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Modelling wheat and sugar markets in Eastern and Southern Africa

Regional Network of Agricultural Policy Research Institutes (ReNAPRI)

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Abstract:
The medium-term outlook for wheat and sugar markets in Kenya, Tanzania, South Africa and Zambia depicts a mixed picture with regard to production, consumption, prices and trade development. It takes the latest trends, policies and market information into consideration, but remains subject to many uncertainties on upcoming market development, macroeconomics or policy changes over the period 2015 to 2024.

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Acknowledgements

This publication presents the methodology and results of a medium-term outlook (2015-2024) for wheat and sugar markets in four Eastern and Southern African countries, namely Kenya, Tanzania, South Africa and Zambia. It has been supported by the European Commission, Joint Research Centre (JRC), Economics of Agriculture Unit (JRC.D4) which owns a long-standing experience in agri-food market outlook and uncertainty analysis.

The authorship and responsibility for the content rest with the Regional Network of Agricultural Policy Research Institutes (ReNAPRI). Outcomes for the wheat and sugar market outlook are extracted from ReNAPRI (2015) whose partners involved are:

- Tegemeo Institute of Agricultural Policy and Development, Egerton University, Kenya;
- Bureau for Food and Agricultural Policy (BFAP), University of Pretoria & University of Stellenbosch, South Africa;
- Dept. of Agricultural Economics and Agribusiness, Sokoine University of Agriculture (SUA), Tanzania;
- Indaba Agriculture Policy Research Institute (IAPRI), Zambia.

Along with:

- The Food and Agricultural Policy Research Institute at the University of Missouri (FAPRI-MU), United States.

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Abstract

The medium-term outlook for wheat and sugar markets in Kenya, Tanzania, South Africa and Zambia depicts a mixed picture with regard to production, consumption, prices and trade development. It takes the latest trends, policies and market information into consideration, but remains subject to many uncertainties on upcoming market development, macroeconomics or policy changes over the period 2015 to 2024.

In the past decade the wheat area in South Africa, Zambia, Tanzania and Kenya combined has fallen steadily, with the decrease in South Africa accounting for most of this fall, with the other three counties slighting increasing their area. South African yields grew as area fell with the share of wheat under irrigation also increasing. In other countries yields have remained flat. The largest expansion in production has taken place in Zambia that has resulted in Zambia moving from a net importer of wheat to exporting small surpluses to neighbouring countries. Although feed use of wheat is limited in the region, per capita human consumption of wheat has increased as incomes grow. The 2024 projections show that consumption growth outstrips production, resulting in an increase in import requirements. Zambia is the only country which will keep on producing a small surplus. The bulk of the imports is expected to originate from outside the region, mainly from Argentina, Europe and the Black Sea region.

Although the continent of Africa is a net importer of sugar, it includes countries that are mainly exporters, e.g. Zambia and South Africa. The export success has come about in part as a result of preferential access to the European market for Least Developed Countries in particular. However reforms in the EU sugar policy, which include reductions in the EU reference price and the elimination of EU production quotas by 2017 present a challenge to the sector in the future, with a likely re-orientation of trade to other African countries, and an increase in domestic demand. Furthermore, the area under sugarcane production (mainly in the dryland coastal areas) in South Africa has constantly been declining over the past decade due to the lack of profitability and exportable surpluses are projected to decline over time. The profitability of dryland coastal farmers has been declining due to a number or droughts and average yields that have not been increasing.

1 Introduction

While agriculture is a key sector in Africa, analysis of the potential future development of the African agricultural sector is limited, in contrast to other forward looking agricultural sector outlooks at the global level (OECD-FAO), for Europe (European Commission, including the JRC) or the US (USDA, FAPRI).[1] A promising initiative in this direction is the Regional Network of Agricultural Policy Research Institutes (ReNAPRI). With its long-standing experience in agri-food market outlook and uncertainty analysis, mainly for DG AGRI (M'barek et al, 2012), the JRC is supporting this model development. In 2015, the JRC has been co-funding the extension of the ReNAPRI partial equilibrium model to complement its baseline with wheat and sugar.

The objective of ReNAPRI is to build capacity for the scientific analysis of policy options for its member countries (Democratic Republic of Congo, Kenya, Malawi, Mozambique, South Africa, Tanzania, Uganda, Zambia, Zimbabwe). It is natural that the first set of commodities that were analysed was the most important in terms of providing food to the population. Thus the first generation of the ReNAPRI models focused on maize markets. Successful models of the agricultural and food sector require that other crops be considered as these compete for land, and therefore interact with maize markets in terms of producer decision making in many cases, provide an important part of diets, and also contribute income to the agricultural economy. The policy framework for non-staple crops is often different from maize or rice, and this must be considered by the analyst.

In 2015, wheat was added to the models for South Africa, Zambia, Tanzania and Kenya; and sugar was added to the South Africa and Zambia model. On the one hand, if maize remains the most important staple in Eastern and Southern Africa, rising wheat consumption levels over the past decade attest to its growing importance as a food staple in the region (Jayne et al, 2010). Rising income levels, combined with the convenience associated with wheat products has made it increasingly popular and since 2000, wheat consumption in the region has expanded by approximately 55%. Despite the rapid growth in consumption, production has remained largely stagnant, resulting in an expanding gap between domestic consumption and production, implying a growing dependence on imported products. Whereas imported wheat accounted for only 37% of regional consumption in 2000, the share of imported products in total consumption within the region has risen to almost 65% in 2014.

On the other hand, if Africa is a net importer of sugar, some countries (i.e. Zimbabwe, Swaziland, Malawi, Zambia and South Africa) are mainly exporters. Under the Everything But Arms (EBA) agreement, the Least Developed Countries (LDCs) within this group have been granted quotas providing preferential access to the higher sugar price within the European Union (EU), resulting in favourable prices in the region relative to the world reference price. However significant reforms to the EU sugar policy, which include reductions in the EU reference price and the elimination of EU production quotas by 2017 has presented an uncertain future for EU destined exports from within the region. Expected reduction in EU prices following the reforms will likely lead to a situation where exports are shifted away from the EU into the Eastern and Southern African (ESA) region, especially considering that these countries are landlocked and face high transportation costs.

The ReNAPRI model system forms part of an overall model capacity building partnership. The partners develop partial equilibrium models of the agriculture and food sectors. The models are dynamic, partial equilibrium, multi-product, non-spatial modelling systems. The models are based in part on the modelling approach developed by the Food and

[1] Note the chapter on African Green Revolution in European Commission's *Prospects for Agricultural Markets and Income in the EU 2013-2023* (EC, 2013) and the special focus on Sub-Saharan Africa in *OECD-FAO Agricultural Outlook 2016-2025* (OECD-FAO, 2016).

Agriculture Policy Research Institute at the University of Missouri (FAPRI-MU) which is focussed on providing the flexibility to include in models the relevant economic and policy drivers resulting in robust analysis that reflects the way that policies impact markets. Section 2 develops the wheat and sugar components of the ReNAPRI modelling system. The types of policies which are implemented in the focus countries are discussed in section 3. Then extracted from ReNAPRI (2015), the 2015-2024 wheat and sugar market outlooks are presented in section 4 and 5, respectively. Section 6 concludes and provides some guidance for further work.

2 The ReNAPRI System

The aim of the ReNAPRI modelling framework is to be a tool that provides input into strategic information to regional governments in particular to anticipate and project the effects of exogenous and endogenous drivers on production, consumption and trade. The models are multi-product, partial equilibrium dynamic models that can be simulated over a ten-year horizon. In order to meet the requirements of the ReNAPRI vision the models need to include the most important economics, biology and policy that influence the markets concerned. The development of the system therefore requires not only data and knowledge in economics, but also an understanding of the production processes themselves and how policy actually works. In practice this means that within an overall consistent structure there must be flexibility in the implementation of the models. This results in differences emerging between the models across commodities and countries and these are detailed below.

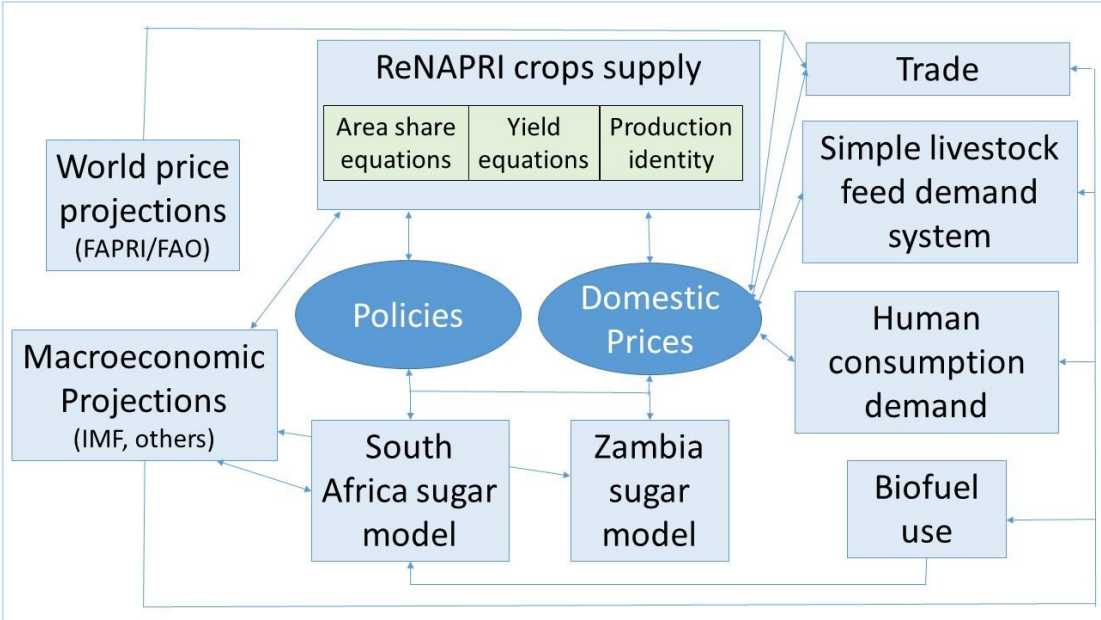

Figure 1: Overview of the model system

The general structure of the model system that is used in this report is presented in Figure 1. World prices and macroeconomic projections are currently taken as exogenous to the models and are taken from various sources. World prices are taken from a combination of the outlooks of FAPRI-MU and FAO-OECD. Macroeconomic data comes from a variety of national and international sources. Policies are determined by the country level modellers in conjunction with experts from their countries. Given the nature of the sugar sector in South Africa and Zambia it is currently modelled separately from the grain area determination.

2.1 Modelling wheat

Models are a system of single equations that are estimated where data is available, but otherwise synthetic equations are used with parameter estimates from other studies and analyst judgement. Prices generally enter the model through price linkage equations between world prices and domestic prices that take into account policy and transport costs where appropriate and available. Prices, as well as a measure on input costs are used to determine the returns to crop production, which determine area. For example, where wheat and maize only are modelled the total area of the two crops would first be determined by weighted crop returns. Then, in a second step the relative returns of the two crops would be used to determine the share of each crop in area. Although the exact

specification of the model will vary between countries a stylized flow chart of the wheat model component is shown in Figure 2.

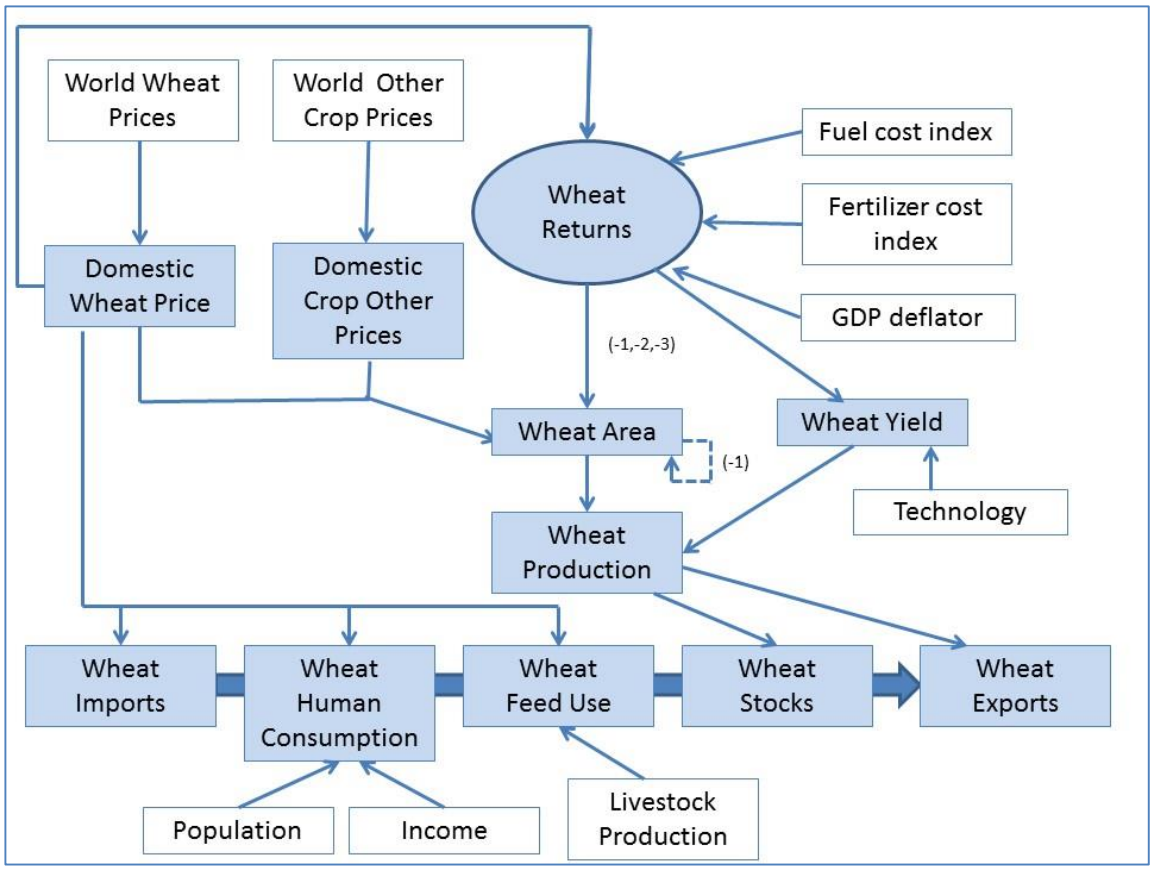

Figure 2: Flow chart of the wheat component

A key part of the model is the determination of the prices in the local markets. The simplest way to determine prices is through simple price linkage equations. For many large scale models this is the preferred method, as the structure and data requirements are simple. Typically world markets are linked with local markets though a single transmission equation that includes exchange rates, tariffs and transport costs. With large models this simplicity is required, but it cannot capture the more complex reality of price relationships (Meyer et al, 2006). One area of focus for the ReNAPRI modelling system has been to include these price relationships more fully. Meyer (*op. cit*) presents a method for the explicit representation of a regime switching specification in the case of maize.

