

# Input cost monitor: The story of Maize and Wheat

July 2008

## 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 however also realised that it is 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 from 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 whole 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 form part of two of the NAMC's key research themes namely, **agro-food chain analysis** and **market information systems**.

The purpose of input cost monitoring is to publish trends in farm input costs on a regular basis. This report provides broad trends in input costs for grains, more specifically the maize and wheat industry (note that trends in 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 total variable input cost of maize and wheat and (iii) trends in individual input cost items.

The purpose of input cost monitoring is to publish trends in farm input costs on a regular basis. This report focuses on grains and more specifically on maize and wheat.

Trends from 1990 to 2007:

PPI-Maize: ↑ 415.1%.

PPI-Wheat: ↑ 353.9%

PPI-Field crops: ↑ 348.1%

PPI-Total: ↑ 309.5%.

FRPI-Total: ↑ 301.6%.

## 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 2007. From the graph 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) showed much more variability since 2001 than the All Farming Requisites Index (FRPI-Total). Such variability brings about uncertainty and risk that affects farmers' decisions to plant and invest, and hence also affects supply.

The PPI-Maize and PPI-Wheat increased by 415.1 and 353.9 percent, respectively, from 1990 to 2007 whilst the PPI-Field crops and PPI-Total increased by 348.1 and 309.5 percent, respectively.

During the same period, the FRPI-Total increased by 301.6 percent.

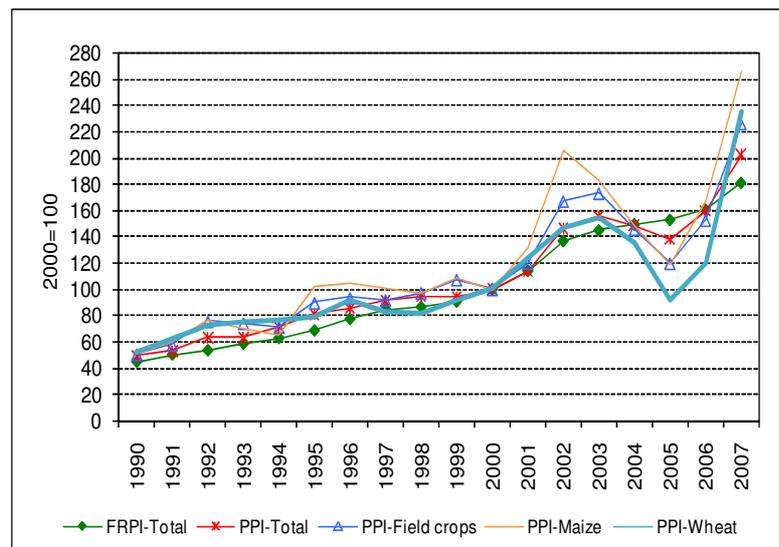


Figure 1: Comparison of various Price Indices, 1990 to 2007<sup>1</sup>

Source: DoA, 2008.

<sup>1</sup> See Appendix A for definitions of different price indices.

The trend in the PPI for output is much more variable than for input costs. The result is much more variability in farm profits.

Trends from 1990 to 2007:

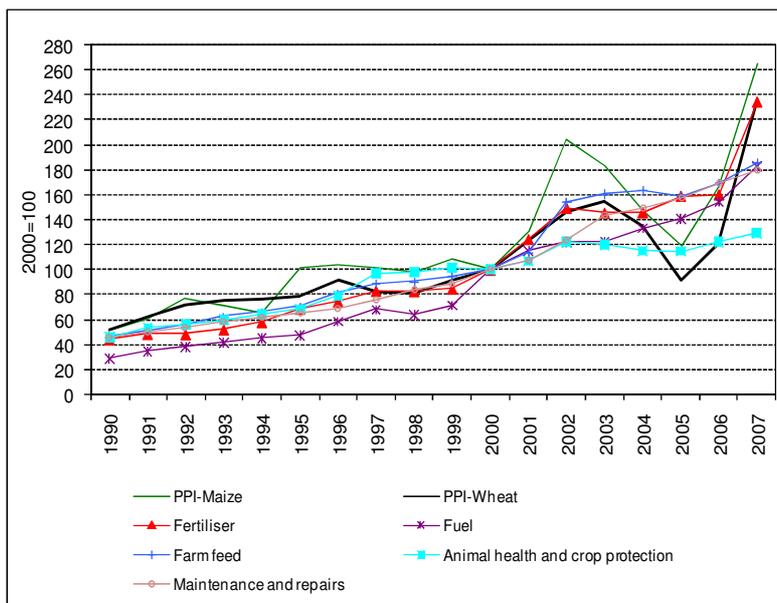
- PPI-Maize: ↑ 415.1%.
- PPI-Wheat: ↑ 353.9%
- Fertiliser: ↑ 429.6%.
- Fuel: ↑ 534.3%.
- Animal health and crop protection: ↑ 184%.
- Maintenance & repairs: ↑ 294.1%.
- Farm Feed: ↑ 298.1%.

Fertiliser and lime contributed more than 20 percent to total variable input cost (between 22 and 26 percent) of maize production.

**Note should be taken 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 and PPI-Wheat and selected intermediate inputs from 1990 to 2007 (note intermediate inputs are part of the overall FRPI-Total). The intermediate inputs included are fertiliser, fuel, animal health and crop protection, maintenance and repairs and farm feed.

All the indices show an increasing trend over the depicted period. The PPI-Maize and PPI-Wheat shows higher variability (particularly from 2001 onwards) compared to the other price indices depicted. The variability in the PPI of Maize and Wheat were, amongst other factors, due to exchange rate fluctuations and the demand and supply situation in the maize and wheat industries<sup>2</sup>. Overall, the result was much more variability in farm profits and also variability in supply.



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

Source: DoA, 2008.

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

The main focus of this section is on the variable costs for maize<sup>3</sup> and specifically to express different variable input cost items as a percentage of 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 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 total variable input cost in the maize production regions mentioned in footnote 3. For the period under consideration fertiliser and lime contributed more than 20 percent to total variable input cost (between 22 and 26 percent).

<sup>2</sup> The reader is referred to the Food Price Trend Reports at [www.namc.co.za](http://www.namc.co.za)

<sup>3</sup> For maize, variable input cost information was available for six summer production areas. These are North-West Province, North-Western and Eastern Free State, Northern KwaZulu-Natal, and Middelburg and Ermelo in Mpumalanga.

In terms of relative contribution to total variable input cost over the last 7 years:

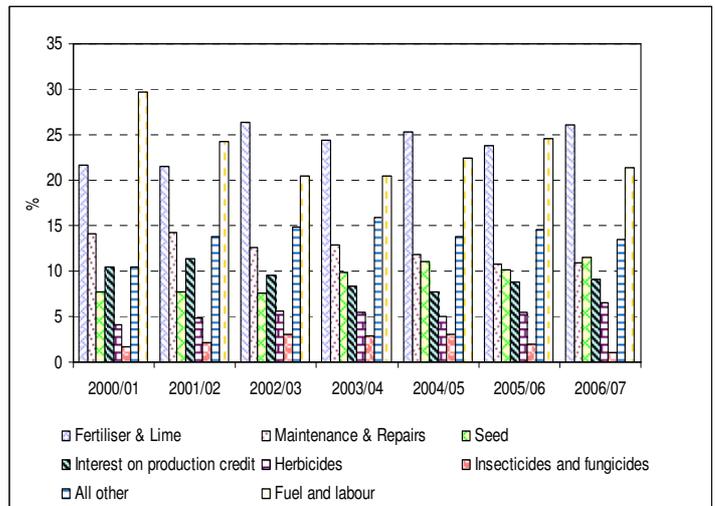
- Maintenance and repairs showed a downward trend.
- Seed cost showed an upward trend.
- Herbicides remained more or less the same.
- Fuel and labour contributed on average 23 percent to the total variable input cost.

In Northern KwaZulu-Natal fertiliser and seed expenses as percentage of variable input cost were the highest compared to other regions.

Maintenance and repairs cost was the highest in the North Western Free State and the Eastern Free State.

Maintenance and repairs contributed almost 13 percent and showed a declining trend in terms of its relative contribution to total variable input cost. Seed cost showed an increase in its relative contribution to total variable input cost, while the cost for herbicides remained more or less five percent of total variable input cost.

