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Development of the animal feed to poultry value chain across Botswana, South Africa, and Zimbabwe

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Abstract: The animal feed to poultry value chain in the southern African region has seen rapid demand growth owing to increases in urbanization. This growth has been accompanied by the increase in co-ordinated investments by large, predominantly South African, firms across the region. We examine the developments in the value chain across countries in southern Africa, paying attention to production and trade in poultry meat and its main inputs. We also consider the regional nature of the animal feed to poultry value chain. We argue that large firms play a lead role in the development of the value chain in southern Africa given their ability to make co-ordinated investments at different levels and to realize the competitive potential from the regional agricultural production of the main feed crops.

Keywords: value chains, trade, poultry, regional industrialization, agro-processing

JEL classification: L66, Q13, F15, O14

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1 Introduction

Countries in sub-Saharan (SSA) Africa have experienced relatively high economic growth from the mid-2000s, along with rapid urbanization. This has led to the consequent increase in demand for processed food. At the same time, demand for food globally has increased with the rapid economic growth of China. Among processed foods, poultry has been in particularly high demand as this is the main source of protein in southern African countries, as in most developing countries (Steinfeld et al. 2006). As a result, the commercial poultry industries in some countries in the region, such as Zambia and Mozambique, have been growing at rates as high as 20 per cent per annum between 2005 and 2010 (Technoserve 2011a). Against this backdrop, this paper critically assesses developments in the animal feed to poultry value chain across Botswana, South Africa, and Zimbabwe.

The main input cost to the poultry industry is animal feed, which in turn is composed of processed maize, soya, and supplements. Poultry breeding stock for day-old chicks that are reared as broilers is, for the great majority of southern African production, sourced from one of two multinational corporations, Aviagen Broiler Breeders and Cobb-Vantress Inc. (hereafter Aviagen and Cobb-Vantress, respectively). Breeding stock has characteristics including the feed conversion ratio, and resilience to disease, climate, and altitude. The poultry industry can therefore be understood as a value chain, from the production and processing of agricultural commodities through a quasi-industrial process of batch production of the rearing, processing, and distribution of poultry in fresh and frozen form (McCleod et al. 2009). The competitiveness of the final product depends on co-ordination of production and investment through the various levels and the ability to acquire the key raw materials at a reasonable price.

The southern African region is a net importer of both poultry and one of its key inputs, oilcakes required for the production of animal feed, even though there is substantial potential for agricultural production of the main inputs. The regional trade deficit is largely on account of South Africa having a poultry trade deficit of US\$270 million, or approximately 15 per cent of local demand, and an oilcake trade deficit of US\$257 million in 2014. Agricultural conditions mean that while South Africa produces surplus maize, it is constrained in the production of soya and feed-related products such as oilcake which are mainly imported from South America. Poultry imports also used to come largely from South America, switching to Europe in early 2014 when the European Union (EU)–South Africa free trade agreement came into effect and following anti-dumping duties imposed against Brazil.

The potential for expanded agricultural production is in countries such as Zambia; since 2012–13, indeed, Zambia has emerged as a net exporter of oilcakes and their key raw materials maize and soybean. The country's 2014 oilcake exports alone amounted to US\$75 million, approximately 30 per cent of South Africa's oilcake trade deficit. Zambia's combined oilcake, maize, and soybean exports were over US\$150 million in 2014.

The growth in poultry production in the southern African region has been led by investments at different levels of the value chain by a small number of South African companies, in particular, RCL Foods Limited, Country Bird Holdings Limited, and Astral Foods Limited (hereafter RCL, CBH, and Astral, respectively). These investments illustrate the importance of bringing together the rights to the main breeds, large-scale investments in production facilities, and the technical and organizational capabilities in commercial poultry. The backward linkages to agricultural products in the region in the form of animal feed and its key constituents, maize and soybeans, are critical.

Taken together, the characteristics and recent performance of the poultry industry raises a number of important questions about investment and growth in regional value chains, linkages to growth in agricultural production and agro-processing capacity, and the lead role of large internationalized firms. With strong domestic and regional backward linkages and with growing regional demand, the animal feed to poultry value chain presents opportunities for domestic and regional industrialization. Substantial gains from regional trade in agro-processing products have recently been identified in the analysis of intra-African trade (Jensen and Sandrey 2015). South Africa has been identified as gaining from greater trade and as being a key driver of regional value chains as a market and as a source of inputs (AfDB et al. 2014).

The analysis of the animal feed to poultry value chain therefore raises a number of issues. First, it represents the intersection between agriculture and manufacturing, and indeed services such as retail and logistics. Second, it is characterized by large, vertically integrated producers who have control over key inputs, namely animal feed and breeding licences for the grandparent and parent stock. Third, it is also fragmented in parts as inputs such as soybean oilcake and maize are traded at arm's-length by international traders and oilcake, in particular, is imported from outside the region in order to produce animal feed.

Value chains emphasize linkages in vertical stages of processing, governance of the overall chains, and the firm-level processes of upgrading. The global value chain (GVC) literature has analysed trade in intermediate products along value chains, such that countries develop production of different components and 'compete in tasks' (Gereffi and Fernandez-Stark 2011). Relatively little work, however, considers regional value chains and the manner in which agro-processing can be used to industrialize, an area where this paper makes a contribution.¹ In addition, this paper considers the role of large and lead firms in the development of the poultry industry in southern Africa, including issues of market power and governance.

This working paper is drawn from a study on the development of animal feed across Botswana, South Africa, Zambia, and Zimbabwe. A partner organization, the Indaba Agricultural Policy Research Institute in Zambia, is working on the Zambian component of the study. The study itself is part of United Nations University World Institute for Development Economics Research (UNU-WIDER) project on 'Regional growth and development in Southern Africa'.

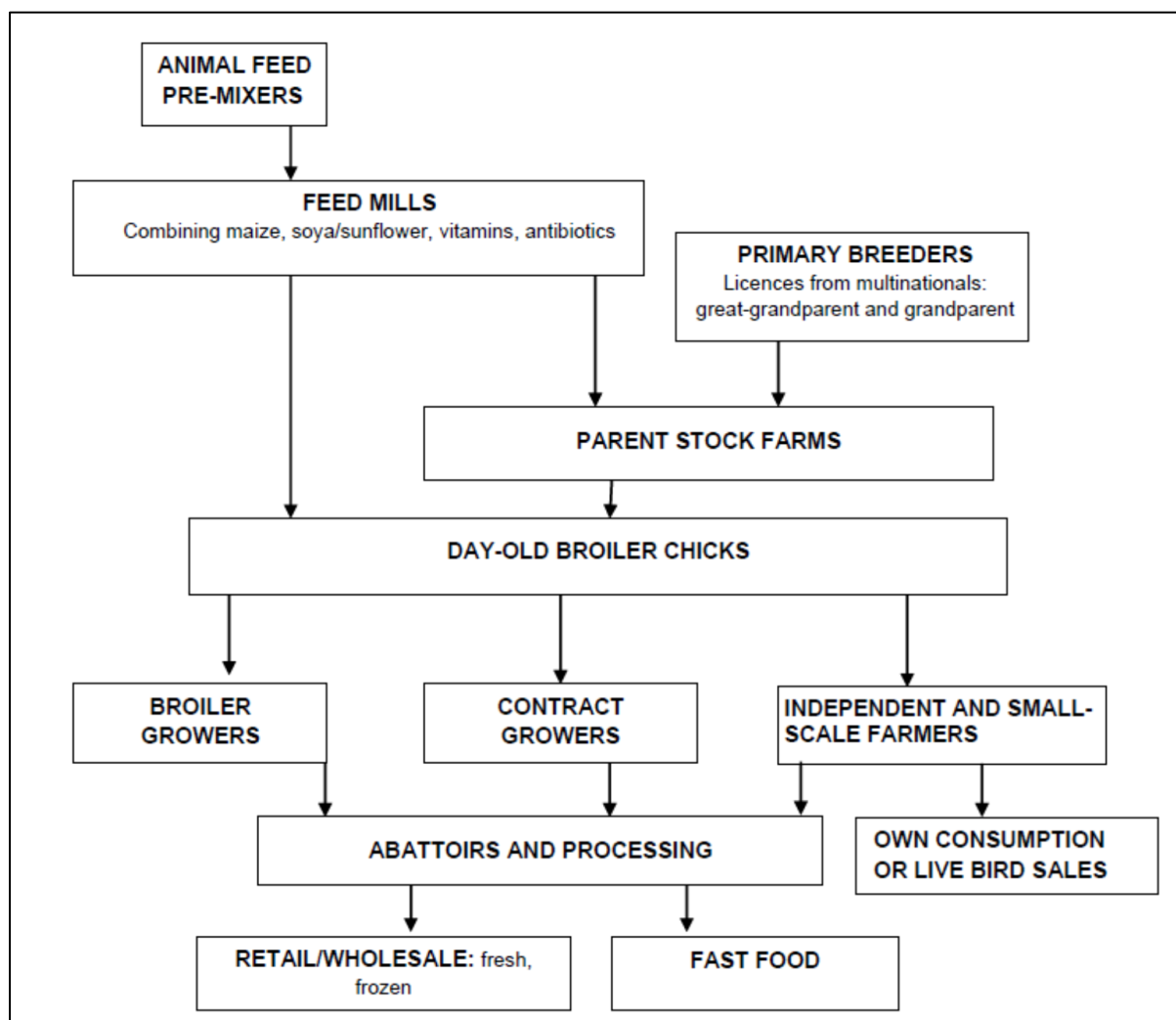
Section 2 provides a brief overview of the general structure of the animal feed to poultry value chain and the main producers. Section 3 provides a brief but critical review of the main theoretical frameworks through which the value chain can be understood. Section 4 provides an analysis of the growth and competitiveness of the various levels of the animal feed to poultry value chain through an analysis of production and trade data. Section 5 considers the role of large players in the development of the poultry industry in southern Africa. Section 6 concludes by setting out the key insights from the analysis.

