STAPLE FOODS VALUE CHAIN ANALYSIS

COUNTRY REPORT - ZAMBIA

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ACRONYMS AND ABBREVIATIONS

ACF	Agricultural Consultative Forum
ACT	Competitiveness and Trade Activity
AGCI	African Growth and Competitiveness Initiative
AGOA	African Growth and Opportunities Act
BOZ	Bank of Zambia
CAADP	Comprehensive Africa Agriculture Development Programme
CEE	Citizens Economic Empowerment
CEEC	Citizens Economic Empowerment Commission
CF	Conservation Farming
CFU	Conservation Farming Unit
COMACO	Community Market for Conservation
COMESA	Common Market of Eastern and Southern Africa
CPI	Cost Price Index
CSO	Central Statistics Office
DMMU	Disaster Management and Mitigation Unit
DNA	Deoxyribonucleic Acid
DRC	Democratic Republic of Congo
EAC	East African Community
ECZ	Environmental Council of Zambia
FAO	Food and Agriculture Organisation
FBS	Food Balance Sheet
FEWSNET	Famine Early Warning Systems Network
FISP	Farmer Input Support Programme
FNDP	Fifth National Development Plan
FoB	Free on Board
FRA	Food Reserve Agency
FSP	Fertiliser Support Programme

FSRP	Food Security Research Project
GART	Golden Valley Research Trust
GDP	Gross Domestic Product
GFRS	Global Food Security Response
GMO	Genetically Modified Organism
GTAZ	Grain Traders' Association
Ha	Hectare
IEHIA	Initiative to End Hunger in Africa
Kg	Kilogramme
LUSE	Lusaka Stock Exchange
MACO	Ministry of Agriculture and Cooperatives
MAZ	Millers' Association of Zambia
MCTI	Ministry of Trade Commerce and Industry
MFN	Most Favoured Nation
MMD	Movement for Multiparty Democracy
MOU	Memorandum of Understanding
Mt	Metric tons (Tonne)
NAMBOARD	National Agricultural Marketing Board
NAPSA	National Pension Scheme Authority
NEWU	National Early Warning Unit
NFBS	National Food Balance Sheet
NGO	Non-Governmental Organisation
NMC	National Milling Company
PAM	Programme Against Malnutrition
PHS	Post Harvest Survey
PQPS	Plant Quarantine and Phytosanitary Services
R	Rand
REWU	Regional Early Warning Unit

RSA	Republic of South Africa
SADC	Southern Africa Development Community
SAFEX	South African Futures Exchange
SAGIS	South African Grain Information Service
SCCI	Seed Control and Certification Institute
SI	Statutory Instrument
SMS	Short Message Service
SPS	Sanitary and Phytosanitary
UNZA	University of Zambia
VAT	Value Added Tax
WFP	World Food Programme
WRS	Warehouse Receipt System
WTO	World Trade Organisation
ZABS	Zambia Bureau of Standards
ZAMACE	Zambia Agricultural Commodity Exchange
ZANACO	Zambia National Commercial Bank
ZARI	Zambia Agricultural Research Institute
ZEGA	Zambia Export Growers Association
ZESCO	Zambia Electricity Supply Company
ZNFU	Zambia National Farmers' Union

Contents

LIST OF FIGURES

LIST OF FIGURES

EXECUTIVE SUMMARY

This value chain analysis is replicated in other African countries with the aim of increasing competitiveness in delivery of staple foods to consumers. Sensitivity to equitable distribution of rewards from liberal trade is a pre-requisite when analysing policies intended to reduce consumer pricing when a large proportion of Zambia's poor are dependent on agricultural for a living, since hasty exposure to the efficiencies of more developed economies can make poor farmers poorer.

The analysis reviews the economic and socio-political framework of agriculture with specific reference to the main crops, but excluding soya, and including pulses and millet with little significance to Zambia. It has been examined through documents and by distribution of questionnaires with follow-up interviews with farmers, traders, millers, processors and their organisations, NGOs line ministries and regulatory bodies in Lusaka and some provincial towns. Limitations arise from inadequate data sources and protection of commercial positions through secrecy and some determined obfuscation. Conclusions, their political implications and recommendations are derived from the views of stakeholders.

Agriculture's significance to the Zambian economy is due to the high proportion of the population with little option other than to derive its income from the sector, the landlocked position and the rich natural endowments that lend themselves to farming. Policy has evolved tortuously over 40 years from socialist forms towards full liberalisation, constrained repeatedly by political nostalgia for price manipulation to appease urban consumers, and by diversion of attention towards the sometimes more alluring prospects of the mining sector.

Agricultural policy has been the vehicle of social welfare, ostensibly delivered to producers but largely diverted through farmers to consumers. Welfare has spawned duality in the farming sector and emasculated the commercial imperatives in agriculture that could spearhead economic development. Price support on inputs for targeted farmers under Fertiliser Support Programmes (FSPs), while absorbing 97% of the budget for agriculture, has not achieved its stated aims of demonstrating the rewards of increased yields but has resulted in dependence on government support that is non-dependable due to late deliveries and corrupt diversion of fertiliser. And since producer prices have been tailored by Food Reserve Agency (FRA) pricing policy to the FSP beneficiaries' costs of production, it has rendered those who are not supported, who are the more reliable producers for the market, non-viable.

Advancements in small-scale production through conservation farming (CF) techniques have opened a route by which dedicated farmers can achieve yields comparable to the best commercial farmers', without the need for capital equipment. Wide adoption of CF, in the context of conducive marketing policies and an enabling business environment, could usher farmers towards wealth by sustainable exploitation of Zambia's resource base. In order to unleash the production potential to feed markets in Zambia and neighbouring countries while they have deficits, the costs of production must be reduced by embracing greater efficiency and foregoing the temptation to derive government revenue and unofficial rent from many components of the sector. The producers' cost structure is closely correlated with efficiencies in the national economy and the political framework in which it operates.

The challenges to reducing costs include the reduction of finance charges to agriculture. The perceived risks attendant on any business venture in Zambia relate to political stability and the potential for disruptive policy decisions. Risks in farming are amplified further by natural causes but the cost of agricultural finance in Zambia is disproportionately high because of the competition for loans from more reliable enterprises with quicker turnover and, above all, from the demands of government spending, which provide banks with a well-secured and lucrative source of income that diverts them from any real interest in agriculture. Fluctuations in exchange rates also expose agriculture to variability on some production costs, since most inputs are foreign exchange derived, and to variability in the competitiveness of exports and exposure to imports. Lack of stability in many facets of the economy encourages all commercial enterprises to increase their margins as a hedge against unfavourable conditions, which has a spiral effect on prices and undermines international competitiveness.

Risk also attaches to the policy environment for agricultural marketing in which FRA buying and selling strategies can undermine viability of storage and price speculation for traders, and early production by farmers. Export and import bans are also often applied, under pressure from a number of lobby groups including purely political interests, which can obliterate current and future trading opportunities and deter producers from expanding their output.

The focus of the value chain analysis on major staple crops is on the constraints to competitiveness within the provision of services to agriculture, to farming, trading, processing, wholesale and retail sectors. It also reviews the conditions applying to imports and exports, to the processes involved and the regulatory framework that should govern them.

Maize production is the predominant agricultural activity, generating output to meet national demand of 1.4 million tonnes per annum. Yields from the small-scale sector are less than 1.4 tonnes unless fertiliser is applied to raise them to 2.5 tonnes, or 5.5 tonnes in the commercial sector, which provides 30% of the national requirement but a much higher proportion of the marketed production. Low yields are attributable to recycled seed, late planting, low input levels, inappropriate spacing and tillage practices and low producer prices. Of all the maize planted since 2004, 33% has been abandoned due to droughts, floods, weed competition or lack of labour. Periodic export bans and price manipulation have deterred farmers from increasing production to levels previously achieved. Average into-mill prices have ranged from $190 to $270 per tonne since 2004.

Half of all maize produced is consumed by subsistence farmers without entering the market or the formal milling sector. The majority of marketed maize is milled commercially for urban consumers into refined Breakfast meal or less purified Roller meal. The stockfeed and brewing industries absorb increasing proportions and regional trade adjusts for imbalances in supply and demand when trading policy permits. Exports to the region are opportunistic rather than strategic and the rewards have usually been confined to FRA or privileged individuals. The FRA is mandated to hold 250,000 tonnes but has entered into the trading arena and brought about price manipulation to the cost of the private sector. Porous borders particularly with D R Congo and Malawi account for as much as 100,000 tonnes of exports of milled maize in some years and 10,000 tonnes of imports. Official imports of maize grain have not exceeded 100,000 tonnes in any of the previous five years, and cross border trade may not have exceeded 30,000 tonnes.

Territorial variability in maize producer prices is wide and reflects isolation and transport costs, whereas seasonal variability in US Dollar terms has been insufficient to cover storage costs due to FRA price manipulation and exchange rate movement. Consumer prices are politically sensitive but also reflect taste for refined product such that cross-subsidy from Breakfast to Roller meal is often practiced by millers. The expanding informal milling sector operates hammer mills in rural and peri-urban areas mostly during the dry season on a toll basis or through informal trading arrangements that undercut commercial mills.

Producer margins on maize for unsubsidised farmers are negative, implying no reward for risk or labour or land resources applied to production, and trading margins are precarious under the influence of FRA, export bans and exchange rate movements. Milling margins are positive, at least when competition from hammer mills is reduced by rains, although assumptions have been made in the face of inscrutable costings.

Wheat production is solely irrigated and confined to commercial farms. Production has reached 195,000 tonnes while demand is 210,000 tonnes and growing as urbanised society swings towards bread. Capacity to produce implies heavy capital investment while medium to long-term loans are not readily available, so production levels do not fluctuate without cost to producers. A fund for irrigation development has been diverted to Citizens' Economic Empowerment. Prospects for domestic production increases to match demand are tempered by competition from duty-free imports, export bans, access to capital and electricity supply capacity. Imports in 2009 caused a crash in price from $720 to $350 per tonne and application of new standards introduced price incentives for greater quality. A shift in production patterns will emerge, favouring efficient producers supplying good quality wheat.

Tariffs on regional trade allow duty-free importation of durum wheat, providing a loophole for millers to import other bread-making wheat, falsely labelled as durum. Tariff structure with South Africa now allows duty-free import of wheat while retaining 15% on flour. The importation of South African wheat is counter to the farmers' position on Rules of Origin which objected to imports from a country in the region that was an importer. Although wheat imports have now been banned by Presidential decree, there remains a surplus that continues to deflate the producer price.

Development of seaport handling facilities at Beira will increase the challenge for the domestic producers from imports originating outside the region, particularly because its owners also own the largest milling company in Zambia.

Prevailing producer prices of $385 per tonne imply a loss of $184 per tonne to the producer under 2009 input cost structure and yields of 6.5 mt/ha. When electricity supply is intermittent the loss is greater. The miller margin, with costs assumed to be as high as $100 per tonne is over $ 400 per tonne and the margin for bakers is much more.

Rice production in Zamia is entirely in the hands of small-scale producers with output of only 23,000 tonnes despite several interventions by donors. The Food Balance Sheet (FBS) states that 42,000 tonnes are produced and a further 12,000 tonnes are imported. In fact imports have declined from 23,500 tonnes in 2004 to 16,200 tonnes in 2008, much of which is refined long-grain or Basmati rice retailing at up to $1,000 per tonne. Rice is something of a luxury food, consumed in the "hungry season" in January and February by poor farmers, but sought after by foreigners from rice eating nations who declare a liking for Zambian rice.

Production areas are remote from large concentrations of population so transport costs are significant. There is scope for improved productivity in the rice industry, particularly with the developments elsewhere in high-yielding upland rice varieties.

Sorghum has been exclusively a smallholder crop but a few commercial farmers are now beginning to produce due to the interest shown by a new beer brewing company. Production has declined from 57,500 ha in 2005-06 to 24,350 ha in 2008-09 at the same time as the price has risen in Kwacha terms from 75,000 to 94,000 per 50 kg bag and individual yields have increased tenfold to 3 tonnes per ha. Although the Kwacha price masks a decline in the US $ denominated price, it is anticipated that production will increase in response to advertised demand and extension advice. Interest in sweet sorghum for biofuel is also increasing in the new energy climate and as a result of research by UNZA. Trade in the region amounts to a few hundred tonnes from the South in annually declining quantities. The crop is susceptible to bird damage.

Millet production has also declined with increasing prices. It is mainly a subsistence crop with very little marketed or traded grain.

Beans have seen an increase in yields and in price with 44,500 tonnes produced and a growing market for canned product and dried beans as a reserve against poor harvest. Farmers can produce three crops a year by intercropping and careful choice of planting areas and outgrower schemes for export crops also take advantage of bean production by their farmers. Better margins attach to retailing than to production and there are lucrative opportunities in arbitrage due to producer price disparities.

Pulses are a very insignificant crop for producers and consumers in Zambia where less than 12,000 tonnes are produced.

Cassava production is of increasing significance with 1.16 million tonnes currently produced on an upward trend but only a small fraction currently marketed. It forms the staple food in large parts of the country to the north and west either as meal or as fresh tuber and is beginning to be applied to stockfeed, which could absorb 250,000 tonnes per annum. Competition from imports should be countered by tax incentives for processors and manufacturers to use local produce. Cassava meal is retailing at $1,156 per tonne. Distribution of improved varieties with disease resistance and higher yield potential need to continue as the average yield is less than 3 tonnes per ha of dried tuber. Small-scale processing capacity is required to create a viable marketing network of dried product decimating the transport cost.

Chalimbana confectionary groundnuts formed the basis of a thriving export industry in the 1960s that later failed as parastatal administration costs suppressed farmer profitability, and South Africa assumed the lead with smaller Natal Common nuts that became the fashion. Groundnuts remain a smallholder crop producing around 150,000 tonnes from low yields and production systems susceptible to aflotoxin contamination. Shelled confectionary nuts are now imported into Zambia and there are no recorded exports. Opportunities exist to control aflotoxin contamination and to export once there is a system in place to improve production, marketing and processing. Wide variation in market prices allows retailers to capture the greatest share of value from the industry.

Pricing and marketing policy, ostensibly liberalised, remains intrusive and manipulative on the staple foods sector through the mechanisms of Fertiliser Support Programmes, FRA marketing strategies and export and import controls in the name of food security. FSP introduced a two-tier production costing structure which did not benefit the beneficiaries while also making unsubsidised production non-viable; FRA sales at below cost made all storage into loss-making ventures; and controls applied to trade made all production and trading ventures precarious or loss-making and caused loss of trust by foreign trading partners.

Reduction or removal of tariffs has exposed Zambian producers to efficiencies of more advanced economies resulting in decline and collapse of some enterprises, particularly those exposed to challenges from power supply, communications, logistics or management capacity that confront development pathways. The standards bureau is not yet engaged with issues relating to quality to be able to ensure that standards have been properly applied in traded commodities but ZAMACE has incorporated them into their trading functions and ensures their application. The Warehouse Receipt System is still not fully operational due to delays in enacting laws to support it, as is the case with ZAMACE.

The Food Balance Sheet is becoming increasingly useful but accuracy needs to be improved through obligations and penalties on those required to provide information contributing to it. Regional Balances would be useful if accurately maintained and made accessible to all.

1. INTRODUCTION

1.1. THE CONTEXT OF THE STUDY

The Competitiveness and Trade Expansion (COMPETE) program, in collaboration with EAC, COMESA and EAGC has selected Staple Foods, among other sectors, for Value Chain Analysis (VCA) with the objective of enhancing economic growth and food security in East and Central Africa.

COMPETE is funded by the United States Agency for International Development office for East Africa (USAID/EA) under the auspices of the WTO Aid for Trade framework. It responds to four major US Government initiatives – AGCI (African Growth and Competitiveness Initiative), IEHIA (Initiative to End Hunger in Africa), GFRS (Global Food Security Response), and AGOA (African Growth and Opportunities Act).

1.2. THE SIGNIFICANCE, OBJECTIVES AND SCOPE OF THE STUDY

The overall objective of this assignment is to conduct value chain and trade policy environment assessment for select staple foods in Zambia geared towards providing a framework for the development of a strategic plan to improve the volume and value of staple foods marketed in Zambia. The specific objectives of the assignment are to: -

1. Synthesize of value chain assessment reports (staples and non-staples) by Governments development partners and map out activities of development partners by identifying who is doing what and where.

2. Conduct a **VCA** starting with production/farm gate, and moving through all points of market transfer and value-added including but not exclusive to: service providers (input/service suppliers), producers, traders, grain reserves, parastatals, exporters, and processing companies. Include all primary products and by-products. Produce a VCA flow chart for each of the products.

3. List all "**players**" along the chain by name, location type of entity and contact information. This will include all major producer organizations, cooperatives, and key corporate (commercial) estates if any; all processing companies, status of operation, i.e. dormant, % capacity, and ownership structure.

4. Identify and explain all **issues, problems and constraints** at each transfer point in the chain; i.e. yields, prices, payment systems, transport, quality, frequency of transfers (points of sale); storage limitations; processing limitations (low technology), etc.

5. Identify **volume** flow between sectors and cover all local use (rural) and consumption of Staple foods and Staple foods by-products. Do farmers keep a portion of their Staple foods crop and if so, for what purpose?

6. Identify and explain the **value change** between transaction points adjusting for measurement differences (baskets to kilograms) and conversions from one type to another type (Staple foods to processed product such as mealie meal or pop corn).

7. Identify and analyze, using COMPETE template for trade policy platform, all trade regulations that govern intra-country flow; exports and imports of Staple foods – Local

Authorities regulations, Quality Standards, Sanitary and Phytosanitary and Pest Risk requirements, tariff and other non tariff charges on Staple foods imports, customs clearance procedures.

8. Assess the status, impact, opportunity for reform and measures necessary to facilitate reform of pricing and marketing policies

9. Assess the status, policy framework and opportunities of the structured trading system

10. Provide insight and personal perspective on the issues and problems. Make recommendations on interventions at "links" in the value added chain that may assist the industry in general and the smallholder farmer in particular to improve on volume and/or value of the produce.

11. Develop a five-year base line of data for volume and value ending with the 2008/2009 season if possible.
    i) Production – volume, value and price (in US$ equivalent), 2004 – 2008
    ii) Exports – volume and value (in US$ equivalent), 2004 – 2008, disaggregate by destination countries
    iii) Domestic sales – volume and value (in US$ equivalent)
    iv) Imports – volume and value (in US$ equivalent), 2004 – 2008, disaggregate by countries of origin

This report presents the results of a market assessment and baseline survey of agricultural value chains for nine staple foods in Zambia.

- Maize
- Wheat
- Rice
- Sorghum
- Millet
- Beans
- Pulses
- Cassava
- Groundnuts

1.3. THE METHODOLOGY USED IN THE STUDY

The study has made use of existing data with CSO, FRA, MACO, MAZ, GTAZ, ZNFU and individual farmers, traders and processors. Questionnaires were sent with explanatory notes to executives of associations and to some individuals, and follow-up visits made to discuss replies and explore opinions. Interviews were also held with NGOs involved in development of various commodities and the information was cross-checked where possible with other components of the industry.

While the investigations were centred in Lusaka, regional variation was determined by visits to other production centres.

1.4. STUDY LIMITATIONS

While the consultant has made every effort to determine the scale of trade in the informal sector of the economy, hard statistics do not exist and the extent of production, trade processing and consumption remains subject to some assumptions, particularly in the case of sorghum, millet, beans and pulses but also to some extent with maize and rice. Zambia's geographical size and the informal economic structure that prevails in rural areas imply that data are sparse.

Some aspects of the staple food industry have operated in an opaque commercial environment in which advantage has been gained from what is known by one party but not by another. This atmosphere persists today with only a slight concession to clarity as increasing numbers of institutions and functions attempt to gather data on which to base policy or commercial decisions. Nonetheless, secrecy and reluctance to divulge information are prominent features of the sector that, despite attempts to triangulate figures, necessitate application of assumptions to some gaps in the value chains.

1.5. STRUCTURE OF THE REPORT

Section 1 explains the rationale for the study, methodology and limitations. Part I of the body of the report introduces Zambia and the agricultural economy, leading to Part II with an exploration of the commodities and their value chains in Sections 4 to 12, each of which looks at production, consumption, trade, stakeholders, market dynamics and structures, and an analysis of the economy of the sector. Part III, in Section 13, examines the policy environment and its impact on the industry and its participants and, in Section 14, looks at the regulatory framework from the perspective of the business-enabling environment. Part IV draws conclusions, notes the policy implications and makes recommendations to address the issues raised. Annexes contain relevant documents and lists associated with the sectors.

PART ONE: THE ECONOMY

2. AN OVERVIEW OF ZAMBIA'S ECONOMY

Zambia is landlocked with eight bordering neighbours and 750,000 square kilometres including lakes. In 2009 the population is 12.896 million, increasing at 2.9%, of which a high proportion is under 15 years old and 35% is urbanized (81% in Lusaka Province). Life expectancy at birth is 52.2 years. Population density is c. 12/sq.km. The Nominal GDP in 2008 was K 53,615 billion (US$ 14.1 Billion at K 3,800 /US$) showing a growth rate of 5.8% and GDP per capita of K 4,280,368 (US$ 1,126). The annualised rate of inflation increased from 9.3% to 15.3% through the year, predominantly as a result of Kwacha devaluation driven by declining exports of minerals and agricultural products. The exchange rate dipped from K3,792 per US$ (BoZ mid range) to K3,249 before rising to K4,257 by year end.

The economy has long been dominated by the copper industry in particular, supported by cobalt, lead, gold and precious stones, all of which witnessed unprecedented returns from late 2005. Initial absence of provisions for windfall taxes implied minimal benefit to the economy from the surge in mining returns, but increased flow of foreign exchange derived from the sector caused the Kwacha to strengthen from K5000/US$ to K2800/US$ in late 2005, thereby undermining the viability of those export sectors with a high proportion of Kwacha denominated production costs such as labour. In 2008 the trade balance was just negative at US$ 12 million with total exports (cif) of US$ 4,316 million. External debt by public and private sectors tripled from $331 million (1.5% of GDP) in December 2005, following HIPC completion and consequent debt write-off, to $1,009 million (2.4% of GDP) in December 2008.

There is a widely apparent surge in activity within the Zambian economy in which a building boom is accompanying expansion in consumerism on an unprecedented scale, and the growing middle class is outwardly displaying abundant and even extravagant wealth while the rural poor remain largely unaffected except to the extent of access to cell phones and some improvements to rural communications to facilitate marketing. This apparent accumulation of wealth is, at least in part, related to the decline in real interest rates of over 30% (nominal 49%) in 2002 to 5.3% (nominal 20.6%) by end 2008, while the real average commercial savings rate moved from -17% (nominal 11.2%) to -10.5% (nominal 4.8%).

3. THE STATUS OF THE AGRICULTURE SECTOR

3.1. THE SIGNIFICANCE OF THE AGRICULTURE SECTOR

When the copper industry is not thriving, agriculture's share of GDP is over 20%, but since copper fortunes have recently been buoyant the proportion of GDP attributable to agriculture and forestry has ranged from 9.4% in 2005, 13.8%, 13.2% and 12.2% in 2008. The contribution of agricultural exports to export earnings has ranged from 8.9% of total export earnings in 2005 to 20.0% and 9.8% in the two following years. But again, this reflects variations in the copper export earnings, which are much more significant than agricultural export earnings. The agricultural export sector in 2005 provided employment directly to 471,000 workers on a seasonal basis, commercial agriculture employed 65,500 on a formal full-time basis, and an estimated 870,000 families relied on subsistence or low-income forms of agricultural production. Although formal employment in agriculture has increased by 16,000 since 2002, it has declined by 21,000 since 1993, possibly as a result of advancing mechanisation and the increasingly onerous obligations by employers towards the welfare benefits of their workers that have dramatically inflated the cost of formal, full-time employment in the long term. According to CSO 2008 statistics, only Trade (87,000) and Personal and Community Services (198,000) employ greater proportions of the formally employed workforce of 544,000 people. In general the agricultural sector occupies a very strategic position in the economy providing a livelihood to two thirds of the population when family dependents are taken into account.

3.2. DYNAMICS OF GROWTH OF THE SECTOR

Prior to 1991, under the Kaunda regime, the agricultural economy was focussed almost entirely on maize and was heavily distorted by price fixing. Liberalisation of the economy, under the newly elected MMD, thrust farmers into a free-market to which they were entirely unaccustomed. It also heralded a brief but devastating rise in real interest rates, reaching 120% (nominal 360%), from which many farmers took years to recover while some were forced into bankruptcy. Other farmers in the small-scale sector found that they no longer enjoyed the equalising effect of pan-territorial (and pan-seasonal) pricing that had lent them viability in remote locations. The application of market forces to a largely unschooled small-scale producer sector caused hardship to many until they adjusted to the new order, but it also brought commercial rationality to the dynamics of production and subjected the sector to the rough and tumble at play on the "fundamentals" of the economy of the early years of the 21st Century.

The demise of the neighbouring Zimbabwean agricultural sector changed the dynamics of the markets and introduced to Zambia an influx of commercial farmers. These new-comers brought some expertise, some capital and a measure of dynamism to the commercial farming sector that also stimulated existing farmers into greater production. Several of the new-comers arrived with only a recommendation from Zimbabwean to Zambian banks, and succumbed to heavy debt burdens within a stagnant tobacco industry, while others have managed to boost output of maize, soya, wheat and horticultural crops. Zambia has not taken full advantage of the opportunities to export staple food crops to Zimbabwe despite the abundant natural resources at her disposal. This can be attributed to lack of access to finance and to non-conducive policy framework.

While household consumerism, as expressed by loan concentration, increased by 240% between September 2006 and December 2008, the loan concentration to agriculture was reduced by 42%. This was driven by the strengthening of the Kwacha against the US Dollar between 2005 and 2006 which reduced the Kwacha cost of imported consumer goods and rendered exports such as high-value horticulture, tobacco, sugar, cotton, beef and even maize non-viable and thereby bankrupted several producers. It also heralded increased imports of major staple crops, both legally and illegally, reducing and reversing the profitability of Kwacha-funded domestic enterprises. The exchange rate of the Kwacha is ostensibly subject only to free market forces but in fact is manipulated by non-free market forces such as debt relief, injections of aid including food aid, and regulatory controls such as minimum wage policies and trade restrictions. In addition the Bank of Zambia bought and sold reserves in order to maintain the exchange rate within a predetermined band. The exchange rate against the US Dollar, which was itself also undergoing depreciation, fell from K4800 to K2800 between August 2005 and May 2006, rose to K5800 in February 2009 and declined again to K4700 in October 2009.

The secondary effect was that commercial banks viewed agriculture as increasingly risky and they therefore loaded the lending rates to the sector. Interest rates at commercial banks have risen from 25.5% in September 2008 to 29.5% in August 2009 while inflation has fallen from 14% to 12.5% over the same period. Opportunities for profit taking by banks in other sectors of the economy, particularly treasury bonds and manufacturing, further militated against agricultural lending. In addition, commercial farmers frequently reported cases of unsympathetic demands by banks, such as repayment prior to harvesting or increasing scales of operation beyond the management capacity of the farmer in order to meet over-ambitious output targets. Emergent farmers have few opportunities to secure loans because of difficulties in obtaining title deeds and providing collateral based on fixed capital assets secured by legal title. Small-scale farmers depend on savings, informal sector loans and subsidies on inputs to finance their cropping, and there are occasional ad hoc arrangements through donors or government to finance the supply of breeding stock, oxen or other items to targeted beneficiaries, which have had minimal impact on the economy.

The impact of these conditions on the agricultural sector has been a general lack of productivity in rainfed cropping, livestock and fisheries leading to a growth rate to 1% while the population has continued to grow at 3%. This disappointing performance has occurred despite the allocations of up to 10% of the national budget to the sector, which has been dispersed in a manner that has focussed more on political ends and consumer benefits than on factors geared to productivity. This decline is, therefore, the result of neglect of the fundamental needs of agriculture in which 65% of the poor are occupied but which in the longer run has been allocated only 5% of government and donor spending. It is also attributable to the perpetuation of a poor business environment that has not been conducive to investment.

Commercial decisions as to how much of a staple crop to plant are tempered by perceptions of distortions to the markets as well as access to and cost of finance. Distortions are created by export bans, which help to reduce the consumer price but at the cost of farmer income. Even where the ban is lifted, the export opportunity is usually afforded only to the FRA, which relieves the market pressure but does not otherwise deliver benefits, such as price advantage, to the farmer. Distortions also arise from fertiliser and seed subsidies, which result in a dual producer cost structure. Those who do not benefit from the subsidy address a market

that can access supplies from a subsidised source. The commercial sector, which is the more reliable source of production under adverse growing conditions, is deterred from producing for a market in which a major component of the producer community is heavily subsidised. Further distortions to the producer cost structure arise from the disparity in the true cost of labour in the formal and the informal sectors. The formal sector has justifiable obligations to pay for days not worked (holidays, leave, sickness, funerals) and other benefits (long-service bonus, housing, NAPSA, Workmen's' Compensation, housing, clothing) that give rise to the cost of a day worked by a formal worker being 2.18 times the actual daily wage, whereas the informal sector pays only the daily wage, which might be paid in kind, such as food or second hand clothing, and be valued below the minimum wage.

The duality of the producer sector is due to the commendable efforts by government to favour the growth of the small-scale sector while understandably leaving the commercial sector to fend for itself, competing with the subsidised smallholder sector through access to advanced technology, to capital and economies of scale. The yields achieved under traditional maize husbandry practices are around 1 tonne per hectare due to poor timing and tillage practices and because 67% of smallholders use no fertiliser at all, and the average use among all farmers is only 10 kg per ha. Under these circumstances, 70% of small-scale farmers have no surplus product to sell and 80% of the sales of maize from the sector is derived from only 10% of the small-scale farmers.

However, spectacular advancements have been made in the small-scale sector by those who have adopted conservation farming methods in their entirety as recommended by the Conservation Farming Unit (CFU). Individual farmers have been able thereby to elevate their yields to 8 tonnes per ha and more, surpassing average commercial farmer yields, without the need for capital equipment other than a substantial hoe or ox-drawn ripper. The wide dissemination of these techniques, which are equally applicable to large scale mechanised production, and their sustained application could result in Zambia's self-sufficiency in maize and soya production in a sustainable and profitable manner within the foreseeable future and it could sweep before it the poverty that characterises the existence of rural farming families. Benefits from CF techniques will also accrue from production of cotton, beans, sunflower and sorghum as well as to the environment by sedentarising farming communities on the same land rather than them moving on to virgin lands having compromised the productivity of their fields.

Disturbing features of the agricultural sector are, firstly, the proportion of the small-scale crops, which are abandoned each year due to late land preparation, late delivery of inputs, challenge from weeds, lack of labour, flooding, drought and other causes; and secondly, the harvest losses reported in the food balance sheet due to poor storage, purchases of poor quality grain and possibly to inaccurate record keeping or mismanagement of stocks. In 2007/08, 41% was abandoned and in the ideal season of 2008/09, it was 19% (33% on average over the last six years), while over 94,000 tonnes of maize were estimated to be lost after harvest in 2008.

Within the above context the agricultural sector from 2005 has grown by: 2.8%, 3.9%, 2.8% and -0.1% in 2008. The seasons have been characterised by generally adequate to surplus rainfall distributed well, both through the season and across the country, with some crop loss due to flooding in parts. However, this achievement falls far short of the target 8.3% specified in the Fifth National Development Plan (FNDP).

3.3. MAIN COMMODITIES PRODUCED

The low areas of Zambia, Region I, have unreliable rainfall of around 500 mm per annum. Most of the country lies on a plateau at over 1000 meters altitude in Region II with rainfall from 750 mm to 1200 mm towards the more northerly Region III. There is a mono-modal summer rainy season lasting up to five months. Much of the land in Zambia is potentially arable (60 million hectares) with only some 10 percent actually in use. The soils are acidic and sandy with a general deficiency of phosphorus, nitrogen and sulphur in the higher rainfall areas.

A wide range of crops can be produced, and under competent management yields in excess of six tonnes per hectare of maize are routinely produced and ten-tonne yields are not unknown where acidity is addressed and timeliness observed. In the 2008/09 season, 57.8% of the total cultivated land was occupied by maize. And in Western Province, which is generally inappropriate for maize production being too sandy and too hot, the proportion devoted to maize was 70.8%.

Very high quality Virginia tobacco is grown by commercial and emergent farmers and Burley tobacco is grown by villagers. Cotton and confectionery groundnuts are among smallholder crops that are renowned for their quality. Rice is grown in flood plains of the Zambezi in the west, in Luapula and in Eastern Provinces. Cassava is widely grown in regions II and III but the processing industry remains largely undeveloped. Soya provides good double-cropping opportunities with wheat, and rotation with rainfed maize. It is predominantly produced by commercial farms although there was a surge in smallholder production when logistical support was offered through the parastatal cotton industry of the 1980s. Sweet potato production by smallholders is increasing steadily in the north of the country and is exported informally in small parcels by truckers who sell it in Botswana. Wheat is entirely irrigated and therefore depends on investment in water sources, irrigation systems and electrification in addition to harvesting and planting equipment.

3.4. MAIN CHALLENGES AND CONSTRAINTS

Constraints to expansion in the smallholder sector include access to seasonal credit, poor traditional agricultural practices such as ploughing, burning crop residue, late planting and weeding, disease-impaired labour force, disease-depleted animal draught power resources and non-commercialised society. The emergent sector is further constrained by the cost of finance for seasonal or capital investment compounded by the arduous task of obtaining title deeds for collateral, poor application of appropriate production technology, inadequate marketing facilities with non-functioning Warehouse Receipt System (WRS) and non-dependable producer price resulting from policy based market distortions such as export bans, imports and FRA marketing strategies.

The same conditions afflict the commercial sector, which is also constrained in its capacity to expand by the cost of finance. Commercial Bank lending to agriculture amounts to $480 million or 20% of total lending by commercial banks. The component of the interest rate at commercial banks that is attributable to inflation is 16.9% and the interest paid to depositors is 5.1%, giving a nominal base interest rate of 22%. This is further compounded in the agricultural sector by bank charges to account for the risk factor of 5% to 8% attributed to the individual within the sector to give an average lending rate between the banks in September

2009 of 29.6%. This lending rate is not specific to agriculture since the banks perceive the economic context of all activities in Zambia to be risky, and all bank costs are spread across all sectors. The bank costs are higher in Zambia due to high levels of government borrowing which amplify the competitive environment for lending, the high cost of management staff, for which there is a competitive market raising salaries to double those in South Africa, high rents on buildings and houses, an undisclosed degree of fraud, inflation and, specifically in agriculture, a high level of non-performing loans.

The risk factor in agriculture is a function of the usual challenges from the weather, further exacerbated by policies that might disturb the market such as export bans and price-modifying marketing of produce by FRA. The compounding of these accumulated charges raises the interest payable geometrically and leads to penalty charges that are also compounded until the bank charges against a client become the major haemorrhage to the enterprise. Farmers planning their cash flows frequently omit to account for compounding of interest rates and the consequent impact of further compounded penalty charges. The compounding of the real interest rate of 5.1% would be normal international practice and does not lead to onerous financial impositions, but the compounding of additional components attributable to inflation, risk and penalties rapidly escalates. (There is a Supreme Court ruling against compounding of commercial interest rates by banks in Zambia.) The uncertainties inherent in the financial world that emanate from all these conditions also uphold the high-margin culture that has long existed in Zambia where market competition has been defused by cartels, and parastatals, protected from commercial realities by undiscerning government support, have been compliant milch cows for input and service providers.

When interest rates are examined further the real interest rate should not be viewed simply as the nominal interest rate minus the inflation rate. The correct formula is:

Real Interest Rate = 100*(Kwacha Interest Rate + 100)/(Inflation Rate + 100) – 100.

This gives the real percentage change in value of a loan in terms of consumer goods (if the CPI is used as the inflation rate) or in Dollars (if the exchange rate is used as the inflation rate). However, the CPI is measured against a basket of consumer goods that are purchased by general citizens. They are not representative of the inputs purchased by farmers nor do they represent the trend in producer prices received by farmers. Furthermore, the CPI is "smoothed" through the year, masking the seasonal variation in the Kwacha exchange rate, whereas farmers have repeatedly found that they have bought their imported inputs at a period when the Kwacha is weak and sold their crops when the Kwacha has strengthened – a process that accentuates inflation. Therefore, the impact of the financial movements has recently worked against commercial agriculture in two ways: firstly, the exchange rate movements have overvalued their inputs and undervalued their output, and secondly, the calculation of the interest rates on the basis of the CPI has masked the real interest rate by focussing on non-agricultural items. Inflation in agriculture, if measured over the production season rather than the annual calendar, has been considerably higher than that shown by the CPI.

Farmers have expressed surprise at published inflation rates since, within the farming economy, the inflation in input costs and declines in producer prices have shown trends that are far more acute than those illustrated by the CPI. This dire condition is further exacerbated by the technological changes occurring in commercial agriculture that have increased the

proportion of the sales value of the crops that is attributable to input costs and therefore demanded greater amounts of working capital (and hence finance charges) per unit of output.

A further challenge from the financial sector arises as the effect of financial costs on farmers becomes apparent to the banks; as the farming communities are reduced through imposed bankruptcies, the banks try to recover their losses to agriculture from those farmers who remain and are charged higher fees to cover the cost of their neighbours' failures, thus promoting a snowball effect of financial hardship.

The difficulties of doing business in Zambia, security of property, work permits for managers and workers and perceived longer term threats to business opportunities inherent in the provisions of the Citizens' Economic Empowerment (CEE) Act all act as a constraint to the expansion of production of commercial agriculture. The poor performance of electric power supplies and periodic constraints on access to diesel fuel has also constrained expansion of commercial enterprises. The tax regime favours agriculture by reduced rate of 15% on profits; however the effective tax rate is much higher when additional charges, including VAT, are taken into account. Wheat, pulses and beans for instance are VAT exempt, implying that VAT incurred in production costs cannot be reclaimed. Other charges on access to land, imports, transport, movement of produce, etc. effectively impose a tax burden on turnover on the average commercial farm, such that an 11% surplus on turnover would impose a 100% tax rate, and 25% surplus would impose 70% effective tax.[1]

Although only 10% of Zambia's arable land is said to be under cultivation, the statistic is misleading since logistical considerations imply that much of the unutilised land is too remote or inaccessible to be economically viable until there is further geographical expansion of commercial activity, market demand and functioning communications networks. Costs of production are too high for commercial operators to predicate production on export demand alone in border areas since, although there is current demand in neighbouring D R Congo, Angola and Zimbabwe for staple foods, export policies are unreliable and competitive advantage within the region is, at best, precarious.

3.5. AGRICULTURE SECTOR POLICIES

Agricultural policy as outlined in the FNDP promotes the development of the smallholder sector through subsidised inputs and promotion of conservation farming techniques; it supports development of irrigation capacity, animal disease control and private sector marketing within a liberal pricing structure. However, price distortions are introduced through the bans on exports of maize, subsidies on inputs to targeted small-scale growers, and the purchasing and marketing policy of FRA.

The ban imposed on maize exports is perceived to be the default policy position since exports may only be undertaken with an export permit. The ban is lifted by the issue of permits for specific quantities within a specific timeframe only when there are sufficient assurances that the national food security position is adequately provided for. No GMO products may be imported and consignments of maize have been turned back when it is determined that they are of GMO origin. Since compilation of the national food balance sheet is not a sufficiently rigorous process to provide comfort to MACO on the adequacy of supplies, export opportunities are often foregone or missed due to delays in the decision making process.

