Input cost monitor: The story of potatoes

March 2009

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 led to, for example, 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 entire 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 table potatoes. Note should be taken that for the purpose of this report all regulated inputs, such as fuel prices and labour cost are largely excluded.

In this report the following issues are reported: (i) broad trends in input cost movements for the potato industry, (ii) the contribution of different variable input costs to total production cost of table potatoes 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 vegetables, and more specifically on potatoes.

Trends from 1997 to 2008:

PPI - Potatoes: ↑ 141.8 %.

PPI - Vegetables: ↑ 170 %

PPI - Total: ↑ 148.6 %.

FRPI - Total: ↑ 159.2 %.

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

Figure 1 shows trends for different input and output price indices from 1997 to June 2008. From the graph it is noticeable that the Producer Price Index for Potatoes (PPI - Potatoes) has showed much more variability since 2001 than the other indices. The PPI - Potatoes increased by 141.8 % from 1997 to 2008, while the price indices for All Vegetables (PPI - Vegetables) and All Agricultural Products (PPI - Total) increased by 170 % and 148.6 %, respectively. During the same period, the All Farming Requisites Index (FRPI - Total) increased by 159.2 %.

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

- PPI - Potatoes: 3.4 % decrease
- PPI - Vegetables: 2.6 % decrease
- PPI – Total: 14.3 % increase
- FRPI – Total: 22.9 % increase

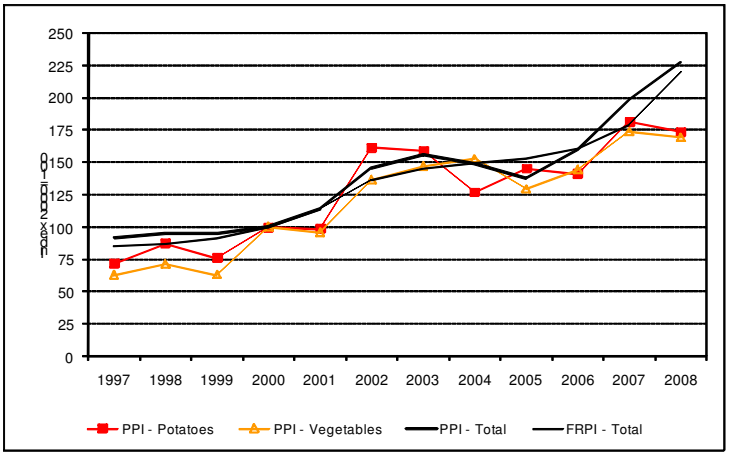

Figure 1: Comparison of various Price Indices, 1997 to 2008[1]

Source: DoA, 2009.

[1] 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 1997 to 2008:
PPI - Potatoes: ↑ 141.8 %.
Fertiliser: ↑ 376.7 %.
Fuel: ↑ 379.2 %.
Maintenance & repairs: ↑ 158.7 %.
Packaging material: ↑ 68.3 %.

Figure 2 shows trends in the PPI - Potatoes and selected intermediate inputs from 1997 to 2008 (Note: intermediate inputs are part of the overall FRPI - Total). The intermediate inputs included are fertiliser, fuel and crop protection, maintenance and repairs and packaging material.

All the indices show an increasing trend over the depicted period. The PPI-Potatoes shows higher variability (particularly from 2001 onwards) compared to the other price indices depicted.

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

- PPI - Potatoes: 4.3 % decrease
- Fertiliser: 76.8 % increase
- Fuel: 78 % increase
- Packing material: 33.6 % increase
- Maintenance and repairs: 13.2 % increase

