cooperation and co-creation of new knowledge markets is essential in the debates concerning the future of agribusiness, agriculture and the environment. Most issues require involvement not only from the business community and knowledge institutions, but also different levels of government and a diverse set of societal organizations.

Many (international) organization and companies are working to ensure a future for agriculture that is sustainable in terms of economic growth and environmental and societal values. In a broader perspective, those organizations generally work towards the same goal, but focus on different aspects of the agricultural arena or have a different mode of operation. Still, there is no clear recipe on how to work on this challenge and with whom. We are still in the experimental stages.

Organisations and businesses of the future will have to adapt and change their current core business models and short sighted visions of the present. This is to be able to facilitate the following and ongoing changes in the business and market environment, and answer to questions raised on the future of the feed industry and the pork and broiler industries:

The continuing reshaping and changes in the world’s economies and financial markets are key principles to consider how to manage the external business environment and retain and develop current core businesses. Business’s scenarios of the future and how the unfolding of these scenario’s can potentially impact on the business must be developed and tested by expertise within the organisational and strategic planning of the board of directors. Dynamic and pragmatic business models for the future are required and contingency plans been put in place to focus on current and future risks, structural changes and unforeseen shocks.

The economic and financial crisis of 2008/09 changed the complexity of forecasting and planning by not foreseeing unusual and threatening circumstances that may abruptly change the structure of the presented business model. This led not only to the declining world economic growth and commodity price instability but also to instability in the agricultural sector. This crisis was followed by the recent government debt crises which also impacts on the South African markets and currencies. The question is whether business in general, including agribusinesses in SA, is paying sufficient attention to the future. Currently companies seem to be short term focused in their financial results, current business models and competition reacting to immediate situations but not being more pro-active by investing sufficient time in the future. The weakening of the global demand because of the deep recession and declining economic growth resulted in the reduced disposable income of consumers and export demand and lower agricultural commodity prices, compared with those in 2008. These in turn reduced farm income and created cash flow problems for farmers – needing additional finance while the availability of credit is restricted by legislation and banks very conservative in their credit policies. Business models need to adapt to new draft banking regulations that are expected to restrict future credit growth by banks, while western economies continue to struggle.

Environmental conflicts within the food system are not a new concept to agriculture, rather an overlooked concept. Business models of the future will have to determine continuously creating sustainable growth given the environmental impact. In South Africa, for example, the rights of water are beginning to have a major impact as a restriction on farm expansion. Without farm expansions, industries cannot grow sufficiently and thus do not adhere to the goal of sustainable growth.

Technology and innovation implementation in meeting food system challenges needs to be up to standard and globally competitive. New methods and machinery needs to be implemented to lower costs and increase production efficiency and competitiveness without increasing the cost to the consumer. The harness of renewable energy needs to be used in running this technologically advanced machinery to further reduce harm to the environment.

Responsible food supply systems as well as the effectiveness of system optimisation are critical for businesses to build their business models for the future. The effectiveness of today's systems means the

downfall tomorrow if no improvements are made to the supply chain infrastructure, communication systems, logistics and control.

Human capital development and management issues are a growing concern for the future. During the 2009 AEASA conference in Durban, it was emphasised that there are not sufficient technical expertise, trained agricultural economists, extension officers and industry leaders in South Africa to supply in the demand for trained expertise. Organisations must invest into programmes to train new graduates in the respective fields of agriculture.

The following issues can impact on the South African agricultural landscape and new questions needs to be asked about the future environment in which they operate:

- Correcting the structural imbalance of maize exports, soya bean and wheat imports in SA agriculture
- The impact of government policies on various aspects of agriculture and economy of SA
- EU farm subsidies will phase out
- USA exports will be competitive given the devaluating currency
- South Africa will have a strong currency because of other structural weaknesses in other countries
- Agricultural growth markets will shift with the realignment of exchange rates
- In the past there has been too large focus on traditional markets. This lead to increasing the South African concentration risks
- The South African agricultural industries are under pressure. The increase in economies of scale as well as capital intensity, yield increases and diversifying can result in lower numbers of small scale shareholders because they have difficulty to establish themselves in the current market environment – a dichotomy in terms of establishing more emerging farmers.
- The lack of agricultural policy guidelines will change the way in which markets are shaped
- The impact of the emerging BRIC countries, and how these countries will handle imports and exports
- The impact of China on the world, and how this impact will change exports and imports
- The current state of the South African infrastructure. The lack of maintenance and infrastructural development will result in decreased competitiveness and higher costs to the consumers

- The environment and green movements are becoming a major concern to all. This needs to be factored into the strategic thinking of organisations to address value adding without damaging the environment
- The alliances and relationships formed within the supply chains as well as the ownership of an entire supply chain structure
- The continuous investigation of the Competition Commission and the impact on businesses. If the Competition Commission keeps focussing on individual large businesses (being highly integrated on all levels in the supply chain) the result may be that these groups may source from outside companies
- Continuous talk on land redistribution and the nationalisation of farm land in South Africa
- The lack of appropriate governmental involvement in creating a sustainable growing agricultural sector without down grading methods
- Ownership arrangements into BEE.

Given the above, the business model of the future will have to be pragmatic and focus on the following:

- Sustainability
- Climate change
- Emerging farmers/markets
- Technology
- Systemic risks
- The balance of power

Feed manufacturers, holding companies, pork producers, contract and independent broiler growers and all links in the supply chain can develop an acceptable business model to focus not only on the current market environment but also to create value to customers in the future. The SWOT analysis of these industries, as earlier mentioned, assists in forming the core foundation and structure of the business model. Without this vision structure to expand upon and revise continuously, a business will not be able to create sustainable growth for the future.

4.1.6 Supply Chain Operation Reference (SCOR)

SCOR is a process reference model designed for effective communication among supply-chain partners. The SCOR model was developed by the Supply Chain Council and is a registered trademark in the United States of Europe.

SCOR is used to describe measure and evaluate Supply-Chain configurations to:

- **Describe:** Standard SCOR process definitions allow virtually any supply-chain to be configured.
- **Measure:** Standard SCOR metrics enable measurement and benchmarking of supply-chain performance.
- **Evaluate:** Supply-chain configurations may be evaluated to support continuous improvement and strategic planning” (SCOR Version 8.0, 2008).

This model is best used by an agri-business or in the case of this study a feed, pork or broiler producer. It explains the relationships, communication and deliverables that must be in place for e.g. a manufacturer to be optimal in business management and operations. To explain the entire supply chain, for example. The pork industry, the conventional approach as illustrated earlier in this study can be used. However, the conventional supply chain only shows how value is added from one link in the chain to another, but not the physical breakdown of activities and value adding processes. This is where the SCOR model, adaptable by individual producers and manufacturers, can be of strategic advantage to management as management can exactly observe the processes, costs and communication involved between actors in the same organisation.

There are four basic levels identified in general operations in a supply chain. These levels are as follows:

- Top level (Process type)

- Configuration level (Process categories)
- Process element levels (Decompose processes)
- Implementation level (Decompose process elements)

These four levels each add a different dimension to the model in order to give management a better understanding of the underlining activities that take place in the analytical thinking process of an actor in the process as well as the interaction between actors in the supply chain. On each level there are certain logical processes at work that a specific actor in a chain must do to deliver a specific desired 'outcome' to the next actor in the chain or the final consumer. These processes are as follows:

- Plan
- Source
- Make
- Deliver
- Return

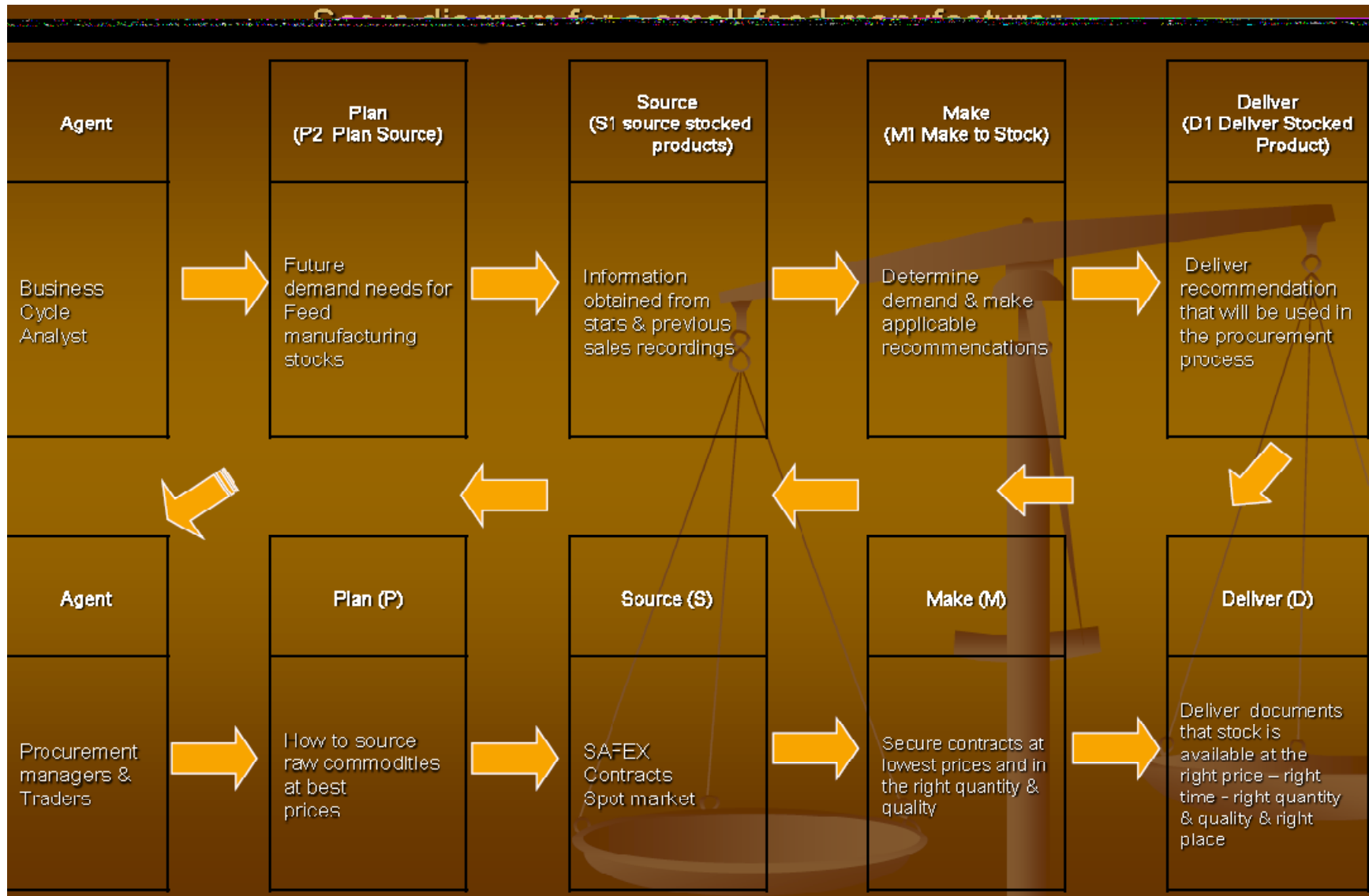
For the purpose of this study, a case study approach will be used in explaining how the SCOR model can be used and implemented as a supply chain break down analysis. This case study will be based on the following scenario and assumptions:

- Feed manufacturer producing a diverse range of feeds for desired livestock according to pre-determined rations. These product ranges are all based on the same actors and manufacturing process
- Small/medium feed manufacturer
- Purchase raw feed ingredients and do not grow own crops
- Only responsible for the manufacturing process and delivery of feed by truck to livestock producers
- Process starts where raw ingredients are sourced and ends at the delivery of manufactured feeds
- A simplified case study will be used

- Only four actors will be assumed in this case study
- Only level 2 will be illustrated.

Figure 72 below is the flow diagram for the feed manufacturer with the interaction indicated between different actors and role players in the manufacturing process.

) .: 9+1



Source: Own representation on SCOR model, 2010

The flow of the diagram is from one actor in the manufacturing value chain to the next actor. In each actor's processes there is a flow of information, paperwork and data as well as products that need to be taken into consideration. Each actor in his respective field in the operational field is responsible to Plan, Source, Make and Deliver either information or goods from one station to the following down the chain. As mentioned, there is a return factor. This return is either feedback on the status of the batch received of goods delivered or information that can be used for future reference and tracking.

Once a business developed the basic SCOR model on a level 2 standard, then the level 3 can be applied to further break the model down. This is to further evaluate the value adding process along the supply line. Once this model is established and uniquely modified to a business's specific needs, it can be used as a strategic business tool to assist management in optimizing the flow of goods and service. This optimisation will result in cost efficiencies and better resource management due to less time and waste management on the production line. This part of the entire value chain can be expanded for the whole feed chain given the unique characteristics of each individual step in the supply chain.

4.1.7 Prices and price volatility

In 1995 grain marketing in South Africa was deregulated in terms of interventions relating to price determination. The market for agricultural derivatives was established to provide market participants with a price risk management facility as well as a price determination mechanism without distorting economic principles. Maize traders who act on behalf of clients for a fixed fee perform an important function in a free market orientated maize market. These traders take positions (forward buying and selling), assume market risks, establish the value of maize and provide the real cash market for maize (NAMC, 2004).

According to the NAMC's Quarterly Food Price Monitor report (November 2009), world prices for most soft commodities, increased by approximately 20 percent from November 2008, due to the world financial crisis. A depreciation of the US Dollar, higher crude oil prices and a strong demand from Asian markets and bio-fuel markets in the US and Europe contributed to this increase. These world-price increases were however not fully transmitted into South African markets due to the appreciation of the Rand relative to the US Dollar during that period. Between October 2008 and October 2009 domestic maize prices decreased by 16.34

percent in the South African market. The prices of maize products in urban areas decreased 2.01 percent (on average) between October 2008 and October 2009. However, the prices of maize products in the rural areas increased by 4.48 percent (NAMC, 2009).

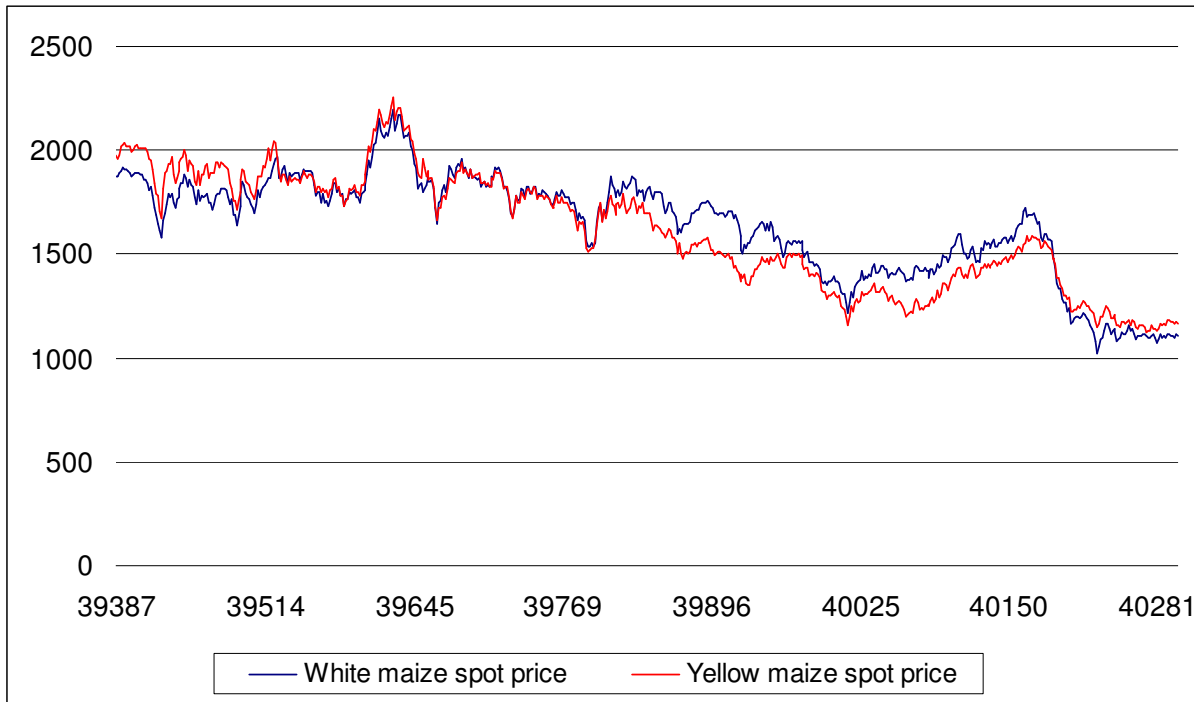


Figure 73: White and yellow maize spot prices, Nov 2007-Jan2010

Source: SAFEX, 2010

Prices of agricultural commodities and "volatility" have been a significant concern since the drastic maize price changes occurred in South Africa during the 2001/02 - marketing season. They have been in the spotlight again since agricultural commodity prices reached their peak in late 2007 and early 2008. The problem of price volatility is not new. The issue of how to address the discontinuity of supply in the face of continued demand has been debated for ages. In addition, volatility discussions nowadays overlap with discussions of greater uncertainty in a rapidly changing economic and natural environment and the structural economic changes that occurred during the recent worldwide economic recession.

The prices of agricultural commodities vary more than many other commodity prices (Alexandratos, 2009). Prices could rise, for example by 50 percent and then drop in a short time period. The structure of the world

cereal markets is also quite thin as only a small proportion of world cereal production end up on the world market as a large portion of the produced cereal is consumed in the domestic market (FAO, 2008).

Only 17 percent of the wheat production and 7 percent of the rice production end up on the world market (FAO, 2008). Thin markets react easily to the changes in global supply and demand (Alexandratos, 2009).

In 2008, many articles were published about the food crisis, for example Abbot *et al.* (2008), Alexandratos (2008), Baltzer *et al.*(2008), Heady and Fan (2008) and Trostle (2008), to name but a few. None of the authors were able to identify a single factor which caused the rapid rise in cereal prices. Some factors identified have influenced structural changes in demand and supply for decades and other factors have affected food prices in the near run and some have been only sudden shocks (Trostle, 2008). Abbot *et al.* (2008) identified three broad sets of forces driving food price increases:

- Global changes in production and consumption of the key commodities
- The depreciation of the dollar, and
- Growth in the production of biofuels.

Heady and Fan (2008) have built a model which explains the principal causes and the main causal mechanism of the 2007/08 food crisis. Many factors are commodity-specific, some factors are highly significant and some less. In Figure 74 the so-called less convincing factors are illustrated with dashed lines. The decline of the dollar and the oil price are in the same box because they are both universal factors and because they may be causally related to each other.