[1] *The Burden of Tax in Agriculture*. ZNFU Paper 2008.

Two subsidised producer programmes are operated, both confusingly referred to as FSP. Firstly, the Food Security Pack is a provision for the vulnerable poor, distributed through Programme Against Malnutrition (PAM), that provides sufficient seed and fertiliser for subsistence support to a family on one lima of land (0.25 ha). This programme has limited scope and little impact, if any, on the market for maize although it is clearly beneficial to the needy. Secondly the Fertiliser Support Programme has operated by providing fertiliser and maize seed subsidised to varying degrees for two hectares of land. It is intended to set smallholders on the path of improved productivity by demonstrating the benefits of fertiliser and hybrid seed over a limited span of years. This FSP has expanded from 50% subsidy applicable to 120,000 smallholders in 2007, 75% subsidy to 200,000 farmers in 2008 and 80% subsidy applied to 240,000 farmers in 2009 and accounting for 52.8% of the agricultural budget on average between 2004 and 2008. The Minister of Agriculture has now announced that the FSP has become the Farmer Input Support Programme (FISP), which will support 534,000 farmers with 106,838 tonnes of fertiliser and 5,341 tonnes of seed.

The Maputo convention in 2003 promoted the spending of 10% of the National Budget on agriculture at a time when Zambia was spending 6.1%. Since then, Zambia has achieved compliance with CAADP and exceeded the 10% target, reaching 12% in 2008 through the FSP, but it is estimated that, in order to achieve the target growth rate in agriculture by 2015, allocations of 16% of the budget will be needed.

There have been allegations of misappropriation of funds and misdirection of fertiliser to intended beneficiaries, which has drastically reduced the effectiveness of the budgetary allocations. There is also a tendency for recipients to sell the subsidised fertiliser to non-target farmers, which would incidentally meet the immediate cash needs of the recipient and probably redirect the fertiliser into more productive applications. When farmers have laid the requisite deposit and placed their expectations on it, their prospects are damaged when deliveries are delayed sometimes to January since yield expectations are reduced by 1.5% to 2.4% by every day's delay in planting after the optimal date with adequate rain in mid November, so that the price advantage offered by the subsidy is entirely negated by the delays in planting and consequent loss of yield. The extent of the subsidy accentuates the duality of the production sector, as described above.

The remit of the FRA was originally to ensure a food reserve of 250,000 tonnes, sufficient to bridge the time between a shortage becoming apparent and the arrival of compensatory imports. However, its role has been expanded into a marketing function focussed on maize in which it offers pan- territorial pricing (thereby undermining the commercial viability of the private sector traders in remote areas) at prices that reflect the FSP subsidy (thereby removing the benefit of the subsidy from the farmer to the consumer and the administrative expenses of FRA). And since their prices reflect the FSP production costs, the farmers who were not beneficiaries of FSP are placed at a disadvantage since their production costs are not covered by the offer price. The disruption caused by this strategy is further compounded when FRA cash-flow problems are transferred to the farmers through late payments at the time when the farmers' needs for cash for school fees and other expenses such as purchasing of inputs for further cropping cannot be met. FRA's disruptive influence also reaches into the pricing structure of maize through the season since, as the price rises to account for storage, finance and some speculation, FRA can respond to government directives to release stocks onto the market to lower the price (thereby undermining the financial viability of storage in the private

sector). This action is usually accompanied by publicised accusations of "hoarding" by commercial enterprises despite the policy of encouraging capital investment in private storage facilities to spread the burden and distribute stocks. This price reducing mechanism and the reach of the FSP are more prevalent as national elections become imminent.

PART TWO: VALUE CHAIN ANALYSIS FOR SELECT STAPLE COMMODITIES

4. THE MAIZE SUB-SECTOR

4.1. MAIZE PRODUCTION

Maize is by far the most prominent crop in Zambia and forms the predominant dietary component in most of the country. Emergent farmers and commercial farmers provide the marketed production. Low average yields are due to bad timing, low input levels, inappropriate tillage techniques and the use of recycled seed by 61% of households. Open pollinated varieties are used by 1% and hybrid seed by 38%. Other factors include unclear policy signals, low producer prices in relation to input costs, poor distribution of inputs, disparity between costs of subsidised and unsubsidised production and late payment to farmers by FRA.

4.1.1. Production

Table 1 Maize plantings, production and sales

Maize	2004-05	2005-06	2006-07	2007-08	2008-09
Planted ha	834,980	784,525	872,812	928,224	1,125,849
Yield mt/ha planted	1.04	1.82	1.57	1.31	1.68
Actual production mt	866,187	1,424,439	1,366,158	1,211,566	1,888,773
Sales mt	349,734		662,470	534,294	820,318
Lusaka price K/50kg bag July,	44,444	37,780	47,625	44,544	68,111
Exchange rate K/US$ July	4680	3650	3830	3305	5190
Lusaka price US$/mt	189,93	207.01	248.69	269.56	262.47

Source: CSO, FEWSNET

Note: Smallholder farm produce sales are often made in rural areas on the basis of a "meda" or a "gallon" which is volumetric measures widely believed to represent 5kg and 20 kg but, depending on the density of the product, is usually found to contain 4.5kg and 18 kg respectively. Scope for variability and manipulation lies in the fact that the old paraffin tins that originally gave rise to the measures are being replaced by plastic containers of different capacities, and by the fact that the containers could be either leveled or heaped. Therefore, conversion from medas and gallons to kilogrammes is not a reliable linear progression. Statistics maintained by CSO on district price variations have migrated from using kilogrammes to medas in the course of 2008 and, for the purpose of comparison in these tables, the medas have been converted to kilogrammes on the assumption of there being 4.5 kg per meda.

The efficiency of input deliveries, the relative price expectations of maize and soya due to recent experience with FRA buying price, the recent experience of export bans and the distribution of rains through the season all impact on the production of maize. The figures for 2008-09 is viewed with some skepticism by farmers, traders and millers but the general upward trend is clear and is at least partly attributable to a period of well-distributed rainfall.

Late rains in Eastern Province, which supplies 24% of the marketed maize, resulted in 20% of the grain being rejected in 2009. The rot induced by high humidity results in bitterness of the mealie meal, which is rendered useless.

Projections for the period 2009 – 2013

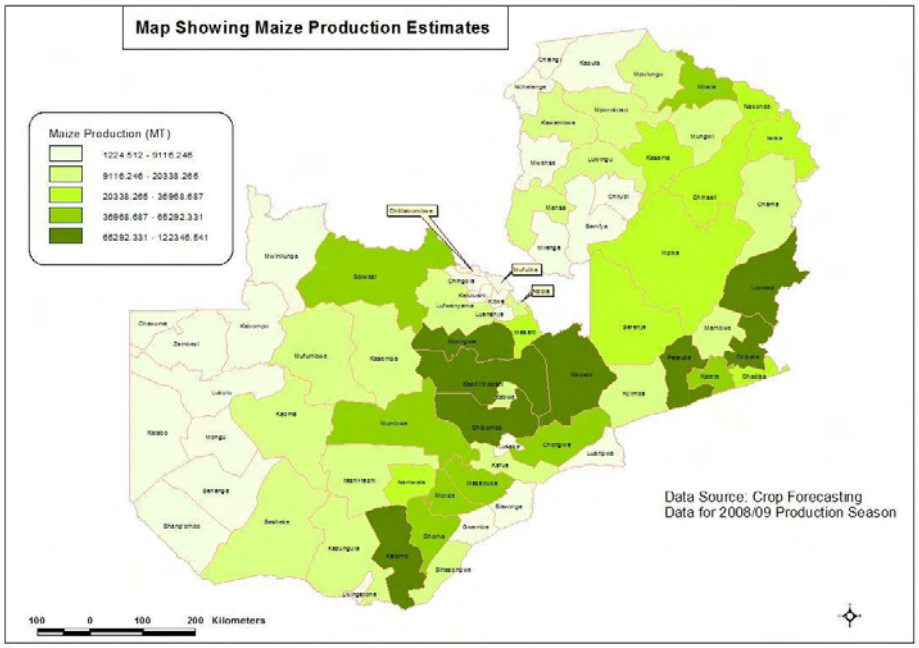
Bearing in mind that Zambia has previously produced 2 million tonnes of maize, it is clear that there is the capacity to do so again under conducive conditions. Such conditions include

timely supply of inputs, adequate distribution of rain and attractive markets. Despite the well-publicized threats from climate change, the most dubious of these conditions is the market since it is subject to policy change that is more commonly in favour of consumers than producers.

If export bans continue to undermine the confidence of investors in maize production, there will be little expansion of production from the large-scale commercial sector. However, as conservation farming techniques become more widely practiced among small-scale farmers there will be expansion from that quarter due to improved yields, so long as inputs are made available in a timely manner and rainfall is reliable. Small-scale farmers tend to be less analytical about price predictions and will therefore take less heed of suppressive policies, which unfortunately makes them subject to exploitation.

The trend towards conversion to cassava in areas that are better suited to that crop than to maize will reduce maize production in some parts of the country, but the resulting maize equivalent, as far as the food balance sheet is concerned, may show a positive trend.

The nature of the business is also evolving as there are now more traders and brokers who operate under mandates from the millers such that there is increasing specialization by which traders do the purchasing from farmers and the storage, and they supply to the millers according to prearranged schedules. Previously millers bought for their annual requirement soon after harvest but this function has now devolved to traders.



4.2. MAIZE CONSUMPTION

4.2.1. Domestic Consumption Production vs. Consumption

Domestic consumption (Domestic sales)

An estimated 50% of the maize produced in Zambia is applied to subsistence consumption and does not enter the market. Emergent farmer retention for home consumption is of a higher proportion than that retained by commercial farmers for labour or stockfeed

The trend in consumption in urban areas is characterized by a swing towards refined Breakfast meal, despite its reduced nutritional value over Roller meal, seasonally increased consumption of alternative foods such as cassava, wheat and sweet potato between April and June, increased demand from the stockfeed sector and from the breweries, including informal sector brewing of opaque beer.

National consumption levels can be approximated by assuming:

A. Population: 12.9 million
B. Average family size: 6.2 members
C. Average family consumption: 1.75 x 25 kg bags maize meal per month
D. Annual consumption = A/B*C*12/40 = 1.092 million tonnes per annum.

In addition, the brewing industry has been demanding 70,000 tonnes per annum, but they are now thought to be in decline due to bad management of the informal or emergent brewing sector where poor stock control is undermining their viability.

Production vs. Domestic consumption

Since the consumer price of maize meal is a highly political issue it behoves any government, particularly when elections are in the offing, to manipulate consumer prices with all the tools at their disposal. Such tools include input price subsidies, FRA marketing strategies and export bans, all of which militate against farmer profitability. Surpluses are unlikely to arise under these circumstances, particularly as exports are not widely competitive given Zambia's high cost structure within the region. So, despite the policy of "Maize without borders" which is promoted in the region, there is a price-penalty for producing a surplus, which falls to the farmers.

It is not the production capability that is in question, since the smaller population of the 1980s was able to produce up to 2 million tonnes when producer subsidies where effective in enhancing production, albeit at the cost of the viability of the national economy. The constraint to production emanates from the policy on exports.

Table 2 Maize production vs. consumption balance

	Tonnes				
Maize	**2004/5**	**2005/6**	**2006/7**	**2007/8**	**2008/9**
Production	1,213,601	866,187	1,424,439	1,366,158	1,211,566
Consumption	1,153,336	1,141,889	1,204,698	1,299,188	1,301,916
Surplus/Deficit	60,265	-275,702	219,741	66,970	-90,350

Source:Food Balance sheet

The figures in the Table above are derived from the Food Balance Sheet (FBS) and are not compatible with the imports and exports recorded in the Table below, illustrating that the information on which the FBS is assembled is not reliable.

4.2.2. Maize Exports and Imports

FRA purchases and trading activities are illustrated below, showing the surge in their trading activities from 2006.

	Purchases (Tonnes)	Imports (Tonnes)	Exports (Tonnes)
2004-05	105,300	0	22,098
2005-06	120,000	0	13,029
2006-07	386,450	49,274	230,000
2007-08	400,000	0	230,000
2008-09	72,000	0	0

Source: FRA Updates

Exports

Table 3 Zambian maize exports into the region

US $	2004	2005	2006	2007	2008
Angola	31,720	221,868			
South Africa	61,517		20,557	3,871,466	3,549,339
Malawi	6,568,265	2,224,829	364		517,395
Zimbabwe	6,353,786	2,377,762	4,106,980	30,099,504	25,464,960
Congo DR	1,032,005	1,785,431	35,223	1,857,542	3,241,939
Kenya	63,119				
Namibia				1,494,628	1,140,472
Total	**14,110,413**	**6,609,890**	**4,163,124**	**37,323,140**	**33,914,105**

Tonnes	2004	2005	2006	2007	2008
Angola					
South Africa			115	19,177	18,249
Malawi			3		2,591
Zimbabwe			17,727	126,657	126,080
Congo DR			115	7,652	16,060
Kenya					
Namibia				7,297	5,876
Total	**0**	**0**	**17,960**	**160,782**	**168,856**

Source: CSO, FEWSNET, COMESA

The Zambian Government also arranged for a donation of 9,000 tonnes of roller meal for Zimbabwe in 2009.

Exports to Kinshasa in D R Congo are all in the form of mealie meal since there are no roller mills in that town. The exports are predominantly informal and arranged between a fraternity of extended families that stretch across the borders.

In addition to the formally traded quantities tabulated above, FEWSNET has recorded the following informal cross-border food trade out of Zambia, which they estimate could represent about one third of the actual informal traded quantity.

Table 4 Informal maize meal exports

Destination	2005/06 mt	2006/07 mt	2007/08 mt	2008/09 mt
Congo D R	4,682	9,481	33,424	4,589
Malawi	419	378	2,500	5,388
Mozambique	55	2	0	60
Tanzania	0	7	4	15
Zimbabwe	182	299	433	350
Total	**5,338**	**10,167**	**36,361**	**10,402**

Source: FEWSNET

4.2.2.2. Imports

Maize imports from the region					
US $	**2004**	**2005**	**2006**	**2007**	**2008**
South Africa	44,913	6,589,514	23,422,552	31,166	70,303
Tanzania	33,114	1,851,408	6,216,377	12,899	
Zimbabwe		8,249	745		1,120
Congo DR		5,093			
Total	**80,031**	**8,456,269**	**29,641,680**	**46,072**	**73,431**
Tonnes	**2004**	**2005**	**2006**	**2007**	**2008**
South Africa		24,672	80,674	61	185
Tanzania		7,163	13,547	31.06	
Zimbabwe		8	0.12		0.19
Congo DR		121			
Total	n.a.	31,964	94,221	92	185
Av. Price US$/mt		264.6	314.6	502.6	396.1

Table 5 Maize imports from the region

In addition to the above formal imports, FEWSNET has also recorded the following informal cross-border imports, which they estimate might represent one third of the actual flow.

Table 6 Informal maize import from the region

Origin	2005/06 mt	2006/07 mt	2007/08 mt	2008/09 mt
Malawi	81	202	1,779	129
Mozambique	49	1,269	2,113	865
Tanzania	13,556	6,260	4,980	2,449
Zimbabwe	-	-	166	207
Total	**13,686**	**7,731**	**9,038**	**3,650**

Source: FEWSNET

4.3. Value Chain Mapping

The value chains are subject to variability from three major causes: territorial, due to different conditions prevailing in different locations; seasonal, due to harvesting seasons and storage costs; and random, due to exchange rate movements that affect input costs, interest rates and import/export parity prices.

Territorial variability within the same month in producer prices is exemplified in 2008 by July prices of K10,558 and K23,767 per 'gallon' tin in Senanga and Kabwe Rural, giving $177.47 and $399.50 per tonne respectively. And in July 2009 K11,626 and K30,000 per gallon in Kaoma and Chingola giving $124.44 and $321.17 per tonne respectively.

Seasonal variability is exemplified in 2008 in Lusaka Urban by K16,036 in July at K3305/US$ and K24,735 per 'gallon' in December at K4989/US$, giving $269.56 and $275.43 per tonne. (Allowing only US$0.98 per tonne per month for storage). And in 2009 K24,224 in July and K35,179 per gallon for the previous crop in March, giving $259.30 and $347.45 per tonne.

Many of the inputs to agricultural production are foreign exchange derived, so the costs of production and the returns in Kwacha are subject to wide variability in US Dollar denominated prices. For example while the price of maize in Kawambwa in March 2006 was K28,000 per 'gallon', the exchange rate with the US Dollar was K3100, giving a return per tonne of maize of $501. And The price of a 'gallon' in Katete in May 2009 was K10,000 while the exchange rate was K5285, giving only $105 per tonne. Both these groups of producers would be buying foreign exchange derived inputs at approximately the same price and therefore facing widely differing gross margins.

Seasonal price variation due to storage costs and supply and demand balance are easier for farmers and traders to cope with than those associated with exchange rates that affect the farmers' ability to plan and to purchase his inputs.

Millers state that the seasonality of prices due to the prevalence of hammer mills that operate close to production areas implies that all large-scale mills make a loss between June and September. However, some of the large-scale commercial mills are correctly including their fixed costs with depreciation when bemoaning their losses, while others ignore the fixed costs, accepting that they have been amortized, and are content with a positive return on variable cost.

Maize from commercial farms usually fetches a premium of $10 to $15 per tonne because it yields a better extraction rate on milling, but in 2009 there was consistency of quality between smallholder and commercial maize through to October, and premium was not paid for the commercial crop.

Matrix of functions and actors

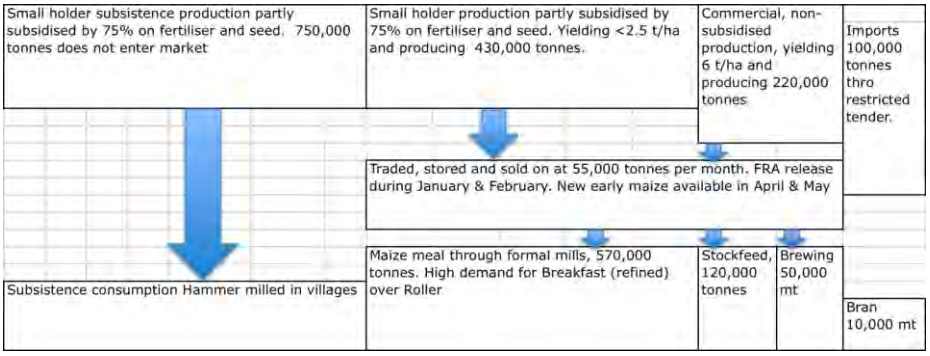
Table 7 Maize functions matrix

Functions	Participants/Actors					Support Markets
	Domestic/Export-Import Market Channels					
	Input suppliers See list of input suppliers in Annexes	Farmers Approx 900,000 small-scale and 400 large scale farmers	Traders See list of members of GTAZ In Annexes plus multiple small-scale traders.	Processors See Table of Millers in Annex plus at least 4,000 informal hammer millers.	Wholesalers Millers, stockfeed manufacturers	Support services: Financial Services, Commercial Banks, ZANACO, Afgri, FPS, SPS/Standards Certification PQSP, SCCI, ZABS, Stock auditing, SOCOTEC, ACE. Extension CFU
Wholesale, Exporting, Importing of **maize meal, bran stockfeed and breweries** ,						
Processing			Some millers also trade	Also stock feed makers and brewers.		
Trading			A few traders also mill			
Collecting, Bulking, Storage		Commercial farms with outgrowers				
Production			Some large scale farmer also trade, export, mill and make stockfeed			
Input Supply		Some farmers act as agents for inputs or provide for outgrowers				

Value Chain Map

About 70% of the maize that is purchased is from the smallholder farming sector with the remainder being derived from commercial farms. Smallholders arrange for the consolidation of their loads and small traders deliver them in lots of one to five truck-loads to the large commercial traders. The maize at the beginning of the season is passed on to the millers and the remaining 80% stored to fulfill mandates with the millers up to February. Similarly commercial maize that is not stored by the farmers may be passed on to the millers for blending with smallholder maize in order to adjust the quality of the end products. Where maize is passed directly to the millers the only charge is interest and direct costs.

Figure 1 Maize Value Chain Map



4.4. Constraints and Opportunities

4.4.1. End market analysis

The consumer price

As described above, the producer price of maize is largely determined by the purchasing policy of FRA while that organisation is playing the role of trader, particularly under instruction from government, which aims to reduce the cost to the consumer. Since FRA has been a major trader (up to 430,000 mt in 2008) it has a strong influence on the prevailing price due also to the history of price setting when smallholders heeded the price offered by government and considered it to be the operative pan-territorial and pan-seasonal price, thereby curtailing their inclination to negotiate better returns.

The maize meal market can be viewed as a dual system since the milling falls into two distinct categories: the commercial sector which uses roller mills and more technically advanced equipment that can separate the germ and the bran to provide refined Breakfast Meal, and secondly the hammer mill industry that is informal and widespread through the rural areas and produces unrefined "mugaiwa" from the whole grain (although it can be adjusted to provide finer meal). Some hammer mills are operated purely on a toll-milling basis while an increasing number are becoming more commercialised and are selling mugaiwa at prices that are 60% to 80% that of roller meal. The trend towards a hammer mill based processing industry is seen to be continuous and likely to dominate the market in the future.

End market characteristics

Table 8 Maize end-market characteristics

The form of the product at the end market	Users (e.g. millers, households, dairy farmers	Volume of National Requirement in Metric Tons per year	End Market Price in July 2009 in US$ per metric ton	Source of the product		
				Domestic Market	Imports	
					Intra regional (i.e from EAC/COMESA) percentage	Extra regional (i.e. outside EAC/ COMESA)
Green Maize	Marketers, subsistence,	Unrecorded		100%	Nil	Nil
Dry Maize (Grain)	33 commercial millers.	1,263,000	(Lusaka) Commercial: $250 – 260	99.22%	Net imports 2008: 0.78%	Nil

	'000s hammer mills in dry season only.		SSF: $235 – 245 (CBelt) $260 – 280 $245 – 260			
Mealie meal	Households,	900,000 to 1,000,000 mt	Breakfast Lusaka $360 Roller Lusaka $312[2]	100%		
Animal Feed (Bran)		130,000	Dry season (Lusaka) $70 – 137 (CBelt) $80 Rains $80	100%		
Breweries		70,000		100%		
Seed	Small-scale farmers	20,000		100%		

Consumer preferences

Consumer preferences are for refined products, therefore Breakfast Meal is preferred to Roller Meal to the extent that it can bear a higher mark up - there is high price elasticity on demand. Millers have reported that they have raised Breakfast Meal prices to cross-subsidize Roller Meal prices without causing noticeable effect on relative demand. This situation has been addressed in publicity campaigns by NGOs concerned with nutrition, since Roller Meal is more nutritious then Breakfast Meal, but with little impact. The ratio of Breakfast Meal to Roller Meal is 60:40 in Lusaka but 55:45 in Livingstone where the mill produces a whiter Roller Meal.

Maize in villages is usually toll-milled for home consumption using diesel or electric powered hammer mills, of which there are possibly 5,000 on farms and in villages in private ownership around the country with a total capacity estimated in 2002 to be equal to that of the commercial mills. The rate of expansion in the hammer mill industry has been high since the removal of milling subsidies in 1991, which concentrated capacity in the commercial sector. It was also assisted by the distribution of hammer mills by a number of NGOs. Although villagers may prefer a more refined product, they have no means of refining it except by insisting on slower feed rates into the mill and finer, better-maintained sieves.

Traditionally prepared flint maize, which is pounded and semi-fermented over three days, is still viewed with some nostalgia by urbanized society, but the low yields associated with flint maize varieties and the onerous demands on women's labour for pounding and winnowing in village settings imply that these preferences are rarely indulged.

Current and potential end market opportunities

Unofficial cross border trading of mealie meal from Zambia through Kasumbalesa to D R Congo thrives as small parcels of product, estimated to total 60,000 tonnes per annum, move

[2] At the same time Breakfast in Nchelenge was $420 and in Choma, $330, while Roller in Kasama was $396 and in Ndola Rural, $300.

through the bush as head-loads and bicycle loads to supply the market in Katanga Province. Significant opportunities exist for the formal sector in supplying this market with processed product if the export ban is lifted. Similarly Zimbabwe and parts of Angola offer opportunities for export of maize grain and mealie meal. The Zimbabwean market is subject to competition from Malawi and South Africa and the Angolan market is plagued by logistical difficulties and may be short-lived as that country's development plans are rapidly implemented to address the shortages in border areas.

The costs of production in Zambia are considerably higher than those in South Africa to the extent that South Africa can land maize in D R Congo more cheaply than Zambia. So, although the markets are there to be supplied, Zambia is not always in a competitive position to benefit

4.4.2. Vertical linkages

When purchasing the major crops from small-scale farmers there has been a strong tendency for so-called "briefcase" traders to pay small-scale farmers low prices in the knowledge that they are desperate for cash at harvest time in order to pay for school fees or other urgent needs. These briefcase traders may well be the agents of registered traders or simply opportunists, but their opportunities to pay low prices are increasingly curtailed by the introduction in 2007 of SMS based price information supported by ZNFU and used by large-scale traders.

This SMS system, in the context of the expanding cell phone network, has provided a major boost to competitiveness in the marketing of many crops and of livestock in the small-scale and large-scale farming sectors, usually to the benefit of the farmers who have traditionally been less well informed than the traders. It is accessible to anyone with a mobile phone and network coverage and provides information on offers and bids in major markets.

The small traders consolidate lots of 150 tonnes or more for delivery to traders who sell according to mandate to millers. This linkage has been reinforced recently as millers and traders become more specialized in their tasks. Brokerage is also increasing as the sector becomes more sophisticated in its manner of dealing with the needs of each component.

Many large-scale commercial farmers have silos or other storage facilities that allow them to store their own products until the market conditions improve, and some invested in roller mills to supply their neighbourhood.

Some large scale farmers have created linkages with neighbouring small-scale farmers in outgrower schemes in which the commercial farmer provides the inputs with varying degrees of credit, technical advice and a contract to buy at least a proportion of the output. This arrangement is made as a means of assisting the small-scale neighbours to improve their production and ease their difficulties in obtaining inputs and marketing their output. It is also a means of reducing the incidence of crop theft from the commercial farms.

Formal linkages within the agricultural sector are made through the ZNFU where farmers, traders and millers meet to deliberate on problems and determine lobbying or commercially based strategies to alleviate them. In the light of constant pressure from consumers, supported by government policies and pronouncements, to reduce the cost of food, the farmers and millers have had frequent discussions revolving around the transparency of the cost of

operations involved in each layer of food production. Farmers have frequently divulged all their costs to the millers and to a Task Force that was established by Government in 2007 to examine the causes of the rises in food prices. The millers, for their part, referred the committee to their formula, which relates the cost of mealie meal directly to the cost of grain – implying illogically that fixed costs are variable with the price of maize grain. The Agricultural Consultative Forum (ACF) also plays a role in bringing together components of the industry with MACO or other ministry representatives to deliberate on issues and determine a means of addressing them.

The quality of the deliberations depends upon the degree of expectations of each party on the sincerity of the other. In some cases the private sector perceives the government sector as not sufficiently engaged in the commercial importance of the issues at hand, and in other cases the government representatives view the private sector as not sufficiently cognizant of the needs of the consumers. The private sector complains that government is reactive rather than pro-active and that they take a short-term view in the light of immediate needs only. However, there have been meaningful engagements that have resulted in progress towards easing constraints and improving the policy environment of the sector. Continued engagement with sincerity and an imaginative outlook on the dynamics of the industry will continue to improve understanding and long-term benefits to all parties.

The most important vertical linkage in the sector is that between the private sector and government since the efficiency of transactions is largely dependent on the policy framework in which they take place. When operators at any level can take comfort in the fact that price movements will take place only on the basis of supply and demand, they will fine-tune their dealings on the basis of known trends, but when government policy changes can be expected to divert the natural movements, then farmers, traders and millers will either not participate in the opportunities or they will ensure that their margins will accommodate a wide divergence from the natural trend. It is for this reason that each party must take pains to understand the concerns of the other and not view them as a troublesome opponent of their own agenda.

Unfortunately many civil servants have not been exposed to the commercial world and sometimes have little understanding or sympathy with its constituents. Similarly the commercial sector can tend to view their operating environment as a field in which to maximize returns, with little sympathy for the wider concerns of society. Constant and conscientious exposure to alternative viewpoints through consultative meetings is mutually beneficial and likely to enhance meaningful development.

4.4.3. Horizontal linkages

Horizontal linkages are formed by traders through the Grain Traders' Association of Zambia (GTAZ), which meets with the Millers Association of Zambia (MAZ) and the Zambia National Farmers' Union (ZNFU) as the need arises so that cohesive lobbying positions can be formulated before presentation to government ministries. The ZNFU represents all aspects of the agricultural industry, including input suppliers. They all maintain secretariats and contribute jointly and severally to activities such as monitoring and prevention of smuggled imports.

Linkages between members of each association focus on response to policy issues and on trade among them with consignments changing hands several times in a season without necessarily entailing physical movement of stocks. There is considerable cooperative activity

in response to trading opportunities which arise from occasional export windows, shifts in price as a result of strategic trading by the Food Reserve Agency (FRA) or response to food security issues resulting from weather-induced surplus and deficits.

Zambia is notorious as a "high margin" economic environment, and horizontal linkages are more likely to focus on means of reducing competition through cohesive marketing strategies than by enhancing it to capture market share, however, the SMS based system provides opportunities to avoid exploitation through ignorance of prevailing prices.

Maize traders report active horizontal trading of maize without necessarily moving the goods.

4.4.4. Supporting markets/services

One of the major constraints to the advancement of agricultural production in Zambia has been access to both seasonal and medium to long-term finance. This gap has been addressed in the past by government funded credit schemes, such as the Lima Bank, that floundered due to poor recovery performance. The tolerance towards non-repayment was so great, in fact, that it induced in the small-scale and, to some extent, in the large-scale sectors a culture of non-compliance with the need to pay off agricultural loans. Now that there is a commercial approach to agricultural lending, loan recovery is a vital component of the sustainability of the lending institutions, which are therefore careful to ensure that loans are supported by sound collateral security. This is constrained by lack of title deeds and supporting legislation for the Warehouse Receipt System, both of which should be accelerated.

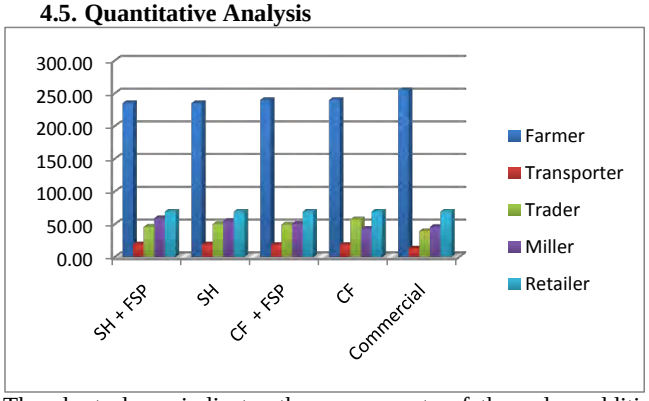
A scheme to provide a line of credit with supporting extension services and technical and financial advice for emergent farmers was initiated in 2007 with the support of the IFC through ZANACO. This scheme is being expanded as lessons are learned and systems for service provision are developed and will be extended to a greater number of applicants as it is refined.

A scheme for lending small amounts is also being made available under the so called Munda Scheme for peasant farmers through ZANACO.

Omnia Fertilisers is providing technical advice to farmers on the emergent farmer lending scheme and to all commercial farms on a commercial basis. ZNFU support to the emergent farmer scheme includes access to technical and financial advice.

However, the most pressing need in the smallholder sector is for the improvement of production technology both to improve the sustainability of their practices on the land and to improve the return to their land, labour and inputs. This is provided currently to small-scale farmers by the Conservation Farming Unit (CFU) which is steadily revolutionizing the sector by teaching farmers how to apply Conservation Farming methods, which emphasize minimal soil disturbance, precision in applications, spacing and timeliness, thereby improving yield potential and sustainability. While the CFU has extended the development of CF practices and conducted trials that have lead to refinement of the practices specifically for the locations in which they are practiced, other NGOS and MACO extension officers have also promoted CF but not always with sufficient understanding or vigour to ensure that the full potential of the technology can be realized by the beneficiaries.

4.5. Quantitative Analysis



The chart above indicates the components of the value additions to maize. However, the impression that the farmer is receiving the major proportion is misleading since the variable and fixed costs of production have not been deducted. The table below shows various production models, subsidized and non-subsidised at different levels of technical input. Note that the return to non-subsidised maize production with the prices prevailing over the 2008-09 season lead to negative returns to farmers.

The costs of production between the formal and informal producers reflect the differences in payment for labour. Smallholders in the informal sectors use largely family labour, which is not paid for directly, so their gross margins should be seen as return to labour.

Table 9 Maize Value Chain

Maize							
Value chain	**US Dollars**	K/US$ 5000					
Production							
per ha	**Subsistence**	**SH subsidised**	**SH no sub**	**CF Subsd**	**CF no sub**	**Commercial**	**Early Comm**
Seed	16.00	15.00	60.00	22.50	90.00	127.00	127.00
Fertiliser & Lime	20.00	90.41	361.65	127.93	511.70	690.35	814.60
Herbicides	0.00	27.60	27.60	87.60	87.60	59.14	50.49
Other chems	0.00	12.00	12.00	21.60	21.60	109.08	68.18
Labour	0.00	60.00	60.00	212.65	212.65	200.99	232.25
Cultivation & harvest	0.00	40.00	40.00	100.00	100.00	222.33	597.33
Packaging	0.00	15.00	15.00	27.00	27.00	42.00	54.00
Transport	0.00	18.75	18.75	33.75	33.75	78.75	162.00
Council levy	0.00	4.88	4.88	8.78	8.78	8.93	11.70
Finance	0.00	31.52	129.97	85.36	145.38	347.86	474.15
Total Variable costs	0.00	315.15	729.85	727.16	1,238.45	1,886.42	2,591.70
Fixed costs %age of VC	0.0%	12.0%	12.0%	18.0%	18.0%	24.0%	28.0%
Fixed costs /ha		37.82	87.58	130.89	222.92	452.74	725.68
Breakeven price /mt		141.19	326.97	171.61	292.28	389.86	368.60
Yield expectation t/ha	1.0	2.5	2.5	5.0	5.0	6.0	9.0
Price expectation US$/50kg		11.75	11.75	12.00	12.00	12.75	13.00
Gross return		587.50	587.50	1,200.00	1,200.00	1,530.00	2,340.00
Gross margin		272.35	-142.35	472.84	-38.45	-356.42	-251.70
Net Return /ha		234.53	-229.93	341.95	-261.38	-809.16	-977.37
Net Return /mt		93.81	-91.97	68.39	-52.28	-134.86	-108.60
Trading & Storage							
Producer price US$/mt		235.00	235.00	240.00	240.00	255.00	260.00
Transport km		150	150	150	150	0	0
Transport US$/mt/km		0.08	0.08	0.08	0.08	0.08	0.08
Transport cost US$/mt		11.70	11.70	11.70	11.70	0.00	0.00
Shrinkage		1.5%	1.5%	1.5%	3.0%	1.0%	2.0%
Fumigation		1.70	1.70	1.70	1.70	1.70	1.70
Weighbridge		0.50	0.50	0.50	0.50	0.50	0.50
Cost in store		252.43	252.43	257.50	261.10	259.75	267.40
Average storage months		2	3	4	5	6	1
Storage cost US$/mt/mont ??		3.85	3.85	3.85	3.85	3.85	3.85
Interest %/month		1.66%	1.66%	1.66%	1.66%	1.66%	1.66%
Post storage cost		260	264	273	281	283	271
Trader margin		8%	8%	6%	6%	4%	4%
Milling							
Into mill price US$/mt		281	285	289	297	294	282
Variable Milling cost		30.00	30.00	30.00	30.00	30.00	30.00
Breakfast percentage		52.0%	52.0%	52.0%	52.0%	52.0%	52.0%
Roller percentage		34.0%	34.0%	34.0%	34.0%	34.0%	34.0%
Bran		11.0%	11.0%	11.0%	11.0%	11.0%	11.0%
Wasteage		3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Wholesale Prices							
Breakfast US$/mt		440.00	440.00	440.00	440.00	440.00	440.00
Roller US$/mt		304.00	304.00	304.00	304.00	304.00	304.00
Bran US$/mt		75.20	75.20	75.20	75.20	75.20	75.20
Returns per mt grain							
Breakfast		228.80	228.80	228.80	228.80	228.80	228.80
Roller		103.36	103.36	103.36	103.36	103.36	103.36
Bran		8.27	8.27	8.27	8.27	8.27	8.27
Total return US$/mt grain		340.43	340.43	340.43	340.43	340.43	340.43
Milling margin US$/mt		29.40	25.20	20.97	13.01	15.97	28.29
Retail Prices							
Breakfast K/mt		489.24	489.24	489.24	489.24	489.24	489.24
Roller K/mt		324.16	324.16	324.16	324.16	324.16	324.16
Bran K/mt		0.00	0.00	0.00	0.00	0.00	0.00

5. Wheat

5.1. WHEAT PRODUCTION

Wheat production is done solely under irrigation during the dry season although there were attempts in the 1980s to produce it under rain-fed conditions in the north of the country, which failed. Since it is entirely irrigated, it is capital intensive: water resources must be developed from rivers, dams or boreholes, with piping and sprinkler systems operated by electric power, which must be extended to the farms from the national grid. Since it is also only harvested economically by machine, there are limitations on the minimum economic size of production units, although there is increasing availability of hired combining capacity. These constraints imply that wheat production is limited to the commercial farmer sector, Prison Services and National Service and to those areas served by both abundant water resources and national electricity grid, since diesel powered pumping is non-viable in the long run.

Wheat is produced in Southern Province in Livingstone, and along the line of rail through Choma, Mazabuka, to Lusaka and Central Provinces, Chisamba, Kabwe, Mpongwe and Munkumpu, Copperbelt and Mkushi. Small quantities were produced in the 1920s under flood irrigation and manual harvesting, but there was no further production until the early 1970s when self-sufficiency was seen to be of increasing importance as Zambia took a political stand against regimes to the south. At the time demand was limited to 50,000 tonnes and the surplus demand over the 30,000 tonnes produced was supplied predominantly by PL480 aid wheat from USA. These imports tended to coincide with delivery of the domestic crop, disrupting farmers' efforts to fill the gap. Demand has steadily increased and now exceeds 210,000 tonnes as Zambian's increasingly urbanized lifestyle places a premium on wheat products that do not require cooking immediately prior to eating, as does maize meal. Extension of the national electricity grid and the greater availability of foreign exchange together with access to capital have facilitated the expansion of the production sector such that current production is about 195,000 tonnes.

Conversion by consumers to wheat products continues steadily and predictions of impending surplus production have been repeatedly confounded by increased demand. Wheat production is favoured by commercial farmers since it provides an income at the time that working capital is required for rain-fed cropping, and it spreads the productive period of the management and worker capacity into otherwise slack seasons. Wheat is also conveniently rotated with soya, using the same machinery, or less conveniently with early maize within the same year and is, therefore, a valuable addition to the portfolio of any efficient commercial farm.