Specifically, the transmission of world prices throughout the region will depend on tariff barriers and trade costs but will also depend on geography and established trade routes, thus world grain prices will be transmitted more quickly to the relatively open South African ports, but more slowly to the interior African countries. One of the biggest challenges to adding wheat to the model is getting the data that is needed to capture at least some of the complexities.

Here we consider the case of wheat in Zambia. The wheat import parity price is given by taking the US gulf price[2] and adjusting it by freight and insurance to determine the Beira

[2] US gulf price for hard red winter as that is the price that is available from the global models. In reality the source of imports can come from other regions, such as the Black Sea, and a more complicated global representation would be an improvement but this has not been available.

(a port in Mozambique) CIF price. This price is then adjusted for tariffs and the costs of delivery to Lusaka to get the import parity price. In the model two export parity prices are calculated; one for cross border trade (for example DRC) and one for export through Beira (high sea).The cross border price is the SAFEX price adjusted for transport of grain from Randfontein (South Africa) to Harare (Zimbabwe) taking into account the costs of transport from Lusaka. The high sea export parity takes into account the fob Beira price and the costs of delivery there from Lusaka. Given the large cost of transportation, the spread between import and export parity prices is significant and historically when prices have fallen to export parity levels, area has reduced. For these projections, the Zambian market is finely balanced and while it remains in a net exporting position, volumes are small at less than 10% of domestic production. Thus prices are determined through a market clearing mechanism that equilibrates total supply and total demand.

South Africa is a large importer of wheat and the basic model structure of the Bureau for Food and Agricultural Policy's (BFAP) wheat sector model was adopted for the development of this wheat model. The import parity price that is used is calculated from the international wheat price landed at Durban and adjusted for transport to Randfontein. A simple price linkage links the import parity price to the domestic price. Thus provided that the world price is above the reference price that would trigger the variable import tariff, a change in the world price can be traced through the model. An increase in the world wheat price increases the South African import parity price, increasing the domestic price. It will also increase the export parity price (cross border) for Zambia, and therefore the domestic price there.

However, the transmission elasticities are not one, and the trade barriers and transportation/other costs mean that the increase in the Zambian price in percentage terms will be less than that of the South African price which is itself less than the increase in the world price. In instances where the world price is already below the reference price, the variable tariff mechanism negates the impact of world price changes on import parity prices.

For wheat there is a special representation of prices centred on Beira/Randfontein/Harare and accounting for internal African transportation costs. Through constructing the model this way it is also possible to analyse changes in the other parts of price determination, such as transportation costs, and their impact on price transmission, trade and regional production.

2.1.1 Supply specification for wheat

An overview of the specification of the crop modelling system is shown in Figure 1 and Figure 2. The exact specification of the crop model depends on the country concerned as commodity coverage varies.

The first step is to generate total area. This is a function of lagged area and weighted returns that are lagged over three years. The model therefore assumes naïve expectations regarding prices, although when calibrating the model the analyst will typically set an adjustment factor for the first year of the projection period which will itself incorporate a *de facto* assumption of price expectation behaviour based on the most recent crop market behaviour. The elasticity of total area relative to crop returns varies across countries between 0.2 and 0.4. In Zambia an additional shift variable is included to reflect the subsidised input-output regime that adds 300 thousand hectares to total area that is allocated among the crops by the share equations.[3] Zambia and Tanzania both include trend terms to capture additional crop areas being brought into production over time.

[3] For regions such as the US and the EU, elasticities on crop area are generally low and policy interventions tend to have no large impact on crop areas. The impact of policy, or changing prices, is likely larger in the ReNAPRI countries given that there is land that can be brought into production, and policies tend to be more tied to production (e.g. input subsidies).

The share of wheat as a proportion of crop area is determined by the lagged share and wheat returns (based on price and yields) and weighted crop returns. The elasticity of wheat share with respect to relative returns is about 0.4 in the short term and 0.45 in the longer run.

Yields equations include total area planted and returns. Total planted area is included as expansion of crop area may include less productive land, although very small elasticities of around -0.01 are assumed in the model. Impacts of returns are also small, with elasticities of between 0.02 and 0.06 depending on the countries. A trend term based on historical growth and expert input explains most of yield development. Yield is a variable that can be impacted by policy, especially input subsidies, although this is not incorporated explicitly in the current model specification.

Production of wheat is simply an identity given area and yields. Where prices are determined by a price transmission equation, as is the case with wheat, trade is usually the balancing term that closes the model. For example in the South African model where exports are small a simple relative price term is used to explain exports and wheat imports are the residual that balances the market after all the other sources of supply and demand are determined. Within the wheat sector, Zambia is the exception solving for market clearing price. In this instance, trade is modelled as a function of relative domestic and parity prices.

2.1.2 Demand specification for wheat

The ReNAPRI system includes a feed demand component. A simple livestock model projects beef, pork, poultry and milk production where appropriate. Volumes of meat are converted into feed requirement that is used to generate demand for cereals for feed. The data availability for both meat production and feed consumption is not extensive, but for the case of wheat this is not problematic given the small proportion of wheat that is consumed by animals. Nonetheless wheat feed consumption is estimated and projected in the outlook.

More important is the human consumption of wheat. Per capita wheat use is determined using the deflated wheat price and income per head. All of the countries that are part of this study have rapidly growing populations that increases consumption over time. Income elasticities for wheat are assumed to be low, at around 0.1 with own price elasticities of close to -0.1. Substitutes are not explicitly included in the model as it is currently structured.

Wheat per capita consumption is the largest in South Africa, but projections have it remaining stable as do projections for Zambia and Tanzania. Kenya has seen a rapid expansion in per capita wheat consumption over the last 15 years as incomes have grown. Kenyan per capita consumption is projected to continue on this upward trend in the projection period so that it approaches that of South Africa by 2025.

Wheat stocks are projected on the basis of lagged stocks, wheat production, and prices. Since yields are projected to increase, this drives production and increases overall stock levels in the projection period.

2.2 Modelling sugar

Sugar area is not part of the total crop area that is estimated to determine cereal production, but it follows a similar pattern. A stylized flow chart of the sugar model component is shown in Figure 3. The first step is the determination of the sugar returns at the farm level. This involves determining the import parity and export parity price, deciding which of these is relevant, and then transmitting it back to the farm level along with an estimation of costs. No. 11 and No. 5 prices that are derived from the projections of FAPRI and/or FAO-OECD are linked to Durban (port) prices.

For Zambia the Durban price is adjusted for Durban to Lusaka transportation costs. Both South Africa and Zambia are projected to be net exporters of sugar, hence Zambian prices are expected to trade in line with export parity prices to the EU, corresponding to price transmission equations. In South Africa, the sugar market is the only agricultural market that still operates under a single channel marketing system with a surplus removal scheme that allows for the local prices to trade above the world market price and imports subject to an import duty if the world price for sugar declines below a reference price of $566/ton. A notional price is set annually at a 'consensus' level – taking into consideration inflation, world price levels, as well as the domestic surplus / deficit in production. The Recoverable Value (RV price) is derived from the notional price, based on the sucrose value of different sugar products. If there is a surplus, the surplus sugar is exported and the revenue is shared amongst industry role players.For South Africa the combination of static area and increasing consumption means that exports are lower in the projected period that in recent history, which increases the chance of prices moving to import parity at some point. The single channel marketing system which is based on an inflationary adjustment further accentuates this possibility.

The sugar area equation included the returns to sugar production on the basis of the domestic price and an estimate of input costs. For South Africa the long run elasticity of area with respect to returns is around 0.2. Yield is based mostly on a trend that is derived from historical increases in productivity. For South Africa sugar for biofuels use is determined based on energy markets and policy.

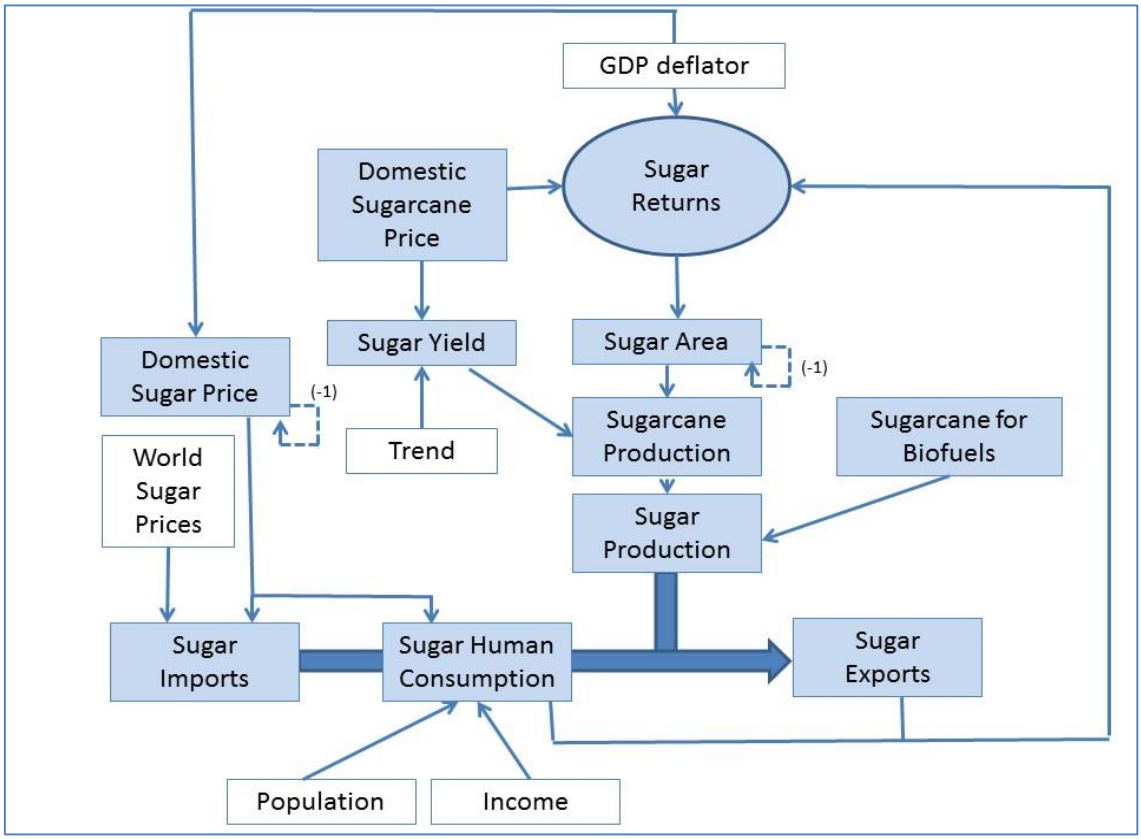

Figure 3: Flow chart of the sugar component

Sugar consumption per capita is based on deflated sugar prices and income. Both Zambia and South Africa per capita consumption equations have a negative trend term in them. The own price elasticity is -0.03 and -0.01 for South Africa and Zambia respectively. The income elasticity for South Africa is 0.3 and 0.1 for Zambia. Increases in population are likely to result in a large increase in demand for sugar in the countries concerned.

In the models for both countries imports are small and are estimated using relative domestic and world prices. When the price linkage equation is operating exports are the residual that balances.

3 Policy overview

The policy challenges for this work are typically different from the previous work carried out by ReNAPRI on maize. Maize is a staple product and typically produced domestically – with white maize in particular sourced within the region. Wheat is typically imported to the region and therefore the focus of the policy is usually at the border. However, although official tariff rates are available, for some countries the system of tariffs is not transparent and there may be other *ad hoc* interventions under certain market circumstances. Sugar is processed by a small number of companies, with contractual arrangements rather than policy as drivers of the sector. The interaction with EU markets is one important challenge, especially given the impending removal of quotas there.

3.1 Kenya

In Kenya wheat is the second most important staple after maize, however Kenya exhibits a structural deficit of approximately 70% of total demand which is covered through imports. Import duties within the East African Community (EAC) and Common Market for Eastern and Southern Africa (COMESA) region amount to 10%, whereas a duty of 35% is applied to imports from the rest of the world. Wheat products are imported duty free if they conform to the rules of origin of both EAC and COMESA.

In Kenya wheat production is highly mechanized and input intensive, making it uncompetitive for small scale farmers. Consequently the government requested a moratorium from COMESA on the 35% ad valorem import duty on wheat grain from 2002-2005, in order to allow time to address challenges in the wheat sector to make it more competitive. At the end of the Moratorium, an extension was requested, which was subsequently granted until June 2010. At the expiry of the moratorium import duties reverted to 35%[4]. Even with the duty, imported wheat is priced more competitively than domestically produced wheat. Government supports farmers by requiring importers (millers) to import only after exhausting domestic supply. Wheat farmers are, however, lobbying for an increase of the duty to make their wheat locally competitive. On the other hand, millers have been pushing for the wheat to be zero rated to lower cost of wheat flour to the consumers. According to millers, wheat grain accounts for between 55-65% of the cost of milled flour.

Fertilizer use in Kenya amounts to approximately 530 thousand tons annually and although government started providing subsidized fertilizer in 2008, the subsidized fertilizer only accounts for around 10 – 14 percent of the total fertilizer requirement. The implementation of the fertiliser subsidy program is faced with accessibility challenges that result in well to do farmers accessing the fertilizer. A possible reason relates to the distribution, which is handled by the National Cereals and Produce Board (NCPB), whose depots are situated in major towns far from the resource poor farmers.

The aforementioned policies on fertilizer subsidies and maize producer price support are counterproductive given that they benefit a few farmers and their objective of lowering maize grain and flour prices is yet to be achieved. Experts recommend that the government should not interfere with the grain market. Instead, market forces should be left to determine prices and the government can purchase grain for strategic reserves at the existing market prices.

3.2 Tanzania

Agricultural support strategies are aimed at supporting agriculture from four angles namely; input supply, agro-financing, agro-mechanization and marketing. Support policies have been provided to the production of maize, rice, cotton, cashew nuts, coffee

[4] The tariff is 35% but government rebates importers 25%. This is to bring the effective tariff back to 10% in line with regional trade.

and tea. Since 1 July 2014 a new system has been introduced that is agricultural loan-based, targeting registered farmer groups whereby the government undertakes to subsidize farmers through loan guarantees, allowing them to pay a fixed interest rate of 4% per annum, starting in the 2014/15 production season. This new system entails a quadripartite arrangement between the farmer groups, designated financial institutions, appointed input suppliers and reputable crop buyers.