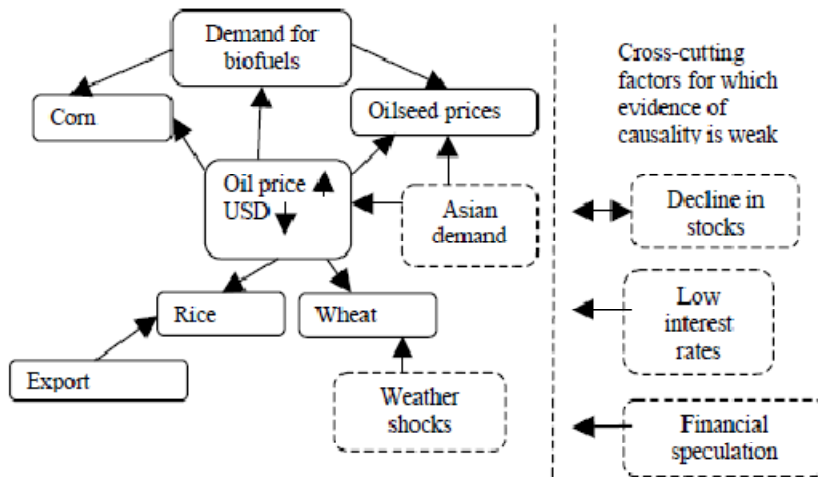


Figure 74: A model of the principal causes of the crisis

Source: Heady & Fan, 2008

Before discussing price volatility, it is necessary to understand what volatility is and how it is related to risk. According to Hull (2006), *risk* permits the assignment of probabilities to the different outcomes, and *volatility* is linked to risk in that it provides a measure of the possible variation or movement in a particular economic variable or some function of that variable, an example being a growth rate.

Volatility provides a measure of the possible variation or movement in a particular economic variable. It provides a measure that describes the tendency of a commodity, for example the maize market, to move either up or down and to what extent the anticipated move could be. In essence it is a fear factor. If the price jumps by large amounts in a short space of time then the volatility of the market will be high. If the market movement is small, steady and predictable then the volatility will be low. Lack of predictability and uncertainty associated with increased volatility may influence both producers and consumers. High volatility may limit the ability of consumers (processors) to secure supplies and control input costs.

Two measures of volatility are used by European Commission (2009). These are:

- Historical (realised) volatility, based on observed (realised) movements of price over an historical period. Historical volatility tells us how volatile an asset has been in the past. It represents past price movements and reflects the resolution of supply and demand factors.
- Implicit volatility. Implicit volatility is the markets' view on how volatile an asset will be in the future. It represents the market's expectation of how much the price of a commodity is likely to move and tends to be more responsive to current market conditions.

Historical volatility

Historical volatility is a statistical measure of the volatility of a futures contract, security, or other instrument over a specified number of past trading days. (www.cftc.gov/educationcenter/glossary/glossary_h.html, n.d.). It is an indication of past volatility in the market place. Historical volatility is calculated as the annualized standard deviation of the first difference in the logarithmic values of nearby futures settlement prices. Mathematically,

$$Volatility = STDEV_{Day1}^{Day2} \left(\ln \frac{SettlePx T}{SettlePx T-1} \right) * \sqrt{252}$$

As volatility is usually described in annualized terms, a factor of square root of 252 (estimated number of trade days in a year) are used to annualize the historical volatility. Table 36 shows the historical volatility of the maize contract traded on the CME.

Table 36: Historical volatility of the maize contract traded on CME (percentage)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly Average
2000	22.4	14.4	25.6	16.8	26.0	28.8	20.4	16.2	18.5	17.4	17	15.7	19.9
2001	17.9	12.1	19.2	20.8	21.3	16.6	41.6	19.1	17.3	15.0	21.4	11.2	19.4
2002	12.0	13.1	11.6	11.4	23.2	20.2	42.1	24.7	28.0	19.2	16.7	13	19.6
2003	20.2	11.4	18.5	12.5	22.6	19.7	16.6	25.4	22.8	28.6	25.2	18.3	20.1
2004	26.0	17.9	23.6	26.3	27.6	29.9	20.4	23.4	15.1	18.0	15.5	16.7	21.7
2005	20.1	20.9	22.6	20.1	25.0	33.8	42.2	22.4	16.0	10.5	9.5	19.5	21.9
2006	19.1	23.1	30.7	19.8	31.3	28.8	26.7	30.2	39.5	43.5	26.9	26.3	28.8
2007	38.1	27.9	23	36.8	42	38.1	30.1	27.3	39.2	31.4	22.6	20.1	31.4
2008	32.2	22.2	40.8	28.9	29.2	35.1	36.5	51.2	49.4	63.9	46	59.8	41.3
2009	50.9	30.2	36.3	28.7	16.6	41.4	46.3	28.4	55.2	43.0	35.2	29.2	36.8
2010	31.7												31.7
Mean	40.23	25.05	31.9	32.85	42	38.1	33.3	39.25	49.4	37.2	23.6	22.98	
High	50.9	30.2	40.8	36.8	42	56	54.8	51.2	55.2	63.9	46	59.8	
Low	12	11.4	11.6	11.4	21.3	16.6	16.6	16.2	15.1	10.5	9.5	11.2	

Table 36 shows the volatile nature of the South African white maize contract traded on SAFEX. One can clearly see that the South African contract is much more volatile than the CME contracts. Interesting to note is the fact that during 2008 and 2009 (the word financial crisis) the volatility of the white maize contract traded on SAFEX was less than the volatility of the corn contract traded on the CME. A possible explanation can be that the South African market has a smaller portion of funds traded the contract compared to the CME.

Table 37: Historical volatility of the white maize contract traded on SAFEX (percentage)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly average
2000	15.5	14.9	39.2	67.7	45.9	15.6	18.9	20.4	18.1	26.1	23.4	15.6	26.77
2001	38.6	58.3	28.5	10.7	16.5	21.7	23.7	11.1	18.7	35.4	30.5	39.1	27.73
2002	48.8	39.1	42.6	22.4	24.4	25.6	17.0	14.0	9.3	14.5	14.2	34.7	25.55
2003	41.0	59.8	63.3	47.4	53.6	36.2	26.7	30.7	19.9	47.9	21.8	52.0	41.70
2004	55.4	45.0	47.8	42.3	24.5	31.5	36.8	30.8	23.5	41.0	43.2	49.5	39.28
2005	61.8	36.2	36.4	30.2	25.7	20.5	28.6	20.1	34.5	30.4	37.4	43.4	33.77
2006	47.6	40.5	20.9	51.3	16.5	21.0	19.9	21.2	23.2	40.7	31.3	30.4	30.37
2007	34.7	41.5	39.6	44.4	31.0	32.0	31.1	22.4	24.5	21.6	13.1	38.7	31.22
2008	29.9	33.0	33.5	23.6	26.8	28.6	34.1	42.2	22.6	30.3	20.7	46.5	31.00
2009	27.9	24.4	13.2	26.8	28.3	22.2	36.4	28.4	20.9	28.6	27.1	21.8	25.49
2010	38.9	38.3											38.61
Monthly Average	40.0	39.2	36.5	36.7	29.3	25.5	27.3	24.1	21.5	31.6	26.3	37.2	
High	61.8	59.8	63.3	67.7	45.9	36.2	36.8	42.2	34.5	47.9	43.2	52.0	
Low	15.5	15.0	13.2	10.7	16.5	15.6	17.0	11.1	9.3	14.5	13.1	15.6	

Source: Based on own calculations from SAFEX data (2010)

Implicit volatility

The South African Volatility Index (SAVI) for white maize is based on the forward looking option volatility which therefore means it provides a transparent reference tool for the market to better understand the potential uncertainty in the market. It therefore measures the implicit volatility of the white maize contract.

With the SAVI-White Maize the JSE is constructing a 3 month forward looking index (JSE, 2009). In essence, the JSE measures the market volatility is three months from today, every day. The index serves

as a transparent volatility indicator. Because it is a forward looking indicator and not based entirely on the historic values but rather more on participants' opinions, one will be able to notice that as people get more fearful of market conditions, the value of the indicator will start to rise. This can be seen in Figure 75 which plots the SAVI white maize index versus the spot price for white maize going back to 2002. The volatility or fear in the market increases particularly around the local weather market (Jan- Mar) when follow-up rains are crucial to ensure a good crop. Due to the uncertainty around this period, particularly when stock levels are tight, the volatility increases to over 60 percent in certain seasons.

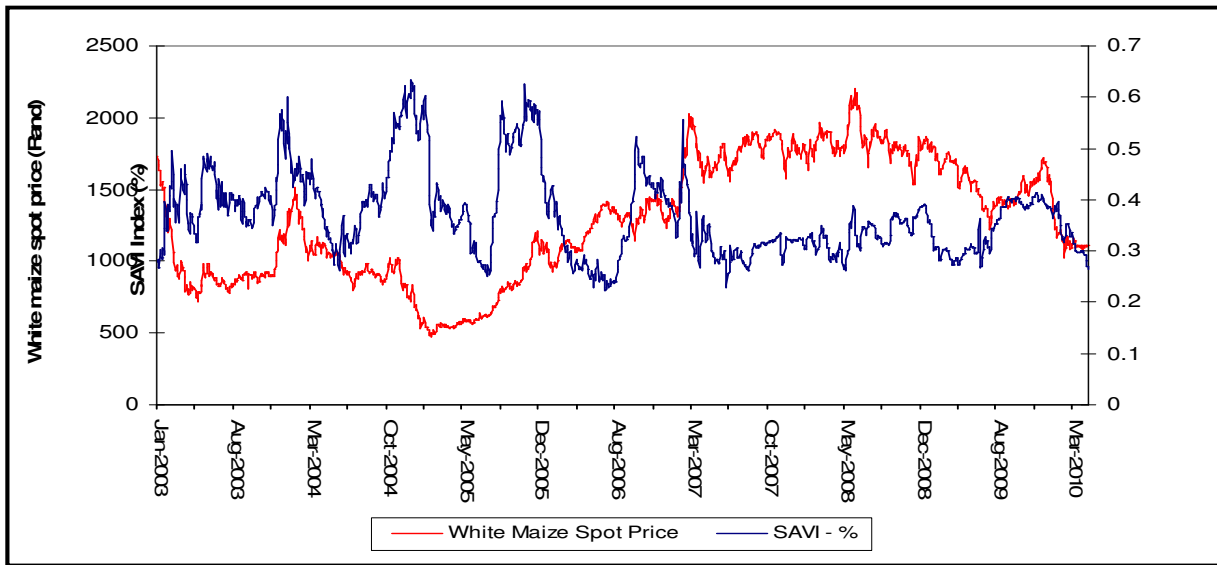


Figure 75: SAVI Index of white maize traded on SAFEX (from January 2002 to February 2010)

Source: JSE, 2010

The SAVI white maize is a transparent indicator of the market sentiment and easily allows market participants to gauge how fearful the market really is. When considering the history of the index, an index below 30 percent implies the market is complacent with limited uncertainty envisaged for the 3 months ahead, whilst anything over 30 percent implies a higher degree of uncertainty (JSE, 2009).

Price variability is an important component of the grain farmers' planning because of its impact on farm profitability. Knowledge about price volatility and the factors affecting it will benefit derivative instrument users and will aid in price risk management. South Africa shows high levels of both implied option volatility and price volatility. Meyer *et al* (2006) state that the equilibrium price in the smaller market can be

estimated as a function of the equilibrium price in the dominant market, the exchange rate and the transaction costs. Thus when trade occurs between markets, the difference in price is equal to the transaction costs. Meyer *et al* (2006) divide trade into three market regimes: near-autarky, import parity, and export parity. Within these regimes Meyer tested the effect of a 10% increase in the world price on the South African producer price of yellow maize. The results reported indicate a 3.4% increase in producer price in the case of a near-autarky regime and an 11.2% increase in the case of an import parity regime. The average percentage change between these two regimes is 7.3% indicating a strong link between the world price and the domestic producer price.

In light of the above, one therefore expects the SAFEX price to follow similar volatility patterns as CBOT and the exchange rate. Geysler and Cutts conducted a study in 2007 into price volatility of SAFEX. Cutts and Geysler (2007) explain that the fundamental factors determining the price of maize on the South African Futures Exchange (SAFEX) are:

- The supply and demand globally [as reflected in the Chicago Board of Trade (CBOT) price]
- South African demand, supply and stock levels,
- The Rand-Dollar exchange rates due to it directly affecting the import and export parity price.

Cutts and Geysler (2007) also noted two points after adjusting a monthly average price volatility graph depicting South African and North American maize prices (as well as the value of gold and the Rand/Dollar currency), so that planting and harvesting seasons coincide in the two different countries. Firstly, they note that uncertainty increases in all markets during the planting and initial growth period. During the growth period volatility decreases and finally attains a minimum after accurate crop estimates have been released. The SAFEX futures price for white maize, WMAZ, shows strong variability in December to February when high degrees of uncertainty surrounding the likely yield outcomes are present. They further report that the high price variability corresponds to the typical “weather market” period when SAFEX is responsive towards the impact of the South African weather on maize production. The SAFEX futures price for yellow maize, YMAZ, follows a similar pattern (although the period of uncertainty extends into March). Cutts and Geysler (2007) suggested that the futures price for yellow maize (YMAZ) might not pose the same sensitivity

towards weather as the futures price for white maize (WMAZ), but rather sensitivity towards world supply and therefore exchange rate.

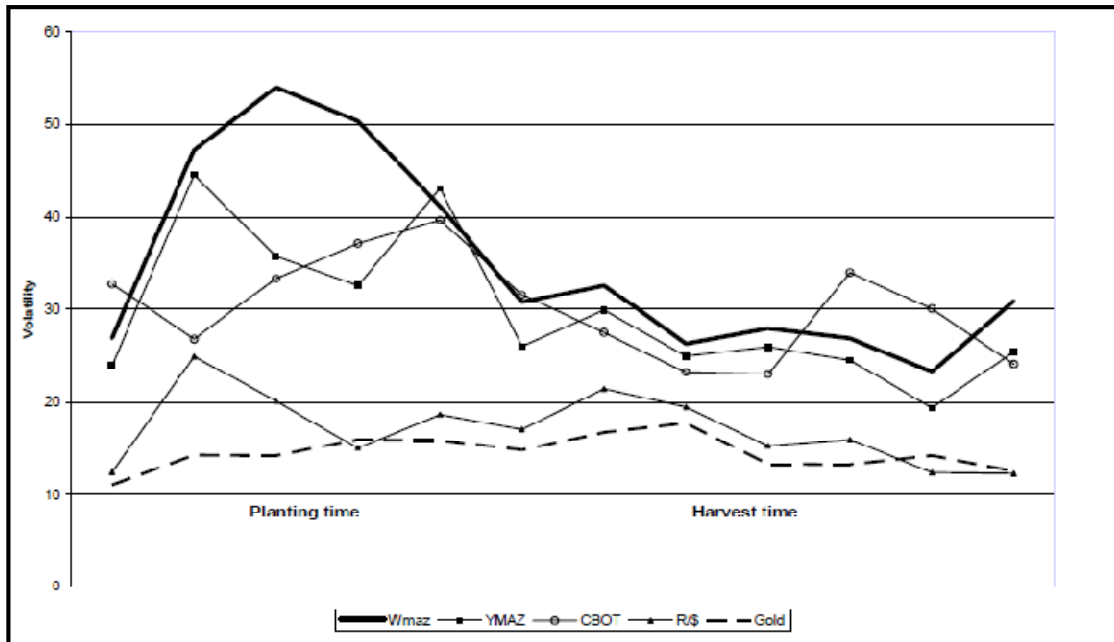


Figure 76: Average monthly price volatility

Source: Cutts & Geysler, 2007

Secondly, they found that the South African maize market was consistently more volatile than the CBOT maize price, and that the SAFEX white maize price was more volatile (on average) than the SAFEX yellow maize price. They also found that the extended period of volatility for YMAZ (up to March) illustrated the sensitivity of YMAZ to world supply, which during this period depends heavily on the weather in the United States.

Another study conducted by Monk, Grove and Jordaan (2007) aimed to quantify and explain SAFEX July futures price volatilities for white and yellow maize. They also found that volatility has increased for both the white- and yellow maize market in later years. They found that information plays a major role in price changes on futures contracts. Traders and speculators are very sensitive towards new information releases as has been proven by the significance of the Crop Estimates Committee's reports as well as the

World Agricultural Supply and Demand reports issued by the US Department of Agriculture. Local information as well as international information plays an important role in trader decision making in the South African maize futures market. This effect can be seen with significant volatility changes in the futures market prior to the report dates for the respective local and international reports. This information phenomena can be backed by the fact that expected rainfall is also a significant role player in the market. The study found that white maize is more sensitive towards CEC reports than yellow maize, confirming the fact that South Africa rely more in yellow maize imports, thus being more sensitive towards world conditions and world reports.

The impact of price volatility on the feed industry as earlier mentioned as well as illustrated practically in the maize market above is severe. The large scale fluctuation of raw commodity prices make the strategic procurement process more difficult to manage than with fixed and stable price trends over time. The direct impact on feed manufacturers is the fluctuations in the cost of production. Prices are mostly fixed for a month. If prices in the maize market fluctuate largely, then the cost only gets transferred to the following months. The effect down the supply chain is that price transmissions are slower and impacts more on the profitability levels of pork and broiler producers. In the end the multiplication impact of these sudden price fluctuations is that the consumer ends up paying more for the desired products than need to be.

4.2 Poultry industry analysis

The following section will focus on the structure, conduct and performance of the poultry industry and more specifically the broiler industry.

4.2.1 Structure in the poultry industry

Historically, the poultry industry has been the face of South African animal production sector (SAPA, 2009). Individuals kept broiler as well as layer production chickens in the backyard for different purposes including traditional ceremonies and general consumption purposes by households. An increased interest on poultry

production, accompanied by the growing need for protein and white meat, led to increased awareness and interest and more people formed poultry clubs which helped them to share the necessary skills and knowledge on how they can overcome problems in the production and growth of poultry enterprises. This mindset of people getting together and forming joint groups that can better attend to one another's problems led to a number of bodies formed in the poultry industry. Figure 77 below is a typical supply chain found in the broiler industry.

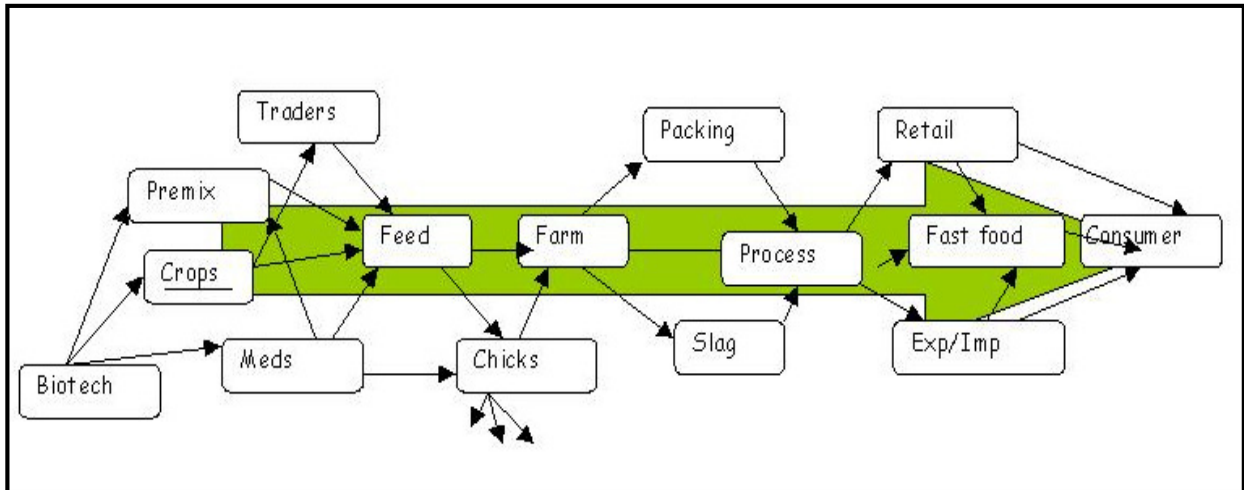


Figure 77: Example of a typical broiler supply chain

Source: www.spesfeed.co.za, 2010

Figure 78 gives the current structure within the broiler industry. The different components and role players in the broiler supply chain follow afterwards.