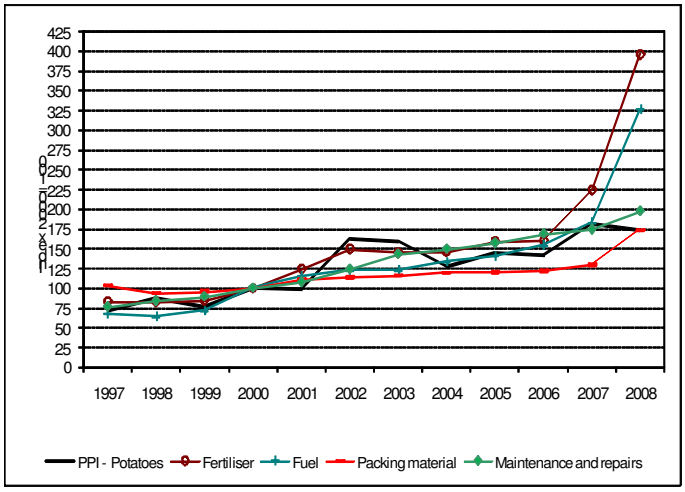

Figure 2: Trends in the PPI - Potatoes versus selected intermediate inputs

Source: DoA, 2009.

Contribution of different variable input cost items to total production cost of table potatoes

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

Figure 3 shows the average percentage contribution of selected variable input costs to total production cost in selected potato production regions mentioned in footnote 2. For the period under consideration, seed cost contributed on average 18 % to total production cost (between 15.3 and 20.3 %), but its contribution to total production cost is showing a declining trend.

[2] For table potatoes, variable input cost information were available for six irrigation production areas. These are the North-West Province, the Southwest Free State, KwaZulu-Natal, Sandveld, Limpopo and Mpumalanga.

In terms of contribution to total variable cost over the last 3 years:

Seed cost - downward trend.

Fertilisation - upward trend.

Insecticides - fungicides and seed treatment remained more or less the same.

Market commission and transport cost to markets - downward trend.

Expenditure on fertilisers is the highest in the Sandveld region.

Expenditure on seed is the highest in Limpopo.

Transport cost to markets was the highest in the Limpopo Province and the Northwest.

Fertilisation contributed just over 14 % and showed an increasing trend in terms of its contribution to total production cost. Market commission and transport to market costs showed a decrease in their contribution to total production cost, while the cost for insecticides, fungicides and seed treatment remained more or less 10 % of total production cost.

Mechanisation (including fuel) and labour contributed, on average, 8.8 % to the total production cost.

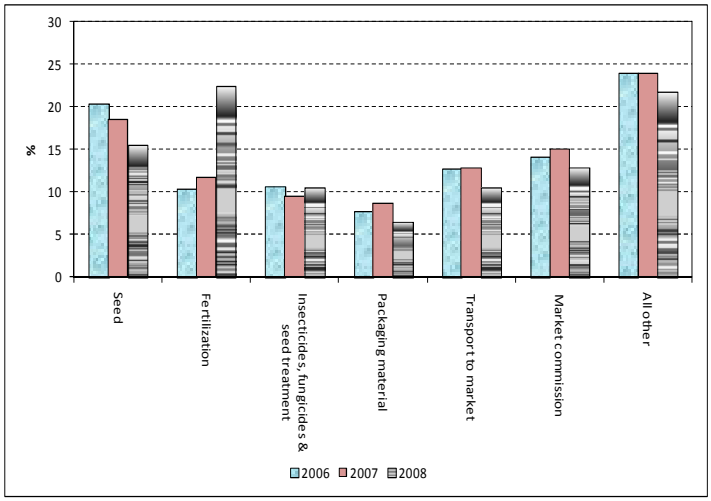

Figure 3: Average percentage contribution of individual variable cost items to total production cost

Source: Own calculations based on data from PotatoSA.

When comparing the variable input cost items per production area for the 2008 production season, it can be seen from Figure 4 that producers in the Sandveld region have the largest expenditure on fertilisers, which contributed 27 % to total production cost. In the Eastern Free State under dryland conditions expenditure on fertilisers was the lowest, contributing 13 % to total production cost. In Limpopo seed expenses as percentage of total production cost was highest, while in the Sandveld area it was lowest. In the Limpopo region transport cost to markets as percentage of total production cost was highest (16.7 %) followed by Northwest with 14.2 %.

