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Poultry Production and Trade in the Republic of South Africa: A Look at Alternative Trade Policy Scenarios

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Abstract

Before 2000, the United States was the largest supplier of bone-in chicken to South Africa. But in 2000, alarmed by rapidly rising imports, the South African Government imposed antidumping duties on U.S. bone-in chicken, following which U.S. exports to South Africa fell almost to zero. Faced with possible suspension of trade preferences under the recently renewed African Growth and Opportunity Act (AGOA), South Africa agreed in June 2015 to allow a quota of 65,000 tons of U.S. chicken legs at a tariff rate of 37 percent. The first U.S. chicken entered the South African market in March 2016. This study analyzes the long-term impact of the removal of the antidumping duty. Findings suggest that with the 37-percent tariff, but without the quota, South Africa would import close to 71,000 tons of U.S. bone-in chicken, only slightly above the quota now in effect. Longrun negative impacts on the South African poultry industry are minimal.

Keywords: South Africa, poultry, U.S. poultry exports, leg quarters, antidumping duties, AGOA.

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Poultry Production and Trade in the Republic of South Africa: A Look at Alternative Trade Policy Scenarios

Introduction

Consumer demand for poultry meat more than doubled in the past 20 years in South Africa, reflecting rising income and population growth. Domestic poultry output grew more slowly and imports increased. During the last 15 years, the South African Government used a variety of trade restricting measures on the United States and other exporters to limit imports and support the domestic poultry industry. While restrictive trade policies have changed the mix of countries exporting to South Africa, they have not prevented import growth. Internal production constraints limit the growth of South Africa's domestic industry, and the 2015/16 USDA baseline projects continued import growth over the next decade.

Before 2000, the United States was the largest supplier of leg quarters to the South African market. In 1997, the United States shipped 37,192 tons under the affected tariff lines, and South Africa was the sixth-largest U.S. market.[1] But in 2001, South Africa imposed antidumping duties on U.S. chicken leg quarters, after which U.S. exports dropped nearly to zero. In 2010, U.S. exports of bone-in chicken to South Africa began to rise, reaching 9,665 tons in 2012. In response, South Africa raised the antidumping duty in 2013, once again shutting off U.S. exports.

The U.S. poultry industry argued that the method used by South Africa to justify the antidumping duties violated the rules of the World Trade Organization (WTO). The method used by the South Africans was a calculation of a weighted cost of production that ignored the fact that white meat in the United States commands a higher price than dark meat. The United States did not take the case to the WTO. Instead, the U.S. poultry industry pursued bilateral negotiations in the context of the 2015 debate over the renewal of the African Growth and Opportunity Act (AGOA) in the U.S. Congress. Under pressure from the U.S. poultry industry, Congress threatened to exclude South Africa from AGOA trade preferences unless South Africa provided greater market access to U.S. poultry. South Africa had a strong interest in remaining in the AGOA, which has provided duty-free access for significant exports of wine and citrus fruit, as well as automobiles and other manufactured products, to the United States. (See Appendix A: What Does AGOA Mean for South Africa?)

AGOA was renewed for an additional 10 years in June 2015, with the proviso that the United States Trade Representative (USTR) undertake an out-of-cycle review of South African trade policies

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[1]The bulk of U.S. poultry exports to South Africa before 2000 fell under two 10-digit tariff codes: 0207.14.0010 (leg quarters) and 0207.14.0090 (other chicken portions not including offals). Tariff codes are harmonized across countries to the 6-digit level, but each country has the option of supplementing the codes with greater detail to meet its own needs. The United States adopted a 10-digit code system and began using it for U.S. trade on January 1, 1989. South Africa uses 8-digit codes, and South African trade statistics classify chicken under both the U.S. codes as 0207.14.90.

and report on its compliance with AGOA trade requirements. The review raised concerns about continued lack of access for U.S. poultry and other meats. Finally, in January 2016, following an intense round of negotiations, South Africa agreed to allow up to 65,000 tons of U.S. chicken legs at the Most Favored Nation (MFN) tariff of 37 percent, with exports over that quota still subject to the antidumping duty. The first shipment of U.S. chicken arrived in South Africa in March 2016.

Research results presented in this report suggest that even without the quota, U.S. exports at the MFN rate would not rise very much above the 65,000-ton quota because U.S. poultry now faces stiff competition from the European Union (EU) as a result of the Trade, Development and Co-operation Agreement signed by South Africa and the EU in 1999. The agreement established a free trade area that covers 90 percent of bilateral trade between the EU and South Africa, and the full liberalization of trade went into effect in 2012. Among other goods traded between the two countries, tariffs on poultry imported from the EU were eliminated. Immediately, there was a significant rise in poultry imports from the EU, particularly for bone-in portions, which rose from 1,487 tons in 2011 to 62,000 tons in 2012 and 113,000 tons in 2013. The EU's rising share has come principally at the expense of Brazil, whose exports remained subject to the MFN tariffs, all of which were raised in 2013 (the new tariffs are still within the maximum allowed under WTO rules).

What is likely to happen to the South African poultry industry now that U.S. poultry is once again entering the country? The industry faces a number of internal constraints to expansion, including high feed costs, labor costs, labor regulations, infrastructure weaknesses, limited electricity and water supplies, and a lack of a supportive environment for productivity-enhancing investments (NAMC, 2015b). A severe drought has hampered South Africa's poultry market by reducing the corn crop by 40 percent and increasing feed prices. USDA baseline projections (presented below) suggest that throughout the next decade, under normal weather conditions, South Africa's industry will continue to be unable to meet demand through domestic production. As in the past, trade policies can shift the source, but not the existence, of poultry imports.

In this report, we present a set of alternative trade-policy scenarios of liberalized imports, using an Armington-Cline spreadsheet-based model to simulate a reduction in the tariff on U.S. chicken. We then use the 2015/16 USDA Baseline modeling framework to analyze the impact of the resulting increase in imports on the entire agricultural sector. We model two scenarios:

- Elimination of the antidumping duty on U.S. exports of leg quarters. The 2015/16 USDA Baseline model assumes that the antidumping duty remains in place. Under this scenario, U.S. exports enter South Africa at the most favored nation (MFN) tariff rate of 37 percent, but without a quota. Imports from all other partners would enter at the duty rates they are now subject to.

- U.S. leg quarters enter South Africa at the MFN rate, again without a quota, and duty-free access for EU leg quarters is eliminated, so that EU legs also face the MFN tariff. This is a measure that the South African poultry industry has recently requested. This scenario can also reveal the market share that the United States has lost as a result of this agreement.

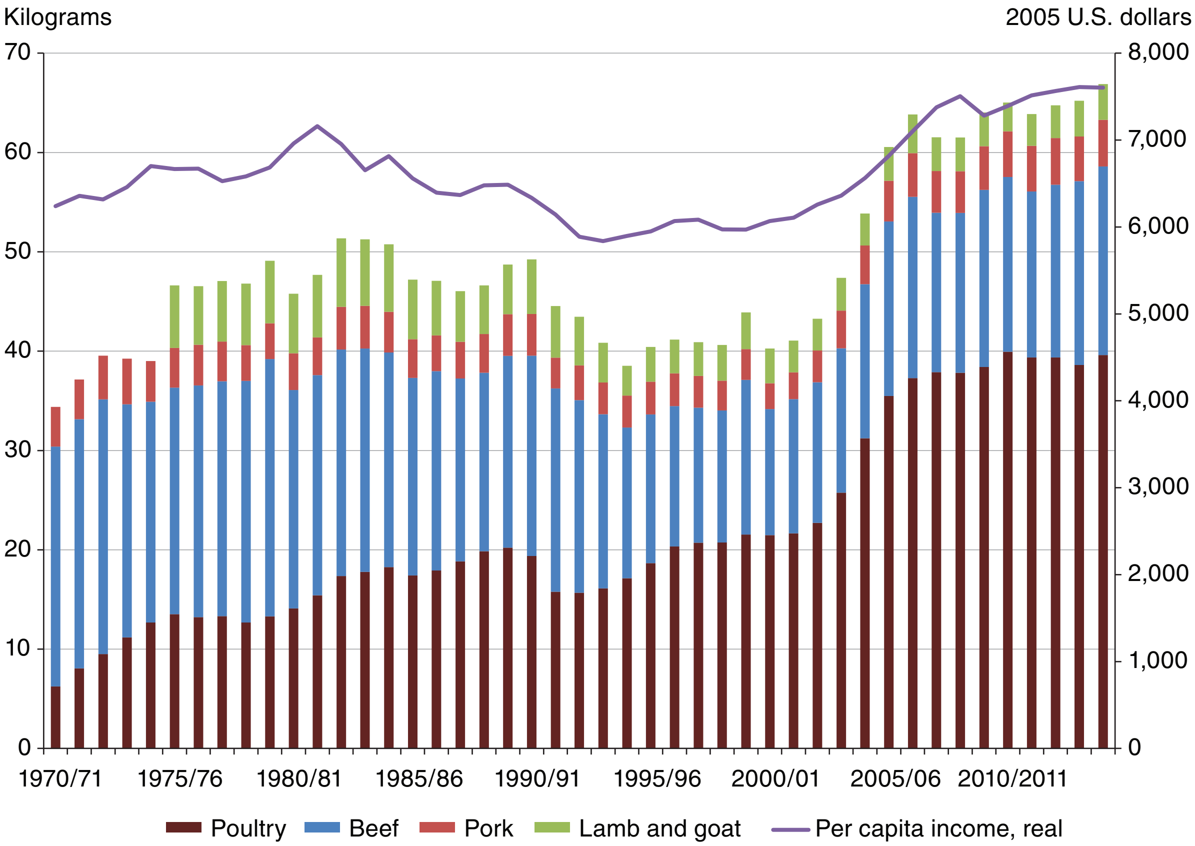
The scenarios presented in this analysis do not represent a full liberalization of South African poultry trade. We focus on one tariff line—bone-in chicken—and both scenarios reduce the tariff to the MFN rate of 37 percent, not to zero. Our results suggest that this tariff change will not seriously impact the South African poultry sector. It is quite possible that a reduction of all tariffs to zero would have a more serious impact. But the focus of this analysis is the long term impacts of the recent opening of the South African market to U.S. poultry; we do not address the implications of full trade liberalization.