Reductions in the output of wheat can be due to drought that fails to fill the water reservoirs, poor electricity supply, which disrupts the irrigation scheduling, or disruptions to the payment for the crop. The effects of drought can usually be assessed in time to rationalize the planting plan and thereby limit the financial damage by saving on inputs. The poor electricity supply can be damaging in that it has not been entirely predictable since it can be due to unforeseen breakdowns in the grid or generating network, and it can reduce or annihilate productivity of the applied inputs or cause unsupportable expense in generating with diesel. Breakdown in the payments have been due to financial mismanagement within the processing industry or by importations of wheat from cheaper sources that undermine the pricing structure.

5.1.1. Production

Table 10 Wheat Planting, production and prices

Wheat	2005	2006	2007	2008	2009
Planted ha	22,323	9,714	19,188	25,820	34,296
Yield mt/ha planted	6.1	5.5	6.03	5.8	56
Actual production mt	136,833	53,479	115,843	146,800	195,000
Into-mill price K/tonne				2,652,000	1,288,000
Into-mill price US$/mt				650	320

The above figures from CSO are an understatement of production

Factors affecting production of wheat are the adequacy of the previous rains to fill the reservoirs including the underground water table, the reliability of the electricity supply to drive the irrigation systems, the marketing experience from the previous year's crop, which gives indications as to the expected price, and the policy on imports, which can undermine the pricing structure.

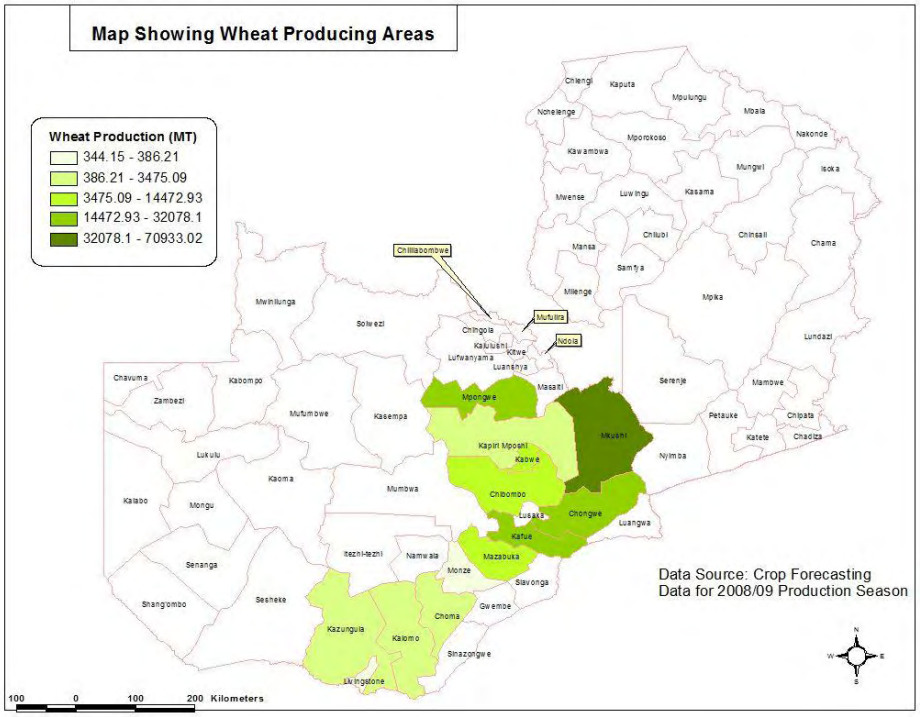
The period under review has been characterized by generally adequate rains to feed the irrigation systems, drastically reduced reliability of electricity supply due to rehabilitation of the national hydro-electric generators and the importation of wheat grain under a duty free tariff, which has undercut the price structure.

Projections for the period 2009 – 2013

The ZNFU has long lobbied government for the creation of revolving fund for the development of irrigation capacity. Such a fund of $18 million was established under the Mwanawasa regime in 2008 but was almost immediately diverted to the CEE fund where it was no longer earmarked for irrigation development. This move has dented the scope for expansion of irrigation since access to loans for capital projects in agriculture is a major constraint. However, some large new dams that were developed before the price structure was damaged will come on stream in 2010 and facilitate expansion of production capacity.

Another constraint that is perceived by potential investors is the lag in development of electricity generating capacity within the national grid. This is due to the fact that financing of such expansion through agencies such as the World Bank is not forthcoming since the tariff charges do not allow for capital recovery. Attempts by Zambia Electricity Supply Company (ZESCO) to raise the tariff have been blocked by short-sighted objections from users and by the Energy Regulation Board. Zambian consumers enjoy one of the lowest tariffs in the region and the electricity charge currently constitutes only 15% of the variable costs of wheat production. The electricity supply and demand situation is projected to deteriorate further into 2011 and 2012 with the mines enjoying a guaranteed supply while agriculture, though ostensibly treated as a priority, being subject to devastating load shedding that renders wheat production highly inefficient and risky since load-shedding of the power supply, although ostensibly managed according to pre-determined schedules, remains unpredictable. Some irrigation systems take time to prime and others depend on pumping from a water delivery as it passes down a canal – if the pumps cannot be operated to coincide with the delivery, the valuable water runs to waste. The pumps and other items of electrical equipment also suffer damage from power cuts and low voltage, which adds to the cost of production.

A third constraint to the expansion of the wheat industry arises from the threat to the price structure imposed by imports from sources that are either subsidized, rain-fed or products of developed economies where economies of scale and efficient infrastructure exist. When Zambian investors cannot be secure in the knowledge that the producer price will be maintained, they will not invest in irrigation capacity. If it were not for these three major threats, the Zambian wheat production capacity would continue to expand into the increasing demand and provide farm income and employment at convenient stages in the calendar.



5.2. WHEAT CONSUMPTION

5.2.1. Domestic Production vs. Consumption

Production capacity, in terms of irrigated area and wheat harvesting equipment, is adequate to produce about 95% of Zambia's demand for wheat in the context of the consumer price prevailing in 2008. The trend for several years has been for production capacity to expand with demand, lagging by a diminishing proportion. The point seems to have arrived in 2009 when demand has dropped off due to the producer price structure imposed by the world fertilizer price hikes such that producers consider carefully whether it is worth planting without a marketing contract. The assault on the domestic price, made by the importation of duty free wheat grain, effectively reduced the producer price and obliged farmers to sell at prices that did not reward their management or capital investment.

Domestic consumption (Domestic sales)

The convenience of bread is a strong incentive for conversion from mealie meal, particularly when power cuts or wetted charcoal make the cooking of mealie meal difficult. However, the price elasticity of demand is demonstrably constrained in the face of increased cost, resulting in an estimated drop in demand of 20% in October 2009.

Production vs. Domestic consumption

Table 11 Wheat Production vs. Consumption Balance

	Tonnes				
Wheat	**2004/5**	**2005/6**	**2006/7**	**2007/8**	**2008/9**
Production	82,858	136,833	93,482	115,843	180,000
Consumption	140,000	140,000	140,000	140,000	195,000
Surplus/Deficit	-57,142	-3,167	-46,518	-24,157	-15,000

Source: FBS

The demand for wheat has in the last five years generally crept ahead of supply each year and production capacity has been expanded rapidly to follow it. However, the sharp spike in fertiliser price in 2008, with the anticipation that world demand would ensure that the price remained high, together with the poor electricity supply that reduced yields, encouraged farmers to demand high prices for their output. In turn the millers took pains to puncture the price by importing vigorously. The stocks of 80,000 tonnes that were left with the farmers and the indifference of the millers to their plight in the context of the available imported supplies ensured that the price fell back from the $720 demanded by the farmers to $350 paid by the mills. At the same time Standards established by ZAMACE were applied with a sharpened discount between grades.

The impact of these moves will be to dampen or halt the expansion of the production industry and to rationalise the distribution of growers into those who are already well established with amortised infrastructure and efficient logistical location and management practices.

5.2.2. Wheat Imports

Imports

Table 12 Durum Wheat imports from the region

Durum wheat imports from the region					
US $	**2004**	**2005**	**2006**	**2007**	**2008**
Malawi					1,643
Mozambique		649,924.00			
South Africa	3,749,421	9,158,525	4,923,589.71	1,267,410	1,067,227
Tanzania					164
Zimbabwe	48,711	470,734		899	14,521
Total	**3,798,133**	**10,279,183**	**4,923,590**	**1,268,309**	**1,083,555**
Tonnes	**2004**	**2005**	**2006**	**2007**	**2008**
Malawi					10.0
Mozambique		1992.255			
South Africa		28,736.4	14,063.4	3,648.0	1,760.7
Tanzania					0.6
Zimbabwe		1,407.1		0.2	60.0
Total	**0.0**	**32,135.7**	**14,063.4**	**3,648.2**	**1,831.3**
Av. Price US$/mt		319.9	350.1	347.7	591.7

The table above shows that there have consistently been importations of "durum" wheat into Zambia although there is no pasta making industry to absorb it.

Table 13 Wheat imports excluding durum

Wheat (excluding durum) imports from the region					
US $	**2004**	**2005**	**2006**	**2007**	**2008**
Malawi					
Mozambique			10,545.79		
South Africa	11,744,973	7,436,788	8,132,247.34	1,759,525	16,891,859
Tanzania					
Zimbabwe				114,960	
Total	**11,744,973**	**7,436,788**	**8,142,793**	**1,874,485**	**16,891,859**
Tonnes	**2004**	**2005**	**2006**	**2007**	**2008**
Malawi					
Mozambique			30		
South Africa		28,344.7	26,228.8	4,441.6	28,069.2
Tanzania					
Zimbabwe				200.0	
Total	**0.0**	**28,344.7**	**26,258.8**	**4,641.6**	**28,069.2**
Av. Price US$/mt		262.4	310.1	403.8	601.8

Wheat imports are dominated by those from South Africa, although South Africa is not self sufficient in wheat.

Table 14 Wheat flour imports from the region

Wheat flour imports from the region					
US $	**2004**	**2005**	**2006**	**2007**	**2008**
Congo DR		5,289.00		18,846.00	
Malawi	118,569.63	35,963.00	624,095.35	51,184.00	47,858.00
Mozambique			73,650.55		
South Africa	26,995.90	22,701.00	20,400.88	30,650.00	38,497.00
Tanzania	4,847.99	1,059.00	11,379.60	4,209.00	
Zimbabwe				22	
Total	**150,414**	**65,012**	**729,526**	**104,911**	**86,355**
Tonnes	**2004**	**2005**	**2006**	**2007**	**2008**
Congo DR		17.249		64.09	
Malawi		112.34	1385.6	120	130.115
Mozambique			185.2		
South Africa		57.054	27.971	65.214	35.576
Tanzania		3.275	30	12.64	
Zimbabwe				0.04	
Total	n/a	190	1,629	262	166

Imports of aid wheat continued from the early 1970s until reductions were guided by MoUs with the ZNFU which stipulated the amount to be imported, the timing of the imports so as not to interfere with domestic production and pricing mechanisms, and the application of the funds raised by monetizing the imports to agricultural development projects. As domestic production appeared to be approaching domestic demand in 2008, the aid-derived imports were terminated.

However, commercial imports of wheat from RSA increased in 2009 despite the negotiating position within SADC taken by the ZNFU to maintain the tariff protection of 15% on wheat and wheat flour. Durum wheat was accepted in the negotiations to be imported duty-free since it was not produced in the country and demand for durum for pasta production was extremely limited. This strategy failed since imports of bread wheat were labeled as durum wheat and the customs officials had no means of verifying the type or appreciating the difference in terms of commercial impact, so many tonnes of "durum" were imported and were applied to bread making.

Statutory Instrument (SI) No. 103 of 2007 includes Zambia's offer to all SADC member states except South Africa and a further section on Zambia's offer to South Africa. In the first section there is mention of Durum wheat under MFN 10011090 and 10011010 showing no tariff, but no mention of Wheat or meslin flour. Under the advice of MCTI, this was taken by ZNFU to imply that there was no agreement with SADC on tariff phase down and that the duty of 25% would therefore remain. Under Zambia's offer to South Africa, Durum wheat is treated in the same way but Wheat or meslin flour on 11010000 is given tariff protection phasing down from 25% in 2007 to 0% in 2012. Wheat grain is given no protection despite the strongly argued position of ZNFU.

Zambia's negotiating position on wheat imports within SADC and COMESA was that the domestic industry should be protected in its expansion phase since it was capital intensive and investors needed price protection while capital loans were repaid. The approach to the Rules of Origin that was promoted by ZNFU was that a member country that was not at least 80% self sufficient in production should not be exporting to other member states, and that value addition into flour should imply more than 35% cost component, and that change of tariff heading did not provide protection of the production or processing industries.

These positions were not supported and import permits were issued initially for 5,000 tonnes of wheat. It was argued that the actual imports were in fact over 27,000 tonnes and their arrival coincided with the Zambian domestic production harvest in September and October of 2008. This was seen by farmers as a device by the millers to undermine the producer price structure, which it effectively achieved, since the impending onset of the rains puts any farmers who do not have sufficient storage space, or who need the wheat income to finance their rain-fed crops, into a weak negotiating position. The price expectation was reduced from $650 per tonne to as low as $360. This setback came on top of the damage suffered by poor electricity supplies, which reduced yields.

However, possibly in recognition of the damage caused to the domestic wheat producing industry by duty free imports, a SI was issued in October 2009 to ban the import of wheat.

Future prospects for wheat imports

A shift in the dynamics of the wheat import potential is a prospect for the near future when a grain handling facility will start to operate at Beira. Since the shipping cost of a shipload of wheat from Black Sea ports can be delivered for only $45 per tonne, and transport to Lusaka by train could be arranged for $110 per tonne, the landed cost of Ukrainian wheat could drastically reduce the import parity price for Zambian producers. The owners of National Milling Company (NMC), Seaboard, have a 27% share in the grain handling facility, which could be taken as an indication of a strategy to import into the region from overseas.

Exports

Since Zambian wheat producers had not previously experienced resistance from the domestic market, the export market had not been a significant consideration and there had been little scope to explore it in the context of the export bans imposed by MACO. The economic logic of exporting from the north while importing from the south may not have been appreciated by MACO and no export permits were issued to facilitate such trade. However, since the spike in fertiliser prices had prompted farmers to raise their producer price demands beyond the tolerance of the millers, MACO was persuaded to issue import permits for 5000 tonnes that were stretched into the importation of over 27,000 tonnes. The timing of these imports and the competitiveness of the pricing resulted in the accumulation of 80,000 tonnes of unsold wheat in the hands of the producers and traders. Appeals to MACO for an export window to resolve the surplus stock situation resulted in exports to D R C while also bringing about a rationalisation of the production strategy such that some farmers did not plant in the absence of a delivery contract with millers.

Principal destination countries for 2008 exports

D R Congo is the major target for wheat flour exports and would provide a constant market if export permits were to be reliably available for that destination. Zimbabwe, under its current state of economic problems, is also an export destination for wheat grain.

Table 15 Wheat flour exports to the region

US $	2004	2005	2006	2007	2008
Angola					4,210
Congo DR	2,257,215	7,170,167	11,531,147	15,289,343	24,771,848
South Africa					5,648
Zimbabwe	338,798			53	
Total	**2,596,013**	**7,170,167**	**11,531,147**	**15,289,396**	**24,781,706**
Tonnes	**2004**	**2005**	**2006**	**2007**	**2008**
Angola					2.4
Congo DR		15,528	22,470	26,107	28,653
South Africa					80.2
Zimbabwe				0.05	
Total	**n/a**	**15,528**	**22,470**	**26,107**	**28,736**
Average price		461.76	513.19	585.65	862.40

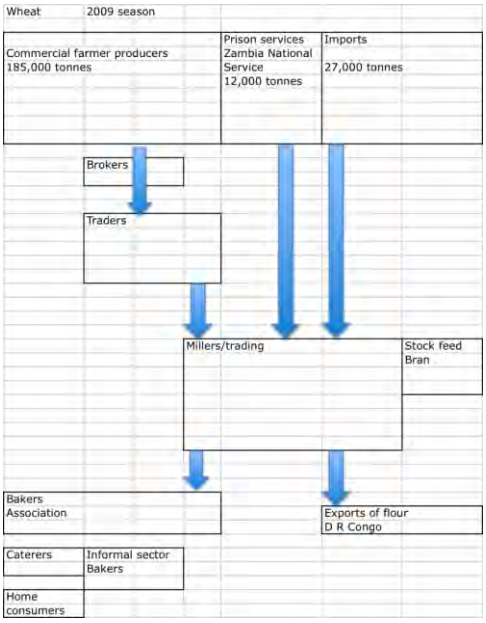
5.3. Value Chain Mapping

Matrix of functions and actors

Table 16 Wheat functions matrix

Functions	Participants/Actors					Support Markets
	Domestic/Export-Import Market Channels					
	Input suppliers See list of input suppliers in Annexes	Farmers commercial farmers, Prison Services, ZNS.	Traders See list of members of GTAZ In Annexes.	Processors See Table of Millers in Annex	Bakers See list of members of the Bakers' Association of Zambia in the	Support services: Financial Services, Commercial Banks, Afgri,

					annexes.	FPS, SPS/Standards Certification ZAMACE, PQSP, SCCI, ZABS, Stock auditing, SOCOTEC, ACE.
Baking						
Wholesale, Exporting, Importing of **wheat flour, bran**						
Milling			Some millers also trade			
Trading						
Storage						
Production						
Input Supply						



Value Chain Map

Figure 2 Wheat value chain structure

High in-country costs of transport restrict the viability of wheat as exemplified by the $65 per tonne cost of moving wheat from Mkushi to Lusaka. VAT has been lifted from road haulage horses (trucks) but this is not seen as a significant contribution to reducing road haulage rates. Farmers and traders state that regulations governing road transport are too restrictive to allow for effective competition that could reduce the rates.

VAT is also applied to wheat since it is designated as VAT Exempt and yet it has also exposed to duty free imports from the SADC region.

5.4. Constraints and opportunities

Constraints to expanded production, as explained above, arise from the high capital cost of establishing production capacity by the creation of water sources and installation of the reticulation system as well as the need to build up combine harvesting capacity. Access to capital is constrained, and the risk of such investments being rendered non-viable financially due to competition from imports of wheat grain or flour that is produced under subsidised or more developed economies is a threat that investors evaluate in the light of experience. The power supply to run irrigation systems is currently over stretched and needs to be rapidly developed in order to meet the expanding demand from all sectors of the economy.

Opportunities for expanded production afforded by the wheat industry are promising if the policy environment is made conducive to investment. Zambia's natural endowments provide wide scope for exporting to neighbouring countries to the north and west as well as for serving the domestic market that is growing with the wealth of the people and their swing towards convenience foods. The water resources are abundant, but need development, and there is ample irrigable land.

5.4.1. End market analysis

The consumer price

There is a wide difference in the consumer price that, if passed back to the farmer rather than absorbed by the miller, would allow well-established, efficient farmers to remain in production, and the price that would justify capital investment in irrigation capacity and grain handling machinery. Since wheat production under irrigation is a capital intensive enterprise the price must include a premium if the industry is to expand with demand. When the price below that which justifies expansion, expansion of domestic demand will have to be fed by imports at the expense of the Zambian economy. Since Zambia is better endowed with land and water resources and skilled growers than many of the neighbours, there is a good opportunity to continue to promote domestic production by providing some protection against imports that are likely to include at least an element of subsidy.

Zambian workers may indeed express consumer resistance, but the growing middle classes show little resistance to the prices and can therefore assist in the expansion of the industry to the point where it can serve both the middle classes and the general workers and their families from an expanded production capacity.

End market characteristics

Table 17 Wheat end-market characteristics

The form of the product at the end market	Users (e.g. millers, households, dairy farmers	Volume of National Requirement in Metric Tons per year	End Market Price in October 2009 in US$ per metric ton	Source of the product		
				Domestic Market	Imports	
					Intra regional (i.e from EAC/COMESA) percentage	Extra regional (i.e. outside EAC/COMESA)
Wheat (Grain)	Millers	210,000 – 215,000 mt pa	$330-$580/mt	195,000 mt	27,500 mt from RSA but possibly extra regional.	
Flour	Bakers –	195,000 mt			Illegal trade from	

	formal and informal				Malawi	
Animal Feed (Bran)	Dairy farmers	20,000 mt	$70 to $80			

Consumer preferences

As with maize meal, Zambian consumers prefer refined products and therefore buy white bread in preference to brown. There is a rapid expansion of formal and informal bakeries with many of the latter setting up charcoal fuelled ovens in high-density compounds in peri-urban areas where they produce buns for local consumption. This trend reflects the needs of working families who have difficulties providing for their fuel needs and time to cook mealie meal. The working people in these areas provide a growing market for wheat products, which is served by both formal and informal bakeries.

Arguments as to the quality of the Zambian wheat have been pursued for many years with millers claiming that the quality must be enhanced by blending with imported wheat and farmers claiming that the quality is so good that millers can afford to dilute it with inferior imported product without diminishing the quality of the bread. Since the import parity price is often below the domestic price there is a commercial incentive for millers to claim a need to import in order to dilute the domestic wheat. There are now laboratory facilities to accurately determine quality aspects of wheat and ZAMACE and ZABS have laid down the minimum quality requirements so that the rationale for blending domestic and imported wheat can be clearly determined on a well-founded scientific basis.

The Zambian standards, specified by ZAMACE are accepted by the industry. Allowance is made by ZAMACE pricing structures for Premium Grade wheat, which was originally a National Milling Grade. There is no such grade in SAFEX or ZABS, which recognise only grades B1 to B4. Premium and B1 grade wheat requires no blending with imported wheat to satisfy the requirements of the baking industry although the Hagberg Falling Number is not amenable to modification through blending. But farmers in Zambia have been in the habit of maximising yield at the expense of quality with the result that it becomes necessary for millers to import higher-grade wheat to comply with bakers' demands. Since the introduction of standards for Zambian wheat, farmers are being encouraged to modify their growing techniques and varieties towards attaining the high grades, which currently bear a price differential at the mills of up to $20 per tonne per grade-shift. Whether this gradation in price implies a worthwhile reduction in yield is not yet determined by empirical analysis, but one of the considerations in such an analysis would be the impact on the overall price structure of removing the millers' incentive to import, which has its impact on the whole range of wheat prices.

Table 18 ZAMACE grades premiums for wheat

Grade	Premium	B1	B2	B3	B4
Protein	12.5% min	12% min	11% min	10% min	9% min
Test Density	78kg/hl min	77kg/hl min	76kg/hl min	74kg/hl min	72kg/hl min
Premium/discount US$/mt	+20	Par	-15	-30	-45

The 2008 domestic wheat crop was characterised by poor quality but high yields due to the widespread planting of the variety Induna. This, according to the millers, necessitated importation of B1 grade wheat from South Africa to create a blend with qualities acceptable to the bakeries. In the 2009 season an improvement in quality was brought about by planting the variety Shine, and Scarlet is now promoted by the millers in pursuit of further improvement but at the expense of yield. However, millers state that as Zambia approaches self-sufficiency in wheat production, the proportion of high-grade grain is not enough to ensure the requisite quality characteristics without blending with imports. This argument may have been pushed to extremes in order to justify imports to the extent that the price structure was flattened, since millers are strategising towards a price for domestic wheat of $320 per tonne for Premium and $300 for B1 grade. Such a price structure would increase demand and reduce domestic supply, providing further argument to import from overseas parent companies.

Current and potential end market opportunities

Zambia has great potential in the production of wheat being endowed with over 40% of the water resources of the whole southern African region and abundant irrigable land while also being in possession of the expertise and entrepreneurial skills to exploit these resources. The market opportunities that currently exist in D R Congo and Zimbabwe may not be long lived while there remains a vacuum in the supply, so government should support a private sector strategy to exploit the opportunity while it lasts and hopefully substantiate a long lasting trading relationship.

5.4.2. Vertical linkages

The introduction of ZAMACE into the trading chain is seen by farmers, traders and millers as an improvement because of the transparency that it implies, the competitiveness that it introduces to the market place, the regulatory implications for quality control and the simplification of the price determination process. Vertical linkages operate through the ZNFU where, by common consent of the various member groups, cohesive lobbying strategies can be determined before presentation to government. Many such meetings have worked successfully and avoided the situation in which the ministries are fed with opposing versions of the same issues, but at times there has been breakdown when one party speaks to government without the agreement of the other, resulting in confused and damaging policy decisions.

5.4.3. Horizontal linkages

Farmers meet under the Wheat Commodity Committee of the ZNFU; Traders have the Grain Traders' Association of Zambia (GTAZ), Millers have the Millers' Association of Zambia (MAZ) and Bakers, the Bakers Association. They all meet together under the ZNFU or the Zambia Business Forum.

5.4.4. Supporting markets/services

Services available to wheat farmers include soil analysis provided by Omnia fertilizer, leading to fertilizer recommendations tailored to specific fields; contract combining and precision farming GIS services that relate yield variability to specific nutritional deficiencies with accompanying corrective fertilizer applications; crop pre-financing against pre-determined prices and purchase agreements as provided by Afgri and National Milling Company; and crop monitoring based on satellite imagery that facilitates corrective measures on irrigation.

5.5. Quantitative Analysis

Under the prevailing producer price regime the farmers make a negative return of $184 per tonne since the price has been reduced by imported wheat.

Figure 3 Distribution of margins in wheat

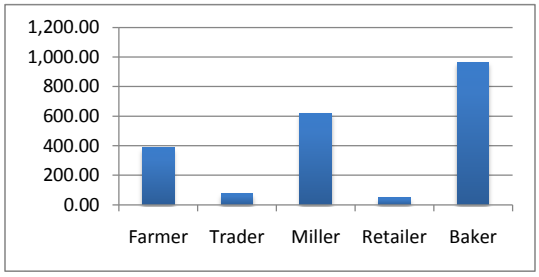


Table 19 Wheat Value Chain

Exchange rate	5000	K/US$
2009		
Value chain	**US Dollars**	**%age of**
Production		variable
per ha	**Commercial**	
Seed	149.50	5.34%
Fertiliser	1,221.70	43.61%
Chemicals	206.76	7.38%
Labour	67.00	2.39%
Irrigation	468.75	16.73%
Cultivation & harvest	229.11	8.18%
Packaging	39.00	1.39%
Transport	48.75	1.74%
Council levy	0.00	0.00%
Insurance	22.75	0.81%
Finance	347.86	12.42%
Total Variable costs	2,801.18	
Fixed costs %age of VC	32%	
Fixed costs /ha	896.38	
Breakeven price /mt	568.85	
Yield expectation t/ha	6.5	
Price expectation US$/mt	385.00	
Gross return	2,502.50	
Gross margin	-298.68	
Net Return /ha	-1,195.05	
Net Return /mt	-183.85	
Trading & Storage		
Producer price US$/mt	385.00	
Transport km	0.00	
Transport US$/mt/km	0.08	
Transport cost US$/mt	0.00	
Shrinkage	2%	
Cost in store	392.70	
Average storage months	5	
Storage cost US$/mt/month	10.00	
Interest %/month	1.66%	
Post storage cost	443.07	
Trader margin	4%	
Milling		
Into mill price US$/mt	460.79	
Variable Milling cost	100.00	
Flour	88%	
Wheat Bran	10%	
Wasteage	2%	
Wholesale Prices		
Flour US$/mt	840.00	
Wheat Bran US$/mt	240.00	
Returns per mt grain		
Flour US$/mt	739.20	
Wheat Bran US$/mt	240.00	
Total return US$/mt grain	979.20	
Milling margin US$/mt	418.41	
Retailing		
Sales	887.04	
Baking		
Flour	887.04	
Bread	1,850.00	

6. Rice

6.1. RICE PRODUCTION

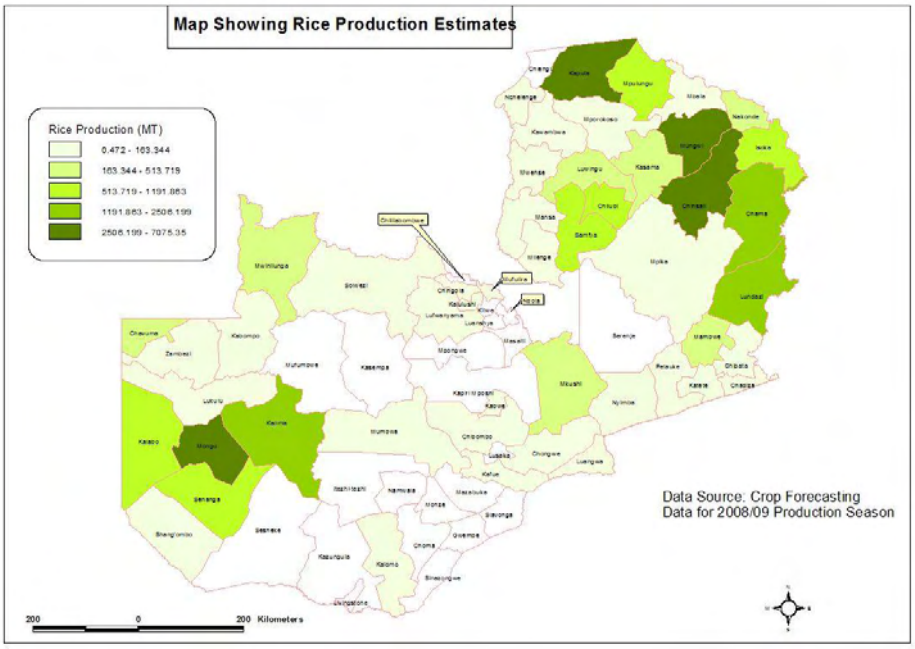
6.1.1. Production

Rice production is undertaken by small-scale producers only in Zambia and is focussed on Northern Province, where 50% of domestic rice production occurs, followed by Western and Eastern Provinces. Small-scale production is characterised by low inputs and poor yields but these are being addressed by NGOs in an attempt to increase the return to labour and land. COMACO, for instance, in Eastern Province has played a role in increasing output of rice in Eastern Province from 350 mt in 2005 to 1200 mt in 2009.

Table 20 Rice planting production and prices

Rice	2004-05	2005-06	2006-07	2007-08	2008-09
Area ha	18,243	14,358	20,073	20,067	25,177
Yield mt/ha planted	0.73	0.73	0.97	1.19	0.9
Expected production mt	13,337	13,964	18,317	24,023	22,898
Expected Sales mt	6,626	n.a.	11,318	13,151	10,526
Farm gate price K/50kg bag	45,000	50,000	50,000	60,000	75,000
Exchange rate K/US$ July	4680	3650	3830	3305	5190
Farm gate price US$/mt	192.30	273.97	261.09	363.08	289.01

Source: CSO, FEWSNET



6.2. RICE CONSUMPTION

6.2.1. Domestic Production vs. Consumption

Table 21 Rice Production vs. Consumption balance

	Tonnes				
Rice	**2004/5**	**2005/6**	**2006/7**	**2007/8**	**2008/9**
Production	11,699	13,338	13,964	19,248	24,023
Consumption	17,884	25,340	26,065	31,248	37,249
Surplus/Deficit	-6,185	-12,002	-12,101	-12,000	-13,226

Source: FBS

The majority of the rice trade takes place in the informal sector so that data are not reliable on either production or consumption. However, traders estimate monthly consumption of 300 to 400 tonnes per month and the food balance sheet estimates domestic production of 42,000 tonnes and imports of 12,000 tonnes. These figures are at variance with the CSO estimation of production which is half that of the FBS.

Domestic consumption (Domestic sales)

Consumption is somewhat seasonal and relates to the availability of maize, which declines in rural areas in January and February when rice becomes a luxury item for consumption. The data on production and sales show that 46% to 61% of the expected rice crop is applied to domestic consumption or informal local sales, indicating that rice is an important subsistence crop in areas where it can be grown, as well as a cash crop.

Production vs. Domestic consumption

6.2.2. Rice Exports and Imports

US $	**2004**	**2005**	**2006**	**2007**	**2008**
Angola	10,530				16,504
Congo DR	1,350,071	6,015	6,018	4,014	103,072
South Africa				6,065	
Zimbabwe				77	1,971
Total	**1,360,601**	**6,015**	**6,018**	**10,156**	**121,547**

Tonnes	**2004**	**2005**	**2006**	**2007**	**2008**
Angola		0.0	0.0	0.0	12.6
Congo DR		222.8	8.9	14.6	125.9
South Africa		0.0	0.0	31.0	0.0
Zimbabwe		0.0	0.0	0.0	2.5
Total	**n.a.**	**222.8**	**8.9**	**45.6**	**141.0**

Table 22 Exports of rice in husk, milled or broken into the region

Exports of rice are not significant in relation to total consumption. The amounts and destinations are typical of small-scale trading in the informal sector. Since Zambia is not self sufficient in rice, it would not be expected that exports would be driven from within the country but rather that they would be a response to demand from neighbouring countries to supply proximate markets.

However, Zambian rice is popular even among foreign nationals from countries where rice has long been a staple food, which suggests that it could serve a specialised domestic and export market. There is also scope to increase production considerably to satisfy growing local demand, replacing all but specialised imports, and continue to expand to service markets in neighbouring countries.

Table 23 Imports of rice into the region

US $	2004	2005	2006	2007	2008
Kenya		155,209	77,479		
Malawi		16,183	57,598	1,540,860	984,687
Mozambique			388,344	1,327,886	741,768
Namibia		1,344,583	569,037		
South Africa	5,672,322	2,633,328	1,476,737	835,681	612,285
Tanzania	17,226		13,317	5,722	
Zimbabwe	173,577			15,578	32,425
Total	**5,863,125**	**4,149,303**	**2,582,513**	**3,725,727**	**2,371,165**

Tonnes	2004	2005	2006	2007	2008
Kenya		660.0	60.0	0.0	0.0
Malawi		23.9	76.3	1,651.1	1,581.7
Mozambique		0.0	2,219.9	3,614.7	1,396.5
Namibia		4,534.5	1,710.8	0.0	0.0
South Africa		6,232.0	3,170.4	1,168.2	1,016.3
Tanzania		0.0	45.2	2.1	0.0
Zimbabwe		0.0	0.0	30.2	150.0
Total	**n.a**	**11,450**	**7,283**	**6,466**	**4,144**

Long-grained rice is imported from Vietnam, Thailand, Pakistan and Malaysia with 5% to 10% broken grain and repacked into 1 or 5 kg packs. Indian traders, NMC and Amigrain import it through large-scale traders in Durban and Beira. It lands in Lusaka at K195,000 to K200,000 per 50kg bags ($830 to $855 per tonne) and is retailed in shops at $960 to $1000 per tonne after cleaning, fumigation and repackaging into 500 gm, 1kg, 2kg or 5kg bags. A small amount of Basmati rice is also imported and sold at a premium price.

Table 24 Total Rice imports

Rice Imports	2004	2005	2006	2007	2008
US $	9,462,426	7,069,098	6,716,119	6,691,635	11,260,995
Tonnes	23,473.2	20,343.7	19,947.1	12,040.1	16,228.3

Value Chain Mapping

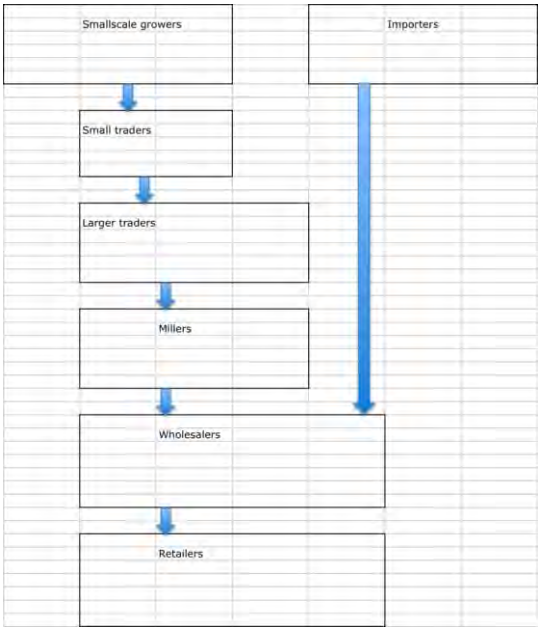
Matrix of functions and actors

Functions	Participants/Actors					Support Markets
	Domestic/Export-Import Market Channels					
	Input suppliers	Farmers Small-scale farmers	Traders NMC, COMACO,	Processors APG Milling	Wholesalers PAZA Retailers Supermarkets	Support services: Financial Services,
Packaging/ retail						
Wholesale, Exporting, Importing						
Milling						
Trading						
Storage						
Production						
Input Supply						

Table 25 Rice functions matrix

6.2.2.1. Value Chain Map

Figure 4 Rice value chain map



6.3. Constraints and opportunities

6.3.1 End market analysis

The consumer price

Imported cost of rice is $800 to $850 FoB Lusaka with a retail price of $970 per tonne.

End market characteristics

The quality of the product is appreciated by consumers even though the processing is not of high quality. Rice from Chama in Eastern Province is sought after by consumers due to the taste and quality.

Current and potential end market opportunities

Zambia's natural endowments lend themselves to paddy-rice production in several parts of the country, but more expertise is required to improve production techniques and to introduce newly developed varieties that can boost total output. Efforts have been made to develop the rice production industry focusing on Western and Luapula Provinces and including rice-cum-fish farming, which was abandoned. Trials are also underway on commercial farms for the production of upland rice using newly developed, high yielding varieties. Costs of production must be reduced through improved efficiencies within the national economy in order to compete with imports from Asia.

6.3.2 Vertical linkages

In Eastern Province, rice growers have been encouraged and assisted by COMACO, a NGO supported by various donors including the World Wildlife Fund, which aims to provide income-earning opportunities through agriculture to communities that would otherwise depend on poaching of wildlife in the vicinity of the Luangwa National Park. COMACO provides technical advice and the inputs for the production of crops appropriate to the area, including rice, which is then bought, processed and sold in supermarket chains under the brand name "It's Wild". This linkage overcomes most of the technical, logistical and marketing challenges faced by producers but may not be sustainable without donor support.

COMACO inputs in the Mfuwe area amounted to 9.45 tonnes and purchased output of rice to 165 tonnes in 2007/08, and the organization had other centres of production, including Chama, for which data were not available.

There are also Asian-owned businesses of long-standing including Faruk Mushashu of SHIFAS, Kavulamungu and Ali and Sons, based in Chipata, who purchase the crops from small-holders, process it and retail it in their shops

In Western Province in the region of Mongu, there have been projects aimed at enhancing production of rice on the flood plain of the Zambezi and its periphery, notably Sefula, where flood irrigation infrastructure was built to bring an area of the flood plain into intensified production by smallholders. However, the plan necessitated a rearrangement of the ownership of small parcels of land that proved more problematic than was anticipated. The scheme has not been as successful as was hoped as a result of land disputes and some engineering failures in connection with the distribution canals.

The produce of rice from the small-holder growers is bought by ACP Milling, which has a rice mill in Mongu, the Catholic Mission and agents of Lusaka-based National Milling Company who transport it to Lusaka for wholesaling and retailing. The main wholesaler of rice and other commodities in Lusaka is PAZA whose throughput of rice is 300 – 400 tonnes per month.

The farmers, traders and millers are linked through their respective associations, which fall under the general umbrella of ZNFU.

6.3.3 Horizontal linkages

Smallholders associated with COMACO are linked through associations with members elected to represent the interests of others. They are also often linked as members of ZNFU through a District Farmers' Association.

