Input Cost Monitor: The Story of Maize and Wheat – An Update

November 2010

FOREWORD

Since 2002, when exchange rate depreciation resulted in rising prices for most agricultural commodities and inputs, as well as retail food prices, there has been increasing interest in the behaviour of agricultural prices. This, for example, led to the establishment of a Food Price Monitoring Initiative by the National Agricultural Marketing Council (NAMC), and the publication of quarterly reports on changes in food prices. It was also realized, however, that it was important to monitor and disseminate information on changes in agricultural input costs. In August 2006, a workshop was convened with stakeholders in the agricultural sector, at which it emerged that input cost monitoring would be a welcome addition to ongoing research on changes in agricultural-related prices. At this workshop, the NAMC was mandated to coordinate input cost monitoring on behalf of the agricultural industry. The NAMC has since taken up this activity in collaboration with various branches of the agricultural industry. Input cost monitoring, together with food price monitoring, now forms part of two of the NAMC's key research themes, namely, **agro-food chain analysis** and **market information systems**.

Through monitoring input costs, the NAMC aims to be able to publish information on trends in farm input costs on a regular basis. This report provides broad trends in input costs for grains, more specifically in the maize and wheat industries (note that the trends of most input cost items are also applicable to other grains).

In this report, the following issues are reported: (i) broad trends in input cost movements for the grain industry; (ii), the contribution of different variable input costs to the total variable input cost of maize and wheat; and (iii) trends in individual input cost items.

A comparison of price indices (price movements of outputs and inputs) of maize and wheat

Figure 1 shows trends for different input and output price indices from 1990 to 2009. It is noticeable that the producer price indices for maize (PPI-Maize), wheat (PPI-Wheat), all field crops (PPI-Field crops) and all agricultural products (PPI-Total) have shown much more variability than the all farming requisites index (FRPI-Total) since 2001. Such variability brings about uncertainty and risk, which affects farmers' decisions to plant and invest, and, hence, it also affects supply. The PPI-Maize and PPI-Wheat increased by 255.3% and 121.6%, respectively, from 1990 to 2009, whilst the PPI-Field crops and PPI-Total increased by 315.7% and 355.6%, respectively.

During the same period, the FRPI-Total increased by 457.9%.

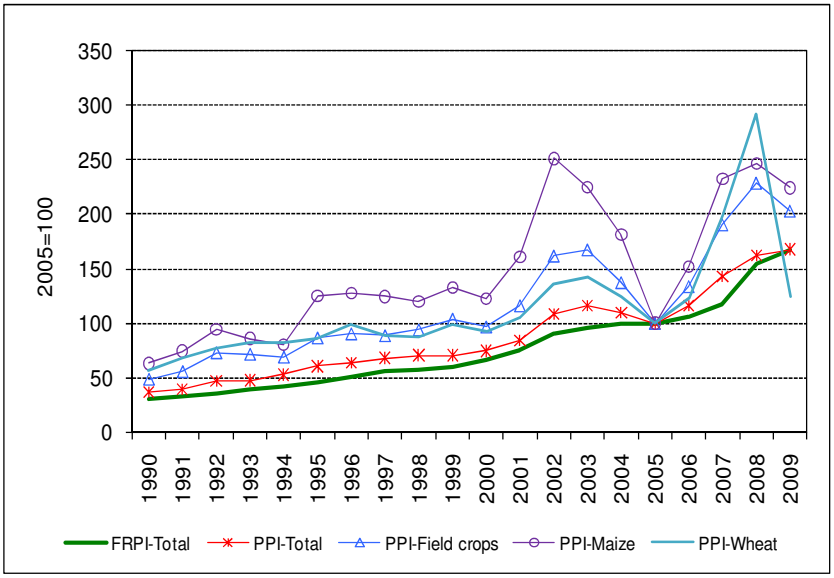

Figure 1: Comparison of various price indices, 1990 to 2009[1]
Source: DAFF, 2010

It is noteworthy that most of the inputs included in the FRPI-Total increased substantially in late 2007 and early 2008. This is highlighted later in the report.

Figure 2 shows trends in the PPI-Maize, PPI-Wheat and selected intermediate inputs between 1990 and 2009 (note that intermediate inputs are part of the overall FRPI-Total). The intermediate inputs included are fertilizer, fuel, animal health and crop protection, maintenance, repairs and farm feed.

[1] See Appendix A for definitions of different price indices.

All of the indices show an increasing trend over the depicted period. During 2008, most of the prices depicted reached levels never seen before, except for maize, which almost reached the same level achieved during 2002.

During 2009, record harvests in mostly developing countries, weaker demand for food as a result of the global economic slowdown, a weaker US Dollar and lower fuel prices have caused prices to decrease for most of the agricultural commodities. Fertilizer stock levels improved, the demand for fertilizer decreased and the crude oil price also decreased significantly, leading to a reduction in the fertilizer prices.

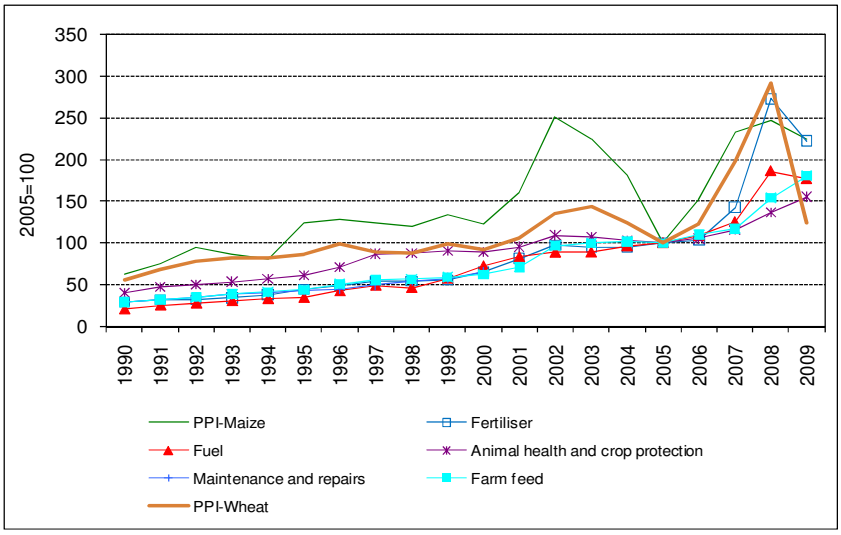

Figure 2: Trends in the PPI-Maize and PPI-Wheat versus selected intermediate inputs

Source: DAFF, 2010

Contribution of different variable input cost items to the total variable input cost of maize

The main focus of this section is on the variable costs to produce maize[2] and, specifically, to express different variable input cost items as a percentage of the total variable input costs (see Appendix B for the different input cost components included in a typical input cost budget for maize). Due to the many different input cost items included, their relative contribution to the total variable cost and the format in which this information is generally available, it was necessary to aggregate certain variable inputs into an "All other" category (see Appendix C for existing "Other cost" and "All other" cost items).