Insecticides, fungicides and seed treatment expenses as percentage of total production cost were highest in the Eastern Free State under dryland conditions, at 16.7 %, followed by Mpumalanga at 14.6 %.

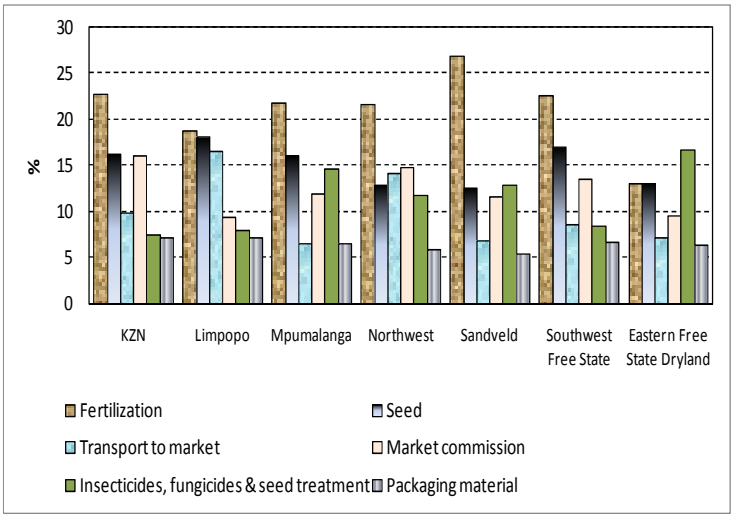

Figure 4: Comparison of the contribution of different variable input cost items to total production cost in different table potato production regions (2008)

Source: Own calculations based on data from PotatoSA, 2008

The price indices for 2:3:4(30), 1:0:1(36), 4:3:4(33), Ammonium sulphate 21 % increased significantly more than the price indices for potatoes from 2000 to 2008. Price increase was more than 300 % and in some cases more than 400 %.

During the first two months of 2009 the depicted fertiliser prices showed the following changes:

2:3:4(30): 6.8 % decrease

1:0:1(36): 18.1 % increase

4:3:4(33): 1.2 % decrease

Ammonium sulphate 21 %: 6.1 % increase

Changes in fertiliser costs

During discussions with various role-players in the potato industry, a number of fertilisers were identified for inclusion in this report, based on the relative ease of sourcing their price information and their wide usage. To ensure easy interpretation of the data presented, price movements of the identified fertilisers are presented in Figures 5a and 5b. The PPI for Vegetables (PPI - Vegetables) and PPI - Potatoes are also included.

Figure 5a shows that the trends for the items represented are generally upwards. Price increases for these items between 2000 and 2008 were as follows:

- 2:3:4(30): 468.7 % increase
- 1:0:1(36): 405 % increase
- 4:3:4(33): 476.7 % increase
- Ammonium sulphate 21 %: 340.7 % increase
- PPI - Vegetables: 69.3 % increase
- PPI - Potatoes: 73.7 % increase