2 Overview of the animal feed to poultry value chain and main companies

The animal feed to poultry value chain describes the range of activities and processes required to produce commercial chickens or broilers. We begin by summarizing the key characteristics of the value chain, then map the value chain and describe each of the processes found in the chain (Figure 1).

¹ See Keane (2015) for a discussion of value chains and regional development in southern Africa.

Figure 1: Poultry value chain



Source: Bagopi et al. (2014).

In South Africa, the great majority of poultry is produced by large-scale commercial players who are generally vertically integrated with key inputs such as animal feed, all the way to slaughtering operations (DAFF 2014). The poultry is packaged and sold in fresh or frozen form, in pieces or whole, through retailers. For example, large players such as Rainbow Chicken (a subsidiary of RCL) and Daybreak Farms (formerly known as Afgri Poultry) sell approximately 50 per cent of their produce through retailers.² The most important category is packs of individually quick frozen (or IQF) chicken pieces which accounts for 90 per cent of production of chicken meat in South Africa, largely sold to supermarkets. Fast food outlets are also becoming more important for poultry meat products such as chicken nuggets and fried drumsticks (Fessehaie et al. 2015). Although on a much smaller scale, the Botswana poultry industry is similar to that in South Africa as it is dominated by large players mainly from South Africa.

In contrast, poultry companies in Zimbabwe are largely split into three production scales: large-scale fully integrated, large-scale semi-integrated, and medium- and small-scale production (Zengeni 2014), with the medium- and small-scale producers producing the bulk of the chicken supplied into the Zimbabwean market (LMAC 2014). In 2014, the large-scale producers supplied

² Interview with Rainbow Chicken, 15 July 2015; interview with Daybreak Farms, 30 June 2015.

between 2,600 and 3,000 metric tons of chicken per month to the formal market, that is, supermarkets.³ The small-scale producers sold between 6,000 and 6,500 metric tons of chicken per month.⁴ These smallholders typically sell into the so-called informal market, by selling either directly or via traders to local retailers and consumers and into live markets (Technoserve 2011b).

The animal feed to poultry value chain starts with the two main inputs—animal feed and breeding stock (Figure 1). Animal feed accounts for between 50 and 70 per cent of the total input costs (Bagopi et al. 2014).⁵ Animal feed for poultry is generally made from milled maize and soybean or sunflower. At approximately 60 per cent of production costs, maize accounts for the largest share of inputs into feed production by volume and value.⁶ Soybean products account for 25–30 per cent of animal feed production cost and the rest is made up of additives such as lysine.⁷ Soybean oilcake and full-fat soya are the processed soybean products used in animal feeds. South Africa is a net importer of these products, with various oilcake imports reaching over US\$600 million in 2012 and soybean imports increasing sharply from US\$3.4 million in 2013 to US\$51 million in 2014.⁸ Soybean oilcake is used to produce general animal feeds whereas full-fat soya is used to produce high-quality animal feeds (Takala-Greenish et al. 2014). Animal feed production is carried out in the feed mills where the main ingredients (maize and soya), including vitamins and antibiotics, are combined to produce stock feed.

Two dominant breeds of chickens are used worldwide in the broiler production industry, the Ross breed, supplied by Aviagen, and the Cobb breed, supplied by Cobb-Vantress of the United States.⁹ Typically, the holder of the intellectual property—in this case Aviagen or Cobb-Vantress—sells grandparents to a distributor (usually through a franchise arrangement) who then breeds grandparents to supply day-old parent stocks to the market. The customers of this parent stock are either fully integrated broilers who sell their product to the retail market or they are day-old broiler chick producers who in turn supply independent broiler producers that sell their product in the retail market.

In both Zimbabwe and South Africa, both Ross and Cobb breeds have established markets, although a new breed, Arbor Acres, was introduced into the South African market in 2007. In South Africa, the breeding licences for Ross and Cobb are held by Astral and RCL, respectively. Astral, through its Ross Poultry Breeders division, supplies breeding stock of the Ross 308 to the South African broiler industry, whereas Rainbow Chicken supplies the Cobb 500 breeding stock breed. However, these companies only have these breeding licences for their operations in South Africa. In Zimbabwe, the breeding rights for Cobb are held by Irvine's Zimbabwe (Private) Limited, which also owns the breeding rights in the rest of Africa through Irvine's Africa (Pty) Limited, whereas the breeding rights for Ross for operations outside South Africa are held by

³ Interview with Livestock and Meat Advisory Council (LMAC), 19 August 2015.

⁴ Interview with LMAC, 19 August 2015.

⁵ The description of the production process in this section is summarized from Bagopi et al. (2014) unless otherwise stated.

⁶ Interview with Animal Feed Manufacturers' Association (AFMA), 15 July 2015.

⁷ Interview with AFMA, 15 July 2015; interview with Epol, 16 July 2015; interview with Afgri, 27 July 2015.

⁸ Data acquired from Trade Map (ITC 1999–2015).

⁹ It is important to note that the breeds for layers (birds grown for the production of table eggs) and broilers (birds grown for the production of meat) are different and thus constitute two separate markets. As this study looks specifically at broilers, the breeds and licences for layer genetics will not be explored here.

CBH, the same company that introduced the new breed Arbor Acres (also licensed from Aviagen) into the South African market in 2007.

The day-old chicks are reared by contract growers, the poultry firms' own farms, or independent farmers. The broiler production model has evolved from industry players owning the farms on which broilers are produced to them having contract growers rear the birds. Large firms are increasingly using contract growers because owning farming land is costly.¹⁰ Contract growing accounts for approximately 60–80 per cent of the production of broilers in South Africa.¹¹ Typically, the poultry company contracting the farmer would provide day-old chicks, animal feed, and extension services such as veterinary services and training.¹²

Once the day-old chicks are fully grown (between 32 and 42 days old) they are taken to slaughter at an abattoir and processed for sale in the retail market and fast food restaurants. In some cases, the chickens are sold live. This is normally the case with small-scale farmers. Access to abattoirs and processing facilities affect the level of processing of the chickens, that is, whether they are sold live, slaughtered and fresh, or slaughtered and frozen. It also affects the level of access to the retail sector, especially given that consumers mostly purchase frozen chicken, with South African and Namibian consumers purchasing between 80 and 90 per cent of chicken as either IQF or frozen whole birds (Bagopi et al. 2014).

Vertical integration with key inputs such as animal feed is a key characteristic in the poultry value chains in Botswana, South Africa, and Zimbabwe, particularly for the larger players. This is important for the co-ordination of production, especially for those firms operating on a large scale. The major producers in each country are generally vertically integrated, starting from breeding operations and feed production to slaughtering and processing (FAO 2013; Louw et al. 2013). In Zimbabwe, where the bulk of chicken supplied to the market is from small-scale farmers, vertical integration is only a key feature for the few large firms that supply the formal market. Moreover, a number of the players, especially large South African poultry companies, have operations in more than one country in the region. For instance, leading poultry companies such as Astral and Rainbow Chicken in South Africa have operations in Zambia and Mozambique, whereas the Zimbabwean company Irvine's also has operations in Botswana and Mozambique.¹³

The poultry industries in the region generally have trade restrictions and South Africa and Zimbabwe are no exception. Zimbabwe has a range of tariffs, with the highest being 40 per cent or US\$1.50 per kilogramme (Zengeni 2014). Botswana has restrictions on imports of maize where animal feed producers must source at least 30 per cent of their requirements from local farmers.¹⁴ South Africa has a combination of anti-dumping duties, most recently against imports from the EU, tariffs, and a quota for imports from the United States. Recently, there has been a battle between South Africa poultry producers as represented by the South African Poultry Association (SAPA) and American poultry producers as the latter threatened to have benefits of the African Growth and Opportunity Act (Agoa) repealed if access is not granted to American

¹⁰ Interview with the South African Poultry Association (SAPA), 6 July 2015.

¹¹ Interview with Daybreak, 30 June 2015; interview with Quantum Foods, 1 September 2015; interview with Country Bird Holdings (CBH) Limited, 3 July 2015; interview with Astral Foods Limited, 31 July 2015.

¹² Interview with Daybreak, 30 June 2015; interview with Quantum, 1 September 2015; interview with CBH, 3 July 2015; interview with Astral, 31 July 2015.

¹³ Company annual reports and websites.

¹⁴ Interview with Nutri Feeds Botswana, 18 November 2015.

poultry farmers (Mnyandu 2015). The result of the negotiations is an increase in the quota of American-produced poultry permitted in the South African market to 65,000 tons (Ensor 2015). However, negotiations around phytosanitary standards imposed by the South African government on chicken (and other meat) imports from the United States led to a stalemate which resulted in the United States government issuing an ultimatum stating that South Africa's Agoa benefits would be revoked if an agreement was not reached (le Cordeur 2016). However, although the quota of 65,000 tons still stands, an agreement has since been reached between the South African and United States governments and the Department of Trade and Industry (DTI 2016) states that applications for chicken imports from the United States will open up in the second quarter of 2016. South Africa also has soybean import tariffs imposed as part of a soybean strategy, with assistance having been granted to a number of companies to increase processing capacity (DTI 2012; Zengeni 2014).

