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FOREWORD AND ACKNOWLEDGEMENTS



To the Reader,

The fact that you are reading this is most probably an indication that you are interested in the production and availability of maize in South Africa. The objective of this *Prospectus* is to answer as many of your questions as possible in a brief, but succinct manner and to provide you with relevant information about the South African maize industry and pointers as to the important elements of the what, where and how of securing quality South African maize. If you have chanced upon this *Prospectus* and are reading it out of interest, may it serve to stimulate that interest and provide you with a comprehensive first exposure to the maize sector in South Africa. You could also pass it on to someone you know who may find it a useful resource.

As you will note from the contents page, this *Prospectus* covers the broader descriptive issues of maize and its uses in South Africa, the procedural issues of the marketing of maize and the more specific issues of grain quality, grain standards, exporting facilities, logistics, required export documentation and the management of price risk in South Africa.

We trust that this *Prospectus* will not only provide you with *what you need to know*, but also with *what you want to know*. Please feel free to contact The Maize Trust (details on the back cover) or any one of the contributing value chain partners should you have additional questions or desire further information.

The concept of this *Prospectus* germinated in the Maize Forum Steering Committee, was financially supported by the Maize Trust of South Africa and benefited in its growth by valuable inputs from the following value chain partners: Agricultural Research Council of South Africa (ARC), Animal Feeds Manufacturing Association (AFMA), Grain Silo Industry (GSI), Grain South Africa (GSA), Johannesburg Stock Exchange (JSE), National Chamber of Milling (NCM), South African Cereals and Oilseeds Trade Association (SACOTA), South African National Seed Organization (SANSOR), South African Poultry Association (SAPA), Southern African Grain Laboratory (SAGL) and Tongaat Hulett Starch.

Our appreciation to the Information Workgroup of the Maize Forum Steering Committee (MFSC) who oversaw and managed the process which resulted in the harvest of this *Prospectus on the South African Maize Industry*.

Rod Gravelet-Blondin, Chairman, South African Maize Forum

SOUTH AFRICAN MAIZE (CORN) DESCRIPTION

MAIZE (CORN): GENERAL DESCRIPTION

Maize is the most important field crop produced in South Africa, followed by wheat, soya beans and sunflower seed. It is the staple food of the bulk of the population, more particularly of the poor. The industry has strong linkages throughout the economy, both upstream to the input industries and downstream into milling, animal feed and food processing industries.

Maize hectares vary from year to year, depending on weather and market conditions, but on average approximately 2.5 to 2.75 million hectares of hybrid maize are planted in South Africa each year. In addition, about 350 000 to 500 000 hectares are planted by small-scale farmers to a mix of saved seed, open-pollinated varieties and hybrids. The total crop planted comprises about 85% genetically modified (GM) maize (about 80.5% white maize and about 90.6% yellow maize). South Africa leads the continent in technology adoption, which has allowed productivity gains. In 1998, it became the first African country to grow biotech crops commercially. By 2010, it was the world's ninth largest cultivator of biotech crops, with more than 2.2 million hectares under cultivation.

White maize is mainly for human consumption and yellow maize for animal feed. Approximately 10 to 12 million tons of maize is produced in South Africa annually. On a ten-year average, maize for human consumption totals about 4.1 million tons, animal feed about 3.9 million tons, while starch- and glucose-manufacturing industries consume about 650 000 tons of maize annually. The feed industry uses mostly yellow maize in the manufacture of animal feed. Feed production in South Africa is estimated at more than 11 million tons per annum. The poultry industry is the largest consumer of feed produced locally. On a five-year average, South Africa normally has approximately 1.8 million tons surplus maize for the export markets.

IMPORTANCE OF THE VALUE CHAIN

The maize industry plays a very important role in the economy in Southern Africa. It is the largest locally produced field crop and the most important source of carbohydrates for human and animal consumption in the Southern African Customs Union (SACU).



South Africa is the main maize producer in the SACU, with an average production of approximately 10 to 12 million tons per annum over the past ten years. It is estimated that more than 9 000 producers are responsible for the bulk of the South African crop, while the balance is produced by many thousands of small-scale producers.