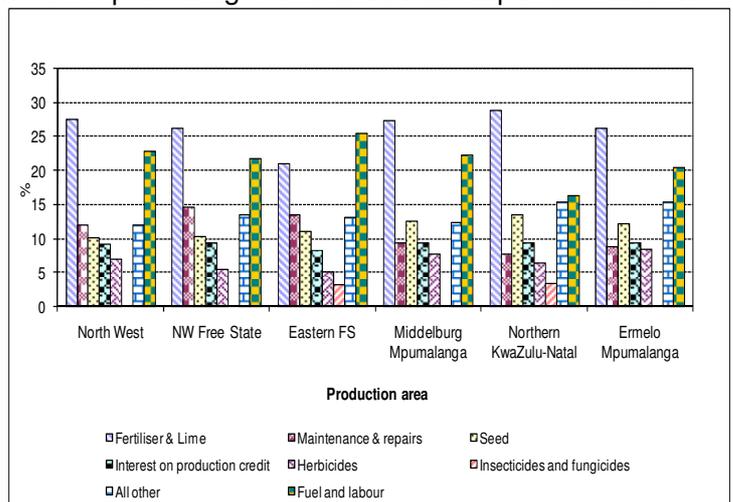
Fuel and labour contributed on average 23 percent to the total variable input cost.



**Figure 3: Average % contribution of individual variable cost items to total variable input cost<sup>4</sup>**

Source: Grain SA, 2008 and own calculations.

When comparing the variable input cost items per production region for the 2006/07 production season it can be seen from Figure 4 that producers in the Northern KwaZulu-Natal region have the largest expenditure on fertilisers, i.e. fertilisers contributed 28.7 percent to total variable input cost, followed by Middelburg (Mpumalanga). In the Eastern Free State expenditure on fertilisers was the lowest; contributing 20.8 percent to total variable input cost. In Northern KwaZulu-Natal seed expenses as percentage of total variable input cost was the highest, while it was lowest in the North-West Province. Maintenance and repair costs as percentage of total variable input cost was the highest in the North Western Free State and the Eastern Free State, while it had almost the same contribution to total variable input cost in the other production areas.



**Figure 4: Comparison of the contribution of different variable input cost items to total variable input cost in different maize production regions (2006/07)**

Source: Grain SA, 2008 and own calculations.

<sup>4</sup> From 2003/04 for six areas; In 2002/03 for five areas; In 2001/02 for four areas; In 1999/00 for three areas. The information for 2007/08 was not available during the preparation of this report.

The average relative contribution of selected variable input costs to total variable input cost for wheat from 2001/02 to 2006/07 were:

- Fertilizer and lime contributed between 17 and 26%.
- Maintenance and repairs cost contributed between 10 and 13%.
- Seed cost contributed between 8 and 10%.
- Fuel cost contributed between 10 and 17%.
- Labour cost contributed between 8 and 12%.

Change in relative contribution to total variable input cost from 2001/02 to 2006/07 in the Southern Cape (selected items):

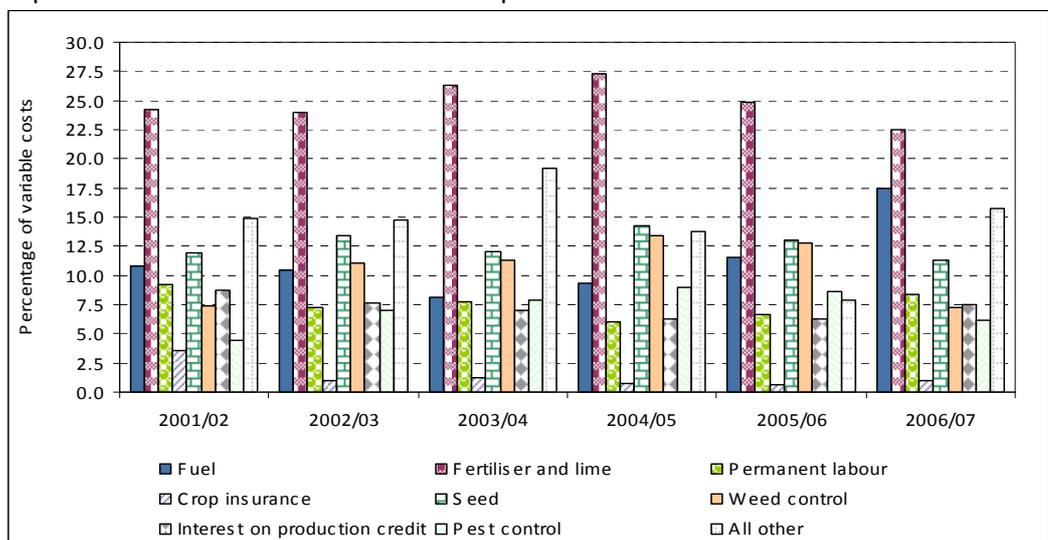
- Fuel: 10.9 to 17.4%.
- Fertiliser & lime: 24.3 to 22.6%.
- Perm. labour: 9.3 to 8.4%.
- Crop insurance: 3.5 to 1%.
- Seed: 12 to 11%.
- Weed control: 7.4 to 7.2%.
- Pest control: 4.4 to 6.2%.

## Contribution of different variable input cost items to total variable input cost of wheat

The main focus of this section is on the variable input costs for wheat, and specifically to express different variable input cost items as a percentage of total variable input costs (See Appendix B for the different variable input cost components included in a typical input cost budget for wheat). Due to the many different variable input cost items included, their relative contribution to 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 "All other" cost items).

Figure 5a, 5b, 5c and 5d show the average percentage contribution of selected variable input costs to total variable input cost in each of the following wheat production regions respectively: Southern Cape, Swartland (western part of Western Cape), Western Free State and Eastern Free State. For the period under consideration fertilizer and lime contributed between 17 and 26 percent to total variable input cost. Maintenance and repairs contributed between 10 and 13 percent to total variable input cost. Seed cost contributed between 8 and 10 percent to total variable input cost, while the cost for herbicides were more or less five percent of total variable input cost. Fuel contributed between 10 and 17 percent and labour between 8 and 12 percent to the total variable input cost.

From Figure 5a it is evident that fertiliser and lime contributed the most to total variable input cost with 22.6 percent during 2006/07 in the Southern Cape production region. The contribution of fuel cost to total variable input cost increased the most from 2001/02 to 2006/07 with 60.7 percent followed by the cost of pest control with an increase of 39.8 percent.



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

Source: GrainSA, 2008.

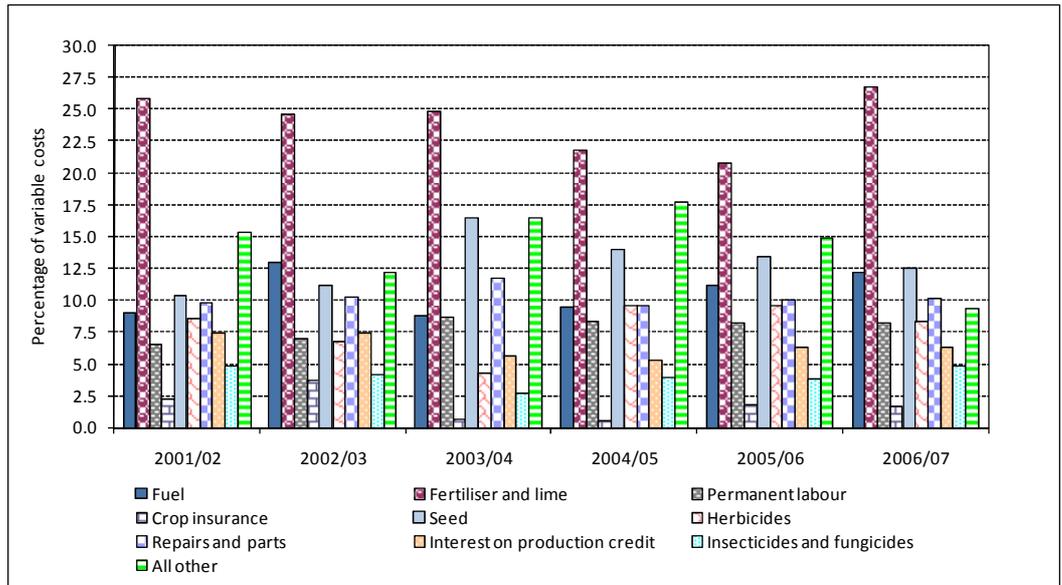
Figure 5b shows the contribution of individual variable input cost items to total variable input cost in the Swartland production area. The cost of fertiliser and lime contributed the most to total variable cost during the depicted period and varied between 22.2 percent in 2001/02 and 26.7 percent during 2006/07. The contribution of fuel cost to total variable cost increased with 34 percent from 2001/02 to 2006/07.