Agro-mechanization efforts have targeted the provision of farm implements, including tractors, power-tillers, ox-ploughs and processing machinery to farmer groups through district councils and/or big private buyers who import in large quantities. Marketing support has been concentrated on Warehouse Receipt Systems (WRS) and market infrastructure, in which temporary seasonal bulking markets are established in rural and urban areas. Most of the bulking markets only consist of sheds, with limited quality storage facilities. Further the National Food Reserve Agency (NFRA) also buys maize. Quantities purchased are subject to budget limitations and current storage capacity remains a restriction at only 200,000 tons. Export bans have been used for maize in the past but their use is now not favoured.

As part of the EAC, wheat traded within the region is charged a duty of 10%. Currently, wheat originating from outside the region is charged a duty of 35%. As is also the case in Kenya it is possible that a proportion of the tariff is rebated in order to align with regional tariffs, but there is no official policy or clear indication on how much this might be.

3.3 South Africa

South Africa currently trades in an open market environment that is characterised by a relatively high transmission of world prices to domestic markets, a situation that is expected to continue over the outlook. With the deregulation of agricultural markets in the mid-nineties, many non-tariff trade barriers and some direct trade subsidies to agriculture were replaced by tariff barriers. In the case of maize, wheat and sugar, variable import tariffs were introduced. The reference price that activates the maize tariff was set at US$ 110 and has not increased since. The tariff is only applied when the world price falls below the reference price and by implication, the maize tariff has been irrelevant in recent years.

The variable import tariff for wheat was replaced by a 2% ad valorem tariff in 2006. However, in December 2008 the original variable import tariff system was re-introduced, and the reference price that triggers the variable import tariff on wheat was adjusted upwards from $157/ton to $215/ton. In 2013, an application from the industry to review the wheat reference price was successful, resulting in an upward adjustment to US$ 294. Following this increase, the wheat tariff has played a much more significant role and is currently active. Given the projected world price associated with the baseline assumptions, the wheat tariff is projected to remain active over the next decade. However a prolonged period of activation could result in requests from the milling industry to review the level of the reference price.

The variable sugar tariff, applied by the Southern African Customs Union (SACU) was introduced in 2000, with the reference price set at US$ 330 / ton, implying that the tariff would be triggered if the 20 day moving average settlement price for #5 white sugar traded on the London International Financial Futures and Options Exchange drops below $330. Following a request from industry, the US dollar based reference price was subsequently increased to $358 in 2009 and in 2014, it was raised once more to $566. The South African sugar industry further gained access to the lucrative EU market towards the end of 2014, being granted duty free access for a quota of 150 thousand tons of sugar. At the same time, its borders remain open to countries within the Southern African Development Community (SADC), which have been granted duty free access for 40 thousand tons of sugar exported into the SACU market.

Sugar is the only market in South Africa with significant regulation operating under a single channel marketing scheme. A notional price is set annually at a 'consensus' level – taking into consideration inflation, world price levels, as well as the domestic surplus / deficit in production. The Recoverable Value (RV price) is derived from the notional price, based on the sucrose value of different sugar products. If there is a surplus, the surplus sugar is exported and the revenue is shared amongst industry role players.

3.4 Zambia

Most support policies in Zambia are oriented towards the maize sector. Contrary to maize, there has been limited interference from the government in the wheat sector. Zambia has maintained tight regulation of the wheat import/export sector through the Controlled Goods Act. The aim has been to 'protect' the emerging wheat industry which has resulted in Zambia becoming self-sufficient in wheat production. In 2008, after intense lobbying by some of the big players in the industry, wheat imports were allowed into the country. This decision later resulted in strong opposition from some sections of the agricultural industry. The decision to allow imports had relatively little input from the technical level of the decision making process within the Ministry.

In addition to the regulations above, the Patriotic Front (PF) administration "zero-rated" wheat flour for value added tax (VAT), a move which is meant to boost domestic production of wheat and wheat products. The government zero-rated wheat and bread for VAT purposes effective January 1, 2013 as a way of reducing the prices of bread and other wheat products and reduce the cost of living for households. This move was also meant to stimulate domestic production of wheat and wheat products. This means that wheat flour was not levied VAT in an attempt to reduce the price of wheat products including bread.

Recently the government has become involved in the wheat sector primarily because of fears of escalating consumer prices of bread, whenever national supply of wheat is inadequate. A case in point is in the 2014/15 agricultural season when there was lack of clarity on whether Zambia was in a deficit or surplus position due to conflicting statistics from the government and the Zambia National Farmers Union (ZNFU)[5]. Millers wanted to import wheat amounting to the deficit announced by the government, while farmers maintained that there was surplus wheat based on the ZNFU statistics. Eventually, the government had to allow importation of 75 thousand tons of wheat for fear of escalation of bread prices. As at end of July, ZRA data revealed that about 60 thousand tons of wheat had been imported into the country (ZNFU, 2015a).

[5] The Zambian government released the Crop Forecast Survey (CFS) in May 2014 showing that Zambia was expected to have a wheat deficit of 19,936. ZNFU carried another survey using satellite imagery and it estimates national wheat output to be 294, 283 tons in the 2013/14 production season. This meant that Zambia had a surplus of 72,843 tons. Export or import decisions were put on hold until the actual figures are verified.

4 Wheat market outlook

This section presents the 2015-2024 baseline on wheat production, consumption, prices and trade for Kenya, Tanzania, South Africa and Zambia. For the purpose of the ReNAPRI outlook, specific world price projections were generated for maize, wheat, sugar and rice as part of the FAPRI 2015 August Update, using market information available at that time. These can be interpreted as the average level of prices that would prevail given the assumption that currently agreed policies are in place, and the macroeconomic projections that underpin them. In reality we would expect that the volatility in prices that has been experienced in recent years will continue. The outlook for global prices is reported in US dollars, and with the US dollar strengthening against many currencies due in part to the relative strength of the US economy, prices expressed in domestic currencies may move differently in important ways.

The cereal prices that are used in the ReNAPRI outlook from the FAPRI model are presented in Figure 4. Prices are projected to recover somewhat from their current levels but remain on average below the recent peaks. Based on the assumption that oil prices are projected to remain low in the short term before increasing steadily over the outlook, the growth in use of grain for biofuels is expected to slow, with increased demand for feed driving the market. Higher levels of oil prices than are assumed here could rejuvenate demand for biofuels.

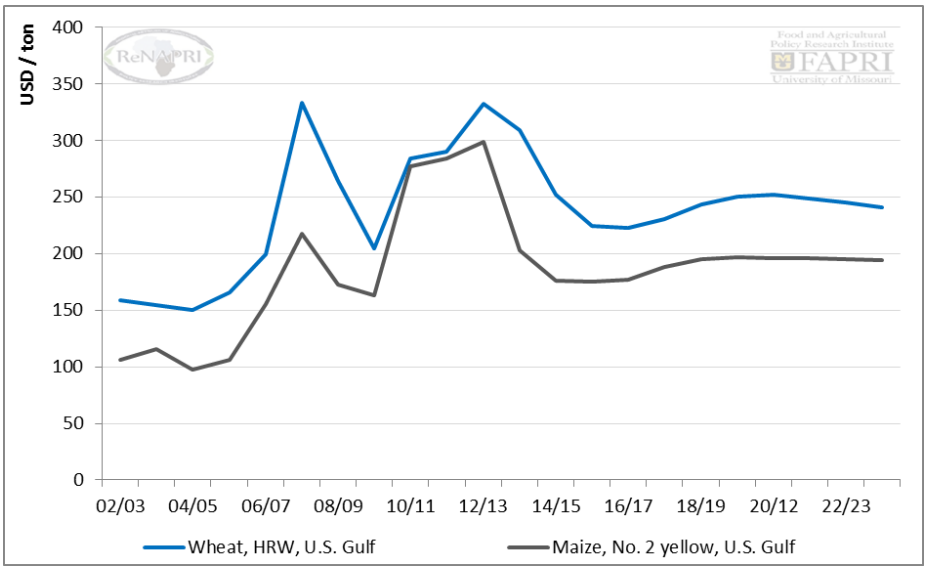

Figure 4: Outlook for global cereal prices

Maize remains the most important staple in Eastern and Southern Africa, however rising wheat consumption levels over the past decade attest to its growing importance as a food staple in the region. Rising income levels, combined with the convenience associated with wheat products has made it increasingly popular and since 2000, wheat consumption in the region has expanded by approximately 55%. Despite the rapid growth in consumption, production has remained largely stagnant, resulting in an expanding gap between domestic consumption and production, implying a growing dependence on imported products. Whereas imported wheat accounted for only 37% of regional consumption in 2000, the share of imported products in total consumption within the region has risen to almost 65% in 2014.

Over the course of the past decade, the total area planted to wheat in Eastern and Southern Africa has declined significantly, mainly as a result of substantial reductions in South Africa. Whereas more than 80% of the wheat area in the region was attributed to South Africa in 2000, it accounted for only 62% of the area planted to wheat in 2014.

In South Africa in particular, the reduction in area has been accompanied by a commensurate increase in yield levels and despite the area reductions, production levels have remained relatively constant, fluctuating around 2.6 million tons over most of the past decade. Given the historic dependence on imported wheat to meet domestic demand, combined with limited government intervention in wheat markets, domestic prices within the Eastern and Southern African region have reflected a relatively high level of transmission from world prices.

In South Africa, the application of a variable import tariff that effectively supports the price of imported wheat at $294 results in domestic prices remaining relatively constant over the next decade in US dollar terms, due to the fact that the projected world price remains well below $294 over the entire period and hence the sharp decline evident in world prices from 2015 onwards is not reflected in the South African price.

By contrast, imported wheat represents the bulk of consumption in both Kenya and Tanzania and consequently, particularly in the coastal regions, wheat prices are expected to decline in US dollar terms in 2015, continuing on a similar trend to world prices over the next 10 years. Having expanded production significantly since 2008, Zambia has become self-sufficient in wheat production, with limited volumes being exported to Zimbabwe in recent years. Export volumes remain constrained by the high cost of transport in the region however and while the domestic prices in Zambia are now largely determined by the domestic supply and demand situation, some correlation with the South African price remains evident as both countries supply wheat into Zimbabwe (Figure 5).

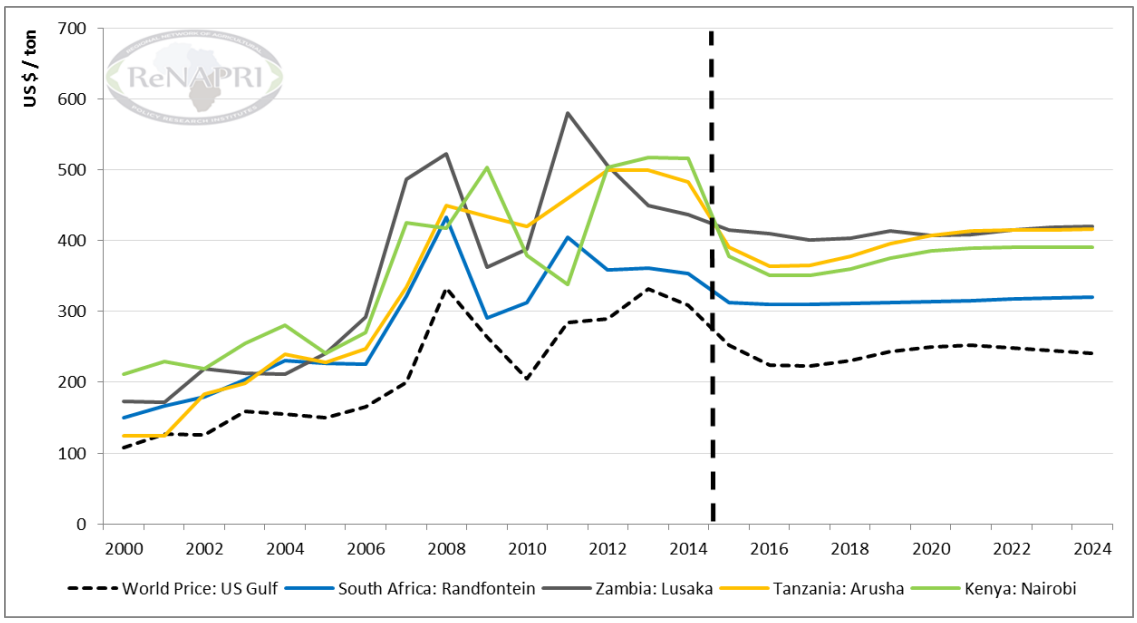

Figure 5: Wheat price outlook

Over the medium term, wheat area in the region is projected to consolidate, with only a very marginal decline projected to 2024, however the cost of production across the region remains high and under the assumptions of the baseline projection, price levels remain below recent peaks and are therefore not conducive to further area expansion (Figure 5 and Figure 6). Furthermore, yield improvements in the region have been erratic in the past; South African yield growth was supported by large reductions in area, which increased the share of irrigated wheat in total wheat area and Zambian yields have reflected an improving trend since 2006, however in Kenya and Tanzania, yields have remained fairly stagnant.

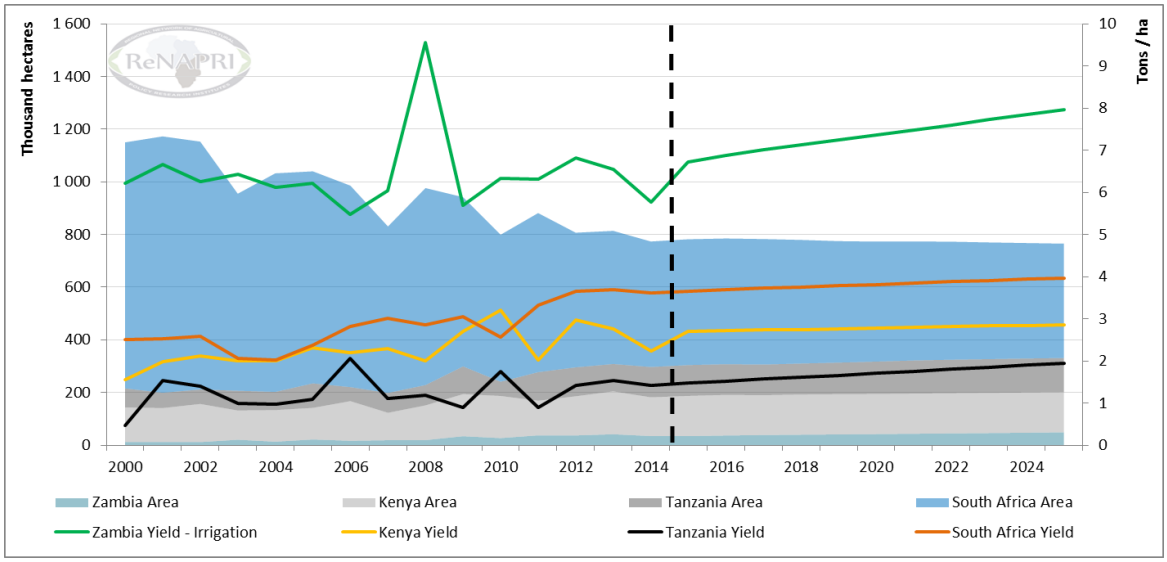

Figure 6: Wheat area harvested and yield by country

Over the baseline projection, yield growth in South Africa is projected to slow given the consolidation in area and while improvements are still projected in Zambia where wheat is typically irrigated, Zambia represents a very small share of total wheat area in the region and consequently, at an aggregate level, further yield improvements are limited (Figure 6). The marginal yield improvements are expected to be sufficient to offset further area declines, however at an aggregate level, production in the region remains fairly stagnant to 2024.