MAIZE PRODUCTION IN SOUTH AFRICA

The production of maize in South Africa is concentrated in the North West, Free State, Mpumalanga and KwaZulu-Natal provinces.

The mostly rain-fed grain cropping area is divided into four major maize production regions according to climatological characteristics. They are as follows:

- The Warm Western Region (western parts of the Free State and most of the North West)
- The Temperate Eastern Region (Gauteng and the central parts of the Free State)
- The Cold Eastern Region (the Mpumalanga Highveld and eastern Free State)
- The KwaZulu-Natal Region (the western/upland and central/midland parts of KZN)

Within these four regions the major maize-growing area cuts across the central and western parts of the North West, the north-western Free State, southern Gauteng and the central to south-western parts of Mpumalanga. In the west of this major maize-growing area the mean annual rainfall ranges between 550 and 650 mm. Precipitation is relatively erratic and has a big influence on crop production. Although the start and duration of the rainfall season in this region restrict the length of the growing season, the high heat units make it very suitable for crop production and, more importantly, the growing of white maize varieties. In the central and eastern parts of this area (i.e. Gauteng and Mpumalanga) the mean annual rainfall ranges between 650 and 850 mm. Low heat units result in a relatively short growing season, which is more suitable for yellow maize varieties.

INDUSTRIAL USES FOR SOUTH AFRICAN MAIZE

The industrial use of maize is categorised into three processes:

- 1. Wet milling
- 2. Dry milling
- 3. Animal feeds

WET MILLING

The principal food products from the wet milling industry are corn starch, corn syrup, high-fructose corn syrup, dextrose and corn oil. By-products are used for animal feed and other applications. Corn starch is used primarily to thicken and stabilise other ingredients. Products include modified and unmodified starches, glucose, maltose and dextrose syrups, glucose powders, maize germ, Gluten 60°, Gluten 20°, corn steep liquor and sorbitol.

Various modifications of corn starch can be made to obtain the desired results in foods. Baking powder, prepared mixes, candies, baking goods and puddings require starch products. Paper and textile industries utilise starch. The greatest use of corn syrup is in confections, followed by bakery and dairy products.

High-fructose corn syrup (HFCS) is utilised in a wide variety of food products such as confections, baked foods, table syrup, fountain syrups, sweet beverages, tomato sauce, pickles and other condiments.

The largest single food-manufacturing use for dextrose is in baked goods where it serves as a yeast nutrient, provides some sweetness and causes crust browning. Other major uses for dextrose are in confectionery manufacturing, canning and frozen packs, tomato sauce, jams, jellies, soft drinks, wines and malt liquors.

Corn oil is consumed as salad or cooking oil and in margarine. Corn oil is also used as a carrier for vitamins and medicine.

Utilising maize, waxy maize and tapioca as raw materials, a wide range of products are manufactured for an equally diverse variety of industries such as food, beverages, pharmaceuticals, textiles, paper making, adhesives and spray drying.



DRY MILLING

The primary products derived from dry milling of maize are maize meal, flour and maize grits. Other products are oil and by-products for animal feed. The endosperm fractions are characterised by their particulate dimensions and sizes, which affect composition and utilisation.

South Africa has a relatively dry climate and maize crops dry naturally to a moisture content of 13% or lower before harvesting commences. This contributes to a unique hardness and whiteness, which in turn is of great importance to the milling industry. Hard maize ensures a higher-quality product and yield per ton, while whiteness is of importance to the consumer market.

Grit fractions (1.2–0.6 mm) – Grit fractions are used for many foods domestically and commercially. Examples are hominy grits, imitation rice and corn flakes. Brewer's grits are used in beer production.

Maize meal (0.6–0.2 mm) – Maize meal is used for meal mixes, maize bread, maize muffins and some extruded maize snack products. White maize is used principally as milled maize meal for human consumption and eaten by several million South Africans as a staple food.

Maize flour (< 0.2 mm) – Maize flour is particularly valuable as an ingredient of pancake mixes, baby foods, cookies, biscuits, ice cream cones,















ready-to-eat cereals, batter breading mixes, and binders for loaf-type sandwich meats. Maize flour can be pregelatinised and used in compounding high-nutrient mixes like corn-soy-milk (CSM) and corn-soy-blend (CSB).

