

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

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ABSTRACT

Poultry is one of the fastest-growing agricultural sectors. The poultry industry provides meat that is preferred by almost all cultures, is affordable and of good quality. In South Africa, the poultry farming business has been in existence for a long time. The industry was 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, to provide an instrument to voice the feelings of the industry, and later to stage egg-laying tests.

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. The subsectors of this industry 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 the different subsectors and various other challenges. These factors have a major impact on decision makers, 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 buyers' and sellers' perspective. 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. This study focused on the animal feed industry; with special emphasis on the broiler feed industry. Previous studies on these two subsectors were limited and even outdated. Several objectives were set, and methodologies were identified. This study provides findings on the current and up-to-date situation relating to the broiler industry.

The supply chain analysis that was conducted for this study showed the role that the feed industry plays in producing broilers. Feed costs account for more than 70 percent of the total costs of broiler production. The findings exposed structural shifts in the feed industry, indicating that the impact of these on growers was extreme, especially where feed manufacturers were part of a holding company chain.

Restrictive factors currently being faced by broiler industry players in doing business, among others, include issues relating to infrastructure for feed manufacturers (the cost and competitiveness of doing business). A good infrastructure may assist with optimising the feed industry at higher levels of operation.

Significant barriers to entry exist in the value chain, which makes it difficult for new and smaller entrants to compete with existing market players. These barriers include high capital requirements, relevant experience and track records, the significance of research and biotechnology in the provision of seeds, and economies of scale for other major inputs such as fertilizer. Various issues were highlighted by growers, which they experienced as immediate challenges to the poultry industry. These included quality and consistency of feed and associated raw components, changes in technology and innovation, electricity supply, price and availability, input prices other than the cost of feed (e.g. interest rates, labour, running costs), market degradation of poultry markets, and transport and road infrastructure.

The procurement of feed in the poultry industry is based mainly on a contractual arrangement between the parties. About 70 percent of growers were of the opinion that the level of integration and coordination was very high in this industry. The largest risks identified were power outages, followed by financial and economic risks, and the price volatility risks of feed. All these risks have a fairly large impact on growers. Growers felt that these risks could severely cripple their farming businesses, and restrict production expansions and profitability. A SWOT (strengths, weaknesses, opportunities & treats) analysis was conducted, and it was found that the strengths of the industry lie in the high demand for poultry meat, and the opportunities lie in the growth of the economy and increased investment into Africa.

Poultry remains a relatively cheap source of protein. Therefore, production can easily be undertaken by smaller entities, which can grow later as demand increases. There was concern about imports or dumping of especially Brazilian poultry at a much lower cost than that at which poultry could be produced locally. Brazil also has the ability to deliver on time and in high quantities. If government does not intervene to counter this situation, the industry could suffer significant impediments to growth, and hence, sacrifice food security.

The general observation based on the outcome of this study is that the broiler industry is well-structured, and is organised by competitive and educated members. However, there remains a core lack of trust among members in certain instances. For these sectors to be able to grow along a sustainable path together in the supply chain, they will have to trust one another and adapt their individual businesses to form a unity, rather than remaining separate entities. It is recommended that business owners will need to adapt their business models to the challenges and changes of the future.

Business in 2020 will not be the same as it is today. Strategic changes need to be made by taking into account the vision of future business models. 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.

INTRODUCTION AND BACKGROUND

The animal feed industry is of strategic importance to the beef, milk, poultry, sheep and pork, and other animal and pet industries. These subsectors are major buyers, processors and suppliers of processed commodities to the retail sectors and the final consumer markets. The animal feed industry is exposed to various risks, including input-commodity price volatility, high capital requirements, the inherent business and climatic risks of the different subsectors, and various other challenges. These factors have a major impact on decision-making, affecting 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 buyers' and sellers' perspectives. The feed industry in general forms part of the value chains of these industries, as feed is a major component of production costs in these value chains. The purpose of this paper was to study and understand the broiler industry supply chain, focusing on feed and feed-related issues experienced within the feed and broiler supply chains.

Producers face various challenges on a daily basis within a dynamic, ever-changing environment, which encounters increasing risk to such a degree that in order 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 records, the significance of research and biotechnology in the provision of seeds, and economies of scale in other major inputs such as fertilizer, the cost 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.

Poultry is one of the largest and growing agricultural sectors. Both small-scale and commercial business entities are involved in breeding (breeders), the rearing of chickens (broiler production), and feed supply. Furthermore, the poultry industry provides meat that is preferred by almost all cultures, is affordable, and of good quality. In South Africa, the poultry farming business has been in existence for a long time. The industry was 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 coordinate and promote broiler production, to provide an instrument to voice the feelings of the industry, and later to stage egg-laying tests. Since then, it has worked tirelessly to enhance the production and marketing of poultry products, while ensuring that the quality of the produce is maintained by members as well as consumers.