Background: South African Poultry Output Fails To Keep Pace With Demand

Like many middle-income countries, South Africa's rising income has been accompanied by significant increases in per capita meat consumption (fig. 1). Poultry meat, being cheaper than other meats, accounts for most of the growth. Per capita poultry consumption more than doubled from 17 kilograms in 1994/95 to 40 in 2013/14 (DAFF, 2016). In recent years, beef consumption has also risen, but poultry consumption remains dominant. Consumption of other meats has remained constant.

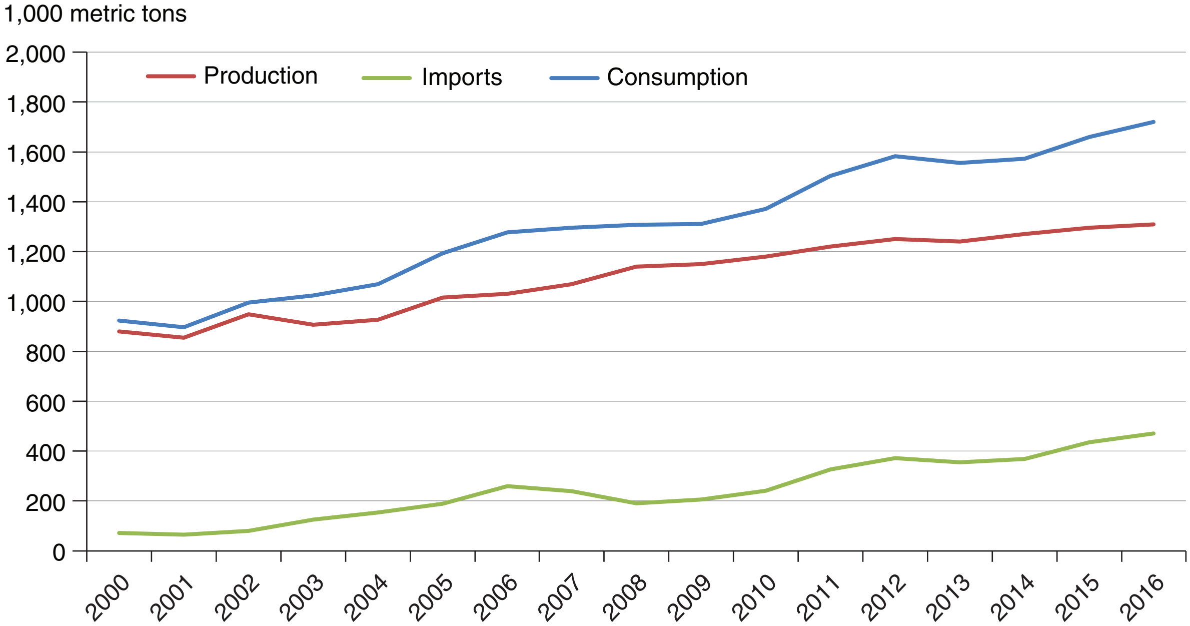
Domestic output has also increased rapidly, but has failed to keep pace with demand growth, resulting in rising imports (fig. 2). The South African Poultry Association (SAPA) has long advocated greater protection against imports. Significant protection has been put in place, including imposing antidumping duties on U.S. leg quarters in 2001, as well as increases in tariffs on poultry supplied by other exporters such as Brazil and Argentina (see details in the next section). Despite increasing levels of protection, imports have continued to rise. In 2000, the country was nearly self-sufficient in poultry production; by 2015 imports made up 22 percent of domestic consumption.

Figure 1
Per capita poultry consumption rises with per capita income



Source: USDA, Economic Research Service, using data from USDA's Foreign Agricultural Service Production, Supply, and Distribution (PS&D) database.

Figure 2
Poultry production rises, but does not keep pace with demand

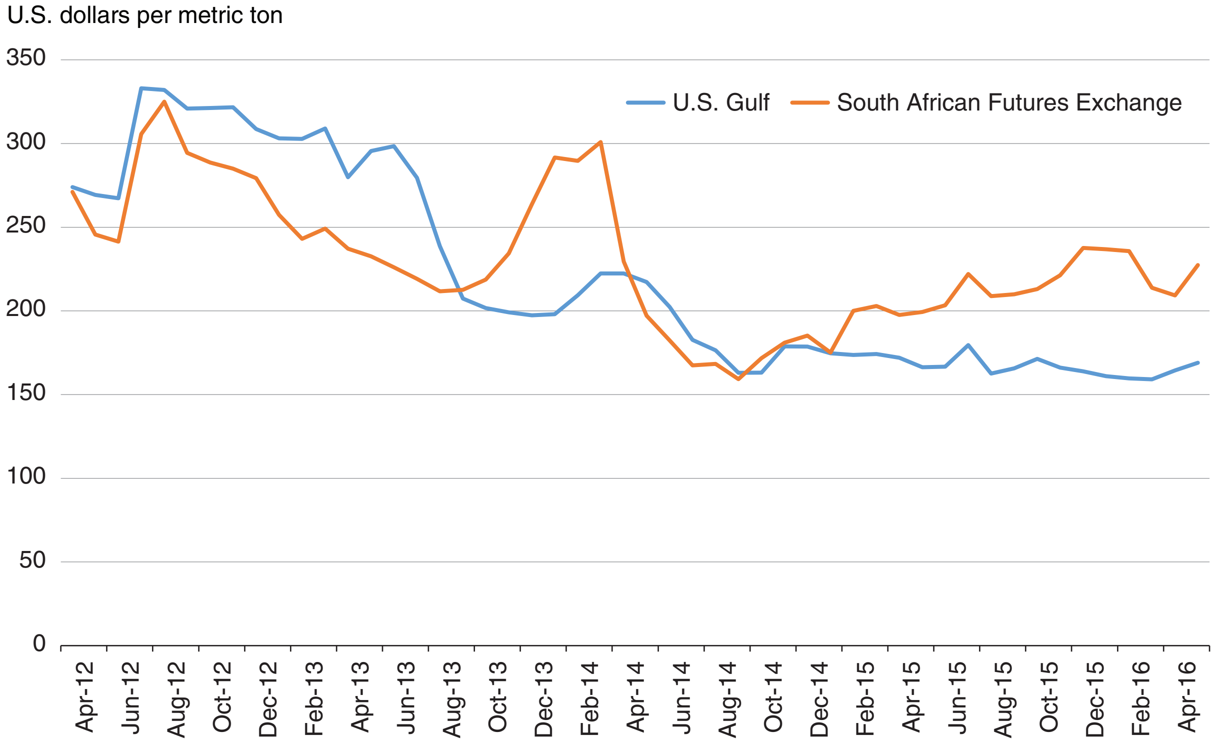


Source: USDA, Economic Research Service, using data from USDA's Foreign Agricultural Service Production, Supply, and Distribution (PS&D) database.

The South African poultry industry is highly concentrated—two large firms control slightly over 50 percent of the market, while five medium-sized firms control 31 percent (NAMC, 2015b). The industry is considered to be technically efficient, with feed conversion ratios reported to be around 1.6, comparable to other major producing countries (NAMC, 2015a), but South African producers face high production costs and have difficulty competing with lower priced imports.

The highest cost faced by poultry producers is feed. Feed makes up 70 percent of total production costs (NAMC, 2015b). Feed costs are high because of the need to import soybean meal and highly variable corn yields and prices (NAMC, 2015f). As a result of large corn yield fluctuations, South Africa alternates between being a net exporter and a net importer of corn. In most years, the country is a net exporter, but when yields are extremely low, it becomes a net importer. Prices thus fluctuate between "export parity" and "import parity." Import parity is the international price plus the cost of unloading at the port and transporting to the major markets. Export parity is the international price minus the costs of transporting to the port of Durbin and loading onto a ship. If the country has an exportable surplus, the market price tends to fall toward export parity; conversely, if there is a production shortfall, the price rises to approach import parity. As a result, the domestic corn price has risen rapidly even though world prices are stable or even falling. This phenomenon was especially acute in 2015/16, as a severe drought forced South Africa to import large volumes of corn. In recent months, the U.S. Gulf price of corn declined slightly, but the price on the South African Futures Exchange (SAFEX) has been rising toward import parity (fig. 3). The variability in yields thus leads to extreme price volatility, which raises costs for users of corn.

Figure 3
U.S. Gulf corn price compared to South African SAFEX price, 2012-16



Source: USDA, Economic Research Service and the South African Futures Exchange (SAFEX).