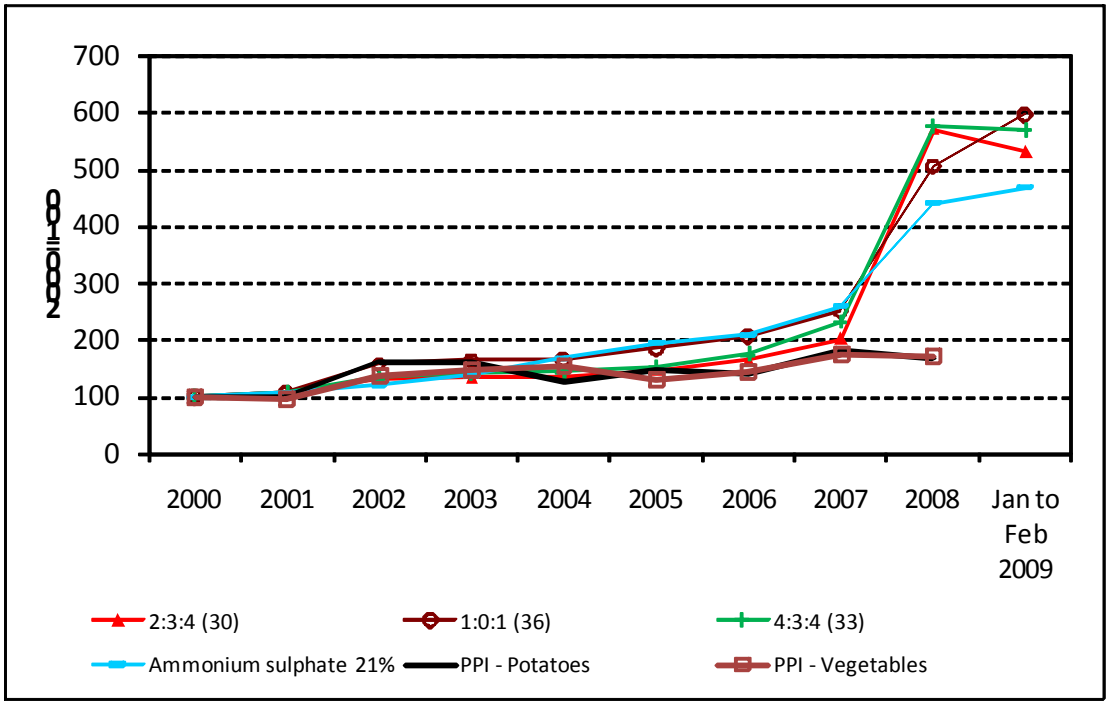

Figure 5a: Price indices for different fertiliser products compared to the PPI - Vegetables and PPI - Potatoes[3]

Source: DoA, 2009 and own calculations from list prices.

[3] PPI – Vegetables and PPI – Potatoes not available for January to February 2009

The price indices for LAN(28), Supers(10.5), Urea Prill(46) and Potassium Nitrate increased significantly more than the price indices for potatoes from 2000 to 2008.

During the first two months of 2009 the depicted fertiliser prices showed the following changes:

LAN(28): 7.6 % decrease

Supers(10.5): 40 % decrease

Urea Prill(46): 10.3 % decrease

Potassium Nitrate: 15 % increase

South Africa's demand for fertiliser is in the region of 2 million tons. To supply this demand, more than half of the fertilisers are imported.

Figure 5b shows that the trends for the items represented are also generally upwards. Price increases for the items depicted between 2000 and 2008 were as follows:

- LAN(28): 334.5 % increase
- Supers(10.5): 575.2 % increase
- Urea Prill(46): 332.5 % increase
- Potassium Nitrate: 284.7 % increase
- PPI - Vegetables: 69.3 % increase
- PPI - Potatoes: 73.7 % increase