ANIMAL FEEDS

Maize (yellow and white) is the primary feedstock ingredient (energy source) utilised in animal feeds in South Africa and can be interchanged, depending on the maize prices on the day.

Latest annual figures show that yellow maize (about 3.5 million tons) is by far the most utilised in animal feeds, while only 1 million tons of white maize is used, bringing the total maize utilised in animal feeds to about 4.5 million tons. This brings about a situation where the quantity of maize utilised in animal feeds almost equals the quantity of maize use for human consumption.

Besides utilising maize as the primary product, the animal feed industry is also the largest consumer of by-products originating from the further processing of maize. Typical products used are as follows:

- Maize gluten meal 20%
- Maize gluten meal 60%
- Maize screenings
- Maize germ meal
- Maize germ oil cake
- Hominy chop

3 MARKETING PROCEDURES

South Africa has established itself as a net exporter of maize, annually exporting predominantly white maize to a wide range of destinations, across inland borders and overseas, while a fair amount of yellow maize is exported to the Far East.

The importer should have an in-depth know-ledge of the various South African maize grades and the characteristics of each type. It should identify the different participants in the market that regularly export, and in South Africa's case it would be the multinationals that understand the market and the logistics involved globally. Information in this regard can be obtained from the South African Cereals and Oilseeds Trade Association (SACOTA) at www.sacota.co.za or from the Agricultural or Trade Attachés who are the overseas representatives of the Department of Agriculture, Forestry and Fisheries (DAFF) and the Department of Trade and Industry (DTI).

Quality

Maize quality is determined by official grading regulations promulgated under the Agricultural Products Standards Act, which governs the classification and grading of maize based on several qualitative factors. The quality of the maize destined for export is confirmed with an export certificate issued by the Perishable Products Export Control Board (PPECB) as the official assignee of DAFF.









Quantity

The quantity must be specified. The importer should also specify the method that will be used to establish the price of the quantity above or below the mean contract amount. Another issue is the weight of the grain and the certification of that weight. The shipped weight at the port of export is usually the weight that governs.

FINANCING SOUTH AFRICAN MAIZE

The most commonly used method of payment for international grain transactions is a letter of credit, a method that comes with a range of options.

Letter of credit

A contract between an importer and an exporter may call for payment under a letter of credit, often abbreviated as L/C or LC. A letter of credit is a written commitment by a bank to make payment at sight of a defined amount of money to a beneficiary (exporter) according to the terms and conditions specified by the importer (applicant). The letter of credit should set a time limit for completion and specify which documents are needed to confirm the transaction's fulfilment.

Payment against documents

Under the payment against documents option, the exporter instructs its bank through a collection letter to forward a draft and the original shipping documents to the importer's bank for payment. The collection letter contains complete and precise payment instructions to be followed by the importer's bank, including the timing of the release of the shipping documents. The release of the documents is either on a cash-against-documents (cad) basis or on a documents-against-acceptance (d/a) basis. Payment under a cad arrangement is at sight, while payment under a d/a arrangement utilises a time draft.

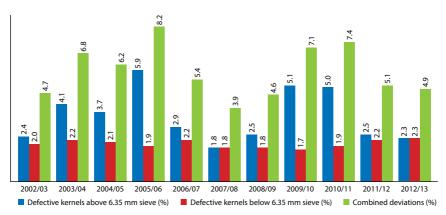
GRAIN QUALITY OF SOUTH AFRICAN MAIZE AND SOUTH AFRICAN MAIZE STANDARDS

MAIZE CROP QUALITY SURVEY

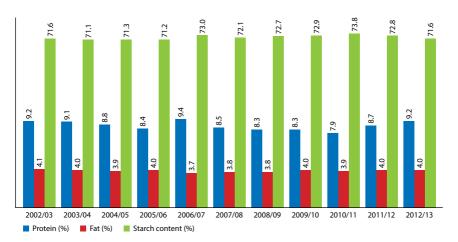
The Southern African Grain Laboratory (SAGL) is responsible for conducting an annual Maize Crop Quality Survey with funding from the Maize Trust. The SAGL is an ISO 17025-accredited testing facility and participates in eleven international and one local proficiency scheme as part of ongoing quality assurance to demonstrate technical competency and international comparability. The purpose of these surveys is to accumulate reliable data on the quality of locally produced maize over different seasons and from different regions. The quality of imported maize is also monitored to compare it with locally produced maize from the corresponding period.