The Structure of South African Poultry Trade

The bulk of South Africa poultry imports falls under six tariff lines, described below and in table 1. In 2013, the South African Government, alarmed at the rapid rise in poultry imports, raised tariffs on five of the tariff lines. Most new tariffs are still below the bound rates agreed on with the WTO, but the tariff on frozen whole birds was raised to the maximum allowed under WTO rules. At the same time, however, tariffs for the EU on all tariff lines fell to zero as a result of the 1999 agreement with the EU. The new tariffs apply only to non-EU countries.

1. Mechanically deboned meat (MDM, tariff code 0207.12.10): this product accounts for nearly half of imports by volume and comes in at a zero tariff (fig. 3). Brazil is the main supplier. The motivation behind the zero tariff is a desire on the part of the South African Government to provide a source of low-cost meat to lower-income households.

2. Carcasses (0207.12.20): this product has a relatively small share—around 5 percent by volume. The tariff was raised from 27 percent to 31 percent in 2013. Argentina and the EU are the main suppliers.

3. Frozen whole birds (0207.12.90): this product also accounted for a small share. The tariff was raised to 82 percent (the maximum allowed under WTO rules) in 2013, and imports of this tariff line dropped almost to zero after that.

4. Boneless cuts (0207.14.10): this a product lso accounts for a small share. The tariff was raised from 5 percent to 12 percent in 2013. Brazil is the largest supplier, and imports have dropped since the tariff was raised.

5. Offal (0207.14.20): the tariff on offal went from 27 percent to 30 percent. Brazil was historically the largest supplier, but starting in 2013, it has lost share to the EU. In 2014, the EU was the largest supplier.

6. Bone-in portions (0207.14.90): this product accounts for about half of South Africa's imports by volume. This tariff line is also the most contentious on the part of the South African poultry industry. The antidumping duty on the United States applies to this tariff line.

Table 1

South African tariffs on poultry imports by tariff code

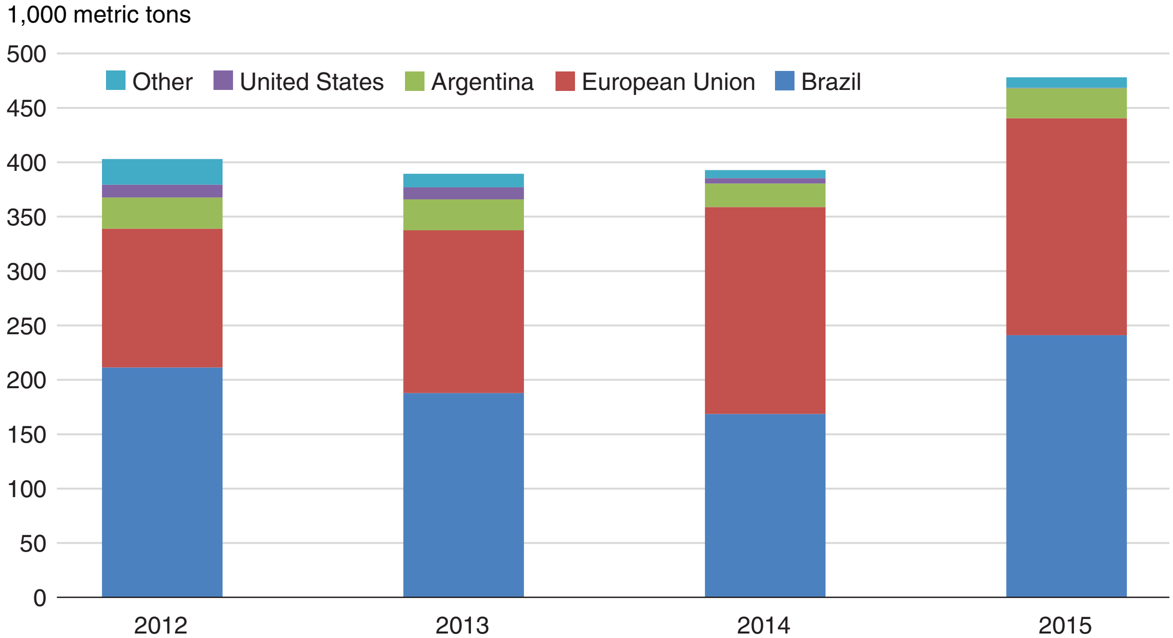
Tariff code	Product	Old tariff	New tariff*	EU**	United States	2014 share by volume
0207.12.10	Mechanically deboned meat	0	0	0	0	0.37
0207.12.20	Carcasses	0.27	0.31	0	0.31	0.05
0207.12.90	Frozen whole birds	0.27	0.82	0	0.82	0.01
0207.14.10	Boneless cuts	0.05	0.12	0	0.12	0.03
0207.14.20	Offal	0.27	0.30	0	0.30	0.09
0207.14.90	Bone-in portions	0.18	0.37	0	9.4 rand/kg.***	0.40

*New tariffs took effect October 2013.
**As of July 2014, antidumping duties on EU bone-in portions were imposed: 73% for Germany, 22.8% for the Netherlands, and 22% for the United Kingdom. These lapsed in January 2015.
***This rate went into effect February 2012; previous duties were 2.24 to 6.96 rand per kilogram.
Note: EU = European Union.
Source: USDA, Economic Research Service, and USDA, Foreign Agricultural Service.

Imports have continued to grow, but there was a shift in suppliers from Brazil toward the EU (fig. 4). Until 2014, Brazil was losing share to the EU as a result of the South Africa-EU trade agreement. However, in 2015, imports rose, and Brazil captured nearly the entire increase. There was an increase in imports of MDM, for which Brazil is the main supplier, but Brazil also managed to increase shipments of bone-in (fig. 5).

Figure 4

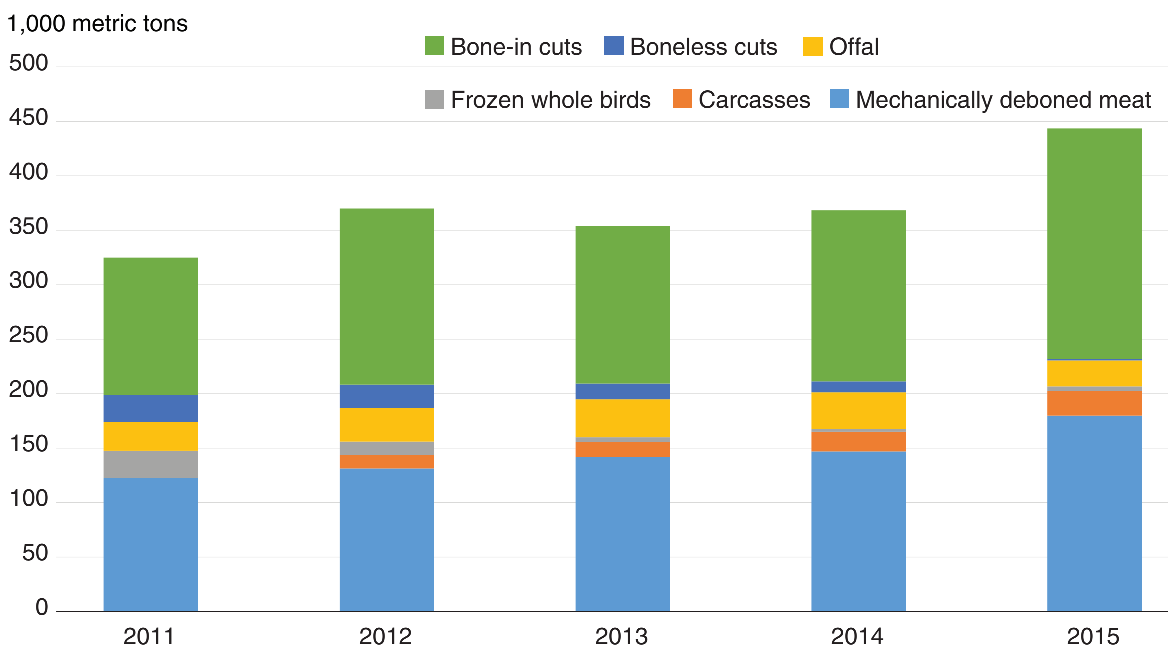
South African poultry imports by country of origin



Source: USDA, Economic Research Service, using data from the Global Trade Atlas.

Figure 5

Composition of South Africa's poultry imports[1]



[1]Total imports depicted in this chart are slightly less than what is shown in figure 4. Figure 4 depicts all poultry imports, including turkeys and ducks, which are not included in this chart.

Source: USDA, Economic Research Service, using data from the Global Trade Atlas.