2.1 Growth in production and consumption in the region

Consumption in the region's largest market, South Africa, has grown strongly at a compound annual growth rate of 6.3 per cent per year from 2004 to 2014, consistent with growing urban incomes (Table 1). The growth in consumption reflects an increase from 23 kg per capita in 2003 to almost 38 kg per capita in 2014 (DAFF 2014; SAPA 2014). Consumption in the rest of the region has also grown although off a much lower base, with Zimbabwe and Zambia's consumption reported at approximately 9–10 kg per capita (SAPA 2015; ZPA 2013).¹⁵

Table 1: Broiler meat production and consumption in South Africa (in thousand metric tons)

Year	Production	Consumption	Estimated production deficit	Actual imports
2004	928	1082	-154	
2005	1019	1204	-185	
2006	1143	1383	-240	260
2007	1200	1470	-270	238
2008	1276	1508	-232	191
2009	1358	1558	-200	206
2010	1430	1645	-215	240
2011	1478	1753	-275	325
2012	1499	1836	-337	371
2013	1529	1899	-370	355
2014	1711	2023	-312	369

Source: DAFF (2014), Lovell (2012), and SAPA (2015).

There has been rapid production growth alongside increased consumption. In South Africa, domestic production has continued to lag consumption such that the substantial production deficit has remained at about 15 per cent of consumption, and has doubled in absolute terms over the period. The shortfall has been met by imports. The increased imports in 2011 and 2012, judged to be unfairly priced, resulted in the imposition of anti-dumping duties against Brazil in 2013 (ITAC 2013). As a result of these duties, imports declined in that year.

While Zimbabwe, Botswana, and Mozambique all remain net importers, Zambia moved to be a net exporter in 2012–13. In 2014, 81,400 tons of poultry was produced, of which 18,500 tons (23 per cent) were exported (AgriProFocus 2015).¹⁶ The South African deficit alone far outweighs this, even disregarding the deficits of other countries in the region. The persistent regional deficit

¹⁵ No reliable time series data for these countries has been found at the time of writing.

¹⁶ Similarly, Zambia's total egg production in 2014 was estimated at 1.1 billion eggs, with 235.4 million eggs—21 per cent—destined for the export market.

has been met by deep-sea imports from South America and Europe. In these simple terms the poultry value chain in southern Africa is not competitive.

The poultry industries of other countries in the region are also unsurprisingly relatively small compared to that of South Africa. Estimates for Zimbabwe place total production at over 88,000 tons in 2012 increasing to 132,000 tons in 2014,¹⁷ although it remained uncompetitive with large net imports and is largely driven by the demand variability owing to economic conditions and the protection imposed by the Zimbabwe government (ZPA 2013; see also Chawafambira 2015). Mozambique's local commercial production of poultry meat has grown very strongly off a low base of 4,156 tons in 2004 to 40,493 tons in 2011. The increase in production was largest in 2006 and 2007 and this has been attributed to the establishment of new hatchery businesses in Maputo and an increase in production of day-old chicks (FAO 2013). However, the country remains a net importer. Production in Botswana in 2014 was estimated at just over 42,600 tons.¹⁸

As discussed, the South African poultry industry is made up of a few large, vertically integrated players who produce chickens commercially on a large scale. The structure of the poultry industry in the other countries is somewhat different. In Zimbabwe, various sources suggest that large-scale production of poultry only accounts for 20–30 per cent of total domestic poultry meat production in the country (ZPA 2013; see also Chawafambira 2015). Botswana's poultry industry has strong links to the South African industry, as South Africa's CBH and Quantum Foods (formerly a subsidiary of Pioneer Foods) have large-scale poultry and animal feed operations there.

Mozambique's poultry industry is characterized by a dual market where 30 per cent of the production of chicken meat in 2011 was from the smallholder family sector and just under 70 per cent was from the commercial private sector with a small percentage also coming from co-operatives (FAO 2013).

2.2 Large firms

The industry in South Africa and Botswana has grown strongly owing to investments by a small number of regional producers who are vertically integrated and have international relationships, such as for sourcing breeding stock. By comparison, Zimbabwe has a much larger relative share of small-scale producers.

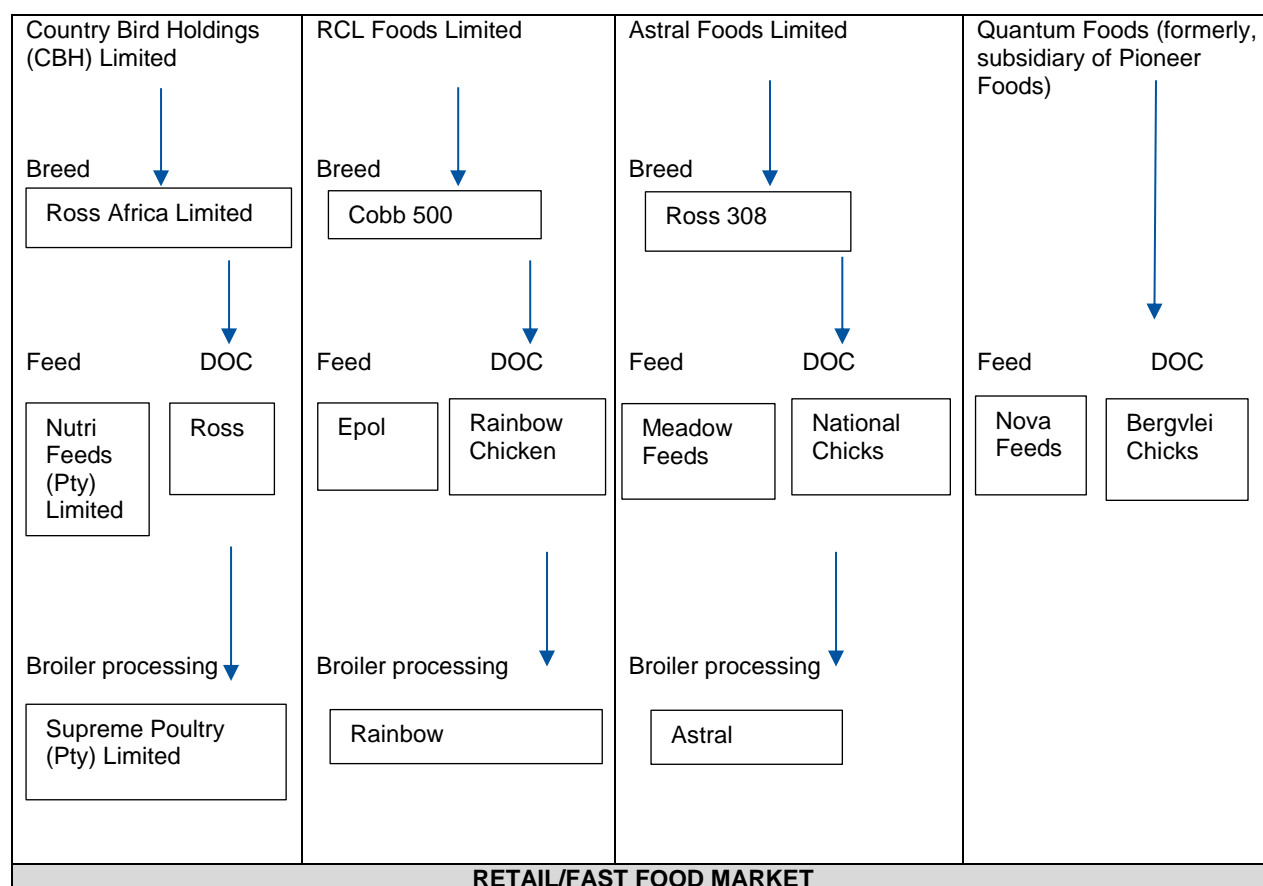
In South Africa there are two main poultry producers: Rainbow Chicken and Astral. The poultry production of these two companies represents 46 per cent of total broiler meat production (DAFF 2014). The other key producers are CBH, Quantum, and Daybreak. Smaller players such as Sovereign Foods and new entrant Grain Field Chickens (GFC) make up the rest of the production, although to a much less extent than the aforementioned players. As can be seen, all these producers are integrated with feed production and broiler production and processing, which includes abattoirs (Figure 2). Apart from Quantum, all the producers shown in Figure 2 also have breeding facilities. Recently, Quantum disposed of its abattoirs to Astral and Sovereign, with the disposal tied to agreements to supply these companies with live birds (Magwaza 2014).¹⁹

¹⁷ These numbers are based on estimates calculated using information from Bagopi et al. (2014), Chawafambira (2015), and ZPA (2013).

¹⁸ Interview with the Botswana Ministry of Agriculture, 20 November 2015.

¹⁹ Astral unaudited interim results, 2015; interview with Quantum, 1 September 2015.

Figure 2: Company structure of main integrated poultry firms in South Africa



Source: Authors' compilation.

It is also important to note that the animal feed companies that are vertically integrated with the poultry companies shown in Figure 2—Nutri Feeds (Pty) Limited, Epol, Meadow Feeds, and Nova Feeds—along with Daybreak are the top five producers of animal feed in South Africa (Louw et al. 2013). Similarly to their parent companies, the animal feed producers are also major players in their market as their production levels represent over 75 per cent of the animal feed produced by members of the Animal Feed Manufacturers' Association (AFMA) (Louw et al. 2013). AFMA's members' production levels account for 60 per cent of total animal feed manufactured in South Africa. As such, the top five animal feed producers produce almost 50 per cent of the total animal feed produced in South Africa.

The relative performance of the main integrated poultry and animal feed producers in revenue terms is outlined in Table 2. These figures reflect their full operations, including the revenues gained from outside South Africa. However, an assessment of their segmented revenues, where possible, indicates that the bulk of their poultry and animal feed revenues come from their South African operations.