Change in relative contribution to total variable input cost from 2001/02 to 2006/07 in the Swartland:

- Fuel: 9.1 to 12.2%.
- Fertiliser & lime: 25.9 to 26.7%.
- Perm. labour: 6.5 to 8.2%.
- Crop insurance: 2.2 to 1.6%.
- Seed: 10.4 to 12.5%.
- Weed control: 8.6 to 8.3%.
- Pest control: 4.4 to 6.2%.

Change in relative contribution to total variable input cost from 2001/02 to 2006/07 in the Western Free State:

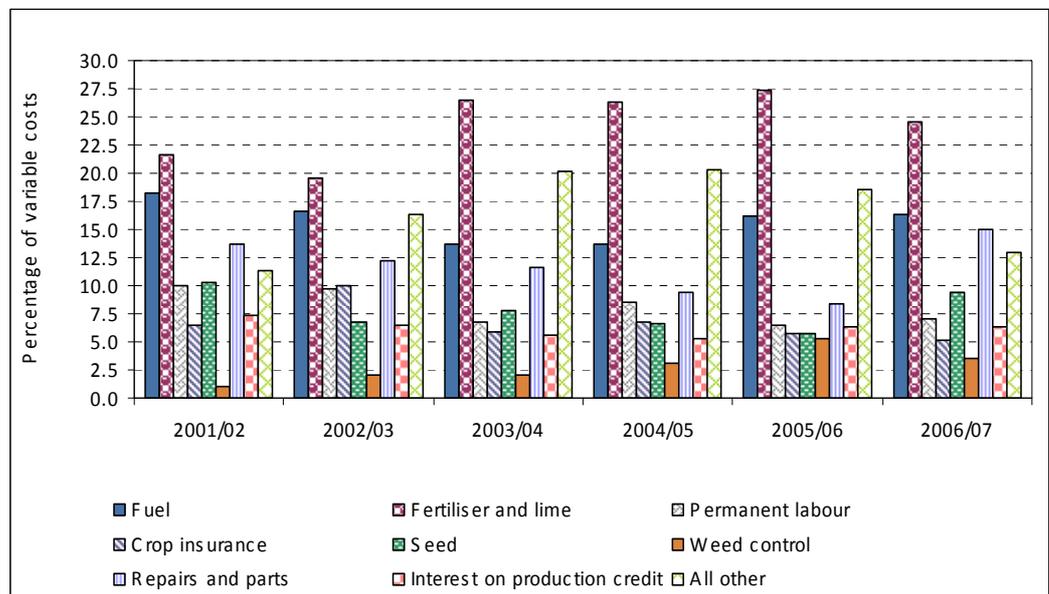
- Fuel: 18.3 to 16.3%.
- Fertiliser & lime: 21.6 to 24.5%.
- Perm. labour: 10 to 7%.
- Crop insurance: 6.5 to 5.1%.
- Seed: 10.3 to 9.3%.
- Weed control: 1 to 3.5%.



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

Source: GrainSA, 2008.

Figure 5c shows the contribution of individual variable input cost items to total variable input cost in the Western Free State production region. The cost of fertiliser and lime contributed the most to total variable input cost during the depicted period and varied between 26.4 percent in 2001/02 and 24.5 percent during 2006/07. The contribution of weed control cost to total variable cost increased from 1% to 3.5%. The relative contribution of permanent labour changed from 10% to 7% over the depicted period.



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

Source: GrainSA, 2008.

Figure 5d shows the contribution of individual variable input cost items to total variable input cost in the Eastern Free State production area. Fertiliser and lime contributed the most to total variable input cost with 17.7 percent during 2006, this

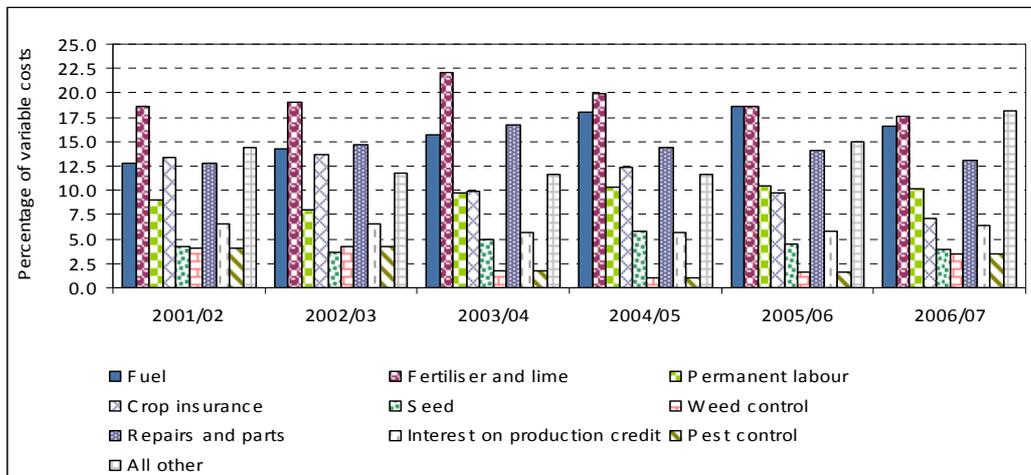
Change in relative contribution to total variable input cost from 2001/02 to 2006/07 in the Eastern Free State:

- Fuel: 12.8 to 16.6%.
- Fertiliser & lime: 18.7 to 17.7%.
- Perm. labour: 9 to 10.2%.
- Crop insurance: 13.4 to 7.1%.
- Seed: 4.2 to 3.9%.
- Weed control: 4.1 to 3.5%.
- Interest on production credit: 6.5 to 6.3%.
- Pest control: 4.1 to 3.5%.

Change in the relative contribution of fertilizer and lime costs to total variable cost from 2006/07 to 2008/09:

- Swartland: 26.7 to 39.3%.
- Western Free State: 24.5 to 35.8%.
- Eastern Free State: 17.7 to 36.5%.

is 5.4 percent lower than the 18.7 percent in 2001/02. The relative contribution of fuel cost to total variable input cost increased the most from 2001 to 2006 with 29.5%.

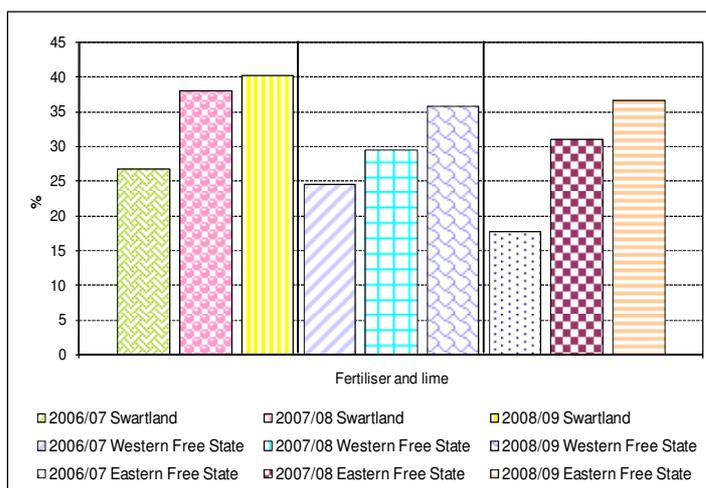


**Figure 5d: Percentage contribution of individual variable cost items to total variable input cost (Eastern Free State)**

Source: GrainSA, 2008.

To compare the previous (2006/07), current (2007/08) and forthcoming (2008/09) seasons, the most important variable input cost items in three wheat production regions are compared. The available data is for the Swartland, Western Free State and Eastern Free State production regions. The comparisons are done for fertilizer and lime, fuel, weed control and repairs and parts.