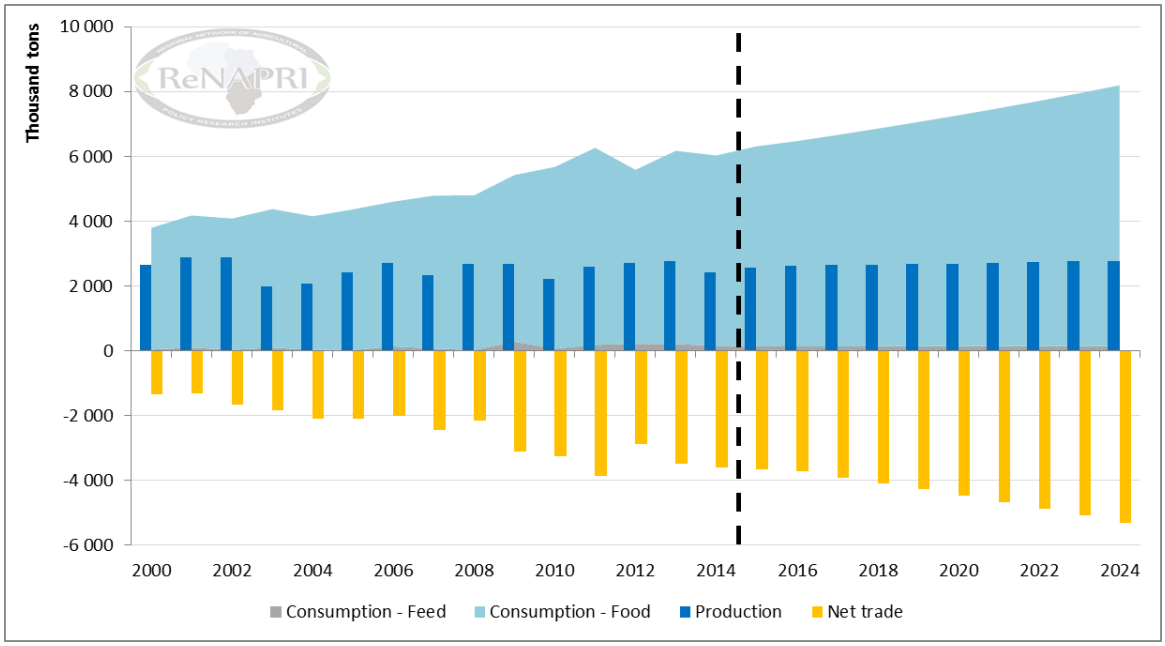

Figure 7: Regional wheat supply and demand

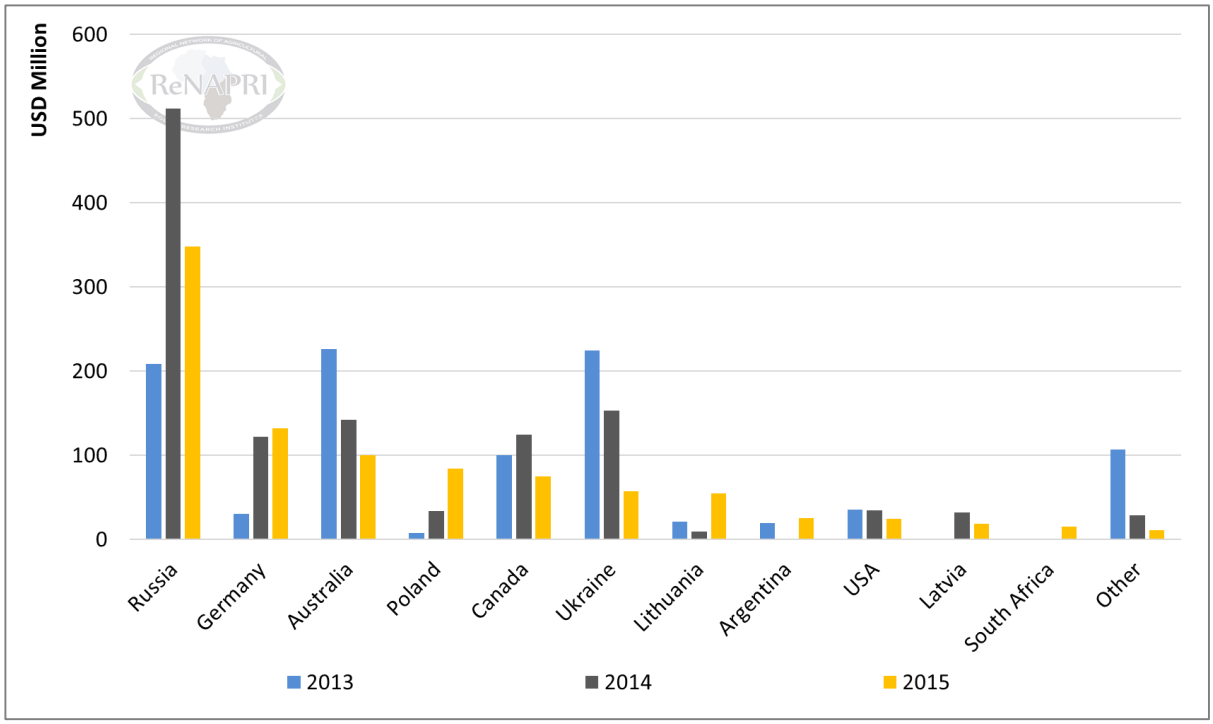

Figure 8: Wheat suppliers into the region (imports)
Source: ITC Trademap, 2016

Underpinned by growing income levels which enable the inclusion of wheat products in increasingly diversified diets, per capita wheat consumption in the region is projected to continue trending upwards. Within the context of an expanding population, the growth in per capita consumption results in combined wheat consumption within the four countries included in the analysis exceeding 8 million tons by 2024. Despite this growth in consumption, production remains fairly stagnant and hence the deficit continues to increase for the group South Africa, Zambia, Kenya and Tanzania (Figure 7). Zambia is the only country in the region producing a small surplus and therefore the bulk of the import requirement will continue to originate from outside of the region. Argentina, Europe and the Black Sea region have supplied the region in the past and will likely continue to be key suppliers to the region (Figure 8). Wheat use in the animal feed market remains very limited in the region, with maize representing a more cost efficient energy source in typical feed rations.

4.1 Kenya wheat

Kenyan wheat production is rain fed and dominated by medium and large scale farmers, who account for approximately 75% of area planted and also production. Over the past decade, production has been characterized by significant volatility, although a generally upward trend has been evident in the area planted to wheat. Production peaked in 2010 at 511 thousand tons, yet yields have been weaker since and in 2014, production declined by 27% relative to 2013, as a result of both area reductions and poor yields. In addition to climatic variation, the main challenges faced by wheat farmers, particularly small scale farmers, include high cost of production, use of recycled seed (55% of small scale farmers) and competition from other high value crops. Nonetheless, the Ministry of Agriculture (MOA) is expecting a bumper crop of more than 400 thousand tons in 2015 due to increased area in production, as well as good yields associated with favourable weather conditions.

Historically, Kenya has produced less than 30% of its domestic wheat requirement and due to its reliance on imports to fill the deficit, prices tend to be closely correlated to world prices. Over the outlook period nominal wheat prices are expected to follow world prices lower in 2015 and 2016 before trending upwards for the remainder of the

projection period, while the real price of wheat declines to 2016, before remaining fairly stagnant to 2024 (Figure 9). Given the decline in real prices, there is little incentive for expansion area under production remains fairly stagnant towards 2024.

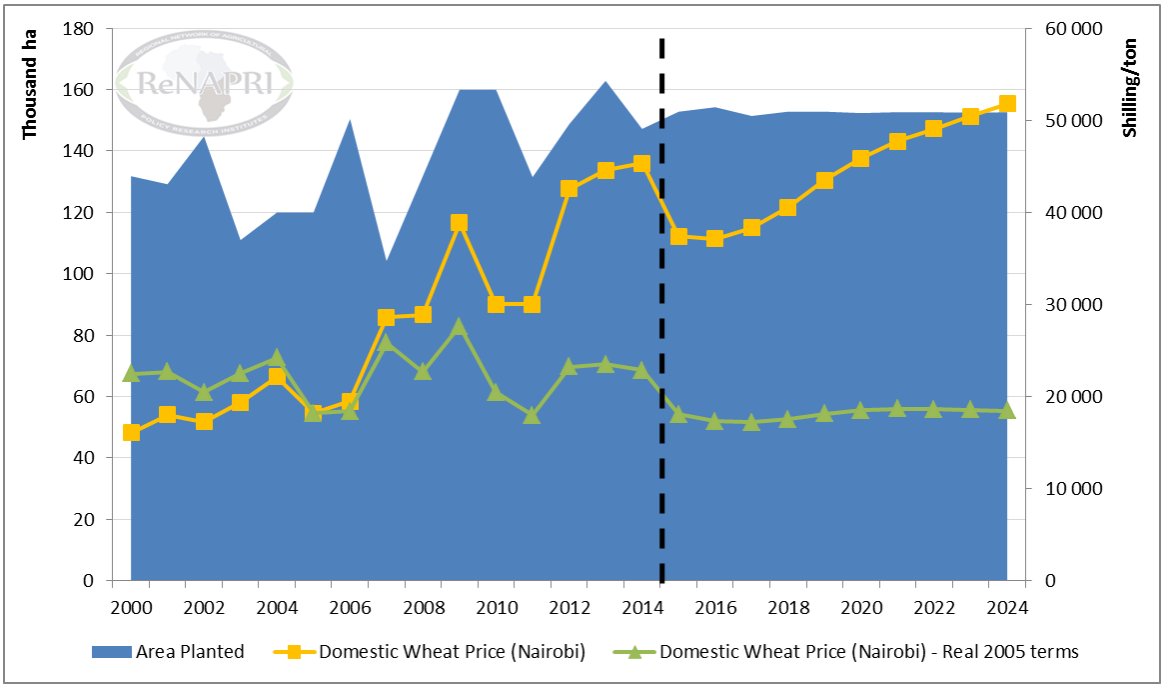

Figure 9: Kenya wheat area harvested and price

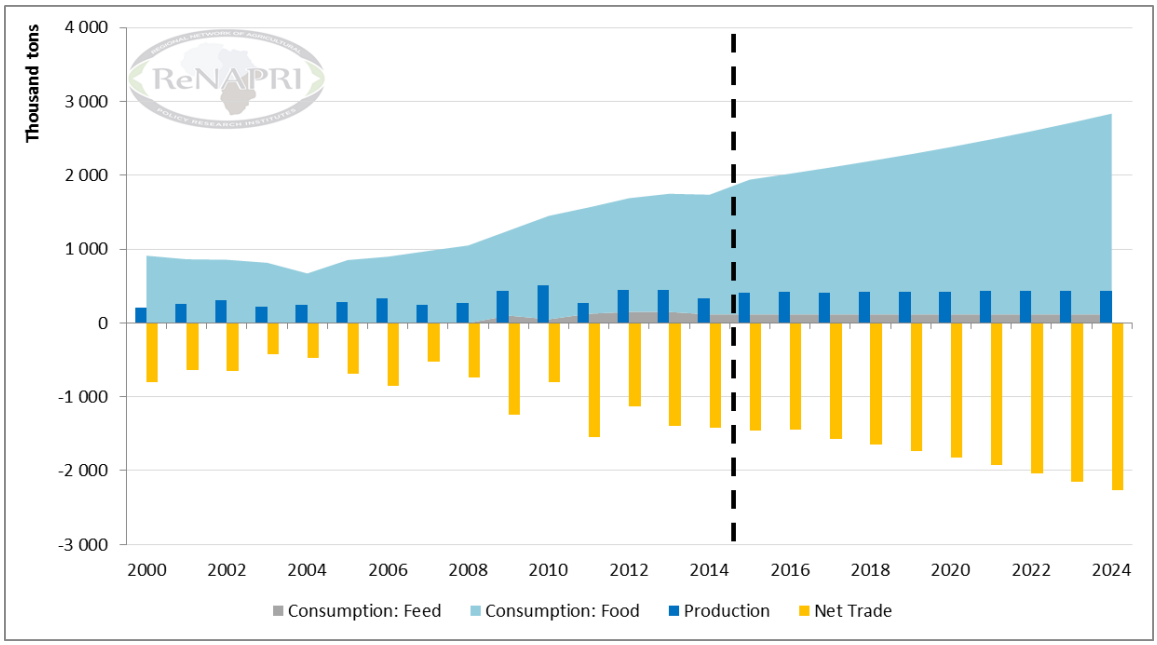

Figure 10: Kenya wheat production, consumption and trade

Supported by rising income levels and expanding population, wheat consumption is expected to grow by around 55% over the next ten years, reaching 2.7 million tons by 2024 (Figure 10). On a per capita basis, this relates to consumption growth of 21% by 2024, with the remainder of the expansion being attributed to population expansion. As income levels rise and urbanisation continues, households may substitute some maize consumption with more convenient wheat products as part of an increasingly diversified

diet. In order to meet the deficit in production during the next decade, a substantial increase in imports will be required, thus exacerbating the negative net trade position, which is set to reach 2.3 million tons by 2024 from 1.4 million tons in 2014 (Figure 10).