Figure 3 shows the average percentage contribution of selected variable input costs to the total variable input cost in the maize production regions mentioned in footnote 3. For the period under consideration, fertilizer and lime contributed more than 26% to the total variable input cost (between 22% and 33%).

Maintenance and repairs contributed almost 12% and showed a declining trend in terms of its relative contribution to the total variable input cost. The seed cost showed an increase in its relative contribution to the total variable input cost, while the cost for herbicides remained more or less 6% of the total variable input cost. Fuel and labour contributed, on average, 22% to the total variable input cost.

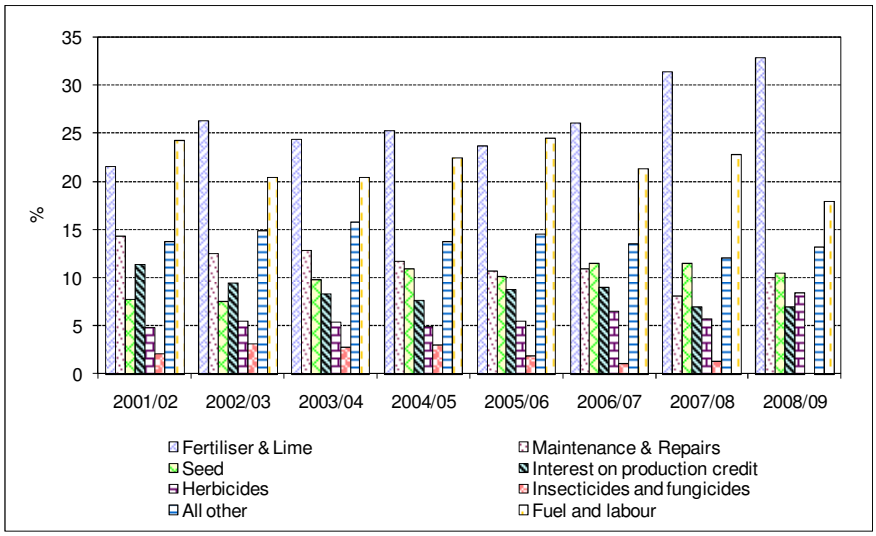

Figure 3: Average percentage contribution of individual variable cost items to the total variable input cost[3]

Source: Grain SA, 2010 and own calculations

Note that the insecticides and fungicides were included with herbicides for 2008/09.

[2] For maize, the variable input cost information was available for six summer production areas. These are the North West Province, North-Western and Eastern Free State, Northern KwaZulu-Natal, and Middelburg and Ermelo in Mpumalanga.

[3] From 2003/04 for six areas; in 2002/03 for five areas; in 2001/02 for four areas; and in 1999/00 for three areas.
The information for 2009/10 was not available during the preparation of this report.

Comparing the variable input cost items per production region for the 2008/09 production season, producers in the Middelburg (Mpumalanga) region have the largest expenditure on fertilizers, i.e. fertilizers contributed 35.5% to the total variable input cost, followed by that of the North-Western Free State (see Figure 4). In the North West region, expenditure on fertilizers was the lowest, contributing 29.3% to the total variable input cost. In Ermelo (Mpumalanga), the seed cost, as a percentage of the total variable input cost, was the highest, while it was lowest in the Eastern Free State. The maintenance and repair cost, as a percentage of the total variable input cost, was highest in the Ermelo (Mpumalanga) and the Eastern Free State regions, while it had almost the same contribution to the total variable input cost in the other production areas.

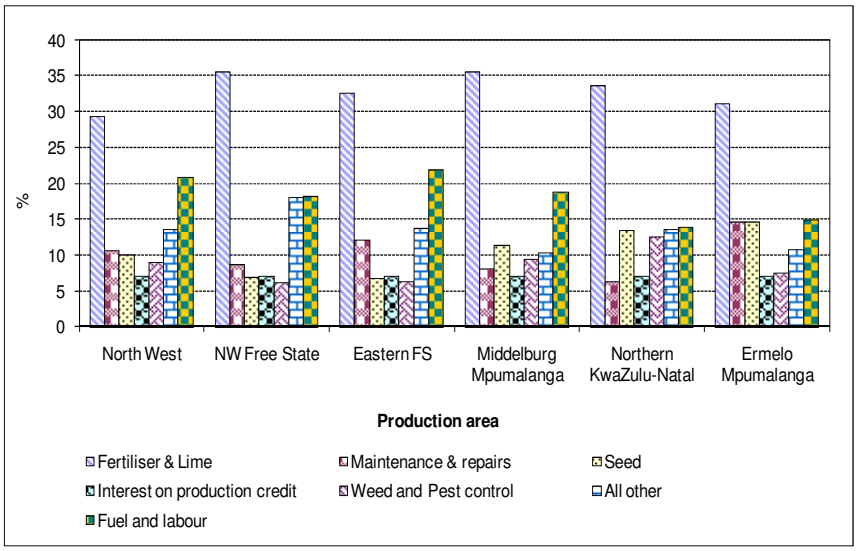

Figure 4: Comparison of the contribution of different variable input cost items to the total variable input cost in different maize production regions (2008/09)

Source: Grain SA, 2010 and own calculations

Contribution of different variable input cost items to the total variable input cost of wheat[4]

Figure 5a, 5b, 5c and 5d show the average percentage contribution of selected variable input costs to the total variable input cost in each of the following wheat production regions, respectively: the Southern Cape, Swartland (the western part of the Western Cape), the Western Free State and the Eastern Free State.

For the period under consideration, fertilizer and lime contributed between 22% and 32% to the total variable input cost. Repairs and parts contributed between 13% and 14% to the total variable input cost. The seed cost contributed about 9 % to the total variable input cost, while the cost for herbicides was between 5% and 6% of the total variable input cost. Fuel contributed between 13% and 15% and labour between 7% and 8% to the total variable input cost.

From Figure 5a, it is evident that fertilizer and lime contributed most to the total variable input cost, with 35.1% during 2008/09 in the Southern Cape production region. The contribution of pest control to the total variable input cost increased the most from 2001/02 to 2008/09, by 200.9%, followed by the cost of weed control, which increased 194.7%.

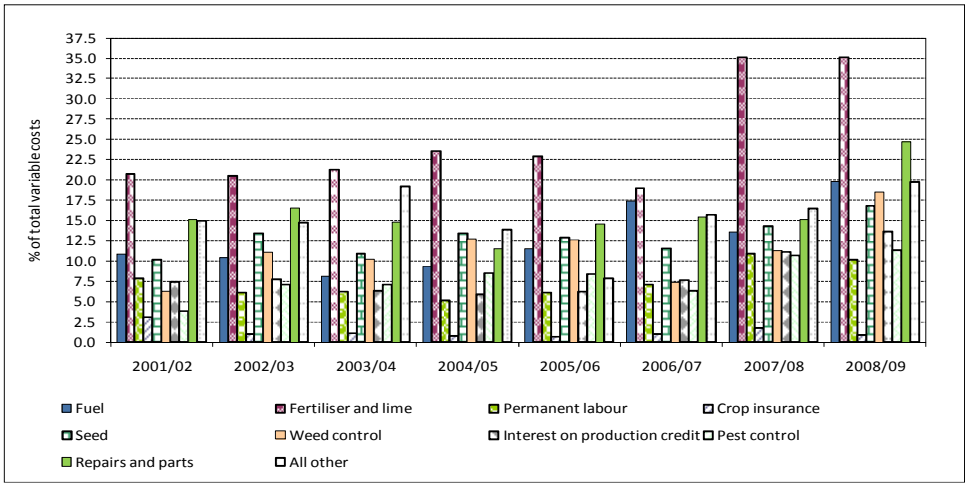

Figure 5a: Percentage contribution of individual variable cost items to the total variable input cost (Southern Cape)

Source: Grain SA, 2010 and own calculations

[4] The methodology for wheat is the same as for maize, please refer to Appendix B.2 and C for detail on the budgets.