By comparing the fertilizers cost per production region for the 2007/08 and 2008/09 seasons with the 2006/07 production season it can be seen from Figure 6a that fertilizer and lime makes the largest contribution to total variable cost in the Swartland region. In the Swartland region the contribution of fertilizer and lime to total variable input cost is expected to increase to 39.3 percent in 2008/09. For the Western Free State the relative contribution to total variable input cost is expected to increase to 35.8 percent. In the Eastern Free State the relative contribution of fertilizers and lime to total variable input cost is expected to increase to 36.5 percent in 2008/09.



**Figure 6a: Comparison of the contribution of fertilizer and lime cost to total variable input cost in different wheat production regions 2006/07 to 2008/09<sup>5</sup>**

Source: GrainSA, 2008.

<sup>5</sup> Note in Figures 6a to 6d 2007/08 and 2008/09 budget figures were used and not final production cost figures.

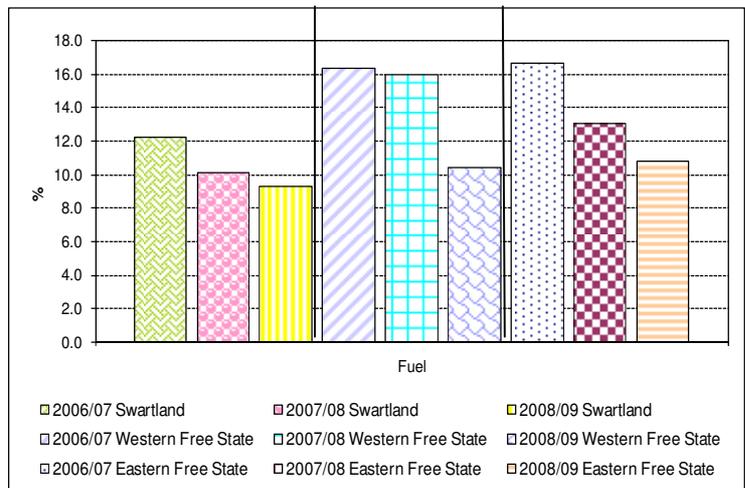
Change in the relative contribution of fuel costs to total variable input cost from 2006/07 to 2008/09:

- Swartland: 12.2 to 9.3%.
- Western Free State: 16.3 to 10.4%.
- Eastern Free State: 16.6 to 10.8%.

Change in the relative contribution of weed control costs to total variable input cost from 2006/07 to 2008/09:

- Swartland: 8.3 to 7.4%.
- Western Free State: 3.5 to 13.5%.
- Eastern Free State: 3.5 to 13.3%.

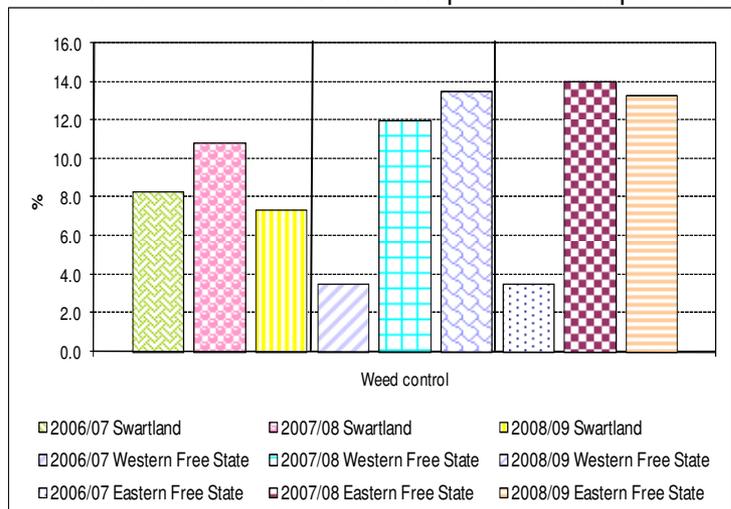
By comparing the fuel cost per production region for the 2007/08 and 2008/09 seasons with the 2006/07 production season it can be seen from Figure 6b that fuel cost makes the smallest contribution to total variable input cost in the Swartland region. In the Swartland region the relative contribution of fuel is expected to decrease to 9.3 percent in 2008/09. For the Western Free State the relative contribution to total variable input cost is expected to decrease to 10.4 percent. In the Eastern Free State the relative contribution of fuel to total variable input cost is expected to decrease to 10.8 percent in 2008/09.



**Figure 6b: Comparison of the contribution of fuel cost to total variable input cost in different wheat production regions 2006/07 to 2008/09**

Source: GrainSA, 2008.

By comparing the weed control cost per production region for the 2007/08 and 2008/09 seasons with the 2006/07 production season it can be seen from Figure 6c that the largest change in the relative contribution of weed control costs to total variable input cost was in the Eastern Free State region. In the Swartland the relative contribution of weed control cost to total variable input cost is expected to decrease to 7.4 percent in 2008/09. For the Western Free State the relative contribution to total variable input cost is expected to increase to 13.5 percent. In the Eastern Free State the relative contribution of weed control cost to total variable input cost is expected to increase to 13.3 percent in 2008/09.



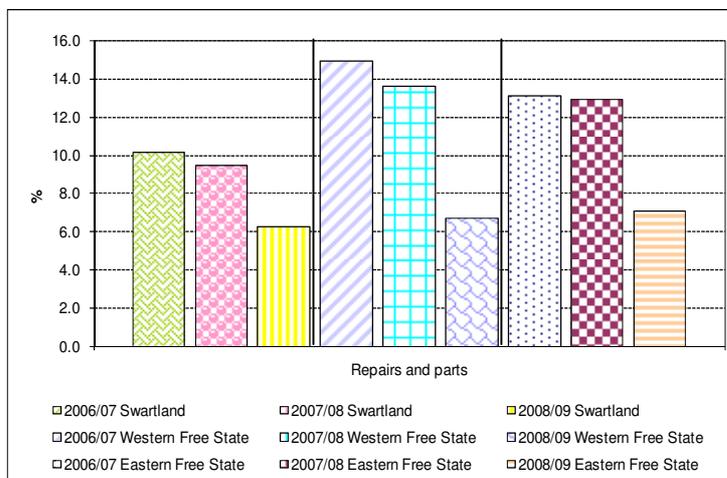
**Figure 6c: Comparison of the contribution of weed control cost to total variable input cost in different wheat production regions 2006/07 to 2008/09**

Source: GrainSA, 2008.

Change in the relative contribution of repairs and parts costs to total variable input cost from 2006/07 to 2008/09:

- Swartland: 10.1 to 6.2%.
- Western Free State: 14.9 to 6.7%.
- Eastern Free State: 13.1 to 7%.

By comparing the repairs and parts cost per production region for the 2007/08 and 2008/09 seasons with the 2006/07 production season it can be seen from Figure 6d that repairs and parts makes the largest contribution to total variable input cost in the Western Free State region. In the Swartland the relative contribution of repairs and parts cost to total variable input cost is expected to decrease to 6.2 percent in 2008/09. For the Western Free State the relative contribution to total variable input cost is expected to decrease to 6.7 percent. In the Eastern Free State the relative contribution of repairs and parts to total variable input cost is expected to decrease to 7 percent in 2008/09.



**Figure 6d: Comparison of the contribution of repairs and parts cost to total variable input cost in different wheat production regions 2006/07 to 2008/09**

Source: GrainSA, 2008.

- **Mechanisation**

Producers are continuously seeking ways to reduce production cost of small grain. In some production areas like the Rooi Karoo and middle Rûens, producers tend to buy second hand machinery and keep them longer than the recommended replacement period of 12 years. To determine the impact on profitability, a typical small grain farm model was used to calculate the internal rate of return of a multi-period investment<sup>6</sup>. The impact of a 12 year replacement period for their combine harvesters and big tractors used for pulling the big planting machines was compared with the impact of a replacement period of 20 years. The impact on the Internal Rate of Returns (IRR's) is shown in Table D1 (see Appendix D).

The capital cost of the 20 year replacement period option is significantly lower, and the IRR higher. However, the risk of a machine breakdown during the critical periods of harvesting increases – an expected loss in income not captured by the model and in most cases not acceptable for producers in higher yield areas. The option of buying cheaper models of well-known European combine harvester brands manufactured elsewhere is also not preferred by Western Cape wheat producers as they expect the saving on a cheaper model to be exceeded by a loss in income if the lighter axle model breaks during harvesting – a risk that they cannot afford to take.