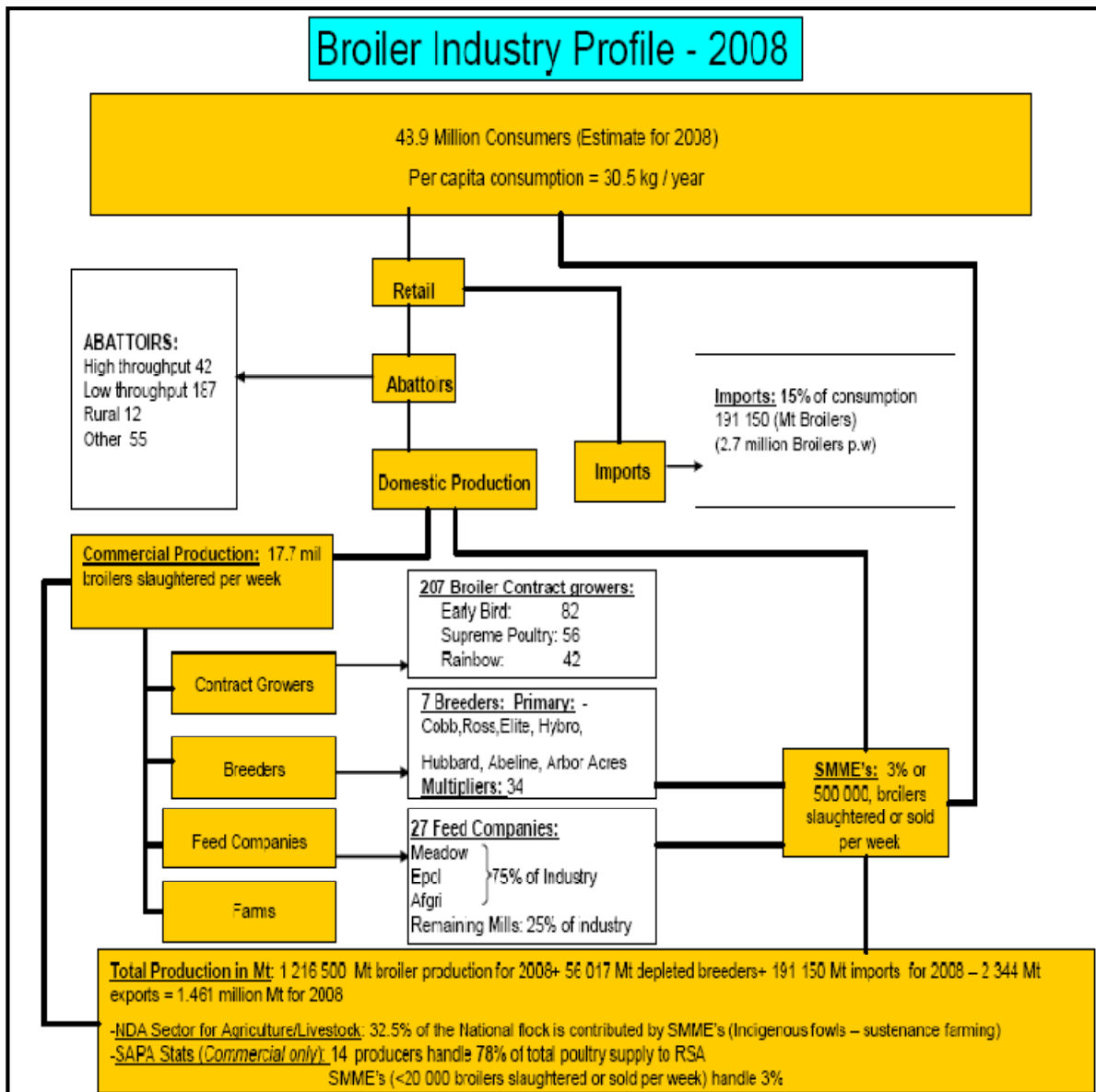


Figure 78: South African Broiler Industry Profile

Source: SAPA, 2009

It can further be seen from Figure 78 that the process of broiler production gets to be successful because of the integration formed by the feed companies, processors, farmers, retailers and consumers. The feed industry forms part of interrelated chains of plant derived materials and animal derived materials (Broring, 2009). The relationship formed by this integration spreads further into the key role players involved in the manufacturing of feed stuffs. More detail is given below.

Breeders

Under the broiler industry three kinds of growers can be established namely:

- Contract growers: Under contract to grow and deliver to a specific holding company and to purchase the feed as specified by the company.
- Independent growers: Under no obligation to deliver to any company, may also source own feed supplier.
- Direct growers: Grows for own organisation e.g. Rainbow growers

Growers can be sized in the following criteria as was used for the structuring of the interviews:

- Small: Less than 600 000 chickens per cycle
- Medium: Between 600 001 to 5 000 000 chickens per cycle
- Large: More than 5 000 000 chickens per cycle

Note: These sizes are for larger growers and are not applicable to small informal growers

Poultry farmers, both broiler and layers, get their inputs from the day-old chick supply (SAPA, 2009). The quality of poultry inputs from the day-old chick supply plays an important role in terms of performance when looking at the egg production and reducing mortality, when looking at broilers. Some of the key role players in the poultry industry are Rainbow, Tydstroom, Early Bird, Sovereign, Country Bird, Supreme, County Fair, and the independent producers to name a few.

“Rainbow remains the biggest volume producer of broiler meat in South Africa, with approximately four million birds per week. It is a fully integrated broiler producer that breeds and rears its own livestock and processes and markets fresh, frozen, value-added and further processed chicken nationally. Rainbow estimates the size of the total chicken market in South Africa to be approximately R11 billion. Total market volume growth over the past year is estimated at 10 percent of which approximately 7 percent relates to local producers and the balance is attributable to a 48 percent growth in imports. The foodservice channel, which represents almost a third of Rainbow's chicken business, grew by approximately 12 percent” (De

Beer, 2009). The capital outlay for a broiler unit varies between R1.9 million to R3 million per unit depending on the type of unit being built and the level of technology incorporated. These houses usually have between 25 000 to 35 000 chickens with an average of 20 chickens per square meter. For a grower to be able to grow profitable as well as sustainable, more than 100 000 chickens per 54 day cycle are required.

Producers

South African broiler producers are divided into two major categories namely, the commercial producers and small scale producers. Table 38 shows the provincial distribution of broiler farms in South Africa where it is evident that the North West province dominates all other provinces in terms of broiler production with the share of 25.1 percent followed by the Western Cape, Mpumalanga, KwaZulu-Natal, Gauteng, Free State, Eastern Cape and Northern Cape.

Table 38: Provincial distribution of broiler farms in South Africa

Region	Broilers	% Broilers
Eastern Cape	4 224 050	4.21
Free state	5 400 995	5.39
Gauteng	5 953 081	5.94
KwaZulu-Natal	14 760 749	14.72
Limpopo	2 066 681	2.06
Mpumalanga	21 092 140	21.04
North West	25 150 413	25.08
Northern Cape	140 000	0.14
Western Cape	21 479 600	21.42
Total	100 267 709	100.00

Source: SAPA, 2009

Table 39 below shows the percentage market share that different growers owned in the broiler market in 2005. Note that these figures are for 2005, but the share in capacity and production size remains mainly the same at present. Rainbow and Astral are still the largest market share owners.

Table 39: Percentage market share of producers in the broiler industry

Producer	% Market share
Daybreak	4
Country Bird	8
Rainbow	36
Astral	27
Tydstroom	5
Chubby Chick	4
Rocklands	4
Argy	2
Others	10
Total	100

Source: AFMA & Roberts of the Competition Commission Board, 2005

South African Poultry Association (SAPA)

South African Poultry Association (SAPA) is one of the key role players in the poultry supply chain. It was established in 1904 in Kimberley mainly as a body to promote and coordinate the broiler industry and later the egg industry. SAPA is crucial to the growth and development of the poultry industry in general. As its mission and vision is to be an industry driven organization that addresses collective issues and to create a milieu within which members can become world class competitors in the food market, SAPA is a representative of broiler farmers both small scale and commercial farmers. It is concerned about the representation and assistance of farmers in different aspects such as the day-old chick supply industry, the egg industry and the broiler industry. It is further characterised by a huge sub-continental impact.

Consumers

Poultry is one of the continuously growing industries in the South African meat industry. The continuous growth is influenced by the fact that poultry is one of the cheapest sources of protein in comparison to other meat sources of protein such as pork, beef, and mutton. According to Vauquelin (2009), there has been a significant increase in the growth and demand for poultry since 2006 which continued through to 2007 and

2008. According to Briedenhann (2009) the remarkable increase in the demand for food could be attributed to an increase in disposable income which was recorded in South Africa in 2008, which further resulted in an increased *per capita* consumption of not only poultry products, but also other agricultural products such as milk and meat in general.

Consumption in the feed industry ranges from the feed manufacturers who are vertically integrated to the farmers themselves. Figure 78 shows that producers, feed companies, contract growers and breeders jointly form commercialized broiler production. Each product that is involved in the process is being consumed by a different party in the same process. Farmers are customers of animal feed and day-old chicks and are therefore consumers of animal feed and day-old chicks. This is an indication that farmers are largely dependent on feed manufacturers for feed. On the other hand, contract growers need supply of fully grown chicken from farmers and they are consumers of the day-old chickens. Should farmers underperform, the contract growers would not be able to sell to the retailers which in turn would not be able to sell to the final consumer. Finally individual people buy processed chicken from the abattoirs and retailers and are therefore consumers in that regard and this makes the whole supply chain complete.

Production of poultry meat and eggs has increased by 7.2 percent in 2002/2008 where red meat increased by less than 7.2 percent during the same period (SAPA, 2009). Under commercial production 17.7 million broilers are slaughtered per week in comparison to the small, medium and micro enterprises (SMMEs) which are able to slaughter only 500 000 broiler per week. This is evident looking at the parties involved, that is, farmers, feed companies, breeders and contract growers such as Rainbow, Early Bird and Supreme poultry.

4.2.2 Conduct in the poultry industry

The conduct of the poultry industry will be analysed by focussing on the critical issues currently being experienced in the industry as well as future issues that may have a significant impact. These issues as well as the scale of impact were compiled from the structural interviews with contracted as well as independent growers countrywide in South Africa. Procurement is one of the key elements of how business

is conducted in this industry and will also form part of the industries conduct as well as the associated risks involved in the industry.

Issues within the poultry industry

The discussion on the issues in the industry gave a wide overview of what challenges farmers on growers experience on a daily basis, not only with regard to feed but also with external influences and from the contract holders. The following issues were highlighted by the growers which they experience as immediate challenges in their industry. Ranks were assigned with very high at 5 and very low at 1. The top 10 issues are given below in order of importance as the response of the main issues in the poultry industry:

- The quality and consistency of feed and associated raw components
- Changes in technology and innovation
- Electricity supply, price and availability
- Input prices other than feed cost e.g. interest rates, labour, running costs etc.
- Payment structure as given by contract growers
- Market degradation in the poultry markets
- Transport and road infrastructure
- Diseases and the control and containment of outbreaks
- Imports and the inability to control dumping of poultry products in South Africa
- The level and skills of management as well as the team and farm structure

The following issues were also mentioned by the growers:

- The quality of the day old chicks
- Bio-security
- High feed cost
- Inability for contract growers to choose their own feed supplier

- Quality and availability of good strong water and water sources
- Climate controlled houses vs. open houses
- How to manage contracts and adhere to contract terms
- Inconsistency in pellet quality
- Feed delivery lags and time to catch up on backlogs
- Communication between farmers and the organisational structures
- Economies of scale
- Capital intensively of the industry
- Regulations and legislations
- Consumer demand and the associated changes in demand
- Lack of negotiation between contractors and contracted
- Lack of incentives by contract growers
- Sales
- Efficient Feed Conversion Ratio (FCR)
- Managing cash flow effectively
- Genetics.

These issues and challenges were all captured as the general trend in the poultry industry. The following issues were highlighted by SAPA as key challenges and issues from an organisational point of view:

- Changes in disposable income and job opportunities
- Feed cost considerably higher than in competing countries
- Effective disease control and management of outbreaks
- Infrastructure e.g. road, water, electricity.
- Increasing use of feed products for biofuels
- Perception of different LSM groups in South Africa.

The following issues and challenges were highly ranked by broiler holding companies 'as concerns and challenges that they face in the poultry industry:

- Managing price volatility of inputs
- Imports of poultry meats
- Managing profitability in this dynamic industry
- Exchange rate volatility
- Availability of good genetic material and parent stocks
- Governance structure
- Managing waste material and environmental impact studies
- Infrastructure

The management of these issues and challenges by the industry is considered good and industry leaders are of the opinion that they have adapted their business considerably in order to accommodate these changes and challenges. Many of these issues e.g. diseases still pose a major threat to the industry with a very high impact on the industry should an outbreak of poultry diseases occur.

Procurement of feed for contract and non-contract growers

The procurement of feed in the poultry industry is mainly based on the contractual arrangement between the contract parties. Independent producers are not bound to source feed from just one main supplier. More than 90 percent of growers procure feed as a pre mixture from an accredited feed producing company, which in the case of the major growers forms part of the business structure. The risks associated with this form of procurement are much less than with own mixers that have to develop their own feeding mix and source the raw material with varying quality and price levels. When a premix is purchased, the mix has an assurance that it is developed for a specific genetic chick material, and that the combination will ensure rapid growth of the birds.

The data analysis revealed that most contract growers do not know what the actual expenditure on feed cost per cycle for their chickens are. When the birds are delivered to the abattoir, the payment that the

grower receives is the price per kg as determined by the contractor minus the feed cost for the duration of the cycle. The following bullets are a summary of the procurement process of mainly premixed feeds by contract growers and the issues that they experience with the arrangements:

- More than 75 percent of farmers estimate cost to range between 60-80 percent of the total cost of production.
- Feed mixtures vary according to the types of genetic material used as invested by the contractors as well as the different growth stages of the birds.
- Payment from the day of delivery takes on average 14 days.
- Product development and innovation are considered as extremely important by all farmers interviewed. Feed mixes must adapt to be able to adjust to changes and the availability of good quality raw ingredients and additives.
- Procurement of feed is sourced by contractual agreement but no raw feed ingredients are purchased by growers.

Issues related to procurement and general contractual restrictions for contract growers:

- Risks start from the delivery of the day old chicks to the farm and ends when the live birds are delivered to the abattoir.
- Chicks are mainly supplied by the holding companies of the contract.
- Feed is supplied by a feed company under the structure of the holding company, and in many cases only the feed supplied from that specific feed manufacturer may be used.
- Restrictions with regard to the above are that there is very little bargaining power by contract growers for better feed prices. They must accept the price as given by the feed manufacturer.
- Many contracts require that birds will only be sold to the holding company, and under no circumstances be sold independently.
- Incentive or bonus schemes are only available to certain holding company contractors.

- Growers feel that the price transmission from the free market trade of raw ingredients to the growers as the final user is ineffective. Many feel that when commodity prices of e.g. maize increase, the price of feed increase considerably in a short period of time. However when the opposite occurs, then the prices stay constant and in a later stage lower, but at a much lower rate.

These are general issues as captured during the interviews. Please refer to the performance in the poultry industry for a detailed outline of costs and profit margins between different contracted parties from different holding companies.

Level of integration in the poultry industry

Figure 79 below shows the perception of growers on how they see themselves as integrated or not integrated in the poultry industry. Ranks were assigned where 5 are very highly integrated and 1 very low level of integration. About 70 percent of growers were of the opinion that the level of integration and coordination was very high in this industry.

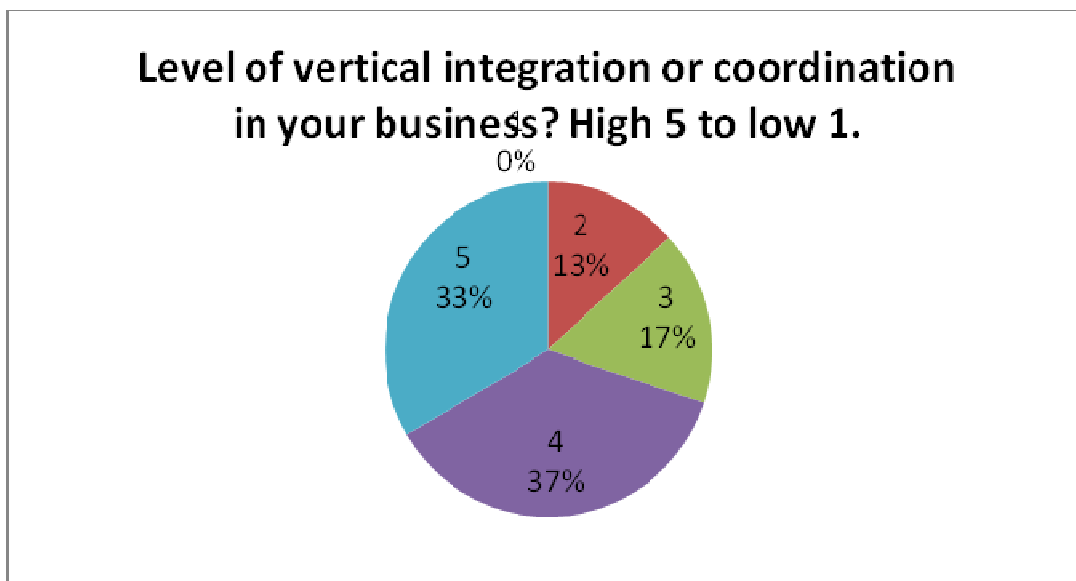


Figure 79: Level of vertical integration in the poultry as indicated in questionnaires

Source: Interviews, 2010

Current feed supplier rating

Growers were asked to rank their current feed supplier, on a scale of 5 (very good) to 1 (very bad). In general high scores were obtained with the exception of cost, support services, information on additives and health information. The standard deviation between the different opinions of the growers ranged from between 0.63 to 1.03 for the individual feed criteria.