4.2 Tanzania

Area cultivated to wheat in Tanzania exhibits an erratic, yet firmly upward trend over the past decade, some of which can be explained by domestic price movements. Historically, Tanzania has produced less than 20% of its domestic wheat requirement and consequently, prices tend to be highly correlated to global markets. While sharp increases in price levels are often associated with international movements, such as the price spike in 2008 which resulted from supply shortages recorded from the Black sea region (devastation of wheat in Russia, Kazakhstan and Ukraine), these increases often induce domestic area expansions which are not maintained when prices decline. Following the sharp increase in domestic prices, both in real and nominal terms, in 2004 and 2008, wheat area expanded rapidly in the subsequent seasons, before declining once more when prices softened.

Over the course of the baseline projection, nominal wheat prices are projected to trend upwards, supported by continued depreciation of the Tanzanian Shilling, which increases the cost of imported wheat. Accounting for general inflation however results in fairly stagnant real prices post 2016 and consequently, the rapid increase in wheat area historically (68% from 2004 to 2014) is projected to slow. Further expansion is also constrained by limitations in agro-ecologically suitable areas for wheat cultivation and by 2024, the area planted to wheat is projected to reach 128 thousand hectares, an expansion of 12% from 2014 levels (Figure 11).

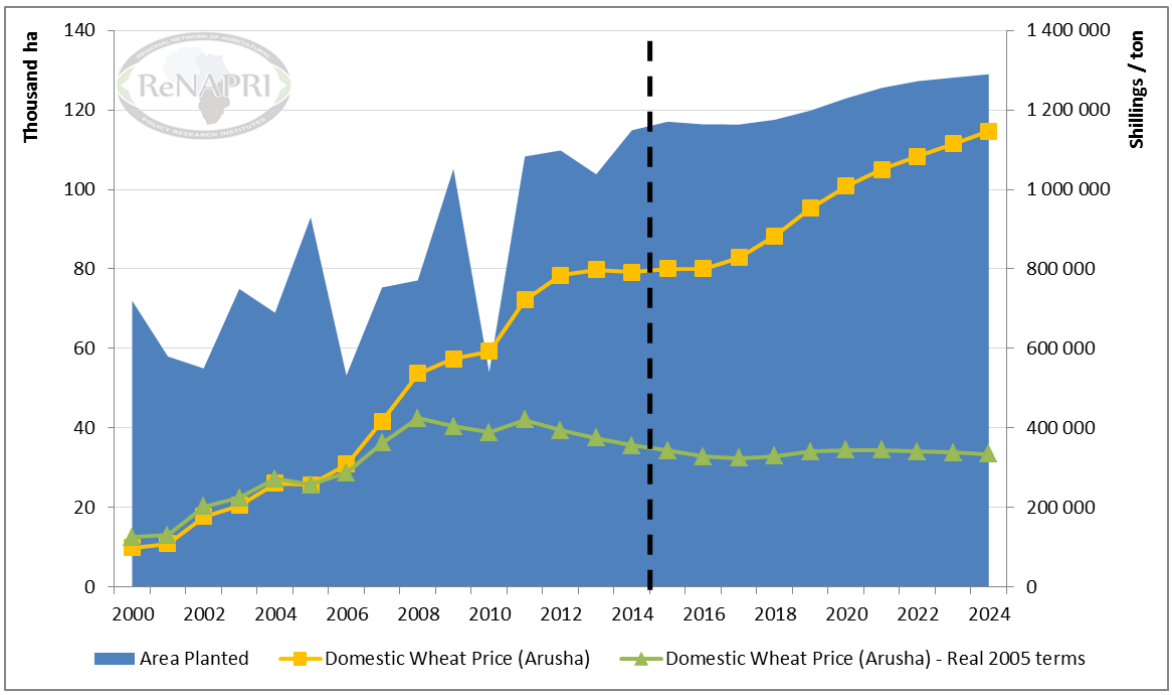

Figure 11: Tanzania wheat area and price

Wheat consumption in Tanzania more than doubled over the past decade, exceeding 800 thousand tons in 2014. Domestic production accounted for only 20% of the wheat consumed in 2014 and Tanzania continues to depend on imports to meet domestic demand. Since 2000, imports have increased from approximately 400 thousand tons to roughly 700 thousand tons in 2014, however prior to the strong expansion in production in 2012, imports had reached levels of more than 1 million tons. The sharp price increase in 2011 however induced a supply response, as well as a contraction in consumption volumes. By 2024, imports are expected to exceed 950 thousand tons once

more as demand growth of almost 47% continues to outpace the supply response (Figure 12). Rising demand over the next decade will result from increasing income levels, which support consumption growth of just over 10% on a per capita basis over the ten year period, as well as continuously expanding population numbers.

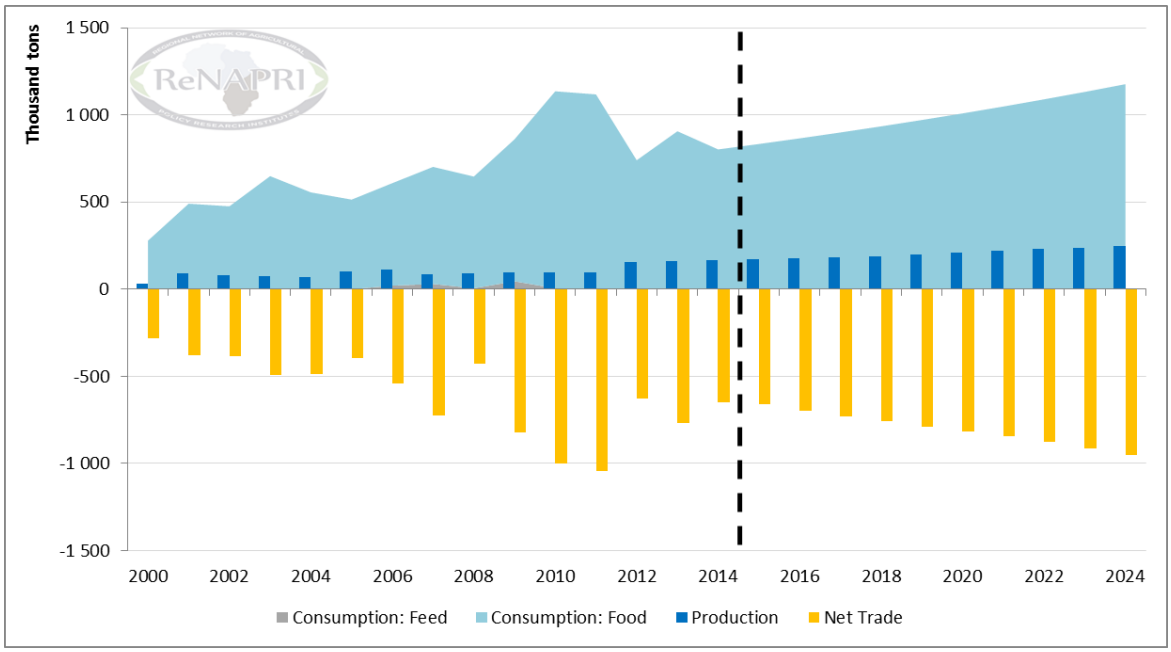

Figure 12: Tanzania wheat production, consumption and trade

4.3 South Africa

The total area cultivated to wheat in South Africa peaked in the late eighties at almost 2 million hectares, which subsequently declined to below 1 million hectares shortly after the deregulation of agricultural markets in the mid-nineties. Over the past decade, the area under wheat has remained on this declining path, to the extent that in 2014, less than 500 thousand hectares were planted to wheat. Consequently, South Africa has moved from a surplus position to importing almost 50% of its domestic demand. The decline in wheat area over the past decade can be ascribed to a number of factors, yet the bulk of the decline occurred in the Free State, which now accounts for merely 70 thousand hectares, from more than 1 million hectares in 1988. Arguably some of this area was marginal for wheat production; evident in the sharp decline following deregulation, but the persistent decline over the past decade would indicate that additional factors continued to influence the competitiveness of wheat relative to other crops in the region. Seemingly deteriorating rainfall conditions in key months has been a contributing factor, as price incentives were insufficient to compensate for the increasing risk associated with wheat production in the region. At the same time, the rising demand for soybeans, as well as its favourable characteristics as part of a maize rotation system has motivated producers to substitute wheat with soybeans.

The increasing reliance on imports to fulfill domestic demand has resulted in domestic prices trading close to import parity levels for a number of years. By implication, the level of the world price, relative currency values, as well as the relevant trade policies will be the most important drivers of domestic prices in South Africa. Following the deregulation of agricultural markets, many non-tariff barriers, as well as direct support to agriculture was replaced by tariffs. In the case of wheat, a variable import tariff was employed, which is triggered when the world price of Hard Red Winter Wheat drops below a specified reference price, which was set at $215 in 2008. Following the sharp increase in world price levels in 2012, the industry submitted a request for a further increase in the reference price, which was accepted in 2013, increasing the reference price to $294/ton. Over the next decade, prices will therefore find support from

persistent devaluation in domestic currency, as well as the variable import tariff which is projected to remain active with the world price below $294 over the entire period. Under the assumption of normal weather conditions, world prices are not projected to exceed $255 over the next decade, which could provide an incentive for the milling industry to request a review of the current reference price of $294. In light of the fact that a very limited number of hectares remain under wheat production in the Free State, the total wheat area is projected to consolidate, with only a marginal decline in area projected to 2024, mainly as a result of increasing adoption of canola production as a rotational crop in the winter rainfall region in the Western Cape (Figure 13).

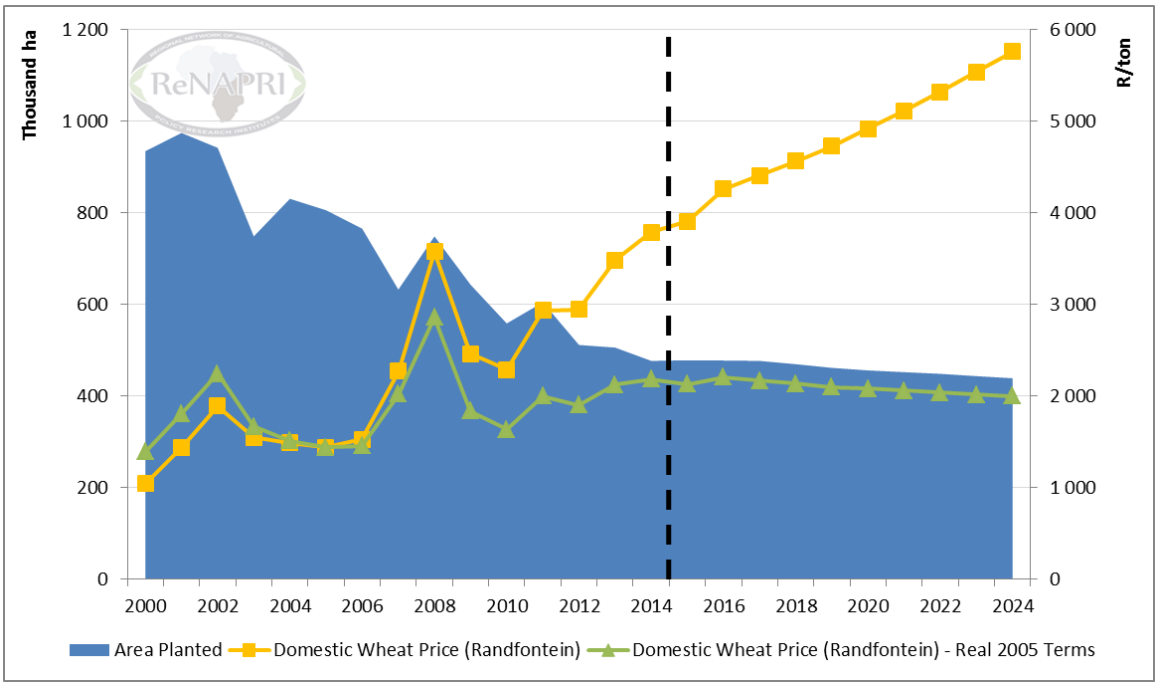

Figure 13: South Africa wheat area harvested and price

In line with the decline in area harvested, wheat production has also declined over the past decade, yet significant yield improvements were also evident, which offset much of the area decline, resulting in a smaller decline in production relative to area harvested. Although technological improvement and improved farming practices undoubtedly played a role, much of the yield improvement observed over the past decade is associated with the sharp reduction in area. Inevitably, lower potential areas are removed first and with the reductions concentrated in dryland production areas, the share of higher yielding irrigated wheat in total area increased from 10% in 1995 to 20% in 2014. Over the course of the next decade, yield levels are projected to remain on an upward trend, due to the assumption of technological improvement, but the rate at which yield levels improve is projected to slow significantly relative to the past decade due to the consolidation in area. The projected improvement is however sufficient to offset the marginal area reduction, resulting in relatively constant production levels over the next decade.

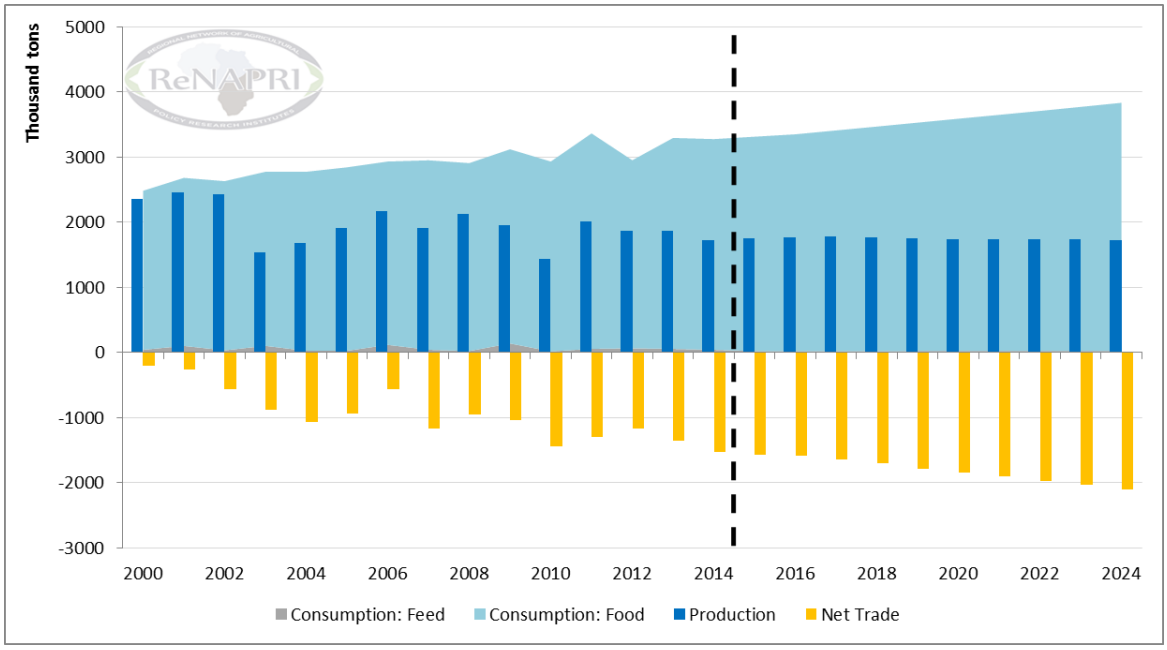

Figure 14: South Africa wheat production, consumption and trade

Consumption however is projected to expand, exceeding 3.8 million tons by 2024, underpinned by both rising income levels and expanding population numbers. Consequently, the share of imports in domestic consumption continues to rise over the next decade (Figure 14). At the same time, South Africa continues to export some wheat into the Southern African region, particularly Zimbabwe, Botswana, Namibia, Lesotho and Swaziland, which is projected to continue over the next decade. By 2019, the share of net imports in domestic consumption is projected to exceed 50%.