Linkages exist between the members of the Asian trading community of Eastern Province who are in competition with each other to a degree but, at the same time, would not enter into destructive competition. The component parts of the market are too few in number for them to tolerate a competitive state in which retail margins would suffer.

In Western Province small-scale farmers may be linked through the ZNFU District Farmers' Association and through the growers' association at Sefula.

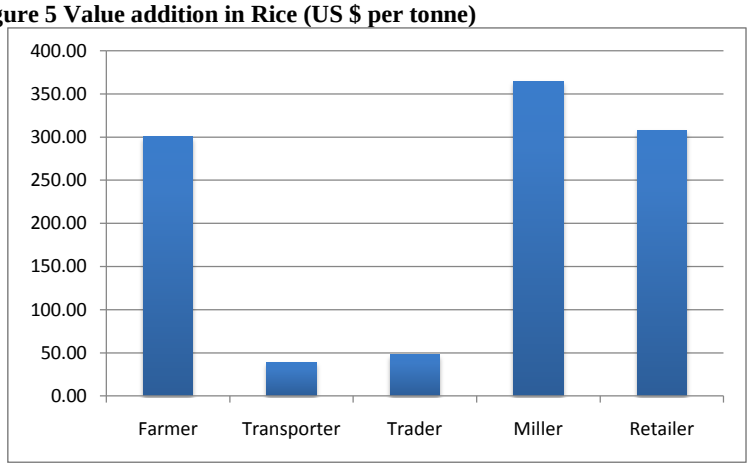
Millers are linked through MAZ, and traders through GTAZ.

6.3.4 Supporting markets/services

NGOs and donor agencies have engaged with the rice industry and its potential and created schemes, such as Sefula near Mongu, to be transferred to local management after an establishment phase. However, little remains of the investments made in terms o sustained output due to lack of local management expertise except in the case of COMACO which is supported in order to divert villagers from their traditional game poaching activities.

6.4. Quantitative Analysis

Figure 5 Value addition in Rice (US $ per tonne)



Note that the above chart indicates only the amount by which each enterprise in the value chain adds to the final retail price. It does not indicate the margins attributable to each component, some of whom may not recover their costs.

The table below provides indicative costs for some items involved in each stage of the value chain. Margins of each player cannot be deduced without full divulgence of the costs of the many variables by the managers of each stage. This process requires an auditing exercise on representative samples of the industry, which, in the context of the reluctance to reveal actual costs, is beyond the scope of this study.

Table 26 Value chain for rice

Exchange rate	5000	K/US$
Rice 2009		
Value chain	**US Dollars**	**%age of**
Production		variable
per ha	**Commercial**	
Seed	38.40	7.34%
Fertiliser	357.30	68.27%
Chemicals	40.40	7.72%
Labour	0.00	0.00%
Irrigation	0.00	0.00%
Cultivation & harvest	0.00	0.00%
Packaging	7.68	1.47%
Transport	9.60	1.83%
Council levy	0.00	0.00%
Insurance	0.00	0.00%
Finance	70.00	13.37%
Total Variable costs	523.38	
Fixed costs %age of VC	8%	
Fixed costs /ha	41.87	
Breakeven price /mt	282.63	
Yield expectation t/ha	2.0	
Price expectation US$/mt	300.00	
Gross return	600.00	
Gross margin	76.62	
Net Return /ha	34.75	
Net Return /mt	17.37	
Trading & Storage		
Producer price US$/mt	300.00	
Transport km	500.00	
Transport US$/mt/km	0.08	
Transport cost US$/mt	39.00	
Shrinkage	2%	
Cost in store	345.00	
Average storage months	5	
Storage cost US$/mt/month	4.00	
Interest %/month	1.66%	
Post storage cost	365.30	
Trader margin	4%	
Milling		
Into mill price $/mt	387.22	
Variable Milling cost	20.00	
Polished rice	80%	
Rice Bran	5%	
Husk	15%	
Wholesale Prices		
Polished rice $/mt	840.00	
Rice Bran $/mt	80.00	
Returns per mt grain		
Polished rice $/mt	672.00	
Rice Bran $/mt	80.00	
Total return $/mt grain	752.00	
Milling margin $/mt	344.78	
Retailing		
Packaging		
Sales	970.00	
Bran	89.60	

7. Sorghum

7.1 SORGHUM PRODUCTION

Sorghum is a traditional crop in parts of Zambia where its drought tolerance plays an important role in food security. However, the production techniques applied have not been greatly advanced partly because there has been a very limited market for the output. However, recent investment in breweries for sorghum based beer has stimulated interest in the crop and yields in areas where extension services have been applied by NGOs have increased from less than 500 kg per ha to 3 tonnes per ha in the same location.

Table 27 Sorghum planting, production and prices

Sorghum	2004-05	2005-06	2006-07	2007-08	2008-09
Area ha	47,390	57,432	43,626	31,596	24,349
Yield mt/ha planted	0.52	0.33	0.48	0.40	0.41
Actual production mt	24,467	18,714	21,048	12,773	9,992
Sales	2,304				
Ndola price K/50kg bag		75,000	80,500	88,900	94,000
Exchange rate K/US$ July	4680	3650	3830	3305	5190
Ndola price US$/mt		411	420	538	362

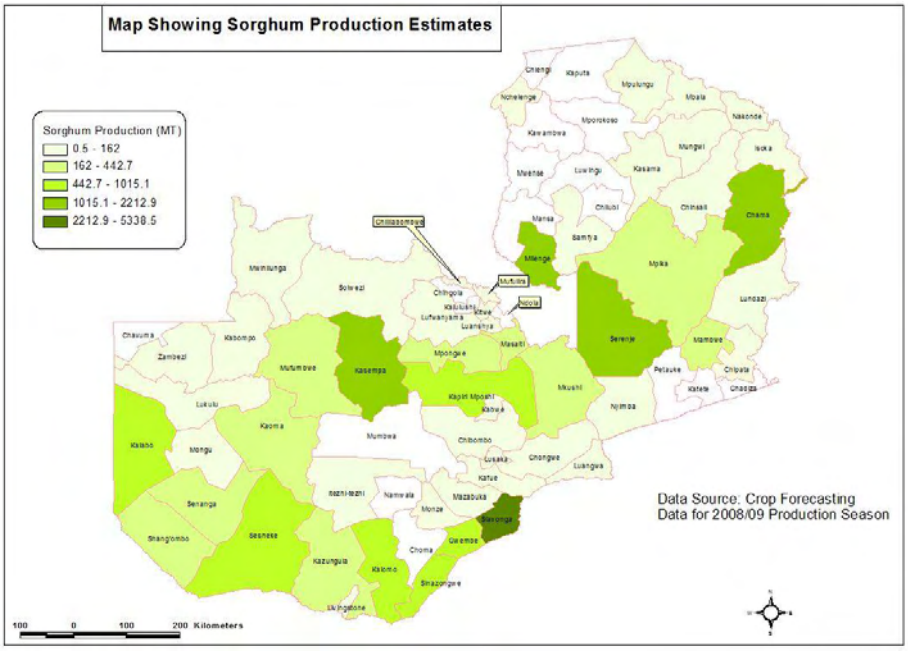
Source: CSO, FEWSNET

The price quoted above relates to the Ndola Rural price in August (for the newly harvested crop) and is converted from that of a 5 litre tin or "meda", which contains approximately 4.5 kg. The product is not always found in Lusaka.

7.1.1 Projections for the period 2009 – 2013

Increased interest in sorghum by the brewing industry in conjunction with a rationalization of cropping patterns in relation to production regions and research on varieties can enhance the scope for production. Farmers should be more amenable to converting to or expanding sorghum production if adequately serviced by extension organizations and input suppliers. Greater production and availability of sorghum on the market could also extend its applications further than the brewing industry into incorporation into staple foods and animal feeds.

There is also considerable interest in sweet sorghums as a biofuel crop with dual purpose of grain production. These developments are still in their infancy in Zambia although the benefits of sweet sorghum have already been explored under local conditions and proved to be viable as fuel crops in a high oil price environment.



7.1.2 SORGHUM CONSUMPTION

Domestic Production vs. Consumption

Table 28 Sorghum and Millet combined Production vs. Consumption Balance

	Tonnes				
Sorghum/Millet	**2004/5**	**2005/6**	**2006/7**	**2007/8**	**2008/9**
Production	64,251	48,297	69,206	34,480	43,926
Consumption	68,593	49,742	69,374	38,192	46,199
Surplus/Deficit	-4,342	-1,445	-168	-3,712	-2,273

Source: FSB

The decline in domestic production and in imports would indicate a decrease in local demand, but the Kwacha price has risen steadily in the last few years. The decline in the US Dollar denominated price in 2008/09 is likely to relate to a dislocation between the sudden dip in the value of the Kwacha, rather than a steady decline, and to the fact that sorghum is often grown with few, if any, imported inputs, and is thus related more to expectations of return to labour than return on cash investment on inputs.

7.1.3 Sorghum Exports and Imports

Sorghum Exports					
US $	**2004**	**2005**	**2006**	**2007**	**2008**
Sorghum imports from the region					
US $	**2004**	**2005**	**2006**	**2007**	**2008**
South Africa	1,798,868	3,604,734	3,296,917	18,418	1,592
Tanzania		2,940	314,102	2,362	
Zimbabwe			358	6,901	
Total	**1,798,868**	**3,607,674**	**3,611,377**	**27,681**	**1,592**
Tonnes	**2004**	**2005**	**2006**	**2007**	**2008**
South Africa		8,150	7,507	34	19
Tanzania		38	1,546	48	
Zimbabwe			1	30	
Total	n/a	8,188	9,054	112	19
Av Price /mt		440.60	398.88	247.81	83.67
South Africa				32	
Zimbabwe					60
Total	**n.a.**	**0.1**	**161**	**44**	**60**
Price $/mt		2120.00	734.31	233.84	166.73

Table 29 Sorghum exports to the region

Table 30 Sorghum imports from the region

Imports from the region have declined rapidly since 2006, indicating a decline in demand from the Zambian economy and accompanied by a decline in the price paid.

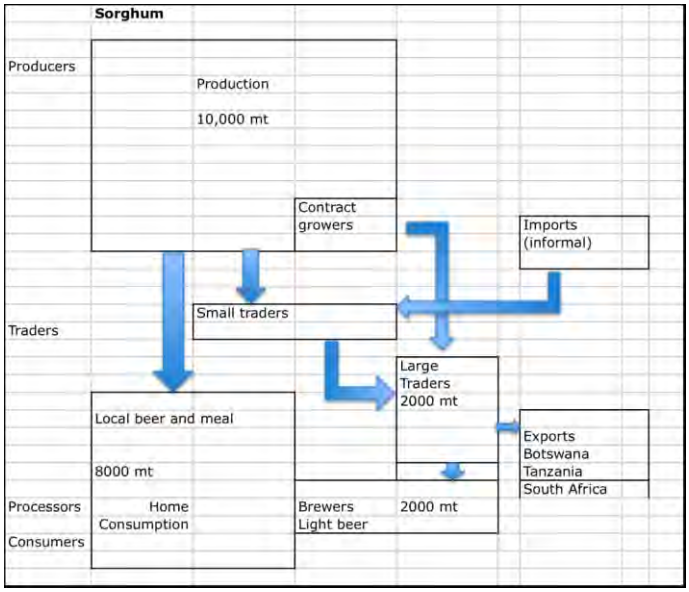
7.1.4 Value Chain Mapping

Matrix of functions and actors

Table 31 Sorghum matrix of functions

Functions	Support Markets				
	Input suppliers Seed companies	Farmers	Traders Small-scale traders and CHC	Processors Eagle Breweries, home brewers	Support services: Financial Services,
Wholesale, Exporting, Importing					
Processing					
Trading					
Collecting, Bulking, Storage					
Production					
Input Supply					

Value Chain Map



7.2 **Figure 6 Sorghum Value chain map**

Constraints and opportunities

One of the constraints to sorghum production in Zambia has been the prevalence of Quealia finches, which flock in huge numbers when grain crops are maturing. White sorghum is more susceptible to bird damage than red sorghum but red sorghum is more costly to mill since its seed coating must be grinded. Unfortunately the brewing industry needs the varieties that are susceptible to bird damage.

7.2.1 End market analysis

Sorghum as a staple food in Zambia is not widely appreciated since maize has long been a staple of preference and has been promoted vigorously by agricultural policy. However, the value of sorghum production in drought years as a reliable source of food is fully appreciated by farmers in drought prone areas. These areas extend beyond the borders of Zambia into Botswana and Namibia where there is market demand that exceeds that which existed in Zambia prior to the opening of sorghum based breweries.

Eagle Breweries has created additional demand for sorghum in Zambia for its sorghum based beer such that a marketing chain has now developed and stimulated production in areas where few alternative sources of income have been developed.

The consumer price

Sorghum is an intermediate product within the brewing industry, and as such, it is remotely linked to consumers in the value chain. The wholesale price range in 2009 is between $180 and $650 which has little bearing, if any, on the consumer price of beer.

End market characteristics

Table 32 Sorghum End-market characteristics

The form of the product at the end market	Users,	Volume of National Requirement in Metric Tons per year	End Market Price in October 2009 in US$ per metric ton	Source of the product		
				Domestic Market	Imports	
					Intra regional (i.e from EAC/COMESA) percentage	Extra regional (i.e. outside EAC/COMESA)
Sorghum (Grain)	Households Brewers	8,000 mt pa 2,000 mt pa	$360/mt	2,000 – 3,000 mt pa	Informal Tanzania	
Flour		Unknown				

Current and potential end market opportunities

The growing use of sorghum for production of clear beer on a large commercial scale could increase demand for sorghum for that industry to 3,000 tonnes per annum by 2012 from 1,800 in 2009.

If government were to provide tax incentives to breweries for using domestically produced raw materials, it would provide a boost to the production and processing sectors.

Vertical linkages

Smallholder production relies for its marketing on linkages with small-scale traders who consolidate loads for deliveries to breweries or traders following the guidance of traders of whom CHC in Lusaka is the main player. Traders enter into contracts for the supply of sorghum amounting to 4,000 tonnes in order to achieve deliveries of just 1,800 tonnes.

Supporting markets/services

Research into production methods and varieties is conducted by GART and SARI and trials have been conducted on commercial farms and by the University of Zambia (UNZA) specifically for the purposes of identifying cultivars of sweet sorghum for biofuels.

7.3 Quantitative Analysis

Figure 7 Sorghum value chain distribution

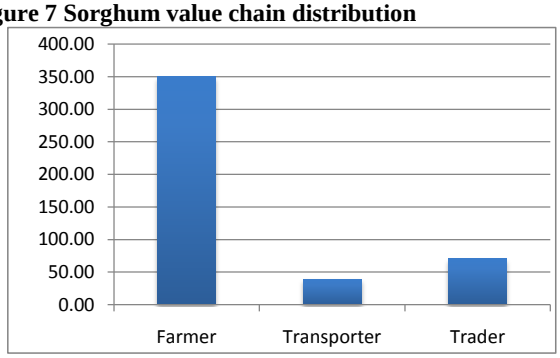


Table 33 Sorghum Value chain analysis

Exchange rate	5000	K/US$
Sorghum 2009		
Value chain	**US Dollars**	**%age of**
Production		variable
per ha	**Smallscale**	
Seed	16.80	3.04%
Fertiliser	241.00	43.64%
Chemicals	0.00	0.00%
Labour	170.00	30.79%
Packaging	10.80	1.96%
Transport	9.60	1.74%
Finance	104.00	18.83%
Total Variable costs	552.20	
Fixed costs %age of VC	8%	
Fixed costs /ha	44.18	
Breakeven price /mt	331.32	
Yield expectation t/ha	1.8	
Price expectation US$/mt	350.00	
Gross return	630.00	
Gross margin	77.80	
Net Return /ha	33.62	
Net Return /mt	18.68	
Trading & Storage		
Producer price US$/mt	350.00	
Transport km	500.00	
Transport US$/mt/km	0.08	
Transport cost US$/mt	39.00	
Shrinkage	2%	
Cost in store	396.00	
Average storage months	5	
Storage cost US$/mt/month	4.00	
Interest %/month	1.66%	
Post storage cost	416.35	
Trader margin	4%	
Wholesale Prices		
Polished Sorghum $/mt	460.00	

8. Millet

8.1 MILLET PRODUCTION

Two types of millet are produced in Zambia: Finger Millet and Pearl Millet. Finger millet is produced under the chitemene system in the acid leached soils of the north of the country while Pearl Millet is produced predominantly in the low rainfall areas of the south. Pearl millet is valued for its tolerance of severe drought conditions that would completely destroy maize. Both millets, in common with sorghum, give poor returns to labour and are grown only in niche situations such as the last in the rotation of chitemene plots in the case of finger millet, or in the case of Pearl millet as a food security provision in case of drought.

The chitemene system has been practiced for centuries in the forested areas on acid leached soils of Northern Province by the Bemba people. It basically entails burning timber over a patch of land and planting crops in a rotation so as to exploit the nutrition afforded by the burned wood and foliage. Branches are lobbed from trees, allowing them to re-grow and continue to pump nutrients from the deep root zone to be deposited by burning on the soil surface. When population density was not pressing family could live for four years on each plot and return after sixteen years to the original one. Pressure on land has now intensified the process to the extent that the tree growth cannot keep up with the activity (particularly since charcoal burning for cash, and export, has further exploited forest growth).

Table 34 Millet planting, production and prices

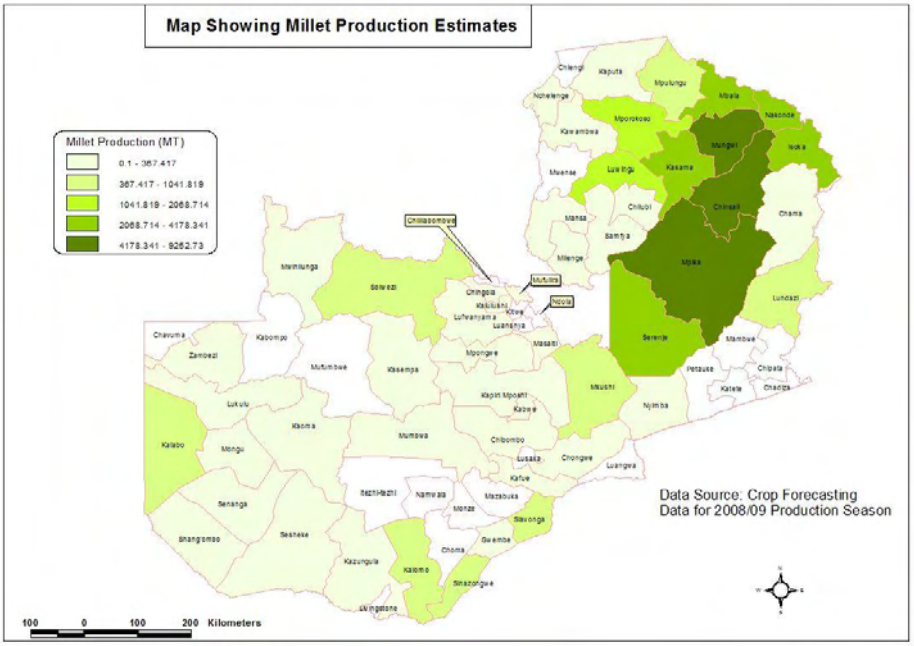
Millet	2004-05	2005-06	2006-07	2007-08	2008-09
Area ha	59,081	63,411	69,529	56,817	45,508
Yield mt/ha	0.67	0.47	0.69	.38	0.75
Actual production mt	39,784	29,583	48,159	21,707	33,934
Ndola price K/50kg bag	66,000	72,200	80,500	83,300	108,800
Ndola price US$/mt		396	420	504	419

Source: CSO, FEWSNET

The price quoted above relates to the Ndola Rural price in August (for the newly harvested crop) and is converted from that of a 5 litre tin or "meda", which contains approximately 4.5 kg. The product is not always found in Lusaka.

8.1.1 Projections for the period 2009 – 2013

The poor returns to labour and the greater access to alternative staple foods may account for the long-term decline in the production of millets. It may also be that the urgency of providing for severe drought conditions has been defused by the greater availability of food relief. More productive application of labour either to alternative crops or to employment, and the dearth of labour in some rural environments where health problems have reduced the productivity of the working population may also account for the decline.



8.2 MILLET CONSUMPTION

8.2.1 Domestic Production vs. Consumption

Domestic consumption (Domestic sales)

Millet is grown mainly for home consumption and very little is traded.

8.2.2 Millet Exports and Imports

The only exports to the region have been 2.8 tonnes to Namibia in 2007 and 1140 tonnes to Kenya in 2008.
There are no records of imports from the region in the last 5 years.

9. Beans

9.1 BEANS PRODUCTION

There are many varieties of beans known by many different names in Zambia according to their appearance or their provenance. Northern, North Western and Luapula Provinces produce most of the saleable surplus, but they are also found for sale in Eastern and Central Provinces. Kabulangeti is the most commonly found bean and it originates from southern Tanzania. In the north of Zambia, where the rainy season is longest, farmers can plant three crops in a season although two is more common. The first crop is intercropped with maize, groundnuts or cassava, and the second is planted between January and March on free draining soils. The third crop is planted in the dry season where it can either draw on residual moisture, or where it can be irrigated.

Yields of the traditional varieties are low, in the range of 300 to 500 kg per ha, and they are susceptible to disease, but they are grown for their taste and colour preference, although varieties are available with disease resistance and yield potential of 2500 kg per ha.

Table 35 Beans plantings, production and prices

Beans	2004-05	2005-06	2006-07	2007-08	2008-09
Area under beans	45,270	50,496	54,532	55,663	59,588
Yield mt/ha planted	0.40	0.46	0.51	0.43	0.75
Actual production mt	18,161	23,098	27,697	24,164	44,463
Lusaka price K/50kg bag	339,300	444,200	424,100	489,550	594,150
Lusaka price US$/mt	1,450	2,434	2,215	2,962	2,289

Source: CSO

The prices quoted above are derived from the market price of a 1 kg tin in August. The US Dollar price per tonne is calculated using the exchange rate prevailing at the time of the recorded price.

9.1.1 Bean Exports and Imports

No significant exports of beans are reported in national statistics. The price regime in Zambia is high and is unlikely to give scope for comparative advantage over export parity prices.

Table 36 Beans regional imports

Beans imports from the region					
US $	**2004**	**2005**	**2006**	**2007**	**2008**
Malawi		14,118	9,679	11,965	48,406
South Africa	1,197,126	1,338,851	252,714	28,669	43,492
Tanzania	527,354	10,963	140,221	3,475	3,025
Zimbabwe	203,011	1,449		1,370	
Total	**1,927,492**	**1,365,381**	**402,614**	**45,479**	**94,923**
Tonnes	**2004**	**2005**	**2006**	**2007**	**2008**
Malawi		23.8	34.0	24.9	24.9
South Africa		7,148.9	220.8	5.5	34.4
Tanzania		102.1	285.2	13.0	30.5
Zimbabwe		2.0		2.0	
Total	**0.0**	**7,276.8**	**540.0**	**45.4**	**89.8**
Av. Price US$/mt		187.6	745.6	1,001.3	1,057.1

Source: CSO

Beans can be bought from China at $450 per tonne but there is duty and VAT on them if they are exported since they are non-SADC or COMESA origin, which makes them uneconomical.

9.2 Value Chain Mapping

9.2.1 Value Chain Map

Seasonal and territorial variability in prices provide scope for arbitrage by traders who tend to store beans for long periods in anticipation of price rises which occur periodically when food shortage threatens communities. In the past WFP was the buyer that could be relied upon to compensate traders for their speculation, but they are now buying through ZAMACE where competition reduces the scope for exploitative profit taking.

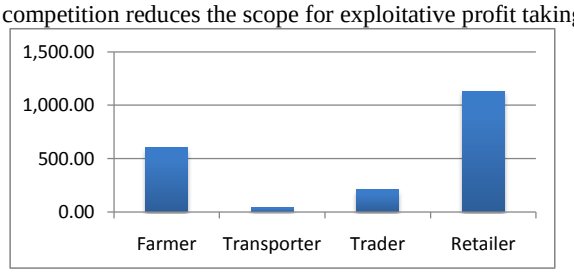


Figure 8 Beans value chain distribution

Table 37 Beans value chain

Exchange rate	5000	K/US$
Beans 2009		
Value chain	**US Dollars**	**%age of**
Production		variable
per ha	**Smallscale**	
Seed	15.00	3.62%
Fertiliser	124.00	29.91%
Chemicals	36.00	8.68%
Labour	120.00	28.94%
Packaging	6.00	1.45%
Transport	9.60	2.32%
Finance	104.00	25.08%
Total Variable costs	414.60	
Fixed costs %age of VC	8%	
Fixed costs /ha	33.17	
Breakeven price /mt	447.77	
Yield expectation t/ha	1.0	
Price expectation US$/mt	600.00	
Gross return	600.00	
Gross margin	185.40	
Net Return /ha	152.23	
Net Return /mt	152.23	
Trading & Storage		
Producer price US$/mt	600.00	
Transport km	500.00	
Transport US$/mt/km	0.08	
Transport cost US$/mt	39.00	
Shrinkage	2%	
Cost in store	669.00	
Average storage months	5	
Storage cost US$/mt/month	4.00	
Interest %/month	1.66%	
Post storage cost	689.57	
Trader margin	30%	
Wholesale Price	896.44	
Cleaning	63.00	
Packaging	10.00	
Retail price	2,100.00	
Retail margin	1,130.56	

WFP annual requirement was 3000 tonnes but has now declined to 500 – 600 tonnes pa. and they are buying through ZAMACE.
Dealers in Chipata are Shifa and Aliboo.

9.2.2 End market analysis

The consumer price

Consumer prices are variable according to location and season. The table below demonstrates the variability of prices in Kwacha per kilo at various markets in September 2009.

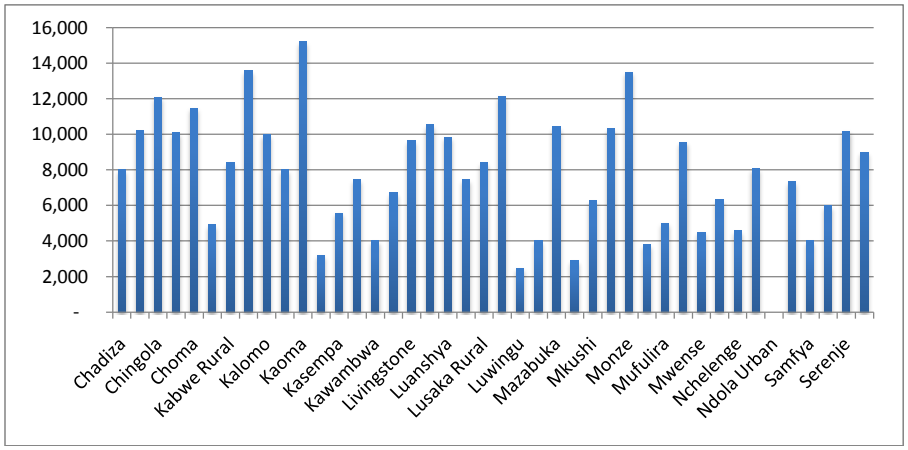


Figure 9 Beans price variability

End market characteristics

Beans are an important component of the diet and are sold in most markets throughout the year. They are canned in Lusaka.

Current and potential end market opportunities

The domestic market could be expanded by addition of beans into more food preparations and by substitution of imported product and by exporting to the region either dried or canned.

9.2.3 Vertical linkages

An important link in the bean trade is that between small-scale cotton growers who are supported as outgrowers by Dunavant. Since Dunavant has a presence among the farmers in order for them to facilitate cotton growers, they "piggy-back" their bean growing and marketing enterprise onto the cotton outgrowers, thereby creating economies of scale while also ensuring better nutrition and additional income for their growers.

Traders dealing in maize and other commodities also piggy-back their bean purchasing activities, speculating on both seasonal and territorial price variability.

Canneries purchase while the prices are low but the majority of consumption is from the dried bean market.

9.2.4 Horizontal linkages

Traders do not trade beans among themselves as a rule because they are viewed as assets when there is a shortage and consumers pay high prices for them.

9.2.5 Supporting markets/services

9.3 Quantitative Analysis

Figure 10 Beans value chain distribution

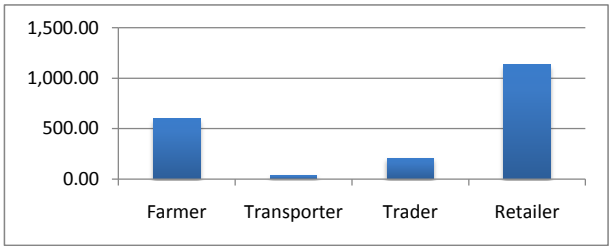


Table 38 Beans value chain analysis

Exchange rate	5000	K/US$
Beans 2009		
Value chain	**US Dollars**	**%age of**
Production		variable
per ha	**Smallscale**	
Seed	15.00	3.62%
Fertiliser	124.00	29.91%
Chemicals	36.00	8.68%
Labour	120.00	28.94%
Packaging	6.00	1.45%
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Net Return /mt	152.23	
Trading & Storage		
Producer price US$/mt	600.00	
Transport km	500.00	
Transport US$/mt/km	0.08	
Transport cost US$/mt	39.00	
Shrinkage	2%	
Cost in store	669.00	
Average storage months	5	
Storage cost US$/mt/month	4.00	
Interest %/month	1.66%	
Post storage cost	689.57	
Trader margin	30%	
Wholesale Price	896.44	
Cleaning	63.00	
Packaging	10.00	
Retail price	2,100.00	
Retail margin	1,130.56	

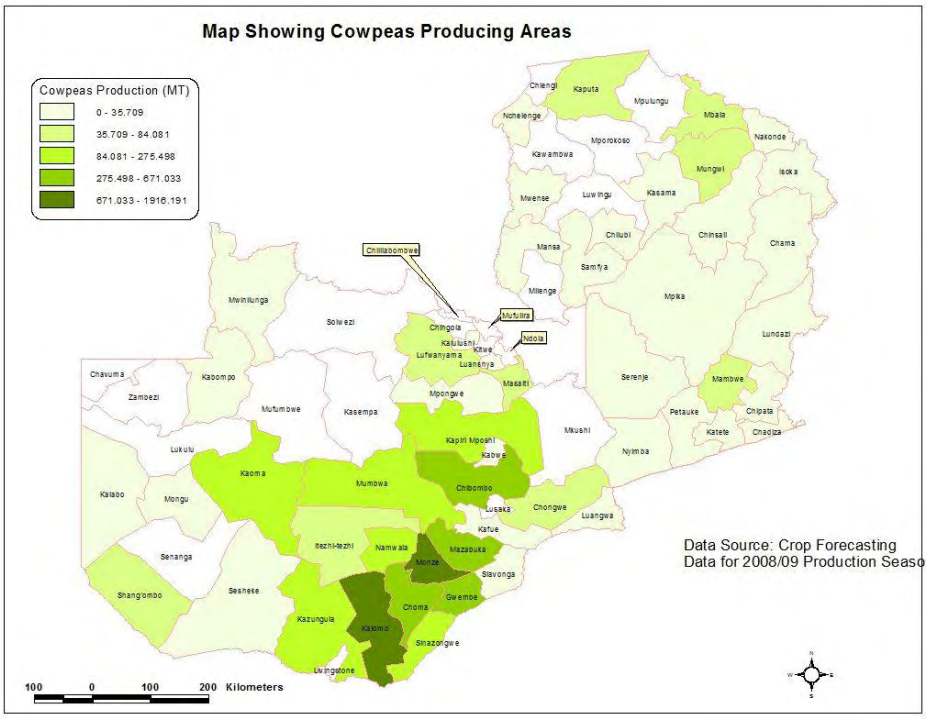
10. Pulses (pigeon pea, cow pea, chick pea)

10.1. PULSE PRODUCTION

Pulses are not yet a significant crop in Zambia, the production and consumption levels being very low.

Table 39 Cowpeas plantings, production and prices

Pulses (Cowpeas)	2004-05	2005-06	2006-07	2007-08	2008-09
Planted ha				4,544	12,963
Harvested ha				2,571	11,185
Expected production MT				1,841	7,468
Yield mt/ha planted				0.41	0.58
Actual production mt					
Farm gate price K/50kg bag					
Farm gate price US$/mt					



11. THE CASSAVA SUB-SECTOR

11.1 CASSAVA PRODUCTION

Production of cassava increased gradually up to 1975 when 200,000 tonnes were produced annually. There was a slow acceleration to 1991 by which time production had increased to 400,000 tonnes. Then a surge in production was registered as output increased rapidly to 900,000 tonnes by 2007, coinciding with a decline in maize production since 1991.

Note, however, that this surge may be due to the way in which data on cassava production have been collected, since output is assumed from the area planted. Prior to 2003/04 it was assumed that average cassava yield was 7 tonnes per ha, but his was revised upwards to 11.7 tonnes per ha. Also in that season, production of cassava in urban areas was included for the first time. There has been no study on actual output.

Whatever the actual changes are, they do reflect a more rational approach to appropriate cropping patterns that had been distorted by the strong promotion of maize production through subsidies that was practiced in the 1970s and '80s, even in areas much better suited to cassava. It also coincided with advances in pest control management techniques and the introduction of improved varieties that moved yield potential up from 7 tonnes per ha to high 20s during the 1990s and to 35 and 41 tonnes per ha from 2000. The varieties introduced in the 1990s were Bangweulu, Kapumba and Namulimo and those in 2000 were Mweru, Chila, Tanganyika and Kampolombo.

Traditionally chiefs in Zambia obliged their subjects to grow cassava on a proportion of their land as a hedge against the failure of maize crops, since cassava is more drought tolerant. However, this practice fell away as the Kaunda regime focused exclusively on maize and aid agency based relief food could be called upon to mask the effects of this detrimental policy change. Cassava is almost exclusively a smallholder crop serving a subsistence need. In the cassava growing areas 96% of households produce cassava (and 26% of them sell only 6% of total production) and 49% produce maize, whereas in the maize growing areas 95% grow maize and only 3% grow cassava (and 45% of them sell 25% of total cassava production), indicating a strong dependence on maize even where it is less appropriate.

The expansion of production is constrained by lack of marketing and logistical considerations. The value/weight ratio of fresh cassava, with its high water content, implies that the transport costs rapidly exceed value. Therefore it is largely consumed by its producers and there is very little small-scale processing other than by hand.

A parastatal cassava processing plant was established on the Copperbelt in the 1980s when economic factors were not a major consideration. It failed to operate successfully because the cost of transporting fresh cassava from the production areas was prohibitive, so it was economically non-viable and could not survive in times of economic imperatives. Small-scale processing units designed for village use, which can be supplied by ox-cart or bicycle transport and powered by water mills or small engines, have not been introduced as they have in the Far East. The marketable products of dried chips or milled flour are therefore only available in such small quantities as to make collection by motorized vehicles non-viable.

Table 40 Cassava plantings, production and prices

Cassava	2004-05	2005-06	2006-07	2007-08	2008-09
Area ha	311,684	361,028	362,354	391,844	398,000
Yield mt/ha planted	2.92	2.92	2.92	2.92	2.92
Actual production mt	911,673	1,056,000	1,059,887	1,146,142	1,160,853
Farm gate price – fresh US$/mt					45
Ndola Meal retail price K/kg bag	3,400	1,786	1,000	2,661	6,000
Ndola meal retail price US$/mt	726	484	261	805	1,156

Source: FEWSNET

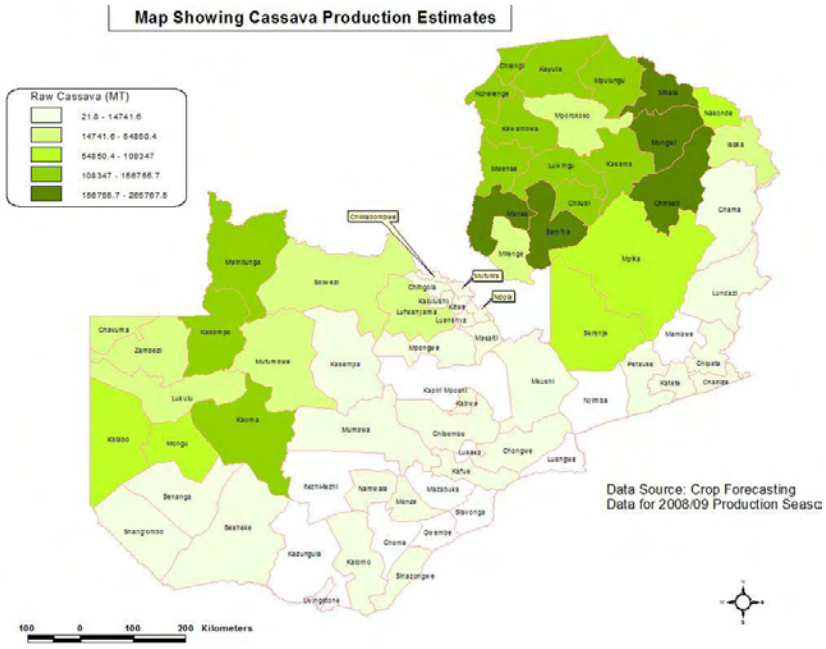
Clearly the tonnage has been estimated by assuming a constant yield by which to multiply the hectarage. It must be said that these output figures are viewed with some skepticism by traders familiar with the industry.

11.1.1 Projections for the period 2009 – 2013

A strong upward trend in production has been underway through the 1990s and 2000s that should continue with improved access and distribution of high yielding varieties, which has been underway for a number of years. The extension services needed to optimize the benefits that can accrue from improved production technology are being supported by government and donor agencies through NGOs. These efforts, in conjunction with development of artisanal basic processing enterprises, will help to develop the market for cassava products in the human food, stockfeed and manufacturing industries. One area of the potential growth in consumption is with the fresh tubers, which are available during the hungry season of January and February. Increase in human population and further conversion to cassava from maize will increase demand by more than the population growth rate.

If millers were also to incorporate 10% cassava flour into maize meal and wheat flour, it would increase demand by 250,000 tonnes, and convenience foods could double that increment. Taste trials showed that cassava incorporation into bread was acceptable to consumers. Further development of the stock feeds industry and manufacturing sector could add another 150,000 mt to demand. Cassava has been shown to deliver the same growth in animals as maize and it would be economically viable as an alternative ingredient in stockfeed if it were no more than 70% of the cost of maize.

The challenges are to instill the entrepreneurial and management skills needed to operate processing facilities in appropriate areas and to produce end products that compete effectively with cheap imports from Asia. Further development of a taste for cassava in the general community will also help to increase demand and proactive promotion of domestically produced cassava as a component of stockfeed and flours for human consumption has been underway through a Cassava Task Force with the support of MACO and a number of agricultural projects. The perennial challenge to development of the cassava processing industry, and hence the production, is the long distances between production areas and the market for the processed product in a country where the cost of transport is high.