From Table 2, it is clear that Rainbow Chicken and Astral are the largest players. Some revenue growth is noted among the main poultry and animal feed producers, as they all grew 4–9 per cent between 2009 and 2014. Although the smaller companies—CBH and Quantum—recorded higher growth figures (8–9 per cent), this is off a much lower base than Rainbow Chicken and Astral who both recorded a 4 per cent growth. For Astral, the growth is related to higher broiler volumes owing to its acquisition of Quantum's abattoir in the Western Cape and a general

increase in bird placements.²⁰ In turn, the increase in Quantum's poultry-related revenue must be viewed in the context of its disposal of abattoirs in the Western Cape. Quantum is also selling its abattoir in Gauteng to Sovereign (the smallest vertically integrated player), which is currently only operational in the Eastern Cape.²¹ The transaction is pending a decision by the competition authorities.

Table 2: Revenue of main poultry and feed firms in South Africa (ZAR billions)

	2009	2010	2011	2012	2013	2014
Country Bird Holdings Limited	2.2	2.4	2.8	3.1	3.2	3.6
Rainbow Chicken	6.8	6.95	8.6	7.8	8.1	8.7
Astral Foods Limited	7.4	7	7.2	8.16	8.5	9.6
Pioneer Foods/ Quantum Foods		2.4	2.7	3.1	3.6	3.6

Note: The revenue figures include operations outside South Africa where applicable. It is not possible to disaggregate them further. In 2011, RCL Foods Limited changed their financial year end from March to June. Therefore, the 2011 revenue figure for Rainbow Chicken is for a 15-month period, as opposed to 12 months.

Source: Company annual reports.

Astral, which was the largest in 2014, has poultry operations in South Africa, Mozambique, Swaziland, and Zambia and feed mills in South Africa, Mozambique, and Zambia. In Zambia, Astral, through its breeder farm and hatchery division Tiger Chicks, has introduced a new broiler breed, the Lohmann Meat. Also, in Mozambique, Astral recently constructed a hatchery called Mozpintos and is currently constructing a breeder farm.

Rainbow Chicken is the fully integrated poultry-producing subsidiary of RCL. Rainbow Chicken specializes in the Cobb 500 breed; it manufactures its own feed through its feed division Epol. The company also has business interests in Zambia and Botswana. In Zambia, RCL has a joint venture with Zambeef since 2013, and holds 49 per cent of Zambeef's shareholding in Zam Chick Limited worth US\$14.25 million. Zam Chick manages and operates Zambeef's broiler business, including the broiler houses, chicken abattoir, and processing plant. In Botswana, RCL through its subsidiary Vector Logistics recently acquired a 49 per cent shareholding in Senn Foods Logistics (Pty) (also from Botswana) on 1 May 2014. Senn is the largest cold chain distribution business in Botswana and is involved in the distribution of dry, frozen, and chilled foodstuffs.

Quantum is a former subsidiary of Pioneer and consists of three integrated business units, Tydstroom (broiler business), Nulaid (eggs and commercial laying hens), and Nova Feeds (animal feed). The company recently disposed of the abattoirs of its Tydstroom unit, effectively exiting from the broiler meat production business. It is now in an agreement with Astral to supply it with 550,000 live birds per week to its Western Cape abattoir and another agreement with Sovereign Foods to supply 250,000 live birds per week to its Gauteng abattoir. Quantum also has broiler and layer breeding operations in Zambia and Uganda and acquired a commercial egg business in Zambia in 2013.

CBH is a holding company formed in 2005 incorporating integrated poultry and stock feed business operations in South Africa, operating as Supreme Poultry (Pty) Ltd and Nutri Feeds, and poultry breeding operations in the region operating as Ross Africa Limited. CBH currently

²⁰ Astral unaudited interim results, 2015.

²¹ Interview with Quantum, 1 September 2015.

operates in South Africa, Botswana, Zambia, Namibia, Zimbabwe, and Mozambique. The company's poultry breeding operations in Botswana and Zambia operate under the Ross subsidiaries and the animal feed production operates under the Master Farmer subsidiary. CBH's Mozambique operations are still to be incorporated but they will include a fully integrated poultry business. Finally, in Zimbabwe CBH operates the KFC franchise.

The main poultry and animal feed companies in South Africa, Zambia, and Botswana are all inter-related and spread across the region. Unfortunately, we do not have data on ownership structures in Zimbabwe except those for Irvine's. However, as mentioned earlier we do know that the poultry firms are largely split into three production scales: large-scale fully integrated, large-scale semi-integrated, and medium- and small-scale production (Zengeni 2014). The large-scale fully integrated producers are Irvine's, Suncrest Chickens (Private) Limited, Lunar Chickens (all based in Harare) and P.T. Royal Ostrindo Zimbabwe (Private) Limited (based in Bulawayo). Irvine's is a subsidiary of Innscor Africa Limited, a company that manufactures, distributes, and retails fast-moving and durable consumer goods (Innskor Africa Limited 2014). Innscor's portfolio of businesses includes, among others, Irvine's, animal feeds producers Profeeds and National Feeds Private Limited, a group of fast food chains, and a number of Spar franchise stores in Zimbabwe (Innskor Africa Limited 2015). Irvine's Africa holds the breeding rights to the Cobb 500 breed in all African countries other than South Africa.

3 Industrialization, value chains, and agro-processing

3.1 Industrialization and agriculture

The agricultural sector has not been viewed as an important contributor to growth because it has deteriorating terms of trade and fewer backward and forward linkages to other sectors compared with manufacturing (World Bank 2004). However, due to their relative advantage in terms of agricultural land, it has been suggested that for SSA countries the agricultural sector provides a platform by linking with agribusiness in order to foster industrial development.

The attractiveness of the agro-processing sector for industrialization stems from its greater potential to reduce poverty compared with other manufacturing sectors because it increases income and welfare of farmers through either the purchase of their produce or the employment of their family members where the processing occurs in rural areas (Watanabe et al. 2009). Agro-processing activities are part of manufacturing and exhibit features such as increasing returns to scale, scope for learning and technology improvements, upgrading of capabilities, and higher levels of productivity (Takala-Greenish et al. 2014). Over the years, there have been important changes in agro-industrial development in SSA, with new industries being established around agricultural commodities since the 1980s. This has been reflected by a move from low-value processed food to higher value fresh produce for export, mostly horticultural produce (Ouma and Whitfield 2012).

Despite the benefits, industrialization through agro-processing has been prevented because of obstacles in accessing world markets; for example, processed fruits and vegetables are constrained by stringent quality and sanitary requirements (Cramer 1999). The returns from engaging with agribusiness are also shaped by the specific way in which local producers are linked to global markets (Stamm 2008: 23). However, a number of countries such as Kenya have been relatively successful in this sphere. Moreover, as demand for processed foods increases in African countries as a result of increases in urbanization, it has been suggested that African countries can industrialize further by creating linkages within the region, using regional markets as larger versions of their domestic markets (Morris and Fessehaie 2014). Thus, they can start by

exporting processed final products to the regional markets first, and use this as a learning process before considering export to Northern countries where conditions are stringent (Morris and Fessehaie 2014).

The view of linking agriculture and industry through value chains is also part of a United Nations Economic Commission for Africa (UNECA) programme. The UNECA's 2013 programme, the Agribusiness and Agro-industry Development Initiative, advocates the value chain approach. The animal feed to poultry value chain represents the perfect nexus between agriculture and industry at various levels. At one level, soybean and maize farming and chicken rearing fall under agriculture. At another level, the processed soybeans and maize that go into animal feed, the animal feed itself, and the slaughtered and dressed chickens constitute manufactured products. The processes—the agricultural activities and manufacturing—occur through various transactions, either within a vertically integrated firm or with an independent firm, and often require trade. The next section thus looks at GVC perspectives, including exploring how they are related to agro-commodity or agro-processing value chains.

3.2 GVCs

GVC perspectives are used to analyse international trade and production networks (Gereffi 1999). Due to the increased globalization of processes involved in the manufacturing of various products, it has become important to understand the linkages found in the aforementioned. These international trade networks are generally characterized by unequal distribution of economic rents (Gereffi et al. 2001). This necessitates their analysis to determine where the distribution of these economic rents is determined, that is, the locus of power in the trade network. In addition, it is important to analyse value chain networks to understand how the distribution of rents can be changed in order for firms to receive higher shares of these rents through mechanisms such as upgrading.

GVC analysis brings out key questions around market power, the governance of chains and the dynamics of production network, with governance being viewed as a central concept in the understanding of value chains (Gereffi et al. 2001). A value chain is the full range of activities required to take a product from its conception to the final consumer (Kaplinsky and Morris 2001). These chains can involve cross-border co-ordination of the activities of independent firms around the world (Dolan and Humphrey 2000: 149). A key characteristic of these activities is that they are generally not arm's-length transactions. In fact, value chain researchers noted that an important part of global trade 'is conducted within multinational enterprises or through systems of governance that link firms together in a variety of sourcing and contracting arrangements' (Gereffi et al. 2001: 1). The governance structure of the commodity chain describes the 'process by which particular players in the chain exert control over other participants and how these lead firms appropriate or distribute the value that is created along the chain' (Bair 2008: 9).