Figure 5b shows the contribution of individual variable input cost items to the total variable input cost in the Swartland production area. The cost of fertilizer and lime contributed the most to the total variable cost during the depicted period and varied between 25.9% in 2001/02 and 29.8% during 2008/09. The contribution of the insecticides and fungicides cost to the total variable cost increased by 131.1% from 2001/02 to 2008/09.

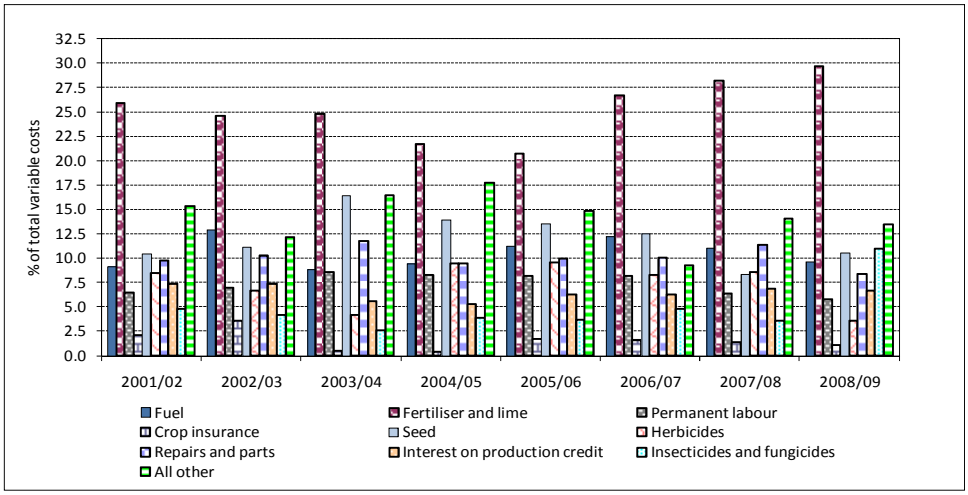

Figure 5b: Percentage contribution of individual variable cost items to the total variable input cost (Swartland)

Source: Grain SA, 2010 and own calculations

Figure 5c shows the contribution of individual variable input cost items to the total variable input cost in the Western Free State production region. The cost of fertilizer and lime contributed the most to the total variable input cost during the depicted period and varied between 21.6% in 2001/02 and 33.9 % during 2008/09. The contribution of the fuel cost to the total variable cost decreased from 18.3% to 14.1%. The relative contribution of permanent labour changed from 10% to 5% over the depicted period.

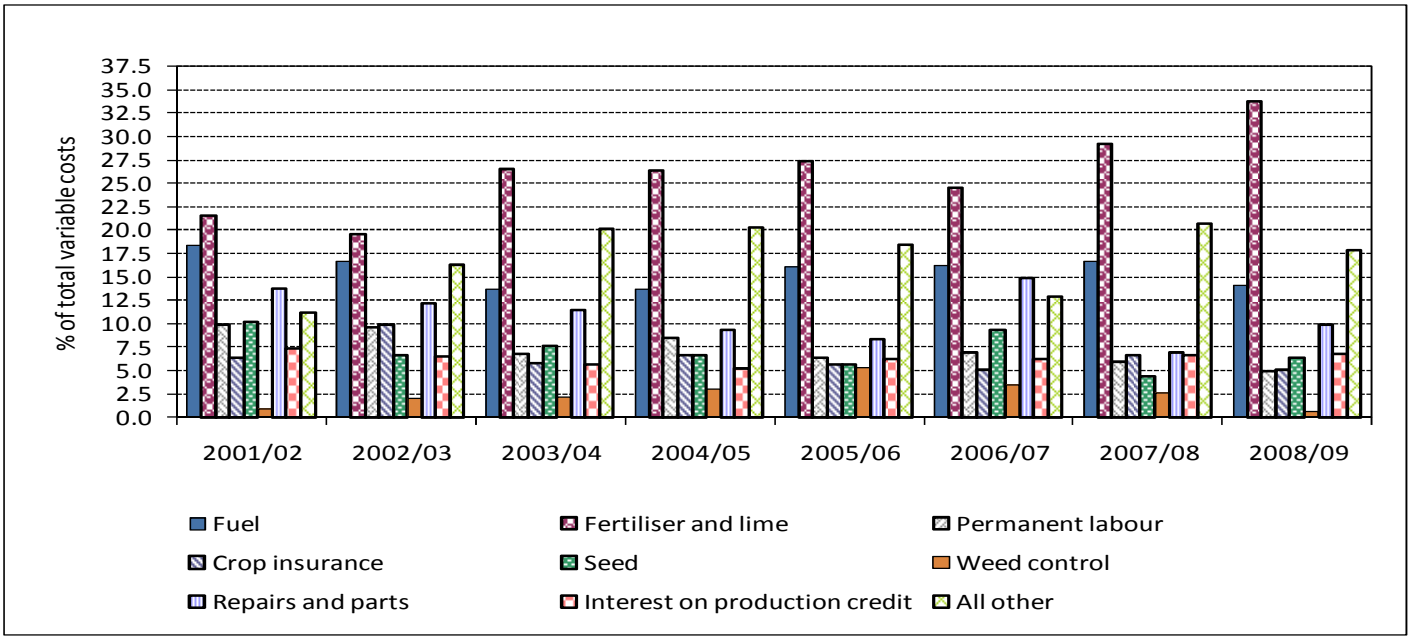

Figure 5c: Percentage contribution of individual variable cost items to the total variable input cost (Western Free State)

Source: Grain SA, 2010 and own calculations

Figure 5d shows the contribution of individual variable input cost items to the total variable input cost in the Eastern Free State production area. Fertilizer and lime contributed the most to the total variable input cost with 30.3% during 2008/09; this is 62.4% higher than the 18.7% achieved in 2001/02.