11.2 CASSAVA CONSUMPTION

11.2.1 Domestic Production vs. Consumption

Table 41Cassava Flour Production vs Consumptions Balance

	Tonnes				
Cassava Flour	**2004/5**	**2005/6**	**2006/7**	**2007/8**	**2008/9**
Production	911,673	1,056,000	1,059,887	1,185,600	1,160,853
Consumption	679,423	731,046	723,785	724,155	694,134
Surplus/Deficit	232,250	324,954	336,102	461,445	466,719

Source: FBS

Cassava provides both fresh leaves and tubers for subsistence consumption. Sweet tubers are eaten fresh and all tubers are chipped and dried or pounded, washed and dried as flour. Fresh cassava can be harvested before maize and is therefore an important component of the diet during the "hungry season" of January and February. Refined cassava starch products are ironically more easily available to industry from the Far East than from domestic supplies. Buyers observe that they can obtain cassava products from the Far East with reliable quality and packaging at acceptable prices delivered to their premises simply by lifting the telephone,

whereas to support local production implies prowling the distant production areas with costly transport to obtain variable product that requires processing within an economy plagued by unpredictable inefficiencies. This reflects relative economies of scale of foreign producers, application of standards to the industrialized product and distortions to the value of the currencies of both the exporter and the importer, which favour imports over local purchase.

11.2.2 CASSAVA Exports and Imports

No records are available on exports and imports of cassava. The suggestion by the CSO figures in the Table above that there is a huge annual surplus of cassava flour is clearly erroneous.

Value Chain Mapping

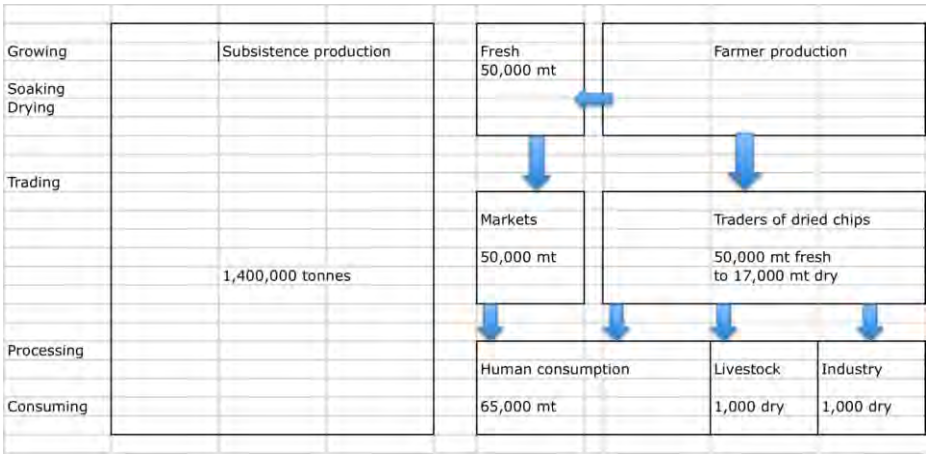


Figure 11 Cassava value chain map

11.3 Constraints and opportunities

Constraints to farmer productivity arise from inadequate access to appropriate high yielding varieties although there is a process underway where the varieties are bred at the research station in Luapula Province, bulked up on a private farm, Aralussa, in Chisamba and distributed to growing areas by aid agencies. The efficiency of the distribution is compromised by lack of supervision at the receiving end such that cuttings do not arrive, are allowed to dry out before allocation to farmers or are simply dumped beside the road without a reception process.

Opportunities for increased income generation from cassava exist through the food, stockfeed and manufacturing industries but, in order to overcome the cost of transporting fresh tubers, there must be local processing capability to reduce the weight through drying, rendering the tubers into chips or flour and consolidating loads for increased efficiency in collection. Such a process calls for more extension to farmers and assistance to communities in initiating collaborative activities and training in establishing communication networks and

management systems. It also requires capital investment in simple processing facilities, transport and storage and a marketing chain to manufacturers.

If a tax incentive were to be offered to local industries in the cassava chain to make use of locally produced raw material such as cassava, many of the constraints would be addressed by market forces and proactive strategies from the private sector. The growth of the industry and processing facilities at both district and national level would lead to export opportunities for refined products towards the south and possibly further if efficiencies are sufficient to ensure that the industry is internationally competitive.

11.4 Matrix of functions and actors

Table 42 Cassava matrix of functions

Functions	Participants/Actors					Support Markets
	Domestic/Export-Import Market Channels					
	Input suppliers Plant material from Aralussa.	Farmers Small-scale farmers	Traders CHC	Processors Tiger Feeds, NMC	Wholesalers	Support services: CRS, Care, CFU
Wholesale, Retail, Exporting, Importing						
Processing						
Trading						
Collecting, Bulking, Storage						
Production						
Input Supply						

11.4.1 End market analysis

Current and potential end market opportunities

The growing urbanization of the Zambian population has increased demand for convenient snacks when cooking is awkward, and fresh cassava of the sweet varieties are becoming increasingly popular. This opportunity has been recognized.

The value: weight ratio of cassava, particularly in the context of the high cost of transport in rural Zambia, dictates that the most appropriate use of cassava will be found in the immediate locality of its production. Since many of the areas where it is produced are also poorly provided with stockfeed for livestock, it could be well applied to animal feed to enhance the productivity of that sector where improvements are needed most. This implies the introduction of cottage industry scale processing units for the preparation of the cassava and the mixing of stockfeed with available additives.

Since there is currently no established value chain associated with cassava, it would be beneficial for government to provide tax incentives to the food and stockfeed industries as

well as to manufacturers of industrial products so as to promote the use of locally produced crops such as cassava.

11.4.2 Vertical linkages

The introduction of ZAMACE into the trading chain is seen by farmers, traders and millers as an improvement because of the transparency that it implies, the competitiveness that it introduces to the market place, the regulatory implications for quality control and the simplification of the price determination process.

Farmer groups have expressed keen interest in some cassava growing areas in the prospects for local processing and subsequent marketing to enhance the commercialization of their enterprises. There is clearly scope for improvements in the value chain but innovation and the introduction of appropriate technological solutions to processing functions are required. These issues should be addressed by the Cassava Task Force using a practical approach.

Tiger Feeds has expressed a willingness to use locally produced cassava chips as a component of stockfeed with the expectation that economies of scale will increase the efficiency as the market develops. Further linkages are feasible with millers, bakers and other stockfeed producers. However, the logistical considerations remain a consideration in the financial viability of developing cassava marketing until economies of scale become effective.

11.4.3 Horizontal linkages

Horizontal linkages at the NGO level exist in the form of a Cassava Task Force that aims to promote the product processing and marketing of cassava for the benefit of the producers and the economy at large. The task force is comprised of the Agricultural Consultative Forum (ACF), Programme Against Malnutrition (PAM), SNV, Food Security Research Project (FSRP), Zambia Agricultural Research Institute (ZARI), ZABS and private sector businesses with an interest in cassava development.

12. Groundnuts

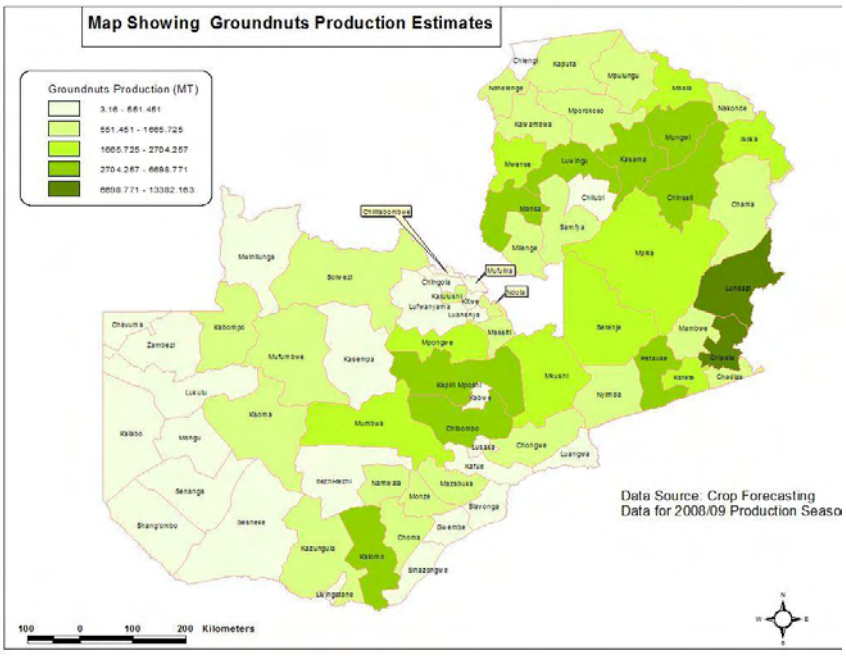
12.1 GROUNDNUT PRODUCTION

Zambia was a major supplier of confectionary groundnuts to the World market in the 1960s when the Chalimbana nut was highly desirable. However, the parastatal marketing company became a costly burden on producers and collapsed, the basic seed became moribund due to lack of a sustained rejuvenating breeding programme, and gradually consumer tastes turned towards the smaller confectionary nuts produced by South Africa, which were marketed more aggressively. Production declined considerably as most commercial farmers ceased to produce and small-scale farmers were not offered the services and rewards associated with successful marketing arrangements.

Groundnuts are now produced almost exclusively by small-scale growers on a low input/low output regime where safeguards against nematodes, "pops" (empty shells due to calcium deficiency) and, crucially, aflotoxin are absent or insufficient. Yields in the small-scale sector are low as a result, and return to labour falls far short of its potential.

Table 43 Groundnuts plantings, production and prices

Groundnuts	2004-05	2005-06	2006-07	2007-08	2008-09
Area ha	116,494	161,962	144,251	147,320	144,000
Yield mt/ha planted	0.60	0.45	0.58	0.37	0.48
Actual production mt	69,696	74,218	84,010	55,215	70,527
Farm gate price K/50kg bag		100,000	50,000	60,000	120,000
Farm gate price US$/mt		548	261	363	462



12.2 GROUNDNUT CONSUMPTION

12.2.1 Domestic Production vs. Consumption

Records indicate that Zambia now imports groundnuts and that there are no exports although there was a significant export industry in the past.

Groundnuts Exports and Imports

Table 44 Groundnuts imports

Groundnuts in shell imported from the region					
US $	**2004**	**2005**	**2006**	**2007**	**2008**
Malawi	17,576.16		2,111.28	15,391.00	
Mozambique			17,574.16		
South Africa					16
Zimbabwe			3,106.61	33,897.00	
Total	**17,576**	**0**	**22,792**	**49,288**	**16**
Tonnes	**2004**	**2005**	**2006**	**2007**	**2008**
Malawi			5.000	52.890	
Mozambique			20.000		
South Africa					0.001
Zimbabwe			2.700	28.312	
Total	n/a	0	28	81	0
Av Price /mt			822.82	606.98	16000.00
Groundnuts shelled imported from the region					
US $	**2004**	**2005**	**2006**	**2007**	**2008**
Malawi	132,565	144,450	14,843	206,754	364,623
South Africa		633	97	1,409	843
Tanzania		7,374	2,071	1,761	
Zimbabwe		3,104	178,373	28,395	
Total	**132,565**	**155,561**	**195,384**	**238,319**	**365,466**
Tonnes	**2004**	**2005**	**2006**	**2007**	**2008**
Malawi		713.4	89.5	1028.2	1906.8
South Africa		1.7	0.0	0.6	1.1
Tanzania		68.0	18.0	12.0	
Zimbabwe		0.6	58.0	16.4	
Total	n/a	784	165	1,057	1,908
Av Price /mt			1180.77	225.43	191.56

There is no record of groundnut exports.

12.3 Value Chain Map

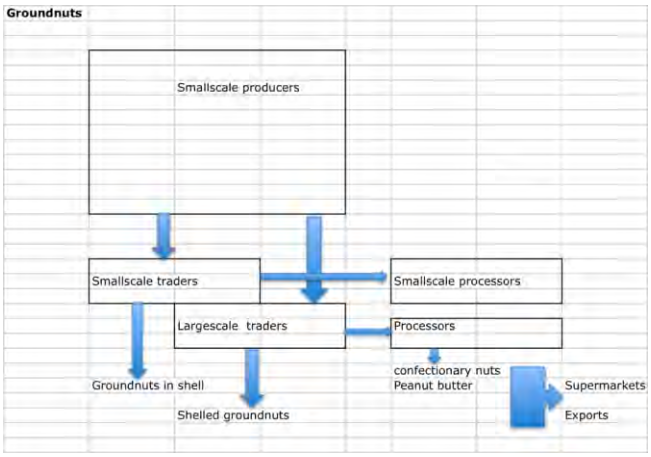


Figure 12 Groundnut value chain map

12.4 Constraints and opportunities

12.4.1 End market analysis

Groundnuts form a large component of the traditional Zambian diet and are an important nutritional component. However, the most attractive aspect of the end market is that for the processed product of both confectionary nuts and for peanut butter on both the domestic and the export markets where sensitivity to aflotoxin contamination is acute.

Companies and NGO-supported organisations have embarked on peanut butter production and some have supply contracts with supermarket chains. The supermarket chains are mostly owned by foreign companies with their own agendas for sourcing their products which, while posing a challenge to domestic suppliers, has provided the competitive environment needed to improve quality of the products and their presentation.

12.4.2 The consumer price

The wide variability of market prices for groundnuts is illustrated below by the prices recorded in September 2009 in a range of markets in Zambia, which indicate the opportunities for arbitrage as well as the apparent poor communication between markets, despite the widespread use of mobile phones and SMS based pricing systems. The isolation of some producer communities is a great cost to their income generating capacity.

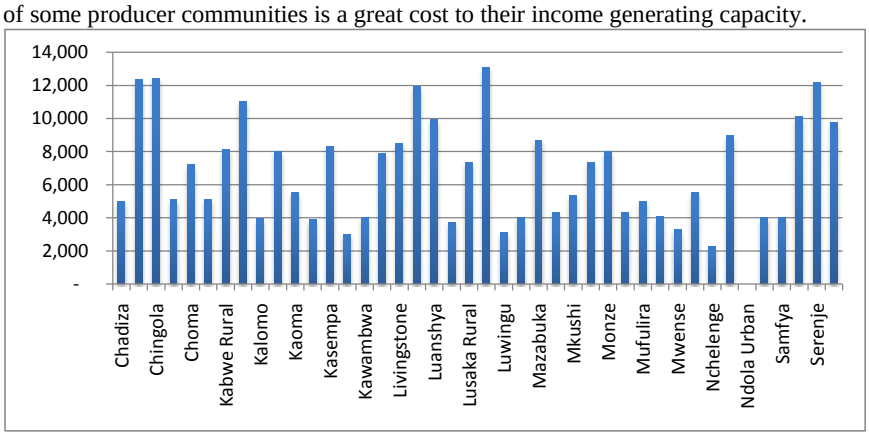


Figure 13 Groundnut price variability

12.4.3 End market characteristics

The end market products are: fresh unshelled nuts in bulk, dry unshelled nuts in bulk, shelled nuts in bulk, packaged unshelled nuts, processed shelled nuts with flavourings, peanut butter, oil and cake. Therefore groundnuts provide for the poor as well as for the more wealthy sectors of the community, including ingredients for processed foods.

Current and potential end market opportunities

The potential for groundnut production offered by the confectionary industry both internally and on the export market and for peanut butter is very great. Aspiring exporters quote demand in South Africa of 20,000 tonnes per annum. A minor proportion of this market could have a substantial impact on the economy of the Eastern and Northern Provinces and on the lives of small-scale farmers involved. The major constraint to accessing this market on

a large scale is control of aflotoxin. Harvesting systems and early access to hygienic shelling capability together with the use of storage and packaging systems followed by testing with modern equipment can overcome this constraint and open Zambia's production to the export market. South Africa's current insistence on performing their own aflotoxin testing of Zambian exports is understandable but may also be a mechanism for reducing the price offered.

The low productivity and poor quality product is a challenge to be addressed through a breeding programme and extension work by a party with commercial interest in the successful outcome of such efforts. The commercial incentive will arise from the establishment of aflotoxin control systems and open access to export markets. This is dependent upon the business enabling environment and the willingness of investors to commit themselves to a sustained effort to turn the industry around and regain at least some of the former status that it enjoyed under private management.

A risk associated with all export enterprises in Zambia and elsewhere is exchange rate movements, particularly in the context of an industry in which the majority of the costs of production are Kwacha based. Many agricultural export sectors have failed due to appreciation of the Kwacha, which although ostensibly subject to free market forces, is in fact subject to a large measure of central control that is driven more by the interests of consumers of imported goods than by exporters.

12.5 Vertical linkages

Small-scale farmers have in the past sold their groundnuts shelled or unshelled to various traders and NGOs that aim to improve their livelihoods. Co-operatives have also played a role but have sometimes suffered from bad management.

12.6 Horizontal linkages

Horizontal linkages between growers exist under the Eastern Province Cooperative Union and Chipata District Farmers' Association.

The industry has formed the Groundnuts Industry Association of Zambia.

12.7 Supporting markets/services

It is the intention of the Eastern Province Cooperative to provide services to groundnut producers including input credit, extension services, mobile shelling and packaging against aflotoxin. COMACO also provide extension services and basic inputs.

12.8 Quantitative Analysis

Figure 14 Groundnut value distribution

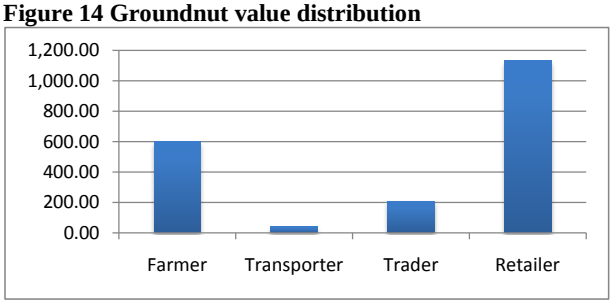


Table 45 Groundnut Value Chain

Exchange rate	5000	K/US$
Groundnuts 2009		
Value chain	**US Dollars**	**%age of**
Production		variable
per ha	**Smallscale**	
Seed	58.00	13.46%
Fertiliser	145.40	33.74%
Chemicals	0.00	0.00%
Labour	120.00	27.84%
Packaging	6.00	1.39%
Transport	9.60	2.23%
Finance	92.00	21.35%
Total Variable costs	431.00	
Fixed costs %age of VC	8%	
Fixed costs /ha	34.48	
Breakeven price /mt	465.48	
Yield expectation t/ha	1.0	
Price expectation US$/mt	480.00	
Gross return	480.00	
Gross margin	49.00	
Net Return /ha	14.52	
Net Return /mt	14.52	
Trading & Storage		
Producer price US$/mt	480.00	
Transport km	500.00	
Transport US$/mt/km	0.08	
Transport cost US$/mt	39.00	
Shrinkage	2%	
Cost in store	567.00	
Average storage months	2	
Storage cost US$/mt/month	4.00	
Interest %/month	1.66%	
Post storage cost	575.19	
Trader margin	30%	
Wholesale Price	1,040.00	
Cleaning	80.00	
Packaging	16.00	
Retail price	2,620.20	
Retail margin	1,484.20	

PART THREE: THE BUSINESS ENABLING ENVIRONMENT FOR TRADE IN AGRICULTURAL COMMODITIES

13. THE POLICY ENVIRONMENT

13.1 PRICING AND MARKETING POLICIES

The Zambian economy was liberalised in 1992 so that all agricultural commodities are essentially driven by supply and demand. However, the government does play a major role in price modification through the FRA and by exercising control over imports and exports, as described below.

13.1.1 Role of Government in pricing and marketing of staple foods

The role of FRA, as explained above, has been expanded form that of a food reserve into a trader with considerable impact on the market. The impact is derived from the practice of announcing a pan territorial price with no time limit, which was adopted from the National Agricultural Marketing Board (NAMBOARD), which was closed with the change of government and liberalization of the economy in 1991. Many small-scale farmers still adhere to the notion that FRA, in the footsteps of NAMBOARD, is the primary purchasing organ that dictates all aspects of maize marketing. In years like 2008 when FRA bought over 400,000 tonnes of maize from rural areas, this perception is not unjustified, and may even be nurtured by government. However, although FRA was expected to confine its purchasing activities to areas that were not economical for the private sector to venture, and thereby play a social development role, it also dictated the price to be paid. The price paid to small-scale farmers reflected the fertilizer subsidy and did not adequately compensate farmers for their labour, application of capital resources or the risks associated with rain-fed crop production.

Since FRA were purchasing in areas that were remote and therefore not economical for private sector traders, they were indeed playing a useful role in social welfare by providing an income-earning opportunity to communities that would otherwise be isolated from national economic activity. But, because FRA were already stretching the limits of their own economic resources in buying crops in these remote areas, their payments were meager compensation for the efforts of the farmers and could not have been done without a level of subsidy in the transport of the crops, and could therefore be said to perpetuate poverty. By purchasing the crops from these remote farmers FRA provided them with an income but also gave them the false impression that they were integral to the viable agricultural economy. This practice is socially beneficial but economically unproductive since it encourages surplus production in uneconomic circumstances that would prove catastrophic for the farmers if FRA were to cease to buy in those areas.

FRA, by purchasing more maize than was needed in 2008 as a food reserve, put themselves, or was enabled by government to put themselves in a position to have a major influence on the price of maize to the mills. Had they been obliged to observe the rules of financial management that govern the management strategies of the private sector they would not have been able either to purchase in the areas that they went to or pay the prices that they paid or release stocks onto the market at the price that they demanded. Or having done so they would have been bankrupted. Although they argued at the time of the release of their stocks that the

release was necessitated by their cash flow needs, it was seen clearly by the market as a move to deflate the seasonal price rise for political expediency in the interest of consumers.

The losses incurred by FRA were said by traders and millers to have arisen from poor technical management of their stored stocks, which became rotten, and from theft arising from late payment of salaries, which encouraged staff to plunder the stocks in a manner that was opaque to the auditors. Their financial management or cash-flow problems also affected the farmers who delivered their harvests to them but were not paid for several months, further exacerbating their poverty.

The overall effect of FRA playing the role of a trader, while applying a strategy designed for political ends, has been to undermine the viability of commercial trading operations (and therefore encourage traders always to ensure a substantial margin in case of disruption), to deepen the poverty of farming communities who should never have been encouraged to enter into the commercial maize growing arena in their locations, to incur massive losses of grain from the food balance sheet through mismanagement, and to impose a hefty burden on taxpayers.

13.2 Production and post harvest storage facilities

The effect of liberalizing the pricing policy on production, to the extent that it has been truly liberalized, has been to increase efficiencies in the economy by allowing the natural economic laws of supply and demand to rationalize production techniques and areas of production such that there is a tendency for producer prices to settle at levels that support enough of the most efficient producers to supply the market needs.

However, the pricing policy is not truly liberalized. There are distortions due to FRA trading policy, to the skewed production subsidies towards only one section of the growers, and to free trade.

The FRA pan territorial pricing policy has meant that uneconomical production areas have been sustained. This has merit as a social welfare policy, but it is not an agricultural policy aimed at economic efficiency in that sector. The pan-seasonal pricing policy implies that there is no incentive for storage, and indeed anyone who does store a crop will be penalized if they are obliged to sell to FRA because their costs, including interest and risk, will earn no compensation or reward. The policy therefore undermines any policy statement to the effect that investment in private sector storage capacity is encouraged by government.

When FRA enters into trade by selling stocks onto the market, they tend to do so at a time and price intended to deflate the natural price rise induced by the passage of time and consequent storage or production costs. The practice discourages the private sector from being able to supply the market at a time of comparative shortage either by storage or by early production.

The skewed production subsidy in the form of the FSP is intended to demonstrate the benefits of fertilizing maize and to reduce the cost of production and therefore of consumption. Since the benefits pass directly to consumers through reduced producer prices, the FSP is not an agricultural subsidy but a subsidy to consumers. There is therefore no benefit to the subsidized growers the effect on those growers, apart from reduced demand for working

capital, but there is a strongly negative effect on those growers who are not subsidized, since their producer price is reduced in line with the subsidized producers. The effect of FSP on the agricultural industry is to confine production to those who are subsidized. They do not, however, have the capacity to satisfy the market demand, particularly in drought years when small-scale production techniques (apart from well executed conservation farming methods) render them more susceptible to water stress.

Finally, the effect of export bans is to limit expansion of production for fear that excess production will reduce prices further below economic levels, and to curtail opportunities for producing specifically for export markets, which offer high rewards for individuals and the national economy.

The effect of periodic export bans on traders is damaging in the long run, not only because of the losses they may incur in the process of strategizing towards exports, but because business relationships built on trust are destroyed when deals are broken due to the bans. Many cases of disenchanted importers in neighbouring countries are reported by Zambian trading companies who lose opportunities to foreign rivals when bans are imposed and who are then unable to re-establish the trust on which trade deals are built. It is ironic that the agricultural potential with which Zambia is so generously endowed should be so frequently undermined by export bans that destroy the production capacity that ought to be the engine of economic development.

13.3 Supply of input services

The viability of input supply services is directly dependent on the vigour of the production sector. The sector is suppressed by departure from the liberalized pricing policy and the input supply services remain moribund as a result.

13.4 Role of the private sector in marketing of staple foods

The pricing and marketing policy has been in a state of transition since the abrupt shift in policy from the state control exercised until 1991 to the liberalised policy declared by the newly elected MMD government. The stated policy shifted abruptly but the enactment of a fully liberalised status has been less rapid since there have been elements within the ruling regime that have retained a liking for the ability to manipulate prices through the markets towards their political ends. Thus FRA has been used as a marketing channel running sometimes counter to the natural price trends that lend viability to private sector trading patterns that respond to seasonal flows.

However, despite the periodic setbacks occasioned by government interference in the markets, the private sector has managed to establish some sound institutions and to operate on a commercial footing characterised more and more by rational economic logic. ZAMACE has made good progress towards playing the key role I commodity exchange, even though its legal basis is not yet in place. Traders and brokers are settling into their roles and being used by the industry to refine the operation of the sector with division of labour and responsibility according to their designation. The various strata of the agricultural industry have their associations, which are utilised to variable effect in lobbying with government for policy modifications. Hence the communications between ZNFU, MAZ, GTAZ and others are constantly addressing policy matters as they arise and deliberating on appropriate action. The structures of the industry are in place and steadily maturing in capability and effectiveness, generating skills and sensitivities that could make the industry thrive within a fully liberated but regulated economic environment.

The members of MAZ and GTAZ and the corporate members of ZNFU are annexed to this report.

13.5 BUSINESS ENABLING ENVIRONMENT

13.5.1 Tariffs

Tariff reductions in agreement with the member states of SADC, COMESA and ECA have been met by some concern from farmers who have invested in capital-intensive projects such as irrigated wheat production because the protection afforded by transport costs from neighbouring production areas do not always annul the benefits of them being grown in economies that are more advanced than Zambia's. The position of the farmers on tariff reductions on wheat, whereby they lobbied for continued application of the tariff, was side-stepped by confusion with durum wheat, which was afforded duty free access on the basis that it did not compete with any durum wheat production in Zambia. Importers exploited the fact that durum wheat could not be distinguished from other wheat grain and falsely labelled it durum and thereby undermined the price structure. The rules of origin have also not been applied to the satisfaction of the farming community since it allows South Africa to import wheat to make up their production shortfall while exporting from the north to Zambia on the basis of the actual consignment exported is domestically grown, thereby avoiding the tariff applicable to imports from the rest of the world..

The milling industry continues to enjoy tariff protection from SADC countries and the rest of the world on the basis that their industry needs duty free access to raw material but at the same time protection from competition from advanced economies.

13.5.2 Tariff applicable on imports of staple foods from the region and outside the region

Table 46 Tariffs applicable to trade

	Import Duty applicable on imports from:			
Product	**COMESA Countries**	**SADC Countries except RSA**	**RSA**	**Rest of the World**
Maize Grain and Seed	0%	0%	0%	5%[3]
Maize Flour	0%	0%	15%	15%
Wheat Grain and Seed	0%	0%	0%	15%
Wheat Flour	0%	15%	15%	15%[4]
Rice	0%	0%	0%	15%
Sorghum	0%	0%	0%	15%
Millet	0%	0%	0%	15%
Beans	0%	0%	0%	15%

[3] Or K1000 per Kilogramme, whichever is the greater.

[4] Exception is made for Durum wheat, which has 0% duty.

Pulses (Pigeon Pea, Cow pea and Chick pea)	0%	0%	0%	15%
Cassava	0%	0%	0%	15%
Groundnuts	0%	0%	0%	15%

13.5.3 Concerns of traders on application of the tariffs when importing products from EAC, COMESA, SADC and Rest of the World.

Naturally, when the imported cost of a commodity is lower than the domestic producer price, traders and millers can benefit from the disparity, but farmers will lose the production opportunity unless they can reduce costs of production to compete effectively with the landed cost of imports. When the landed cost of imports reflects subsidies or the benefits of more advanced economies, the challenge to domestic production is effectively played out on a tilted playing field on which the farmers of the importing country will be the losers. In this case the tariffs on imported products are necessary to protect the livelihoods of domestic producers and to shield the development process from the destructive forces of foreign subsidies. In any trading group where free trade is promoted, it will always be the most advanced economy within the group that benefits most although consumers in the less developed member states will benefit in the short run through access to cheaper food. In the case of Zambia, where a high proportion of the population derives its income from agricultural production, the effect of converting from domestic consumption to imported consumption will have a devastating impact on producers who will benefit by becoming net consumers so long as they can find an alternative source of income.

There is a conflict between the tariff book, which indicates no preferential treatment of wheat from SADC, as confirmed by ZRA implying that a duty of 25% is applicable, and the importation of wheat at 0%.

13.5.4 Views of stakeholders on whether the tariff applied on imports from third countries (EAC CET) is appropriate and if not their proposal of alternative tariff

i) Farmers

There have been attempts in the early 1980s to grow wheat in the north of Zambia under rain-fed conditions, but they failed since high temperature and susceptibility to disease have led to low yields and rendered them non-viable. Wheat production in Zambia is, therefore, entirely an irrigated crop. This implies a high degree of investment in development of water sources such as dams and boreholes, water reticulation, centre pivots, pumps and electrification as well as in combine harvesters and specialised planting equipment and grain handling capacity. This capital investment is an onerous financial burden in the context of Zambia's high interest rate economy, so farmers investing in wheat production capacity must be assured of a secure and viable market, at least during the payback period of their investment.

Expansion in wheat production capacity has been steady since it was initiated in 1972 when production was 30,000 tonnes and consumption was little more. With urbanisation and the need to have access to ready-cooked staple food, consumption has steadily increased to 210,000 tonnes and production has followed closely and currently stands at 195,000 tonnes. The deficit has been made up of PL 480 (donor) wheat that was monetised to finance agricultural development projects guided by an MOU with ZNFU, which stipulated the timing of the imports so as not to conflict with domestic harvest.

Imports have been banned by default and only authorised by a lifting of the ban through the issue of import permits by MACO. This arrangement has ensured that the producer price for wheat has been sufficiently rewarding to stimulate increased production and usually to allow capital investment in production capacity to be justified. The disparity between the domestic price and the price of imported wheat was sufficient to induce smuggling – customs officials at Livingstone were surprised to find that baboons were tearing open imported cement bags until they saw that the consignment labelled 'cement' was in fact wheat.

Permits were issued in 2008 to import 5000 tonnes of wheat but it is estimated by SAGIS that 27,635 tonnes were imported on the same permit, which allowed millers to undermine the price structure that supported the highly capital intensive investment in wheat production capacity under irrigation in Zambia. This extended application of the same import permit is possible because the customs department has no mechanism for monitoring imports against the quantity specified on the permit; they do not keep a tally of the tonnage entering the country and they do not have a centralised record of the extent to which the permit has been applied. Even if one border post was to keep a tally of the incoming loads by that route, the importer can arrange parallel streams of imports through alternative routes without any reference being made to the first border post. So the importer can continue to bring in unlimited quantities for as long as the permit remains valid.

Farmers who have not yet repaid their loans on capital have suffered a severe deterioration in their viability and a significant proportion of new entrants have faced financial failure. The commercial farming sector is therefore opposed to imports of wheat, particularly in the light of the lack of control over imports that is inherent in the management of the border posts.

They negotiated through SADC and COMESA fora over the rules of origin arguing that a member state that is not self-sufficient in wheat should not be permitted to export to another member state. These rules have not been incorporated into the protocols, and as a result Zambia has imported wheat from Malawi and from South Africa, which have replaced their exports by imports from more advanced economies with lower production costs, thereby undermining the Zambian producer price.
The Rules of Origin have, it is alleged, been applied fraudulently by exporters to Zambia by distorting guidelines over "local content". This has allegedly been the case with imports to Zambia from Mauritius and Malawi in the case of wheat flour, and with cooking oil derived from Malaysian palm oil through Kenya. While the latter is beyond the scope of this study, the case of wheat flour has been the subject of investigations by various selected individuals from Zambia who have visited those countries to determine the validity of the degree of added value through milling which allowed a change of classification or qualified for sufficient "locally added value" (35%) for the product to be deemed to be originating in those countries. However, the milling charge can be adjusted to comply with the rules irrespective

of the actual cost of the milling process, which cannot be easily determined by foreign visitors who may not be qualified to derive the real costs from the given data.

In the light of this experience, the farmers are not satisfied that the rules or the feasibility of applying them accurately constitute a sufficient barrier to wheat dumped in Africa from subsidised or otherwise price-distorted sources. Since only RSA and Zambia have significant domestic wheat production industries, Zambian farmers state that the policies relating to the supply of subsidised wheat from developed countries into Africa as a whole are more damaging to the Zambian economies than to those of other African countries. While the importation of wheat to a country without a significant domestic production base might be beneficial to that country's economy through social welfare, it is damaging to a country with a production sector in that commodity and that donors and those responsible for the issue of import permits should be more aware of the damage to their economies that follows cheap imports.

Farmers, in common with traders and millers have the impression that they are not on the same stage as their government when it comes to acceptance of trade protocols that are damaging to the agricultural sector. Zambia is a high cost production area due to its stage of economic development and isolation from the sea, and is bound to be at a disadvantage when exposed to competition from more advanced or subsidised economies, despite the protection afforded by the cost of transport. While the consumers might benefit in the short run, the productive sector is destroyed since it is unable to compete. This is the case with all sectors of the economy since comparative advantage rarely falls to Zambia in its landlocked situation.

The ban on exports of maize has long been used as a tool for reducing the producer price of maize on the pretext of ensuring domestic food security. Such bans are particularly prevalent when political elections are in the offing and they not only depress the producer price but inhibit plans for expansion of production.

ii) Traders

While price distortions due to the application of trade protocols might provide scope for traders to realise profit at the expense of the production sector, they are also likely to undermine trading patterns predicated on logical expectations within a free market. The risks associated with distortions to the market due to the miss-application of trade protocols are potentially more damaging than the impact of stochastic influences on a free market that can be accommodated within a range of tolerance by an experienced dealer.

iii) Processors

Millers who are able to import wheat can make financial gains when import parity prices are below domestic producer prices. However, this undermines the producer sector and forces farmers into bankruptcy since there are no alternative applications for irrigation within the agricultural economy that can be applied on the scale that would employ it to a viable extent.

The natural consequence of reducing the price of wheat in Zambia by exposing producers to competition from different climates and more advanced economies is to render it non-viable for all but the most efficiently disposed producers. While consumers of wheat products will benefit, the move is detrimental to the employment opportunities offered by commercial production and to the commercial farming economy that depends heavily on the pre-rainy season income provided by dry-season wheat production.

13.5.5 Non-Tariff Charges

a) On imports

Imports of maize and wheat are typically derived from South Africa where the price is determined from SAFEX on the assumption that the product will originate from Randfontein. In fact exports of these commodities can originate closer to Zambia to the north of Randfontein so that the SAFEX price can be discounted and the transport cost reduced. These "differentials" are illustrated in the table below which tracks a representative sample of wheat imported into Zambia. In this example the differential of R125 per tonne is assumed to be due to the northerly origin of the product in relation to Randfontein.

Table 47 Import parity template

	Rail/ Bulk	Rail/ Bagged	Road/ Bulk	Road/ Bagged
Storage p/day	R 0.56	R 0.56	R 0.56	R 0.56
Finance	12.35%	12.35%	12.35%	12.35%
R/$	R 7.69	R 7.69	R 7.69	R 7.69
WHEAT				
SAFEX DEC	R 2,442.00	R 2,442.00	R 2,442.00	R 2,442.00
Average cash Premium	R 40.00	R 40.00	R 40.00	R 40.00
Less Differential	R 125.00	R 125.00	R 125.00	R 125.00
Quality discount	R 0.00	R 0.00	R 0.00	R 0.00
RSA permits	R 3.85	R 3.85	R 3.85	R 3.85
Insurance	R 6.11	R 6.11	R 6.11	R 6.11
Losses	R 12.21	R 12.21	R 12.21	R 12.21
Clearing	R 12.21	R 12.21	R 12.21	R 12.21
Rebagging costs	R 0.00	R 150.00	R 0.00	R 150.00
Freight p/mt	R 1,230.00	R 1,230.00	R 1,310.00	R 1,310.00
Days	32	32	32	32
Storage	R 17.92	R 17.92	R 17.92	R 17.92
Finance	R 26.44	R 26.44	R 26.44	R 26.44
Margin SAF + Zam	R 200.00	R 200.00	R 200.00	R 200.00
FOB LUSAKA Rand	R 3,865.73	R 4,015.73	R 3,945.73	R 4,095.73
FOB LUSAKA USD	**$502.70**	**$522.20**	**$513.10**	**$532.60**
Duty %	5%	5%	5%	5%
Including duty (ex VAT)	**$527.83**	**$548.31**	**$538.75**	**$559.23**
Additional discharge costs for not having a rail siding:				
Handling at railhead	$3.00	$3.00		
Transport from rail to mill	$6.00	$6.00		
TOTAL EX VAT	**$536.83**	**$557.31**	**$538.75**	**$559.23**

In February 2010 it is anticipated that a new grain handling facility will be opened in Beira which will reduce the imported cost of grains in Lusaka as demonstrated by the table below which gives the comparative costs associated with the Durban route and the Beira route. Seaboard, who has a major shareholding in NMC, will have a 27% stake in the Beira facility

and are therefore likely to optimise its use on importing grains from overseas. The reduction in road transport costs alone will reduce the landed cost of wheat in Lusaka by $30 to $50 per tonne and, if the railway functions well, this could be reduced further.

Traders state that they have not been unduly plagued by NTBs when importing grains, so long as their documentation is compliant with ZRA and SPS requirements.

b) On in country movement of products

Zambian District Councils were empowered to charge a levy on produce derived from their district until it was disallowed in 2009. The levy fluctuated considerably as a proportion of the value of the crop although from 2007 there was legislation in place at a national level to limit the levy to a certain percentage of the value or to an absolute amount per unit of produce. There was a MoU in place between the ZNFU and District Councils that substantiated that limit but it was not observed at all road blocks, and many district councils took it upon themselves to determine the rate of the levy unilaterally. Farmers complained that the payment of District Council levies has makes no discernable effect on the maintenance of roads or any services provided by the council and that, to maintain the roads, the commercial farmers are obliged to do the work themselves or at least buy the fuel for the graders.

Traders complained that they were sometimes obliged to pay council levies at road blocks when their trucks carried imported product or product from other areas. Levies could be charged several times over at sequential roadblocks on the same load. It is reported that when the maize was subsequently collected from the silo where it was stored, council levy was charged again as the maize was transported to its next destination.

Levies charged to farmers were added to the producer price as far as the market prices would tolerate it.

Naturally, traders feel that council levy charges should have been co-ordinated so as to avoid multiple payments.

Weighbridge fees are also chargeable at various points along the main routes.