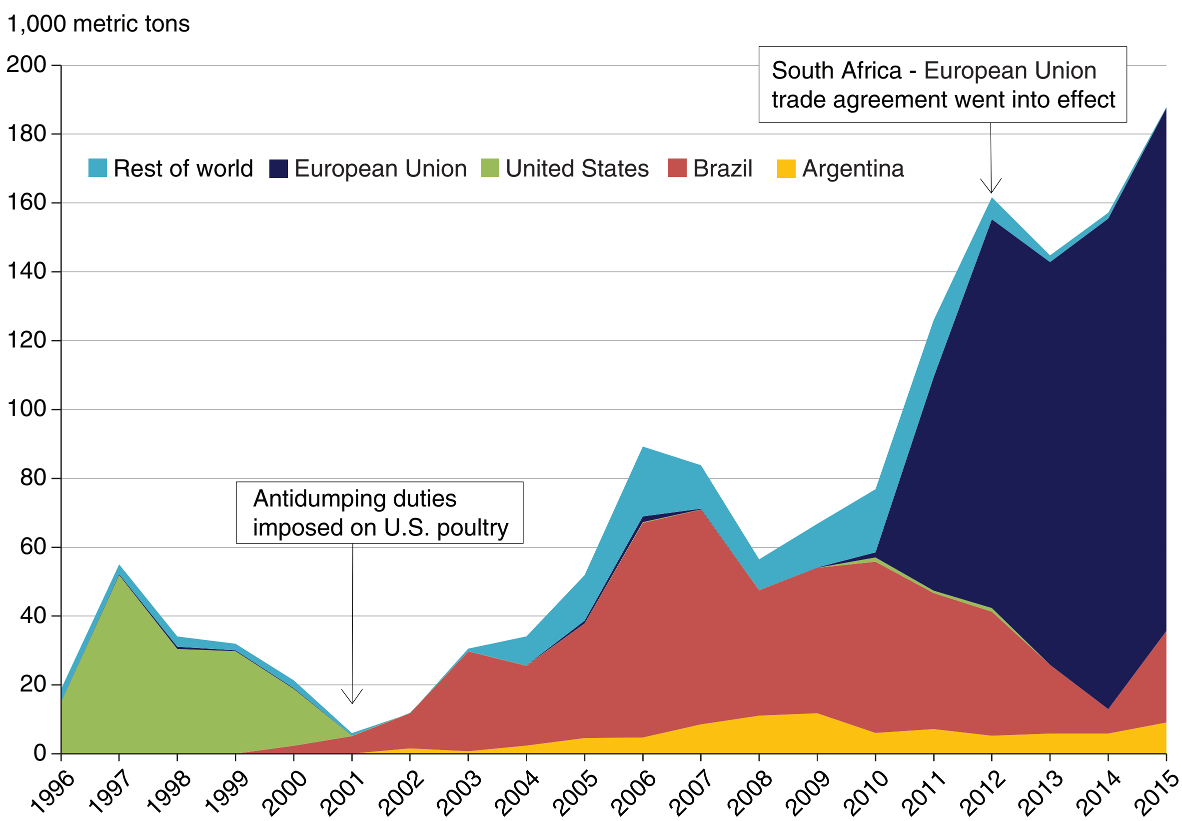
Antidumping Duties Froze U.S. Poultry Out of the South African Market

Before 2000, the United States was the largest supplier of leg quarters to the South African market; but South Africa imposed antidumping duties on U.S. leg quarters in 2000, ranging from 2.24 to 6.96 rand per kilogram, depending on the U.S. supplier. The following year, U.S. exports dropped nearly to zero (fig. 6). In 2013, after U.S. exports began to rise, the duty was raised to 9.4 rand per kilogram and was imposed uniformly on all U.S. suppliers.

Following South Africa's imposition of antidumping tariffs on the United States, Brazil became the largest supplier of leg quarters to South Africa. South Africa attempted to introduce antidumping duties on Brazil as well, but was forced to back off after Brazil filed a request for consultation under the WTO dispute settlement procedures. However, South Africa signed a trade agreement with the EU in 1999, and full liberalization of trade between South Africa and the EU took effect in 2012. Under this agreement, tariffs on EU poultry were eliminated. Starting in 2011, the EU took a growing share of the market for bone-in leg quarters, displacing Brazil (fig. 6). South Africa now accounts for nearly a third of total EU exports of bone-in chicken parts.

Figure 6

Suppliers of bone-in chicken legs to South Africa market (tariff code 0207.14.90) shift with changing tariff regimes



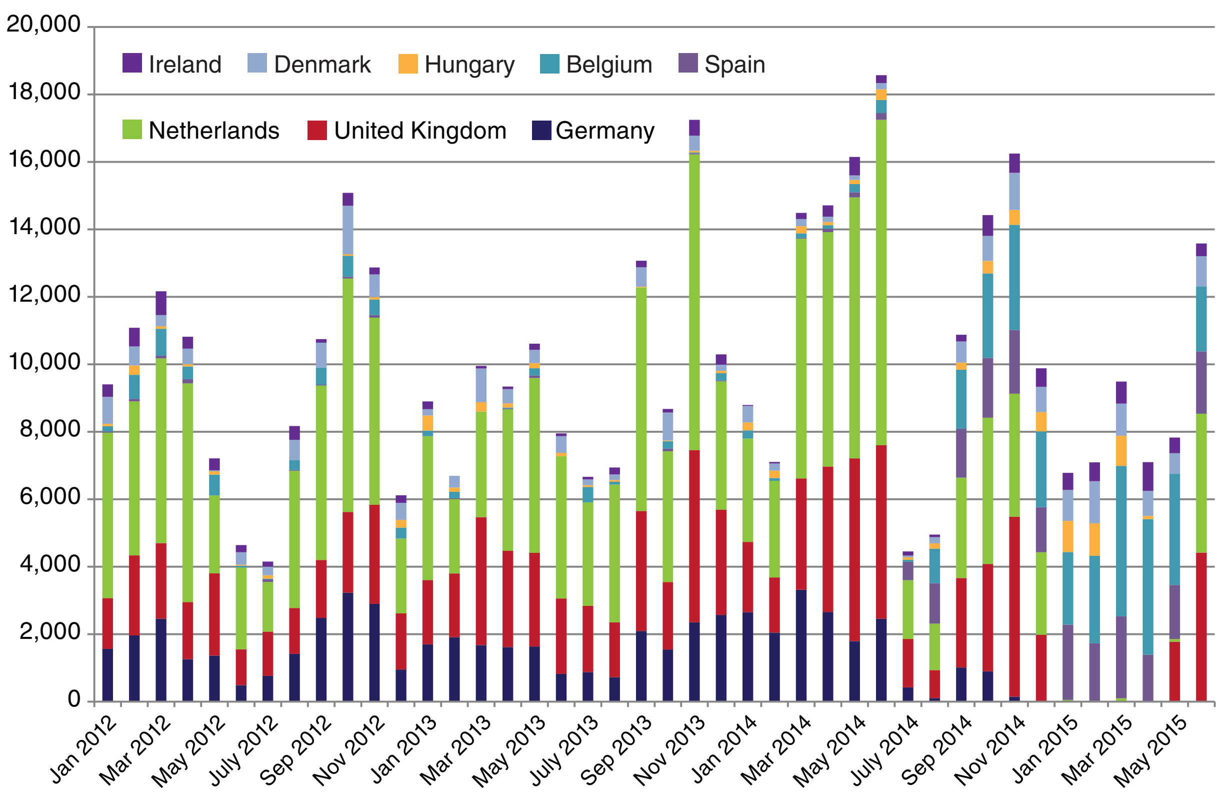
Source: USDA, Economic Research Service, using data from the Global Trade Atlas.

Since the EU agreement went into effect, the EU has captured most of this market. EU exports of bone-in portions rose steadily. In reaction, in July 2014, South Africa imposed antidumping duties on exports of leg quarters from three EU member countries: 72 percent for Germany, 22.8 percent for the Netherlands, and 22 percent for the United Kingdom.

The antidumping duties on the EU lapsed in January 2015, giving rise to vigorous ongoing discussion about reimposing these duties. However, it appears that the antidumping duties had little effect on total imports from the EU. Imports of bone-in portions from the EU fell in July and August 2014 but then picked up; by November 2014 imports were at similar levels as those in previous years (fig. 7). Imports from Germany, the Netherlands, and the United Kingdom stayed down, but other EU member countries—principally Spain, Belgium, Hungary, and Denmark—apparently picked up the slack. Following the resumption of imports from the United States and greater short-term pressures on the South African poultry sector, the industry is again demanding some sanctions on imports from the EU.

Figure 7

Monthly imports of bone-in portions: Antidumping duties lead to shift in suppliers within the European Union, 2012-15