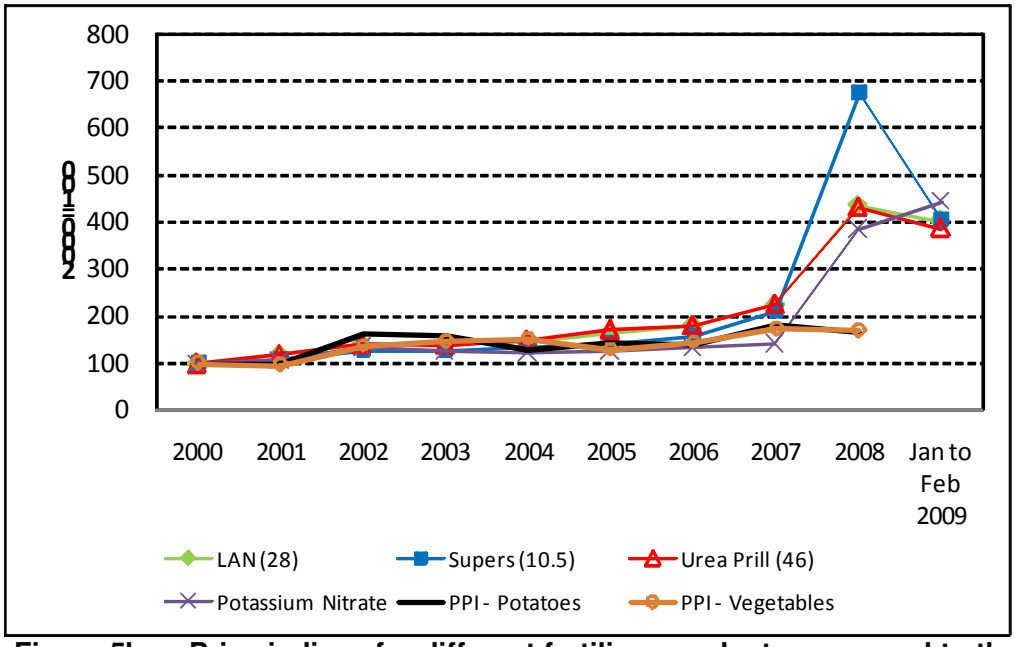

Figure 5b: Price indices for different fertiliser products compared to the PPI - Vegetables and PPI - Potatoes

Source: DoA, 2009 and own calculations from list prices.

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. For more detail on imports of fertilizer, the reader is referred to other Input cost monitors[4].

Figure 6 indicates the international price trends for fertilisers. Note should be taken that the international prices were expressed in R/ton before converting them into an index, which provides a proxy for import parity prices for fertilisers. Also note 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; hence the reason that the depicted prices can only be used as a proxy for price trends. Furthermore, international fob prices used differ from the usual port of origin for imports, but trends and general price levels are similar.

[4] The reader is referred to the Input cost monitor: The story of maize and wheat at www.namc.co.za

Imbalance between global fertiliser demand and supply and significant increases in oil prices was the main drivers of higher fertilizer prices.

Price movements from February 2008 to February 2009 were as follows:

Ammonia 54.5 % decrease.
Urea 2.7 % increase.
DAP 44.6 % decrease.
MOP 183.6 % increase.
R/$ exchange 31.3 % depreciation.

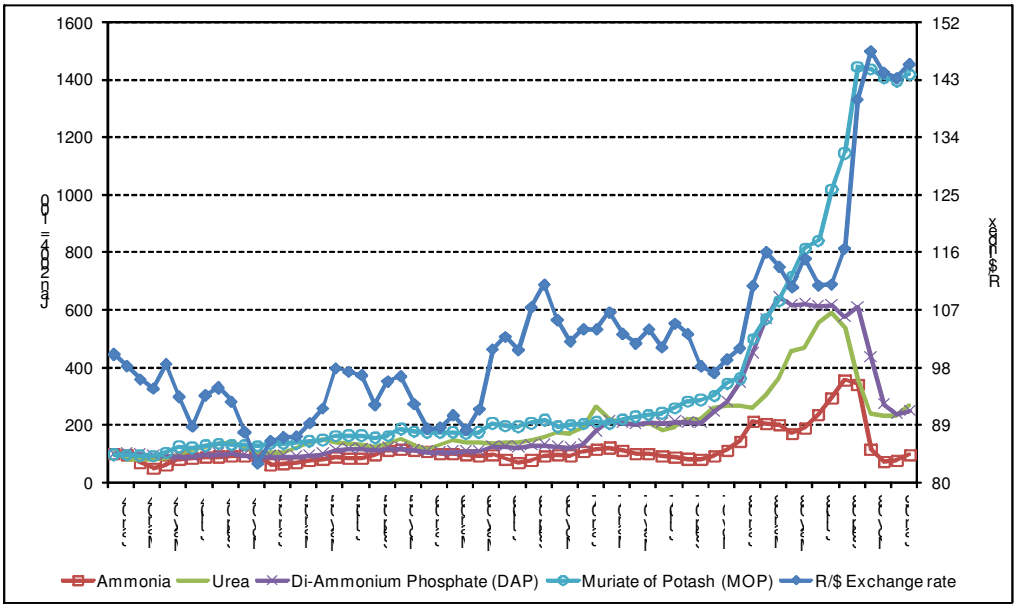

Figure 6: International price indices for different fertiliser products expressed in R/ton

Source: GrainSA, 2008.