PROBLEM STATEMENT

This industry faces many risks in various subsectors. The feed industry plays a major role in determining production costs, contributing 70 percent of production costs in broilers. Previous research studies were identified that pertain to the focus of this study. This was done to prove that this study will make a worthy contribution to the broiler industry as well as to illustrate that this study is not a duplication of other studies.

Numerous areas within the broiler supply chain need to be identified and studied, to indicate the impact that these areas can have on the supply chain. These areas, among others, comprise the various parties involved in feed inputs, manufacturing and procurement, competitiveness and profitability within the animal feed supply chain, and their overall impact on the poultry market. Input factors further upstream in the supply chain (e.g. maize) need to be researched, as well as the producer procurement process, and risk, discounted for efficiency, lower costs and higher quality.

A limited amount of literature was found that included a detailed analysis of the entire supply chain, its stakeholders and its role players, from an economic and strategic perspective, that combined the structure, conduct and performance in the South African feed industry. To understand problems in the broiler industry, a value-chain analysis of feed in the broiler industry, including all the links, needed to be undertaken. Special attention was given to the different parties involved in the input and feed industries. For example, an agribusiness (co-operative) is a major buyer, manufacturer and seller of feed, while there are other players who are independent.

STUDY OBJECTIVES

In order to conduct a study that benefits the industry and stakeholders involved, the following need to be undertaken, and core problem areas need to be elaborated:

- Identify the various stakeholders and role players in the broiler subsector and feed industry (including their structure, size, and market share).
- Identify the factors that restrict and/or enhance competitiveness and profitability within the feed production supply chain.
- Determine the impact of the feed industry on the broiler supply chain.
- Determine the level of price volatility of inputs for the feed industry.
- Address risks and risk mitigation strategies, such as hedging.
- Explore possible business models in the broiler industry.

DATA COLLECTION

In order to understand the impact of the feed industry on the broiler supply chain, producers, and consumers, this study focused on the agro-feed industry. A total of 53 interviews, using structured questionnaires, were conducted to obtain information from broiler producers, feed manufacturers and the major role players and organisations within the relevant industries. Strategies to mitigate risks were explored in order to develop an updated feed supply chain structure, to assist emerging markets and the industries involved.

METHODOLOGIES

The methodologies below were used to identify the impacts faced by the broiler industry relative to the measured challenges. For the purpose of the industry, background desktop studies were conducted to structure the current workings of the sector. To answer certain research questions, structured questionnaires were used, in order to obtain an objective view from industry role players regarding the current trends and issues in the industry. Within the studies' structure, conduct and performance framework, the following methodologies were also used and followed:

- **Vertical integration** within the animal feed industry of South Africa

In the South African feed industry, there are a small number of role players who together control the largest market share. The five main feed producers examined were 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 described as being a vertically integrated system. Vertical integration is the firm's approach to increasing control over its suppliers of inputs.

- **Porter's analysis** of the barriers to entry

Porter's 'Five Forces' model was used to determine the attractiveness of the feed industry in terms of the competitive environment it faces in the South African context. This could be done by indicating what changes had occurred in each of the elements that make up the competitive environment in which the industry operates. To be able to apply this structure, conduct and performance paradigm to the feed industry, it was divided into two subsectors – the broiler subsector and the X subsector, which will be discussed separately.

- **Price volatility**, which is a measure of the possible variation or movement of a particular economic variable. It describes the tendency of a commodity, for example maize, to move up or down, and the extent of the anticipated move.

- **Supply Chain Operations Reference (SCOR)** – this model was used in conjunction with conventional supply chain tree diagrams to indicate the flow of information between different role players and stages. This model provides an enhanced understanding of the 'farm to fork' process and of what is expected within a competitive and sustainable market. The data collected in the surveys was tested and quantified to establish its 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 to establish how these inter-linkages impact on the industry.

- **Risk analysis** within the broiler industry, which, for the purposes of this study, was divided into macro and micro levels. All identified risks that have an external impact on the daily operations of the milling industry were classified as macro risks. Macro risks were further classified into

political, economic, social, technological and environmental risks (Louw, 2007). Micro risks have an internal impact on the milling industry, in that these types of risks are unique to and affect the long-term sustainability of the industry. Micro risks, therefore, were divided into operational, product, market, financial, input and export risks.