4.4 Zambia

Wheat represents one of the success stories within Zambian agricultural sector, having evolved from zero production in the early 1970s when the country depended entirely on imported wheat, to attain surplus production status in 2011 (ZNFU, 2015b). One of the main factors contributing to the increase in wheat production has been the clear and consistent policies in wheat, with limited government interference in the market, which has propelled the sector forward by encouraging private sector investments from both commercial farmers and grain traders alike.

Despite the long term success, wheat production has faced some major setbacks in the last two seasons. The 2014 harvest reflected a decline of approximately 25% from 2013 peaks, mainly attributed to the limited irrigation water in the Mkushi farm block dams, a major wheat producing area in Zambia. Similarly, the current season crop has been affected by power shortages which limit irrigation, impacting on the entire crop as all of Zambian wheat is produced under irrigation. Load shedding has been finely managed however, reducing the impact. While well below 2013 levels, Zambian wheat production is projected to increase in 2015 relative to 2014 levels.

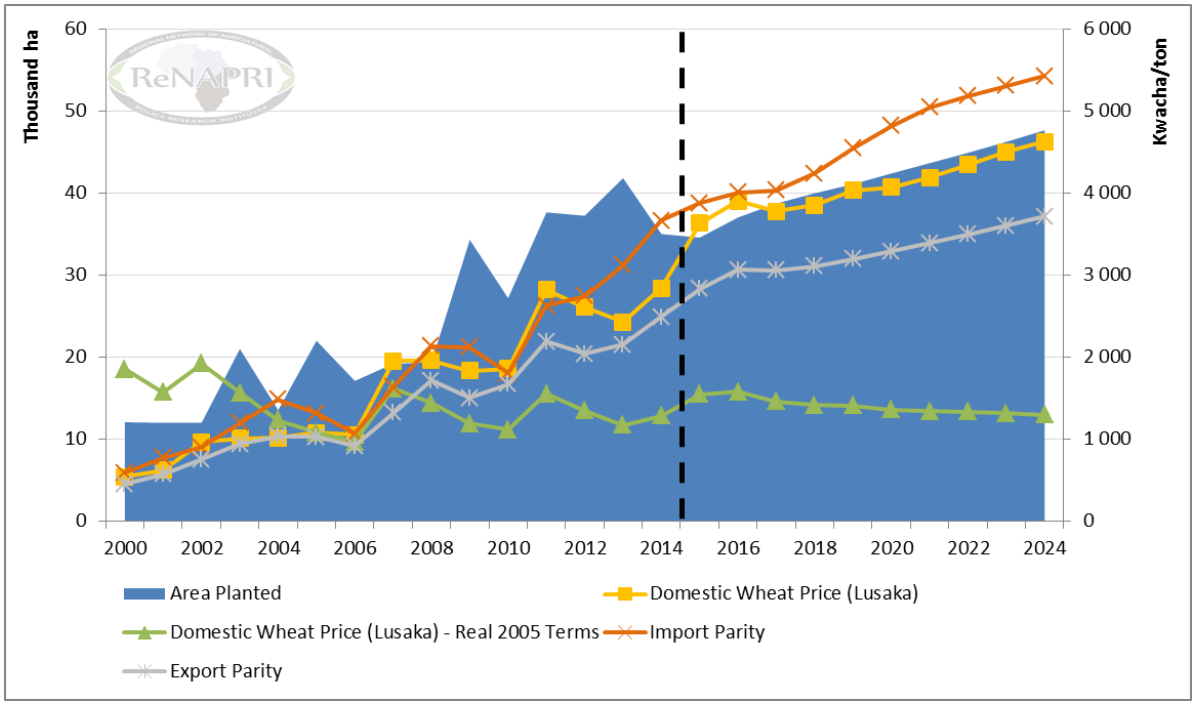

Figure 15: Zambia wheat area harvested and price

In addition to the challenges associated with irrigation volumes over the past two seasons, wheat prices have broken away from import parity[6] levels since Zambia started producing a surplus in 2011, implying a significant decline and limited incentive for further area expansion. Over the course of the next decade, some area expansion is projected, however at a much slower rate relative to the past decade. By 2024, the area under wheat is projected to reach 48 thousand hectares, an expansion of 36% from 2014 levels (Figure 15). Coupled with continued technological advancement that will drive yield improvements, the expansion is projected to boost production levels to more than 370 thousand tons.

Having moved towards import parity once more in 2014 due to the sharp reduction in output, wheat prices are projected to remain high in 2015, supported by the depreciation in the value of the Zambian Kwacha. The depreciation of the local currency means that debt repayment has become more expensive since production loans are typically acquired in US Dollars. The rise in the prices of wheat has directly affected bread prices around the country, which have risen by more than 50% this year. In the medium term, Zambia is projected to return to a net exporting position, however the high cost of transportation is expected to limit export volumes and while the price is projected to move away from import parity, exports remain seasonal and equilibrium is achieved at an annual average price that remains above export parity levels.

[6] Import parity prices are indicative of the cost of imported wheat into the Zambian market, accounting for exchange rate fluctuations as well as the relevant transaction costs, reflecting a price that is comparable to the price of domestic wheat at the same location. Similarly, export parity prices are indicative of the price achieved for domestically produced wheat after accounting for the costs associated with exporting.

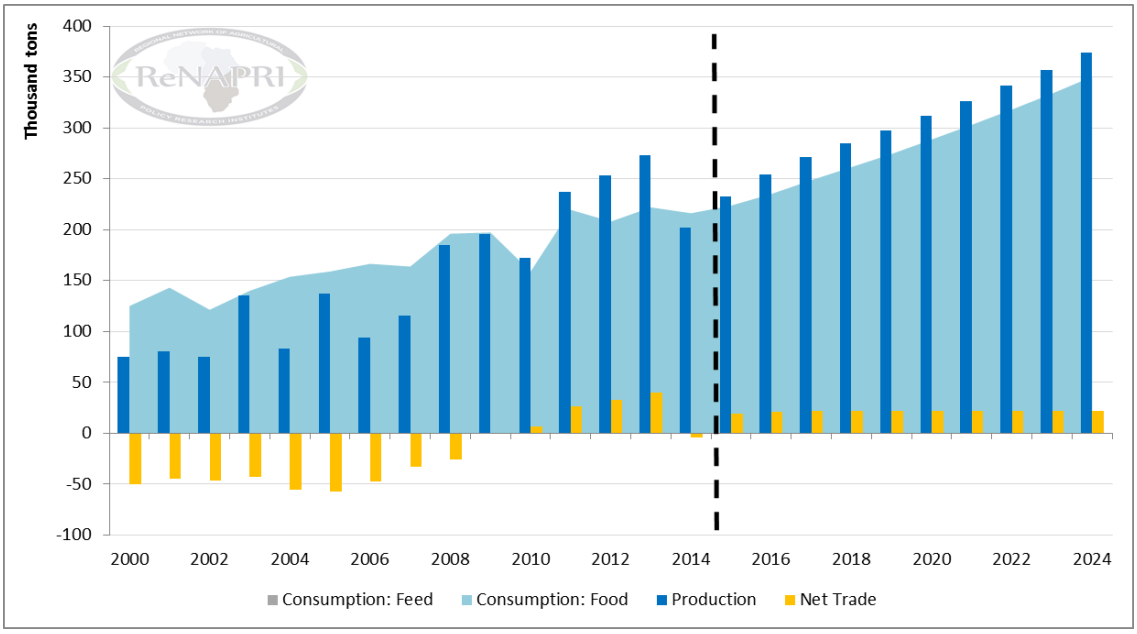

Figure 16: Zambia wheat production, consumption and trade

Driven by rising incomes and firm population growth, domestic wheat consumption in Zambia is projected to surpass 350 thousand tons by 2024, representing growth of more than 60% from 2014 volumes. Considering the impressive growth in wheat production however, Zambia is projected to remain a consistent net exporter of wheat, with export volumes projected to reach 22 thousand tons by 2024 (Figure 16). Relatively constant export volumes over the ten year period imply that domestic demand will be the main driver of increased wheat output. Reductions in the cost of transportation could however make exports more viable, resulting in increased area expansion and higher export volumes.

5 Sugar market outlook

Sugar markets have seen prices fall dramatically as a result of the depreciation of the Brazilian Real against the US dollar and the likelihood of India becoming a significant net exporter this year. Brazil has acted to support the ethanol and sugar sector with the mandatory blending requirement for ethanol increased to 27% along with a gasoline price which has not fallen with oil prices (supporting the demand for hydrous ethanol). Despite these actions the FAO Sugar Price Index was still down 10% in August 2015, with futures markets not expecting much recovery in the near term (Figure 17).

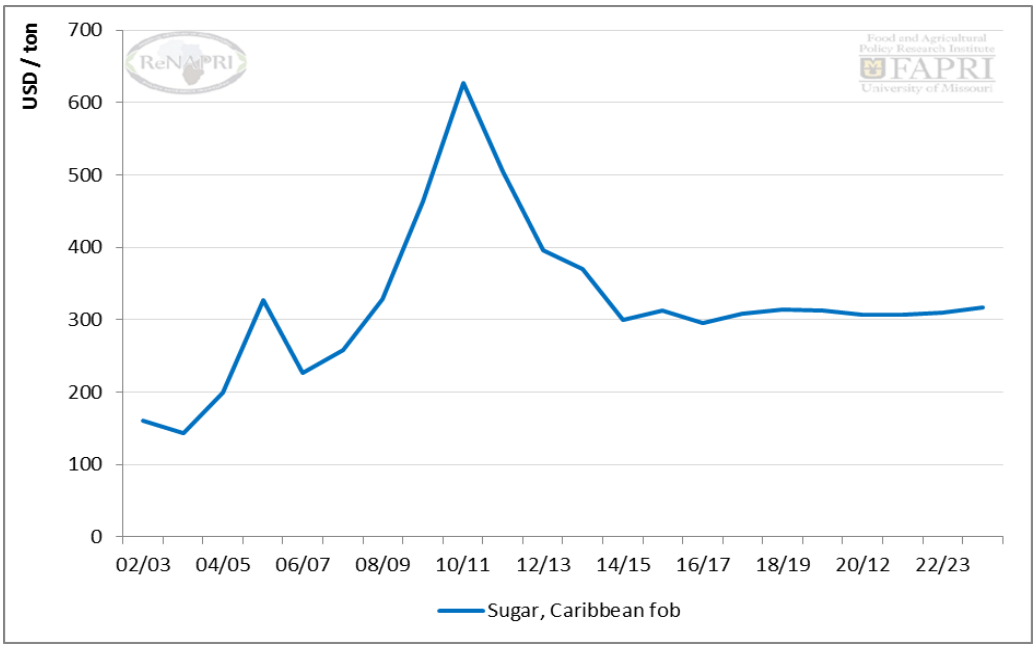

Figure 17: Outlook for global sugar prices

Sugar production within Sub-Saharan Africa generally represents a success story. Tyler (2008) showed that while Africa remains a net importer of sugar, five African countries (Zimbabwe, Malawi, Zambia, Swaziland and South Africa) are consistent exporters, ranking amongst the lower cost producers in the world. Under the Everything But Arms (EBA) agreement, the Least Developed Countries (LDCs) within this group have benefited from quotas providing access to a highly beneficial sugar price within the European Union (EU), resulting in favourable prices in the region relative to the world reference price (Figure 18). However significant reforms to the EU sugar policy, which include reductions in the EU reference price and the elimination of EU production quotas by 2017 has presented an uncertain future for EU destined exports from within the region.

Given the preferential market access received, Zimbabwe, Zambia, Malawi and Swaziland have all exported successfully to the EU in the past; however these countries are landlocked and high transportation costs raise the cost of exports. Consequently, the expected reduction in EU prices following the reforms will likely lead to a situation where exports are shifted away from the EU into the ESA region. Increased trade flows within the region may result in stronger regional price correlations going forward.