It is clear from Figure 6 that the international prices all moved sideways until the end of 2007, after which unprecedented escalations took place. This was mainly due to imbalance between global fertiliser demand and supply and significant increases in oil prices. The drop in oil prices combined with global economic problems caused most fertiliser prices to decline towards the end of 2008.

Between January 2004 and February 2009 price increases for the items depicted were as follows:

- Ammonia[5] 3.2 % decrease
- Urea[6] 166.4 % increase
- Di-Ammonium Phosphate (DAP)[7] 149 % increase
- Muriate of Potash (MOP)[8] 1317.6 % increase
- R/$ exchange 45.4 % depreciation.

Between February 2008 and February 2009 price changes for the items depicted were as follows:

- Ammonia 54.5 % decrease
- Urea 2.7 % increase
- DAP 44.6 % decrease
- MOP 183.6 % increase
- R/$ exchange 31.3 % depreciation.

[5] Ammonia price is fob, Middle East in bulk.
[6] Urea price is fob, Eastern Europe in bulk.
[7] DAP price is fob, US Gulf in bulk.
[8] MOP price is fob, CIS in bulk.

Urea prices are directly affected by the price of natural gas which is, in turn, influenced by the price of oil.

Figure 7 depicts the price of Brent crude oil from January 2004 to January 2009. The price of oil increased steadily between 2004 to beginning of 2007, after which it increase rapidly to mid 2008. Over the depicted period, the price of oil increased by 45.1 % when expressed in $/barrel and by 108.1 % expressed in R/barrel. From July 2008 to January 2009 oil prices decreased by 66.9 and 57.2 %, respectively.

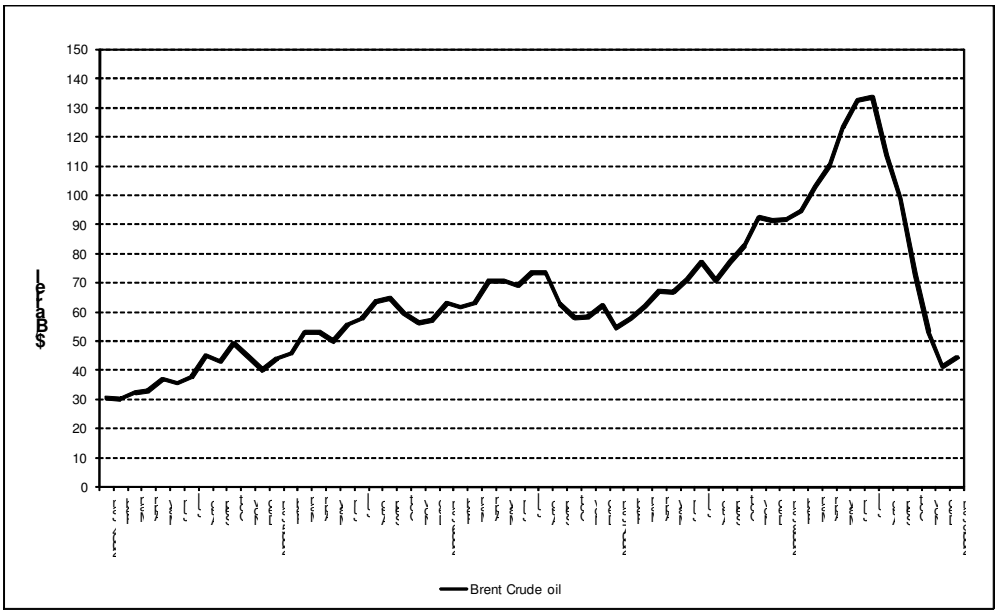

Figure 7: Price of Brent crude oil from 2004 to 2009
Source: GrainSA, 2009.

Other factors that influence the local market price for fertilisers are the variability of local demand and stocks and shipping fees. In terms of the latter the Baltic Dry Index is used as a proxy of international shipping costs.