RESULTS AND FINDINGS

Historically, the poultry industry has been the face of the South African animal production sector (SAPA, 2009). Individuals kept broiler as well as layer production chickens in their back yards for different purposes, including traditional ceremonies and consumption by households. An increased interest in poultry production has been brought about by the growing need for a cheap source of protein.

The 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. Its mission and vision are to be an industry-driven organisation that addresses collective issues and creates 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. Furthermore, it represents and assists farmers from different sectors of the industry, such as the day-old chick supply industry, the egg industry, as well as the broiler industry. Figure 1 below, illustrates the interrelationships in the feed industry between the different stakeholders involved in the animal feed supply chain.

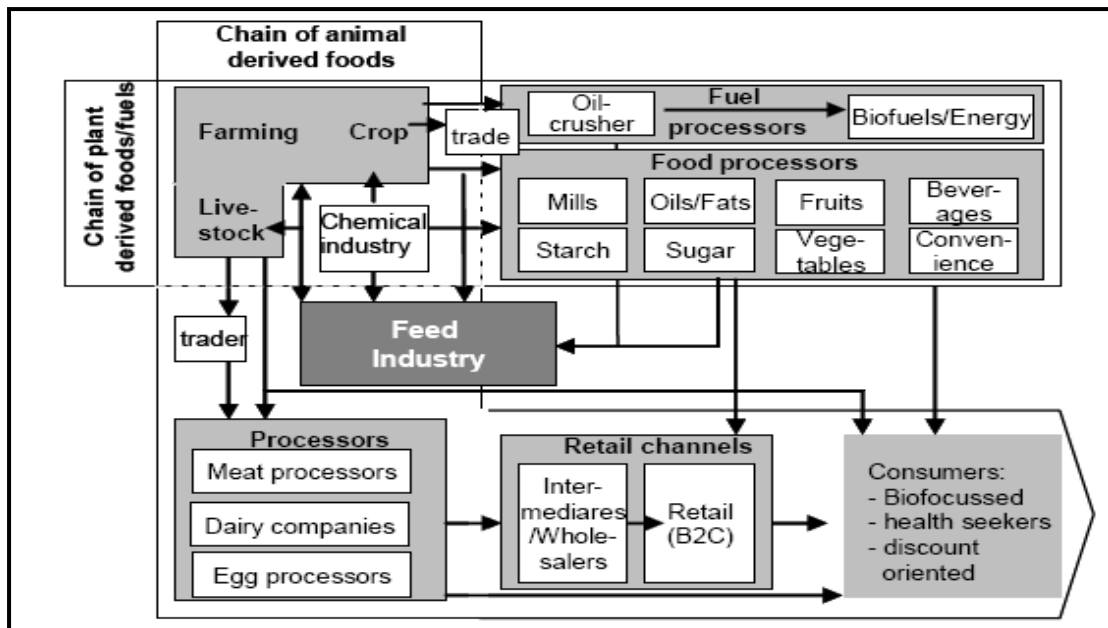


Figure 1: The Role of the Feed Industry in the Supply Chain

Source: Broring, 2009

The number of firms or companies and their 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 enterprises, are not able to take part in or get actively involved in the national market. Mather (2005) shows that since 1960, the liberalisation of agricultural markets has opened few opportunities for small and medium enterprises, and this is borne out by the number of emerging farmers who gain inadequate access to the agricultural market.

Poultry farmers, of both broilers and layers, procure their inputs from the day-old chick suppliers (SAPA, 2009). The quality of poultry inputs from the day-old chick suppliers plays an important role in performance relating to egg production and reducing mortality. Some of the key role players in the poultry industry are Rainbow, Tydstroom, Early Bird, Sovereign, Country Bird, Supreme, County Fair, Daybreak, 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 slaughtered 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 estimated the total size of the chicken market in South Africa to be approximately R11 billion in 2009”(De Beer, 2009).

The capital outlay for a broiler unit varies between R1.9 million and R3 million, depending on the type of unit constructed and the level of technology incorporated. These units usually house between 25 000 and 35 000 chickens, with an average of 20 chickens per square meter. For a grower to be profitable and sustainable, more than 100 000 chickens must be produced per 54-day cycle.

The procurement of feed in the poultry industry is based mainly on a contractual arrangement between the parties. 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 is part of their business structure. The risks associated with this form of procurement are far fewer, compared with own mixers, who have to develop their own feeding mix and source raw materials, with varying quality and price levels.

The data analysis revealed that most contract chicken growers do not know their actual feed cost per cycle. 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 and other contractually agreed costs. The procurement process of premixed feeds is summarised below.