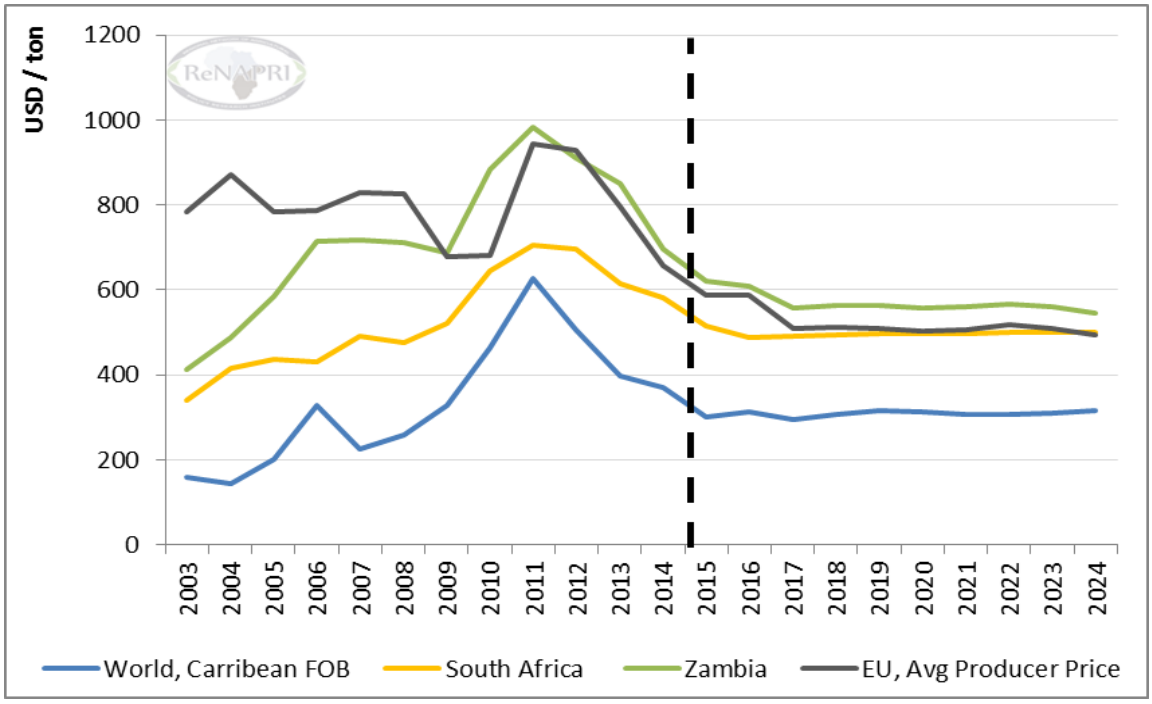

Figure 18: Sugar price outlook

Sugar trade within the ESA region is governed by national regulations and regional agreements which include the SADC Sugar Cooperation Agreement (Annex VII of the SADC Trade Protocol), COMESA FTA of 2000, Special Safeguards applicable to Kenya and Common protocol for commodities in the EAC. Under the SADC Sugar Co-operation Agreement, each member state that produces surplus sugar, including SACU members, is permitted to export an agreed proportion of the excess sugar to other member states duty-free (SADC, 2009). Under the COMESA FTA, sugar imports originating from member states have access to duty free treatment. Kenya represents the only exception, having been granted special safeguards to protect its domestic industry which is characterised by inefficiencies and high taxation. The safeguards entail successive increases of 40 thousand tons in the size of the COMESA sugar quota each year effective from 2008/09, whilst simultaneously reducing the tariff rate applied to out of quota imports until 2014 when it is expected to be fully liberalised (Kenya Sugar Board, 2010).

In the EAC the member states have signed a common protocol that guides commodity entry into the markets. Under the protocol, sugar has been classified as a sensitive product and is accorded special protection in order to protect the industry from imports.

Due to the trade restrictions in Kenya, regional surplus producers such as Zambia have been unable to access the lucrative Kenyan market, however the impact has been minimalised by the opportunities presented in the EU market. Consequently, surplus production has been diverted away from regional markets and in 2013 both Zambia and Swaziland ranked within the top ten sugar exporters into the EU. Given the expected changes in the EU however, the importance of regional market access will escalate and the implications of changing trade patterns will affect the entire region. A substantial share of exports from Swaziland is already directed at the South African market, however reductions in EU exports will likely increased the volumes flowing into South Africa. Given that South Africa is, under its surplus removal scheme, already exporting surpluses at low prices, increase volumes will be detrimental to margins that have already tightened in recent years. South African companies such as Illovo have directed further expansion into other regions like Zambia in recent years, but it is likely that Zambia will in future also be faced with the need to redirect surpluses into the region. In this regard, the opportunity for improved market access presented by the EAC-COMESA-SADC tripartite free trade agreement will be beneficial to Zambia.

5.1 South Africa

For the past decade the South African sugar industry has been grappling to come to terms with much tighter profit margins, mainly due to stagnant and in some areas even declining yields, combined with rising input costs. In the coastal dryland regions, the prevalence of Eldana (African sugar cane borer) has forced growers to shorten their cutting cycles, impacting negatively on yields as well as the quality of cane delivered. In recent years, yields have also been affected by exceptionally low rainfall conditions. Particularly during 2014 and 2015, precipitation has fallen well below long term average levels and within the South African sugar industry, 2015 will be remembered as the worst drought in 103 years. The severity of the drought has impacted heavily on yield levels and consequently, total cane production is projected to drop to 14.2 million tons in 2015, compared to 17.7 million tons in 2014 and 20.3 million tons in 2013.

The financial position of the industry has also resulted in a large number of seasonal farm workers not being employed in the current season as farmers struggle to make ends meet, while the amount of cane to be harvested is significantly reduced. The drought comes at a time where a number of mills have already been struggling with lower throughput and consequently lower profit margins for several years. As a result, the Umzimkulu mill on the south coast remained closed for the season and it is likely that a number of other mills will also open for only a very short period, as continued lack of rain has caused a further reduction in crop estimates.

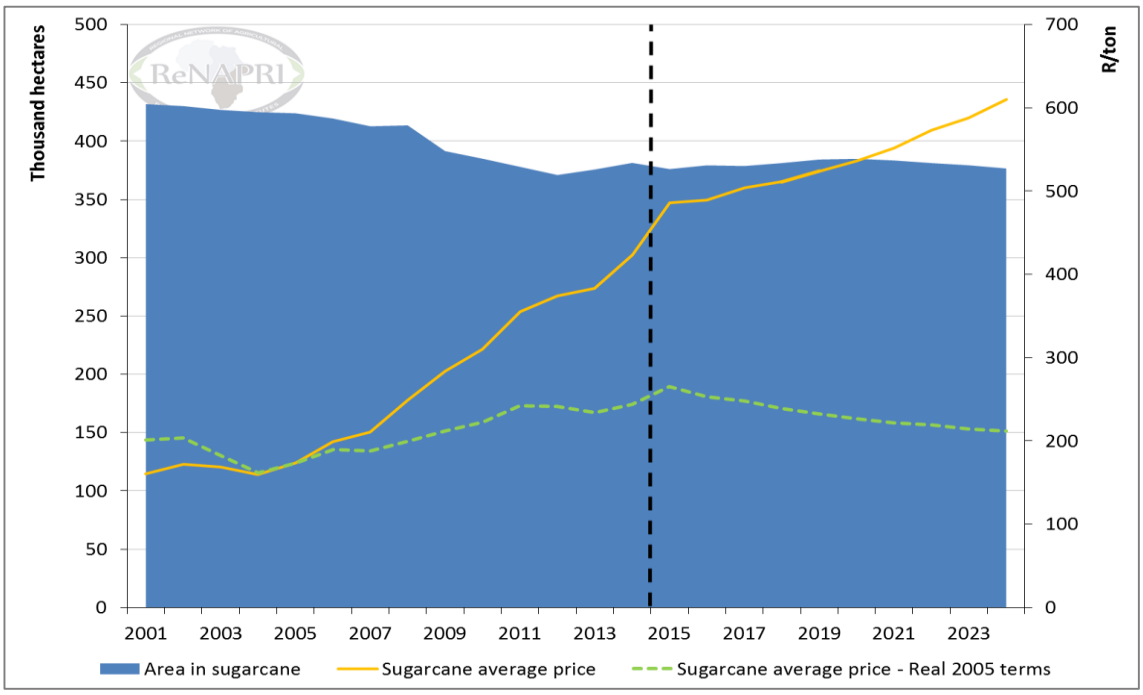

Figure 19: South Africa sugarcane area and price

After losing close to 60 thousand hectares over the period from 2001 to 2012, the area under cane has remained fairly stable over the past three years and is also expected to remain relatively stable around these levels over the outlook period. Industry experts argue that most of the land with marginal production potential has fallen out of production and although the number of growers may continue to consolidate as the average farm size continues to expand, no further drastic shifts in the area under production is projected under the baseline assumptions (Figure 19). The baseline further assumes relatively normal rainfall conditions and under this assumption it is expected that production will recover to levels of around 18 million tons of cane and consequently more than 2 million tons of sugar over the baseline period. Since this increase in

production is likely to come from the lower base of hectares, yields are anticipated to increase gradually over time.

At its peak in 2001, the sugar industry exported close to 1.5 million tons of sugar. In the current marketing season, exports are expected to drop to barely 50 thousand tons due to the drought. Over the baseline, exports of sugar are expected to average around 500 thousand tons per year (Figure 20). Nonetheless, the industry will face continued pressure from imports as the global market remains in over supply. The pricing mechanism of sugar remains the main reason for rising competition from imports. The sugar market basically still operates as a single market channel, where surpluses are removed in the form of exports, while the notional price[7], which represents the basis for the Recoverable Value[8] (RV), continues to escalate at an inflationary rate. This trend will likely expose the industry to the low world market prices and without adequate tariff protection, the industry runs the risk of losing even more market share to Brazilian and other deep sea imports.

World market prices have hit their lowest levels in 6 years as a result of high stock levels. The situation in the EU is similar and the low prices there have already resulted in SADC sugar producers searching for alternatives. At this stage it seems likely that the SACU market will also be exposed to the SADC sugar producers, which in turn could displace more SA sugar onto the world market.

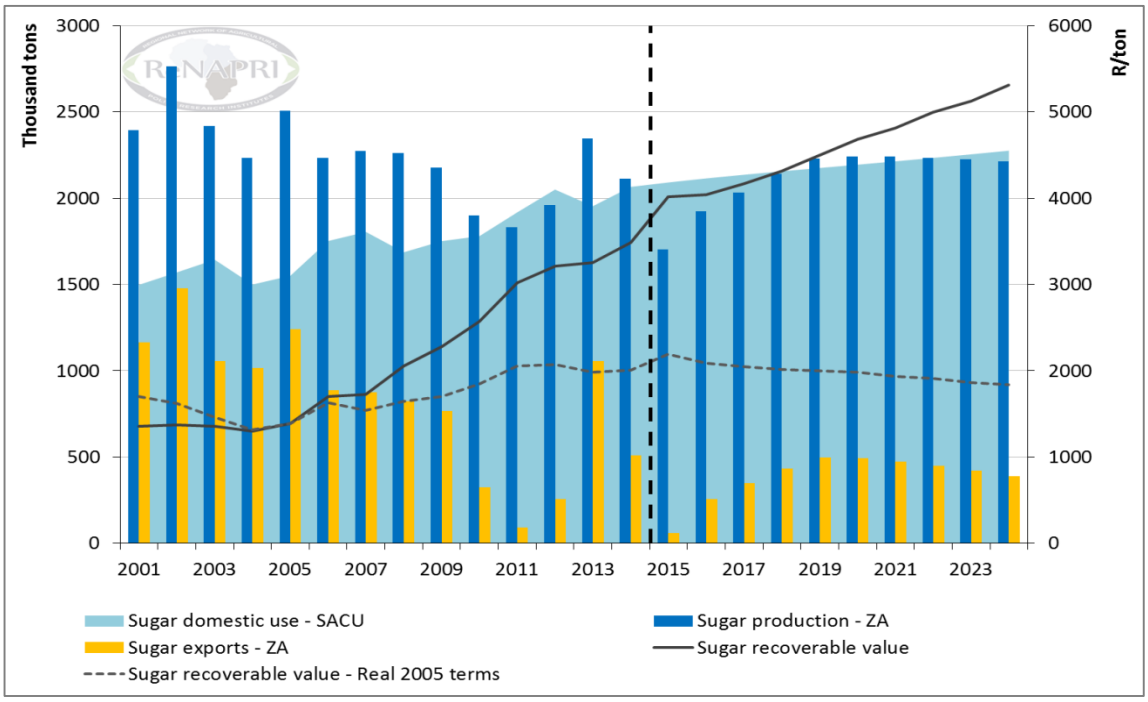

Figure 20: South Africa sugar production, consumption, export and price

The industry is currently reviewing a number of its processes and planning strategic interventions to bring sustainability back into the production and processing of sugarcane and sugar. A new Sugar Act is being developed by the industry. Under the new Sugar Act, it is envisaged that the principle of vertical slicing will be introduced, which provides the opportunity for growers to share in the revenue of sales of products other than cane and molasses, such as bioethanol.

[7] The notional price is an industry consensus price for sugar in the domestic market.
[8] The recoverable value is derived from the notional price and accounts for the sucrose value in sugar and by-products such as molasses.

This implies that the industry will also be in need of a revenue sharing model that goes beyond the current division of proceeds based on the sales of sugar and molasses only. Apart from catering for alternative sources of income in a new payment system, one also has to ensure that a new cane payment system drives the correct incentives and rewards for efficiencies and investment in alternative sources of income.

Unfortunately, these alternative sources of income have not materialised to date, despite many years of negotiations between farmers, milling companies and government. Bioethanol production in South Africa has yet again taken a step backwards as the current position paper has been referred back to the Biofuels Task Team for further review. A number of concerns were raised by various government departments, which included the subsidy mechanism and the risk and exposure that it creates for the fiscus, the length of the subsidy period, the risk to food security and the level of the guaranteed return on investment. It is somewhat ironic that the biofuels industry has been given 'market access' by the introduction of legislation that mandates a 2% blend of biofuel into conventional petroleum products in South Africa from the 1st of October 2015, yet has not been afforded a pricing framework in which sufficient production can take place to meet this demand. The current review of the policy is largely driven by the National Treasury and it is unclear when any further information on the progress will be forthcoming.

Cogeneration of electricity has been under discussion in the sugar industry for the past 5 years. The potential that the sugar industry can offer is estimated at a total of 700 MW of renewable electricity given the necessary policy support. 2015 saw the policy framework for cogeneration being released by the Department of Energy but unfortunately it seems to be based on providing immediate short term relief to the national electricity grid rather than long term sustainable solutions. Consequently, if the tariff and framework is not suitable, the likelihood that sugar millers in South Africa will invest significantly in expensive power island equipment remains small.

In conclusion, it is essential for the industry to regain positive sentiments and enter a cycle of re-investment in the future. Industry experts argue that apart from the economic realities, a number of external influences have contributed to the decline in hectares under production and tighter profit margins at the mills due to lower throughput. These factors include urbanisation in the coastal regions, land claims and unsuccessful land reform projects in the Midlands areas. A general lack of incentive to reinvest in the establishment of new ratoons is evident, since almost 30% of the sugarcane area is currently under land claims. Going forward, a strong partnership between the industry and government, which delivers on set targets and actions, is essential to provide an enabling environment for the industry to regain the capacity that has been lost.

5.2 Zambia

Zambian sugar industry stands as the most successful non-traditional export sector; currently contributing approximately 6% of total national exports. Growth in sugar supply is underpinned by growing demand in the domestic, regional and international markets. While both the short and medium term outlook remains positive, the underlying market constraints, domestic policies, regional and international trade policy frameworks pose challenges for Zambia to meet its full potential.