The Baltic Dry Index is a shipping and trade index created by the London-based Baltic Exchange that measures changes in the cost of transporting raw materials such as metals, grains and fossil fuels by sea[9]. The Baltic Exchange directly contacts shipping brokers to assess price levels for a given route, product to transport and time to delivery (speed).

The Baltic Dry Index is a composite of three sub-indexes that measure different sizes of dry bulk carriers (merchant ships) - Capesize, Supramax and Panamax. Multiple geographic routes are evaluated for each index to give depth to the index's composite measurement. It is also known as the "Dry Bulk Index".

According to Investopedia, the changes in the Baltic Dry Index can give investors insight into global supply and demand trends. This index is often considered a leading indicator of future economic growth (if the index is rising) or contraction (if the index is falling) because the goods shipped are raw, pre-

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Other factors that influence the local market prices for fertilisers are the variability of local demand and stocks and shipping costs.

[9] Source: http://www.investopedia.com/terms/b/baltic_dry_index.asp

Changes in the Baltic Dry Index give investors insight into global supply and demand trends.

After extreme highs in late 2007 and early 2008 the Baltic Dry Index declined significantly to reach a low in November 2008.

In January 2009 diesel prices was on average 9.9 percent lower than in January 2008.

production material, which is typically an area with very low levels of speculation. Because the supply of large carriers tends to remain very tight, with long lead times and high production costs, the index can experience high levels of volatility if global demand increases or drops off suddenly.

Figure 8 takes a closer look at the Baltic Dry Index, which is a general barometer for shipping costs associated with imports of fertilisers by South Africa. It is clear that the index experienced a significant increase from August 2007 to November 2007, after which it declined to its previous level in February 2008 to increase again to a high in May 2008. Thereafter the index experienced a significant decline to reach a low in November 2008. The index showed an increase again from January 2009.

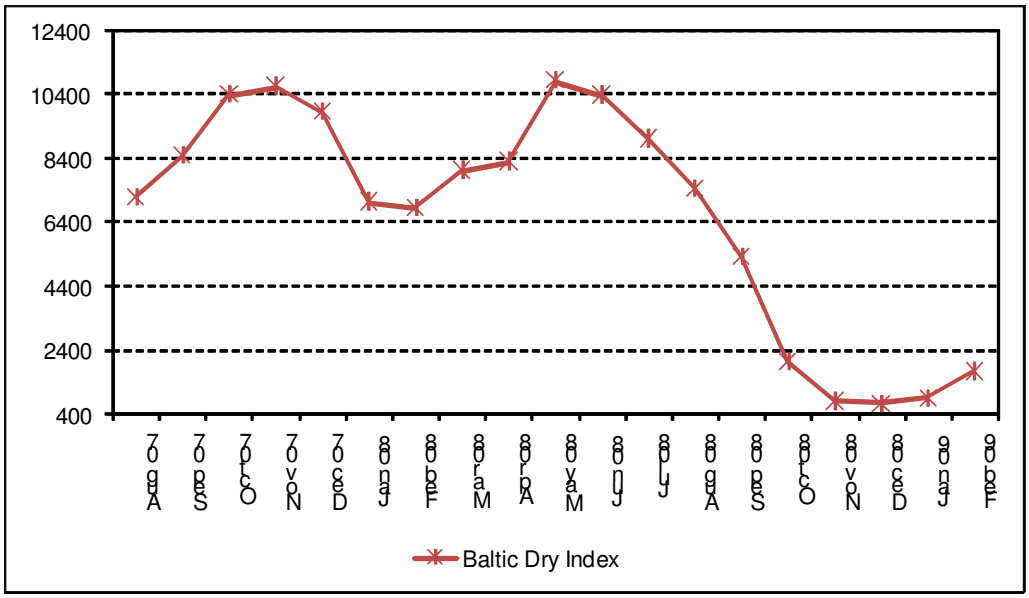

Figure 8: Baltic Dry Index
Source: SAGIS, 2009

Changes in fuel prices

Figure 9 shows the prices of diesel 0.05% S Gauteng and diesel 0.05% S Coast from January 2006 to January 2009. During the depicted period the prices of diesel 0.05% S Gauteng and diesel 0.05% S Coast increased by 26.4 and 26.8 percent, respectively. Comparing year-on-year for January 2009 prices decreased by 9.8 and 10.1 percent, respectively.