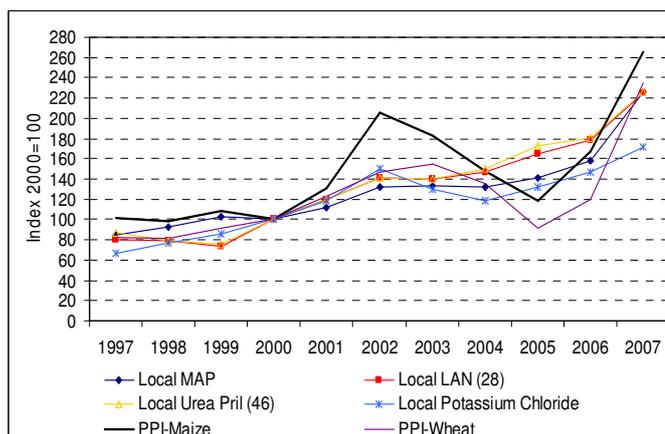
<sup>6</sup> Developed by TE Kleynhans and W Hoffmann at the University of Stellenbosch.

## Changes in fertiliser prices

This section report price changes for only selected fertilizers. The decision, in consultation with GSA and producer representatives, to include the identified fertilizers was based on the fact that it was relatively easy to source price information, as well as their wide use. To ensure easy interpretation of the data presented, price movements on only the local market of the identified fertilizers are presented in Figures 7 and 8. The PPI-Wheat and PPI-Maize are also included.

Figure 7 shows that the trends for the items represented are generally upward. Price increases for the items depicted between 1997 and 2007 were as follows:

- MAP: 167.6% increase
- LAN (28): 180.5% increase
- Urea Prill: 161.4 % increase
- Potassium chloride granular: 157.8 % increase
- PPI-Wheat: 186% increase
- PPI-Maize: 161.1% increase

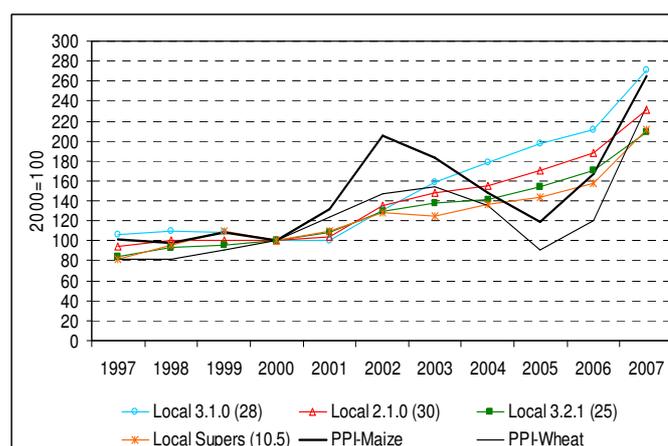


**Figure 7: Price indices for different fertiliser products compared to the PPI-Wheat & PPI-Maize**

Source: DoA, 2008 and own calculations from list prices.

Figure 8 shows that the trends for the items represented are also generally upward. Price increases for the items depicted between 1997 and 2007 were as follows:

- 3.2.1(25): 148.7% increase
- 2.1.0(30): 145.7% increase
- 3.1.0(28): 155.7% increase
- Local Supers (10.5): 157.9% increase
- PPI-Wheat: 186% increase
- PPI-Maize: 161.1% increase



**Figure 8: Price indices for different fertiliser products compared to the PPI-Wheat & PPI-Maize**

Source: DoA, 2008 and own calculations from list prices.

The price indices for MAP and LAN (28) increased more than the price index for maize from 1997 to 2007, but less than that of wheat.

The price indices for 3.1.0(28), 3.2.0(30), 3.1.0(28) and local supers(10.5) increased less than the PPI for outputs. However, output prices were much more variable resulting in large variations in income.

South Africa's demand for fertiliser is in the region of 2 million tons. To supply in this demand almost 70% of the fertilisers are imported.

The local demand for fertiliser is in the region of 2 million tons. To meet this demand almost 70% of the fertilisers have to be imported. Annual imports of Urea amounts to 450 000 tons, LAN between 20 000 and 60 000 tons, Ammonia

Most fertiliser prices remained firm after 2002 possibly due to the fact that local manufacturers buy against fixed prices and exchange rate options months ahead and thus carrying stocks for future delivery leading to slower price adjustments.

From 2007 to June 2008, local MAP and international DAP increased with 103.3 and 134.7 percent respectively.

The prices on SAFEX of maize and wheat increased by 15.3 and 58.2 percent, respectively between 2007 and 2008(June).

Sulphate between 100 000 and 150 000 tons, Potassium around 150 000 tons and MAP and DAP between 30 000 and 50 000 tons. When considering the basic composition of fertiliser in terms of N:P:K (Nitrogen: Phosphorous: Potassium), it is important to note that South Africa produces no Urea and as a result in the order of 50 percent of nitrogen is imported in the form of Urea, LAN and Ammonia Sulphate. For Phosphorous, the amount of imports varies significantly between years and is in the order of 50 000 tons per year, as South Africa is mostly self sufficient in Phosphorous. South Africa does not have any natural sources of Potassium which are mined and all our requirements are imported.<sup>7</sup>

Figures 9 to 11 compare domestic and international price trends (expressed as indices: 2000=100) for fertilisers over the period 1997 to 2008 (June). All the local prices are list prices, excluding VAT and transport to the farm. All the local prices are list prices, excluding VAT and transport to the farm. It should be noted that the international prices were expressed in R/ton and \$/ton before converting them into an index. Note should also be taken that the international prices depicted are not at South African harbours, and hence exclude cost, insurance and freight 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.

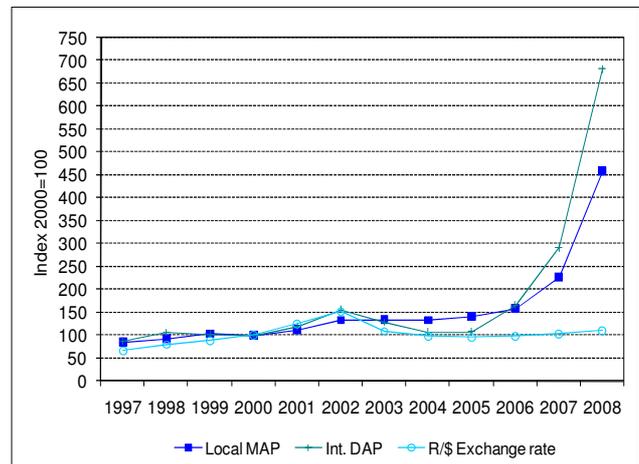
The analysis shows that most local fertiliser prices remained firm after 2002, possibly due to the fact that local manufacturers buy against fixed prices and exchange rate options months ahead and thus carry stocks for future delivery leading to slower price adjustments. Firm prices continued during the first six months of 2008, mainly due to high demand from China and USA for production of grains for the bio-fuel industry, as well as food security.

In Figure 9 the price movement of the local MAP price is compared with the price movement of the international DAP price<sup>8</sup>. Price increases for the items depicted between **1997 and 2008 (June)** were as follows:

- Local MAP 444.1% increase
- Int. DAP 688% increase

From **2007 to 2008(June)** the following changes in prices occurred:

- Local MAP: 103.3% increase
- Int. DAP: 134.7% increase
- White maize (SAFEX): 15.3% increase
- Wheat (SAFEX): 58.2% increase



**Figure 9: Local MAP compared with international DAP**

Source: Grain SA, 2008 and own calculations from list prices.

<sup>7</sup> Based on information obtain from interviews with industry role-players.

<sup>8</sup> International DAP price is fob, US Gulf in bulk. This comparison is made because both are a source of phosphate although different compositions.

From 2007 to June 2008, local Urea and international Urea increased with 45.3 and 28.7 percent, respectively.

The prices on SAFEX of maize and wheat increased by 15.3 and 58.2 percent, respectively between 2007 and 2008(June).

From 2007 to June 2008, local Potassium chloride and international MOP increased with 113.5 and 100 percent, respectively.