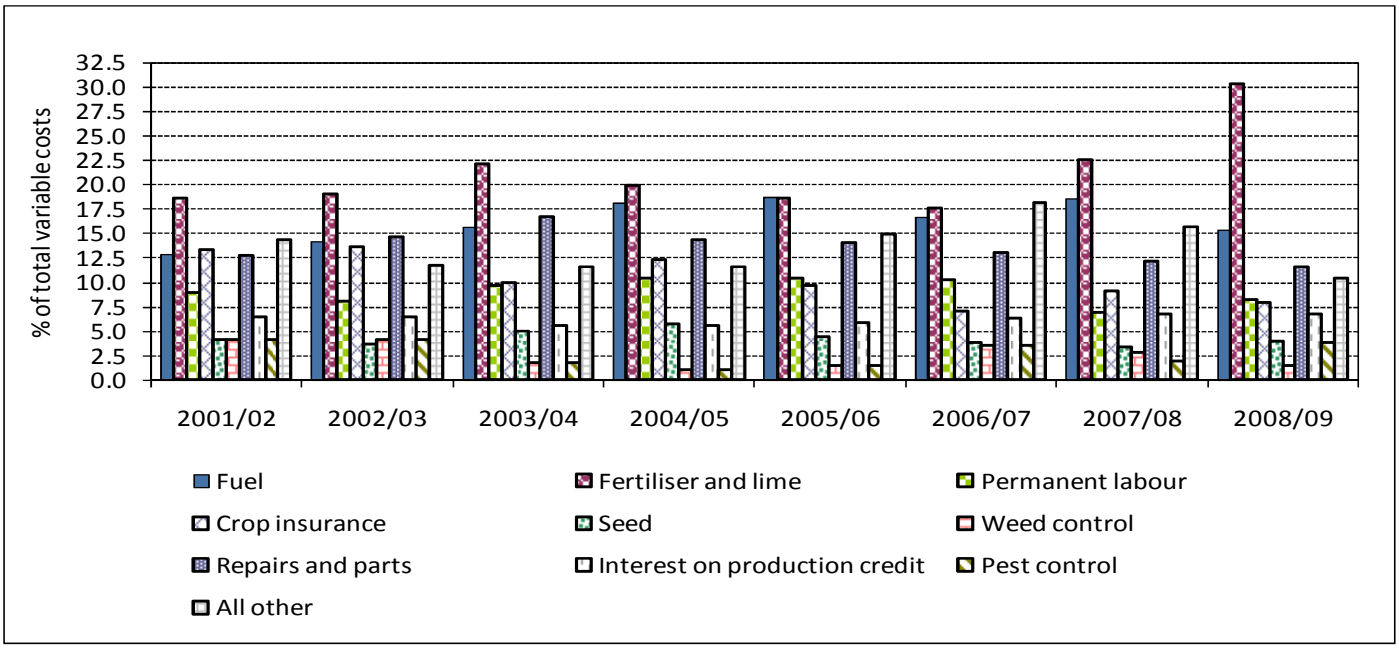

Figure 5d: Percentage contribution of individual variable cost items to the total variable input cost (Eastern Free State)

Source: Grain SA, 2010 and own calculations

To compare the previous (2008/09), current (2009/10) and forthcoming (2010/11) seasons, the most important variable input cost items of three wheat production regions are compared. The available data is for the Swartland, Western Free State and Eastern Free State production regions. Input costs for fertilizer and lime, fuel, weed control and repairs and parts were compared.

Comparing the fertilizer cost per production region for the 2009/10 and 2010/11 seasons with that of the 2008/09 production season, it emerged that fertilizer and lime makes the largest contribution to the total variable cost in the Swartland region, as can be seen in Figure 6a.

In the Swartland region, the contribution of fertilizer and lime to the total variable input cost is expected to remain at 37.3% for the 2010/11 season. During the same period, the relative contribution to the total variable input cost in the Western and Eastern Free State is expected to be 30.2% and 30.9%, respectively.

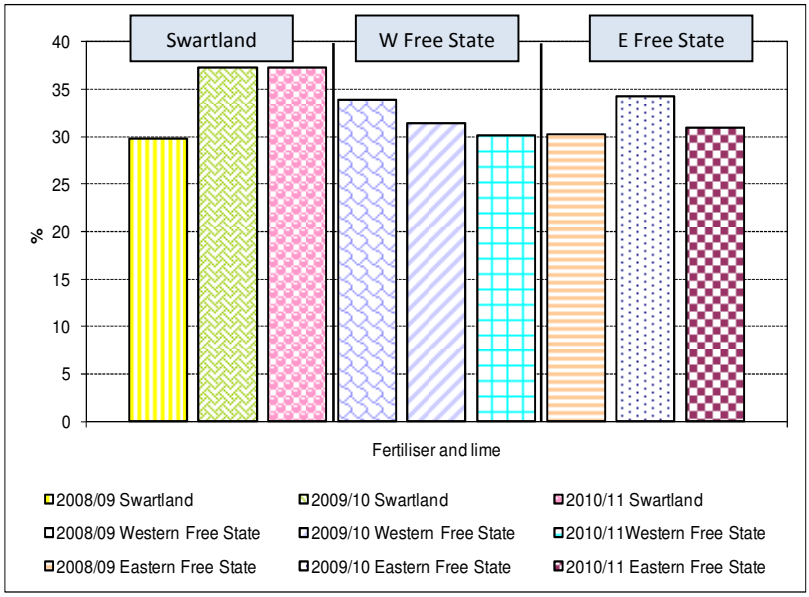

Figure 6a: Comparison of the contribution of the fertilizer and lime cost to the total variable input cost in different wheat production regions in 2008/09 to 2010/11[5]

Source: Grain SA and own calculations, 2010

[5] Note that the 2009/10 and 2010/11 budget figures, not the final production cost figures, were used in figures 6a to 6d.

Comparing the fuel cost per production region for the 2009/10 and 2010/11 seasons with that of the 2008/09 production season, it emerges that the fuel cost makes the smallest contribution to the total variable input cost in the Swartland region, as seen in Figure 6b.

In the Swartland region, the relative contribution of fuel is expected to increase to 8.6% in 2010/11. For the Western Free State, the relative contribution to the total variable input cost is expected to increase to 12.4%. In the Eastern Free State, the relative contribution of fuel to the total variable input cost is expected to increase to 13.8% in 2010/11.