Table 40: Ranking of current feed supplier

Criteria	Rank	Std.dev
Quality of feed	4.0	0.79
Cost of feed	3.6	0.83
Delivery on time	4.1	0.60
Quality of service	4.0	0.88
Consistency of service	4.1	0.72
Support services	3.6	0.91
Health	3.8	0.63
Feed efficiency	3.6	1.03
Additives	3.7	0.71

Source: Interviews, 2010

Risk opinion of the broiler growers and associated level of impact

The following opinions were obtained regarding the impact of certain risks on growers and the probability that these risks will occur. These risks form part of the set of risks as discussed in the performance section on the feed industry and apply to the broiler industry as well. Growers were asked to rank the impact that the risk may have on their business from 5 very high to 1 a very low impact. The impact was then multiplied with the probability of occurrence to indicate the relative importance of the risks. The largest risks were power outages (214) followed by financial and economical risks (170) and price volatility risks of feed (163). All the risks have a fairly large impact on growers. Growers felt that these risks could severely cripple their farm business and restrict production expansions and profitability. The probability that these risks will occur

in the near future are also very high and was a major concern to all, not only as a producer, but also further downstream to the processors and final consumers.

Table 41: Risk impact levels and probabilities for the broiler industry

Risk	Impact (5high-1low)	Probability (%)	Standardised scale of impact
Political	2.8	43	121
Financial & Economic	3.1	54	170*
Labour skills	2.8	32	87
Labour strikes	3.5	20	70
Business	2.6	32	81
Price volatility of feed	3.1	53	163*
Food safety	2.9	39	116
Power outages	3.8	56	214*
Inventory	2.3	23	52
Theft & Security	2.6	44	116
Disposable income of consumer	1.9	22	43
Customer, Competition & Supply	2.8	39	107
Environmental (e.g. waste management)	2.1	31	64

Source: Interviews, 2010

4.2.3 Performance in the poultry industry

Table 42 below illustrates the performance of five contract growers and the performances that they achieved on production cycles. Due to the confidentiality agreement, the names of the different contractors cannot be mentioned. The table gives the cost of growing broilers as well as the incentives used by contract holders for growers to perform within a specified parameter.

Table 42: Price structure comparison between different grower organisations

Price structure comparison	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
Updated	Feb-10	Nov-09	Jan-10	Feb-10	Feb-10
Production Standards {Grower Parameters}					
Mortality	5.50%	4.38%	6.29%	5.50%	4.90%
Live Mass (kg)	1.65	1.792	1.71	1.65	1.708
FCR { Feed Conversion}	1.64	1.72	1.58	1.64	1.71
Feed Consumption per bird (g)	2706	3082.2	2701	2706	2920.7
Day of Slaughter	34	35	35	34	34
Production Efficiency Factor (PEF)	280	285	290	280	279
Feed Cost /Bird	R8.03	R9.53	R9.48	R8.08	R9.64
Feed Cost /kg	R5.15	R5.56	R5.92	R5.18	R5.94
Day old chick (DOC) Cost /Bird	R3.56	R2.65	R2.00	R3.38	R3.50
DOC Cost /kg	R2.28	R1.63	R1.25	R2.17	R2.15
Farm Cost /Bird	R2.14	R1.11	R1.70	R1.64	R1.66
Farm Cost /kg	R1.37	R0.65	R1.06	R1.05	R1.02
Margin /Bird	R1.08	R0.98	R0.85	R0.81	R0.97
Margin /kg	R0.69	R0.57	R0.53	R0.52	R0.60
Bonus /Bird	R0.16	R0.51	R0.56	R0.83	
Bonus /kg	R0.10	R0.30	R0.35	R0.53	
Total Price /Bird	R14.97	R14.78	R14.59	R14.74	R15.77
Total Price /kg	R9.59	R8.71	R9.11	R9.45	R9.71
Transport + Catching/bird	0.47				
Transport + Catching/KG	0.29				
<u>Fixed Grower Margin / Bird</u>	<u>R2.91</u>	<u>R2.60</u>	<u>R 3.11</u>	<u>R3.28</u>	<u>R2.63</u>
<u>Fixed Grower Margin / kg</u>	<u>R1.87</u>	<u>R1.52</u>	<u>R1.94</u>	<u>R2.10</u>	<u>R1.62</u>

<u>Fixed Grower Margin / Bird Without Bonus</u>	<u>R2.75</u>	<u>R2.60</u>	<u>R2.55</u>	<u>R2.45</u>	<u>R 2.63</u>
<u>Fixed Grower Margin / kg Without Bonus</u>	<u>R1.77</u>	<u>R1.52</u>	<u>R1.59</u>	<u>R1.57</u>	<u>R1.62</u>
Rolling Average	Yes	Yes	Yes	No	No
Rolling Average Cycle / Growers	4/100%	3/100%	3/100%		6/80%
Bonus	Yes	Yes	Yes	Yes	No
Bonus Parameters (in kg)	1,6-1,69	1,4-1,8	Better Standard		
Grower Margin Increase	Yes 10%	Yes 10%	No	Yes 10%	No
			Rate increase from 1.53-1.59		

Source: Steenkamp, 2010

The Production Efficiency Factor (PEF) is a standardised measurement system to evaluate one grower to another by comparing apples with apples. The Feed Conversion Ratio (FCR), mortality, and days form part of this equation. Note the change in fixed grower margins from one contractor to another.

Figure 80 below shows the top five producer's production levels in 2009. Rainbow remains the largest producer with production of 4.4 million birds per week followed by Astral with 3.8 million birds per week, Country Bird (1.1 million), Sovereign (850 000) and Afgri with 650 000 birds production per week.

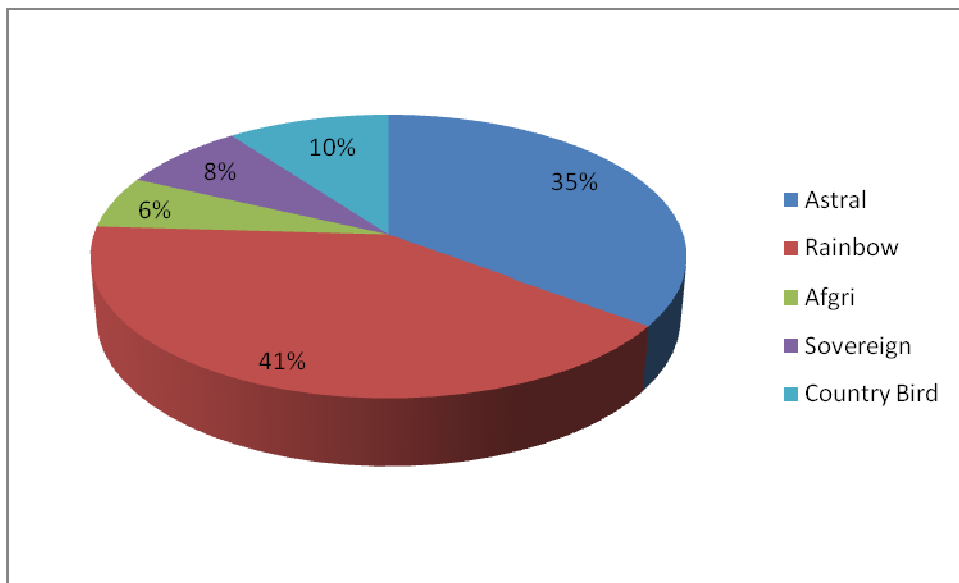


Figure 80: Share of top five poultry producers in 2009

Source: Based on Afgri, 2009

Figure 81 below shows the current production capacity vs. the available production capacity of the top five broiler producers. Astral and Rainbow are currently producing at 100 percent capacity whilst Afgri (13 percent), Sovereign (15 percent) and Country Bird (15 percent) are producing under capacity.

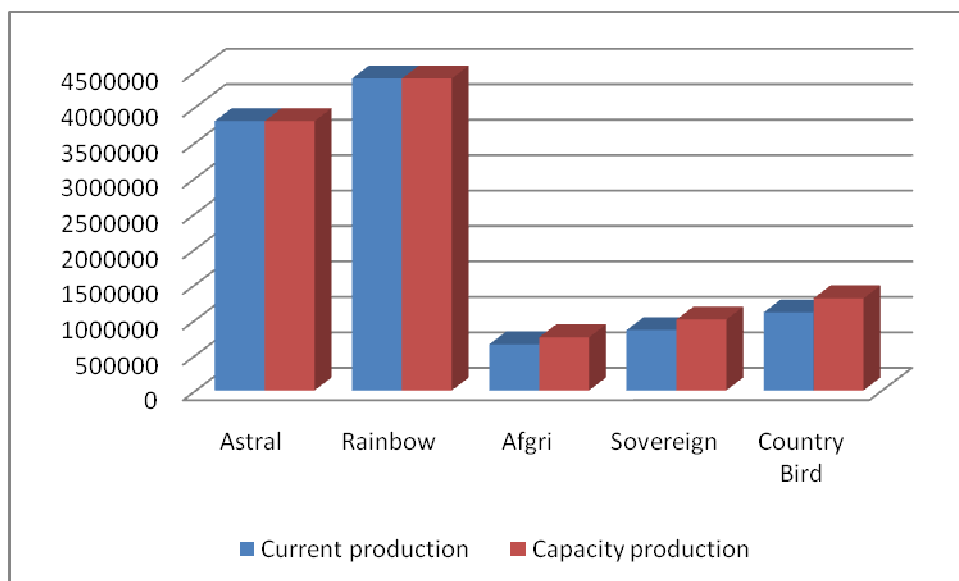


Figure 81: Top five poultry producer's capacity

Source: Based on Afgri, 2009

4.2.4 SWOT analysis for the broiler industry

Figure 82 below focuses on the main areas of a SWOT analysis of SAPA and is supported by the broiler growers. As with the pork industry, the organisational body SAPA speaks on behalf of the poultry industry.

Strengths	Weaknesses
<ul style="list-style-type: none"> • Large demand for poultry meat • Effectiveness of FCR • Strong protein brand • Large economies of scale • Highly competitive pricing strategies 	<ul style="list-style-type: none"> • Changes in markets due to changes in disposable income • Disease management • Total cold chain to retailers • Recalls of products • Lack of fresh and value added market
Opportunities	Threats
<ul style="list-style-type: none"> • Growth of the economy 	<ul style="list-style-type: none"> • Very high uncompetitive input costs

<ul style="list-style-type: none"> • African export markets • Better disease management 	<ul style="list-style-type: none"> • Imports (Dumping) • Distorting from developed worlds • Exchange rate
---	--

Figure 82: SWOT analysis of the South African broiler industry

Source: Interviews & SAPA, 2010

The strengths of the industry lie in the high demand for poultry meat. It is a low cost source of protein. South African having a population with a low domestic income favours poultry on a regular basis than the more expensive red meats. The FCR is very high for the industry, thus converting feed to meat without the excessive loss in energy is good.

The recession saw many people resorting to cost cutting during the recession, thus buying more poultry products as a substitute for red meats. With the global economy climbing gradually out of the recession, the industry fears that this increase in disposable income will allow consumers to purchase more of the expensive proteins. The control of an outbreak of disease is also a weakness of the industry. Especially the outbreak of the recent bird flu saw how rapidly the disease can be spread over and in countries.

Opportunities lie in the growth of the economy and the increased investment into Africa. Poultry remains a relatively cheap source of protein that can easily form smaller entities growing later as demand increases. If feed manufacturers can work in conjunction with broiler growers, than a mutual goal of growth and expansion can be realised.

On the short term the effect of uncompetitive input costs are crushing the industry. As with pork producers, broiler growers are also price takers. Another concern is the imports or dumping of especially Brazilian poultry at a much lower cost than can be locally produced. Brazil also has the ability to deliver on time and

at high quantities. If government do not intervene, then the industry can face serious loss in growth and thus an increase in the food security debate.

4.3 Pork industry analysis

The following section will focus on the analysis of the pork industry given the results obtained from the interviews conducted with role players in the pork industry.

4.3.1 Structure in the pork industry

The following section will focus on the structure, role players and stakeholders in the pork industry from the pork farmers to the retail outlets and finally the end consumer ('farm to fork'). During the different stages there are governing bodies and organisations that ensure that the correct measures of production is adhered to, that the final product guarantees customer satisfaction and also sustainable industry growth.

The size of individual sow units can be classified in three sizes namely:

- Small Less than 400 sows
- Medium Between 401 and 1000 sows
- Large More than 1000 sows

For a pork farmer to be a profitable producer, the farm must house more than 300 sows. The capital cost outlay for a new pork farm is between R25 000 and R40 000 per sow for a fully mechanised farming system. Workers needed on the farm range from 8-10 workers for a small farm to more than 50 workers for the larger farms. Figure 83 is a simplified pork supply chain in South Africa and globally, indicating the relationships between the various organisational structures as well as the linkages between different major market actors. The supply chain structure flows from the grain producers to the final customer. A detailed outline of each segment role player is illustrated in figure 76 below.

Genetic material and the technological innovation in veterinary health and safety are the start of the supply chain. It is more cost effective to raise a healthy pig with good genes and a favourable feed conversion ratio, than pigs that do not perform as required. The Kanhym/PIC as well as the Topigs chain produces 73 percent of all the genetic material in South Africa (Kirsten *et al.*, 2006).

From an institutional point of view the South African pork producers are structured under Provincial Producer Organisations (as seen in Figure 84), which are governed by the South African Producers Organisation (SAPPO I, 2009). These organisations are responsible for all issues related to the South African pork industry. The different portfolios within the SAPPO organisation are responsible for animal health, promotions, emerging farmer's growth and sustainability, statistics, industry protection, research, communication and information (SAPPO I, 2009). Under SAPPO the Premium Pork Producers (PPP) is the organisation for the northern region representing 60 percent of South African pork producers. The other four organisations are for the Free State, Western Cape, KwaZulu-Natal, and Eastern Cape regions (SAPPO I, 2009). Pork producers are organised under these regional organisations. From these producers, 75 percent are home mixers of feed (SAPPO I, 2009) while 25 percent (situated in the Western Cape region and KwaZulu-Natal) buy commercially mixed feed subjected to the availability of raw feed materials.

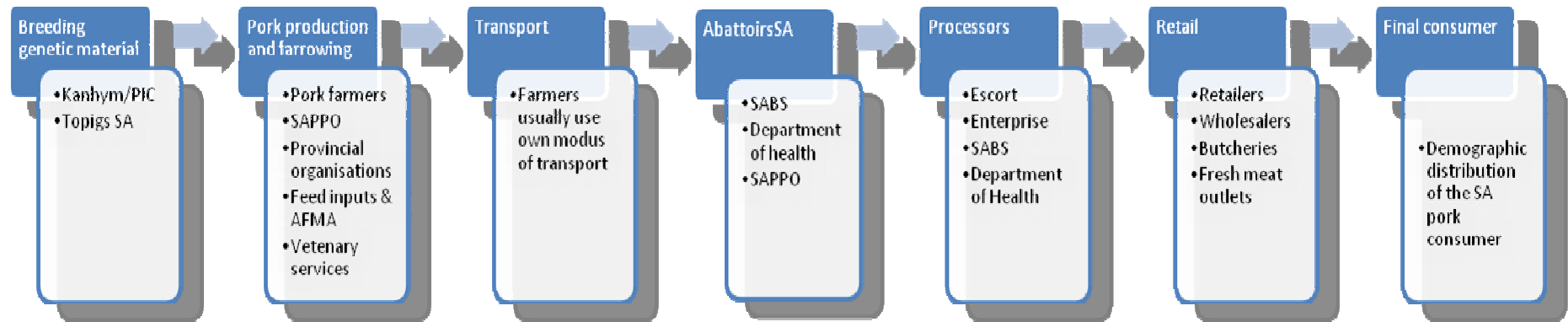


Figure 83: Simplified pork supply chain in South Africa

Source: Adapted from Kirsten *et al.*, 2006

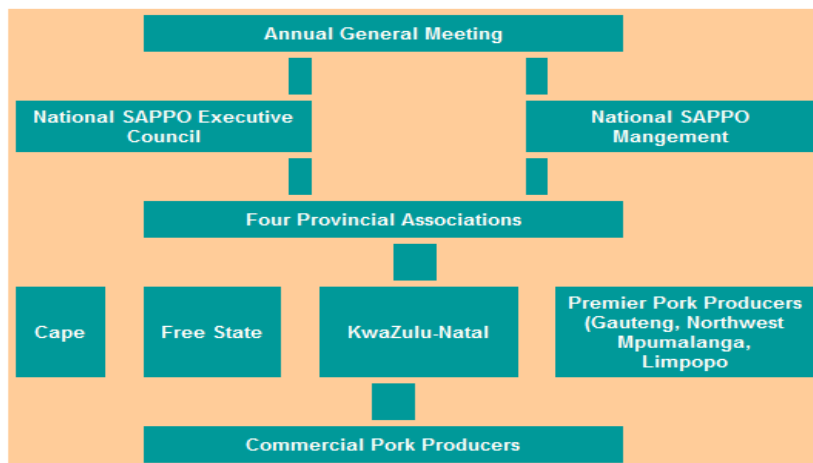


Figure 84: SAPPO’s organisational structure

Source: www.sapork.com, 2010

As already mentioned, feed costs are estimated at 70 percent of the total cost of production inputs on pig farms in South Africa (Streicher (2010)). Although 75 percent are home mixers procuring raw inputs from quality assured grain and additives suppliers, the remainder of the pork producers procure ready mixed feed. The Animal Feed Manufacturers Association (AFMA) is the organisation governing commercial feed mixing and governing in South Africa from an institutional point of view. Per annum the national pork feed production is about 618 000 thousand tons, of which AFMA members supply 22.8 percent (AFMA, 2009 rep). Geographic sales commercial pork feed are concentrated in the Mpumalanga, KwaZulu-Natal and Western Cape region. These three areas procure more than 76 percent (AFMA & own calculations, 2009) of the total commercial feed sold per annum.