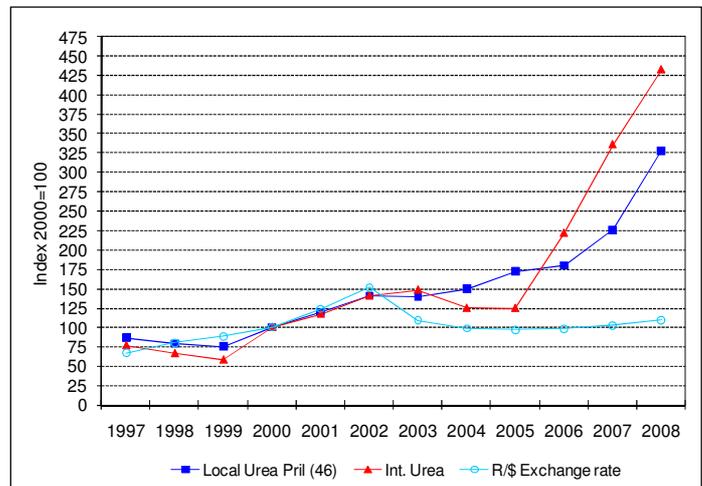
The prices of maize and wheat increased by 15.3 and 58.2 percent, respectively between 2007 and 2008(June).

Figure 10 shows the price movements of local Urea in comparison with the price movements of international Urea<sup>9</sup>. Price increases for the items depicted between 1997 and 2008 (June) were as follows:

- Local Urea: 280% increase
- International Urea: 464.8% increase

From 2007 to 2008(June) the following changes in prices occurred:

- Local Urea: 45.3% increase
- International Urea: 28.7% increase
- White maize: 15.3% increase
- Wheat: 58.2% increase



**Figure 10: Local Urea compared with international Urea**

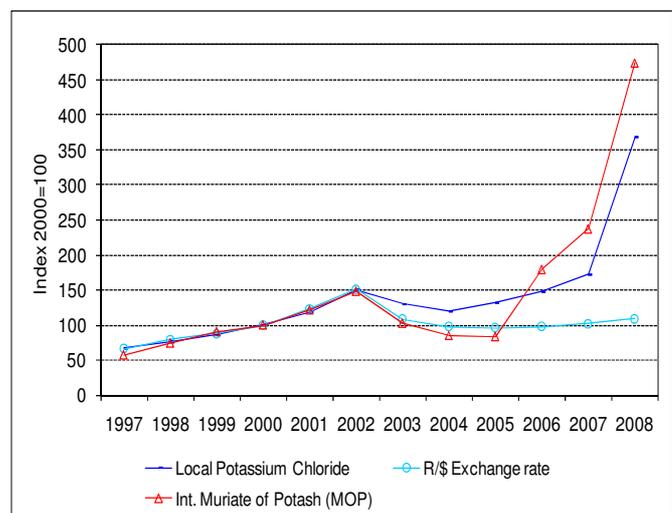
Source: Grain SA, 2008 and own calculations from list prices.

Figure 11 shows the price movements of local Potassium Chloride in comparison with price movements of international Muriate of Potash (MOP)<sup>10</sup>. Price increases for the items depicted between 1997 and 2008 (June) were as follows:

- Potassium chloride: 450.4% increase
- International MOP: 726.2% increase

From 2007 to 2008(June) the following changes in prices occurred:

- Potassium chloride: 113.5% increase
- International MOP: 100% increase
- White maize: 15.3% increase
- Wheat: 58.2% increase



**Figure 11: Local Potassium chloride compared with international Muriate of Potash (MOP)**

Source: Grain SA, 2008 and own calculations from list prices.

It is interesting to note that, on average, local prices of the depicted fertilisers showed downward stickiness between 2002 and 2005, i.e. in many instances

<sup>9</sup> International Urea price is fob, E. Europe in bulk. Although most Urea is imported from the Arab Gulf, prices show the same movement on slightly different levels.

<sup>10</sup> International Muriate of Potash (MOP) price is fob, CIS in bulk. Although most Muriate of Potash (MOP) is imported from Vancouver and Israel, prices show the same movement on slightly different levels.

Developments in the bio-fuel markets also have a noticeable influence on fertiliser prices in that they influence the international demand for fertilisers, and hence the availability of base material.

The Maize seed price index increased by 62.4 percent from 2000 to 2007, compared to a 165.3 percent increase in the PPI-Maize.

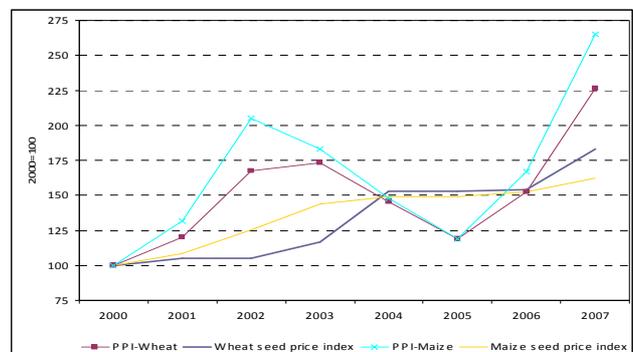
fertiliser prices did not follow the same downward trend seen for international prices expressed in R/ton. As mentioned this is, amongst other things, due to forward cover on exchange rate options and order banking with fixed prices. Other factors that have an influence on the local market prices for fertilisers are the variability of local demand and stocks, oil prices and shipping fees. Developments in the bio-fuel markets also have a noticeable influence on fertiliser prices in that they influence the international demand for fertilisers, and hence the availability of base material.

### Changes in maize and wheat seed prices

The cost of seed is determined by, amongst others, the cost of technology development, parent seed development cost<sup>11</sup>, production cost of seed growers<sup>12</sup>, drying and other factory cost. Cognisance should also be taken of the fact that overall returns (yield × price) from producing maize seed<sup>13</sup> versus producing maize or any other crop for commercial purposes impacts on the availability of maize seed; the result is that when margins increase between seed and commercial production seed companies have to compensate maize seed producers<sup>14</sup>. All these factors give rise to upward pressure on seed prices.

When monitoring seed prices it is important to take into account that seed cultivar development leads to continuous cultivar improvements. This causes difficulties with the monitoring of a “basket” of seed prices over time since new seeds enter the seed “basket” continuously. The differences between cultivars of the various seed companies create further difficulties to make comparisons and to construct a comparable seed “basket”. Hence, the information depicted in Figure 12 only provides a general trend.

Figure 12 shows the PPI-Maize, PPI-Wheat and the Maize and Wheat seed price indices. The Maize seed price index increased by 62.4 percent from 2000 to 2007, while the PPI-Maize increased by 165.3 percent. During this period the PPI-Maize showed much more movement with a 56 percent increase during 2002, and a decrease of 42 percent from 2002 to 2005. The PPI-Maize increased from 2005 to 2007, with 123.1 percent compared to an increase of 8.8 percent in the seed price index.



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

Source: PPI-Maize & PPI-Wheat, DoA 2008; Seed price index, Grain SA, 2008.

<sup>11</sup> The development of parent seed and the cost thereof occur almost two years prior to the selling of the seed. During this period there is also the production cost of growers a year in advance. Another reason is the cost of carrying stocks and seed, while it only has a shelf life of three years.

<sup>12</sup> Note that production of seed is highly labour intensive, while any labour availability problems can lead to crop losses. Also seed production is done under irrigation in areas that are dry and hot to limit the occurrence of diseases on breeding material.

<sup>13</sup> It is reported that yields vary between 3 to 4 tons per hectare to produce seed under irrigation.

<sup>14</sup> Based on information obtain from interviews with industry role-players.

The Wheat seed price index increased by 83.2 percent from 2000 to 2007, compared to a 126.3 percent increase in the PPI-Wheat.

Tractor sales represent 60 percent of all machinery sold in South Africa. Of this 97 percent is imported due to economies of scale related issues.