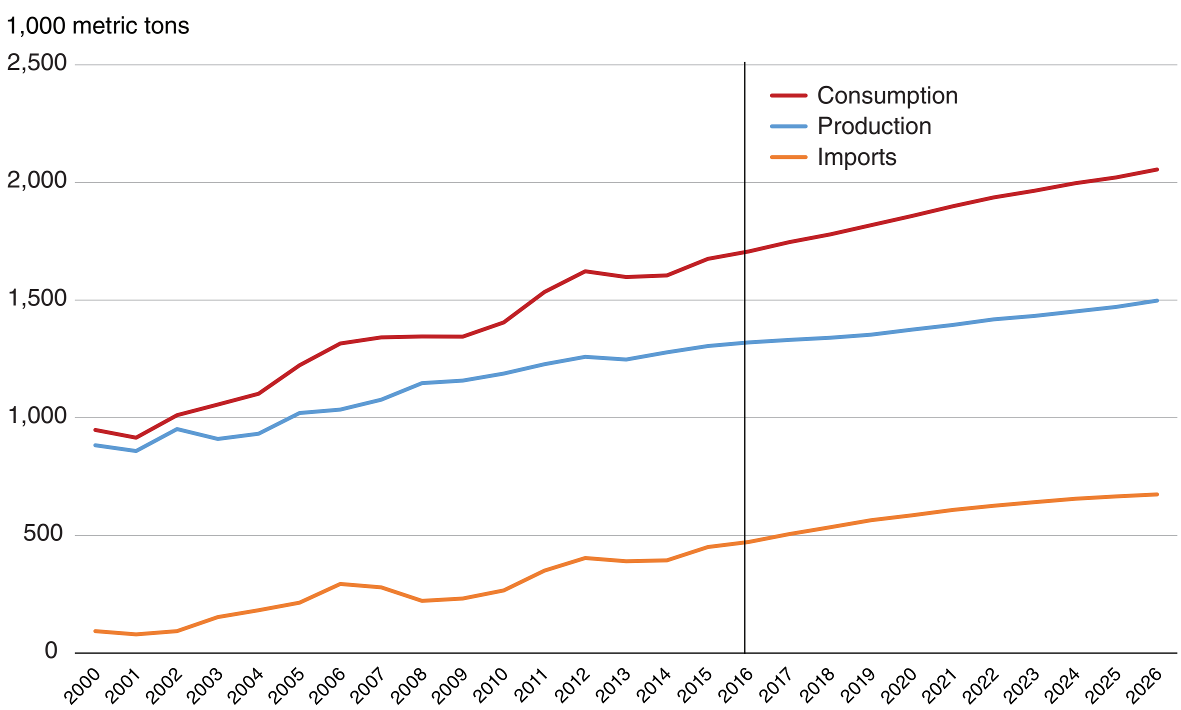
Source: USDA, Economic Research Service, using data from the Global Trade Atlas.

Long-Term Outlook: Poultry Imports Will Continue To Grow

We used the 2015/16 USDA Baseline model to project the 10-year outlook for South Africa's poultry production and trade (described in Appendix B). The South African country model used to make the baseline projections is a partial equilibrium model that includes behavioral equations for production, consumption, and stocks. The model covers 24 commodity markets, including beef, pork, poultry, wheat, corn, other feed grains, oilseeds, protein meals, and vegetable oils. For most commodities, imports or exports are residual; however, poultry is modeled with a market-clearing producer price and behavioral imports and exports. The model makes 10-year projections under neutral assumptions, including normal weather and a continuation of the current policy and institutional environment. The South African model with scenario tariff changes was run in the country-commodity linked system, which links 41 country and regional models to derive a new set of equilibrium world prices (see Appendix B).

The 2015/16 country model assumes a continuation of the antidumping duties on U.S. chicken exports, since at the time the model was finalized (December 2015), it was not certain whether the duties would be lifted. Model results show that under the baseline scenario with no change in the 2015 policy regime, poultry consumption continues to rise (fig. 8). The key factor driving this consumption growth is 2.1-percent annual growth in real per capita income combined with a 2.1-percent annual decline in real prices. Poultry continues to be lower priced than other meats. Domestic production also rises but fails to keep pace with demand, leading to rising imports. By the end of the projection period, imports make up 33 percent of domestic consumption.

Figure 8
South African poultry output grows but does not keep pace with demand



Source: USDA, Economic Research Service (2016).

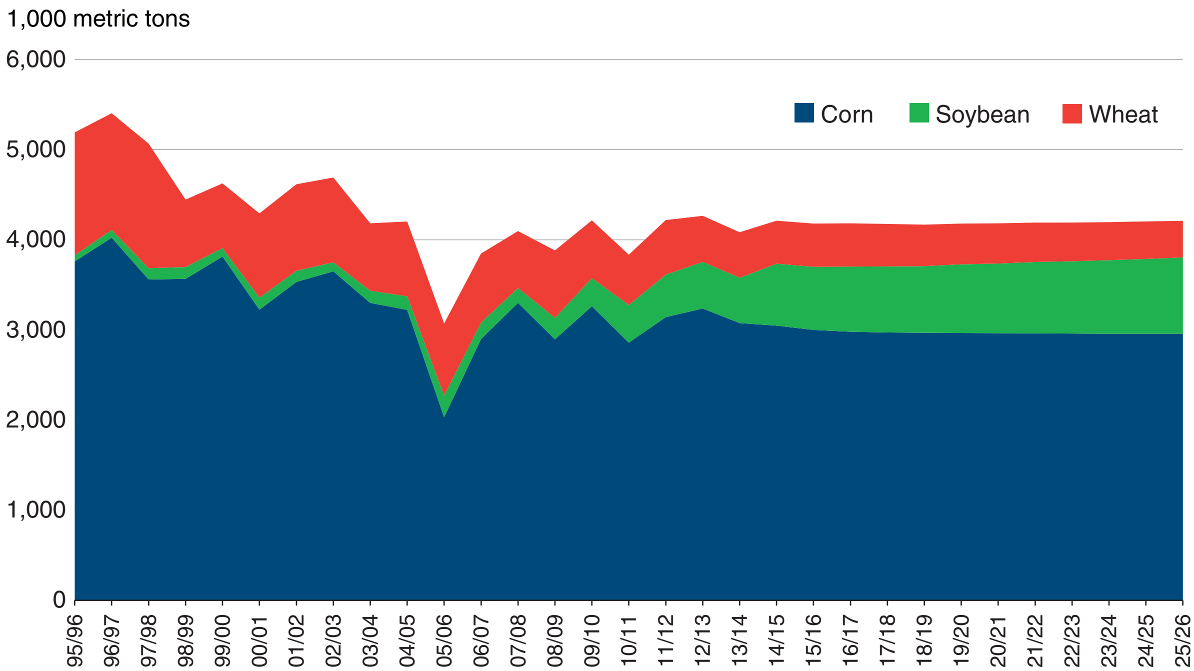
Results also show a continuation of increases in soybean and soymeal output. In recent years, area planted to soybeans expanded as a result of favorable prices relative to corn and wheat. Soybean area continues to expand at the expense of corn and wheat (fig. 9).

Even as soybean area and production rise, South Africa has been constrained by a shortage of crushing capacity. Between 2007/08 and 2011/12, South Africa found itself exporting soybeans even as it continued importing soymeal, due to the inability to crush the entire crop. But crushing capacity has increased rapidly, soymeal production has increased, and exports dropped to zero in 2013/14 (fig. 10).

This trend is projected to continue. South Africa's soymeal production and use continue to increase while imports fall (fig. 11).