The quality attributes included in the surveys are as follows:

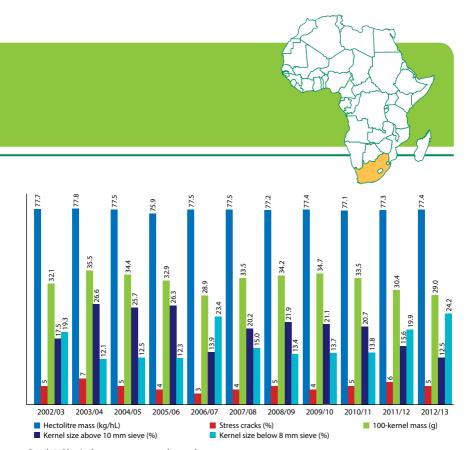
- South African grading is done according to the following factors as defined in the South African grading regulation: defective kernels above and below a 6.35 mm sieve, total defective kernels, foreign matter, other colour, total deviation and pinked kernels. See Graph 1 for an eleven-year trend analysis.
- US grading is done according to regulations on all samples to determine the following factors: grain density expressed as hectolitre mass, damaged by heat, total damaged, broken kernels and foreign matter (BCFM) and other colour.
- Nutritional values are determined (for all samples) fat, protein and starch. See Graph 2 for an eleven-year trend analysis.
- Physical factors (on all samples) Hectolitre mass, 100-kernel mass, kernel size, breakage susceptibility, stress cracks and milling index. See Graph 3 for an eleven-year trend analysis.
- All white maize samples are milled on a Roff laboratory mill and the whiteness index of the maize meal is determined.
- Mycotoxin analyses are performed on 10% of the samples representative of the white and yellow maize crop produced per region. With the SAGL multi-mycotoxin screening method thirteen different mycotoxins are analysed simultaneously in one run using UPLC-MS/ MS. The mycotoxins tested for are aflatoxin G1, B1, G2, B2, fumonisin B1, B2, B3 (FUM), deoxynivalenol (DON) including the two acetyl derivatives, 3-acetyl deoxynivalenol (3-ADON) and 15-acetyl deoxynivalenol (15-ADON), T-2 toxin, HT-2 toxin, zearalenone (ZON) and ochratoxin A (OTA).
- Testing for the presence of GM maize is performed on 10% of the samples representative of the white and yellow maize crop produced per region.



Graph 1: RSA grading factors - trend over eleven seasons



Graph 2: Nutritional values - trend over eleven seasons



Graph 3: Physical parameters - trend over eleven seasons

Results are reported as an average, minimum and maximum per region.

Comparisons are made between production areas, regions and seasons in graph formats. Reports are available in hard copy as well as downloadable in PDF format from the SAGL website (www.sagl.co.za).

Average results per region are updated onto the SAGL website on a weekly basis as results become available.

SOUTH AFRICAN EXPORT FACILITIES, TRANSPORTATION AND EXPORTERS'

South African legislation provides that all food business operators must adhere to acceptable food safety and food hygiene standards. Inland grain storage providers and port facilities must conform to these standards and are audited on a regular basis. Grain exports may only be conducted from grain storage and handling facilities that have been audited according to the South African Food Safety Standard.

The export of grain from South Africa can occur across inland borders into the rest of Africa or via sea to overseas countries. Exports by sea are usually done through the Durban harbour. South African exports through the Maputo harbour in Mozambique are usually destined for elsewhere in Africa and the maize is sourced mainly from the nearby Mpumalanga Province.