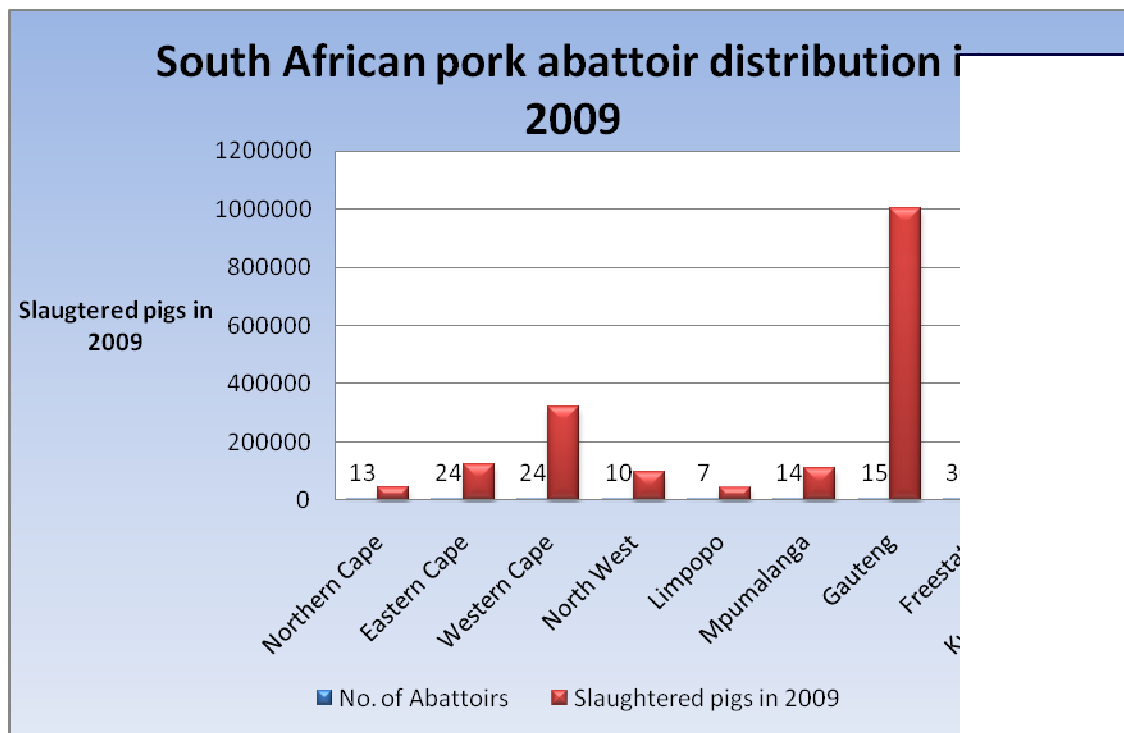


Figure 85: South African pork abattoir distribution in 2009

Source: Streicher, 2010

From the farms the pigs are sent to the abattoirs, currently mostly privately owned and managed. SAPPO I (2009) reports that less than 20 abattoirs slaughter more than 98 percent of pigs in South Africa. Figure 85 gives the provincial distribution of pork abattoirs in South Africa as well as the number of pigs slaughtered per region in 2009. These state of the art abattoirs comply with standards set by the Department of health and safety as well as the South African Bureau of Standards. These five abattoirs comply with international standards and regulations and have been approved to export pork globally. The majority of the abattoirs are situated in the Gauteng region close to the consumer markets. “Abattoirs play a vital role in the marketing chain and they are custodians of our quality of pork sold to the consumer. Together with pig producers, a solution to the taint issue will have to be found. We will not promote long term growth in pork consumption by ignoring concerns of taint “(SAPPO II, 2009). The abattoirs are all registered in terms of the Meat Safety Act of 2000.

Of the total number of pigs slaughtered (2.2 million) in South Africa per annum, 55 percent are processed and the remainder (45 percent) are sold fresh to butcheries, retail and wholesale stores (SAPPO I, 2009). Major pork processors in the pork industry are Eskort (Heidelberg) and Enterprise (Olifantsfontein) and account for about 80 percent of total processing in South Africa (Streicher, 2010). In the KwaZulu-Natal region, the major pork producer is Frey's meat (Streicher, 2010). These processing plants are regulated by the South African Department of Health, the South African Bureau of Standards and the South African Meat Processors Association (SAPPO I, 2009).

These governing bodies ensure that sanitary measures are in place to protect human health and to comply with international set standards. In any supply chain it is necessary to have knowledge of the links, integration and interdependencies between the different stakeholders or actors in the supply chain. The pork supply chain is only an addition or component of the feed supply chain. With the levels of integrations come high interdependencies between the different role players. One weak link will mean that the supply chain carries high risks and uncertainties.

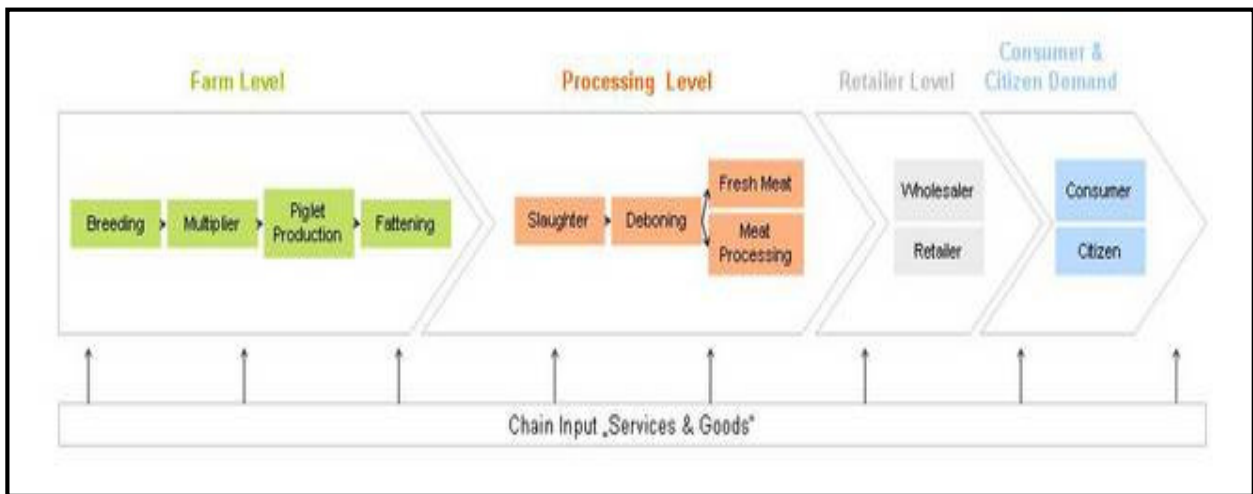


Figure 86: Generalisation of the global pork supply chain

Source: Q-pork chains, 2009

Figure 86 is a general representation of the global pork supply chain as adapted from Q-pork chains. Note that the structural levels, as well as role segments for the two chains, are basically identical with the exceptions of the individual and governing bodies in the chain.

4.3.2 Conduct in the pork industry

The conduct of the pork industry will be analysed by focussing on the critical issues currently being experienced in the industry as well as future issues that may have a significant impact. These issues as well as the scale of impact were compiled from the structured interviews with contracted as well as independent producers countrywide in South Africa. Procurement is one of the key elements of how business is done in this industry and will also form part of the industries conduct as well as the associated risks involved in the industry.

Issues and challenges within the pork industry

The following issues were obtained from the structured interviews with pork producers. Producers were asked to assign ranks to the following issues ranging from 5 critical issues to 1 very low issue. The following 10 issues and challenges were identified as the main issue that challenge business in the pork industry:

- Environmental impact studies that needs to be done to expand current operations
- Weak demand for pork meat, especially during the swine flu epidemic recently experienced
- Transparency of the true price of pork meat per kg. Currently the prices of pork are determined by the abattoirs as well as the contractors, but these prices differ in principle, and no accurate standard between the two exists
- Dumping of pork meats from subsidised countries
- Quality of raw feed ingredients
- Feed raw material price volatility
- Managing and the control of disease outbreaks
- Market access for non-contract producers
- Managing cash flow in this industry. Unlike with the broiler growers, own feed mixers and even premixed purchases must be paid before remuneration is received by the producer for pigs delivered

- Availability, price and quality of fishmeal.

The following issues were also included as concerns in the pork industry:

- Transportation of pigs as well as raw feed ingredients
- Quality of soya, and the concern that most soya oilcakes must be imported. Many producers feel that the quality of South African soya oilcakes is not up to standards with international imports.
- Good quality breed genetics
- Performance of pre mixed feeds
- Availability of good, educated and trained labour
- Low veterinary support in rural areas
- Effective management of waste materials
- Governmental support in the pork industry
- Institutional instability, and current land claims and nationalisation talks
- Consumer and religious perception of pork meat

According to SAPPO the following are key issues in the pork industry and need to be taken into account:

- The assessment and long lead times of impact studies
- Water legislations and the control of waste material in water sources
- Government back logs
- Weak regulations of imports of pork meats
- Price determination of pork prices
- Raw feed ingredients - quality and prices
- Bio security

Procurement of pork feeds

According to SAPPO (2010) and other producers, approximately 75 percent of all pork feeds are own mixes on the farm developed by food scientists for optimal feed conversion ratio's. Other producers source from feed manufacturers in the area or have a joined feature as part of their business structure with a small feed manufacturer.

Smaller producers and own mixers (less than 500 sow unit) source raw ingredients from own productions, neighbouring farms as well as from the spot market. With cash flow being a major concern to the producers, the majority felt that it is not worth the risk to bind into contracts to source raw ingredients in the future. The additional risks they have to endure outweigh the current price risks for the size of their operations. Larger farms (more than 500 sow unit) engage into contractual agreements to procure raw feed stuffs. The support that they have, to be able to engage in these activities (future procurement of raw ingredients) is the contracts or quotas agreements with abattoirs or processors that can reassure them of purchasing their pigs.

The mutual opinion of most of the producers was that they prefer to mix their own feed than to purchase premixed feeds. However if the price is right, they will source from feed manufacturers. Storage capacity on the farms are good, and pork producers do not feel the need to keep more feedstock than is absolutely necessary needed.

Raw ingredients sourced by pork producers are the following:

- Maize \Longrightarrow 60-70 percent
- Soya oil cakes/Fish meal substitutes \Longrightarrow 15-25 percent
- Wheat bran \Longrightarrow 5-10 percent
- Vitamins, minerals and additives \Longrightarrow 5-10 percent

Due to the high quantity of grain feeds required, the impact of price volatility and availability of these ingredients are very high on the producer. Because farmers are price takers, the effect on the cash flow of producers are severe because the prices received for outputs stay relatively constant irrespective of fluctuating production costs. This principle in general farming and also in the pork industry is a major drawback for agricultural practice in South Africa. The expenditure on feed alone is between 70-80 percent of the total cost of pork production.

The rations differ from different stages of the production as well as the availability of some of the ingredients. Producers feel that improvement and adaptation of the feed rations with the genetic material are crucial to ensure a high feed conversion ratio.

Payment takes on average 7-14 working days from the day that pigs are delivered to the abattoir. More than 90 percent of producers do not have their own abattoirs, but deliver either on contract basis to a processor with its own abattoir, or via an agreement on a quota system to processors. The cost and standards that needs to be kept with having your own abattoir is very high for a smaller producer.

Risks in the pork industry

The following opinions were obtained on the impact of certain risks on pork producers and the probability that these risks will occur. These risks form part of the set of risks as discussed in the performance section on the feed industry and apply to the pork industry as well. Producers were asked to rank the impact that the risk may have on their business from 5 (very high) to 1 (very low) impact. The largest risks were price volatility (256) followed by financial and economical risks (227) and political risks (134). Producers felt that these risks could severely cripple their farm business and restrict production expansion and profitability.

Table 43: Risk impact levels and probabilities for pork producers

Risk	Impact (5 high-1 low)	Probability (%)	Standardised scale of impact
Political	3.2	42	134*
Financial & economic	3.4	66	227*
Labour skills	2.9	30	86
Labour strikes	3.0	20	60
Business	2.5	38	95
Price volatility of feed	4	64	256*
Food safety	2.9	33	95
Power outages	2.8	37	102
Inventory	2.2	37	81
Theft & security	2.3	34	77
Disposable income of consumer	2.2	27	59
Customer, Competition & Supply	2.4	38	93
Environmental (e.g. waste management)	2.6	34	88

Source: Interviews, 2010

4.3.3 Performance in the pork industry

The performance of the industry is difficult to report due to the varying sizes of producers. The following guidelines were given by Streicher (2010) as measurement of the performance of pigs on the farm.

- Dressing percentage of carcasses
- Profit margins: a good profit margin is between 10-15 percent; anything above is exceptionally good and below 10 percent becomes too risky.
- Low mortality: mortality must be maintained at less than 4 percent per pig cycle
- Average piglets per sow should be approximately 24 piglets per annum
- Average litters per sow per year are approximately 2.3 litters

- Rearing of pigs take between 5 (for porker) to 6 months for a baconer
- Approximately 75 percent are sold as baconer with a carcass mass of 75kg
- And 25 percent sold as porker have a carcass mass of 55kg on average
- The feed conversion ratios for pigs differ from farm to farm and from feed ration to feed ration.

In general the pork industry in South Africa is very stable with good governance structures and prevention methods put in place to act as needed be.

4.3.4 SWOT analysis for the pork industry

Figure 87 below gives the SWOT analysis as given by SAPPO and supported by the pork producers. Because most of the pork producers have the same common vision, the view from SAPPO was used as the organisational body over the pork industry. SAPPO needs to give vision, leadership and lobby on behalf of pork producers. These issues and point are in order of importance as indicated in the interviews.

Strengths	Weaknesses
<ul style="list-style-type: none"> • Pig industry health status • Technology advanced • High sow productivity • Quality of products (low residual levels in carcasses) • High genetics quality • Good work done by producer organisation 	<ul style="list-style-type: none"> • Elasticity of pork prices (price sensitivity) • Prices of raw feed ingredients • Governmental support (import supports) • Lack of sufficient state veterinary services in rural communities

Opportunities	Threats
<ul style="list-style-type: none"> • Exports to Africa • Increasing domestic consumption • New entrants on the same levels • More contract producers • Relationships with abattoirs 	<ul style="list-style-type: none"> • Bio-Security • Quality of expansion • State supported farms (lack of support afterwards) • Shipping ports (galley waste materials given to pork farms in rural communities) • State vets (National vs. Provincial)

Figure 87: SWOT analysis for the South African pork industry

Source: Interviews & SAPPO, 2010

The strength of the pork industry lies in the governance of the industry. Health statuses have been maintained at a high level and this resulted in good production levels comparable to international standards. The genetic gene pool is strong and South Africa has a very high level of strong genes available. Technological advancements on especially large scale farms assist producers to monitor and manage the levels of production, growth and health of pigs. SAPPO assists the pork producers by liaising on their behalf with government on issues especially related to health matters and import protocols for pork.

However, there still exist a lack in efficient governmental support regarding the international trade and imports of pork. This factor remains a major weakness for the industry. Price formation and the sensitivity of pork prices is a key weakness to the industry. Producers are price takers and thus have very little bargaining power with abattoirs. This causes friction and a lack of trust between different members of the value chain. Opportunities exist for South African pork to grow into Africa given that support is available by government. The markets are available, they only needs to be accessed. Local demand must also be stimulated. The industry must thus promote the goodness and healthy aspects of pork meat.

But expansion cannot be made possible without support. Support from government is key, and currently very little is done to improve this situation. Bio security is another threat to the industry. The recent outbreak of PRRS (however quickly controlled) remains a growing concern that can destroy local markets in a very short period of time.

On a strategical viewpoint, all involved parties in the pork value chain must discuss these issues and strategically plan and develop contingency plans in order to ensure that the industry do not suffer should one of the threatening events occur. At present the pork industry in South Africa are experiencing excellent external environmental conditions allowing them to produce within structural guided limits.

Chapter 5: Conclusions and Recommendations

This study highlighted the level importance of the feed industry in South Africa and focused on the level of integration in the poultry and pork industries. The purpose of this project was to study and understand the pork and broiler industry supply chain focusing on feed and feed related issues experienced within the supply chains. Special attention was given to the different players in the input and feed (own and manufactured) industries. For example, an agribusiness (co-operative) is a major buyer, manufacturer and seller of feed, whilst there are other players whom are independent. Feed costs form a high percentage of the production costs of meat and broiler producers and the different aspects surrounding these costs were analysed to identify the degree of change within feed components. This served as an aid to understand certain of the problems resulting in higher consumer cost and to give a better understanding of the possible future impact.

The project objectives were as follow:

- To identify the various stakeholders and role players in the pork and broiler sub-sectors and feed industry (including structures, size, market share, etc)
- To identify the factors that restrict and/or enhance the competitiveness and profitability within the feed production supply chain
- To determine the impact of the feed industry on the pork and broiler supply chains.
- To determine the level of price volatility of inputs for the feed industry
- To address risk mitigation strategies, such as hedging
- To explore possible business models in the feed industry.

The scope of this project was to provide the following current updated information:

- An international and domestic feed industry overview
- Industry overviews of the pork and broiler sub-sectors

- Conduct supply / value chains in the pork and broiler industries
- Research in input commodities and the link between input suppliers to feed manufacturers, producers, buyers and consumer
- Identify the risks in the feed industry
- Identify the level of concentration in the feed industry and whether this is in favour of the industry
- Identification of the current and future issues in the three sub-sectors
- Identification of the links between the commodities, feed and producers
- Evaluate the competitiveness of the industry
- Research and understand the role of contracting in the pork and broiler sub-sectors
- Understand the role of contracting regarding feed inputs
- Differentiation between the free market trade and contract markets
- Identify the different business models in the three sub-sectors with respect to structure, conduct and performance
- Identify price cycles with respect to seasonal trends in the input and substitutive meat markets
- Issue analysis with respect to the availability of domestic ingredients vs. imported ingredients and impact on the industry
- International impact overview study on the South African pork and broiler industry with respect to imports of inputs, and how competitiveness in procurement methods can be used to an advantage.

These objectives and observations were studied and observed and from the findings the following trends could be identified for the environmental surrounding as well as for the feed, pork and broiler industries. Although not all of the objectives are explained in the conclusions, they were studied and reported in earlier text in this study.

Conclusions on the Feed industry

The feed industry, and especially in a South African context, is a complex and very dynamic growing agricultural industry. Producers face various challenges on a daily basis within a dynamic, ever changing environment that increases risk to such a degree that in order to be able to farm sustainably, a competitive advantage in the form of lower cost and higher quality produce must be established. Primary production is relatively un-concentrated, implying that farmers are price takers on the input and output sides.

Significant barriers to entry exist in the value chain. These barriers include high capital requirements, adequate relevant experience and track record, the significance of research and biotechnology in the provision of quality inputs, economies of scale in other major inputs such as fertilizer, including the costs of establishing large grain silos, large-scale milling operations and sophisticated logistics and infrastructure. Branding and marketing can be significant barriers, as can be access to prime retail space, suitable sites for new stores, capital outlay and retailing experience. Such barriers to entry make it difficult for new and smaller entrants to compete with existing market players.

The main issues within this study are the number of players in feed inputs, manufacturing and procurement, the competitiveness and profitability within the animal feed supply chain and the overall impact on the pork and poultry markets. Input factors further upstream in the supply chain (e.g. maize and soya from farmers) are researched on a procurement process basis by producers, to optimise profit through hedging and to discount risk efficiently to lower cost. In this way a degree of competitive advantage can be established in both the pork and broiler industry. Policies and methods of effective price hedging must be set in place to ensure sufficient grain stocks at the best or lowest possible prices.

Even with the world in an economic recession during early 2010, international trade is still a critical component of the agricultural sector. More than one third of agricultural production is being exported worldwide. Other countries provide an important market for SA's products.

A number of economists speculate that due to the economic recession, the country must implement new protective policies for the domestic market, in order to protect local businesses, limit job losses and ensure higher farm incomes. Increasing import tariffs and restricting some imports was also suggested. However, South Africa is part of the World Trade Organization (WTO) and protective policies are not as feasible as suggested. If South Africa changes its import policies with import taxation, tariff increases or quantity limitations, the exporting countries will follow the increased tax, tariff and limitations on exports. This will start trade wars between the countries, which South Africa cannot afford.