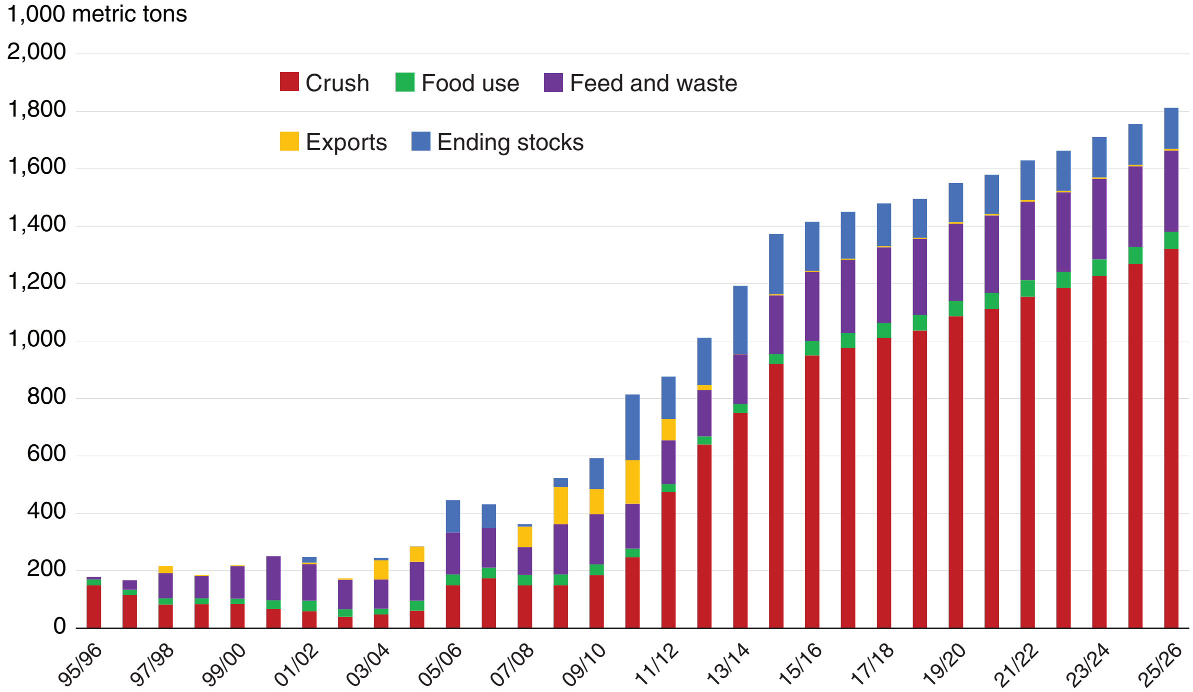
Figure 9

South African soybean area expands at the expense of corn and wheat



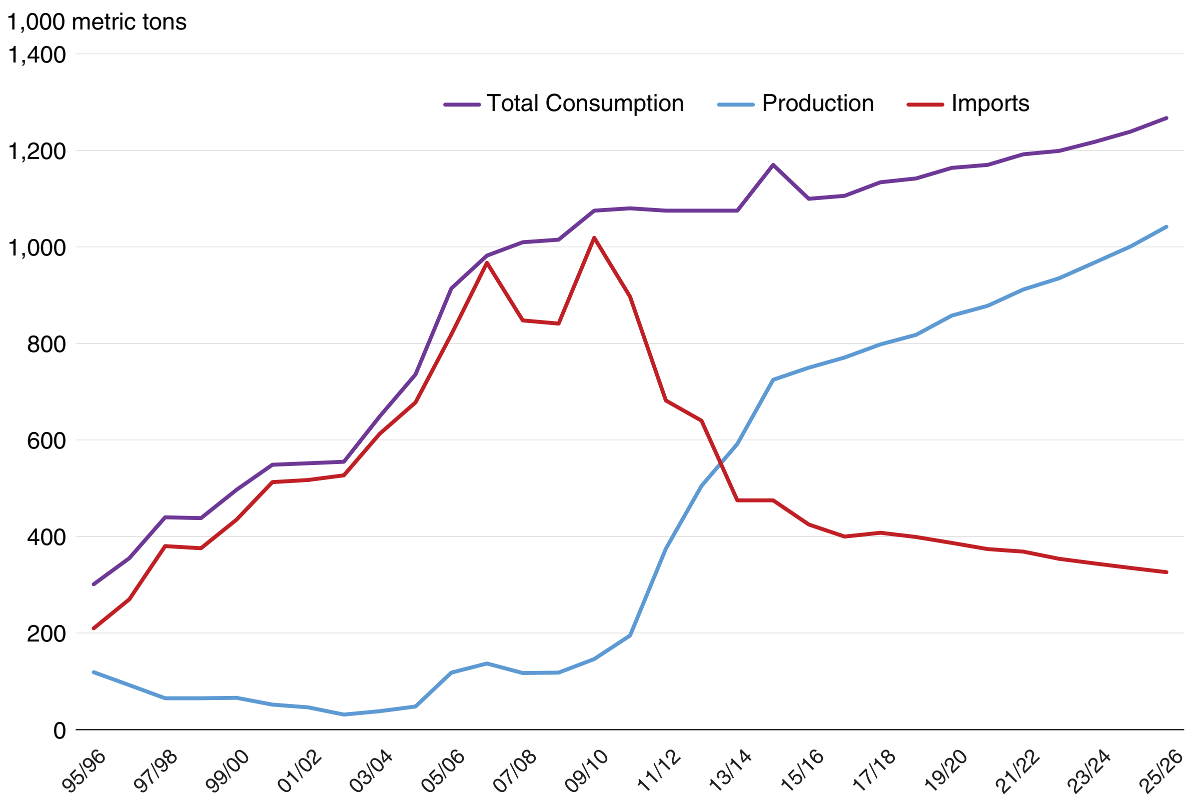
Source: USDA, Economic Research Service (2016).

Figure 10
Soybean crush in South Africa expands rapidly



Source: USDA, Economic Research Service (2016).

Figure 11
South African domestic soymeal output expands while imports decline



Source: USDA, Economic Research Service (2016).

Scenario Analysis: Reduction of Duties on U.S. Bone-In Exports

We used a two-step process to model a reduction or elimination of the antidumping duties currently imposed on imports of bone-in portions (tariff code 0207.14.90) from the United States. The first step was to use a spreadsheet-based framework, which we refer to as a "modified Armington Cline framework," to model changes in trade at one point in time (see Appendix C for details). Then we used the USDA baseline modeling framework to model the impact of the trade changes on the entire agricultural sector of South Africa over the 10-year projections period.

The model used in this analysis draws on what is known in the literature as the "Armington assumption": that demand for an internationally traded product is differentiated by country of origin (Armington, 1969). This is an approach that is commonly used to model changes in bilateral trade flows. Our objective was to model South Africa's substitution among import partners in response to tariff changes. The model consists of a set of equations (referred to in Appendix C as "Armington equations" and "Cline equations") that calculate changes in trade in response to relative changes in effective prices, including ad valorem tariffs (Cline, 1978).

The first step was to construct a 6-by-6 trade matrix, averaged over the 2012-14 period. The trade matrix shows bilateral trade in poultry meat among six trading partners: South Africa, the United States, the EU, Brazil, Argentina, and rest of world (ROW). In the base period, Brazil, Argentina, and ROW faced the most favored nation (MFN) tariff of 37 percent; the EU faced a zero tariff, and the United States faced an ad valorem equivalent tariff of 65 percent.[2] The model can then be shocked by changing the tariff rate faced by one or more trading partners. The results reflect what 2012-14 average trade would have been under different tariff regimes.

We used the Armington-Cline framework to evaluate trade changes under two tariff reduction scenarios. Under the first, the tariff on U.S. exports was reduced to the MFN rate of 37 percent, while tariffs on other suppliers remained unchanged. Results suggest that under this scenario, a reduction of the antidumping duties on U.S. poultry to the MFN rate of 37 percent would enable the United States to capture on average 35 percent of the South African market for bone-in quarters exports to South Africa during 2012-14 (table 2). Exports rise from less than 1,000 tons to nearly 71,000 tons, slightly above the 65,000 quota that is now in effect. The United States takes some share away from the EU, but the EU remains the dominant supplier.

Table 2

South African bone-in poultry trade 2012-14 average: Following tariff changes, the United States gains share at the expense of the EU

	Base	Scenario 1	Absolute change	Scenario 2	Absolute change
			1,000 metric tons		
U.S. exports to RSA	0.8	70.7	69.9	81.9	81.1
EU exports to RSA	124.2	105.6	-18.6	16.7	-107.4
Total RSA imports	155.0	200.7	45.7	130.0	-25.0

Note: RSA = Republic of South Africa.

Source: USDA, Economic Research Service, using data from the Global Trade Atlas.

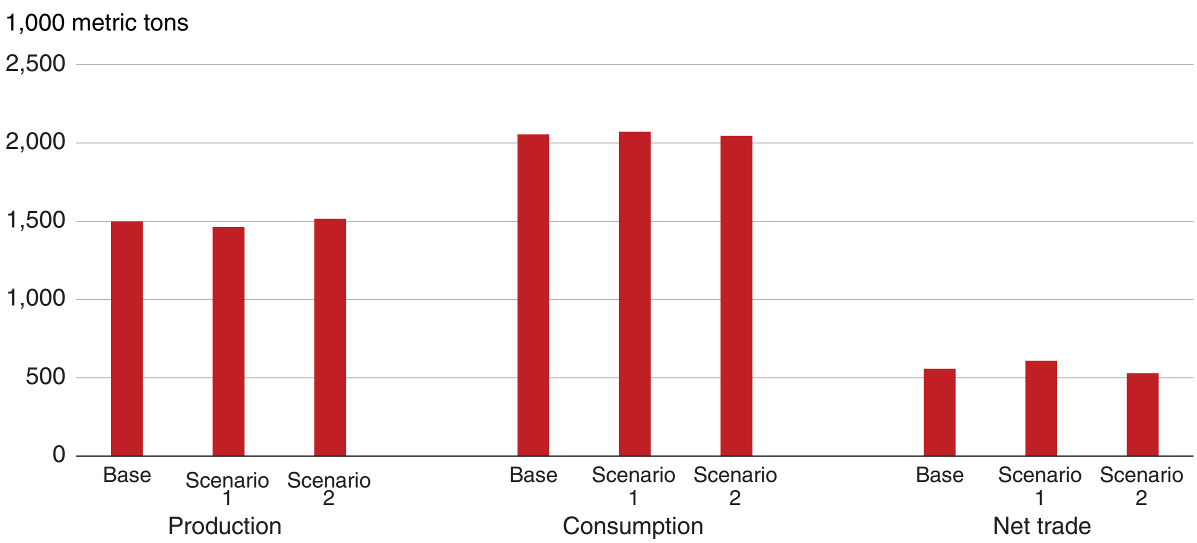
[2]The ad valorem equivalent was calculated by dividing the specific tariff of 9.4 rand per kilogram by the import unit value of that tariff line.

The second scenario assumes that the EU loses its preferential access, and all suppliers, including the EU, face a 37-percent tariff. In response to financial pressures resulting from the 2016 drought, SAPA requested the South African Government impose a 37-percent safeguard duty on bone-in poultry from the EU. Under this scenario, U.S. poultry is not subject to a quota, so this scenario also provides an estimate of the market share lost to the United States as a result of that trade agreement. The U.S. share rises to 63 percent, the EU loses substantial share, and total South African imports fall. If the South Africa-EU trade agreement were not in place, and if U.S. poultry could enter without a quota, the United States would come closer to regaining its pre-2000 position in the South African market. However, the market structure has changed, and under current conditions, elimination of the antidumping duty brings substantial benefits to the U.S. poultry sector, but does not bring it back to its earlier dominance in the market.

To analyze the impact of the tariff change on the entire South African poultry/feed complex over the 10-year projection period, we created two tariff shocks within the baseline framework. Under scenario 1, average 2012-14 South African poultry imports rise by 46,000 tons; under scenario 2 imports decrease by 25,000 tons. We ran several iterations of the baseline model to determine how much the trade-weighted tariff on all poultry products would need to change in order to generate these changes in import quantities in the first year of the projections period.[3] Before the tariff change, the trade-weighted tariff on all poultry cuts was 34 percent (NAMC, 2015e). Under scenario 1, we determined that lowering this tariff to 31 percent would bring the desired increase in imports; under the second scenario, raising the tariff to 35 percent was found to generate a 25,000- ton decline in imports. We then created two scenarios to simulate the long-term impact of these tariff changes. The new tariffs were assumed to remain constant throughout the projection period.