As such, the governance concept recognizes that these so-called lead firms essentially control the value chain (Humphrey and Schmitz 2001). These firms control the parameters of what is to be produced, how it is to be produced, and by whom it is to be produced (Gereffi et al. 2001). The governance theory is thus used to explain the inter-firm relationships found in a value chain. As long as firms outsource and do not procure from the market, especially in developing markets, there will always be a need to have chain governance (Humphrey and Schmitz 2001). Firms seek to govern the value chain because they want to control the product parameters and to reduce the risks associated with making the product. The governance structure is where the 'key notions of barriers to entry and chain co-ordination appear in the analytical framework' (Raikes et al. 2000: 393).

Over time, the understanding of governance in the GVC literature has evolved from a dichotomous view of buyer- versus producer-driven value chains to the more recent understanding of governance structures being found on a spectrum relating to the level of control and complexity of the value chain. Five different structures have been posited—market, modular, relational, captive and hierarchical—which depend on the complexity of the transactions, the producers’ capabilities, and the extent to which they can be codified (Gereffi et al. 2005). These are all based on country case studies.

These governance structures are described in a spectrum from the simplest governance structure (i.e. market) to the most complicated (i.e. hierarchical structure). They are described as follows (Gereffi et al. 2005; Keane 2015):

- Market: In this governance structure the transactions are the least complicated.
- Modular: Transactions are relatively simple, information of product specifications is easily transmitted, and suppliers make products based on customer specifications with little input from the customers.
- Relational: Transactions are fairly complex, resulting in buyers and sellers interacting frequently. The lead firms exert some level of control over the suppliers.
- Captive: Small suppliers are dependent on one or more large buyers, facing significant switching costs, hence the term ‘captive’. Because of this ‘captivity’, small suppliers often operate under conditions set by and usually specific to a specific buyer. Some forms of contract growing fall under this governance structure.
- Hierarchical: Transactions are very complex, product specifications cannot be codified, and highly competent producers cannot be found. This governance structure is generally characterized by vertical integration, particularly in industries where all production is carried out in-house, although this may occur at different geographical locations.

Another important building block in GVC analysis, especially in the realm of policy-making, is industrial upgrading (Gereffi et al. 2001). Upgrading ‘refers to several kinds of shifts that firms or groups of firms might undertake to improve their competitive position in global value chains’ (Gereffi et al. 2001: 5). This involves the learning that organizations undertake to improve their position in the value chain (Gereffi 1999). Upgrading can happen in three distinct ways. Process upgrading refers to improvements in the efficiency of internal processes such that they surpass those of competitors (Fromm 2007: 10). Product upgrading occurs when firms move into producing higher value added products (Gereffi et al. 2001). Finally, functional upgrading occurs when firms increase the value added by moving their production to other parts of the value chain (Gereffi et al. 2001).

There are important links between governance and upgrading because governance determines upgrading opportunities for firms in the chain, such as through providing the commitments required for investments in customer-specific production. However, governance can also be exerted to protect rents in certain parts of the chain, while competition drives them down in other parts. The powerful actors in the chain thus influence the overall competitiveness of the chain by inducing customers and suppliers to changes their procedures (Kaplinsky 2000: 126). The more hierarchical value chains are posited to provide more opportunities for product and process upgrading rather than for functional upgrading because functional upgrading is blocked by lead firms who ‘control more lucrative nodes of production’ (Keane 2015: 5). Moreover, in the case where the governance structure is captive, that is, driven by one dominant player, the interaction with the lead firm tends to take place within the context of an uneven relationship which influences the upgrading trajectory (Humphrey and Schmitz 2002: 1018). Upgrading opportunities, or lack thereof, then determine how the value chain will evolve.

Food value chains are seen as a ‘new model of organization’ in the agricultural business sector (Diamond et al. 2014). Their development is influenced by the increasing demand for more processed, possibly specialized, and differentiated food products. This includes packaging, distribution, and retail channels such as through supermarkets and fast food outlets, which means they are no longer simply homogeneous commodity goods (Diamond et al. 2014). Scale economies in processing, differentiation, and vertical integration imply relative concentration at various levels of each product market’s value chain. Producers of high-value agricultural products are pushed towards vertical integration by retailers in order to allow retailers to standardize quality and reap scale economies (Hellin and Erenstein 2009: 246).

A huge change has also taken place since the 1990s in the role of state regulation. In developing countries, food and agricultural chains were largely state-controlled through marketing boards. State-owned companies were privatized while markets were deregulated. Relevant to the animal feed to poultry value chain, in South Africa the grain marketing board was dismantled and replaced with the South African Futures Exchange (SAFEX). In contrast, Zimbabwe’s Grain Marketing Board (GMB) is still functional, retaining its position as theoretically the most attractive customer for maize farmers in Zimbabwe as they pay the highest price for maize (Chikwati 2015). It also has the highest number and widest network of silos in the country. However, owing to late payments, farmers are reportedly selling to private players at far lower prices as they are guaranteed payment (Chikwati 2015). Interestingly, the GMB has become increasingly commercialised, with the introduction of its SILO range of products for human consumption which include maize meal, popcorn, and rice (GMB 2015). More recently, it has branched out into the production of animal feeds.²²

The change in governance structures has important implications for food value chains, especially since power is unequal at various levels of the value chain. For instance, although SAFEX provides traders with opportunities to make profits from the grain, for farmers this may result in unequal distribution of income along the value chain. For coffee farmers, higher income is skewed towards transnational corporations located in developed countries whereas coffee producers in less-developed countries receive an increasingly lower portion of the income (Kaplinsky and Fitter 2004; Petkova 2006; Ponte 2002).

There is limited literature on regional value chains, especially in the case of value chains in Africa. The GVC literature on Africa either focuses on the effect of Asian firms on African producers or on the demand patterns driven by BRICS countries (i.e. Brazil, Russia, India, China, and South Africa) (Keane 2015). However, the consideration of regional value chains is particularly important because these chains may be more amenable to upgrading than GVCs because of the control of marketing and retailing in the latter by international lead firms (Keane 2015). A consideration of regional value chains for Africa has mostly been in the context of African firms gearing themselves up to be eventually inserted in GVCs (Keane 2015). For example, it was suggested that firms need to create markets in the region first before they try to meet the far more stringent conditions found in European and American markets (Morris and Fessehaie 2014). As such, it is important not only to identify regional value chains that are already present but also to understand their operation and potential for regional industrialization. The next section analyses the growth and competitiveness in the poultry industries in southern Africa, focusing on production, trade, and price data.

²² Interview with Grain Marketing Board, 19 July 2015.

4 Trade and competitiveness in the animal feed and poultry value chain

4.1 Trade

In assessing the trade flows we distinguish between regional flows, which include intra-firm sales across borders, and the deep-sea trade, almost entirely imports. Although South Africa's imports of poultry and animal feed components are from deep-sea sources, there are important intra-regional trade flows in the animal feed part of the value chain. Zambia is a net exporter of maize, and more recently of soybean and oilcakes, to neighbouring countries. Mozambique has also become a net exporter of oilcakes, although on a much lower scale than Zambia. We consider regional trade in intermediate products (oilcake and its constituents) in the context of regional value chains and the implications for regional integration. This includes protectionist measures, the costs of transport, and the role and strategies of large corporations stretching across the countries in the region.

Poultry trade

South African poultry trade flows dwarf those of other countries. The value of imports of poultry into South Africa rose from approximately US\$60 million per quarter or around US\$240 million annually in 2010 to almost US\$380 million for 2014 as a whole. Prior to 2012, the main source of imports was Brazil. Thereafter, there was a switch towards imports from the EU, with which South Africa has a free trade agreement (Kwaramba and Tregenna 2014). While there was a 50 per cent increase in the value of imports between 2010 and 2011, this was a gradual increase over time. In contrast, two significant spikes led to applications for anti-dumping duties, a spike in the third quarter of 2012 and that in the first quarter of 2014 (Figure 3). The spike at the end of 2012 saw imports increasing from US\$80 million to US\$140 million, a 75 per cent increase from one quarter to the next. The spike at the beginning of 2014 was also substantial, even though only increasing to the levels at the end of 2011.