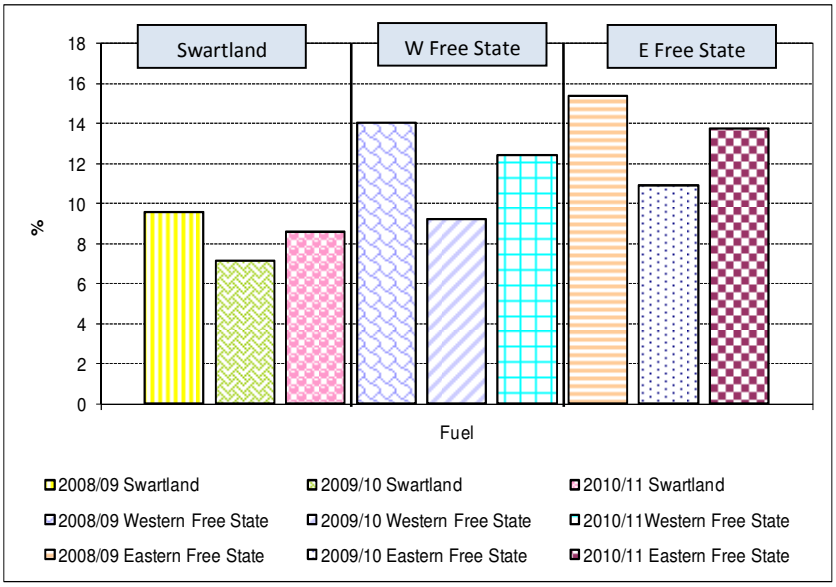

Figure 6b: Comparison of the contribution of the fuel cost to the total variable input cost in different wheat production regions in 2008/09 to 2010/11

Source: Grain SA and own calculations, 2010

Comparing the weed control cost per production region for the 2009/10 and 2010/11 seasons with that of the 2008/09 production season, it emerges that the largest change in the relative contribution of weed control costs to the total variable input cost is in the Eastern Free State region, as seen in Figure 6c.

In the Swartland, the relative contribution of weed control cost to the total variable input cost is expected to decrease by 43.4% in 2010/11. For the Western Free State, the relative contribution to the total variable input cost is expected to decrease to 7.1%. In the Eastern Free State, the relative contribution of weed control cost to the total variable input cost is expected to remain relatively constant at 1% in 2010/11.

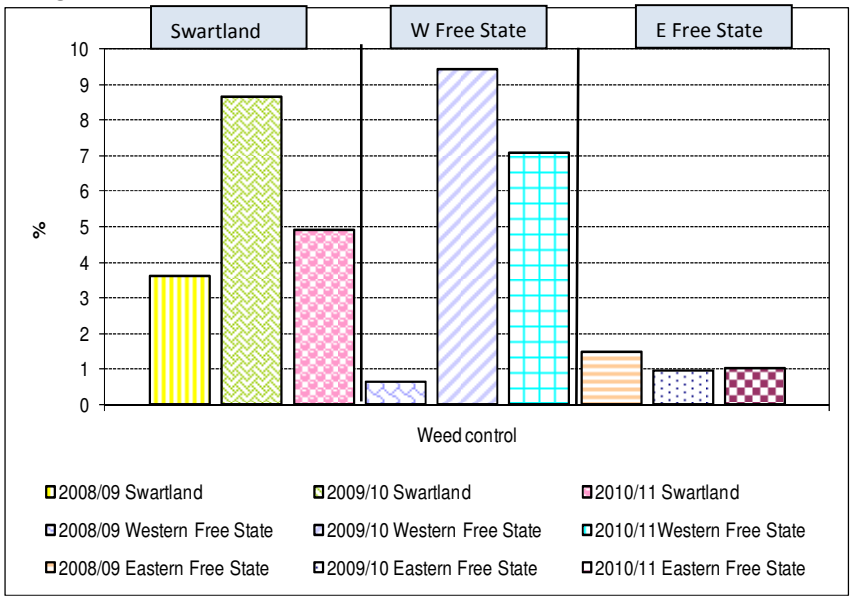

Figure 6c: Comparison of the contribution of the weed control cost to the total variable input cost in different wheat production regions in 2008/09 to 2010/11

Source: Grain SA and own calculations, 2010

Comparing the repairs and parts cost per production region for the 2009/10 and 2010/11 seasons with that of the 2008/09 production season, it emerges that repairs and parts makes the largest contribution to the total variable input cost in the Eastern Free State region, as seen in Figure 6d.

In the Swartland, the relative contribution of the repairs and parts cost to the total variable input cost is expected to increase to 8.7% in 2010/11. For the Western Free State, the relative contribution to the total variable input cost is expected to increase to 9.6%. In the Eastern Free State, the relative contribution of repairs and parts to the total variable input cost is expected to decrease to 10.7% in 2010/11.

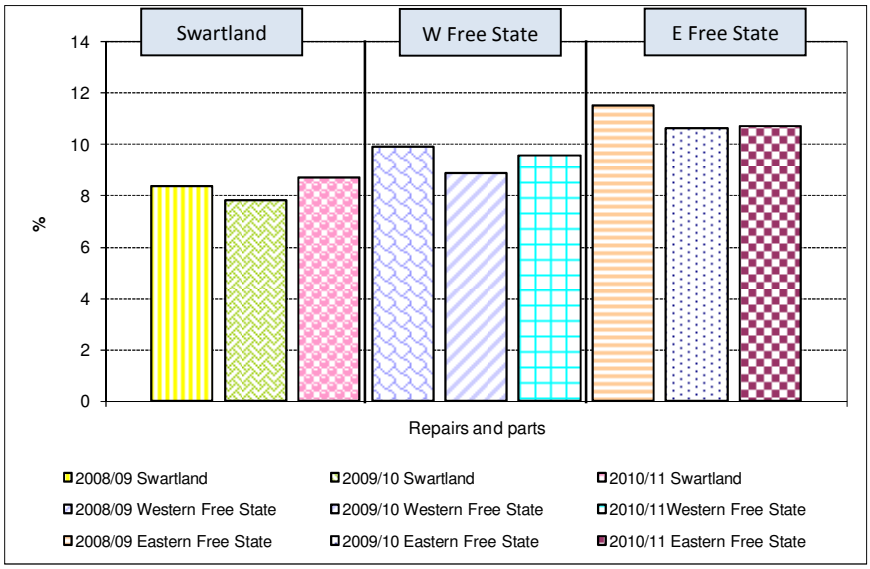

Figure 6d: Comparison of the contribution of the repairs and parts cost to the total variable input cost in different wheat production regions in 2008/09 to 2010/11

Source: Grain SA and own calculations, 2010

Changes in fertilizer prices

The South African fertilizer industry is fully exposed to world market forces in a totally deregulated environment, with no import tariffs or government sponsored measures. The local demand for fertilizer is in the region of 2 million physical tons; this amounts to approximately 750 000 tons of plant nutrient ($N + P_2O_5 + K_2O$). Table 1 shows the South African fertilizer demand, domestic production and import situation.

Table 1: The South African fertilizer demand, domestic production and imports

Nutrient	Demand ('000 t)	Domestic production ('000 t)	Imports ('000 t)	Products
Nitrogen (N)	400	250	150	Mostly Urea
Phosphate (P_2O_5)	200	Over 90 % of demand	<10 % of demand	Mostly DAP
Potassium (K_2O)	160	None	All	Mostly MOP

Source: FSSA, 2010

South Africa is a net importer of potassium and imports approximately 50 % of its nitrogen requirements. Thus, the domestic prices are severely impacted by international prices of raw materials and fertilizers as well as shipping costs and the Rand/$ exchange rate.

Figures 7 to 9 compare domestic and international price trends (expressed as indices: 2005 = 100) for fertilizers over the period of 1997 to 2009. All of the local prices are listed prices, excluding VAT and transport to the farm. It should be noted that the international prices were expressed in R/ton before they were converted into an index. In addition, the product is not at South African harbours, thus the international prices depicted exclude the cost, insurance and freight needed to land the product in South Africa. Furthermore, international FOB prices used differ from the usual port of origin for imports, but trends and general price levels are similar.