South African poultry production in 2026 is 2.3 percent lower in scenario 1 than in the baseline, but is 1.2 percent higher under scenario 2 (fig. 12). But the changes in South African poultry output are very small under both scenarios. The bottom line is that the tariff changes do not appear to have serious long-term impacts on the South African poultry sector.

Figure 12
South Africa's 2016 poultry output is lower than the base under scenario 1, but higher under scenario 2



Source: USDA, Economic Research Service, authors' analysis using results from USDA (2016).

[3]The USDA Baseline model does not disaggregate poultry meat by cut.

Conclusions: Outlook Remains Uncertain

In June 2015, the U.S. and South African industries agreed on a tariff rate quota: imports of U.S. bone-in leg quarters would be allowed at the MFN tariff of 37 percent, up to a quota of 65,000 tons, and over-quota imports would be subject to the antidumping duty. Implementation was delayed, however. Even though the South African industry agreed to reduce the tariff on U.S. poultry, the market remained closed to U.S. poultry for several months. South Africa maintained a blanket ban on U.S. poultry due to ongoing outbreaks of highly pathogenic avian influenza. It was only after President Obama issued a formal threat to suspend South Africa's trade preferences under AGOA that South Africa finally agreed, on January 6, 2016, to end its ban on U.S. poultry as well as pork and beef, which were also banned due to sanitary concerns.

Our results suggest that the resumption of U.S. poultry exports to South Africa will not cause serious harm to the country's poultry industry. But the tariff changes analyzed in this report are relatively small; greater liberalization of South African poultry trade could bring more dramatic impacts. The South African poultry industry remains concerned about its ability to compete in the world market without the current tariff protection. SAPA has warned that the industry could lose as much as $72 million and suffer job losses approaching 6,500 as a result of the resumption of imports from the United States (Reuters, 2015). South African analysis, using a computable general equilibrium model, estimates that reduction of the average tariff to zero would bring job losses of 22,693 jobs per year (NAMC, 2015g). The scenarios presented in this report are more moderate—reducing the tariff on just one tariff line to the MFN level. Our results suggest that reducing the tariff on U.S. poultry would not seriously impact the South African poultry industry. In any case, estimated job gains from AGOA far outnumber any losses that might be suffered by the poultry industry.

In the short term, however, the South African poultry industry is under serious stress because of the ongoing drought. The drought has reduced the corn crop by 40 percent, and the country is projected to import 3.5 million tons in 2015/16. Soybean output is down by 20 percent, and imports are projected by USDA to reach 250,000 tons. The result is rising feed costs and worsening financial pressures on the South African poultry industry.

In response, SAPA is demanding a safeguard duty of 37 percent on EU chicken. Our model results suggest that the elimination of duty-free access for EU poultry would bring small increases in South African production, but would leave the country dependent on imports to meet the population's rising demand. The South African poultry industry will continue to be challenged by high feed costs, the result of volatile corn prices and a continuing need to import soymeal. As long as U.S. poultry remains subject to the 65,000-ton quota, the United States would not benefit from such an action. The gap would most likely be filled by other suppliers such as Brazil.

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Appendix A: What Does AGOA Mean for South Africa?

Enacted in 2000, the African Growth and Opportunity Act (AGOA) is aimed at expanding U.S. trade and investment with sub-Saharan Africa. Combined with the Generalized System of Preferences (GSP), nearly all goods produced in AGOA-eligible countries enter the U.S. duty-free. The agreement potentially covers 49 countries, but each of the 49 countries must undergo an annual review by USTR to determine whether it continues to meet the eligibility criteria, which include market-based economic policies, reduced barriers to U.S. trade and investment, efforts to battle corruption, protected internationally recognized labor rights, and policies promoting economic development (Williams, 2015). As of the end of 2015, 39 countries, out of 49 total, were eligible for AGOA benefits.

South Africa is part of both GSP and AGOA; it is the third-largest exporter under AGOA to the United States (numbers one and two are Nigeria and Angola, respectively). AGOA, combined with GSP, are very important to South Africa. Combined U.S. imports from South Africa under AGOA and GSP totaled $3.1 billion in 2014; imports under AGOA alone totaled $1.7 billion, roughly 21 percent of all South African exports to the United States. South Africa is the top exporter of non-energy products under AGOA. Most products are manufactured goods. The largest category of imports under AGOA are automobiles, totaling $1.3 billion in 2014. Agricultural imports under AGOA totaled $176 million, 56 percent of total U.S. agricultural imports from South Africa, consisting mainly of wine and citrus (appendix table 1).

According to a one study, South Africa had been able to add 62,395 jobs as of 2010 because of exports under AGOA (Schneidman and Lewis, 2012). Another study estimates that exclusion from AGOA would cost South Africa $260 million in lost exports (Mevel et al., 2013).[4] South African media report concerns about the potential loss of jobs in South Africa's auto industry, as well as jobs in the labor-intensive apparel and food processing sectors. According to the Brookings Institution, the South African automotive industry is the fifth-largest employer in the country, directly employing 36,000 people and indirectly supporting nearly 275,000 (Schneidman, January 14, 2014).

[4]The 2013 Brookings study was conducted before the decision on AGOA renewal. It analyzed several alternative scenarios concerning both country eligibility and product coverage. The scenario cited here was one where middle income countries, including South Africa, are excluded from AGOA. Because other countries in addition to South Africa were excluded under this scenario, the results may not be identical to a scenario under which only South Africa is excluded.

Appendix table 1

U.S. Imports from South Africa under AGOA

Sector	Category	2012	2013	2014
Agricultural products		**$ Million U.S.**		
	Total U.S. imports from South Africa	306,465	301,535	315,443
	Imports under AGOA	163,178	184,516	175,504
Forest products				
	Total U.S. imports from South Africa	26,181	35,567	40,538
	Imports under AGOA	92	55	102
Chemicals and related products				
	Total U.S. imports from South Africa	831,922	773,786	794,386
	Imports under AGOA	63,330	62,292	47,790
Energy-related products				
	Total U.S. imports from South Africa	74,170	104,956	64,701
	Imports under AGOA	33	96	24
Textiles and apparel				
	Total U.S. imports from South Africa	24,686	26,501	25,251
	Imports under AGOA	5,253	5,999	5,717
Footwear				
	Total U.S. imports from South Africa	1,354	1,052	1,074
	Imports under AGOA	316	444	343
Minerals and metals				
	Total U.S. imports from South Africa	4,564,069	4,172,844	4,794,578
	Imports under AGOA	221,245	202,839	209,132
Machinery				
	Total U.S. imports from South Africa	353,339	338,354	369,685
	Imports under AGOA	6		2
Transportation equipment				
	Total U.S. imports from South Africa	2,160,564	2,313,838	1,528,956
	Imports under AGOA	1,928,750	2,121,213	1,307,121
Electronic products				
	Total U.S. imports from South Africa	73,119	69,754	72,855
	Imports under AGOA	16	16	
Miscellaneous manufactures				
	Total U.S. imports from South Africa	131,697	144,549	136,556
	Imports under AGOA	1,133	1,027	1,898

continued—

Appendix table 1

U.S. Imports from South Africa under AGOA—continued

Sector	Category	2012	2013	2014
Agricultural products		**$ Million U.S.**		
Special provision				
	Total U.S. imports from South Africa	332,349	323,437	270,238
	Imports under AGOA	147,891	109,398	125,542
All sectors				
	Total U.S. imports from South Africa	8,695,457	8,392,134	8,269,567
	Imports under AGOA	2,383,352	2,578,496	1,747,633
Imports from all AGOA eligible countries	Billion U.S. dollars			
	Total U.S. imports	47,500	38,329	25,479
	Imports under AGOA	32,476	24,800	11,813
	South Africa share	.07	.10	.15

Source: Data compiled from agoa.info using data from the U.S. Department of Commerce.

Appendix B: The Country-Commodity Linked System (CCLS)

The country-commodity-linked system (CCLS) consists of 42 models, of which 32 are country models and 10 are regional models. The system simultaneously equilibrates prices and quantities for 24 world commodity markets, for each of the 10 projected years in the analysis. The commodities include four coarse grains (corn, sorghum, barley, and other coarse grains); two food grains (wheat and rice); four oilseeds and respective meals and oils (soybeans, rapeseed, sun seed, and other oilseeds); two other crops (cotton and sugar); and four animal products (beef, pork, poultry, and eggs).

Each model contains commodity blocks with prices, policy variables, and supply and use variables, including production, imports, exports, consumption, and stocks. The quantities respond to prices, policy variables, and macroeconomic variables, or to other quantities. The modeling of different country-commodity blocks may vary in the level of detail, in the choice of residual variable, and so on. The number of commodity blocks varies by model, with less important country/commodity pairs aggregated into rest-of-regions models or rest-of-sector commodities, such as other oilseeds. The behavioral equations typically use a linearized growth-rate functional form.

The modeling system can introduce scenario shocks by incorporating reference-run and scenario versions of models. Alternatively, the system can introduce shocks into the reference-run versions of models. In the reference run, levels for a residual "region" are calculated to clear world markets. For most scenarios, the residual calculations are performed for all years, so the world will be in balance prior to the introduction of scenario shocks. The modeling software includes Excel for individual models, and Fortran, Visual Basic, and Access for the modeling system.