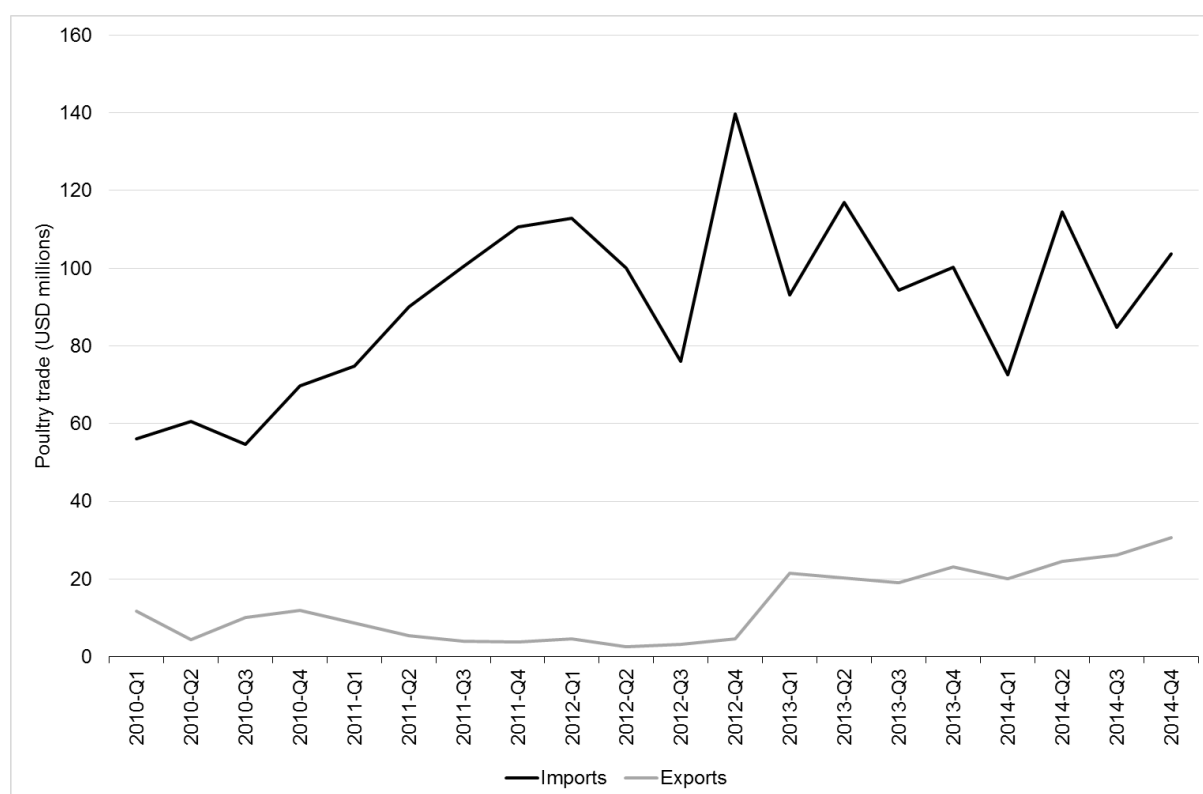
South Africa's exports are mainly to the Southern African Customs Union (SACU). At the beginning of 2013, poultry exports increased from US\$4.7 million in the fourth quarter of 2012 to US\$22 million in the first quarter of 2013 and remained at around these levels thereafter (Figure 3). The increase was largely due to a sharp recorded increase in exports to Lesotho and Namibia as a result of the improvement in the recording of intra-SACU trade from 2013 and under-reporting before that point.

The imports reflect different chicken consumption patterns found in North American and EU countries when compared to that in South Africa. In the South African market, bone-in portions are the most widely consumed, generally in the form of IQF portions (SAPA 2014). In contrast, high-income overseas markets mostly consume fillets such as breast portions that are sold at a premium. Since bone-in portions are not in high demand in overseas markets, they are then sold in other markets, such as South Africa, for a lower price.²³ It is alleged that overseas players, including Brazilian producers, make their margins on fillet meat and sell bone-in portions at costs that allow them to cover the tariffs and logistical costs of shipping the meat to South Africa.²⁴

²³ Interview with Daybreak, 30 June 2015.

²⁴ Interview with Daybreak, 30 June 2015.

Figure 3: South Africa poultry trade flows



Source: Trade Map (ITC 1999–2005).

After the imposition of anti-dumping duties on Brazilian imports, there was a decline—albeit with fluctuations—in the value (Figure 3) and the volume of imports (Table 1). The anti-dumping tariffs—ranging from 12 to 82 per cent—were imposed on whole birds, boneless cuts, bone-in portions, and offal imported from Brazil (ITAC 2013). However, these anti-dumping duties did not apply to EU countries as a result of the free trade agreements between South Africa and the EU (Tregenna and Kwaramba 2014). The spike in imports at the beginning of 2014 was due to a sharp increase in imports from Europe. This increase led to another bid for an anti-dumping investigation being submitted by SAPA to ITAC in 2014. ITAC made a final determination on 27 February 2015, recommending the imposition of anti-dumping duties of 31.30–73.33 per cent on Germany, 3.86–22.81 per cent on the Netherlands, and 12.07–30.99 per cent on the United Kingdom (ITAC 2015). In its determination on this matter, ITAC indicated that though the poultry industry suffered material injury from dumping, other factors also contributed to its performance such as rising production costs related to feed, fuel, electricity, and labour costs (ITAC 2015). That said, ITAC asserted that these other factors do not detract from the material injury suffered by poultry producers as a result of the dumping of poultry products from Europe. It also pointed to the challenge of lowering costs and improving efficiencies through the value chain.

More recently, as part of negotiations with the United States to extend Agoa benefits, a duty-free quota of poultry imports from the United States of 65,000 tons has been agreed (Ensor 2015). This equates to approximately 16 per cent of poultry imports based on import data from 2014.

Oilcake, maize, and soya trade

Maize and soybean meal are two key inputs to animal feed. South African imports of oilcakes used in the production of animal feed, mostly made up of soybean oilcake, are larger than the

imports of poultry. Argentina is the main source of South Africa's imports, accounting for 54 per cent of the total share of oilcake imports in 2014.

Zambia has been a net exporter since 2010 (Table 3). The majority of these are to Zimbabwe, with the remainder going to Namibia, Botswana, and South Africa. The big change happened from 2011 to 2012. Mozambique has also reduced its trade deficit with substantial growth in local production and has recorded a small surplus in 2014. As with poultry, South Africa has some exports of oilcake to neighbouring countries, with the main markets being Namibia and Zimbabwe. The growth in exports to Namibia is explained by the fact that in 2012 Namibia started producing chickens and therefore the established companies had to rely on imported raw materials, particularly feed and day-old chicks, to support domestic production.

Table 3: Trade of oilcakes used in the production of animal feed (US\$ millions)

		2010	2011	2012	2013	2014
Botswana	Imports	29	30	30	32	
	Exports	2	3	4	3	
Mozambique	Imports	6	14	239	16	17
	Exports	7	13	22	11	28
South Africa	Imports	530	593	618	582	502
	Exports	198	191	236	201	245
Zambia	Imports	10	22	25	20	21
	Exports	17	28	132	81	75
Zimbabwe	Imports	23	71	59	134	62
	Exports	8	9	18	12	8

Source: Trade Map (ITC 1999–2015).

Only two countries have been engaged in soybean exports on a large scale—Zambia and South Africa (Table 4). Zambia is now a net exporter of soybean, with the sharp increase in exports between 2013 and 2014 being driven by increased demand from Zimbabwe and South Africa. These two countries combined accounted for 86 per cent of Zambia's soybean exports in 2014, an increase from 69 per cent in the previous year.

Table 4: Soybean trade (US\$ millions)

		2010	2011	2012	2013	2014
Botswana	Imports	1.5	1.9	2.6	1.7	0.2
	Exports					
Mozambique	Imports	0.02	1.15	2.8	0.9	0.7
	Exports		0.02		0.3	0.7
South Africa	Imports	0.96	0.9	0.9	3.4	51
	Exports	51	23.6	95	11	2
Zambia	Imports	0.0	1.1	0.3	1.15	0.8
	Exports	6	1.1	1.4	2.4	13.9
Zimbabwe	Imports	9.6	1.8	0.3	2.9	8.8
	Exports			0.1	0.6	1

Source: Trade Map (ITC 1999–2015).

There are also relatively small trade flows of soybeans (Table 4). South Africa had substantial exports in 2010–12; however, the implementation of DTI's soybean strategy (DTI 2012) has meant investment in processing capacity and has reduced imports of soybean meal from 2012. There have been imports of soybeans as the processing capacity is much larger than agricultural production. Through this strategy and financing from the Industrial Development Corporation in 2013, South African soybean crushing capacity has been substantially expanded to approximately 2.1 million tons per year.²⁵ However, given that the country only produces 1

²⁵ Interview with AFMA, 15 July 2015.

million tons per year,²⁶ there is now an over-investment in soya crushing capacity with South Africa having limited prospects of producing enough soya to move to a net export position.

In contrast with Zambia and South Africa, Zimbabwe, Botswana, and Mozambique do not have significant exports over the period under review and have been running trade deficits. In the case of Zimbabwe and Botswana, this reflects production constraints in the key raw materials (i.e. maize and soya), whereas in Mozambique while production has been growing strongly, demand growth has continued to outstrip production. Soybeans were introduced into Mozambican farming in 2004 and production has expanded rapidly. By 2011–12, 26,750 farmers were producing 31,500 tons of soybeans, which was an increase from 11,200 farmers and 7500 tons in 2009–10 (Smart and Hanlon 2014). The increase in soybean production is driven by the chicken feed market.

In contrast with soya exports, South Africa has maintained substantial net exports of maize in almost all years (Table 5). Zambia has also had maize surpluses. As a result, the region as a whole has been in a net export position. This is reflected in maize prices in South Africa and Zambia which are generally the lowest in the region, and prices in South Africa have been in line with those of deep-sea exports (the computed export parity values; see Figure 4). However, since the trade data does not distinguish between yellow and white maize trade, it is difficult to ascertain from the data how much is destined for animal feed and how much is for human consumption. It seems that, at least recently, almost 75 per cent of the maize exported from South Africa is yellow maize, mostly destined for Asia (FAO 2015a). In fact, the exports in 2012 and 2013 were largely driven by increases in exports to Japan. That said, the largest destination of South Africa's maize exports is southern African countries.

Table 5: Maize trade (US\$ millions)

		2010	2011	2012	2013	2014
Botswana	Imports	10	17	20	50	48
	Exports	0.06	0.2	0.14	0.07	0.02
Mozambique	Imports	18	32	6	19	37
	Exports	3	6.4	1.7	0.4	13
South Africa	Imports	11	30	75	11	37
	Exports	309	841	396	767	608
Zambia	Imports	2.5	1.5	2	6	5
	Exports	36	190	420	153	66
Zimbabwe	Imports	57	122	269	108	114
	Exports	0.35	1.3	0.8	1.5	0.7

Source: Trade Map (ITC 1999–2015).