- More than 75 percent of farmers estimate costs to range between 60 and 80 percent of the total cost of production.
- Feed mixtures vary according to the genetics of the broilers used, budgets set 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 were considered extremely important by all the farmers interviewed. Feed mixes must be adaptable in order to adjust to changes and the availability of good quality raw ingredients and additives.
- Procurement of feed is sourced by contractual agreement.

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

- Risks start from the delivery of the day-old chicks to the farm and end when the live birds are delivered to the abattoir.
- Chicks are supplied mainly by the holding companies subcontracting the growing to farmlevel.

- 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 stipulated by the feed manufacturer.
- Many contracts require that birds are only to be sold to the holding company, and under no circumstances are they to be sold independently.
- Incentive or bonus schemes are only available to certain contractors within the holding company.
- Growers feel that the price transmission from the free market trade of raw ingredients to the growers, as the final users, is ineffectively decreasing.

The following opinions were given regarding the impact of certain risks on growers, and the probability that these risks would occur. These risks form part of the set of risks discussed in the performance section on the feed industry and also apply to the broiler industry. Growers were requested to rank the impact of the risk on their business, from 5 (being very high) to 1 (having a very low impact). The impact was then multiplied by the probability of occurrence to indicate the relative importance of the risk. The largest risks were power outages, followed by financial and economic risks, and the price volatility risks of feed. All the risks have a fairly large impact on growers. Growers felt that these risks, along with the probability that they would occur could severely cripple their farm businesses and restrict production expansions and profitability. The risk impact levels and probabilities for the broiler industry are summarised in Table 1:

Table1: Risk impact levels and probabilities for the broiler industry

Risk	Impact (5, high –1, low)	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

A SWOT analysis of the feed industry was conducted, and the findings are presented in Table 2, below.

Table 2: SWOT analysis of the South African feed industry

<p style="text-align: center;">Strengths</p> <ul style="list-style-type: none"> • Well-trained personnel in the organisations • Cultural qualities through which organisations do business • Well-known trademarks and customer basis • Part of an integrated business structure • Quality, control and technological innovation 	<p style="text-align: center;">Weaknesses</p> <ul style="list-style-type: none"> • Price volatility and its effect lower down the value chain • Procurement of good-quality raw ingredients • Old levels of technology • Availability of capital for expansion • Not assured of buyers for feed manufactured
<p style="text-align: center;">Opportunities</p> <ul style="list-style-type: none"> • Technological advancement • Growing markets, especially in Africa • Increased value-adding through integration • Growth of 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"> • Supply of electricity • Infrastructure not maintained by government departments • Changes in legislation, and the effect of the Competition Commission's continuous investigations • GMO issues and how these will be managed • Uncertainty of agriculture with regard to political involvement

Source: Interviews, 2010

The greatest strength exhibited was the core culture of the businesses and the methods that they were perceived to use, which added value to their businesses and contributed towards their vision and mission. The weakest point for feed manufacturers was the fluctuations in prices of raw feed ingredients. The two main opportunities that feed manufacturers will have to embrace in order to expand are technological advancement (necessary to be on par with international trends and standards) and expansion opportunities into Africa.

However, along with these potentially prosperous opportunities lies an old enemy namely, state governance. The strengths of the industry lie in the high demand for poultry meat, which is a low-cost source of protein. South Africa, which has a population with a low domestic income favours eating poultry on a regular basis over the more expensive red meats. The recession saw many people resorting to cost-cutting measures, by buying more poultry products as a substitute for red meats. But a global recovery may result in an increase in disposable income, allowing consumers to purchase more of the expensive proteins. The ability to control an outbreak of disease is also a weakness facing the industry. The outbreak of the H1N1-virus (bird flu), especially, showed how rapidly the disease could be spread over and within countries.

Opportunities lie in the growth of the economy and increased investment into Africa. If feed manufacturers can work together with broiler growers, a mutual goal of growth and expansion can be realised. However this goal must only be pursued in accordance with the rules of the Competition Commission. In the short term, the effect of high input costs are squeezing the industry (broiler growers are price takers). Another concern is imports or dumping of especially Brazilian poultry at a much lower cost than it can be produced locally. Brazil also has the ability to deliver high quantities on time. If government does not intervene, the industry could face serious losses in terms of growth, and this will fuel the food security concerns

The study exposed issues within the broiler industry, giving a wide overview of what challenges farmers or growers experience on a daily basis, not only with regard to feed issues but also with regard to external issues. The following issues were highlighted by the growers, which they experienced as immediate challenges to their industry. Ranks were assigned with intervals of very high at 5 and very low at 1. Below are the major issues affecting industry growth, compiled from the interviews conducted. The issues, in order of importance, are as follows:

- Quality and consistency of feed and associated raw components
- Changes in technology and innovation
- Electricity supply, price and availability
- Input costs other than feed, e.g., interest rates, labour, running costs, etc.
- Payment structures, as stated by contract growers
- Market degradation in the poultry markets

- Transport and road infrastructure
- Disease and the control and containment of outbreaks
- Imports and the inability to control the dumping of poultry products in South Africa
- Skill levels of management and the team, and the farm structure

The following issues were also identified by the growers:

- Quality of day-old chicks
- Bio-security
- High feed costs
- Inability of contract growers to choose their own feed supplier
- Quality and availability of good, strong water and water sources
- Climate-controlled houses Vs. open houses
- Management of contracts and adherence to contract terms
- Inconsistency of pellet quality
- Feed delivery lags and time taken to catch up on backlogs
- Communication between farmers, and organisational structures
- Economies of scale
- Capital intensity of the industry
- Regulations and legislation
- Consumer demand and changes in demand
- Lack of negotiation between contractors and companies contracted
- Lack of incentives for contract growers
- Sales
- Efficient Feed Conversion Ratio (FCR)
- Effective cash flow management

These issues and challenges exhibited the general trends in the poultry industry. The following issues were highlighted by SAPA as the key challenges and issues from an organisational perspective

- Changes in disposable income and job opportunities
- Considerably higher feed cost 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 ranked highly by broiler holding companies as concerns and challenges that they face in the poultry industry:

- Managing the 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

CONCLUSIONS

Poultry is one of the largest and growing industry within the agricultural sector. Both small-scale and commercial business entities are involved in the breeding (breeders) and rearing of chickens (broiler production), and in feed supply. Furthermore, the poultry industry provides meat that is preferred by almost all cultures, is affordable, and is good quality. In South Africa, the poultry farming business has been a growth sector for a many years.

SAPA is crucial to the growth and development of the poultry industry in general. Its mission and vision are to be an industry-driven organisation that addresses collective issues and creates a milieu within which members can become world-class competitors in the food market. SAPA is a representative of both small-scale and commercial broiler farmers. 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, which is a source of concern for the Competition Commission.

The majority of industry leaders stated that they welcomed investigations conducted by the Competition Commission, but were merely concerned with the manner in which these were being conducted. However, continuous investigations could be detrimental to investment.

The high level of capital intensity and the lack of access to credit make it difficult for smaller, new entrants to establish themselves in this market. Fewer newcomers to the market could result in a shortage of skills available to the industry in future. Larger firms have the capital outlay and financial as well as intellectual support required to grow into large competitive businesses, but this only raises further concern as to the levels of competitiveness in the poultry industry.

A further concern for the industry is the high level of imports or 'dumping' that are hurting it. The South African poultry industry is, if compared with the Brazilian market, relatively small, and thus very sensitive to high levels of imports, which could upset the demand balance in the country. The demand for poultry in South Africa has always been relatively steady. The recent recession has resulted in a larger demand for poultry products as a substitute for the more expensive red meats. The lower disposable income of consumers has made the purchase of poultry a better option.

Bio-security is a constant issue for the South African poultry industry. High levels of regulation exist, with contingency plans in place should an outbreak of a potentially hazardous disease, such as the recent outbreak of bird flu, occur. The low level of education, high level of poverty, and dense populations also pose a serious threat of bio-hazard zones for disease outbreaks. The lack of accessibility, control, and funds could result in potential outbreaks not being brought under control quickly enough.

The procurement of feed in the poultry industry is based mainly on contractual arrangements between the contracting parties. More than 90 percent of growers procure feed as a pre-mixture from an accredited feed-producing company, which for the major growers forms part of their business structure. The risks associated with this form of procurement are far fewer than for own mixers. When a premix is purchased, the mix carries an assurance that it has been developed for a specific genetic chick material, and that its combination of elements will ensure the required growth performance of the chickens.

The strengths of the industry lie in the very high feed conversion ratio (converting feed to meat without an excessive loss in energy is good) and also in the high demand for poultry meat, which is a low-cost source of protein. South Africa, with a population earning a relatively low domestic income, favours poultry above the more expensive red meats.

In the short term, the effects of volatile and uncompetitive input costs are squeezing the industry. Another concern is the imports, or dumping, of especially Brazilian poultry at a much lower cost than that at which it can be produced locally. Brazil also has the ability to deliver on time and in high quantities. If government does not intervene, the industry could face a serious setback in growth, and hence an increase in the food security debate. A growing concern with regard to the adding of vitamins, growth hormones and other additives in the rearing of broilers is that there is a lack of governance of these methods. Currently, decisions are politically-based and are not in accordance with best practices.

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