In Figure 7, the price movement of the local MAP price is compared with the price movement of the international DAP price[6].

Price increases for the items depicted were as follows between **1997** and **2009**:

- Local MAP: 205.1% increase
- International DAP: 193.9% increase

From **2008 to 2009,** the following changes in prices occurred:

- Local MAP: 50.8% decrease
- International DAP: 65.8% decrease
- White maize (SAFEX): 16.7% decrease
- Wheat (SAFEX): 43.1% decrease
- R/$ exchange rate: 2.3% depreciation

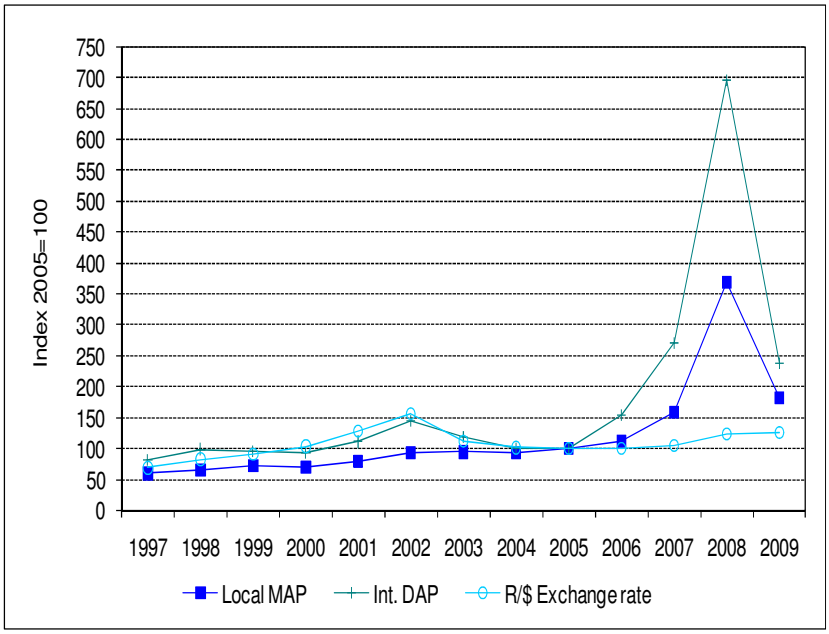

Figure 7: Local MAP compared with international DAP
Source: Grain SA, 2010 and own calculations from listed prices

Figure 8 shows the price movements of local urea in comparison with the price movements of international urea[7].

Price increases for the items depicted were as follows between 1997 and 2009:

- Local urea: 246.9% increase
- International urea: 311.9% increase

From **2008 to 2009,** the following changes in prices occurred:

- Local urea: 30.6% decrease
- International urea: 47.8% decrease
- White maize: 16.7% decrease
- Wheat: 43.1% decrease
- R/$ exchange rate: 2.3% depreciation

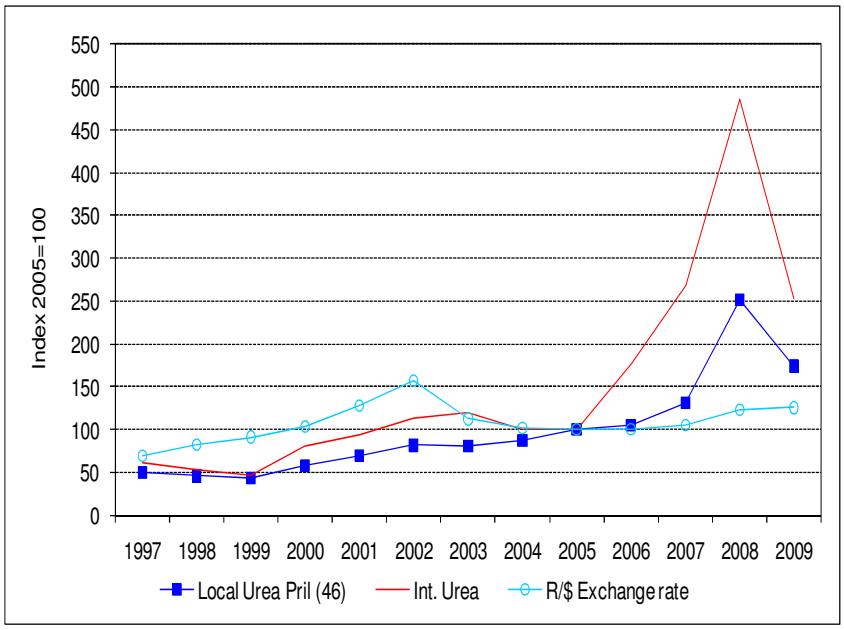

Figure 8: Local urea compared with international urea
Source: Grain SA, 2010 and own calculations from listed prices

[6] The international DAP price is FOB, US Gulf in bulk. This comparison is made because both are a source of phosphate, although of different composition.
[7] The international urea price is FOB, Eastern Europe in bulk. Although most urea is imported from the Arab Gulf, prices show the same movement but at slightly different levels.

Figure 9 shows the price movements of local potassium chloride in comparison with price movements of international muriate of potash (MOP)[8].

Price increases for the items depicted were as follows between 1997 and 2009:

- Local Potassium chloride: 664.1% increase
- International MOP: 1 265.4% increase

From **2008 to 2009,** the following changes in prices occurred:

- Local Potassium chloride: 8.1% increase
- International MOP: 4.1% decrease
- White maize: 16.7% decrease
- Wheat: 43.1% decrease
- R/$ exchange rate: 2.3% depreciation

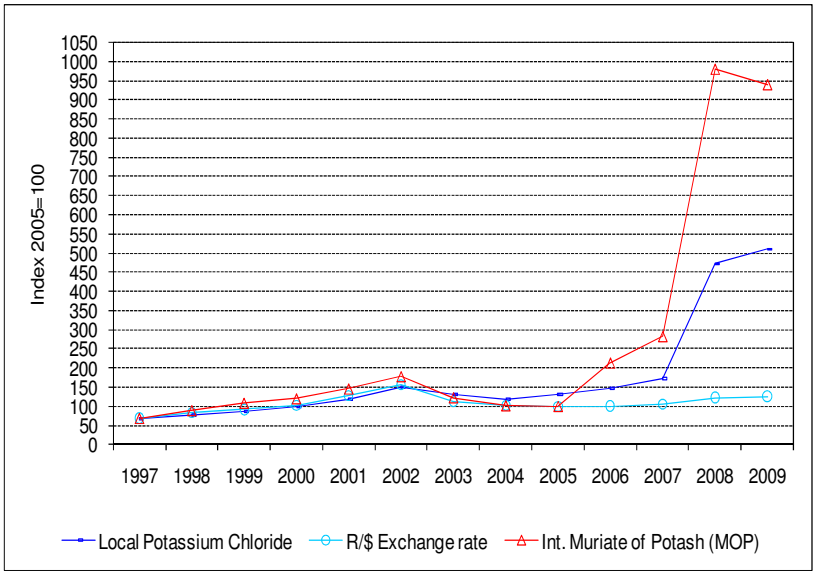

Figure 9: Local Potassium chloride compared with international Muriate of Potash (MOP)

Source: Grain SA, 2010 and own calculations from listed prices

This section compares local fertilizer price changes for various selected fertilizers. To ensure easy interpretation of the data presented, price movements of only the local market of the identified fertilizers are presented in Figures 10 and 11. The PPI-Wheat and PPI-Maize are also included.