Some consignments are subject to inspection at border posts for which a fee of K1.5 million is charged for each 30 tonne truck load, implying an additional cost of $10 per tonne.

13.5.6 Traders' and regulatory authorities' opinion on the effects of the non tariff charges

Traders are of the opinion that the levies that were charged were an imposition that was irregularly imposed since it could be applied repeatedly on the same load, and that it was ineffectual in improving the services provided by the District Councils. The process was also the cause of delays in transport time and required that drivers carry large sums of cash on the open road, which was a security risk.

The generalised complaint from traders is that charges imposed on the movement of goods do not contribute to improvements of services provided by the organisation imposing the charge; the charge is in effect simply a tax that contributes to salaries of operatives who are not

relevant to the challenges facing development or to protection of traders, consumers or the environment.

13.5.7 Recommendations to address the concerns

The Council levy has been addressed by Presidential decree although the source of income for the Councils, whether they are effective or not, will remain an issue to be addressed again.

Charges imposed by any regulatory body and the effectiveness of that body in applying the funds raised to the functions it is supposed to perform remain an issue of governance and accountability. It is up to the private sector associations to lobby for greater accountability and effectiveness or for the cancellation of the charge, as has been effectively achieved by the ZNFU in the case of Council Levies.

13.6 REGIONAL STRUCTURED TRADING SYSTEM PLATFORM

13.6.1 The Food Balance Sheet

Zambia's food balance sheet for 2008

The National Food Balance Sheet (NFBS) was first introduced in 1993/4, based on the FAO template, and has been further refined since that time resulting in the format below, which still has limitations due to the data collection difficulties and the lack of geographic or seasonal variations in consumption.

Product coverage

The Balance Sheet encompasses maize, rice, wheat, sorghum and millet (combined), sweet and Irish potatoes (combined) and cassava flour. These items are all converted into maize equivalent using energy values.

Table 48 Food balance sheet 2008/09

Republic of Zambia
Zambia National Food Balance Sheet For The 2008/2009 Marketing Year
Based On The 2007/2008 MACO/CSO Crop Production Estimates (Metric Tonnes)

		Maize	Paddy rice	Wheat	Sorghum/ millet	Sweet and Irish potatoes	Cassava flour	Total (Maize mealie meal equivalent) 12
A.	Availability:							
	(i) Opening stocks (1st May 200 1/	390,350	2,799	25,848	2,273	0	2,176	376,327
	(ii) Total production (2007/08) 2/	1,211,566	24,023	180,000	43,926	116,719	1,160,853	2,384,674
	Total availability	1,601,916	26,822	205,848	46,199	116,719	1,163,029	2,761,001
B.	Requirements:							
	(i) Staple food requirements:							
	Human consumption 3/	1,140,560	36,048	189,600	42,975	110,883	670,917	1,879,285
	Food Reserve Stocks (net) 4/	157,000	0	0	0	0	0	141,300
	(ii) Industrial requirements:							0
	Stockfeed 5/	66,843	0	0	0	0	0	60,159
	Breweries 6/	15,425	0	0	0	0	0	13,883
	Seed 7/	18,510	0	0	1,028	0	0	17,557
	(iii) Losses 8/	60,578	1,201	5,400	2,196	5,836	23,217	84,270
	Total requirements	1,458,916	37,249	195,000	46,199	116,719	694,134	2,196,454
C.	Surplus/deficit (A-B) 9/	143,000	-10,427	10,848	0	0	468,895	564,548
D.	Commercial import requirements 10/		10,427	-10,848				
E.	Food aid import requirements 11/							

Notes:

1/ Stocks expected to be held by commodity traders, millers, FRA and commercial farmers as at 1st May 2007, including stocks held by small-scale farmers in rural areas.
2/ Production estimates from MACO/CSO. Cassava production is based on the total area under cassava, using an annual yield figure of 11.7 tonnes per hectare (MAFF Root and Tuber Improvement Programme, 1996). A flour extraction rate of 25% is used. Other tubers are sweet potatoes and Irish potatoes.
3/ Staple foods are assumed to represent 70% (1,421 kCal/person/day) of total diet (2,030 kCal/person/day), converted to crop requirements for the national 2007/2008 population of 12.1 million people.
4/ Locally purchased FRA stocks expected to be carried over into the next season. (this does not indicate total FRA purchases on the local market nor imports)
5/ Estimated requirements by major stockfeed producers.
6/ Estimated requirements by industrial breweries.
7/ Estimated seed crop grown for seed companies.
8/ Post harvest losses are estimated at 5% for grains and sweet potatoes in line with estimates from other SADC countries, and 2% for cassava.
9/ Expected surplusses or deficits that arise after meeting minimum overall staple human consumption requirements as well as industrial requirements. Cassava and maize may be substitutable with other crops and may result in different exportable volumes than the ones indicated here. The total is expressed as maize mealie meal equivalent using energy values.
The rice deficit is based on what is known to be imported each year, as indicated under D.
The wheat deficit is based on the estimated market size as indicated in B, less availability as indicated in A.
The maize mealie meal equivallent and cassava flour surplus represents an overall surplus of staple foods. Cross-substitution may make this surplus partly available in the form of other crops.
10/ Imports required to be made by the private sector to meet the commercial market demands.
11/ Total estimated requirement for food relief among vulnerable groups, to be imported. This could be met with maize or other grains.
12/ Total maize mealie meal equivallent refers to all crops being converted to kilocalories that are equal to the corresponding kilocalories in maize mealie meal form.

13.7 Content of the NFBS

13.7.1 Procedure for construction of the food balance sheet

The food balance sheet is focused on the 1st May each year by which time the crop forecast should be prepared by the National Early Warning Unit (NEWU) with MACO and CSO. The Food Security Research Project (FSRP) provides training on data collection and processing, CSO provides the methodology for the survey, and MACO officers conduct the sampling and

surveys. The crop forecast is based on sample surveys of small-scale farmers, whose production is scaled up by statistical extrapolation, and a survey of all commercial farms, which for the purpose of the analysis includes any farmer with more than 20 ha under cultivation. The final outcome of the Balance Sheet is supposed to be adjusted according to the results of the Post Harvest Survey (PHS) but this is usually published too late to have an impact on policies based on the crop forecast. Since a high proportion of the planted crop is abandoned each year, and the crop forecast does not always capture the extent of abandonment, there is wide scope for discrepancies between the forecast and PHS.

The private sector millers, traders and farmers and the Disaster Management and Mitigation Unit (DMMU) and World Food Programme (WFP) are requested by MACO, through the MAZ, GTAZ and ZNFU to declare their stocks of specific crops in store at 1st May. The stocks held by small-scale and subsistence farmers are not included in the reckoning. Although the private sector is obliged by the provisions of the CSO Act, it is said that they are sometimes non-compliant or that they distort the information that they submit in order to sway the opinion of the policy makers in the direction that would provide benefit to the individual.

Private sector players in the industry and FRA are also requested to declare their anticipated annual or monthly consumption and their trade flows, which are added to the estimated annual human consumption on the basis of known calorific needs and the source of alternative foods. The assumption that 70% of the human calorific needs are derived from staple foods is open to question and also subject to wide variability across the socio-economic spectrum and geographic locations. The availability of alternative sources such as vegetables, meat, fish and fruits is highly variable according to location.

There has also been an adjustment to the national human consumption needs, which were reduced from 1,060,720 tonnes in 2002/03 to 981,291 in 2003/04 due to a reassessment of the output of cassava, sweet potato and sorghum, which were believed to have increased by 13%, 71% and 39% respectively.

Estimates are made as to the structural cross border trade that is continuous, the losses in storage and processing and the retention of crop for seed for the coming season.

The balance is then determined by subtracting uses and losses from anticipated output to reveal the expected surplus or deficit.

13.7.2 Role of the private sector (national consultative mechanism on food balance sheet)

The private sector provides information on stocks and consumption. Until 2009 there was little enthusiasm exhibited by the private sector in participating in the FBS construction process, but they have now seen the benefit of accurately maintained records and are said to be more enthusiastically involved, particularly since they were incorporated into the newly created Task Force on Food Price Rises that was prompted by the situation in 2008 when the Minister of Agriculture publicly recommended their participation.

The process of collecting the information from the private sector is informal and based on rounded figures without any mechanism for confirmation or detailed distribution. The CSO attempts to collect this information through questionnaires on a quarterly basis, but there has

always been a poor response to such methods and they are necessarily backed up by interviews or verbal declarations at meetings that may or may not be attended by all relevant operators. There is also an element of confidentiality about the declarations since they can sometimes compromise the commercial advantage that a trader or miller feels he has by holding undeclared stock. They may also attempt to influence decision making by distorting their responses, as described above.

ZNFU states that they could play a role in improving the quality of the data collected but that the cost implication of their involvement would have to be addressed. If they were to follow the example of SAGIS by monthly collection of data backed up by legally enforced obligations of private sector components to comply with requests for information, the reliability of statistics would be improved.

13.7.3 Application of the food balance sheet as a policy tool

The Food Balance Sheet is used as the evidence for arranging for imports, food aid support or export policy. However, since it is not adjusted in time according to the PHS results, and since the process of estimating consumption does not differentiate between regional tastes or seasonal intake and dietary variables according to availability of natural products, and since the requirements are all expressed in maize equivalents, the balance sheet is currently a crude means of anticipating shortages. This is illustrated by queries posed by traders as to why import permits were issued for 40,000 tonnes of maize in 2009 when the FBS showed a surplus of over 203,271 tonnes. Nonetheless it is said to be an effective means of averting hunger. It would be improved by increasing the frequency of data collection from quarterly to monthly stock assessments and by taking measures to ensure that returns are a true reflection of the stocks and usage rates. The private sector has also been frustrated at the lost opportunities due to the slow decision-making process exemplified by the delay from the publication of the FBS in May to the decision as to whether imports were needed, which was announced in December.

13.7.4 Dissemination of information on the food balance sheet

The Food Balance Sheet is released to the public domain through a ministerial announcement, through stakeholder organisations and it is available on websites. It is welcomed as an advancement on the transparency of government deliberations

13.8 Perceived need for a regional food balance sheet

There is general agreement amongst stakeholders on the need for a regional food balance sheet so that opportunities can be identified to fill gaps to commercial advantage. The comments arising from the Millers' Association on the proposal included:

- the need to resolve conflicting GMO policies among member states;
- proposal for contracted private sector management of the reserve taking into account the need for transparency in its management and the security of the stored grain;
- rational approach to possible conflicts over operations of the regional reserve and the smooth flow of private sector trading in grains on the domestic markets and regionally;
- promotion of increased production in order to generate surplus for the regional reserve;
- increasing the accuracy of domestic Food Balance Sheets to ensure that decisions on movement of grains between states were soundly based;

- addressing the current poor physical condition of storage facilities in the region.

Comprehensive data on regional food balance status, in conjunction with reliable data on domestic production and consumption, could allow governments to open up to trading opportunities to the advantage of both exporting and importing countries within the region. Some traders and millers who have close vertical linkages across borders can gain advantage from intelligence as to where there are opportunities for trade, which may be lost if the information about shortages is known to all or if their opportunities are blocked by trade barriers.

There are border areas of Zambia where it would be more economically viable to produce for a neighbouring country than for the Zambian market, but in the absence of reliable regional food balance sheet and guarantied export permits these opportunities are accessible to the economy.

13.8.1 Appropriate mechanism for assembling regional food balance sheet

Zambia, along with other member states, used to submit its annual food balance sheets to the Regional Early Warning Unit (REWU) of SADC, which published a bulletin that was much appreciated until it stopped being circulated three or four years ago. The member states have now lost their enthusiasm for submitting their data and the US $100,000 annual contribution to the training and publication because training was no longer provided and the bulletins ceased to appear.

13.9 Policy use for the regional food balance sheet

There must be legal enforcement of the obligation by the private sector to comply with requests for information on stocks of staple foods in order for the information leading to the domestic and regional food balance sheets to be reliable.

Co-ordination between regional states should include reference to the same calendar dates for completion of each stage of the build up to the balance sheet and conversion standards must be standardised.

13.10 Warehouse Receipt System

Secure operation of the WRS is contingent on the enactment of the Agricultural Marketing Act that should make legal provision for recognising warehouse receipts as a tradable item.

There are some traders willing to operate the WRS prior to the final enactment of the bill and which have already transacted on it. Two audit companies already provide Collateral Management of stocks, which is a prerequisite for the operation of WRS. These are SOCOTEC and ACE. This function is a key to WRS being workable.

13.11 The Commodity Exchange

ZAMACE (Zambia Agricultural Commodity Exchange) is the only commodity exchange currently operating in Zambia and has been in existence since 2007. Although the Lusaka Stock Exchange (LUSE) also exists, it does not trade in physical commodities but only in financial instruments. ZAMACE has traded commodities to the value of US$ 14.136 million between October 2007 and September 2009 as detailed in the table below:

Table 49 ZAMACE trading activity

Market Trading Activity October 2007-September 2009		
Commodity	**Tonnes**	**Turnover (US$)**
Maize	20,077.06	5,760,798.73
Wheat	10,710.00	4,890,029.37
Soya	5,817.00	2,321,498.24
Fertiliser	750.00	527,050.00
Other	2,178.00	636,573.61
Total	**39,532.06**	**14,135,949.95**

The Regulatory Framework under which ZAMACE has operated has been loosely based on the Securities Act of 1993, which has been revised, although the revisions have not been implemented. The Cabinet has now instructed Government to develop the Terms of Reference for consultants to draw up a draft law by March 2010 to be enacted by June 2010 that will resolve the issues facing the legal standing and the regulatory framework under which ZAMACE can operate. The Act should determine the benchmarks for membership requirements and operating rules to be ratified by regulators under Securities … SECC see website secc.gov.zm. These should give guidance on trading and discipline as already outlined in the Securities Act, which should include the requirement that members must be registered.

Secondly, the improved functioning of ZAMACE depends on the passing of the long-awaited Marketing Act that will contain an amendment to recognise the Warehouse Receipt System and allow for legal trading of the financial instruments related to it, which currently carry no legal basis.

ZAMACE has been supported through PROFIT, a USAID funded development project in Zambia which falls under COMPETE. This support will last until March 2010 when it is hoped that Government may step in and ensure that the regulatory framework for the secure operation of ZAMACE is in place. Once this happens it is anticipated that there will be an increase in trading through ZAMACE and that the transparency and open competition will lead to tighter margins and therefore more competitive pricing of commodities. Trader margins are said to have been as much as $100 per tonne in the absence of ZAMACE, and these should be reduced under transparency and guidance, reinforced by guarantees and application of recognised standards, to around $5 per tonne. No doubt there will remain opportunities for traders to make large margins from dealing direct with farmers who do not use the exchange, but these opportunities will be reduced.

Since the opening of business in October 2007, the exchange has seen transactions of 40,000 tonnes, but the monthly requirement of maize alone in Zambia is close to 55,000 tonnes, leaving ample scope for expansion of business through the exchange. Furthermore there is scope for dealing in commodities other than agricultural produce once the legal framework is clearly in place. These may expand into metals and precious stones, among others.

The Board of ZAMACE currently comprises eleven voting members, including eight traders and three institutional bodies, ZNFU, MAZ and Bankers' Association of Zambia, and three ex-officio members including PROFIT. There are fourteen members and it is expected that this may be expanded to twenty in the near future.

There remains a need for ZAMACE to be supported in its proactive approach to identify traders with storage capacity that can be applied to the WRS when the legal provisions have been put in place. Such storage facilities can be used to bulk up stocks for delivery to larger facilities with the help of a revolving storage fund to be established under the Marketing Act. Support is needed to install electronic monitoring systems to keep track of stocks in the warehouses, to inspect the facilities on a regular basis and to have access to laboratory facilities with counter-checking capabilities with other laboratories to increase credibility among the clients. This implies training as well as capital investment.

14. THE REGULATORY FRAMEWORK

14.1 CUSTOMS DOCUMENTATION AND CLEARING PROCEDURES

14.1.1 Customs documents and clearance procedures and release time

Procedure for Exporting

Each export consignment is required to have a permit rather than one permit being valid for a span of time.

1. The exporter must know the SPS specifications from the importing country and the consignment must be checked against these by Mount Makulu where the SPS officers are based. This check may include an inspection in the field, implying that an officer should go to the country of origin to see the crop before it is harvested. Samples must be presented to PQSP from the entire consignment. An inspection fee of K54,000 is chargeable.
2. A permit may be issued by SPS (against a fee of K15,500) for each consignment (usually 30 tonne truckload) or fumigation may be ordered prior to the issue of the permit. The fumigation costs are negotiable and the fumigation certificate costs K54,000 per consignment.
3. These certificates are taken to MACO and to the Ministry of Trade, Commerce and Industry (MTCI) where the export permit is issued. The export permit for each truck load is provided by MACO at a cost of K35,000 per truck load and also necessitating driving to the Ministry through slow traffic.

The procedure must be repeated for each consignment, which entails considerable dedication since the SPS offices are out of Lusaka. It is not so much the K15,500 ($3.30) cost of the SPS form as the need to drive to Mount Makulu to obtain it for each truckload that impinges on the efficiency of export operations. This situation has been a bone of contention among exporters since the early 1970s when proposals to move the SPS offices to a more convenient location were first mooted.

Traders recommend the establishment of a ‘one-stop-shop’ for the allocation of export permits since the need to visit different offices to collect all the necessary documents imposes considerable cost on exporters. This has now been achieved by Zambia Export Growers Association (ZEGA) for fruit and vegetables that are constantly exported by air and by road from Zambia, and there is an on-going attempt to have the same system established for crops.

Traders also recommend that the allocation of export permits should be computerised such that copies would immediately be distributed to all relevant authorities and records

consolidated through the internet in all relevant monitoring organisations. This would help to curtail the repeated use of permits.

The procedure for importing into Zambia is common to all regions of origin:

1. Apply for an import permit. In theory this can be done through the internet but in practice the service has been down since it was first introduced. Therefore the applicant must visit the PQPS offices at either Mount Makulu at Chilanga outside Lusaka, Nakonde on the Tanzanian border, Chirundu on the Zimbabwean border or at Lusaka International Airport.
2. The form is submitted to any of the above offices and can be approved on the same day. Approval is given on the basis of the assessment of challenges from the specified source of origin. If there is cause to investigate the case, approval will depend on the collection of statistics and assessment of the challenge.
3. If approval is given, the SPS permit will be issued as a computer printout that specifies the conditions under which importation can take place. The cost is K5,000 per consignment, which is usually a 30 tonne truckload.
4. Apply to MACO with the SPS certificate, and obtain an export permit from the ministry.

Procedure for importing seed:

1. Notice to import seed must be given on a form submitted to the SCCI with a fee of K35,000. This must provide the client details, the origin of the seed, the seed group, why the applicant wants to import it and the point of entry. Approval may be given within 24 hours but, in the case of cereals, approval may be for a limited quantity to be submitted only to research institutes.
2. Application is then made to PQPS as with the importation of other agricultural commodities.
3. Application is then made to MACO as with other commodities.

However, seeds are a special case, and SCCI are obliged to test new varieties over two growing seasons to ensure that they are distinctive, uniform and stable according to the Plant Variety and Seeds Act Cap 236. This process is currently done visually but DNA finger printing capability is being installed. These delays in the farming community gaining access to new technology may be removed if there is regional harmonisation of the release process.

14.2 STANDARDS

14.2.1 Standard specification

The standards for food products are initially based on the Codex Alimentarius and modified where considered necessary in Zambia by a committee of stakeholders under the chairmanship of the Zambia Bureau of Standards (ZABS). It is intended that they be reviewed every five years to ensure that they remain valid and relevant. However, with the exception of wheat grain, maize grain and beans, the Codex standards have all been accepted by Zambia and other COMESA countries and have not yet been deliberated further under ZABS although they intend to hold meetings with stakeholders during 2010.

The standards for wheat have been established by a committee of stakeholders under ZAMACE and they function as national standards but are in fact association standards by

which the industry operates[5]. The standard for maize has been modified only to the extent that the maximum moisture content has been reduced from 15% to 12.5%. There are no standards recorded for beans. (Standards for wheat and maize are summarised in the annexes).

The standards upheld by ZABS are in fact voluntary because the bureau has not capacity to enforce implementation. SPS standards are established to ensure safety and to protect the country from the spread of pests and diseases, but the ZABS standards are simply to define acceptable quality. Traders or consumers who find that products do not comply with ZABS standards may refer to the standards when seeking compensation but they can also accept goods that do not comply with the ZABS standards.

14.2.2 Application of the standards – for exports

The procedure for exporters is to obtain an export permit from MACO, which is assessed on the basis of the food security situation, and then to seek a certificate from SPS. Since compliance with ZABS Standards is not compulsory, it is not necessary for exporters to obtain a certificate from ZABS unless it is specifically sought by the importing party. Since ZABS has a seat on the SPS committee their influence is already applied to the export permit process.

It is because the standards are voluntarily applied that ZABS does not maintain surveillance personnel at the any of the borders.

There is no mutual recognition of regional bureaux of standards. There was an agreement between Zambia and Malawi but it is not working as demonstrated by a case when Zambian bottled water was refused entry into Malawi since Malawi declared that they did not recognise the authority of ZABS to provide a certificate of compliance with the `relevant Zambian standards.

Farmers, traders and millers take heed of the standards as laid down by this committee and intimate that the Zambian Bureau of Standards (ZABS) is not sufficiently conversant with the technology and the importance of its application to play a meaningful role on behalf of the industry or consumers. Also, in order for an interested party to learn what the standards are for a particular commodity (other than wheat), they must make a request to ZABS and pay the requisite fee. These fees are listed in the ZABS catalogue and, for staple food crops, range from K150,000 to K250,000 per crop. Although charges for these standards are a feature of every standards authority in SADC, COMESA and EAC member state there is wide variability in the amounts charged. While a full set of standards for the crops specified in this VCA cost $425 in Zambia, the same set in Malawi cost less than $20. And since the standards are harmonised for most crops across the region, these two sets will be identical.

14.2.3 Application of the standards – for imports

SPS and Public Health authorities, through the Public Health Act have greater powers over the movement of food than ZABS although ZABS may be called in to make assessments of quality in the event of disputes.

[5] The ZAMACE standard and the Codex Standard are produced in the annex together with the COMESA maize standard for grain

Importers state that there are no objections to the standards as described by any of the bodies responsible but that the level of adherence to the standards is poor and there is no enforcement process to ensure that the standards are met on imported consignments.

14.2.4 Challenges faced by ZABS in facilitating cross border trade

ZABS states that they require further testing equipment since the EC has provided laboratory equipment but they are in need of unspecified ancillary equipment and trained personnel to operate it. They lack equipment for testing for aflotoxin in groundnuts for example.
They also state that they require financial resources to run stakeholder workshops to determine acceptable, broad-based standards. There is a culture of demanding sitting allowance to attend workshops.

14.2.5 ILLEGAL IMPORTS

Regardless of the standards that apply to imports, one of the problems stated by millers and traders is the illegal importation of commodities that may not meet the quality standards, and whose quantities are not monitored. These conditions apply to the commodities that pass through Zambia's border at Nakonde, ostensibly en route to D R Congo. Since they are supposed to be in transit, Zambian customs pay no attention to the quality of the products and apparently have no means of ensuring that the transit goods leave the country again as they enter Congo. It is alleged by millers that large quantities of goods, particularly wheat flour, are off-loaded within the boundaries of Zambia before the truck enters Congo from Zambia.

It is also alleged that there is considerable under-reporting of the quantity of imported goods declared at borders so that the excess is sold off without duty. When smuggling is discovered, punitive measures are not applied so there is little incentive to comply.

A Task Force has been set up in September, 2009, to monitor the illegal imports of wheat flour, tobacco, soft-drinks and sugar at Chipata and Nakonde under the chairmanship of FRA. The private sector contributes to the cost of the operations because they are seen to be the beneficiaries of prevention, but they argue that this is a function of the state, which has the institutions legally empowered to perform the duties and has the obligation to ensure that standards are adhered to for the benefit of the public. The state is also the main beneficiary of effective controls since it collects revenue from legal trade flows.

The Famine Early Warning Systems Network (FEWSNET) is funded by USAID and WFP and collects data at six border crossings in Zambia on a daily basis. They capture data, by their own estimation, on about one third of the illegal trade. The recorded flow in relation to the crops covered by this VCA is given under the trading section of each crop above.

14.2.6 Application of the standards – for Exports

The most reliable means of ensuring compliance with regulations for exports to other countries is to first obtain from that country the precise standards to be observed and to ensure that the consignment meets those standards. Traders report that, if this is done correctly, there are no problems in exporting.

The export of groundnuts from Zambia to South Africa has been made problematical by the requirement that the product is irradiated against Aflotoxin. When the product is not irradiated the buyers reduce the price offer considerably.

Problems have been experienced by traders exporting to Zimbabwe where standards on packaging of milk have been made almost impossible to comply with as a means of protecting the Zimbabwean dairy industry from Zambian competition.

15.2 SANITARY AND PHYTOSANITARY REQUIREMENTS

15.2.1 Sanitary and Phytosanitary Measures

Application of the SPS – for Imports

An application to import must be made to PQSP whereupon a check will be made on the pests and diseases to be guarded against in the computerised crop protection compendium (see Table below).

SPS specification for imports

Table 50 Pest Risk Analysis (PRA)

Pest Risk Analysis (PRA) is specified using Publication no. 14 of 2009

Crop	Pests that should not be found in the area of production	Other requirements
Maize	To be accompanied by Phytosanitary Certificate with additional declaration that the following pathogens do not occur in the are of production: Peronosclerospora phillipinensis Cochliobolus heterostrophus Erwinia sterwatii Acidovorax avenae Sclerophthora macrospora Claviceps gigantean Peronosclerospora sachari Pseudomonas syrigae Clavibacter michiganensis Sugarcane mosaic virus Barley Yellow Dwarf Viruses Gibberella avenacea - or the certificate should state that the crop was inspected during growth and found free from the above diseases.	Confirmation that the consignment was fumigated with an appropriate fumigant. Consignment must be accompanied by original Fumigation Certificate and copy of Plant Import Permit.
Wheat from RSA	To be accompanied by Phytosanitary Certificate with additional declaration that the following pathogens do not occur in the are of production: Tilletia indica Tilletia laevis Tilletia tritici Ditiylenchus africanus Ditylenchus dipsaci Heterodera avenae - or the certificate should state that the crop was inspected during growth and found	Confirmation that the consignment was fumigated. The consignment is to be packed in containers and must be free from the seeds of the following weeds: Anagalis arvensis Lolium temulentum Papaver rhoeas Thlaspi arvense Notification to PQPS on arrival of consignment.

	free from the above pests.	
Rice	To be accompanied by Phytosanitary Certificate with additional declaration that the following pathogens do not occur in the are of production: Titetia barclyana Sarocladium oryzae Magnaporthe salivinii Khuskia oryzae Gibberella avenacea Balansia oryzae-sativae - or that the grain was subject to heat treatment of a degree sufficient to destroy the above pathogens.	The consignment must be treated with an appropriate fumigant no more than 10 days prior to shipment. The consignment must be packed in clean containers and must be free from extraneous materials.
Sorghum from USA	To be accompanied by Phytosanitary Certificate with additional declaration that the following pathogens do not occur in the are of production: Sarocladium oryzae Pseudomonas viridiflova - or that the grain was subject to heat treatment of a degree sufficient to destroy the above Pathogens. And that the following weeds do not occur in the area of production: Parthenium hysterophorus Ambrosia artemisiifolia Polygonum aviculare Sorghum halepense - or that the grain was subject to heat treatment of a degree sufficient to destroy the above weeds.	The consignment must be treated with an appropriate fumigant no more than 10 days prior to shipment. The consignment must be packed in clean containers and must be free from extraneous materials
Millet	Not available	
Beans	N/a	
Pulses	N/a	
Cassava	N/a	
Groundnuts	To be accompanied by Phytosanitary Certificate with additional declaration that the following pests do not occur in the are of production: Glomerella cinguilata Didymosphaeria arachidicola - or that the grain was subject to heat treatment of a degree sufficient to destroy the above Pathogens.	The country of production must be specified. Confirmation that the consignment was fumigated with an appropriate fumigant. Consignment must be accompanied by original Fumigation Certificate and copy of Plant Import Permit. The PQPS of Zambia must be notified upon arrival of the seed in the country for inspection.

The Plant Import Permit (PIP) is issued before the consignment leaves its origin. It is specific to the crop and to the applicant and valid for 30 days and covers up to 30 tonnes in a specified number of loads at a cost of K5000. Two copies are issued: one for the client and the other for the PQSP records.

SPS inspection service is available in all points of entry to Zambia.
The PQSP has mutual recognition with their equivalents in the region.

Sanitary and Phytosanitary Requirements for Exports

Exporters must first be aware of the requirements of the importing country in terms of the SPS and Standards specifications. Once these are known the exporter can apply to PQSP for a certificate to the effect that the specified requirements have been met.

Challenges faced by SPS Authorities

Challenges faced by SPS Authorities in facilitating cross border trade of staple foods	**Proposed solutions**
Shortage of qualified staff to prevent illegal imports.	Increased budgetary contribution
Cash-flow management since revenues are submitted to central government and funding requests are not met in a timely manner.	Establish a monitoring system for the handling of revenue as a revolving fund.
Inefficiency due to duplication of functions between PQPS and SCCI.	Amalgamate the institutions.

Traders report no problems with compliance with SPS requirements on imports or with the administration of the monitoring process although there is room for improvements in efficiency. It is said by some that fumigation is unnecessarily demanded in order to provide an income earning opportunity for the friends of the SPS authorities.

Comment [B1]: This is rather shallow and fails to address the ToRs As reproduced below Please revisit this section and provide required details Respondents here are the SPS Authorities and Traders You seem to have covered traders, although in a very general way

16. TRADE (IMPORT AND EXPORT) RESTRICTIONS

16.1 Seasonal Export/import restrictions

Under the Control of Goods Act the Minister of Agriculture may issue a Statutory Instrument (SI) to ban the export of a commodity over a specified period. However, millers and traders are under the impression that there is a ban permanently in place that may be lifted at the discretion of the Minister. This is in fact the case since no export is permitted without an export permit being issued by the Ministry of Agriculture and Cooperatives. So in some cases an SI has been gazetted that specifies a period over which exports of a specific commodity may not be undertaken, while at other times potential exporters find that export permits are simply not approved, which amounts to an administrative ban. The trend in the last two years has been to forego the establishment of SIs and to rely on ministerial instructions by word of mouth to the permit issuing authority.

The conditions under which exports may be prohibited are not pre-determined, so the Minister and his staff are subject to pressure from lobbyists whose appeals are based on claims that, in the absence of well monitored facts, are often unsubstantiated and tailored to the commercial benefit of the lobby group. In one case tariff was applied on the export of fuzzy cotton under the lobbying exercise of a single company who would benefit from it even though it was not beneficial to the industry as a whole. Traders, millers or farmers can claim that stocks are surplus to requirements and that exports must be permitted in order to avoid wastage. On the other hand, political pressure can be brought to bear on the Ministry to prohibit exports, when there is a known surplus, in order to reduce the cost to consumers. Without the facts at his disposal the Minister can bow to the lobbyist's persuasion and act in their interests.

Traders confirm that the opportunities for exporting from Zambia to the Great Lakes region provide wide scope to producers, traders and millers since Zambia has much underutilised capacity but these opportunities are lost because the industry does not have the assurance that bans will not be imposed, so the opportunities are taken up instead by South Africa and Tanzania, and illicit cross-border trade expands.

In spite of the declared policy of "Maize without borders", export bans are most frequently applied to maize and maize meal but can also be applied to bran. Bran is in demand as a component of supplementary livestock feed during the dry season when shortages often arise. However, the millers complain that during the rains, when farmers do not demand bran for livestock, there is a surplus, which can be exported to markets that provide better remuneration to the mills than the domestic market. The export market is more lucrative than the domestic one and millers are therefore justifiably resentful when the farmers lobby for a ban in order to support the domestic livestock sector.

In the wake of imported wheat in 2009, traders have made repeated applications to export to the north but these have been rejected so that the damage to the price structure, from the perspective of the farmers, is not alleviated. Even sales at Kasumbalesa within Zambia have been banned since government is aware that this is a major channel for illegal exports to D R Congo.

The rationale for the issue of permits is unpredictable to the private sector so that they cannot be secure in their investment strategies since an anticipated logical rise in the price of a stored commodity can be capped at uneconomic levels by export bans, imports or FRA sales of stock. This undermines the logic of the market and reduces the potential for increasing export and production opportunities.

16.2 Views from farmers, traders and processors on the impact of the ban on investments, production and trade.

Farmers, traders and millers all aim to use their capacity for storage and financing to take advantage of seasonal price fluctuations in staple food crops. In the case of maize, small-scale farmers are the first to sell, partly because they have very limited storage capacity but primarily because the sale of their crop is often the only source of cash income that they have in the year. Their need for cash to pay off debts, buy school uniforms and purchase household items and farm inputs is acute by the time they come to harvest their crops. They are also usually not aware of their true costs of production because they do not value their labour

input highly enough. The result is that they tend to be price-takers and they enter the market at the lowest point in the seasonal price fluctuation. Commercial farmers tend to avoid selling close to the harvest as they aim to benefit from the steady price rise as the season progresses. They store to the best advantage dictated by the financing cost and storage capacity, thereby facing storage, fumigation, insurance and interest charges in anticipation of improved prices.

The peak in maize price arises late in the rainy season when the storage challenges have been greatest due to the humidity and the accumulated costs are highest, implying that the consumer price of maize is highest. Political concern for consumer welfare is usually brought into play at this point and FRA is obliged to release stocks at prices that do not reflect the costs of storage. Since FRA is a parastatal organisation, with access to government funding, they are not driven by the commercial imperative to operate under sustainable financial constraints and are therefore able to sell stocks below cost. This action reduces the price on the market to consumers and undermines the pricing structure for stored maize, obliging those who have responded to the call to participate in the storage of grain to suffer losses. In the absence of a ban on exports, farmers and traders would take advantage of the export markets in order to pre-empt the losses caused by FRA sales strategies.

If this pattern did not occur on a regular basis, farmers would be willing to invest in more production, and traders and millers would invest more in storage. Typical storage cost model is shown in the table below in which interest is charged on the basis of the US Dollar rate of 12%. When the resale price is capped at any stage by FRA sales at prices below those shown in the model, losses are incurred.

Table 51 Maize storage cost model

Maize		K/kg	US $ /mt									
Purchase price Smallscale		1050	223.40									
Large scale		1200	255.32									
Fumigation at start			2									
Fumigation every 2 months			2									
Interest annualised. Daily.	12% pa											
Procurement fee chageable on sale			5 to 10									
Example	US $ per mt											
Month		June	July	August	September	October	November	December	January	February	March	April	May
Days		30	31	31	30	31	30	31	31	28	31	30	31
Purchase price		255											
1st Fumigation		2.00											
Regular fumigation				2.00		2.00		2.00		2.00		2.00	
Interest	12%	2.52	2.64	2.67	2.63	2.75	2.70	2.82	2.87	2.62	2.95	2.88	3.03
Cumulative value		259.52	262.16	266.83	269.46	274.21	276.91	281.74	284.61	289.23	292.18	297.06	300.09
Procurement fee		7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Resale price month end		267.02	269.66	274.33	276.96	281.71	284.41	289.24	292.11	296.73	299.68	304.56	307.59

However, although farmers, traders and millers object strongly to export bans, some of them admit that they make little difference since the borders are so porous that alternative channels are soon established.

16.2.1 Seasonal Import restriction

Import restrictions are generally favoured by farmers since it implies that their markets are protected from competing products that may be derived from more advanced economies with lower production costs or from regions that are suited to less costly production systems or to subsidised production. This case is most acute with wheat since the irrigated production system in Zambia is susceptible to competition from rain-fed areas and because the capital

cost of establishing production capacity cannot be recovered if the pricing structure of the product is undermined by imports.

The viability or profitability of rice is also susceptible to the level of imports since efficiencies in production imply lower production costs and exchange rates of exporting countries are often distorted to promote exports. Since Zambia is far from self-sufficient in rice (42,000 tonnes of domestic production and 140,000 tonnes of consumption) there is little prospect of import bans in the near future, although a measure of restriction on imports would favour domestic producers.

Similarly, the market for refined cassava products is much more easily supplied by imports of reliably consistent product from the Far East, making it difficult for domestic producers and processors to establish a presence in the Zambian market. So, although there is plentiful production of cassava in Zambia, the processing has not been developed to a stage where it can begin to compete with imports. The development of refining capacity will rely on protection from imports or subsidised investment.

16.2.2 NON-TARIFF BARRIERS

Agro-chemicals including fertilisers are subject to non-tariff barriers:

- The Environmental Council of Zambia (ECZ) imposes fees of $540 per annum on companies importing chemicals but provides no guidance or protection against illegal or informal imports of generic chemicals, which are not tested.
- The Zambia Bureau of Standards (ZABS) are reported to demand exorbitant fees for testing imported chemicals, which can delay release of the product while providing no meaningful protection or safeguard against inferior products. One company reports a demand from ZABS for a sample size of 2 tonnes of imported sulphur and a fee of K1.8 billion ($ 383,000) to test it. Importers of fertilisers have experienced similar demands.
- Transport of agro-chemicals requires certification of the transporter, the vehicle and the driver and insurance specific to the type of product. Reputable companies have no objections to these added costs but some informal competitors do not comply with the requirements and, because there is no enforcement by customs or police, they are able to undercut the professional companies.

PART FOUR: CONCLUSIONS, POLICY IMPLICATIONS AND RECOMMENDATIONS

17. MAIN CONCLUSIONS

1. Zambia's agricultural potential is not being stimulated sufficiently to take advantage of endowments to create wealth or exploit export opportunities.
2. Costs of production are too high for competitiveness, partly due to VAT and other charges.
3. Cost and access to finance is a major constraint to development due to competition from Government and risks associated with policy changes and exchange rate fluctuations.
4. Production potential is inhibited by export bans.
5. Production potential is inhibited by price distortions through FRA buying and marketing strategies.
6. Production potential is inhibited by duality in the production cost structures due to FSP.
7. Pricing policy accounting for reduced costs due to FSP implies subsidy does not benefit producer beneficiaries but is passed to consumers, and unsubsidised producers are thereby penalised. Confusion between social welfare policies and agricultural policies restrain the growth of the industry.
8. Poor production technology is widespread in SH sector and not being sufficiently addressed.
9. Processors are not participating in competitive open market, but appear to operate a cartel.
10. Accountability of some governmental bodies is weak and a cause of inefficiencies in the economy. Long delays in performance, lead to time wasting and expense in the private sector. Inefficiencies in the business environment are a cause for seeking high margins in business transactions, and they are disincentives for investment.
11. No incentives exist for promotion of Zambian produce in manufacturing – rice, sorghum, cassava, beans, wheat and other products could benefit.
12. Insufficient development work has been devoted to rice, sorghum, millet, pulses and cassava.
13. No protection against subsidised products from elsewhere is provided by trade agreements, which do not account for farmer concerns. There is no tariff protection for expanding capital-intensive production sectors except milling.
14. There is insufficient confidence in the private sector to invest in outgrower production of crops for processing.
15. Delays in enacting the legal framework for agricultural marketing is suppressing the scope for growth in the free market
16. The Food Balance Sheet is not sufficiently reliable.