Zambian exports of maize have increased between 2010 and 2014, reaching a peak of US\$420 million in 2012, even surpassing those originating from South Africa. A great deal of maize from Zambia is going to Zimbabwe. In fact, recent reports indicate that the GMB in Zimbabwe has been engaged by the Food Reserve of Zambia to use its storage facilities as they have excess storage capacity (Mtomba 2015). Zimbabwe has the highest imports in the region.

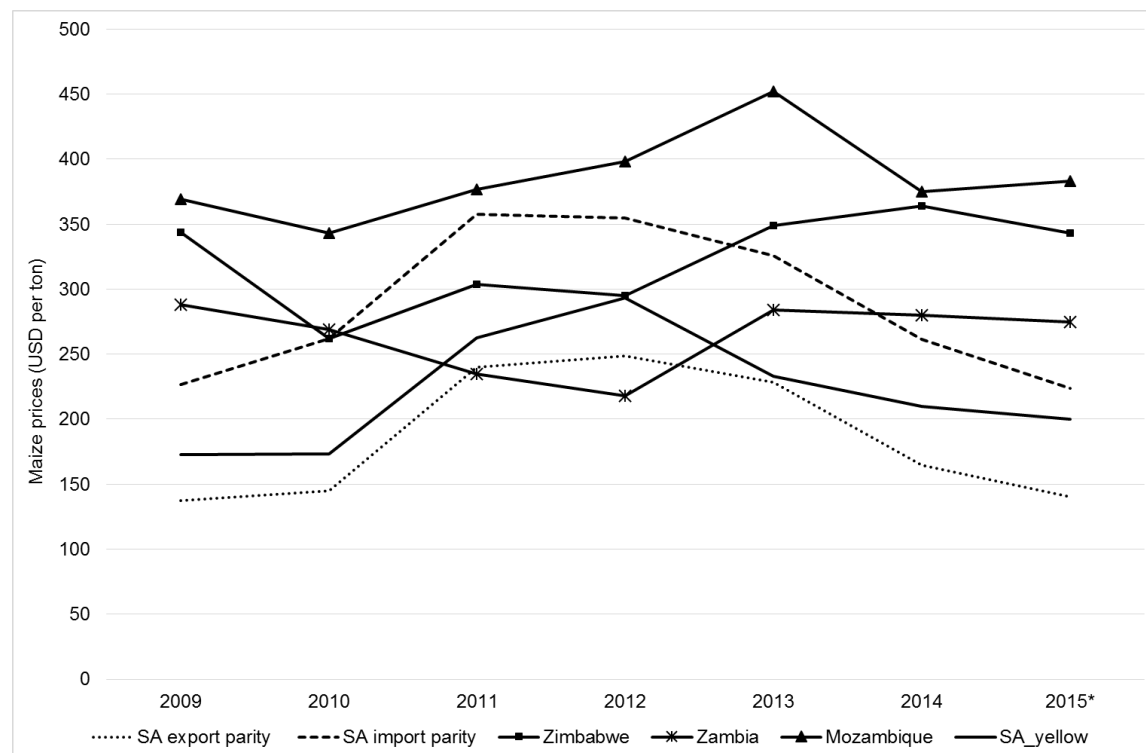
4.2 Input price: prices of maize in the region

As maize constitutes the single largest cost in the production of animal feed—and consequently the production of chicken—the price of maize plays a crucial role in the level of competitiveness of a firm or country's broiler production. For South Africa as the largest net exporter, the export parity and import parity prices are also presented (Figure 4). Given that South Africa actually

²⁶ Interview with AFMA, 15 July 2015.

mostly uses yellow maize for the production of animal feed, South African yellow maize prices are also presented for comparison with the rest of the countries that use white maize. The prices of yellow and white maize in South Africa are not very different.

Figure 4: Maize prices (US\$ per ton)



Note: The South African (SA) import and export parity prices are imputed figures calculated by the South African Grain Information Services (SAGIS). The export parity price is imputed by estimating a FOB (free on board) Gulf value for maize in Rands and subtracting transport, finance, and loading costs to get the export realization. The import parity price is imputed by estimating a CIF (cost, insurance, freight) value for maize and adding transport and discharging costs to get the delivered price. Average annual prices are given except for 2015*, where prices are up to March for Zimbabwe and Mozambique, to February for Zambia, and to August for South Africa.

Source: FAO (2015b), SAGIS (2015), and SMA (2015).

Mozambique has the highest prices of maize for the countries under study at above US\$350 per ton during the period under review. The country also protects its poultry industry. Zimbabwe has the second highest prices. Before the land reform programme Zimbabwe used to produce excess maize and export, with relatively low local prices.²⁷ This has since changed as there are now shortages and the country now relies on maize imports (approximately 500,000 tons in 2014) to supplement local production, particularly outside the harvest seasons.²⁸

As the largest producers of maize in the region, South Africa and Zambia have the lowest prices. South Africa's export parity prices are the net-back prices for exports to deep-sea markets which are low given competition in these markets and the transport costs that have to be subtracted to obtain the net export price in inland regions.²⁹ However, these lower prices are not seen in countries such as Zimbabwe as there is a ban on GMO maize which is the product found in

²⁷ Interview with Drummonds Farm Fresh Chickens, 17 August 2015.

²⁸ Interview with Drummonds Farm Fresh Chickens, 17 August 2015.

²⁹ The reference point is Randfontein, close to Johannesburg.

South Africa. Zambia's price reflects exports to its neighbours. Zambia is Zimbabwe's main source of maize imports as it produces non-GMO maize. For much of the period from 2011 to 2015, Zimbabwean maize prices track Zambian prices, with a premium that should reflect transport and logistics costs between the two countries.

In conclusion, we note that there has been an increase in both demand and production of poultry and oilcake in the region. South Africa is the largest producer in absolute terms of both poultry and animal feed; it is also the largest importer and exporter of these products in the region. South Africa also provides the region with the most likely catalyst for growth and development given its high levels of excess demand for poultry meat, as well as persistent deficits in soya. Zambia has the ability to competitively produce the main animal feed component crops of maize and soya. It has recorded rapid growth in production of poultry, maize, and soya, first meeting its own needs and then exporting to neighbouring countries in the region. Producers in Zimbabwe still rely on the imports of maize and soya owing to low levels of production. Given the unique geographic advantages afforded to countries such as Zambia and Zimbabwe, it is expected that these countries will experience more growth driven by South African demand.³⁰

5 Industrialization and the poultry value chain

The poultry industry in the region has grown strongly due to investments by a small number of regional producers who are vertically integrated and have international relationships, such as for sourcing breeding stock. As previously mentioned in Section 2.2, the main poultry and animal feed companies in South Africa, Zambia, and Botswana are all inter-related and spread across the region, with (largely) South African firms leading the growth of the Zambian and Mozambican poultry industries.

The development of the sector across the region has thus been related to the strategies and investments of large firms. The management of the production at different levels is critical because of the co-ordination required to ensure competitiveness of the overall chain. This actual and potential competitiveness is an important motivator for investments. In this section, we draw on the value chain theory as outlined in Section 3 to consider the nature of governance of value chains, the different means of co-ordination, including full vertical integration, and the processes of upgrading (Keane 2015). We relate this to industrialization through agro-processing and the development of regional value chains.

As previously mentioned in Section 3, governance in the GVC literature is most recently understood through five different governance structures. In the southern African region, the largest poultry firms are generally characterized by high levels of vertical integration, particularly with breeding operations and feed production. Downstream the firms have used out-growers, while owning the abattoir. There are some variations between firms. Rainbow Chicken has been the most integrated, whereas Astral has had a breeding joint venture with other firms. The smaller firms that have grown in the sector have generally been vertically integrated into feed production.

Where animal feed production is concerned, the products generally have a standard specification. Most animal feed is made up of 60 per cent maize, 30 per cent soybeans, and the rest (10%) is

³⁰ It must be noted that because the complete data for 2015 has not been released at the time of writing, the effects of the drought which is currently affecting most parts of southern Africa have not been analysed in this working paper.

made up of vitamins and minerals. Differences may occur in composition, particularly depending on the phase of the feed—starter, grower, or finisher—and also as animal feed producers try to minimize the feed conversion ratio. Because animal feed accounts for such a large portion of the cost of producing broilers—roughly 60 per cent—it is a crucial determinant of competitiveness in broiler production. Vertical integration into feed production ensures supply at reasonable costs, as compared with arms-length transactions where the buyer can be subject to the exertion of market power. Thus, although the transactions are fairly simple and product specifications are fairly easy to communicate, vertical integration among the large players with animal feed has been widely observed. However, some broiler producers are not integrated with animal feed production and depend on the large firms for their supply of animal feed.

In the production of day-old chicks, vertical integration is also a key characteristic, particularly for the large firms. However, the reasons for vertical integration may differ slightly with those for feed production. Because the production of day-old chicks from great-grandparent stock is a process that takes up to 18 months, co-ordination is important to ensure that day-old chicks are delivered to customers on time. However, some level of co-ordination is required between the feed suppliers and poultry farmers in order for the feed to be delivered on time as chickens need to be fed at specific intervals.

Although the level of co-ordination required implies benefits from vertical integration, recent restructuring has included vertical disintegration. In South Africa, the changes in Pioneer to form Quantum involved the closure of their abattoir and an agreement with Astral for supply of live birds, effectively making Quantum a very large outgrower as Quantum exited from the two areas requiring the largest investments and scale of operations. Moreover, the increased use of independent outgrowers across the region, coupled with backward integration into animal feed production, indicates not only a need to cut costs but also the level of control actually required at different stages of the value chain. As such, a competitive poultry value chain involves relationships between relational and hierarchical structures, owing to the vertical integration found upstream and the increased use of independent outgrowers. There are also independent firms that have modular relationships for feed and sourcing breeding stock, but this does not provide the certainty to grow operations. Scale economies are critical at breeding level and at slaughtering and processing, in particular, while investment along the value chain needs to be co-ordinated to ensure throughput, meaning overall growth of the industry is driven by investments of large integrated firms.