The volatility of the exchange rate also plays an important role in international trade. High volatility creates more uncertainty in international trade. South Africa's exchange rate is currently relatively stable. Global trading will continue to present unique challenges. Higher levels of sanitary and phyto-sanitary requirements set higher barriers. Increased concerns regarding food safety and the accompanying need for traceability and good agricultural practices are some of these challenges. There are new requirements in terms of corporate social responsibility and worker welfare, as well as concerns about climate change and the associated buzzwords of "food miles" and "carbon footprints". A further challenge is to increase the share of processed agricultural products within the country's total agricultural exports (Department of Agriculture, 2009).

South Africa's total agricultural trade with the world from 2007 to 2009 has increased. This might be seen as contradictory to the earlier discussions. White maize for human consumption is exported to Zimbabwe, Zambia and Kenya to help relieve the food shortages in those countries. This is extremely relevant for the feed producers to note revenue generated by exporting yellow maize fell drastically in terms of yellow maize prices (R/ton). The imports and export parity bands give an indication of the marginal changes and volatility that is being experienced in the procurement of raw materials for feed production.

A summary of the major issues as identified and discussed in the feed industry included the following:

- Management of price volatility of raw ingredients
- Availability of good quality raw ingredients especially soya oil cakes

- Economies of scale (lower unit cost)
- High commodity prices
- Dumping of Brazilian agricultural commodities
- Shipment delays
- Procurement of raw ingredients
- Transportation and general infrastructure of roads/rail etc.
- Marketing principles
- Lack of effective regulated control of additives and antibiotics.

By evaluating these issues and studying the impact (according to the statistical indications as obtained from participants in the interviews) these issues have on feed manufacturers it became clear that not only industry changes are necessary but government intervention as well. AFMA's role is to represent members of the feed manufacturing division. AFMA has an important liaison, co-ordination and information role between government and the feed industry. They advise government when necessary with regard to policy changes and legislation or other changes that can affect their members. AFMA is currently enjoying recognition as the national role-player being part of all forums related to animal feeds and the grain value chain. These include the various forums, both governmental and private sector where AFMA fulfils its rightful role as one of the leading decision makers (AFMA, 2009). AFMA members are responsible for 55 percent of the national animal feed production (AFMA, 2009).

The role that organisations such as AFMA play in ensuring self regulation and improved regulation by government are critical success factors to manage changes in the issues stated above. The task is too large for Government to regulate the industry on its own. However the main issue now exists on the vision of self regulation in the industry. The lack of capacity of Government to police its own legislation is troublesome. The solution does not lie in Government to regulate, monitor and control the entire feed industry, but merely place appropriate policies in place to allow the industry to function optimally without uncompetitive advantages within the industry.

In this study the cost of feed in the animal livestock industry illustrated the impact it has on the profitability levels of livestock producers, especially in the pork and broiler industries. The vision of all agribusinesses is to grow and be as competitive as possible. Shareholders need to be satisfied in order for them to invest in expansion and sustainable growth. Without this growth (in an ever increasing demand for produce) the local industry will be at a disadvantage and flooded with large quantities of imports from agro-industries from abroad. The concern by the Competition Commission is that because an entire value chain is sometimes owned by one organisational group it leaves very little protection to other role players in the industry as well as the consumer.

High levels of integration as well as concentration levels increase the level of competition between the largest organizations. In the South African feed industry there are a small number of role players that control the largest market share. This leaves only a limited market share for the smaller producers in the industry. The five main feed producers examined are: Meadow feeds, Epol, Afgri foods, Nova feeds and Nutri feeds (Lovell, 2010). Each one of these feed companies is owned by a holding company. This explains why the feed industry is characterized as a vertically integrated system. Vertical integration is the firm's approach to increase control over its suppliers of inputs, to improve economies of scale and to lower prices. The feed producing companies are owned by the animal producers as holding companies especially poultry producers. These holding companies then control their supplier of feeds and vertical integration follows by combining the feed supply chain with the holding company's poultry supply chain.

By seeking a competitive advantage above a rival means that the phenomenon of one organisation owning an entire value chain is more appealing from an investor's point of view. Business models will have to adapt and strategies revised by management teams to ensure a competitive industry in a changing environment, with the added benefit of sustainable growth. The interest by the Competition Commission in the industry is not to discredit the industry but to look after the welfare of the consumer in the supply chain. The ripple effect caused due to multiplication of costs in the beginning of the chain can lead to a large impact on the final consumer price. . The balance has to be established by monitoring of the Competition Commission on how to allow the industry to grow and expand without causing the consumer to be disadvantaged.

Conclusions on the Poultry industry

Poultry is one of the largest growing sectors within the agricultural sector. Both small scale and commercial business entities are involved in breeding (breeders), rearing of chickens (broiler production), and the feed suppliers. Furthermore, the poultry industry provides meat which is preferred by almost all cultures and is of good quality and affordable. In South Africa, the poultry farming business has been in growth sector for a long time.

South African Poultry Association (SAPA) is one of the key role players in the poultry supply chain. It was established in 1904 in Kimberley mainly as a body to promote and coordinate the broiler industry and later the egg industry. SAPA is crucial to the growth and development of the poultry industry in general. As its mission and vision is to be an industry driven organization that addresses collective issues and to create a milieu within which members can become world class competitors in the food market, SAPA is a representative of broiler farmers both small scale and commercial farmers. It is concerned about the representation and assistance of farmers in different aspects such as the day-old chick supply industry, the egg industry and the broiler industry. It is further characterised by a huge sub-continental impact. The main objectives of SAPA were to co-ordinate and promote broiler production and later to stage egg laying tests, and to provide an instrument to voice the feelings of the industry. Since then, it has devoted its efforts to enhance production and marketing of poultry products while ensuring that quality of the produce is adhered to by the members as well as consumers.

The level of integration within the poultry industry is high. About 70 percent of growers were of the opinion that the level of integration and coordination was very high in this industry. This high level of integration as discussed in the conclusion section of the feed industry causes as reason for concern to the Competition Commission.

The industry leaders are of the opinion that they welcome the investigations conducted by the Competition Commission but merely are concerned with the method in which it is being done. Furthermore, the

continuous investigation causes concern to the organisations because they feel that they cannot invest in the industry if they are going to be accused of unethical offences.

Issues that were compiled from the interviews with growers as well as holding companies are given below as the major concerns that need to be addressed in order for the industry to be able to function and maintain a sustainable growth.

The issues are as follows:

- The quality and consistency of feed and associated raw components
- Changes in technology and innovation
- Electricity supply, price and availability
- Input prices other than feed cost e.g. interest rates, labour, running costs etc.
- Payment structure as given by contract growers
- Market degradation in the poultry markets
- Transport and road infrastructure
- Diseases and the control and containment of outbreaks
- Imports and the inability to control dumping of poultry products in South Africa
- The level and skills of management and the team and farm structure.

The requirements of capital as well as knowledge can have the following effects on the industry. For a grower to build a standard size chicken house he will require between R2 million and 4.5 million to build either an open or ventilated house. This large capital outlay makes it difficult for new entrants in this industry.

The high level of capital intensity and the lack of access to credit makes it difficult for smaller new entrants to establish themselves in this market. Fewer newcomers to the market can result in a shortage of skills available to the industry in future. Larger firms have the capital outlay and support to grow to mega businesses, but this will only raise further concern on the levels of competitiveness in the poultry industry.

Further concern to the industry is the high quantities of imports or 'dumping' that is hurting the industry. The South African poultry industry is, if compared to the Brazilian market, relatively small and thus very sensitive for high level imports that can upset the demand balance in the country. The demand for poultry in South Africa has always been steady with slightly upwards and downwards movements. With the recent recession being experienced, there was a larger demand for poultry products as a substitute for the more expensive red meats. The lower disposable income of consumers made the purchase of poultry products more sensible to compensate for the lower buying power.

Bio- security is a constant issue for the South African poultry industry. High levels of regulations exist with contingency plans in place should an outbreak of potential hazardous diseases occur. The utmost care is taken to ensure that South African broilers risks of outbreaks in especially the informal sectors. The low level of education, high poverty levels and dense populations also poses serious bio-hazard zones for disease outbreaks. The lack of accessibility, control and funds can result in potential outbreaks not being brought under control fast enough.

The procurement of feed in the poultry industry is mainly based on the contractual arrangement between the contract parties. Independent producers are not bound to source feed from just one main supplier. More than 90 percent of growers procure feed as a pre mixture from an accredited feed producing company, which in the case of the major growers which form part of the business structure. The risks associated with this form of procurement are much less than with own mixers that have to develop their own feeding mix and source the raw material with varying quality and price levels. When a premix is purchased, the mix has an assurance that it is developed for a specific genetic chick material, and that the combination will ensure the required growth performance of the chickens.

The strengths of the industry lie not only internally in the very high feed conversion ratio (converting feed to meat without the excessive loss in energy is good) but also in the high demand for poultry meat. It is a low cost source of protein. South Africa, with a population with a relative low domestic income, favours poultry on a regular basis above the more expensive red meats. The recession saw many people resorting to cost cutting during the recession, thus buying more poultry products as a substitute for red meats. With the global economy recovering from the recession, the industry fears that this increase in disposable income will allow consumers to purchase more of the expensive proteins.

The control of an outbreak of disease stays a major threat for the industry. Especially the outbreak of the recent bird flu saw how rapidly the disease can spread between countries.

In the short term the effect of volatile and uncompetitive input costs are squeezing the industry. As with pork producers, broiler growers are also price takers. Another concern is the imports or dumping of especially Brazilian poultry at a much lower cost than can be locally produced. Brazil also has the ability to deliver on time and at high quantities. If government do not intervene, then the industry can face serious loss in growth and thus an increase in the food security debate.

Conclusion on the Pork industry

For the South African pork producers to be able to compete with larger more traditional and advanced countries in changing markets, they will have to adapt to global changes within the pork and related industries such as the feed, health and processing industries. It is integral to maintain focus on the economic and strategic aspects globally with regard to the pork industry so as to note the changes and to be able to exploit new and emerging markets. The international markets have large market shares to influence the current economic and structural environment in the pork industries. These markets must therefore be taken into account when exploring the possible structural and other changes for the South African domestic pork market.

From an institutional point of view the South African pork producers are structured under Provincial Producer Organisations which are governed by the South African Producers Organisation (SAPPO I, 2009). These organisations are responsible for all issues related to the South African pork industry. The different portfolios within the SAPPO organisation are responsible for animal health, promotions, emerging farmer's growth and sustainability, statistics, industry protection, research, communication and information (SAPPO I, 2009). Under SAPPO the Premium Pork Producers (PPP) is the organisation for the northern region representing 60 percent of South African pork producers. The other four organisations are for the Free State, Western Cape, KwaZulu-Natal, and Eastern Cape regions (SAPPO I, 2009).

Pork producers are organised under these regional organisations. Of these producers, 75 percent are home mixers of feed (SAPPO I, 2009) while 25 percent (situated in the Western Cape region) buy commercially mixed feed subjected to the availability of raw feed materials.

For a pork farmer to be a profitable producer, the farm must house more than 300 sows. The capital cost outlay for a new pork farm is between R25 000 and R40 000 per sow for a fully mechanised farming system. Workers needed on the farm range from 8-10 workers for a small farm to more than 50 workers for the larger farms.

The size of individual sow units can be classified in three sizes namely:

- Small Less than 400 sows
- Medium Between 401 and 1 000 sows
- Large More than 1 000 sows

Issues that were compiled from the interviews as the major concerns to the pork producers as well as the industry leaders are as follows:

- Environmental impact studies that needs to be done to expand current operations
- Weak demand for pork meat, especially during the swine flu epidemic recently experienced

- Transparency of the true price of pork meat per kg. Currently the prices of pork are determined by the abattoirs as well as the contractors, but these prices differ in principle, and no accurate standard between the two exists.
- Dumping of pork meats from subsidised countries
- Quality of raw feed ingredients
- Feed raw material price volatility
- Managing and the control of disease outbreaks
- Market access for non-contract producers
- Managing cash flow in this industry. Unlike with the broiler growers, own feed mixers and even premixed purchases must be paid before remuneration is received by the producer for pigs delivered.
- Availability, price and quality of fishmeal.

More than 75 percent of pork producers in South Africa are own feed mixers thus procuring raw feed ingredients of high quality and mixing it in accordance with rations as set out by a feed and health nutrition specialist. The new Feed Bill could create some issues for this industry due to the high level of own feed mixers.

Raw ingredients sourced by pork producers are the following:

- Maize \implies 60-70 percent
- Soya oil cakes/Fish meal substitutes \implies 15-25 percent
- Wheat bran \implies 5-10 percent
- Vitamins, minerals and additives \implies 5-10 percent

Due to the high quantity of grain feeds required, the impact of price volatility and availability of these ingredients are very high to the producer. Because farmers are price takers, the effect on the cash flow of producers are severe because the prices received for outputs stay relatively constant irrespective of fluctuating production costs. This complicates sound cash management and exacerbates the issues of

price-costs squeeze in the industry. The expenditure on feed alone is between 70-80 percent of the total cost of pork production. Farmers are also very reluctant to engage in any hedging strategies to minimize their feed price risk.

The strength of the pork industry lies in the governance of the industry. Health statuses have been maintained at a high level and this resulted in good production levels comparable to international standards. The genetic gene pool is strong and South Africa has a very high level of strong genes available. Technological advancements on especially large scale farms assist producers to monitor and manage the levels of production, growth and health of pigs. SAPPO assists the pork producers by lobbying on their behalf with government on issues especially related to imports of pork meat. SAPPO stands firm and delivers excellent results to the industry. However, there still is a lack of efficient governmental support regarding the international trade and imports of pork, which remains a major weakness for the industry. Price formation and the sensitivity of pork prices is a key weakness to the industry. Producers are price takers and thus have very little bargaining power with abattoirs. This causes friction and a lack of trust between different members of the value chain.

Opportunities exist for South African pork to grow into Africa given that support is available by government. The markets are available, they only need to be accessed. Local demand must also be stimulated. The industry must thus promote the goodness and healthy aspects of pork meat. But expansion cannot be made possible without support. Support from government is key, and currently very little is done to improve this situation. Bio security is another threat to the industry. The recent outbreak (however quickly controlled) remains a growing concern that can destroy local markets in a very short period of time.

General Conclusions

Government plays a major role in terms creating an environment that is conducive for business to perform well. The lack of appropriate policy and policing by government in the feed, pork and poultry industry are restricting the competitiveness of these industries.

These industries are all exposed to very weak infrastructural support and maintenance from government. Road (secondary and tertiary) and rail ways account for almost all of grain transportation and delivery systems in and around South Africa. The costs endured in transporting feed ingredients are becoming alarmingly expensive. Maintenance costs on vehicles are additional costs that need to be added to transportation. The end result is that agribusinesses cannot be competitive if these costs keep escalating.

The consumer will end up paying more for protein foods such as pork and poultry due to the high cost of transportation through the multiplication effect throughout the value chain. Large feed manufacturers have the capacity to produce optimally but market conditions are forcing them to produce under the desired potential levels. The constant threat of land claims and the nationalisation of farm lands are creating a trust barrier between producers and the government. Economies of scale are one of the principles that ensure that food security does not become an issue. However if these threats become realities, then the agricultural industries will fall prey to high quantities of imports as well as negative growth in the agricultural sector.

To be able to compete with international markets, a high level of technological innovation is necessary. South Africa is at the forefront in leading technological innovation in Africa. This is a benefit to ensure that a level of growth be maintained in all of the industries. Excellent genetic material is available to producers as well as high quality parenting stock for growers.

All the industries as abovementioned have an array of current and future issues that need to be addressed not only by the industry organisations with its associated members, but also by government and especially the Department of Agriculture.

Funds should be made available to the producer organisations in obtaining statistical data and conduct relevant research and development from within the industry. It is not the task of government to grow an industry, but it is their responsibility to ensure that barriers are lowered for innovation to take place and not be restricted by policy and infrastructural obstacles. The ultimate goal of sustainable growth must be maintained.

Recommendations for industries to take into consideration

The following recommendations can be viewed as guidelines for industries in panel discussions and annual general meetings. These highlights must be used in setting up strategic plans for future expansion and development of the underlying industries. Certain challenges and changes will persist, but returns will be forthcoming if innovative thoughts and methods come from industry leaders. Some recommendations are as follows:

- Need to adapt business models for the challenges and changes in the future. Business in 2020 will not be the same as today. These strategic changes can be adapted by taking into account the vision of the future business models as earlier explained.
- Structural problems: imports exports/ maize, wheat, soya. Currently South Africa is a net exporter of maize. However, South Africa also imports large quantities of chicken meat and soya per annum. Farm development is necessary to increase the current production capacity to be able to use these net surpluses available and lower imports thus stimulating local production of soya beans.

- Protection from other countries that dump on South African markets. Intervention by especially government is required to ensure that imports are regulated and not detrimental to the local industries.
- Africa as alternative source to expand. The future of capital investment lies in less developed countries such as Africa. Large natural resources are available and high effective demand exists due to over population and high poverty levels.
- Importance of feed and food safety. Regulations must be maintained and controlled to ensure that feed and food are safe for human as well as animal consumption. Government support and self regulation is required.
- Industries must be pro-active regarding new consumer bills and traceability issues that mainly originated in the European Union. If industries do not comply with new bills set in place, then it could potentially lead to loss of exporting markets.
- Price volatility in the grain market has escalated worldwide and market participants need to adjust to higher volatility levels. Participation by all role players (hedgers, speculators and arbitrage traders) is necessary to ensure a well functioning futures market. Although suggested, no study to date could label speculators as a reason for the larger volatility in futures markets. The participation of speculators is very much needed in a relative small market (such as South Africa) to ensure that all supply and demand variables are factored into the price. Price volatility will remain and this necessitates effective price hedging strategies even more. It is important that grain organisations, such as Grain SA will ensure a vibrant and well-functioning cash market. Without effective cash market, hedging strategies might be limited.
- Relationships with the Competition Commission (CC) need to be fostered to ensure that there is clear understanding and guidelines regarding business conduct, management information, benchmarking, policy issues, etc.
- Vertical integration and concentration along with economies of scale are an economic fact in the world and is necessary for capital investment support and growth. However the relationship with the Competition Commission must be strengthened to understand the issues at stake in this regard.

- Self regulations should be supported and incentivised. Under the appropriate policy restrictions and guide lines self regulation, if controlled correctly, can result in industry growth and a higher level of global competitiveness
- Government should be put under pressure regarding the future of land reform and nationalisation. Currently, investor confidence is being impacted upon which creates uncertainty and limits investments for future growth and international partnerships.
- Low skills level is a major concern for the future and need to be addressed.
- Also at BBBEE level the situation on skills is a critical issue for the future. There are no incentives for students to study the desired fields necessary to maintain the high skill levels required.

Although these recommendations only serve as guidelines to the feed, pork and broiler industries, they are important in ensuring sustainable investment and growth in these industries. A major task will be to convince government to establish an institutional environment for the industry that ensures food security, complies with health and feed requirements, remains competitive and protects it from unfair international competition but also sets the trend for healthy competition in the local value chains.