The Zambian sugar market presents a highly concentrated market structure with Zambia Sugar accounting for approximately 93.6% of total national output in 2012 while its competitors, Kafue Sugar (Consolidated Farming Limited) and Kalungwishi Estates Limited account for 5.8 and 0.6 percent respectively. This high level of market concentration, combined with policy interventions in support of domestic producers and the high transaction costs are factors that will likely affect market outcomes, as reflected in the high domestic price despite Zambia being a low cost and surplus sugar producer. Zambia Sugar Plc is the most efficient producer among the three, recording exceptional

yields of about 116 tons per hectare, compared to Kafue Sugar with yields of between 60 and 65 tons per hectare. Zambia Sugar Plc has invested in state-of-the art milling technology which results in higher efficiency at factory level allowing it to achieve lower costs of production than its competitors. In addition Zambia Sugar Plc is the only miller that generates its own electricity from its by-products, significantly reducing its electricity costs as a major cost component at sugar processing level.

The area under sugarcane in Zambia has expanded significantly over the past decade, most of which is attributed to Zambia Sugar Plc. As part of an expansion program which included improved milling capacity to 440 thousand tons per annum, its sugar estate was expanded by more than 10 thousand hectares in 2010, while a further expansion of its out grower scheme added further hectares in 2013. Zambia Sugar Plc is already approaching its operating capacity and in light of the policy reform in the EU market, the area under sugarcane is projected to remain fairly stagnant in the range of 38 thousand hectares over the course of the next decade (Figure 21).

With the reform of the EU policy (quota management will end as of September 30, 2017), Least Developed Countries (LDCs) previously exporting to the EU have already started re-directing their exports elsewhere. While these countries will continue to benefit from quota free and duty free access to the EU market, the attractiveness of the EU market as an export destination may be sharply reduced by the expected lower prices (Litch, 2015). Zambia is no exception and is already positioning itself to export more of its sugar within the region, whilst also identifying new markets elsewhere.

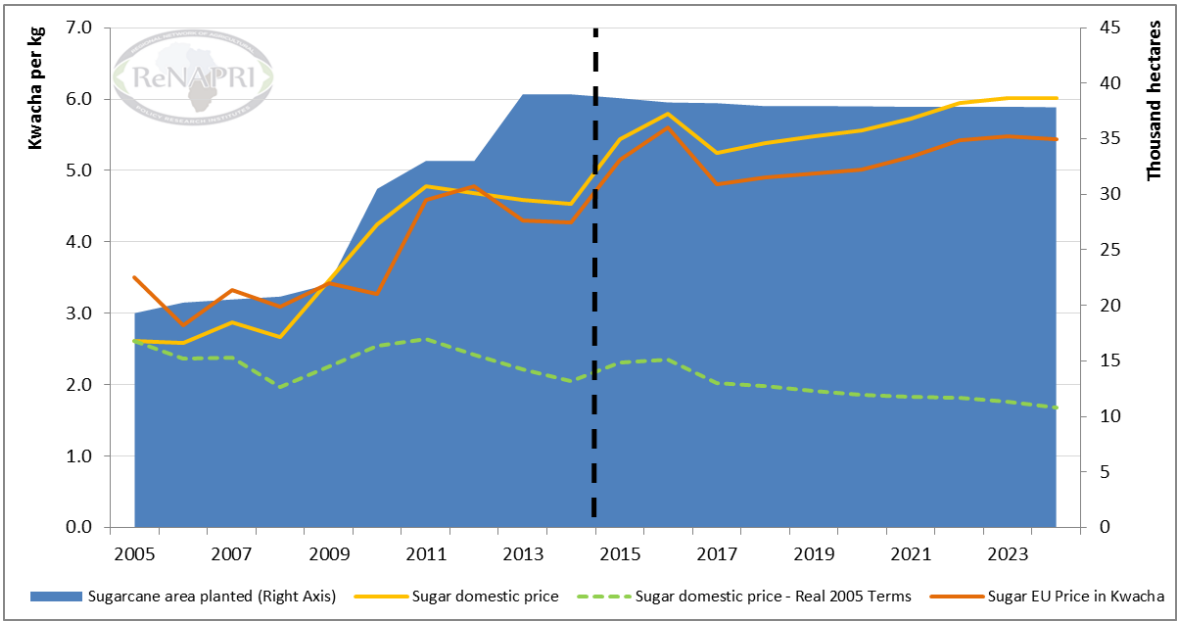

Figure 21: Zambia sugarcane area planted and sugar price

High entry barriers and infrastructural limitations have also affected potential new entrants in the sugar industry. Some potential entrants have been exploring the development of the sugar industry for biofuels. However, Zambia has generally failed to attract new (green field) investments in the recent past. For example about 100 thousand hectares of land in Luena Farm block in Luapula Province of Zambia has been earmarked for sugar investments for over 10 years now but no investments have been forthcoming, due to poor road infrastructure and lack of electricity (Zambia Development Agency & Commonwealth Business Council, 2011). A South African based investor, AGZAM Project Developers Ltd, seeking to invest in Kazungula district in Southern Province has faced challenges in accessing 18 thousand hectares of suitable land which is under traditional tenure (The Zambian Economist, 2011).

Having increased rapidly in line with international prices since 2009, the domestic sugar price has stabilised in recent years. Despite the decline in US dollar based international markets, the sharp depreciation in the value of the Zambian Kwacha is expected to support prices in 2015, The domestic sugar price in Zambia is mainly driven by the export parity into the EU market and this is expected to remain the case over the outlook period. Following the decline in 2017 associated with the elimination of quotas in the EU market, the increase in nominal prices over the course of the projection period is also attributed to further currency depreciation. Accounting for general inflation however results in a declining trends in real (2005) prices from 2016 onwards.

The opportunity to export surpluses into lucrative markets in the EU has supported domestic price levels in the past, resulting in domestic prices which often trade in line with import parity levels from surplus producers such as Brazil, yet imports remain constrained by a number of factors such as high transaction costs, high concentration in the market and restrictive government policies. Imports are restricted indirectly through a policy requiring fortification all sugar imports with Vitamin A, resulting in a closed market with respect to imports. Since no other country in the region and on the African continent has imposed such legislation, almost no sugar imports have been recorded in Zambia since it was enacted in 2000. Potential sugar imports are also regulated by the government through bureaucratic procedures requiring import permits to be cleared by three government ministries (Ministry of Agriculture and Livestock, Ministry of Commerce, Trade and Industry and Ministry of Health).

In 2015, Zambia Sugar Plc produced a record sugar output of 424 thousand tons, exceeding its previous record 404 thousand tons delivered in 2014. This record performance was largely due to improved factory reliability and better than expected overall time efficiencies. Favourable weather and harvesting conditions experienced in November and December 2014 contributed to better cane quality and sucrose (Zambia Sugar Plc, 2015). Given its high market share, the increased output by Zambia Sugar resulted in a similar expansion of national sugar production.

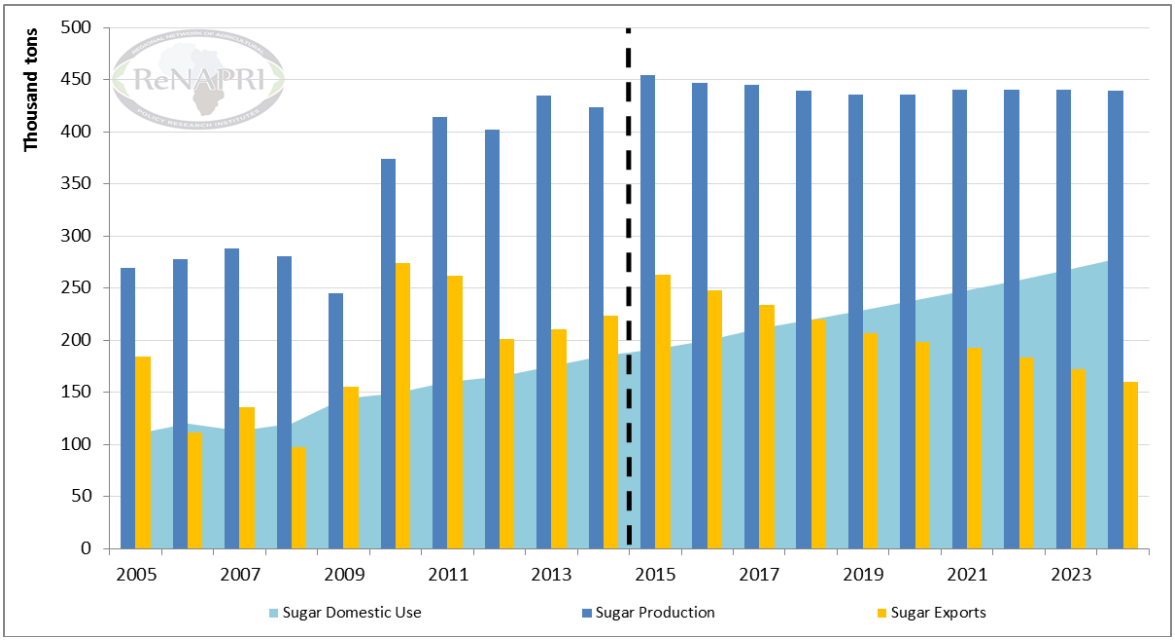

Figure 22: Zambia sugar production, consumption and export

Over the next decade, the uncertainty related to export markets is expected to dampen further growth, resulting in a marginal production expansion of only 4% from 2014 levels due to yield improvements which offset the marginal reduction in area. Exports are projected to decline from more than 250 thousand tons in 2015 to approximately 160 thousand tons by 2024, a contraction of 40% (Figure 22). The decline is

underpinned by the complete liberalisation of the EU market. Consequently Zambia, like other LDCs with preferential access (duty free and quota free) access to the EU market will have to compete with the rest of the world on equal footing.

Under the EBA agreement for LDCs in African, Caribbean and Pacific (ACP) regions, EU sugar policy offered a highly preferential price for raw sugar. Under the new agreement, unrestricted access (duty-free and quota free) has been granted to ACP countries as well as reduced specifications for raw sugar and new opportunities to export refined sugar (previously the EU only imported raw sugar with stringent specifications). However, the guaranteed price has been gradually reduced to US$335/ton in 2010 (36% reduction) until full liberalisation. Despite the loss in revenue under the reduced preferential price, Zambia stands to benefit from a guaranteed market without any quota restrictions.

In response to the initial EU regime change, Zambian exports to the EU have exceeded regional exports and by 2012, 65% of Zambian exports were destined for the EU. Following the expected full liberalisation of the EU market by 2017, exports to the EU market are expected to reduce, implying that Zambia would then have to concentrate on serving the domestic market in East Africa and possibly serve new markets in West Africa. This adjustment period is expected to slow down the pace of growth in the export oriented industry.

The liberalisation of the EU sugar policy has also affected export opportunities for other countries in the region. Illovo Sugar, one of the main suppliers of sugar to the EU under the EBA/EPA program announced recently that sales of bulk sugar to the EU decreased to 211 thousand from 281 thousand tons a year earlier as EU designated sugar is redirected to more profitable markets. Illovo has set its sights on East and West Africa for growth as it prepares its exit from EU markets in the medium to long term. Besides growing the regional market, the company will also need to optimise domestic market sales in the six countries in which it operates.

Domestic demand for sugar in Zambia has expanded significantly since 2008, reflecting growth of more than 50% over the six year period from 2008 to 2014. By 2024, domestic consumption is projected to exceed 270 thousand tons, implying a further expansion of just over 45%. Firm growth in domestic demand is underpinned by rising income levels from favourable economic growth over the ten year period, however on a per capita basis, consumption is projected to expand by only 9%, implying that the bulk of additional consumption is attributed to population growth. The positive outlook for domestic demand will however offset the reduction in export markets to some extent, particularly with high domestic prices.

6 Conclusions and further work

The addition of the wheat and sugar components to the ReNAPRI modelling framework has strengthened policy analysis capacity. In the case of wheat, it has added a crop that competes with maize in terms of area planted by producers in Kenya and Tanzania (in Zambia and South Africa wheat is only produced as a winter crop and does not directly compete with maize), but also a competitor in consumption in all four markets. In contrast to maize, where policy is usually focused on stimulating domestic production, policy in the wheat sector is usually conducted at the border, requiring a different approach to its incorporation into the modelling framework. The sugar industry is an important source of income for the countries concerned, and often the subject of policy either through influencing contractual arrangements, biofuels policy, or policies that influence trade. The modelling effort co-funded by the JRC has led to a greater understanding of how this market works and raised issues, such as the impact on the region of changing policy in the EU.

The model at present incorporates wheat and sugar elements explicitly. Drawing on data from national and international sources equations were developed, with estimation where appropriate for the key variables in the sector. Important areas for future improvement identified are for sugar the linkage with the EU market, and further work on determining the functioning of tariffs in terms of reflecting the reality of their operation.

The future development of the models includes both the refinement of the products that are currently included and the addition of more of the agricultural sector. The priority will be in adding more crops products to get a fuller representation of the competitiveness between crops. The crops could include soybeans, rice, barley or other grains. As the livestock sectors in the ReNAPRI country expand, there has also been an expansion in soybean area and crushing capacity in order to provide meal for feed. The livestock sector itself will provide a challenge to modellers given the disparate nature of production systems and the associated issue of data availability.

A challenge for the model work is the nature of policy and its incorporation into the model. Typically, trade barriers, such as those that are most important for the wheat sector can be most easily incorporated either through the variable definition in the price transmission equations or as part of trade equations in the case of a market clearing price. Tariffs can be included in the parity prices where the more complex regime switching specifications are included. It is harder to incorporate domestic policies such as those for input markets where these might be targeted at certain crops or producers. In the sugar market where possible, care is taken to represent the contractual arrangement that exists between the farmer and the processor.

Demographic changes also provide a challenge to the model. All of the countries in the study are expected to see rapid population growth in the coming years which will result in a changing composition of the population. Along with rising incomes, this will likely impact consumption patterns especially with respect to staple products.

Discussions at ReNAPRI Regional Agricultural Outlook Symposium in Maputo, October 27-28, 2015, identified other issues that must be addressed in future modelling. One is the question of productivity growth, itself linked with changes in the structure of farmers. Medium scale producers are emerging as a driving force in the sector. Productivity improvements, if they occur, will require infrastructure development and improvements. Within the modelling system a special focus on trade will facilitate analysis to help policy makers address changes in these areas.

It was also identified that as well as producing rigorous scientific analysis through economic models, a challenge for ReNAPRI is communication with those outside of the group. ReNAPRI must first understand the needs of policy makers and industry, and the operation of actual and proposed policy. It recognises the need to communicate the

results of the analysis effectively. Central to the work is maintaining effective links with policy makers, producers and agribusiness through a coordinated network of scientists.

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List of abbreviations

ACP	African Caribbean and Pacific
COMESA	Common Market for Eastern and Southern Africa
EAC	East African Community
EBA	Everything But Arms
ESA	Eastern and Southern Africa
EU	European Union
LDCs	Least Developed Countries
SACU	Southern African Customs Union
SADC	Southern African Development Community

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