Figure 10 shows that the trends for the items represented are generally upward.

Price increases for the items depicted were as follows between **2008** and **2009**:

- Local MAP: 50.8% decrease
- Local LAN (28): 30.1% decrease
- Local Urea prills: 30.6% decrease
- Local Potassium chloride granular: 8.1% increase
- PPI-Maize: 9.2% decrease
- PPI-Wheat: 57.4% decrease

The 2009 prices are still higher than the 1997 levels.

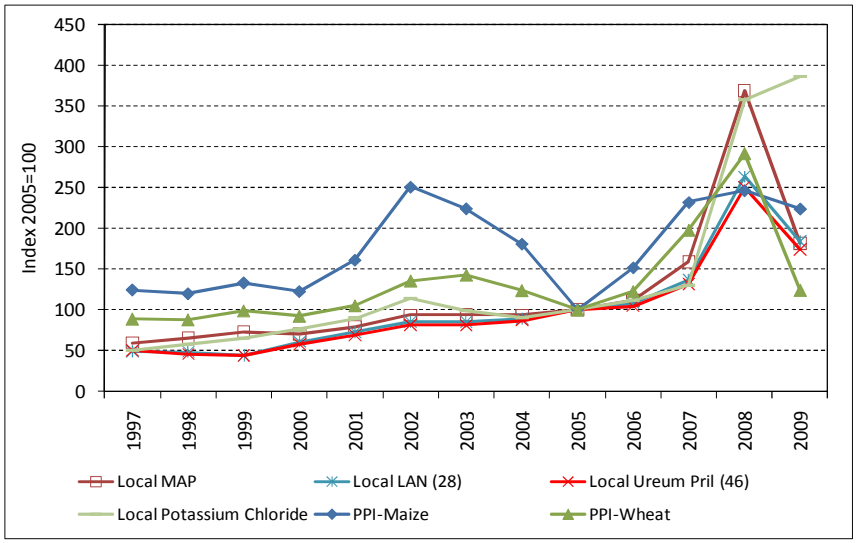

Figure 10: Price indices for different fertilizer products compared to the PPI-Wheat and PPI-Maize

Source: DAFF, 2010 and own calculations from listed prices

[8] The international muriate of potash (MOP) price is FOB, CIS in bulk. Although most muriate of potash is imported from Vancouver and Israel, prices show the same movement but at slightly different levels.

Figure 11 shows that the trends for the items represented are also generally upward.

Price increases for the items depicted were as follows between **2008** and **2009**:

- Local 3.2.1 (25): 45% decrease
- Local 2.1.0 (30): 48% decrease
- Local 3.1.0 (28): 41.2% decrease
- Local Supers (10.5): 54.5% decrease
- PPI-Maize: 9.2% decrease
- PPI-Wheat: 57.4% decrease

The 2009 prices are still higher than the 1997 levels.

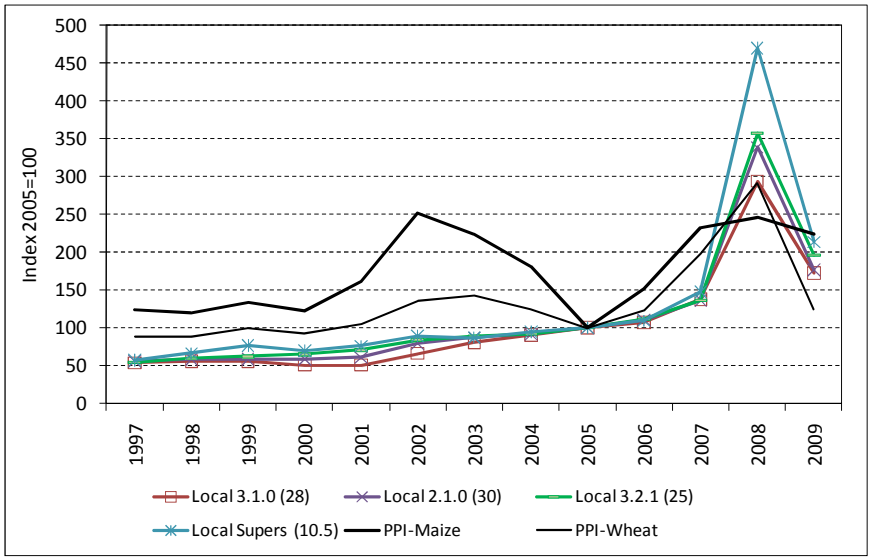

Figure 11: Price indices for different fertilizer products compared to the PPI-Wheat and PPI-Maize

Source: DAFF, 2010 and own calculations from listed prices

There has been little to no growth in the local demand for fertilizer over the last 10 years and no significant growth is expected for the future[9]. According to FSSA (2010), the possibility exists that there could be a decline in demand for fertilizer locally due to:

- Over production of maize, which could partially be replaced with crops which use less fertilizer, such as wheat and oilseeds;
- Conversion of land used for crops to land used for livestock production due to a shift in consumer eating patterns; and
- The uncertainties around land reform have had a temporarily negative impact on fertilizer use and crop planting, which will prevail until upcoming farmers are fully established.

On the positive side, developments in the bio-fuel industry may have a positive impact on crop demand and, thus, fertilizer demand.

Changes in maize and wheat seed prices[10]

The differences between cultivars of the various seed companies make it difficult to compare and construct a seed "basket". Hence, the information depicted in Figure 12 provides only a general trend.

Figure 12 shows the PPI-Maize, PPI-Wheat and the maize and wheat seed price indices.

[9] Source: FSSA, 2010.

[10] Refer to previous Input Cost Monitor: The Story of Maize and Wheat on www.namc.co.za for more background information on seed.