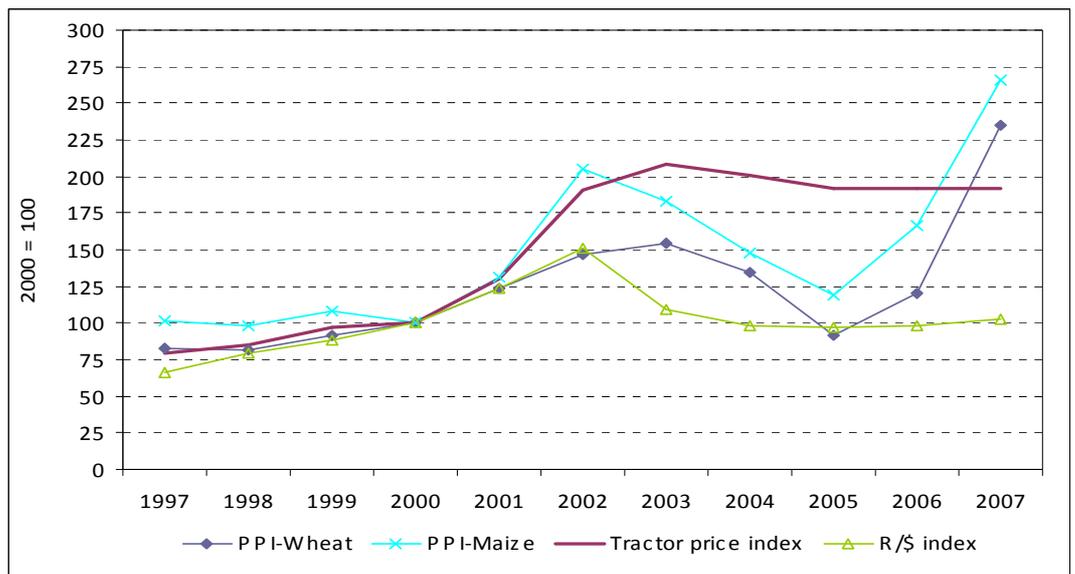
Tractor prices were 140.5% higher in 2007 than in 1997.

Figure 12 further shows that the Wheat seed price index increased by 83.2 percent from 2000 to 2007, while the PPI-Wheat increased by 126.3 percent. During this period the PPI-Wheat also showed much more movement with a 39.2 percent increase during 2002, and a decrease of 28.8 percent from 2002 to 2005. The PPI-Wheat increased from 2005 to 2007, by 90 percent compared to an increase of 19.6 percent in the seed price index.

### Changes in tractor prices

Tractor sales represent 60 percent of all machinery sold in South Africa. Of this, 97 percent is imported due to economies of scale related issues. It is reported that machinery (read tractor) purchasing patterns by maize producers changed significantly over the last two to three years. Factors that impact on tractor prices include competition between tractor manufacturers (wider range of models), exchange rate movements and the rand per kilowatt (R/kW); the latter increased significantly as a result of new technologies that were introduced.<sup>15</sup>

Figure 13 shows the price index for tractors<sup>16</sup>, PPI-Maize, PPI-Wheat and the R/\$ index. The price index for tractors increased by 140.5 percent from 1997 to 2007, while PPI-Maize and PPI-Wheat increased by 161.1 and 186 percent, respectively. Due to the large proportion of imports, the exchange rate is expected to have a significant impact on tractor prices. The downward stickiness depicted in the price index for tractors between 2002 and 2003 can probably be attributed to tractors being ordered by local distributors during periods of higher prices that were not sold during the same period.



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

Source: PPI-Maize & PPI-Wheat, DoA 2008; Tractor price index, Grain SA, 2008.

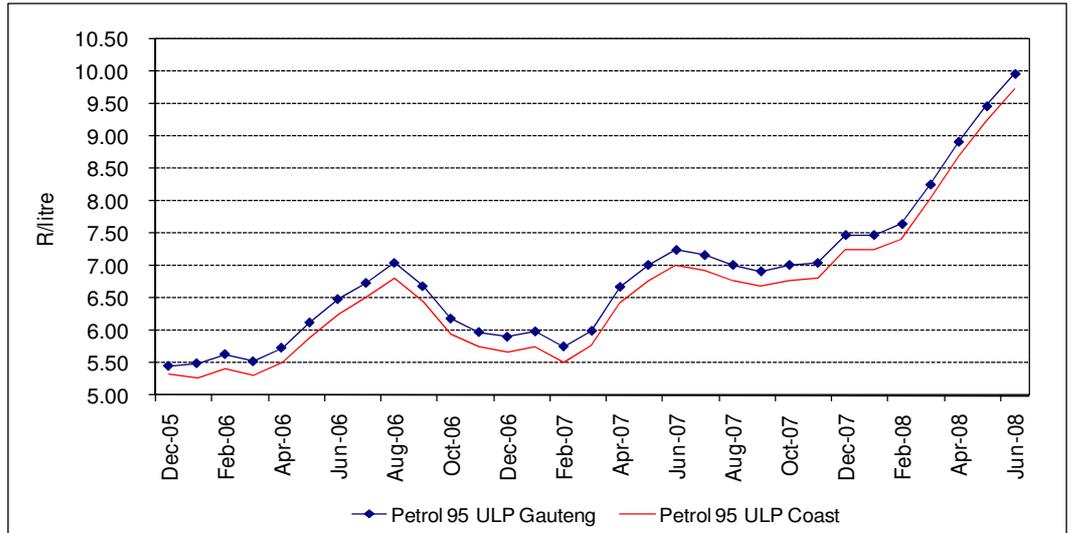
### Changes in fuel prices

Figure 14 shows the prices of petrol from December 2005 to June 2008. During the depicted period, Petrol 95 ULP Gauteng and Petrol 95 ULP Coast prices increased by 82.8 and 82.7 percent respectively. When looking at the current prices in comparison with June 2007, the increases were 37.6 and 38.9 percent, respectively.

<sup>15</sup> Based on information obtained from interviews with Agfacts, Jim Rankin.

<sup>16</sup> Recommended retail prices, excluding personal discounts.

In June 2008 petrol was on average 38.2 percent higher than in June 2007.

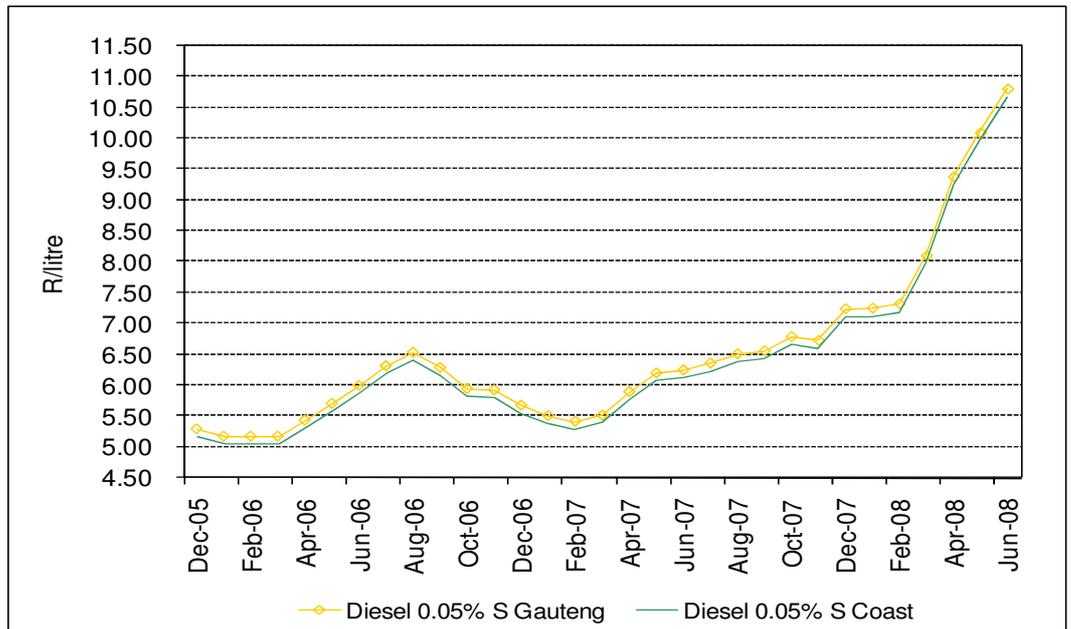


**Figure 14: Petrol prices**

Source: South African Petroleum Industry Association (SAPIA), 2008.

Figure 15 shows the prices of diesel 0.05% S Gauteng and diesel 0.05% S Coast from December 2005 to June 2008. During the depicted period the prices of diesel 0.05% S Gauteng and diesel 0.05% S Coast increased by 103.9 and 106.5 percent, respectively. Comparing year on year for June 2008 prices increased by 72.8 and 74.4 percent, respectively.

In June 2008 petrol was on average 38.2 percent higher than in June 2007.



**Figure 15: Diesel prices**

Source: South African Petroleum Industry Association (SAPIA), 2008.

Summer grain harvesting:  
Increase of R91 per hectare due to diesel price increase.