The following documentation is needed when exporting maize from South Africa:

1. Documents involving the importer

■ The quotation/pro forma invoice detailing the following:

- A complete and clear description of the maize
- The quantity of maize
- The total price of the maize (and unit price where applicable)
- The currency in which the goods will be sold
- The likely delivery schedule and delivery terms
- The physical addresses of both the exporter (referred to as the shipper) and importer (sometimes referred to as the consignee)
- The payment methods
- The payment terms
- The Incoterms to be used
- Who is responsible for the banking fees and other related costs (insurance and freight costs are covered by the Incoterms in question)
- The exporter's banking details
- The country of origin of the maize
- The expected country of final destination
- Any freight details such as the port of loading and discharge
- Any transshipment requirements
- Any other information relevant to the order



- The export contract Exporters from South Africa primarily make use of the GAFTA standard forms of contract, which include clauses for quality, condition, warranties and guarantees, shipping documents and appropriations, payment terms, problems and exceptional circumstances, insurance, default and damages and supporting rules for weighing, sampling, analysis methods and insurance.
- The commercial invoice The commercial invoice is required by both the exporter (to obtain the necessary export documents to enable the consignment to be exported, to prove ownership and to enable payment) and the importer (who requires the commercial invoice to facilitate the import of the goods in question).
- The packing list.
- Letter of credit A written commitment to pay, by a buyer's or importer's bank (called the issuing bank) to the seller's or exporter's bank (called the accepting bank, negotiating bank, or paying bank).
- Certificate of Origin Approved by Chamber of Commerce. The Certificate of Origin (C/O) certifies that the imported product meets the 'Country of Origin' requirements set by the importing country and which are expected of their foreign suppliers.
- Certificates of health Phytosanitary certificates that are required for the import of certain plants and plant products such as seeds and flowers. Phytosanitary certificates are governed by the International Plant Protection Convention and represent an internationally accepted means of pest risk mitigation. Documentation needed for a Phytosanitary Certificate are an Import Permit from the destination country, Fumigation Certificate (exporter to select an export agency to do this) and an Inspection Report (generated by export agency on a PPECB template).
- Fumigation certificate To be obtained by exporter.
- Pre-shipment inspection certificate The scope of the inspection includes quantity and quality, packing and marking, and supervision of loading.
- *Transport documents* The Bill of lading (BOL or B/L) is a document that establishes the terms of a contract between a shipping company (or its agent) and the exporter/ shipper (or agent, such as a freight forwarder).
- Freight Transit Order (FTO) An FTO is a form of inland BOL used in South Africa and required by Transnet Freight Rail (TFR), the local freight rail company.
- Road Consignment Note.
- The Export Cargo Shipping Instruction (ECSI) The written instruction from the exporter to the freight forwarder or carrier (shipping line, airline, road hauler, etc.)



for it to facilitate the movement of goods to the desired destination. It contains information on the goods and the route to their destination, any transport requirements, customs information, who is to receive what documents and how costs are to be allocated.

2. Documents required to export goods from South Africa

- **Exporter registration form** All exporters need to register with the South African Revenue Service (SARS).
- Letter of credit.
- Commercial invoice.
- Bill of entry export The Customs Declaration Form (SAD 500) is a South African document required by the South African Revenue Service (SARS). The purpose of this document is to ensure that exported goods are properly declared to SARS. In effect the document is submitted to the Commissioner of Customs – a subdepartment of SARS – at the time that the goods are exported. The document(s) will need to be approved by Customs before the goods will be allowed to be exported.
- Form NEP (no foreign exchange proceeds).
- Form E (repatriation of foreign exchange earnings).
- Export certificate Issued by the Perishable Products Export Control Board (PPECB).

3. Documents required for transportation

- Bill of lading
- Freight transit order
- Road consignment note
- Export cargo shipping instruction

4. Documents required for payment

- Commercial invoice
- Letter of credit
- Transport documents

RISK MANAGEMENT IN THE PRICING OF MAIZE IN SOUTH AFRICA

The determination of the maize price in South Africa is set entirely within the market place with no government intervention. There is no guaranteed minimum or floor price, no guideline or reference price and no provision for a strategic reserve at a specified buy-in price. All participants in the maize market are therefore subject to volatility in prices, which results basically from the vagaries of nature and the free market system.