References

ABC (2010). *Welcome to the website of the Agricultural Business Chamber in South Africa* [Homepage of Agricultural Business Chamber]. Online: <http://www.agbiz.co.za/> [Accessed 2010, 01/31].

ABELL, D. (2009). *Business Model Template*. EMBA Press 2009.

ABBOTT, P. C., HURT, C. & WALLACE, E. T. (2008). *What's Driving Food Prices?* Farm Foundation. Issue Report. 7/2008.

AFGRI (2009). *Annual Report*. AFGRI foods.

AFMA (2007). *Preface: Feed raw material price volatility and availability presents a challenge for the Feed Industry*. AFMA Matrix, p2, June 2007. Animal Feed Manufacturing Association, South Africa.

AFMA (2008). *Technology implications for global feed industry with changing ingredient supply*. AFMA Matrix, p 4, June 2008. Animal Feed Manufacturing Association, South Africa.

AFMA (2008). *Opportunities and challenge ahead of the poultry industry*. AFMA Matrix, p 14, June 2008. Animal Feed Manufacturing Association, South Africa.

AFMA (2008). *Facing the Feed Industry Challenges*. AFMA Matrix, p 2, September 2008. Animal Feed Manufacturing Association, South Africa.

AFMA (2008). *Amendment to the regulations of Act 36 of 1947- heavy metals*. AFMA Matrix, p10, December 2008. Animal Feed Manufacturing Association, South Africa.

AFMA (2008). *Global feed raw material supply- current and future*. AFMA Matrix, p16, December 2008. Animal Feed Manufacturing Association, South Africa.

AFMA (2008). *Ensuring food and feed safety in 2010 and beyond*. AFMA Matrix, p2, December 2008. Animal Feed Manufacturing Association, South Africa.

AFMA (2009). *AFMA - Chairman's Report 2008_2009*, Animal Feed Manufacturing Association, South Africa.

AFMA (2010). *AFMA Membership List*. Online: <http://www.afma.co.za/Membership.htm> [Accessed 2010, 01/31].

ALEXANDRATOS, N. (2008). Food Prices Surges: Possible Causes, Past Experience and Longer Term Relevance. *Population and Development Review*. Vol. 34(4): 663-697.

ALEXANDRATOS, N. (2009). *World Food and Agriculture to 2030/50*. Paper for the Expert Meeting on "How to Feed the World in 2050," FAO, Rome, 24-26 June 2009 (revised 25 July 2009).

ASTRAL (2009). *Annual Report*. Astral Foods.

ASWART (2009). *Maize Outlook 2010*, DEPARTMENT OF AGRICULTURE, LAND REFORM AND DEVELOPMENT, KIMBERLEY.

AUSTRALIAN FARM INSTITUTE (2008). Future demand for animal protein. pp. 1-2. <https://rirdc.infoservices.com.au/downloads/07-020.pdf> Accessed 2010/01/09.

AUTHOR unknown. 2008. Contract framing in the world's poultry industry. Article livestock.

BALTZER, K., HANSEN, H. & LIND, K. M. (2008). *A note on the causes and consequences of the rapidly increasing international food prices*. Institute of Food and Resource Economics. University of Copenhagen. May 2008.

BFAP (2009). *Bureau for Food and Agricultural Policy Baseline Report*. The Bureau for Food and Agricultural Policy. Online: <http://www.bfap.co.za/reports/BFAP%20baseline%202009.pdf> Accessed on 2009/07/08.

BIÉNABE, E., TROSKIE D., BRAMLEY, C., LECLERCQ, M., (2008). *Sharing views on Quality Products Linked to Geographical Origin: How they can contribute to rural development*. Food and Agriculture Organisation of the United Nations, SINER-GI, Rome.

BOSHOFF, D.W. (2007). *AFMA - Code of Conduct*. Animal Feed Manufacturing Association, South Africa.

BOSHOFF, D.W. (2008). *The role of AFMA in enhancing the industry*. Animal Feed Manufacturing Association, Cape Town.

BOSHOFF, D. (2009). Telephonic communications with the author in August 2009. Pretoria, Centurion. (Notes in possession of author).

BRIEDENHANN, E. (2009). *AFMA Chairman's report 2008/2009*. AFMA 62nd annual general meeting on 4 September 2009, hosted at Euphoria Golf Estate & Hydro, Mookgopong (Naboomspruit), South Africa.

BURGER, F. (2008). *The impact of warehousing and transportation optimization on supply chain effectiveness*. University of Johannesburg, South Africa.

CARDY-BROWN, E. (2006). *Emerging feed markets Pinpointing potential*. Rabobank.

CHANGCHUI, H. (2002). *Protein source for the animal feed industry*. FAO, Rome.

COUNTRY BIRD HOLDINGS (2009). *Annual Report 2009*. Country Bird Holdings.

COUNTRY BIRD HOLDINGS. (2010). Online: www.cbhltd.co.za.

CUTTS M & GEYSER M. (2007). SAFEX maize price volatility scrutinized. *Agrekon*. Vol. 46 No 3 (September 2007).

DE BEER, J. (2009). *A Partial Equilibrium Model for the South African Broiler Industry*. Unpublished M.Sc thesis. University of Pretoria, South Africa.

DE LA ROSA, M. (2008). *World Urbanization Prospects. The 2007 Recession*. United Nations - New York, New York.

DECARBONNEL, E. (2009). *2010 Food Crisis for Dummies*. Online: http://futurefastforward.com/images/stories/featurearticles/Food_Crisis.pdf Accessed 2010/02/01.

DEPARTMENT OF AGRICULTURE (1947). *Fertilizers, farm feeds, agricultural remedies and stock remedies Act (Act no. 36 of 1947)*. South Africa.

DEPARTMENT OF AGRICULTURE (2006). *Plant Health Policy for South Africa*. South Africa.

DEPARTMENT OF AGRICULTURE (2009). *Agricultural strategic plan 2009/10*, Department of agriculture, forestry and fisheries. South Africa.

DHLIWAYO, S. (2007). *We live in entrepreneurial times*. University of Pretoria.

ECONOMIST INTELLIGENCE UNIT, (2009). *Improving the beef supply chain: Ensuring quality in a demanding world, 2008*. Online: http://viewswire.eiu.com/report_dl.asp?mode=fi&fi=1003861685.PDF&rf=0 Accessed 2010/02/02.

Economic Research Service/USDA (2009); *Amber Waves*, volume 7, issue 4.

EUROMAISIERE affiliated member of COCERAL (2009). *The EU dry milling industry of maize: maize milling process (Flow chart)*. [Online]: <http://www.coceral.com/cms/beitrag/10010249/230012> [Downloaded: 01-2010].

EZRA, S. & VERSTE, J. (2009). *South African's Provisional Agricultural Trade Performance 2007 to 2008*. Department of Agriculture, South Africa.

FOOD PRODUCTION DAILY (FPD), (2004). *US poultry industry faces up to challenges*. Available at URL: <http://www.foodproductiondaily.com/Processing/US-poultry-industry-faces-up-to-challenges> Accessed 2010/02/01.

FOOD AND AGRICULTURE ORGANIZATION (FAO), (2008). *Food Outlook*. November 2008. [Online]: <http://www.fao.org/docrep/011/ai474e/ai474e03.htm>. [Downloaded: 24.2.2009].

FOOD AND AGRICULTURAL POLICY RESEARCH INSTITUTE (FAPRI 1), (2009). *U.S and world agricultural outlook*. FAPRI Staff Report 09-FSR 1 ISSN 1534-4533. Online: <http://www.fapri.iastate.edu/outlook/2009/text/OutlookPub2009.pdf> Accessed 2009/06/18.

FOOD AND AGRICULTURAL POLICY RESEARCH INSTITUTE (FAPRI 2), (2009). *World meat*. FAPRI 2009 Agricultural handbook. Online: <http://www.card.iastate.edu/publications/synopsis.aspx?id=1102> Accessed 2010/02/01.

FOOD AND AGRICULTURAL ORGANIZATION (FAO), (2008). *Agricultural Outlook 2008-2017*. OECD - FAO.

FOOD AND AGRICULTURAL ORGANIZATION (FAO), (2009). *Food Outlook, June 2009*. FAO, Rome.

FEED LINK. (2010). [Online] Available from: <http://www.efeedlink.com/ShowDetail/edc8b9ec-f4de-48dd-8ddd-12960c112dd4.htm> [accessed 28 January 2010].

FERRARI, S. (2009). Feed industry challenges beyond 2010, *Italian Feed Association, 2010*. Online: <http://www.afma.co.za/imgs/2.%20Challenges%20for%20the%20feed%20company%20beyond%202010%20-%20Dr%20S%20Ferrari.pdf> Accessed 2010/01/27.

FNB (2009). *Agri-Weekly 4 December 2009*. First National Bank, South Africa.

FORD, D. (2009). Verbal communications with the author in May 2009. Johannesburg. (Notes in possession of author.)

FORGE, F. (2007). *Biofuels - An Energy, Environmental or Agricultural Policy?* Online: <http://www2.parl.gc.ca/Content/LOP/ResearchPublications/prb0637-e.htm> Accessed 2010/01/20.

FRIEDMAN, J.P. (ed) (2007). *Dictionary of Business Terms*, 4th edition. Online: www.docin.com/p-34051417.html Accessed 2010/02/01.

GILBERT, R. (2007). *Recent developments in animal feeds and feeding global feed production*. AFMA Matrix.

GILL, C. (2006). *Feed more profitable, but disease breeds uncertainty*. Watt Publishing.

GIRA FOOD (2002). *Strategies and opportunities for the Next 10 Years in EU Processed Meat Markets 1996 – 2005/6 – 2011 – 2016*. Online: http://www.girafood.com/data/files/Differentiation_in_Meat.pdf Accessed 2010/01/29.

GIRAG SA (2007). *Long Term strategic Trends in World Meat Markets 1990 - 2005/6 - 2010 – 2015, Poultry, Beef, Pigmeat, Sheepmeat*. Online: <http://www.girafood.com/data/files/Props/LTMeat%20Proposal%20May%202007.pdf> Accessed 2010/01/27.

GRAIN SA (2010). *Background and History*. Online: <http://www.grainsa.co.za/history.asp> Accessed 2010/01/31.

GROENEWALD, A. (2008). *Suitable chain strategies for the delivery of naturally fed beef from the Limpopo province*. Unpublished MBA thesis, University of Pretoria.

GROENEWALD, S. (1998). *Importation of animals and animal products*. National Department of Agriculture.

GUEYE, E.F. (2009). *Small Scale Family Poultry Production. The Role of Networks in information Dissemination to Family Poultry Farmers*.

HARRIS, C. (2008). *Opportunities and Challenges Ahead for Poultry Industry*. The Poultry Site. Online: <http://www.thepoultrysite.com/articles/984/opportunities-and-challenges-ahead-for-poultry-industry> Accessed 2010/01/26.

HEADY, D. & FAN, S. (2008). Anatomy of a crisis: the causes and consequences of surging food prices. *Agricultural Economics*, Vol. 39(1): 375-391.

HEBST, F.J. (2001). *An investigation of the product life cycle concept as an instrument in marketing decision-making for selected small organisations in Africa*. Unpublished PhD thesis. University of Pretoria. [Online: <http://upetd.up.ac.za/thesis/available/etd-06132002-085415> Accessed 2010/01/27.

HERFFERNAN, W. & HENDRICKSON, M. (1999). *The Global Food System; A report to the Agribusiness Accountability Initiative Conference on Corporate Power in the Global Food System*. High Leigh Conference Centre. Hertfordshire, United Kingdom.

HOFSTRAND, D. (2007). *Barriers to entry and exit*. Iowa State University. AGMRC United States Department of Agriculture. Online: http://www.agmrc.org/business_development/getting_prepared/business_and_economic_concepts_and_principles/barriers_to_entry_and_exit.cfm Accessed 2010/02/01

HUNT, I., WALL, B. & JADGEV, H. (Not Dated). *Applying the Concepts of Extended Enterprises to Support the Activities of Dynamic Supply Networks in the Agri-Food Industry*.

IFAP (2008). *Animal Welfare: Maintaining Consumer Confidence in Livestock Products is a Responsibility of Farmers*. International Federation of Agricultural Producers.

International Feed Industry Federation (IFIF) (2009). *Annual Report 2008/2009*. Online: <http://www.ifif.org/files/IFIF%20Annual%20report%202009A.pdf> Accessed 2010/01/27.

INTERNATIONAL TRADE ADMINISTRATION (Not dated). *Export Control*. Online: http://www.itac.org.za/import_control.htm. Accessed 2010/02/01.

INVESTOR WORDS (Not dated). *Definition Interest rate*. Online:
http://www.investorwords.com/2539/interest_rate.html. Accessed 2010/02/01.

INVESTOR WORDS (n.d.) *Gross Domestic Production*. Online:
<http://www.investorwords.com/2153/GDP.html> Accessed 2010/01/26.

INTERNATIONAL INSTITUTE FOR ENVIRONMENT AND DEVELOPMENT. (2009). *Innovating for environment and society: an overview*. Online: www.iiied.org/pubs/display.php?o=17056iiied. Accessed 2010/05/05.

INTERNATIONAL TRADE ADMINISTRATION COMMISSION (ITAC), (2007). *Temporary Rebate of the Duty on Soya Oilcake for Use in the Manufacture of Animal Feed*. Report NO.239. South Africa.

INTERVIEWS. (2010). Notes are available from the author.

JOOSTE, A. (2009). *International TradeProbe*. No. 16, April 2009. National Agricultural Marketing Council & Department of Agriculture, South Africa. Online:
http://www.namc.co.za/ASSETS/NEWpdf_18_05_09/NAMC-DoA%20TradeProbe%20No%2016%20April%20%202009.pdf Accessed 2010/01/26.

JSE, (2009). *SAVI White Maize Volatility Index*. [Online]: http://www.jse.co.za/products/commodity-derivatives-market/commodity-derivatives-market-product-detail/SAVI_White_Maize.aspx [Downloaded: 17-12-2009].

JSE, (2010). *SAVI historical database*. [Online]: <http://www.jse.co.za/Markets/Commodity-Derivatives-Market/Commodity-Derivatives-Price-History.aspx#SAVI> [Downloaded: 22-03-2010].

JOURBERT, J.S.G. (2008). *Projections of Protein Demand for Animal Use for 2010 and 2020*.

KANENGONI A. (2007). *ARC Animal Nutrition and Animal Products Institute Introduction: In search of alternative sources of energy*. Online: <http://www.sapork.com/artmarch22007.html> Accessed 2010/01/29.

KARAAN, M. (2010). *The Role of National Planning Commission in Shaping South African agriculture and agribusiness*. Presentation at the 2010 Agricultural Business Chamber conference held in Somerset-West. Cape Town.

KAPLINSKY, R. & MORRIS, M. (2000). *A handbook for Value chain Research*. IDRC.

KERD, J.E. (2004). *The Globalization of Agriculture: Implication for sustainability of small horticultural farms*. Online: http://www.actahort.org/books/638/638_51.htm Accessed 2010/01/26.

KIRSTEN, J., BLIGNAUT, C. & VISSER, D. (2009). *Pork chains in South Africa*. In: *European Pork Chains*, Chapter 12. Wageningen Academic Publishers.

KOENIG, M. (2010). *A Bullish Case for AgFeed Industries*. Seeking Alpha. Online: <http://seekingalpha.com/article/182918-a-bullish-case-for-agfeed-industries> Accessed 2010/01/26.

KOTLER, P. & KELLER, K.L., (2009). *Marketing management*. 13th Edition, Pearson Prentice Hall, New Jersey USA.

KÖSTER, H., (2009). *Quality Assurance (QA) in South African Animal Feed Industry*. AFMA - Animal Feed Manufacturers Association.

KYRIAZAKIS, I. & WHITTEMORE, C. T. (2006). *Whittemore's science and practice of pig production*. USA: Blackwell.

LABUSCAGNE, A. (2007). *A consumer orientated study of the South African beef supply chain*. Unpublished MBA thesis, University of Pretoria.

LEACH, G. (2003). *The South African Pork Industry*. Online: [www.waterberg.gov.za/docs/agriculture/other/2002%2520Annual%2520Report%2520\(Verslag\)%2520onthou%2520bladsynommers%2520regmaak.doc+G.+Leach,+The+South+African+Pork+Industry,+2003&cd=1&hl=en&ct=clnk&gl=za&client=firefox-a](http://www.waterberg.gov.za/docs/agriculture/other/2002%2520Annual%2520Report%2520(Verslag)%2520onthou%2520bladsynommers%2520regmaak.doc+G.+Leach,+The+South+African+Pork+Industry,+2003&cd=1&hl=en&ct=clnk&gl=za&client=firefox-a) Accessed 2010/01/26.

LEACH, G. (2006). *South African pork industry*. Online: www.uovs.ac.za/faculties/documents/.../10421-Pork%20industry.ppt Accessed 2010/02/01.

Local links: Not Dated. *East Anglia Food Link*. Appendix 4.

LOVELL, K. (2008). *WCAP Presentation*. South Africa Poultry Association.

LOVELL, K. (2010). Verbal communications with the author in January 2010. Johannesburg. (Notes in possession of author).

LOWE, M., GEREFFI, G., AYEE, G., DENNISTON, R., KIM, J, & SAM, N. (2008). *A value chain approach to the U.S. pork industry*. Center on Globalization, Governance & Competitiveness. Duke University. Online: www.cggc.duke.edu Accessed 2010/01/05.

LYONS, T.P. (1988). *Biotechnology in the feed industry*. Proceedings of Alltech's 4th annual symposium. Alltech Technical Publications, Nashville, USA.

MAREE, W., (2009). *Management Committee Report*. South African Poultry Association (SAPA).

MATHER, C. 2005. *SME's in South Africa's Food Processing Complex: Development Prospects, Constraints and Opportunities*. Working Paper 3-2005. School of Geography, Archaeology and Environmental Studies University of Witwatersrand.

MAYET, M. (2006). *Case Study: South Africa's Traceability and Segregation Systems for GM Grains*.

MEADOWS FEEDS. (2010). Online: www.meadowfeeds.co.za.

NATIONAL AGRICULTURAL MARKETING COUNCIL (NAMC), (2006): *Sub-sector Study: Chicken meat*. South Africa.

NATIONAL AGRICULTURAL MARKETING COUNCIL (NAMC). (2004). *NAMC Food Value Chains –Maize 2004* [Online]: <http://www.namc.co.za/dnn/PublishedReports/FoodPriceMonitoring.aspx> [Downloaded: 15-02-2010].

NATIONAL AGRICULTURAL MARKETING COUNCIL (NAMC). (2009). *NAMC Quarterly Food Price Monitor Nov 2009* [Online]: <http://www.namc.co.za/dnn/PublishedReports/FoodPriceMonitoring.aspx> [Downloaded: 15-02-2010].

NATIONAL DEPARTMENT OF AGRICULTURE (NDA), (2009). *Monthly Food Security Bulletin of South Africa: June 2009*. Directorate: Agricultural Statistics. Online: <http://www.nda.agric.za/docs/Cropsestimates/RSA%20Food%20Security%20Bulletin%20JUNE2009.pdf> Accessed 2010/01/09.