Price increases were as follows for the items depicted between **2000 and 2009**:

- PPI-Wheat: 34.2% increase
- Wheat seed price index: 272.5% increase
- PPI-Maize: 83% increase
- Maize seed price index: 103.7% increase

From **2008 to 2009,** the following changes in prices occurred:

- PPI-Wheat: 57.4% decrease
- Wheat seed price index: 13.7% increase
- PPI-Maize: 9.2 %decrease
- Maize seed price index: 13% increase

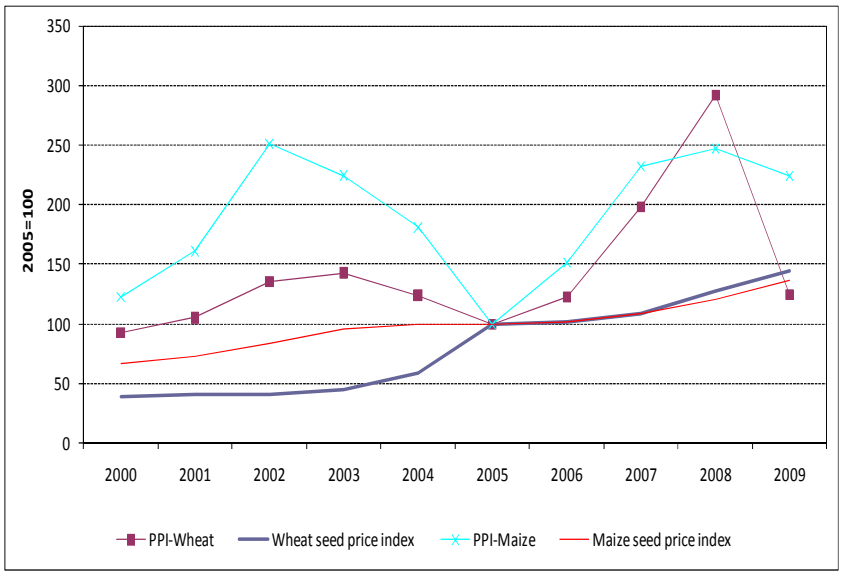

Figure 12: Average price movements for maize seed, wheat seed and maize and wheat

Source: PPI-Maize and PPI-Wheat (DAFF, 2010); Seed price indices (Grain SA) and own calculations, 2010

Changes in tractor prices

Figure 13 shows the price index for tractors[11], PPI-Maize, PPI-Wheat and the R/$ index.

Price increases for the items depicted were as follows between 2000 and 2009:

- PPI-Wheat: 34.2% increase
- PPI-Maize: 83%increase
- Tractor price index: 106.7% increase
- R/$ index: 21.6% depreciation

From **2008 to 2009** the following changes in prices occurred:

- PPI-Wheat: 57.4% decrease
- PPI-Maize: 9.2% decrease
- Tractor price index: 19.9% increase
- R/$ index: 2.3% depreciation

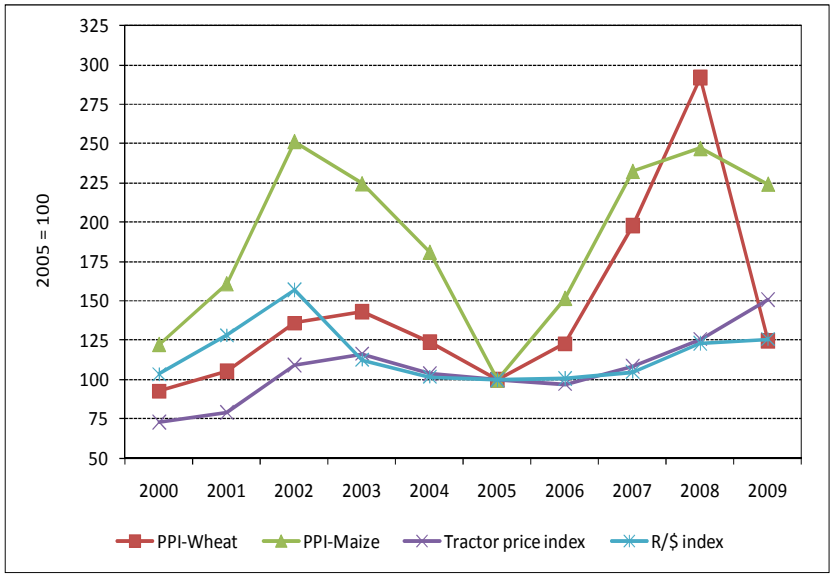

Figure 13: Average price movements for tractors, wheat and maize

Source: PPI-Maize and PPI-Wheat (DAFF, 2010); Tractor price index (Grain SA) and own calculations, 2010

[11] Recommended retail prices, excluding personal discounts.

Changes in fuel prices

Figure 14 shows the prices of petrol 95 ULP Gauteng, petrol 95 ULP Coast and crude oil from January 2006 to September 2010.

Price increases for the items depicted were as follows between **January 2006 and September 2010**:

From **September 2009 to September 2010,** the following changes in prices occurred:

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Figure 14: Petrol and crude oil prices
Source: South African Petroleum Industry Association (SAPIA), 2010

Figure 15 shows the prices of diesel 0.05% S. Gauteng, diesel 0.05% S. Coast and crude oil from January 2006 to September 2010.

Price increases for the items depicted were as follows between **January 2006 and September 2010**:

From **September 2009 to September 2010,** the following changes in prices occurred:

Figure 15: Diesel and crude oil prices
Source: South African Petroleum Industry Association (SAPIA), 2010

The fuel price in South Africa is linked to the international price of crude oil and is quoted in US dollars (US$) per barrel. Crude oil prices and the Rand/Dollar exchange rate therefore have a maice of crude oil and 3788“Ux “A3D6:86AxdR773R77

Appendix A: Definitions of different price indices

FRPI-Total includes price indices for machinery and implements, materials for fixed improvements and intermediate goods. The latter includes fertilizer, fuel, farm feed, animal health and crop protection, packing material, and maintenance and repairs.

PPI-Total includes indices of producer prices of field crops, horticulture and animal production.

PPI-Field crops include indices of producer prices for summer grains, winter grains, oilseeds, sugarcane, hay, dry beans, cotton and tobacco.

PPI-Maize is the price index for producer prices for maize.

PPI-Wheat is the price index for producer prices for wheat.

Appendix B: Composition typical of production costs

Table B.1 shows the different input cost components included in a typical input cost budget. The focus of this report is on the variable cost component only.

Table B.1: Input cost components

Variable cost	**Capital cost**
Seed	Machinery and equipment:
Fertilizer and lime	Depreciation
Herbicides	Interest
Insecticides and fungicides	Fixed improvements:
Fuel	Interest
Maintenance and repairs	Depreciation
Crop insurance	Repairs and maintenance
Casual labour	
Marketing cost	
Drying and cleaning cost	
License and insurance	
Permanent labour	
Interest on production credit	
Contract work	
Other cost	

Table B.2 shows the different input cost components included in a typical input cost budget for wheat. The focus of this report is on the variable cost component only.

Table B.2: Input cost components

Variable cost	**Capital cost**
Seed	Machinery and equipment:
Fertilizer and lime	Depreciation
Herbicides	Interest
Insecticides and fungicides	Fixed improvements:
Fuel	Interest
Maintenance and repairs	Depreciation
Crop insurance	Repairs and maintenance
Casual labour	
Marketing cost	
Drying and cleaning cost	
License and insurance	
Permanent labour	
Interest on production credit	
Contract work	
Other cost	

Appendix C: "Other cost" & "All other" cost items

The "other cost" category includes banking fees, printing and stationary, donations, water and electricity, telephone and auditing costs.

The "All other" cost category includes the costs of crop insurance, marketing, drying and cleaning, license and insurance, and contract work.