18. POLICY IMPLICATIONS

1. Government's transactions with small-scale farmers appears to be one of exchanging social welfare through FSP with commitment of labour to achieve minimal food security; and with commercial farmers, of tolerance provided that revenue can be derived while farmers give back-up to food security. Agriculture is not seen as a potentially rewarding channel for wealth creation offering attractive alternatives to

opportunist sources of income in urban areas, or as a highly valuable resource to be nurtured as an engine of development within the region.

2. Inputs to agriculture, and agricultural products that contribute to food needs, should not be viewed by the ministry of finance as sources of revenue until the sector is thriving as a commercial sector. Particular attention should be applied to transport costs. Attention should be brought to bear on the inefficiencies that increase costs of production with a view to eliminating rent seeking practices and cumbersome procedures in the operation of businesses.
3. Government should be constantly aware of the impact of their borrowing on the cost of finance for the private sector, and of the downstream effects on development of commercial enterprises, and they should take measures to counteract the effects. Banks should be more accountable for their role in facilitating development rather than profiteering from it. Banks should be obliged to be more specific to their clients about the costs of borrowing and the consequences of divergence from their plans.
4. Policies that ensure ample production for domestic needs would obviate export bans. Potential producers of surplus staple food should be given assurances that there will be no price penalties for surplus production.
5. FRA buying and selling policies should be open to deliberation in public and they should be held accountable to the producer and trading sectors for their strategies.
6. Subsidies to poor farmers should be viewed purely in terms of social welfare and they should not be such as to distort producer prices to the detriment of those who are not subsidised. Concentration on policies and actions that reduce the cost of fertiliser to all users would be more beneficial to total output. The strong sentiments expressed by political leadership against allowing any form of input subsidy to reach commercial farmers should be rationalised in the context of agriculture as an engine of growth with export potential and in the light of pronouncements favouring FDI. If subsidies on exports prove contrary to trade protocols then claw-back arrangements can be made on the issue of permits.
7. FSP, as a social welfare programme, does not benefit poor farmers since the pricing of their output - as influenced by FRA - transfers the benefit from farmers to consumers. The net effect on producers is to bring no benefit to those who receive the subsidies unless they consume their own produce, and to make unsubsidised farmers non-viable and therefore poorer. It reduces output from the sector as a whole. FSP, in its current form must be reconsidered.
8. Inappropriate production technology is widespread, leading to destruction of productive resources and poverty among its practitioners. Appropriate technology that is applicable particularly to small-scale producers, has been developed and is being promoted as conservation farming. Its promotion is already enshrined in agricultural policy but its implementation must be accelerated.
9. There is a need for vigilance against creation of cartels in the processing industry. More transparency is called for in the trading activities of the mills.
10. The BEE must be addressed at every level. One-stop-shops are needed to speed up application and certification procedures. The performance of some government departments should be improved and public servants should be held accountable to their positions.
11. Zambians, their public servants, visitors to the country and foreign countries should be made aware of Zambian products and their qualities. Greater emphasis should be placed on promoting local produce. Efforts should be made to open opportunities for

incorporating Zambian produce into processed products at every level. Pride in Zambia should be promoted.

12. Persist in crop diversification programmes to enhance production of crops appropriate to their locations.
13. Farmers concerns over the impact of liberalised trade protocols have not all been respected and domestic production capacity has been damaged without benefits accruing elsewhere in the economy. More concern for Zambia's engine of economic growth is called for in international trade negotiations. Why is the wheat milling industry afforded protection but not the producing industry where capital investments are required?
14. Continued support should be made available to outgrower schemes as a means of increasing production and transferring technology to small-scale producers.
15. The Agricultural Marketing Bill must be enacted.
16. Obligations to respect the data collection process for the FBS must be reinforced.

19. RECOMMENDATIONS

1. Agriculture must play a role as the vehicle for social welfare for the poor but this should not divert attention from the great potential for building agricultural production capacity from all sectors on a regionally competitive basis with sites set on neighbouring and wider markets to be supplied from the generous endowments that Zambia has in terms of land, climate, water, communications, expertise, labour, peace, education, etc. It is recommended that emphasis be placed on recognising this major role that Zambia can attach to agriculture and that a shift in vision is made towards this perception while opportunities are so abundantly available for exports to the neighbours. More debate should be generated, with the engagement of government, on agriculture as an engine of growth within the context of regional markets rather than simply as a vehicle for minimal (and exploitative) social welfare and basic food security.
2. Bring to bear on the Ministry of Finance the importance of supporting competitiveness in agricultural production within the region so as to encourage elimination of taxation on agricultural inputs and transport. Designate agricultural products as Zero rated for VAT. Create one-stop-shops that integrate the functions of diverse ministries or functionaries so as to reduce the obligations and commitments of the private sector in interacting with official administrations. Monitor the performance of bureaucrats through stakeholder response and enforce accountability through ensuring transparency in records of achievement. Why should it require 17 visits to official offices to change ownership on a motorcar? Why should small-scale farmers be told to come back "next week" after travelling across the country to deal with a land ownership or other issues? Why is it thought acceptable and even normal for government officials to turn up one hour late for scheduled meetings?
3. In the interests of enhancing the competitiveness of Zambian agriculture the Ministry of Finance, with the collaboration of MACO, should constantly monitor the causes of high costs of borrowing and oblige BoZ to bring pressure on commercial banks to reduce it by all regulatory and political means at their disposal. Government and BoZ should also explore every possible means of ensuring transparency and open competition between commercial banks such that the performance of commercial banks in providing for their agricultural customers becomes a pivotal criterion for

attracting agricultural customers. Removal of the irrigation development fund to CEEC should be reversed.

4. The Ministries of Finance and Agriculture should commission repeated investigations or market research into export opportunities in the region, and alert stakeholders to the opportunities so as to promote competitive production within agriculture. Such information would give comfort to government on food security and on the consequences of surplus production, allowing them to make pronouncements giving free rein to producers and traders to expand operations and capture export market share.
5. FRA purchasing, selling and exporting or importing strategies should be subject to stakeholder consideration and agreement to avoid damage to private sector enterprises while observing the needs of food security. FRA control over producer prices is too sympathetic to consumer comfort and political interests. It perpetuates poverty in the producer sector.
6. FSP is too extreme in its price distortion on inputs and the consequent production cost structures. It makes non-beneficiaries non-viable. FSP in its current form is not a productive agricultural policy but a means of garnering political favour. The design of subsidy programmes must be subject to considerations of the effect on total agricultural output, and the plight of the poor should be considered under social welfare programmes aimed at alleviation of that problem. Apply government funds and policy instruments to reducing the cost of all inputs to all producers in the interests of creating a competitive agricultural industry. Consider the possible need to claw-back any government expenditure on input costs from exports if trade protocols are violated by subsidies.
7. Reconsider FSP with a view to concentrating instead on reducing costs of production across the board. Where the need to provide social welfare to small-scale farmers is apparent, this function must be addressed by strategies that do not damage the agricultural sector.
8. CFU has already demonstrated that yields of maize under CF can be increased from 1.5 to 8 tonnes per ha and more without capital investment. MACO should set and publicise average yield targets of 4 tonnes per ha or more within two to three years and strategies to achieve them in the smallholder sector through concerted campaigns. This achievement alone would create wealth and induce sustainability of land use practices under increasing challenges from climate change.
9. The MTCI should use the institutions assigned to monitoring monopolies such as ZCC to scrutinise the trading operations of mills to ensure that their cohesive behaviour in the markets does not amount to price fixing or cartels.
10. A political approach to improving the accountability of public servants should aim to improve the efficiency of conducting business. Explore scope for amalgamation of SCCI and PQPS and establishment of one-stop-shops for applications and certification. Let there be provision for clients of government services to post their comments to an ombudsman on the level of service provided to them. Comments, with allowance for anonymity, should be open to public appraisal so that civil servants can be called to account over their efficiency.
11. Incentives should be given through tax or investment concessions to enterprises that incorporate Zambian derived raw materials. Devise incentives for stockfeed manufacturers, for example, to incorporate Zambian cassava or other crops into their ingredients so as to open channels for domestic trade rather than importing from developed economies. Such actions would increase opportunities for production of

small-scale crops that currently have limited marketing channels. Promote pride in Zambian produce at every opportunity. Drink Zambian coffee and tea at public meetings and in government offices. Provide incentives to fill supermarket shelves with Zambian produce even though the supermarkets aim to promote the products of their parent (foreign) countries.

12. In conjunction with 11 above, persist with diversification programmes with strategies through research and extension services to ensure that opportunities to produce crops other than maize in areas that are appropriate to them are optimised. Set challenging yield targets and demonstrate to local farmers that they are achievable through the institutions that exist for the purpose.
13. Stakeholder consultations have been held in deliberations over trade protocols but the messages from farmers have not apparently been carried forward with sufficient concern for the growth of the domestic industry. The needs of the agricultural industry, as the engine for growth in the economy with the best long-term potential, should be held paramount in the signing of trade protocols. More force is called for in addressing issues over rules of origin and the dumping of foreign subsidised products on the Zambian markets. The wheat producing industry should continue to expand to serve growing local demand rather than opening the local market to subsidised production and undermining domestic investments.
14. Provide concessions in CEE and taxes and loan funds to bona fide outgrower schemes that meet criteria on social and economic grounds.
15. Accelerate enactment of the Agricultural Marketing Bill.
16. Introduce penalties for non-compliance with demands for FBS related data and for supplying misinformation.

ANNEXES

1. REFERENCES

http://www.aec msu.edu/agecon/fs2/zambia/index htm
http://www.ebz.co.zm
http://www fews net
http://www.sagis.org.za
http://www.sarpn.org.za
http://www.africanhunger.org
http://www.boz.zm
http://www farmprice.co.zm
http://www.agritrade.co.zm
http://www.safex.co.za
http://www.codexalimentarius.net

Regional trade, government policy and food security: Recent evidence from Zambia
Paul A. Dorosh a,*, Simon Dradri b, Steven Haggblade c

2. Fertiliser suppliers

Bridgeway Commodities Ltd	Parmalat Building Mungwi Road, Lusaka		0211 286913	Bridgeway@zamnet.zm
Omnia	Mukwa Road, Lusaka			
Avignon Fertilizers				
Fairfield Commodities Ltd	Mukwa Road Lusaka		0211 241945	
Greenbelt Fertilizers	Mazabuka		235052	
Kynoch Fertilizers			286406	
Zambian Fertilizers	5260 Mukwa Road Lusaka		240375	
Nyiombo Investments			0211 241644	

3. Agro-chemical suppliers

Agchem Technical Services	Lusaka		246724	
Agrohealth Ltd	Lusaka		233778	
Base Chemicals Ltd	Lusaka		240095	
Cropchem Services Ltd	Lusaka		287514	
Croppack Agro Services Ltd	Lusaka		240725	
Cropserve Ltd	Lusaka		212514	
Farmchem Services Ltd	Lusaka		244274	
Farmers Warehouse Ltd	Chiparamba Road Lusaka		287255	
Gawula Agricultural Supplies	Livingstone		321441	
MCFI Int. Ltd			287181	

Mana Agrochemicals Zambia Ltd			235137	
Plant Agrichem Services			243429	
Prime Agricentre Zambia Ltd			212137	
Prime Cropcare Services Ltd			244018	
Syngenta			237908	
Twiga Chemicals			288511	

4. Millers

NO.	PROVINCE	MILL	Membership to MAZ	TONS/HOUR	TONS/DAY
	LUSAKA				
1.	Lusaka	National Milling		15.0	360.0
2.		APG Milling	NON MAZ	13.0	312.0
3.		GBM Milling		10.0	240.0
4.		Chat Milling		8.3	199.2
5.		Simba Milling		7.0	168.0
6.		Ghirardi Milling		4.2	100.8
7.		A1 Milling		4.2	100.8
8.		Shabco		4.2	100.8
9.		Superior		3.5	84.0
10.		Perfect Milling		2.7	64.5
11.		Bartner		1.5	36.0
11A		African Milling		9.0	216
	SOUTHERN				
12.	Choma	Choma (APG)	NON-MAZ	14.0	336.0
13.	Mazabuka	Kapinga		3.5	84.0
14.	Livingstone	National Milling		3.5	84.0
15.	Choma	Mutupa Milling		3.0	72.0
	WESTERN				
16.	Mongu	Mongu (APG) Milling	NON MAZ	3.5	84.0
	EASTERN				
17.	Chipata	Kwacha Milling		5.0	120.0
	NORTHERN				
18.	Mbala	Sun Sung Milling	NON MAZ		
	COPPERBELT				
19.	Kitwe	Jamas Milling		9.58	230
20.	Ndola	Chimanga Changa		5.0	120
21.	Ndola	Olympic Milling			
22.	Ndola	Mukuba Milling	NON MAZ	2.0	48.0
23.	Kitwe	HM Milling		4.0	96.0
24.	Luanshya	Antelope Milling		3.5	84.0
25.	Mufulira	Olympic Milling		3.5	84.0
26.	Chingola	Litestar		2.5	60.0
27.	Kitwe	Nkana Milling	NON-MAZ	2.0	48.0
28.	Chililabombwe	Litestar		1.67	40.0
	CENTRAL				
29.	Kabwe	National Milling		3.5	84.0
30.	Kabwe	FVG Milling			
31.	Kapiri Mposhi	Chimsoro Milling		3.5	84.0
32.	Mumbwa	Mumbwa Milling	NON MAZ	2.08	50.0
	LUAPULA				
33.	Mansa	Mansa Milling	NON MAZ	2.0	48.0
Not Allocated Micro Feeders					
34.	Monze	Mukuwa Milling	NON MAZ		
35.	Mpika	Mpika	NON MAZ		

5. Contacts

Government							
	PQPS	Arundel Sakala	Co-ordinator		0966 761829	0955 661829	Mnt Mukulu
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	PQPS	Mable Mudenda	Ag Research Off		0976 495676		
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	Consultant Ag Fin	Mike Taylor			0978 429245		
	Consultant	John Keyser					
	FAO	Paulo Sedoni			252277	252568	
	FEWSNET	Chansa Mushinge	Country Representat	cmushinge@fews.net		262751	

Contacts for Value Chains							
Association	ZNFU	Ellah Chembe	DED	chembe@znfu.org.zm	0955 761412	0211 252649	211255769
		Chumba					
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				j_mwale@yahoo.com	0955 988897		
	MAZ	Harrison Banda	ED		0966 800606		
	Z Seed Traders' Assoc	William Rutherford-Smith	Chairman	PANNAR			
Millers							
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		Jurie Snyman	Rice		0977 640103		
		Chris McEnery	Maize		0977 640141		
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	Tiger Feeds	Kelvin Ndhlovu	MD Designate	kelvin@tigerfeeds.com.zm	09655 22008(	0211 286262	212383
					0955 763552		
					0966 860797	287323	
Traders							
	ZDENAKIE	George Liacopoulos	MD	george@zdenakie.com	0977 763552	288204	
	CHC	Chris Hawke	MD	hawke@chc.com.zm	0977 860797	286331	287822
	Quality Feeds	Alnoor Manji	MD	alnoor.manji@gmail.com	0977 790854	274562	
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	WFP	Pablo Recalde		pablo.recalde@wfp.org	0977 790824	252957	
	PAZA Trading Co Ltd	Seraj Ginwala			0977 854181		
	Zamanita	Mrs Casilli					
	Olam Zambia						
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	Amagrain	Andrew Lunt, Allan Obst	Traders				
	Cargill						
	Freshpikt	Chance Kabaghe			240107	240108	240198
	ZAMACE	Bright Tembo				233413	231420

MILLERS ASSOCIATION OF ZAMBIA
MEMBERS' ADDRESS AND TELEPHONE NUMBERS LIST

	MILLER	ADDRESS	CONTACT PERSON	TELEPHONE NUMBER	FAX	MOBILE	E-MAIL ADDRESS
1	Superior Milling Ltd	Box 32007, LUSAKA	Mr. C. Mulenga	01 289 848/289 252	01 286 007/287 690		change@zamnet.zm
2	National Milling Corporation Ltd	Box 31980, LUSAKA	Mr. P. Cottan	01 225977	01 237 073	0966 861 101	PeterC@nmc.co.zm
3	Simba Milling Ltd	Box 32655, LUSAKA	Mr. J. Constantinou	01 288 544 / 5	01 288 546	0966 860 099	john@simbamil.co.zm
4	Royal Milling Ltd	Box 32169, LUSAKA	IMRAN	01 286 115 / 286 463/7	01 286 454	0955 880 004	royal@zamnet.zm
5	Crown Milling Ltd	Box 31351, LUSAKA	Mr. Mussa	01 286 866 / 287 696/7	01 286 288	0966 749 744	crownmillers@iconnect.zm
6	Kwacha Milling Ltd	Box 39150, LUSAKA	Mr. A. Sakala	01 232 441	01 232 441	0966 757 588	agsakala@yahoo.com; agsakala@zamnet.zm
7	Ghirardi Milling Ltd	Box W55, LUSAKA	Mr. Patel	01 240 336	01 240 336		ghirardimill@zamnet.zm
8	Chimsoro Milling Ltd	Box 810012, KAPIRI MPOSHI	Mr. C. Chilala	05 271 215	05 271 215		chibrand@zamtel.zm; chi0061@hotmail.com
9	Shabco Milling Ltd	Box 32018, LUSAKA	Mr. Abdul	01 229 780	01 229 781		shabco@zamnet.zm
10	Olympic Milling Company Ltd	Box 40348, MUFULIRA+NDOLA	Mr. J. S. Samaras	02 411 134 / 410 636	02 412 874 / 411 689	0955 998 006	savvas@zamnet.zm; johnsamaras@microlink.zm
11	Antelope Milling Company Ltd	Box 90887, LUANSHYA	Mr. D. Malliotis	02 511 194 / 511 943	02 512 076	0977 486 262	antelope@zamnet.zm
12	Chimanga Changa Milling Ltd	Box 70493, NDOLA	Mr. B. Meyer	02 613 053	02 611 840	0966 804 403	chimanga@zamtel.zm
13	A.L Milling Ltd	Box 32118, Lusaka	Mr Adam		01 286 389	0966 862 786	
14	G.B.M Milling	Lusaka	Mr Mwamba		01 291183	0955/0977 777810	
15	Chat Milling Ltd	Box 32921, Lusaka	Mr Goma			0966 763 997	
16	Tiger Animal Feeds	Box 31712, Lusaka	Mr R.J. Steeenkamp	01 286262/286524	01 286260	0977 791 208	
17	FVG Milling	KABWE	Mr A. Manji			0977 790 854	
18	Cereal Milling	MBALA			0977 877 777	0977 761 680	
19	Mpongwe Milling	KITWE C/O Simba Milling	Mr. J. Constantinou	01 288 544 / 5	01 288 546	0966 860 099	john@simbamil.co.zm
20	HM Milling	Kitwe	Mr Milan	02 215 068	02 215 067	0966 906 000	
21	Jamas Milling	Kitwe	Mr COUTLIS	02 217 120	02 217 120	0966 920 447	
22	Litestar Milling	Chingola, P.O. Box 10129	Mr CUTURI	02 313744	02 313 483		litestar@zamtel.zm
23	African Milling	Buyantanshi Road, Lusaka	Ibrahim	0211 241620		0977 786 894	
24	Bartner Milling	Lusaka	Davius Mungala	0955 756 819			
	NOTE: Milliers in BLUE produce Wheat Flour and/or Stockfeeds in addition to Maize meal						
	NON-MAZ COMMERCIAL MILLERS						
1	APG Milling (incorporation Choma Milling)						
2	Perfect Milling						
3	Crown Milling						

6. STANDARD SPECIFICATION FOR MAIZE

The maize shall have a good natural colour, be free from objectionable odour, contain no live insects, toxins and moulds and be fit for human consumption and shall comply with the following requirements:

Quality Parameters	UOM	Grades		
		A	B	C
Test Density	Kg/l	67.25 min	64.75 min	61.75 min
Moisture	%	12.5 max	12.5 max	12.5 max
Extraneous Matter	%	1.0 max	1.5 max	2 max
Broken Grains	%	6 max	7 max	8 max
Other coloured grains	%	3 max	4 max	5 max
Total other defective grains, of which:	%	11 max	18.5 max	26 max
a. Discoloured grains	%	3 max	6 max	9 max
b. Insect/pest damages grains	%	3 max	6 max	9 max
c. Diseased grains	%	2 max	2 max	2 max
d. Immature or shrivelled grain	%	1 max	1.5 max	2 max
e. Fungal damaged grains	%	0.5 max	1.0 max	1.5 max
f. Germinated grains	%	Nil	Nil	Nil
g. Pass through 4.15 mm sieve.	%	1.5 max	2.0 max	2.5 max
Diplodia	%	Nil	Nil	Nil
Fusarium	%	0.5 max	0.5 max	0.5 max

DEFINITIONS

Maize: Refers to the seeds of Zea mays L.

Moisture Content: The moisture content, expressed on a wet weight basis, shall be determined by an approved moisture meter calibrated according to a method prescribed by the Zambia Bureau of Standards

Extraneous Matter: a). Anything other than maize grain which will pass through a 4.5 mm sieve.

b). Any animal or mineral or plant matter or grain other than maize, which will not pass through a 4.5 mm sieve.

Damaged Grain: Means grain and pieces of grain which will pass through a 4.5 mm sieve.

Broken Grain: Means maize, which has been broken, cracked or chipped to expose the white interior of the grain. It does not pass through the 4.5 mm sieve and has no other defects.

Other Coloured Grain: Means grain that is coloured or partly coloured maize present in white maize or maize of any colour other than yellow present in yellow maize.

Defective Grain: Means any grain which falls within one or other of the following categories

a) insect/pest damaged grain
b) fungal damaged grain
c) diseased grain
d) immature or shrivelled grain
e) germinated grain
f) discoloured grain

Insect/Pest Damaged Grain: Means maize which has been damaged by any insect or animal

pest.
Fungal Damaged Grain: Means maize with visible mycelial/mould growth on its surface.
Diseased Grain: Means maize which is obviously rotted by fungi, bacteria or other organisms of decay.
Immature or Shrivelled Grain: Means immature maize which has indications of lack of maturity or full development and which may be thin and papery (almost see through) in appearance. Maize which is shrivelled over most of its surface.
Germinated Grain: Means maize grain which shows any signs of germination.
Discoloured Grain: Means grain discoloured by heating, fermentation or weathering.
Sieve: A 4.5 mm grading sieve is a device, the bottom (baseplate) of which is perforated with round-holes 4.5 mm in diameter, and used for the separation of fine extraneous material from grain.
Adopted 1985. Revision 1995

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7. CODEX STANDARD FOR MAIZE (CORN)

CODEX STAN 153-1985

1. SCOPE

This standard applies to maize (corn) for human consumption, i.e., ready for its intended use as human food, presented in packaged form or sold loose from the package directly to the consumer. This standard specifies requirements for whole grain shelled dent maize, Zea mays indentata L., and/or shelled flint maize, Zea mays indurata L., or their hybrids. It does not apply to processed maize.

2. DESCRIPTION

2.1 Product definition

Maize (corn) is the shelled grains of the species defined in the scope.

3. ESSENTIAL COMPOSITION AND QUALITY FACTORS

3.1 Quality factors – general

3.1.1 Maize shall be safe and suitable for human consumption.

3.1.2 Maize shall be free from abnormal flavours, odours and living insects.

3.1.3 Maize shall be free from filth in amounts which may represent a hazard to human health.

3.2 Quality factors – specific

3.2.1 **Moisture content** 15.5% m/m max

Lower moisture limits should be required for certain destinations in relation to the climate, duration of transport and storage. Governments accepting the Standard are requested to indicate and justify the requirements in force in their country.

3.2.2 **Extraneous matter** are all organic and inorganic materials other than maize, broken kernels, other grains and filth.

3.2.2.1 **Filth** are impurities of animal origin (including dead insects). 0.1% m/m max

3.2.2.2 Toxic or noxious seeds

The products covered by the provisions of this standard shall be free from the following toxic or noxious seeds in amounts which may represent a hazard to human health.

– Crotolaria (Crotalaria spp.), Corn cockle (Agrostemma githago L.), Castor bean (Ricinus communis L.),

Jimson weed (Datura ssp.), and other seeds are commonly recognized as harmful to health.

3.2.2.3 **Other organic extraneous matter** which is defined as organic components other than edible grams of cereals (foreign seeds, stems, etc.) (1.5% m/m max).

3.2.2.4 **Inorganic extraneous matter** which is defined as any inorganic component (stones, dust, etc.) (0.5% m/m max).

4. CONTAMINANTS

4.1 Heavy metals

Maize (corn) shall be free from heavy metals in amounts which may represent a hazard to human health.

4.2 Pesticide residues

Maize (corn) shall comply with those maximum residue limits established by the Codex Alimentarius Commission for this commodity.

4.3 Mycotoxins

Maize (corn) shall comply with those maximum mycotoxin limits established by the Codex Alimentarius Commission for this commodity.

5. HYGIENE

5.1 It is recommended that the product covered by the provisions of this standard be prepared

and handled in accordance with the appropriate sections of the Recommended International Code of Practice – General Principles of Food Hygiene (CAC/RCP 1-1969) and other Codes of Practice recommended by the Codex Alimentarius Commission which are relevant to this product.
5.2 To the extent possible in good manufacturing practice, the product shall be free from objectionable matter.
5.3 When tested by appropriate methods of sampling and examination, the product:
– shall be free from micro-organisms in amounts which may represent a hazard to health;
– shall be free from parasites which may represent a hazard to health; and
– shall not contain any substance originating from micro-organisms in amounts which may represent a hazard to health.

6. PACKAGING

6.1 Maize (corn) shall be packaged in containers which will safeguard the hygienic, nutritional, technological, and organoleptic qualities of the product.
6.2 The containers, including packaging material, shall be made of substances which are safe and suitable for their intended use. They should not impart any toxic substance or undesirable odour or flavour to the product.
6.3 When the product is packaged in sacks, these must be clean, sturdy and strongly sewn or sealed.

7. LABELLING

In addition to the requirements of the Codex General Standard for the Labelling of Prepackaged Foods
(CODEX STAN 1-1985), the following specific provisions apply:

7.1 Name of the product

7.1.1 The name of the product to be shown on the label shall be "maize (corn)".

7.2 Labelling of non-retail containers

Information for non-retail containers shall either be given on the container or in accompanying documents, except that the name of the product, lot identification and the name and address of the manufacturer or packer shall appear on the container. However, lot identification and the name and address of the manufacturer or packer may be replaced by an identification mark, provided that such a mark is clearly identifiable with the accompanying documents.

8. METHODS OF ANALYSIS AND SAMPLING

See relevant Codex texts on methods of analysis and sampling.

ANNEX

In those instances where more than one factor limit and/or method of analysis is given we strongly recommend that users specify the appropriate limit and method of analysis.

Factor/Description Limit Method of analysis
KERNELS OF OTHER COLOURS

Visual Examination in yellow maize. Maize grains which are yellow and/or light red in colour are considered to be yellow maize. Maize grains which are yellow and dark red in colour, provided the dark red colour covers less than 50% of the surface of the grain, are also considered to be yellow maize
MAX: 5.0% by weight of maize of other colours in white maize. Maize grains which are white and/or light pink in colour are considered to be white maize. White maize also means maize grains which are white and pink in colour, provided the prink colour covers less than 50% of the surface of the grain

MAX: 2.0% by weight of maize of other colours in red maize. Maize grains which are pink and white or dark red and yellow in colour are considered to be red maize, provided the pink or dark red colour covers 50% or more of the surface of the grain MAX: 5.0% by weight of maize of other colours mixed maize

KERNELS OF OTHER SHAPE

Visual Examination in flint maize MAX: 5.0% by weight of maize of other shapes
In dent maize MAX: 5.0% by weight of maize of other shapes flint and dent maize RANGE: 5.0% to 95% by weight of flint maize

DEFECTS

blemished grains: grains which are insect or vermin damaged, stained, diseased, discoloured, germinated, frost damaged, or otherwise materially damaged MAX: 7.0% of which diseased grains must not exceed 0.5% Visual Examination broken kernels MAX: 6.0% ISO 5223-1983 (4.50 mm metal sieve) other grains MAX: 2.0% Visual Examination

8. ZAMACE WHEAT GRADES

Quality Parameters	UOM	Grades			
		B1	**B2**	**B3**	**B4**
Specific weight	Kg/l	77 min	76 min	74 min	72 min
Moisture	%	13 max	13 max	13 max	13 max
Protein	%	12 min	11 min	10 min	9 min
Hagberg falling Number (+/- 30 secs. B1-B3)	Secs	250 min	250 min	250 min	200 min
A. Screenings	%	3 max	3 max	3 max	3 max
B. Other Grains	%	1 max	1 max	1 max	1 max
C. Foreign Matter	%	1 max	1 max	1 max	1 max
D. Damaged Kernels	%	2 max	2 max	2 max	2 max
Combined deviations (A+B+C+D)	%	5 max	5 max	5 max	5 max
E. Heavily Frost Damaged Kernels	%	5 max	5 max	5 max	5 max
Field Fungi infected kernels	%	2 max	2 max	2 max	2 max
Storage fungi infected kernels	%	0.5 max	0.5 max	0.5 max	0.5 max

DEFINITIONS:

Wheat

Means bread milling wheat of Zambian origin, South African origin, No 2 US Dark Northern Spring, No 2 US Hard Red Winter, No 3 Canadian Red Western Spring, Australian Hard, Australian Prime Hard, Australian Premium White and Argentinean wheat of sound, fair and merchantable quality which is fit for human consumption and which complies with the following criteria and not subject to any containment conditions.

Screenings

A 'Standard sieve' being a hand sieve manufactured of 0.8mm aluminium which consists of a slotted sieve with apertures 1.786mm wide and 12.7mm long, fits into a solid pan and is 330.2mm to 334mm in diameter.

Others Grains

Other grains, oilseeds, unthreshed ears and pods of other grains and oilseeds.

Foreign Matter

All material other than grain, oilseeds, and unthreshed ears and pods of other grain and oilseeds.

Damaged Kernels

Sprouted wheat kernels
Insect damaged wheat kernels
Immature Wheat Kernels
Of which heat damaged kernels should be 0.5% Maximum.

Protein:

Measured using the Inframatic supplied by Perten instruments.

Falling Number:

Measures the alpha-amylase enzyme activity in grains and flour to detect sprout damage. Falling number system by Perten Instrument is used to determine the falling number.

- The grade price discount for ZAMACE is based on Protein and test density only.
- The above ZAMACE grade price discount is applicable from 1st September 2009 to 31st

July 2010.

- The ZAMACE grade price discount is to be determined by the ZAMACE standards committee sitting in conjunction with relevant industry stakeholders by the 1st August each year to 31st July of the following year.

9. CODEX STANDARD FOR WHEAT AND DURUM WHEAT
CODEX STAN 199-1995

1. SCOPE

This standard applies to wheat grains and durum wheat grains as defined in Section 2 intended for processing for human consumption. It does not apply to club wheat (Triticum compactum Host.), red durum wheat, durum wheat semolina or products derived from wheat.

2. DESCRIPTION

2.1 Wheat is the grains obtained from varieties of the species Triticum aestivum L.
2.2 Durum wheat is the grains obtained from varieties of the species Triticum durum Desf.

3. ESSENTIAL COMPOSITION AND QUALITY FACTORS

3.1 Quality and safety factors – general

3.1.1 Wheat and durum wheat shall be safe and suitable for processing for human consumption.
3.1.2 Wheat and durum wheat shall be free from abnormal flavours, odours, living insects and mites.

3.2 Quality factors – specific

3.2.1 Moisture content

Maximum level
Wheat 14.5% m/m
Durum Wheat 14.5% m/m
Lower moisture limits should be required for certain destinations in relation to the climate, duration of transport and storage. Governments accepting the Standard are requested to indicate and justify the requirements in force in their country.

3.2.2 Ergot

Sclerotium of the fungus Claviceps purpurea

Maximum level
Wheat 0.05% m/m
Durum Wheat 0.5% m/m

3.2.3 **Extraneous matter** are all organic and inorganic materials other than wheat and durum wheat, broken kernels, other grains and filth.

3.2.3.1 **Toxic or noxious seeds**

The products covered by the provisions of this standard shall be free from the following toxic or noxious seeds in amounts which may represent a hazard to human health.
– Crotolaria (Crotalaria spp.), Corn cockle (Agrostemma githago L.), Castor bean (Ricinus communis L.), Jimson weed (Datura spp.),and other seeds that are commonly recognized as harmful to health.

3.2.3.2 Filth

Impurities of animal origin, (including dead insects) 0.1% m/m maximum
3.2.3.3 Other Organic extraneous matter which is defined as organic components other than edible grains of cereals (foreign seeds, stems, etc.):

Maximum level
Wheat 1.5% m/m
Durum Wheat 1.5% m/m

3.2.3.4 Inorganic extraneous matter which is defined as any inorganic component (stones, dust, etc.):

Maximum level
Wheat 0.05% m/m
Durum Wheat 0.05% m/m

4. CONTAMINANTS

4.1 Heavy metals

The products covered by the provisions of this standard shall be free from heavy metals in amounts which
may represent a hazard to human health.

4.2 Pesticide residues

Wheat and durum wheat shall comply with those maximum residue limits established by the Codex
Alimentarius Commission for this commodity.

5. HYGIENE

5.1 It is recommended that the product covered by the provisions of this standard be prepared and handled in accordance with the appropriate sections of the Recommended International Code of Practice – General
Principles of Food Hygiene (CAC/RCP 1-1969), and other Codes of Practice recommended by the Codex Alimentarius Commission which are relevant to this product.

5.2 To the extent possible in good manufacturing practice, the cleaned product shall be free from objectionable matter.

5.3 When tested by appropriate methods of sampling and examination, the product, after cleaning and sorting, and before further processing:
– shall be free from micro-organisms in amounts which may represent a hazard to health;
– shall be free from parasites which may represent a hazard to health; and
– shall not contain any substance originating from micro-organisms, including fungi, in amounts which may represent a hazard to health.

6. PACKAGING

6.1 Wheat and durum wheat shall be packaged in containers which will safeguard the hygienic, nutritional, technological, and organoleptic qualities of the product.

6.2 The containers, including packaging material, shall be made of substances which are safe and suitable for their intended use. They should not impart any toxic substance or undesirable odour or flavour to the product.

6.3 When the product is packaged in sacks, these must be clean, sturdy, and strongly sewn or sealed.

7. LABELLING

In addition to the requirements of the Codex General Standard for the Labelling of Prepackaged Foods
(CODEX STAN 1-1985), the following specific provisions apply:

7.1 Name of the product

The name of the product to be shown on the label shall be “wheat” or “durum wheat” as applicable.

7.2 Labelling of non-retail containers

Information for non-retail containers shall be given either on the container or in accompanying documents, except that the name of the product, lot identification and the name and address of the manufacturer or packer shall appear on the container. However, lot identification and the name and address of the manufacturer or packer may be replaced by an identification mark, provided that such a mark is clearly identifiable with the accompanying documents.

8. METHODS OF ANALYSIS AND SAMPLING

See relevant Codex texts on methods of analysis and sampling.

ANNEX

In those instances where more than one factor limit and/or method of analysis is given it is strongly recommended that users specify the appropriate limit and method of analysis.

Limit
Factor/Description
Wheat Durum Wheat
Method of analysis
1. **Minimum test weight:**
the weight of a hundred litre volume expressed in kilograms per hectolitre.
68 70 The test weight shall be the weight per ISO 7971-1986 expressed in kilograms per hectolitre as determined on a test portion of the original sample.
2. **Shrunken and broken kernels:**
broken or shrunken wheat or durum wheat which will pass through a 1.7 mm x 20 oblong-holed metal sieve for wheat and through a 1.9 mm x 20 oblong-holed metal sieve for durum wheat. 5.0% m/m max 6.0% m/m max ISO 5223-1983 "Test sieves for cereals".
3. **Edible Grains other than wheat and durum wheat**
(whole or identifiably broken)
2.0% m/m max 3.0% m/m max ISO 7970-1987: (Annex C)
4. **Damaged kernels** (including pieces of kernels that show visible deterioration due to moisture, weather, disease, mould, heating, fermentation, sprouting, or other causes.)
6.0% m/m max 4.0% m/m max ISO 7970-1987: (Annex C)
5. **Insect bored kernels:**
kernels which have been visibly bored or tunnelled by insects 1.5% m/m 2.5% m/m To be developed

10. CODEX STANDARD FOR CERTAIN PULSES
CODEX STAN 171-1989
1. SCOPE
This Standard applies to the whole, shelled or split pulses defined below which are intended for direct human consumption. The Standard does not apply to pulses intended for factory grading and packaging, industrial processing, or to those pulses intended for use in the feeding of animals. It does not apply to fragmented pulses when sold as such, or to other legumes for which separate standards may be elaborated.
2. DESCRIPTION
2.1 Product definition
Pulses are dry seeds of leguminous plants which are distinguished from leguminous oil seeds by their low fat content. The pulses covered by this Standard are the following:
– Beans of Phaseolus spp. (except Phaseolus mungo L. syn. Vigna mungo (L.) Hepper and Phaseolus aureus Roxb. syn. Phaseolus radiatur L., Vigna radiata (L.) Wilczek);
– Lentils of Lens culinaris Medic. Syn. Lens esculenta Moench.;
– Peas of Pisum sativum L.;
– Chick peas of Cicer arientinum L.;
– Field beans of Vicia faba L.;
– Cow peas of Vigna unguiculata (L.) Walp., syn. Vigna sesquipedalis Fruhw., Vigna sinensis (L.) Savi exd Hassk.
3. ESSENTIAL COMPOSITION AND QUALITY FACTORS
3.1 Quality factors – general
3.1.1 Pulses shall be safe and suitable for human consumption.
3.1.2 Pulses shall be free from abnormal flavour, odours, and living insects.
3.1.3 Pulses shall be free from filth (impurities of animal origin, including dead insects) in amounts which may represent a hazard to human health.
3.2 Quality factors – specific
3.2.1 Moisture content
3.2.1.1 Two maximum moisture levels are provided to meet different climatic conditions and marketing practices.
Lower values in the first column are suggested for countries with tropical climates or when long-term (more than one crop year) storage is a normal commercial practice. The values in the second column are suggested for more moderate climates or when other short-term storage is the normal commercial practice.

Pulse	**Moisture content** (percent)	
beans	15	19
lentils	15	16
peas	15	18
chick peas	14	16
cow peas	15	18
field beans	15	19

Lower moisture limits should be required for certain destinations in relation to the climate, duration of transport and storage. Governments accepting the Standard are requested to indicate and justify the requirements in force in their country.

3.2.1.2 In the case of pulses sold without their seed coat, the maximum moisture content shall be 2 per cent (absolute) lower in each case.

3.2.2 **Extraneous matter** is mineral or organic matter (dust, twigs, seedcoats, seeds of other species, dead insects, fragments, or remains of insects, other impurities of animal origin). Pulses shall have not more than 1% extraneous matter of which not more than 0.25% shall be mineral matter and not more than 0.10% shall be dead insects, fragments or remains of insects, and/or other impurities of animal origin.

3.2.2.1 Toxic or noxious seeds

The products covered by the provisions of this standard shall be free from the following toxic or noxious seeds in amounts which may represent a hazard to human health.

– Crotolaria (Crotalaria spp.), Corn cockle (Agrostemma githago L.), Castor bean (Ricinus communis L.), Jimson weed (Datura spp.), and other seeds that are commonly recognized as harmful to health.