NATIONAL DEPARTMENT OF AGRICULTURE (2009). *South Africa's agricultural trade performance; Quaterly review (2007/08 - 2008/09 seasonal years)*. National Department of Agriculture, South Africa.

NATIONAL PLANT PROTECTION ORGANISATION OF SOUTH AFRICA (Not dated). *Import and Export control*. Online: http://www.nda.agric.za/docs/npposa/page_d.htm Accessed 2010/01/26.

NATIONAL PORK PRODUCERS COUNCIL (NPPC), (2007). *Testimony of the National Pork Producers Council on the U.S. Pork Industry Economic Crisis*. Online: <http://agriculture.house.gov/testimony/111/h102209/Butler.pdf> Accessed 2010/02/01.

NELLEMANN, C., MACDEVETTE, M., MANDERS, T., EICKHOUT, B., SVIHUS, B., PRINS, A.G. & KALTENBORN, B.P. (2009). *The Environmental Food Crisis*. UNEP, Nairobi.

NHLAPO-HLOPE, J. (2009). *Food price increases; is a practical, comprehensive government response possible?* KMAfrica, Dekar.

NOVA FEEDS. (2010). Online: www.novafeeds.co.za.

NTSELE, N. (2008). *South African Agricultural Processers Association (SAAPA) Annual report*. South African Agricultural Processers Association.

OECD (2004). *OECD Agricultural Outlook, 2004-2013*.

OECD (2007). *OECD Agricultural Outlook, 2007-2016*.

OECD (2008). *Agricultural outlook 2008-2017*. Online: www.oecd.org/document/32/0,3343,en_36774715_36775671_40444896_1_1_1_1,00.html Accessed 2009/06/01.

OSTERGREN, K. & OHLSSON, T. (2009). *The Swedish Institute for Food and Biotechnology, The challenge of sustainability in the food sector*. Online: www.sik.se/archive/dokument/Arsrapport_2008_eng_skarm.pdf Accessed 2010/02/02.

PEARSON, I. (2010). Business 2020. In: *Business redefined. A look at the global trends that are changing the world of business*. Ernst & Young.

PIONEER FOODS. (2010). Online: www.pioneerfoods.co.za.

POPULATION REFERENCE BUREAU (PRB), (2009). *2009 World Population Data Sheet*. Online: http://www.prb.org/pdf09/09wpds_eng.pdf Accessed 2010/01/26.

PORTER, M., E. (1985). *Competitive Advantage: Creating and Sustaining Superior Performance*. New York: Free Press.

PIANA, V. (2001). *Exchange rate*. Economic Web Institute.

PIONEER FOODS (2009). *Annual Report 2009*. Pioneer Foods, South Africa.

RAINBOW (2009). *Annual Report 2009*. Online: http://www.rainbowchickens.co.za/investor_annual.aspx
Accessed 2010/01/26.

RAMBURUTH, S. (2009). Presentation to BUSA. Competition Commission. Online: <http://www.busa.org.za/docs/Competition%20Commission%20Presentation.ppt>. Accessed 2010/08/25.

RANDERSON, J. (2008). *Drought Resistant GM Crops Ready 'In Four Years'*. Online:
http://www.fbae.org/2009/FBAE/website/news_08_10_drought-resistant.html Accessed 2010/01/26.

REGIONAL HUNGER AND VULNERABILITY PROGRAM (2007). Biofuel production and the threat to South Africa's food security. SARPAN, vol. 11. Online:
http://www.sarpan.org.za/documents/d0002509/Biofuel_SA_Wahenga_Apr2007.pdf Accessed 2010/01/30.

REID, J. (2009). Higher prices but greater volatility for feed grains. In: Industry report, August 10 2009, pp. 1-2. Online: http://www.rabobank.com/content/images/MR_feed%20grain-%20industry%20report_tcm43-89601.pdf Accessed 2010/01/26.

REMGRO (2007). *Investment Philosophy*. Remgro Ltd, South Africa.

RFA (n.d). *Road Freight Association South Africa*. Online:
<http://www.google.co.za/search?hl=en&safe=off&q=road+freight+association+south+africa&start=10&sa=N>
[2010, 1/17/2010] .

RFA (2009). *2009 Ethanol Industry Outlook*. Renewable Fuels Association.

ROBERTS, COMPETITION COMMISSION. (2005). Case: 113/LM/Nov05.

ROSENDAAL, B. (2009), *Facing the Feed Industry Challenges*. AFMA Matrix.

ROSE, S. P. (1997). *Principles of poultry science*. Wallingford: CAB International.

ROSEGRANT, M.W, RINGLER, C., MSANGI, S., SULSER, T.B., ZHU, T. & CLINE, S.A. (2008). *International Model for Policy Analysis of Agricultural Commodities and Trade (IMPACT): Model Description*. International Food Policy Research Institute, Washington, D.C.

SIMCHI-LEVY, D., WU, D.S., & SHEN, M.Z., (2004). *Supply Chain Analysis and E-Business: An Overview*. South Africa. Department of Agriculture. 2008. Pretoria.

SNYMAN M. (2009). *Blinker toekoms vir varkboere*. Landbou weekblad. Online: www.landbou.com/LandbouWeekblad/Diere/0,,1294-1302_2476030,00.html Accessed 2009/06/12.

SOUTH AFRICAN FUTURES EXCHANGE. 2010. SAVI historical database. [Online] available at: <http://www.jse.co.za/Markets/Commodity-Derivatives-Market/Commodity-Derivatives-Price-History.aspx#SAVI>. [Accessed on 2010-03-22].

SOUTH AFRICA ONLINE (n.d). *Transport*. Online: http://www.southafrica.co.za/transport_91.html Accessed 2010/01/17.

SOUTH AFRICAN POULTRY ASSOCIATION (SAPA), (2008). *The South African Poultry Industry Profile*.

SOUTH AFRICAN POULTRY ASSOCIATION (SAPA), (2009). *The South African Poultry Industry Profile for 2009*.

SOUTH AFRICAN PORK PRODUCERS ORGANISATION (SAPPO I), (2009). *The South African Pork Industry, the big picture*. SAPPO Information leaflet.

SOUTH AFRICAN PORK PRODUCERS ORGANISATION (SAPPO II), (2009). *Highlights of SAPPO's national annual general meeting 2009*. Pretoria.

SPESFEED. (2010). Online: www.spesfeed.co.za.

STATS SA (2009). *Quarterly Labour Force Survey. Quarter 3, 2009*. Statistics South Africa.

STEENKAMP, K. 2010. Personal interview in March 2010. Notes are with Author.

STEY, A. (2009). Quarterly Economic Overview of the Agriculture Sector (July to September 2009). Vol. 7: no. 3. Online: http://www.nda.agric.za/docs/Economic_analysis/EconomicOverview_JulySep2009.pdf Accessed 2010/01/17

STOLTZ, L. (2009). *Uitvoer van varkvleis oorweeg*. Landbouweekbald. Online: <http://www.landbou.com/bedywe/diere/ander-diere/ander-diere/uitvoer-van-varkvleis-oorweeg> Accessed 2010/02/01.

STREICHER, S. (2010). Verbal communication with the author in January 2010. Pretoria. (Notes in possession of author).

TALJAARD, P.R. (2003). *Econometric estimation of the demand for meat in South Africa*, Unpublished M.Sc Agricultural Economics thesis, University of the Free State, Bloemfontein.

TRADE AND AGRICULTURE DIRECTORATE COMMITTEE FOR AGRICULTURE (2008). *Working Party on Agricultural Policies and Markets: The OECD – FAO Agricultural Outlook, 2008 – 2017*. OECD- FAO.

TRANSNET (n.d.). *Transnet Freight Rail: Overview*. Online: <http://www.spoornet.co.za/Website/greenbusiness.html> Accessed 2010/01/17.

TRANSNET (2008). *Transnet annual report 2007*. Online: http://www.spoornet.co.za/Website/annual_report.html Accessed 2010/01/30.

TROSTLE, R. (2008). *Global Agricultural Supply and Demand: Factors Contributing to the Recent Increase in Food Commodity Prices*, USDA. Online: <http://www.ers.usda.gov/PUBLICATIONS/WRS0801/WRS0801.PDF> Accessed 2010/01/17.

UNITED STATES DEPARTMENT OF AGRICULTURE (USDA), (2009). *Livestock and Poultry: World Market and Trade*. Online: http://www.fas.usda.gov/psdonline/circulars/livestock_poultry.pdf Accessed 2010/01/17.

UNITED STATES DEPARTMENT OF AGRICULTURE (2009). *USDA Agricultural projections to 2018*. USDA Agricultural projections to 2018 (OCE-2009-1). February 2009.

UNITED STATES DEPARTMENT OF AGRICULTURE (2009). *World Agricultural Supply and Demand Estimates*.

UNIVERSITY OF PRETORIA (2009). *Quarterly review: The meat industry*. Nedbank, South Africa.

VAN DER AAR, P.J. & DOPPENBERG, J. (2009). *Biofuels: Consequences for the feed industry*, Schothorst Feed Research.

VAN DER MESCHT, J. (2006). *Revisiting the Road Versus Rail Debate*. University of Pretoria.

VAN HOFWEGEN, G., BECX, G., & VAN DEN BROEK, J. (2005). *Drivers for Competitiveness in Agrifood Chains: A Comparative Analysis of 10 EU Food Product Chains*. WP4 EU Mercopol.

VAUQUILIN, C. (2009). *Report of the Broiler Organization Committee*.

VILJOEN, H. (2009). Verbal communications with the author in December 2009. Pretoria, Centurion. (Notes in possession of author).

VISSER, D.P. (2004). *Structuring of the breeding objectives in the pork supply chain in South Africa*. Unpublished PhD thesis, University of Pretoria.

VUKASOVIC, T. (2009). *Consumer Perception of Poultry Meat and the Importance of Country of Origin in a Purchase Making Process*.

WIKIPEDIA CONTRIBUTORS (2009). *Definition of compound feed*. Online:
http://en.wikipedia.org/wiki/Compound_feed. Accessed 2010/01/23.

WIKIPEDIA CONTRIBUTORS (2010). *International trade*. Online:
<http://en.wikipedia.org/w/api.php?action=query&prop=revisions&titles=International>. Accessed 2010/01/17.

WIKIPEDIA CONTRIBUTORS (2010). *Oligopoly*. Online: <http://en.wikipedia.org/wiki/Oligopoly>. Accessed 2010/01/17.

WORLD AGRICULTURAL OUTLOOK BOARD (2009). *World Agricultural Supply and Demand Estimates*. United States Department of Agriculture.

WORLD BANK (2010). *Global Economic Prospects 2010: Crisis, Finance, and Growth*. The World Bank Group, Bangkok.

WORLD MEAT CONGRESS. (2008). *The Global Demand for Meat and its Context..... Top Pork Exporting Countries.... Top Beef Exporting Countries ... Cape Town, South Africa, September9, 2008*. Available online @ URL:www.worldmeatcongress2008.co.za/speech/tuesday/Daley%20IMS%20WMC%202008%20Cape%20Town.pdf. Accessed 2009/05/16.

XINGWANA L. (2009). *Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act No. 36 of 1947*. NDA, South Africa.

YEGANI, M. (2008). *Current challenges of commercial poultry nutrition*. Online:
<http://www.worldpoultry.net/news/current-challenges-of-commercial-poultry-nutrition-3007.html> Accessed 2010/01/23.

Annexure A

Questionnaire: Feed project

Position:

Names:

Address:

Province:

Contact numbers:

Date:

Interviewed by:

GENERAL QUESTIONS ABOUT THE ORGANISATION (Structure)

What is the legal status and ownership structure of this organisation? Who are the main shareholders?

.....
.....
.....

Does the organization chart still correspond with last year's annual report? (Note: Show the figure)
Where did changes take place?

Yes	No
-----	----

.....
.....

How many people are employed in this business?

People employed					
0-50	51-250	251-500	501-1000	1001-2000	>2000

.....

What do you see as the main lines of production and services rendered as well as the turnover during the past 3 years?

(Note: Consult financials)

Line of production	Turnover (Rm)			
	2006/7	2007/8	2008/9	2009/10 (E)
i.e. poultry, pigs, dogs, dairy etc.				
Total				

Comments:.....

Line of production	Volume (Tons)			
	2006/7	2007/8	2008/9	2009/10 (E)

Total				

What are your output volumes for the last three (3) years for the different lines indicated above?

What are the 5 main driving forces/issues/challenges in your business? Rank high 5 to low 1.

Driving force	Rank

SWOT ANALYSIS (Conduct)

Give a SWOT analysis of your business. Assign weights in order of importance to add up to 100.

Strengths	Weight	Weaknesses	Weight
1..... 2..... 3..... 4..... 5..... Total	 100	1..... 2..... 3..... 4..... 5..... Total	 100
Opportunities	Weight	Threats	Weight
1..... 2..... 3..... 4..... 5.....	 	1..... 2..... 3..... 4..... 5.....	

Total	100	Total	100
-------	-----	-------	-----

ISSUES (Conduct)

How would you rate the level of competition in your industry? Table for Feed and Products (e.g. broilers, etc). Rank high 5 to low 1.

Products/ Services	Level of competition		
	Low competition (1)	Competitive (3)	High competition (5)
Feed pork	Low competition (1)	Competitive (3)	High competition (5)
Feed broilers	Low competition (1)	Competitive (3)	High competition (5)
	Low competition (1)	Competitive (3)	High competition (5)
	Low competition (1)	Competitive (3)	High competition (5)
	Low competition (1)	Competitive (3)	High competition (5)

How to you perceive the level of vertical integration or coordination in your business? High 5 to low 1.

Level of integration				
5	4	3	2	1

Why do you give this score?

.....

Who are your 5 major competitors? Rank high 5 to low 1.

Competitors	Rank

PROCUREMENT (conduct)

From whom do you procure raw materials? Name the 5 main providers and rank them from high 5 to low 1 in terms of level of importance.

Providers	Rank

What types of raw materials are procured for your operations?

..... Do you procure
 hominy chop/wheat bran? Yes/No. If yes what %?%

What is your approximate % expenditure on raw materials per annum for your business? Also give R-amount.

% Expenditure on raw materials per annum								
<10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	>81

R.....

Is procurement of raw materials is done on contractual arrangement between parties? What % is based on contractual arrangements?

Yes	No							
% contractual arrangements								
<10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	>81

.....

What impact does price volatility have on your procurement process of raw materials?

High =5 to Low =1

Product	Volume of business (%)	Impact (high=5; low=1)
Maize		
Soya oil cakes		
Sunflower		
Vitamins		
Additives		
Other		

.....
.....

SALES (conduct)

What market channels are used for pig/poultry feed sales e.g. agent sales on commission, direct distribution, contracts to suppliers etc? To whom do you sell mostly?

Market	Sales (Tons)	%	Sales (Rand)	%
Own production				
Contractees				
Agents				
Direct distribution to e.g. co-ops				
Total		100		100

.....
.....
.....

Do you export any products?

.....
.....

How important is product development and innovation in your business?

.....
.....

MARKET INFORMATION SYSTEM (Conduct)

What impact does the institutional environment have on your businesses' conduct? (e.g. New Feed Bill, BEE, Competition Board) (On trust, relationships, availability of information, transaction cost?)

Item	Impact on business	Business behaviour	High 5 to low 1

Comments:.....

How would you rate the level and accessibility of information about raw material ingredient prices in terms of accessibility and quality?

Product /Ingredient	Availability of information (High 5 to low 1)	Quality of information (High 5 to low 1)
Maize		
Soya oil cakes		
Sunflower		
Vitamins		

Additives		
Other		

.....

Is market information about potential market partners / competition easily accessible? Rank from very good (5) to very weak (1).

Market information				
Very good (5)	Good (4)	Moderate (3)	Weak (2)	Very Weak (1)

.....

What types of information are you interested in from a development and competitiveness point of view? Rank high 5 to low 1.

Types of information	Rank

INFRASTRUCTURE & STORAGE (Conduct)

How would you rate public infrastructure in your area of business?

Reasons for answer? Rank from very good (5) to very weak (1).

	Very good (5)	Good (4)	Moderate (3)	Weak (2)	Very Weak (1)
Roads					
Railways					
Water					
Electricity					
Communication					
Other					

.....
.....
.....

How would you rate your storage capacity in your organization? Volumes and quality? Rank from very good (5) to very weak (1).

	Very good (5)	Good (4)	Moderate (3)	Weak (2)	Very Weak (1)
Volumes					
Quality					
Others					

.....
.....

Where do you feel the need to improve?

.....
.....

MAIN PROBLEMS AND PROSPECTS (Conduct)

How would you rate the current performance of your feed High=5; Low=1

Performance criterion	Rating (5 to 1)	Most important 5
Quality of feed		
Cost of feed		
Delivery on time		
Quality of service		
Consistency of service		
Support services		
Health		
Feed efficiency		
Additives		
Other		

How can the performance of the different Strategic Business Units (SBU's) in your organization be improved?

.....
.....

What have the main achievements been during the past 2 years?

.....
.....

What is your opinion of the Competition Commissions interest in the Feed industry? Rank high 5 (Necessary) to low 1(Unnecessary)

Competition commission interest				
5	4	3	2	1

Why this reply?

.....

Are the following main RISKS an issue in your organisation? Which other risks have an impact on your business? What risk mitigation strategies do you apply to reduce these risks? Please rank risks & assign probabilities for the likely occurrence of a specific risk.

Risk	Impact High 5 to low 1	Probability in %	Risk mitigation strategy
<u>Political risks</u> (Institutional environment, legislation, etc.)			
<u>Financial and Economical risks</u> Int. rates, inflation, capital cost, overheads, cash flow, exchange rates)			
<u>Input labour</u> (strikes, staff skills)			

<u>Business risks</u>			
<u>Price volatility of feed</u>			
<u>Food safety</u>			
<u>Power outages</u>			
<u>Inventory</u> (stock balance)			
<u>Theft, security</u>			
<u>Product Market Risk</u> <u>(market share risks)</u>			

Loss of customers/ competition increases/ supply decreases, oversupply			
Environmental risk (waste management etc.)			
Other risks			

FINANCIALS: Performance

What are the 5 main criteria/parameters to measure the success/ performance of your company. How did you perform the past five years?

Performance indicator	2006/07	2007/08	2008/09	2009/10E

.....

.....

What has your Cost: income ratio been during the past 3 years in %

Year	Cost: Income ratio
1	
2	
3	

Do you rate sustainability? Which areas? Rating high 5 and low 1.

Sustainability area	Rating

.....

Rate the trend in your cash flow position during the past three (3) years? Rate high 5 to low 1?

Trend in cash flow position				
Very good (5)	Good (4)	Moderate (3)	Weak (2)	Very Weak (1)

35. Do you anticipate expanding your current operation during the next 2-3 years? Rate very positive 5 to very negative 1.

Expansion of operation				
Very positive (5)	Positive (4)	Moderate (3)	Negative (2)	Very negative (1)

.....