MAIZE PRICE DETERMINANTS

The price of maize in South Africa is determined by willing buyers and willing sellers in an open and transparent manner with the following factors playing a dominant role:

- The supply and demand of complementary international products, as reflected on the predominant international markets.
- The supply and demand of maize in South Africa. This would include the breakdown between white maize and yellow maize and the supply and demand of complementary and supplementary products.
- The demand and supply of maize in the Southern African region, including the policies of neighbouring countries with regard to the acceptability, or not, of GM products and the availability of the non-economic provision of grains (food aid).
- The economic viability of exporting or importing maize, which is largely determined by the ruling exchange rates.

PRICE RISK MANAGEMENT IN THE MAIZE MARKET

All participants in the maize market in South Africa are free to manage the risk of fluctuating prices in any way they may wish. Central to the price risk management facility is the operation of the Commodity Derivatives Division (CDD) of the Johannesburg Stock Exchange (JSE). The CDD was originally founded in 1995 as the SAFEX Agricultural Markets Division following deregulation of the grain markets in South Africa. The JSE acquired SAFEX in 2001. The CDD offers long-dated and short-dated futures and options contracts on both South African white maize and yellow maize.

Agricultural derivatives provide the facility to actively manage price risk, but also play an active role in price determination and transparency in the local maize market. The price discovered on the derivatives market serves as the market reference price for white and

yellow maize throughout the Southern African region. Production, financing, trade and usage decisions are based on the maize prices discovered on the derivatives market.

Market participants hedge their price risk either directly or indirectly on the CDD, thereby effectively limiting their exposure to adverse price movements in the maize markets. This encourages increased productivity in the agricultural sector, as farmers and users are able to concentrate their efforts on managing production risks. Financial institutions lending to the maize sector are also ensured of reduced risk profiles when dealing with clients who have hedged a portion of their price risk. Traders can use the market to not only lock in prices with confidence, but also to source maize on a guaranteed basis, if required. The guaranteed physical delivery mechanisms of the market, based on regulated warehouses and electronic warehouse receipts, provide traders and users of South African maize with a secure source of maize. The CDD also offers Exchanges of Risk (EFR) and Exchanges of Physical (EFP) to facilitate the price risk faced by participants in the maize market.

The CDD of the JSE is regulated by the Financial Services Board (FSB) of South Africa, which approves the rules of the exchange, oversees its operation and reporting and acts as final authority in terms of the prevailing legislation. When trading derivative products, the exchange requires the payment of both initial margins and variation margins. The initial margins are determined by the clearing house and vary, depending on historical price volatility. The variation margin is a daily flow of funds (profits/losses) resulting from any open position calculated through a methodology of Mark-to-Market (M-t-M).

When dealing with the exchange, the exchange's clearing house becomes seller to every buyer and buyer to every seller. Members are free to deal with each other without any credit risk. This eliminates counterparty risk, which is prevalent in the over-the-counter (OTC) markets.

The domestic maize futures contracts traded on the agricultural derivatives market can be physically delivered at expiry in fulfilment of the contract. The delivery process is facilitated by the flow of electronic warehouse receipts issued by registered storage operators who are subject to financial criteria and operating conditions as laid down by the CDD. The storage operators – who store the product and guarantee the quality of the maize according to the detailed grading methodology specified by the South African Department of Agriculture,



Forestry and Fisheries – are required to unload the maize as per the details on the warehouse receipt. Delivery can take place at any JSE-approved silo and each delivery point is subject to a location differential based on prevailing transport costs.

Spread contracts, allowing participants to take positions in product spreads (the difference between white and yellow maize) and calendar spreads (the difference between the prices in one month against the price in another month), are also available and add to the hedging opportunities available on the market.

Both call and put option contracts on white maize and yellow maize are also available to allow participants additional price risk management tools. To accommodate those participants who wish to hedge the international price of maize, the CDD of the JSE also trades cash-settled maize contracts in South African rand (ZAR) that are settled based on the closing prices on the Chicago Board of Trade (CBOT). This product serves those participants within South Africa seeking easy access to the international market, who wish to hedge in ZAR based on expectations of international directional price and spread movements between South African maize and US corn prices.

For the latest information, and further details and information please consult the JSE website at www.jse.co.za – Products & Services – Agricultural Derivatives – Corn Futures and Options.









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