To explore the impact of the increase in diesel prices, consider the following example with prices in Gauteng. A summer grain producer that needs to harvest uses approximately 20 litres per hectare to harvest and transport the grains to the silo. The price increase during June 2008 will therefore result in an increase in cost of R91 per hectare for diesel in comparison to June 2007. Based on the 2006/07 production year's final total hectares planted, the additional diesel cost to harvest summer grain (mainly maize) amounts to approximately R232.2 million.

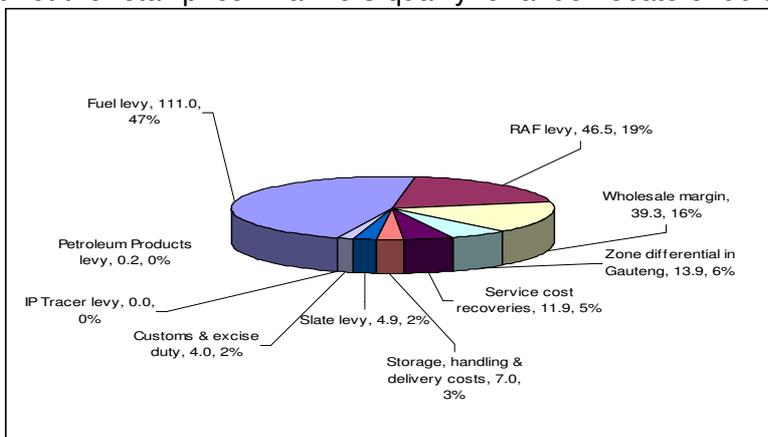
Winter grain planting: Increase of R250 per hectare due to diesel price increase.

Farmers qualify for a fuel rebate of 90.9 c per litre (April 2008) on 80% of consumption.

The wheat producer that needs to plant this season's crops will use approximately 55 litres per hectare to produce wheat. The price increase during June 2008 will therefore result in an increase of R250 per hectare for diesel in comparison to June 2007. Based on the 2007/08 production year's estimated planting, the additional diesel cost to plant winter cereals (mainly wheat) amounts to approximately R158.2 million.

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 combined with the Rand/Dollar exchange rate therefore have a major impact on fuel prices (Department of Mineral and Energy, 2008). The fuel pump price is made up of certain international and domestic price elements. The international element, or Basic Fuel price (BFP), is based on the import parity principal (the cost for a South African importer of fuel to buy the fuel from an international refinery, transport the product from that refinery, insure the product against losses at sea, and land the product on South African shores). To arrive at the final pump price in the different pricing zones (magisterial district zones) certain domestic transport costs, government imposts (or taxes and levies) and retail and wholesale margins need to be added to the international price. The petrol retail price is regulated by government. The Central Energy Fund (CEF) is responsible for the price calculation (on behalf of the Department of Minerals and Energy). Changes in margins and the transport element are based on actual costs incurred by the South African industry and calculated according to a formula (approved by the Minister of Minerals and Energy) (iFleet, 2007).

For the period 2 April to 6 May 2008 the wholesale price for Diesel 0.005%S was 943.7 cent per litre. The Basic Fuel Price amounted to 717.03 c/l. Figure 16 shows the breakdown of the other 226.67 cent per litre. The wholesale price of diesel is regulated but not the retail price. Farmers qualify for a fuel rebate of 90.9 c per litre (April 2008) on 80% of consumption, calculated as follows: The RAF (Road Accident Fund) levy (46.5 c per litre) plus 40% of the fuel tax (111 c per litre).



**Figure 16: Breakdown of (Gauteng) diesel wholesale price: 938.30 c/l on 2 April 2008 (0.05% sulphur content) – price (c/l); percentage (%) of total price**

Source: Department of Minerals and Energy, 2008.

**Disclaimer:**

Although everything has been done to ensure accuracy of the information in this publication, the NAMC does not take responsibility for the accuracy or the opinions contained in this publication. Results of action based on this information, will not be the responsibility of the NAMC.

## 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 fertiliser, 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 & Equipment:
Fertiliser & Lime	Depreciation
Herbicides	Interest
Insecticides and fungicides	Fixed improvements:
Fuel	Interest
Maintenance and repairs	Depreciation
Crop insurance	Repairs & maintenance
Casual labour	
Marketing cost	
Drying & cleaning cost	
License & 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.

<b>Variable cost</b>	<b>Capital cost</b>
Seed	Machinery & Equipment:
Fertiliser & Lime	Depreciation
Herbicides	Interest
Insecticides en fungicides	Fixed improvements:
Fuel	Interest
Maintenance and repairs	Depreciation
Crop insurance	Repairs & maintenance
Casual labour	
Marketing cost	
Drying & cleaning cost	
License & 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 cost of crop insurance, marketing, drying and cleaning, license and insurance, and contract work.

## Appendix D: Impact of expanding the replacement period on return on investment

Table D1: Impact of mechanization structure expanding normal replacement trend of 12 years to 20 years in selected wheat producing areas

REGION		YIELD VARIATION DUE TO CLIMATE			IRR
		POOR	AVERAGE	GOOD	
<b>SWARTLAND</b>					
MIDDLE SWARTLAND (12 years) #	FREQUENCY*	1	7	2	
**FARM SIZE: 800HA	WHEAT YIELD (T/HA)	1.8	2.4	3.0	
	***GPV (R/HA)	2032.85	2609.28	3162.92	
	GROSS MARGIN (R/HA)	695.17	1394.94	1557.33	
	GROSS MARGIN %	34.20%	53.46%	49.24%	
	NET FARM INCOME (R/HA)	-216.21	483.56	645.95	2.10%
<b>SWARTLAND</b>					
MIDDLE SWARTLAND (20 years) ##	FREQUENCY*	1	7	2	
**FARM SIZE: 800HA	WHEAT YIELD (T/HA)	1.8	2.4	3.0	
	***GPV (R/HA)	2032.85	2609.28	3162.92	
	GROSS MARGIN (R/HA)	695.17	1394.94	1557.33	
	GROSS MARGIN %	34.20%	53.46%	49.24%	
	NET FARM INCOME (R/HA)	-162.56	537.20	699.60	3.49%
<b>SWARTLAND</b>					
ROOI KAROO(12 years)	FREQUENCY*	3	6	1	
**FARM SIZE: 980HA	WHEAT YIELD (T/HA)	0.7	1.3	2.0	
	***GPV (R/HA)	1236.82	1642.52	211.84	
	GROSS MARGIN (R/HA)	523.22	836.74	1345.73	
	GROSS MARGIN %	42.30%	50.94%	63.60%	
	NET FARM INCOME (R/HA)	44.71	358.24	867.22	2.23%
<b>SWARTLAND</b>					
ROOI KAROO (20 years)	FREQUENCY*	3	6	1	
**FARM SIZE: 980HA	WHEAT YIELD (T/HA)	0.7	1.3	2.0	
	***GPV (R/HA)	1236.82	1642.52	211.84	
	GROSS MARGIN (R/HA)	523.22	836.74	1345.73	
	GROSS MARGIN %	42.30%	50.94%	63.60%	
	NET FARM INCOME (R/HA)	70.32	383.84	892.83	3.36%
<b>SOUTHERN CAPE</b>					
MIDDLE RUENS (12 years)	FREQUENCY*	2	5	3	
**FARM SIZE: 1600HA	WHEAT YIELD (T/HA)	1.8	2.2	2.5	
	***GPV (R/HA)	2030.41	2317.80	2536.67	
	GROSS MARGIN (R/HA)	460.69	765.12	935.93	
	GROSS MARGIN %	22.96%	33.01%	36.90%	
	NET FARM INCOME (R/HA)	-127.53	176.89	347.71	1.05%
<b>SOUTHERN CAPE</b>					
MIDDLE RUENS (20 years)	FREQUENCY*	2	5	3	
**FARM SIZE: 1600HA	WHEAT YIELD (T/HA)	1.8	2.2	2.5	
	***GPV (R/HA)	2030.41	2317.80	2536.67	
	GROSS MARGIN (R/HA)	460.69	765.12	935.93	
	GROSS MARGIN %	22.96%	33.01%	36.90%	
	NET FARM INCOME (R/HA)	-56.71	247.72	418.53	2.40%

# Indicate the farm model with normal machinery replacement period

## Results for situation where machinery is kept longer than the normal replacement period