New entrants often enter the market as contract growers who buy day-old chicks and feed from the large producer to whom they are contracted (Bagopi et al. 2014). Because large firms control the animal feed, have licences for the high-performing breeds, and provide the opportunity for entry into the poultry industry through outgrowing, they hold the key to development in the poultry value chain in the region. Entry on a large scale requires substantial linked investments and a significant amount of time to bring production on-stream, as in the case of production of day-old chicks; thus, building a business will involve a considerable period before returns are realized, as seen in the case of South Africa's latest entrant, GFC.

Concentration in the key inputs means market power can be exerted over non-integrated firms and entrants. Concentration is highest in breeding stock, although there has also been an oligopoly in feed production in the countries studied here. For example, in Zambia, the prices of day-old chicks have been much higher than those in South Africa despite Zambia being a net exporter (Bagopi et al. 2014). This is an indication of the exertion of market power by the two largest suppliers who account for 75 per cent of the market (Bagopi et al. 2014). There have also been milling cartels in South Africa and supply is relatively concentrated.

Another example of the exertion of market power by large firms is seen in the case that was brought to the Competition Commission of South Africa by CBH against Astral. After gaining unilateral control of the Elite Breeding Farms joint venture in 2002, Astral enforced restrictive provisions lessening the ability of rivals to compete (Robb and Ngwenya 2011; see also Competition Tribunal 2011, 2013). Astral enforced provisions restricting independents from sourcing from other breeders (entrants and small participants) and tied in its feed purchases from its own operations (Meadow). The joint venture had been formed in the 1980s between a number of parties who were rivals to the dominant firm Rainbow Chickens and who needed a supply of breeding stock. It had thus been pro-competitive. When Astral acquired sole control it enforced restrictive arrangements over customers who were also downstream rivals. The end of these restrictive arrangements has seen the growth of smaller producers, substantially increased effective rivalry, increased investment, and lower margins. Astral admitted to abusing its dominant position in the breeding market in restricting a smaller rival, CBH, from competing in the broiler market by introducing a new breeding stock (see Competition Tribunal 2013: paragraph 4.2).

5.1 The poultry sector as part of regional industrialization in agro-processing?

There have been a number of developments in the animal feed to poultry value chain related to agro-processing in the region. Across the spectrum, the developments have been related to investments, a move towards contract farming, upgrading, particularly in the South African poultry market, and regional integration. The rest of this section assesses each of these developments in detail.

Investments

The animal feed and poultry industries have seen a great deal of investment in the region. The investments in the region differ by country and speak directly to the needs and the distinct industry structures in each country. South Africa, with its high levels of concentration and vertical integration, has seen entry most recently in the form of contract farmers and also in the form of producers vertically integrated with feed production—Afgri and GFC. After having entered the South African market in 2005, Afgri, which also had breeding operations, has since sold off its poultry operations that now operate as Daybreak. GFC entered the South African poultry industry in 2010, started operating in 2012, and made its first profit in its 2014 financial year.

In other countries in the region the large investments have been made by the main established producers expanding their operations across southern African borders, mainly into Zambia and Mozambique. This has sustained very high rates of growth. In Zimbabwe, where the industry has not performed well by comparison, the poultry industry has seen investments mainly in the form of new entry of animal feed producers and the increase in hatcheries, and also small-scale investments in the form of the proliferation of small-scale poultry producers. Botswana's poultry industry is mainly dominated by vertically integrated South African firms.

Contract farming

There has been a big move towards contract farming in both South Africa and Zimbabwe. For Zimbabwe's largest player Irvine's, the move to contract farming happened around 2009, which is when dollarization happened. Irvine's switched from producing 70 per cent of their production internally to having 70 per cent of their production come from contract growers. The

switch from internal production is driven by the need to reduce overheads and to spread the risk associated with growing chickens to several farmers.³¹

In South Africa, where almost all production is large scale, there has been a steady move towards contract farming. As previously noted in Section 2, contract growing in the production of broilers in South Africa accounts for approximately 60–80 per cent of total production. This is largely owing to the increased costs associated with rearing birds, including the costly nature of owning farm land. Although there are some new farms, a number of contract growers have entered the industry by buying existing farms from the larger producers. For example, Daybreak has sold seven of its farms in the last six months ending June 2015 to black-owned entities that are now supplying Daybreak with 20 per cent of its broiler offtake on a five-year contract. Of total Daybreak chickens, 80 per cent is produced by contract growers with the remaining 20 per cent stemming from its own operations.

Upgrading and capabilities

The most sophisticated capabilities are required in the breeding operations. There is an important impact on the overall performance as upgrading the breeds being produced means better performance in terms of feed conversion ratios, mortality, and resistance to disease.

There are also important upgrading issues at the broiler rearing level. The feed conversion ratio has decreased over the last few decades from roughly 2.2 in 1980 to between 1.7 and 1.8 in more recent years.³² The feed conversion ratio is determined by a number of factors. First, it depends on how well the birds are managed as they need to be fed at specific intervals. Second, the birds need to have the correct feed at the correct stage. More recently, in South Africa, animal feed producers have gone from three-phase feeds to five-phase feeds, indicating that animal feed has become more specific and poultry production is becoming more technical. A higher number of phases requires more knowledge on the part of the producers of the birds, and also indicates a higher level of sophistication required for the production of birds. A final determinant of feed conversion ratio is the development in the distinction between broiler and layer feed. While layers are fed with mash feed, which is in the form of meal, broilers are fed with pellets. The distinction has been made in order to increase the efficiency of animal feed in broilers, which need to grow to their full size within a roughly 35-day period. As such, each pellet is said to contain the correct amount of nutrients needed by the broilers. In contrast, layers are fed with mash because it is not optimal for them to grow fast as this would affect their egg-laying capabilities.

Regional integration and industrialization

Regional integration and industrialization plays out in a number of different ways in the poultry industry. The largest South African poultry companies—RCL, Astral, and CBH—have expanded to other parts of the region, mainly Zambia and Mozambique. They all have vertically integrated poultry operations in these countries, with some of them exporting fertilized eggs to their operations outside South Africa. In Zimbabwe, most imports of raw materials come from the region. Animal feed inputs (i.e. maize, soybeans, and oilcake) are largely imported from Zambia.³³ Because Zimbabwe has a ban on GMO maize, it does not import maize for animal feed production from South Africa which has the cheapest maize source because of its use of

³¹ All information/data regarding Irvine's here is based on an interview with Irvine's, 21 August 2015.

³² Interview with CBH, 3 July 2015.

³³ Interview with LMAC, 19 August 2015.

GMO seeds. As such, Zambia is the closest non-GMO maize source. This indicates that the value chain for poultry production is becoming more regional in nature.

As far as regional industrialization is concerned, all the firms that have set up operations outside South Africa have fully integrated operations. In addition, RCL has invested in crushing capacity in Zambia, with the aim of bringing down the price of animal feed. RCL has also expanded its Zambian poultry operations by setting up in northern Zambia to supply the Copperbelt region and the Democratic Republic of Congo.

6 Conclusion

The increases in urbanization in the southern African region have led to strong and sustained growth in demand for poultry. Although this has been accompanied by production growth, apart from Zambia, all countries in the region continue to run trade deficits. Poultry has strong and important backward linkages to the animal feed production sector and, in turn, to agricultural output. Competitive production of the final output requires matching linked investments in efficient production facilities at different levels in the value chain, in what are essentially industrial activities, with low-cost primary inputs from agriculture. This presents important opportunities for industrialization with agro-processing being put forward as a means by which developing countries, particularly those in Africa, can increase economic development.

This working paper provides an overview of the animal feed to poultry value chain in the region, positioning it within the debates around industrialization, value chains, and market power. The poultry industry in the region has several important characteristics. First, the industry is driven by commercialized production, particularly in South Africa, with the rest of the region increasing its commercialized production. Second, the industry is characterized by vertical integration with key inputs such as animal feed and breeding operations. Third, the value chain is regional in nature, characterized by intra-regional trade in animal feed components and also the regional spread of large poultry companies that govern the chain.

The cross-country investments being made by large poultry companies in the region indicate that a degree of regional integration is being fostered by firms in the region, largely in the absence of agreements between neighbouring states and in spite of barriers to trade that have been put in place. However, the predominance of large firms in the value chain also raises important questions about the strategies lead firms are pursuing, including vertical integration and agreements, and the implications for the development of local and regional agro-processing capabilities. Two important aspects of industrialization in the poultry value chain—upgrading of feed and breeds, and co-ordinated investments across the region—have been led by large firms. This underlines the importance of large firms in the development of the animal feed to poultry value chain in southern Africa.

The linkages created through the large investments across the region indicate that a stronger and more regional value chain is developing across southern Africa. The analysis suggests that there is the potential for substantially improved performance if poultry production can be internationally competitive and, at the minimum, replace imports. However, this will only happen once soya oilcake for the production of animal feed can be sourced competitively from within the region to complement the existing competitive supply of maize. The logistics required is an important part of the picture given that the main potential for agricultural expansion is in countries such as Zambia, located quite far from the main sources of demand. Key policy challenges for governments in the region involve a coherent regional strategy for the poultry industry, including ensuring the competitiveness of animal feed produced in the southern

African region, as well as the expansion of sophisticated production capabilities involved in commercial poultry and its processing and supply to consumer markets.

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