4. CONTAMINANTS

4.1 Heavy metals

Pulses shall be free from heavy metals in amounts which may represent a hazard to health.

4.2 Pesticide residues

Pulses shall comply with those maximum residue limits established by the Codex Alimentarius Commission for this commodity.

4.3 Mycotoxins

Pulses shall comply with those maximum mycotoxin limits established by the Codex Alimentarius Commission for this commodity.

5. HYGIENE

5.1 It is recommended that the products covered by the provisions of this standard be prepared and handled in accordance with the appropriate sections of the Recommended International Code of Practice – General
Principles of Food Hygiene (CAC/RCP 1-1969), and other Codes of Practice recommended by the Codex Alimentarius Commission which are relevant to these products.

5.2 To the extent possible in good manufacturing practice, the products shall be free from objectionable matter.

5.3 When tested by appropriate methods of sampling and examination, the products:

– shall be free from micro-organisms in amounts which may represent a hazard to health;

– shall be free from parasites which may represent a hazard to health; and

– shall not contain any substance originating from micro-organisms in amounts which may represent a hazard to health.

6. PACKAGING

6.1 Pulses shall be packaged in containers which will safeguard the hygienic, nutritional, technological, and organoleptic qualities of the product.

6.2 The containers, including packaging material, shall be made of substances which are safe and suitable for their intended use. They should not impart any toxic substance or undesirable odour or flavour to the product.

6.3 When the product is packaged in sacks, these must be clean, sturdy and strongly sewn or sealed.

7. LABELLING

In addition to the requirements of the Codex General Standard for the Labelling of Prepackaged Foods
(CODEX STAN 1-1985), the following specific provisions apply:

7.1 Name of the product

The name of the product to be shown on the label shall be the commercial type of the pulse.

7.2 Labelling of non-retail containers

Information for non-retail containers shall either be given on the container or in accompanying documents, except that the name of the product, lot identification and the name and address of the manufacturer or packer shall appear on the container. However, lot identification and the name and address of the manufacturer or packer may be replaced by an identification mark, provided that such a mark is clearly identifiable with the accompanying documents.

8. METHODS OF ANALYSIS AND SAMPLING

See relevant Codex texts on methods of analysis and sampling.

ANNEX

In those instances where more than one factor limit and/or method of analysis is given we strongly recommend that users specify the appropriate limit and method of analysis.

Factor/Description Limit Method of analysis

DEFECTS

Visual Examination seeds with serious defects. Seeds in which the cotyledons have been affected or attached by pests; seeds with very slight traces of mould or decay; or slight cotyledon staining

MAX: 1.0% seeds with slight defects. Seeds which have not reached normal development; seeds with extensive seedcoat staining, without the cotyledon being affected; seeds in which the seedcoat is wrinkled, with pronounced folding, or broken pulses MAX: 7.0% of which broken pulses must not exceed 3.0% broken pulses. Broken in whole pulses are pulses in which the cotyledons are separated or one cotyledon has been broken. Broken in split pulses are pulses in which the cotyledon has been broken

SEED DISCOLORATION

Visual Examination seeds of a similar colour but a different commercial type (except in beans with white seeds) MAX: 3.0% seeds of different colour (other than discoloured seeds) MAX: 6.0% discoloured seeds MAX: 3.0% discoloured seeds of the same commercial type MAX: 10.0% beans with green seed and peas with green seeds with slight discolouration of the seed MAX: 20.0%

PRESENTATION Buyer Preference Visual Examination Shelled pulses. Pulses without their seedcoat, with the cotyledons not separated split pulses. Pulses without their seedcoat, with the two cotyledons separated one from the other

11. CODEX STANDARD FOR SORGHUM GRAINS
CODEX STAN 172-1989
1. SCOPE
This Standard applies to sorghum grains as defined in Section 2, for human consumption; i.e., ready for its
intended use as human food, presented in packaged form or sold loose from the package directly to the consumer. It does not apply to other products derived from sorghum grains.
2. DESCRIPTION
2.1 Definition of the product
Sorghum grains are whole or decorticated grains obtained from species of Sorghum bicolor (L.) Moench. They may be suitably dried if necessary.
2.1.2 Whole sorghum grains
These are sorghum grains obtained as such after a complete threshing without any further treatment.
2.1.3 Decorticated sorghum grains
These are sorghum grains from which the external casings and whole or parts of the germ have been removed in an appropriate manner, using mechanical treatment.
3. ESSENTIAL COMPOSITION AND QUALITY FACTORS
3.1 Quality factors – general
3.1.1 Sorghum grains shall be safe and suitable for human consumption.
3.1.2 Sorghum grains shall be free from abnormal flavours, odours, and living insects.
3.1.3 Sorghum grains shall be free from filth (impurities of animal origin, including dead insects) in amounts which
may represent a hazard to human health.
3.2 Quality factors – specific
3.2.1 **Moisture content** 14.5% m/m max Lower moisture limits should be required for certain destinations in relation to the climate, duration of transport and storage. Governments accepting the Standard are requested to indicate and justify the requirements in force in their country.
3.2.2 Definition of defects
The product shall have not more than 8.0% total defects including extraneous matter, inorganic extraneous matter, and filth as contained in the standards and blemished grains, diseased grains, broken kernels, and other grains as contained in the Annex.
3.2.2.1 **Extraneous matter** is all organic and inorganic material other than sorghum, broken kernels, other grains and filth. Extraneous matter includes loose sorghum seedcoats. Sorghum grains shall have not more than 2.0% extraneous matter of which not more than 0.5% shall be extraneous inorganic matter.
3.2.2.2 **Filth** is impurities of animal origin including dead insects (0.1% m/m max).
3.2.3 Toxic or noxious seeds
The products covered by the provisions of this standard shall be free from the following toxic or noxious seeds in amounts which may represent a hazard to human health.
– Crotolaria (Crotalaria spp.), Corn cockle (Agrostemma githago L.), Castor bean (Ricinus communis L.), Jimson weed (Datura spp.), and other seeds that are commonly recognized as harmful to health.
3.2.4 Tannin content
(a) For whole sorghum grains, the tannin content shall not exceed 0.5% on a dry matter basis.
(b) For decorticated sorghum grains, the tannin content shall not exceed 0.3% on a dry matter basis.

4. CONTAMINANTS

4.1 Heavy metals

Sorghum grains shall be free from heavy metals in amounts which may represent a hazard to human health.

4.2 Pesticide residues

Sorghum grains shall comply with those maximum residue limits established by the Codex Alimentarius Commission for this commodity.

4.3 Mycotoxins

Sorghum grains shall comply with those maximum mycotoxin limits established by the Codex Alimentarius Commission for this commodity.

5. HYGIENE

5.1 It is recommended that the product covered by the provisions of this standard be prepared and handled in accordance with the appropriate sections of the Recommended International Code of Practice – General
Principles of Food Hygiene (CAC/RCP 1-1969) and other Codes of Practice recommended by the Codex
Alimentarius Commission which are relevant to this product.

5.2 To the extent possible in good manufacturing practice, the product shall be free from objectionable matter.

5.3 When tested by appropriate methods of sampling and examination, the product:
– shall be free from micro-organisms in amounts which may represent a hazard to health;
– shall be free from parasites which may represent a hazard to health; and
– shall not contain any substance originating from micro-organisms in amounts which may represent a hazard to health.

6. PACKAGING

6.1 Sorghum grains shall be packaged in containers which will safeguard the hygienic, nutritional, technological, and organoleptic qualities of the product.

6.2 The containers, including packaging material, shall be made of substances which are safe and suitable for their intended use. They should not impart any toxic substance or undesirable odour or flavour to the product.

6.3 When the product is packaged in sacks, these must be clean, sturdy and strongly sewn or sealed.

7. LABELLING

In addition to the requirements of the Codex General Standard for the Labelling of Prepackaged Foods
(CODEX STAN 1-1985), the following specific provisions apply:

7.1 Name of the product

The name of the product to be shown on the label shall be “sorghum grains”.

7.2 Labelling of non-retail containers

Information for non-retail containers shall either be given on the container or in accompanying documents, except that the name of the product, lot identification and the name and address of the manufacturer or packer shall appear on the container. However, lot identification and the name and address of the manufacturer or packer may be replaced by an identification mark, provided that such a mark is clearly identifiable with the accompanying documents.

8. METHODS OF ANALYSIS AND SAMPLING

See relevant Codex texts on methods of analysis and sampling.

ANNEX

In those instances where more than one factor limit and/or method of analysis is given we strongly recommend that users specify the appropriate limit and method of analysis.

Factor/Description Limit Method of analysis
COLOUR Buyer Preference Visual Examination white, pink, red, brown, orange, yellow, or any mixture of these colours abnormal colour. Grains whole natural colour has been modified by bad weather conditions, contact with the ground, heat, and excessive respiration. These grains may be dull, shrivelled, swollen, puffed, or bloated in appearance

ASH
decorticated sorghum grains MAX: 1.5% on a dry matter basis AOAC 923.03 ICC No. 104/1 (1990) Method for the determination of ash in cereals and cereal products (Ashing at 900oC) (Type I method)
– or –
ISO 2171:1980 cereals, pulses and derived products
PROTEIN (N 6.25) MIN: 7.0% on a dry matter basis ICC 105/l (1986) Method for the Determination of Crude Protein in Cereals and Cereal Products for Food and for Feed using selenium copper catalyst (Type I method)
– or –
ISO 1871:1975 **FAT** MAX: 4.0% on a dry matter basis AOAC 945.38F; 920.39C
– or –
ISO 5986:1983 – animal feedingstuffs – Determination of Diethyl Ether Extract
CRUDE FIBRE Buyer Preference ICC 113
Determination of Crude Fibre Value (Type I)
– or –
ISO 6541 (1981) Agricultural food products determination of crude fibre content-modified Scharrer method
DEFECTS (Total)
Visual Examination blemished grains. Grains which are insect of vermin damaged, of abnormal colour, sprouted, diseased, or otherwise materially damaged
MAX: (Total) 8.0%1 diseased grains. Grains made unsafe for human consumption due to decay, moulding, or bacterial decomposition, or other causes that may be noticed without having to cut the grains open to examine them MAX: 3.0% of which diseased grains must not exceed 0.5% insect or vermin damaged grains. Kernels with obvious weevil-bored holes or which have evidence of boring or tunnelling, indicating the presence of insects, insect webbing or insect refuse, or degermed grains, chewed in one or more than one part of the kernel which exhibit evident traces of an attack by vermin grains having an abnormal colour. Grains whose natural colour has been modified by bad weather conditions, contact with the ground, heat, and excessive respiration. These grains may be dull, shrivelled, swollen, puffed, or bloated in appearance sprouted grains. Grains exhibiting obvious signs of sprouting MAX: 5.0% frost-damaged grains. Grains which are damaged by frost and may appear bleached or blistered and the seed coat may be peeling. Germs may appear dead or discoloured MAX: 1.0% broken kernels. Sorghum and pieces of sorghum which pass through a 1.8 mm round-hole sieve

Factor/Description Limit Method of analysis
other grains which are edible grains, whole or identifiable brokens, other than sorghum (i.e., legumes, pulses and other edible cereals)

12. CODEX STANDARD FOR EDIBLE CASSAVA FLOUR
CODEX STAN 176-1989

1. SCOPE

This standard applies to cassava flour intended for direct human consumption which is obtained from the processing of edible cassava (Manihot esculenta Crantz).

2. DESCRIPTION

2.1 Definition of the product

Edible cassava (Manihot esculenta Crantz) flour is the product prepared from dried cassava chips or paste by a pounding, grinding or milling process, followed by sifting to separate the fibre from the flour. In case of edible cassava flour prepared from bitter cassava (Manihot utilissima Pohl), detoxification is carried out by soaking the tubers in water for a few days, before they undergo drying in the form of whole, pounded tuber (paste) or in small pieces.

3. ESSENTIAL COMPOSITION AND QUALITY FACTORS

3.1 Quality factors – general

3.1.1 Edible cassava flour shall be safe and suitable for human consumption.
3.1.2 Edible cassava flour shall be free from abnormal flavours, odours, and living insects.
3.1.3 Edible cassava flour shall be free from filth (impurities of animal origin, including dead insects) in amounts
which may represent a hazard to human health.

3.2 Quality factors – specific

3.2.1 **Moisture content** 13% m/m max

Lower moisture limits should be required for certain destinations in relation to the climate, duration of transport and storage. Governments accepting the Standards are requested to indicate and justify the requirements in force in their country.

3.2.2 Hydrocyanic acid content

The total hydrocyanic acid content of edible cassava flour shall not exceed 10 mg/kg.

4. CONTAMINANTS

4.1 Heavy metals

Edible cassava flour shall be free from heavy metals in amounts which may represent a hazard to human health.

4.2 Pesticide residues

Edible cassava flour shall comply with those maximum residue limits established by the Codex Alimentarius
Commission for this commodity.

4.3 Mycotoxins

Edible cassava flour shall comply with those maximum mycotoxin limits established by the Codex Alimentarius Commission for this commodity.

5. HYGIENE

5.1 It is recommended that the product covered by the provisions of this standard be prepared and handled in accordance with the appropriate sections of the Recommended International Code of Practice – General
Principles of Food Hygiene (CAC/RCP 1-1969), and other Codes of Practice recommended by the Codex Alimentarius Commission which are relevant to this product.
5.2 To the extent possible in good manufacturing practice, the product shall be free from objectionable matter.
5.3 When tested by appropriate methods of sampling and examination, the product:
– shall be free from micro-organisms in amounts which may represent a hazard to health;
– shall be free from parasites which may represent a hazard to health; and
– shall not contain any substance originating from micro-organisms in amounts which may

represent a hazard to health.

6. PACKAGING

6.1 Cassava flour shall be packaged in containers which will safeguard the hygienic, nutritional, technological, and organoleptic qualities of the product.

6.2 The containers, including packaging material, shall be made of substances which are safe and suitable for their intended use. They should not impart any toxic substance or undesirable odour or flavour to the product.

6.3 When the product is packaged in sacks, these must be clean, sturdy and strongly sewn or sealed.

7. LABELLING

In addition to the requirements of the Codex General Standard for the Labelling of Prepackaged Foods
(CODEX STAN 1-1985), the following specific provisions apply:

7.1 Name of the product

The name of the product to be shown on the label shall be "edible cassava flour."

7.2 Labelling of non-retail containers

Information for non-retail containers shall either be given on the container or in accompanying documents, except that the name of the product, lot identification and the name and address of the manufacturer or packer shall appear on the container. However, lot identification and the name and address of the manufacturer or packer may be replaced by an identification mark, provided that such a mark is clearly identifiable with the accompanying documents.

8. METHODS OF SAMPLING

See relevant Codex texts on methods of analysis and sampling.

ANNEX

In those instances where more than one factor limit and/or method of analysis is given we strongly recommend that users specify the appropriate limit and method of analysis.

Factor/Description Limit Method of analysis

CRUDE FIBRE MAX: 2.0% ISO 5498 (1981) – Determination of Crude Fibre Content– B.S. Separation by filtration through filter paper – General Method

ASH MAX: 3.0% ISO 2171 (1980) – Cereals, Pulses and Derived Products – Pulses and Derived Products – Determination of Ash (Type I Method)

FOOD ADDITIVES Conform With Legislation of the Country in Which the Product is Sold None Defined

PARTICLE SIZE

None Defined fine flour MIN: 90% shall pass through a 0.60 mm sieve coarse flour MIN: 90% shall pass through a 1.20 mm sieve

13. CODEX STANDARD FOR RICE
CODEX STAN 198-1995
1. SCOPE
This standard applies to husked rice, milled rice, and parboiled rice, all for direct human consumption; i.e. ready for its intended use as human food, presented in packaged form or sold loose from the package directly to the consumer. It does not apply to other products derived from rice or to glutinous rice.
2. DESCRIPTION
2.1 Definitions
2.1.1 **Rice** is whole and broken kernels obtained from the species Oryza sativa L.
2.1.1.1 **Paddy rice** is rice which has retained its husk after threshing.
2.1.1.2 **Husked rice** (brown rice or cargo rice) is paddy rice from which the husk only has been removed. The process of husking and handling may result in some loss of bran.
2.1.1.3 **Milled rice** (white rice) is husked rice from which all or part of the bran and germ have been removed by milling.
2.1.1.4 **Parboiled rice** may be husked or milled rice processed from paddy or husked rice that has been soaked in water and subjected to a heat treatment so that the starch is fully gelatinized, followed by a drying process.
2.1.1.5 **Glutinous rice; waxy rice:** Kernels of special varieties of rice which have a white and opaque appearance. The starch of glutinous rice consists almost entirely of amylopectin. It has a tendency to stick together after cooking.
3. ESSENTIAL COMPOSITION AND QUALITY FACTORS
3.1 Quality factors – general
3.1.1 Rice shall be safe and suitable for human consumption.
3.1.2 Rice shall be free from abnormal flavours, odours, living insects and mites.
3.2 Quality factors – specific
3.2.1 **Moisture content** 15% m/m max
Lower moisture limits should be required for certain destinations in relation to the climate, duration of transport and storage. Governments accepting the Standard are requested to indicate and justify the requirements in force in their country.
3.2.2 **Extraneous matter**: is defined as organic and inorganic components other than kernels of rice.
3.2.2.1 **Filth**: impurities of animal origin (including dead insects) 0.1% m/m max
3.2.2.2 **Other organic extraneous matter** such as foreign seeds, husk, bran, fragments of straw, etc. shall not exceed the following limits:

Maximum level
Husked Rice 1.5% m/m
Milled Rice 0.5% m/m
Husked Parboiled Rice 1.5% m/m
Milled Parboiled Rice 0.5% m/m

3.2.2.3 **Inorganic extraneous matter** such as stones, sand, dust, etc. shall not exceed the following limits:

Maximum level
Husked Rice 0.1% m/m
Milled Rice 0.1% m/m
Husked Parboiled Rice 0.1% m/m
Milled Parboiled Rice 0.1% m/m

4. CONTAMINANTS

4.1 Heavy metals

The products covered by the provisions of this standard shall be free from heavy metals in amounts which may represent a hazard to human health.

4.2 Pesticide residues

Rice shall comply with those maximum residue limits established by the Codex Alimentarius Commission for this commodity.

5. HYGIENE

5.1 It is recommended that the product covered by the provisions of this standard be prepared and handled in accordance with the appropriate sections of the Recommended International Code of Practice – General
Principles of Food Hygiene (CAC/RCP 1-1969), and other Codes of Practice recommended by the Codex Alimentarius Commission which are relevant to this product.

5.2 To the extent possible in good manufacturing practice, the product shall be free from objectionable matter.

5.3 When tested by appropriate methods of sampling and examination, the product:
– shall be free from micro-organisms in amounts which may represent a hazard to health;
– shall be free from parasites which may represent a hazard to health; and
– shall not contain any substance originating from micro-organisms, including fungi, in amounts which may represent a hazard to health.

6. PACKAGING

6.1 Rice shall be packaged in containers which will safeguard the hygienic, nutritional, technological, and organoleptic qualities of the food.

6.2 The containers, including packaging material, shall be made of substances which are safe and suitable for their intended use. They should not impart any toxic substance or undesirable odour or flavour to the product.

6.3 When the product is packaged in sacks, these must be clean, sturdy, and strongly sewn or sealed.

7. LABELLING

In addition to requirements of the Codex General Standard for the Labelling of Prepackaged Foods (CODEX
STAN 1-1985), the following specific provisions apply:

7.1 Name of the product

The name of the product to be shown on the label shall be in accordance with the definitions given in Section
2.1. The alternative names given in parenthesis shall be used in accordance with local practice.

7.2 Labelling of non-retail containers

Information on non-retail containers shall be given either on the container or in accompanying documents, except that the name of the product, lot identification and the name and address of the manufacturer or packer shall appear on the container. However, lot identification and the name and address of the manufacturer or packer may be replaced by an identification mark, provided that such a mark is clearly identifiable with the accompanying documents.

8. METHODS OF ANALYSIS AND SAMPLING

See relevant Codex texts on methods of analysis and sampling.

ANNEX

1. CLASSIFICATION

If rice is classified as long grain, medium grain or short grain, the classification should be in accordance with one of the following specifications. Traders should indicate which classification option is chosen.

OPTION 1: kernel length/width ratio

1.1 Long grain rice

1.1.1 Husked rice or parboiled husked rice with a length/width ratio of 3.1 or more.

1.1.2 Milled rice or parboiled milled rice with a length/width ratio of 3.0 or more.

1.2 Medium grain rice

1.2.1 Husked rice or parboiled husked rice with a length/width ratio of 2.1–3.0.

1.2.2 Milled rice or parboiled milled rice with a length/width ratio of 2.0–2.9.

1.3 Short grain rice

1.3.1 Husked rice or parboiled rice with a length/width ratio of 2.0 or less.

1.3.2 Milled rice or parboiled milled rice with a length/width ratio of 1.9 or less.

OPTION 2: the kernel length

1.1 **Long grain rice** has a kernel length of 6.6 mm or more.

1.2 **Medium grain rice** has a kernel length of 6.2 mm or more but less than 6.6 mm.

1.3 **Short grain rice** has a kernel length of less than 6.2 mm.

OPTION 3: a combination of the kernel length and the length/width ratio

1.1 **Long grain rice** has either:

1.1.1 a kernel length of more than 6.0 mm and with a length/width ratio of more than 2 but less than 3, or;

1.1.2 a kernel length of more than 6.0 mm and with a length/width ratio of 3 or more.

1.2 **Medium grain rice** has a kernel length of more than 5.2 mm but not more than 6.0 mm and a length/width ratio of less than 3.

1.3 **Short grain rice** has a kernel length of 5.2 mm or less and a length/width ratio of less than 2.

2. MILLING DEGREE

2.1 **Milled rice** (white rice) may be further classified into the following degrees of milling:

2.2 **Undermilled rice** is obtained by milling husked rice but not to the degree necessary to meet the requirements of well-milled rice.

2.3 **Well-milled rice** is obtained by milling husked rice in such a way that some of the germ and all the external layers and most of the internal layers of the bran have been removed.

2.4 **Extra-well-milled rice** is obtained by milling husked rice in such a way that almost all of the germ, all of the external layers and the largest part of the internal layers of the bran, and some of the endosperm, have been removed.

3. OPTIONAL INGREDIENTS

Nutrients

Vitamins, minerals and specific amino acids may be added in conformity with the legislation of the country in which the product is sold. (Governments accepting the Standard are requested to indicate the requirements in force in their country.)

Factor/Description Limit Method of analysis

4. OTHER QUALITY FACTORS

In those instances where more than one factor limit and/or method of analysis is given it is strongly recommended that users specify the appropriate limit and method of analysis.

4.1 Whole Kernel is a kernel without any broken part.

4.1.1 **Head Rice** is a kernel, the length of which is equal to or greater than three quarters of the average length of the corresponding whole kernel. buyer preference ISO 7301 (Annex A)
4.1.2 **Large Broken Kernel** are fragments of kernel, the length of which is less than three-quarters but greater than one-half of the average length of a corresponding whole kernel. buyer preference ISO 7301 (Annex A)
4.1.3 **Medium Broken Kernel** are fragments of kernel, the length of which is equal to or less than one-half but greater than one-quarter of the average length of a corresponding whole kernel. buyer preference ISO 7301 (Annex A)
4.1.4 **Small Broken Kernel** are fragments of kernel, the length of which is equal to or less than one- quarter of the average length of a corresponding whole kernel but which does not pass through a metal sieve with round perforation 1.4 mm in diameter. buyer preference ISO 7301 (Annex A)
4.1.5 **Chips** are fragments of kernel which pass through a metal sieve with round perforations 1.4 mm in diameter. 0.1% m/m ISO 7301 (Annex A)
4.2 Defective Kernels Husked Rice Milled Rice Husked Parboiled Rice Milled Parboiled Rice

4.2.1 **Heat-Damaged Kernels** are kernels, whole or broken, that have changed their normal colour as a result of heating. This category includes whole or broken kernels that are yellow due to alteration. Parboiled rice in a batch of non-parboiled rice is also included in this category. 4.0% m/m* 3.0% m/m 8.0% m/m* 6.0% m/m ISO 7301 (Annex A)
4.2.2 **Damaged Kernels** are kernels, whole or broken, showing obvious deterioration due to moisture, pests, diseases, or other causes, but excluding heat-damaged kernels. 4.0% m/m 3.0% m/m 4.0% m/m 3.0% m/m ISO 7301 (Annex A)
4.2.3 **Immature Kernels** are unripe and/or undeveloped whole or broken kernels. 12.0% m/m 2.0% m/m 12.0% m/m 2.0% m/m ISO 7301 (Annex A)
4.2.4 **Chalky Kernels** are whole or broken kernels except for glutinous rice, of which at least three- quarters of the surface has an opaque and floury appearance.
11.0% m/m* 11.0% m/m N/A N/A ISO 7301 (Annex A)
4.2.5 **Red Kernels** are whole or broken kernels with a red-coloured pericarp covering more than one- quarter of their surface.
12.0% m/m 4.0% m/m 12.0% m/m 4.0% m/m ISO 7301 (Annex A)
4.2.6 **Red-Streaked Kernels** are kernels, whole or broken, with red streaks, the lengths of which may be equal to or greater than one-half of that of the whole kernel, but the surface area covered by these red streaks shall be less than one-quarter of the total surface.
N/A 8.0% m/m N/A 8.0% m/m ISO 7301 (Annex A)

Factor/Description Limit Method of analysis
4.2.7 **Pecks** are whole or broken kernels of parboiled rice of which more than one-quarter of the surface is dark brown or black in colour.
N/A N/A 4.0% m/m* 2.0% m/m ISO 7301 (Annex A)
4.3 Maximum Recommended Levels of Other Types of Rice ISO 7301 (Annex A)
Paddy Rice
Husked Rice
Milled Rice
Glutinous Rice
2.5% m/m
N/A
N/A

1.0% m/m
0.3% m/m
1.0% m/m
N/A
1.0% m/m
2.5% m/m
N/A
2.0% m/m
1.0% m/m
0.3% m/m
1.0% m/m%
2.0% m/m%
1.0% m/m

14. CODEX STANDARD FOR PEANUTS
CODEX STAN 200-1995
1. SCOPE
This standard applies to peanuts as defined in Section 2 intended for processing for direct human consumption.
2. DESCRIPTION
2.1 Definition of the product
Peanuts, either in the pod or in the form of kernels, are obtained from varieties of the species Arachis hypogaea L.
3. ESSENTIAL COMPOSITION AND QUALITY FACTORS
3.1 Quality factors – general
3.1.1 Peanuts shall be safe and suitable for processing for human consumption.
3.1.2 Peanuts shall be free from abnormal flavours, odours, living insects and mites.
3.2 Quality factors – specific
3.2.1 Moisture content
Maximum level
Peanuts in-pod 10%
Peanut kernels 9.0%
Lower moisture limits should be required for certain destinations in relation to the climate, duration of transport and storage. Governments accepting the Standard are requested to indicate and justify the requirements in force in their country.

3.2.2 **Mouldy, rancid or decayed kernels** 0.2% m/m max
– **Mouldy kernels** are defined as kernels with mould filaments visible to the naked eye.
– **Decayed kernels** are defined as those showing visibly significant decomposition.
– **Rancid kernels** are defined as those which have undergone oxidation of lipids (should not exceed 5 meq active oxygen/kg) or the production of free fatty acids (should not exceed 1.0%) resulting in the production of disagreeable flavours.

3.2.3 Organic and inorganic extraneous matter: is defined as organic or inorganic components other than peanuts and includes stones, dust, seeds, stems, etc.

3.2.3.1 Filth
Impurities of animal origin (including dead insects) 0.1% m/m max
3.2.3.2 Other organic and inorganic extraneous matter
Peanuts in-pod 0.5% m/m max
Peanut kernels 0.5% m/m max
4. CONTAMINANTS1
4.1 Heavy metals
The products covered by the provisions of this standard shall be free from heavy metals in amounts which may represent a hazard to human health.

A Proposed Draft Guideline Level for Total Aflatoxin in Peanuts intended for further processing is under elaboration.

4.2 Pesticide residues
Peanuts shall comply with those maximum residue limits established by the Codex Alimentarius Commission

for this commodity.

5. HYGIENE

5.1 It is recommended that the product covered by the provisions of this standard should be prepared in accordance with the appropriate sections of the Recommended International Code of Practice – General Principles of Food Hygiene (CAC/RCP 1-1969), and other Codes of Practice recommended by the Codex Alimentarius Commission which are relevant to this product.

5.2 To the extent possible in good manufacturing practice, the product shall be free from objectionable matter.

5.3 When tested by appropriate methods of sampling and examination, the product:

– shall be free from micro-organisms in amounts which may represent a hazard to health.

– shall be free from parasites which may represent a hazard to health; and

– shall not contain any substance originating from micro-organisms, including fungi, in amounts which may represent a hazard to health.

6. PACKAGING

6.1 Peanuts shall be packaged in such manner which will safeguard the hygienic, nutritional, technological, and organoleptic qualities of the product. Packaging will be sound, clean, dry, and free from insect infestation or fungal contamination.

6.2 Packing material shall be made of substances which are safe and suitable for their intended use, including new clean jute bags, tinplate containers, plastic or paper boxes or bags. They should not impart any toxic substance or undesirable odour or flavour to the product.

6.3 When the product is packaged in sacks, these must be clean, sturdy, and strongly sewn or sealed.

7. LABELLING

In addition to the requirements of the Codex General Standard for the Labelling of Prepackaged Foods (CODEX STAN 1-1985), the following specific provisions apply:

7.1 The name of the product

The name of the product to be shown on the label shall be “peanuts” or “peanuts in-pod” and type of peanuts.

7.2 Labelling of non-retail containers

Information for non-retail containers shall either be given either on the container or in accompanying documents, except that the name of the product, lot identification and the name and address of the manufacturer or packer shall appear on the container. However, lot identification and the name and address of the manufacturer or packer may be replaced by an identification mark, provided that such a mark is clearly identifiable with the accompanying documents.

8. METHODS OF ANALYSIS AND SAMPLING

See relevant Codex texts on methods of analysis and sampling.

ANNEX

In those instances where more than one factor limit and/or method of analysis is given it is strongly recommended that users specify the appropriate limit and method of analysis.

Factor/Description Limit Method of analysis

1. **In-Pod Defects**

1.1 **Empty Pods:** pods containing no kernels. 3% m/m To be determined

1.2 **Damaged Pods:** include:a) shrivelled pods (pods which are imperfectly developed and shrunken); or 10% m/m To be determined

b) pods having cracks or broken areas which cause conspicuous openings or which seriously weaken a large portion of the pod, especially if the kernel inside the pod is easily visible without any pressure forced upon the edges of the crack.
1.3 **Discoloured Pods:** pods having dark discolouration caused by mildew, staining, or other means affecting 50% or more of the pod surface. 2% m/m To be determined
2. **Kernel Defects**
Damaged Kernels include:a) those affected by freezing injury causing hard, translucent or discoloured flesh; 1% m/m To be determined
2.1
b) shrivelled kernels which are imperfectly developed and shrunken; and/or 5% m/m
c) those damaged by insects, worm cuts; 2% m/m
d) mechanical damage; 2%m/m
e) germinated kernels. 2% m/m

2.2 **Discoloured Kernels**: kernels are not damaged but are affected by one or more of the following:a) flesh (cotyledon) discolouration which is darker than a light yellow colour or consists of more than a slight yellow pitting of the flesh; and/or 3% m/m To be determined
b) skin discolouration which is dark brown, dark grey, dark blue, or black, and covers more than 25% of the kernel.
2.3 **Broken and Split Kernels:** broken kernels are those from which more than a quarter has been broken off. Split kernels have been split into halves. 3% m/m To be determined
3. Peanuts other than the designated type. 5% m/m To be determined

15. CODEX STANDARD FOR SWEET CASSAVA1
(CODEX STAN 238-2003)

1. **DEFINITION OF PRODUCE**

This Standard applies to commercial sweet2 varieties of cassava roots grown from Manihot esculenta Crantz, of the Euphorbiaceae family, to be supplied fresh to the consumer, after preparation and packaging.

Cassava for industrial processing is excluded.

2. **PROVISIONS CONCERNING QUALITY**

2.1 **MINIMUM REQUIREMENTS**

In all classes, subject to the special provisions for each class and the tolerances allowed, the cassava must be:

- whole;
- sound, produce affected by rotting, mould or deterioration such as to make it unfit for consumption is excluded;
- clean, practically free of any visible foreign matter, except permitted substances used to prolong its shelf life;
- practically free of pests affecting the general appearance of the produce;
- practically free of damage caused by pests;
- free of abnormal external moisture, excluding condensation following removal from cold storage;
- free of any foreign smell and/or taste3;
- firm;
- practically free of mechanical damage and bruising;
- free of loss of colour in the flesh.

The cut at the distal (narrow) end of the cassava should not exceed 2 cm in diameter.

The stalk end of the root should have a clean cut between 1 cm and 2.5 cm in length.

2.1.1 The cassava must have been carefully harvested and have reached an appropriate degree of physiological development account being taken of the characteristics of the variety and the area in which they are grown.

The development and condition of the cassava must be such as to enable it:

- to withstand transport and handling; and
- to arrive in satisfactory condition at the place of destination.

2.2 **CLASSIFICATION**

Cassava is classified in three classes defined below:

1 Commonly known in certain regions by: manioc, mandioca, tapioca, aipim, yucca, etc.

2 Sweet varieties of cassava are those that contain less than 50 mg/kg hydrogen cyanide (fresh weight basis). In any case, cassava must be peeled and fully cooked before being consumed.

3 This provision allows for smell caused by conservation agents used in compliance with corresponding regulations.

2.2.1 **"Extra" Class**

Cassava in this class must be of superior quality. It must be characteristic of the variety and/or commercial type. It must be free of defects, with the exception of very slight superficial defects, provided these do not affect the general appearance of the produce, the quality, the keeping quality and presentation in the package.

2.2.2 **Class I**

Cassava in this class must be of good quality. It must be characteristic of the variety

and/or commercial type. The following slight defects, however, may be allowed, provided these do not affect the general appearance of the produce, the quality, the keeping quality and presentation in the package:
- slight defects in shape;
- scarring or healed damage, not exceeding 5% of the surface area;
- scraped areas, not exceeding 10% of the surface area.

The defects must not, in any case, affect the pulp of the produce.

2.2.3 **Class II**

This class includes cassava which does not qualify for inclusion in the higher classes, but satisfy the minimum requirements specified in Section 2.1 above. The following defects, however, may be allowed, provided the cassava retains its essential characteristics as regards the quality, the keeping quality and presentation:
- defects in shape;
- scarring or healed damage, not exceeding 10% of the surface area;
- scraped areas, not exceeding 20% of the surface area.

The defects must not, in any case, affect the pulp of the produce.

3. **PROVISIONS CONCERNING SIZING**

Size is determined by the diameter at thickest cross-section of the produce, in accordance with the following table:

Size Code	**Diameter** (in centimetres)
A	3.5 – 6.0
B	6.1 – 8.0
C	> 8.0

In all cases, cassava must not be less than 300 g in weight nor less than 20 cm in length.

4. **PROVISIONS CONCERNING TOLERANCES**

Tolerances in respect of quality and size shall be allowed in each package for produce not satisfying the requirements of the class indicated.

4.1 **QUALITY TOLERANCES**

4.1.1 **"Extra" Class**

Five percent by number or weight of cassava not satisfying the requirements of the class, but meeting those of Class I or, exceptionally, coming within the tolerances of that class.

4.1.2 **Class I**

Ten percent by number or weight of cassava not satisfying the requirements of the class, but meeting those of Class II or, exceptionally, coming within the tolerances of that class.

4.1.3 **Class II**

Ten percent by number or weight of cassava satisfying neither the requirements of the class nor the minimum requirements, with the exception of produce affected by rotting or any other deterioration rendering it unfit for consumption.

4.2 **SIZE TOLERANCES**

For all classes, 10% by number or weight of cassava corresponding to the size immediately above and/or below that indicated on the package.

5. **PROVISIONS CONCERNING PRESENTATION**

5.1 **UNIFORMITY**

The contents of each package must be uniform in shape and contain only cassava of

the same origin, variety and/or commercial type, quality and size. The visible part of the contents of the package must be representative of the entire contents.

5.2 **PACKAGING**

Cassava must be packed in such a way as to protect the produce properly. The materials used inside the package must be new4, clean, and of a quality such as to avoid causing any external or internal damage to the produce. The use of materials, particularly of paper or stamps bearing trade specifications is allowed, provided the printing or labelling has been done with non-toxic ink or glue. Cassava shall be packed in each container in compliance with the Recommended International Code of Practice for Packaging and Transport of Fresh Fruits and Vegetables (CAC/RCP 44-1995).

5.2.1 **Description of Containers**

The containers shall meet the quality, hygiene, ventilation and resistance characteristics to ensure suitable handling, shipping and preserving of the cassava. Packages must be free of all foreign matter and smell.

6. **MARKING OR LABELLING**

6.1 **CONSUMER PACKAGES**

In addition to the requirements of the Codex General Standard for the Labelling of Prepackaged Foods (CODEX STAN 1-1985), the following specific provisions apply:

6.1.1 **Nature of Produce**

Each package shall be labelled as to the name of the produce and type (sweet) and may be labelled as to the name of the variety.

6.1.2 **Preparation Instructions**

A statement indicating that cassava should be peeled and fully cooked before being consumed is required.

6.2 **NON-RETAIL CONTAINERS**

Each package must bear the following particulars, in letters grouped on the same side, legibly and indelibly marked, and visible from the outside, or in the documents accompanying the shipment.

4 For the purposes of this Standard, this includes recycled material of food-grade quality.

6.2.1 **Identification**

Name and address of exporter, packer and/or dispatcher. Identification code (optional)5.

6.2.2 **Nature of Produce**

Name of the produce and type (sweet) if the contents are not visible from the outside. Name of the variety (optional).

6.2.3 **Origin of Produce**

Country of origin and, optionally, district where grown or national, regional or local place name.

6.2.4 **Commercial Identification**

- Class;
- Size (size code or minimum and maximum diameter in centimetres);
- Net weight;
- Preparation instructions (see Section 6.1.2).

6.2.5 **Official Inspection Mark (optional)**

7. **CONTAMINANTS**

7.1 The produce covered by this Standard shall comply with the maximum levels of

the Codex General Standard for Contaminants and Toxins in Food and Feed (CODEX STAN 193-1995).
7.2 The produce covered by this Standard shall comply with the maximum residue limits for pesticides established by the Codex Alimentarius Commission.
8. **HYGIENE**
8.1 It is recommended that the produce covered by the provisions of this Standard be prepared and handled in accordance with the appropriate sections of the Recommended International Code of Practice – General Principles of Food Hygiene (CAC/RCP 1-1969), Code of Hygienic Practice for Fresh Fruits and Vegetables (CAC/RCP 53-2003), and other relevant Codex texts such as Codes of Hygienic Practice and Codes of Practice.
8.2 The produce should comply with any microbiological criteria established in accordance with the Principles for the Establishment and Application of Microbiological Criteria for Foods (CAC/GL 21-1997).
5 The national legislation of a number of countries requires the explicit declaration of the name and address. However, in the case where a code mark is used, the reference "packer and/or dispatcher (or equivalent abbreviations)" has to be indicated in close connection with the code mark.

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