Appendix C: Armington-Cline Model Description

To analyze shifts in bilateral trade resulting from eliminating the antidumping duty on U.S. poultry, we used a spreadsheet-based, modified Armington-Cline model. This method expands upon the "Armington assumption" that demand for an internationally traded product is differentiated by country of origin (Armington, 1969).

The approach used here handles some limitations of Armington's method. The Armington approach describes demand share changes by source for one importer, in response to relative source price changes, through an elasticity of substitution. The approach used here models simultaneous changes in destination shares by multiple exporters, in response to relative destination price changes, as well as source share changes by multiple importers, in response to relative source price changes.

Since the Armington approach describes relative changes in source shares, in response to a change in relative source prices, a zero or small initial share leads to a zero or small change in that share. The bilateral-bilateral model provides a combined functional form that can allow a zero or small share to grow by a non-negligible amount, if the analyst determines that base trade was blocked by a prohibitive tariff. In that case, the analyst may cause the model to calculate a synthetic linear responsiveness for that bilateral trade level.

The model has additional features that are not used in this analysis: it can adjust the synthetic responsiveness to reflect bilateral transportation costs; it can include bilateral tariff rate quotas (TRQs), by a simple but exact method; and it can use estimates of tariff water, the extent to which base tariffs are more than sufficient to prevent trade.

Accurate elasticities of trade substitution are important, but difficult to estimate. In this analysis, we assume that there is no water in the tariff; i.e., that the 65 percent ad valorem base tariff on U.S. poultry is exactly enough to stop exports.

The source and destination choices are combinations of trade substitution and expansion. Trade expansion is based on linear equations (referred to here as "Cline equations"), which use elasticities to calculate relative changes in trade given relative changes in effective prices, including ad valorem tariffs (Cline, 1978). Use of relative price changes means that absolute price levels are not needed. If an unscaled import or export substitution level will increase, a linearized Armington calculation is used so substitution can grow significantly from small or zero initial trade levels. If an unscaled substitution level will decrease, a nonlinear Armington-based calculation is used; therefore, the solution is not vulnerable to a small unscaled-substitution sum.

Elasticities

For individual models, implied expansion elasticities were derived by shocking the country-commodity linked system of models. The import substitution elasticity for all countries was taken from Donelly et al. (2004). It is assumed that the substitution between export destinations is quite price-responsive, to the extent that further increases in the export substitution responsiveness would not change the results substantially.

Linear-nonlinear model equations

To save space, the import expansion, substitution, and total equations are not shown; they are like the corresponding export equations.

Tariffs here are expressed as fractions, to make the equations more compact.

J and K = exporter subscripts; K is used for summation.

L and M = importer subscripts; M is used for summation.

Base = reference run; initial levels. Scen = scenario. Elast = elasticity.

Prices

$ScenExportPrice_{LJ}$ adjusts until $ScenExports_{LJ} \approx ScenImports_{LJ}$.

Import prices are based on the corresponding export prices, adjusted by ad valorem tariffs.

$BaseImportPrice_{LJ} = BaseExportPrice_{LJ} * (1 + BaseTariff_{LJ})$.

$ScenImportPrice_{LJ} = ScenExportPrice_{LJ} * (1 + ScenTariff_{LJ})$.

Base trade levels used to calculate linear responsiveness

In order to allow a bilateral trade level to grow significantly even if the base bilateral trade level is very small or zero, a synthetic base trade level may be used for calculating expansion responsiveness and for calculating linear substitution responsiveness when trade will grow. The synthetic base trade level is less likely to be very small or zero than is the actual base trade level. The synthetic base trade level is the prospective exporter's base total exports times the prospective importer's share in base world imports.

If base bilateral trade levels allow trade to respond appropriately in a particular scenario, then those base trade levels should be used rather than synthetic levels.

$BaseTradeLinear_{LJ} =$

If $\{BaseTradeSwitch_{LJ} = 0,$

$BaseExports_{LJ},$

$\sum_M BaseExports_{MJ} * \sum_K BaseImports_{LK} / \sum_M \sum_K BaseImports_{MK}\}.$

Export and import expansion

The bilateral export expansion calculation includes the relative difference in the bilateral export price, the exporter's expansion elasticity, and base trade for linear calculations. The import and export expansion equations are analogous.

$$ExportExpansion_{LJ} =$$

$$(ScenExportPrice_{LJ} / BaseExportPrice_{LJ} - 1) * ExportExpansionElast_{J} * BaseTradeLinear_{LJ}.$$

Export and import substitution

If an unscaled export substitution level will rise, unscaled substitution depends on the base bilateral export level, the relative price difference, the export substitution elasticity, and base trade for linear calculations. If the unscaled export substitution level will decrease, unscaled substitution depends on the base bilateral export level, the scenario/base bilateral export price ratio, and the export substitution elasticity. The import and export equations are similar.

Use of the linear calculation with a synthetic base level can allow the level to grow significantly from a small or zero base export level. If the unscaled substitution level will decrease, use of a nonlinear Armington-derived calculation prevents the sum of unscaled substitution levels from approaching zero, which is relevant because the sum is used to scale export substitution.

$$UnscaledExportSubstitution_{LJ} =$$

$$\text{If } \{(ScenExportPrice_{LJ} - BaseExportPrice_{LJ}) * ExportSubstitutionElast_{J} >= 0,$$

$$BaseExports_{LJ} + (ScenExportPrice_{LJ} / BaseExportPrice_{LJ} - 1) * ExportSubstitutionElast_{J}$$

$$* BaseTradeLinear_{LJ},$$

$$BaseExports_{LJ} * (ScenExportPrice_{LJ} / BaseExportPrice_{LJ}) \wedge ExportSubstitutionElast_{J} \}.$$

Export substitution is calculated from the scenario-base difference in export shares, applied to the exporter's total base exports. Again, the forms of the import and export equations are parallel. If the denominator sum in a ratio equals zero, the ratio is replaced by zero.

$$ExportSubstitution_{LJ} = \Sigma_{M} BaseExports_{MJ} *$$

$$(UnscaledExportSubstitution_{LJ} / \Sigma_{M} UnscaledExportSubstitution_{MJ}$$

$$- BaseExports_{LJ} / \Sigma_{M} BaseExports_{MJ}).$$

Export and import totals

The import equation is similar to the export equation.

$ScenExports_{LJ} = BaseExports_{LJ} + ExportExpansion_{LJ} + ExportSubstitution_{LJ}$.

Derivation of simple substitution response from Armington demand equation

The substitution equations above are based on the substitution derivation below. The derivation and result are simple because we only need scenario versus base shares, not levels.

x = Armington bilateral demand. **X** = Armington demand index. b = demand coefficient.

p = bilateral price. **P** = Armington price index. σ = (-) elasticity of demand substitution.

j and k = exporter subscripts. s = scenario. 0 = base or reference run.

The first step is to define Armington scenario and base demand (Armington equation 9):

$$x_{js} = b_j^{\sigma} \mathbf{X}_s (p_{js} / \mathbf{P}_s)^{-\sigma}$$

$$x_{j0} = b_j^{\sigma} \mathbf{X}_0 (p_{j0} / \mathbf{P}_0)^{-\sigma}.$$

Solve the scenario and base demand equations for b_j^{σ}, and then solve for x_{js}. Move demand and price indices to the left:

$$b_j^{\sigma} = x_{js} / \mathbf{X}_s (\mathbf{P}_s / p_{js})^{-\sigma} = x_{j0} / \mathbf{X}_0 (\mathbf{P}_0 / p_{j0})^{-\sigma}.$$

$$x_{js} = x_{j0} \mathbf{X}_s / \mathbf{X}_0 (\mathbf{P}_0 / p_{j0})^{-\sigma} / (\mathbf{P}_s / p_{js})^{-\sigma}$$

$$= \mathbf{X}_s / \mathbf{X}_0 (\mathbf{P}_0 / \mathbf{P}_s)^{-\sigma} x_{j0} (p_{js} / p_{j0})^{-\sigma}.$$

Calculate share. Note that the demand and price indices have no country subscripts, so they can be moved outside the summation and then canceled:

$$x_{js} / \Sigma_k x_{ks}$$

$$= [\mathbf{X}_s / \mathbf{X}_0 (\mathbf{P}_0 / \mathbf{P}_s)^{-\sigma} x_{j0} (p_{js} / p_{j0})^{-\sigma}] / [\Sigma_k \mathbf{X}_s / \mathbf{X}_0 (\mathbf{P}_0 / \mathbf{P}_s)^{-\sigma} x_{k0} (p_{ks} / p_{k0})^{-\sigma}]$$

$$= [\mathbf{X}_s / \mathbf{X}_0 (\mathbf{P}_0 / \mathbf{P}_s)^{-\sigma} x_{j0} (p_{js} / p_{j0})^{-\sigma}] / [\mathbf{X}_s / \mathbf{X}_0 (\mathbf{P}_0 / \mathbf{P}_s)^{-\sigma} \Sigma_k x_{k0} (p_{ks} / p_{k0})^{-\sigma}]$$

$$= x_{j0} (p_{js} / p_{j0})^{-\sigma} / \Sigma_k x_{k0} (p_{ks} / p_{k0})^{-\sigma}.$$