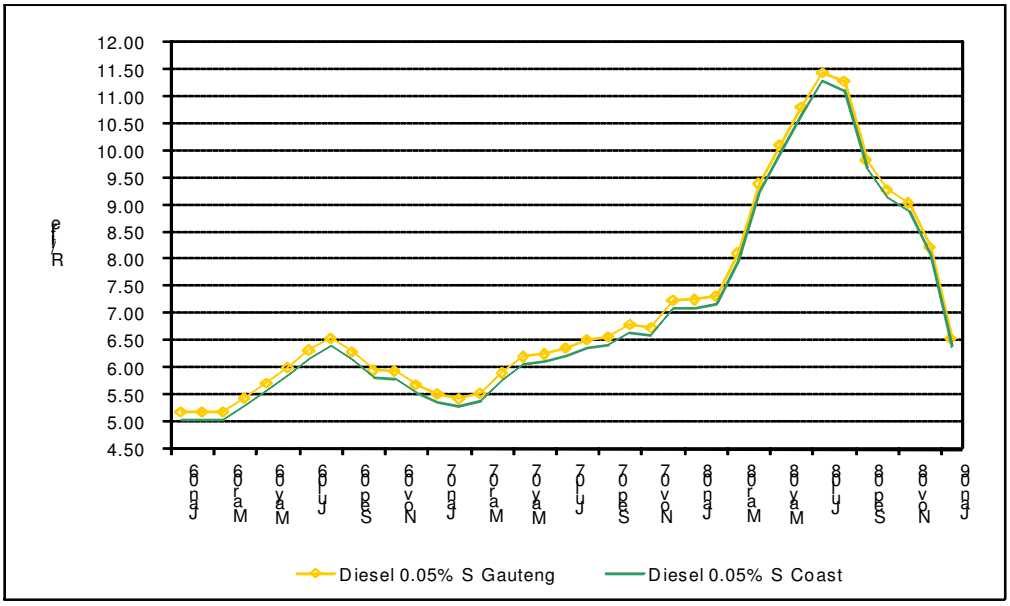

Figure 9: Diesel prices
Source: South African Petroleum Industry Association (SAPIA), 2009.

The additional diesel cost incurred to produce the 2008 potato crop amounted to approximately R43.5 million.

To illustrate the impact of the increase in diesel prices, consider the following example. A potato producer uses approximately 250 litres of diesel per hectare per crop for the production process and general farm transport. Based on the total hectares planted to potatoes and an average price of R5.65 and R9.20 per litre of diesel during 2006 and 2008, respectively, the additional diesel cost incurred to produce the 2008 potato crop amounted to approximately R43.5 million.

Changes in pulp prices

The price of pulp as input to paper is based on international prices, global market conditions and the R/US$ exchange rate.

The price of pulp as input to paper is based on international prices, global market conditions and the R/US$ exchange rate. For further information on the trends of pulp prices, the reader is referred to other input cost monitors by the NAMC[10].

Changes in paper prices

The price of sack craft paper is driven by supply and demand as well as the price of pulp. Figure 10 shows the price trend of Bleached wet strength and Brown wet strength paper from July 2005 to July 2008. The sack craft paper for the potato market in South Africa is estimated at 13 000 tons, of which the brown (unbleached) is the most commonly used. South Africa imported all of the white (bleached) paper until very recently (SAPPI started to produce some locally).

It is clear from Figure 10 that the price of bleached and brown wet strength paper moved upward during the depicted period and increased by 55.6 and 67.9 %, respectively.

[10] Input cost monitor: The story of fruit at www.namc.co.za

Price movement of paper from July 2005 to July 2008 was as follows:

Bleached: 55.6 % increase.

Brown: 67.9 % increase.

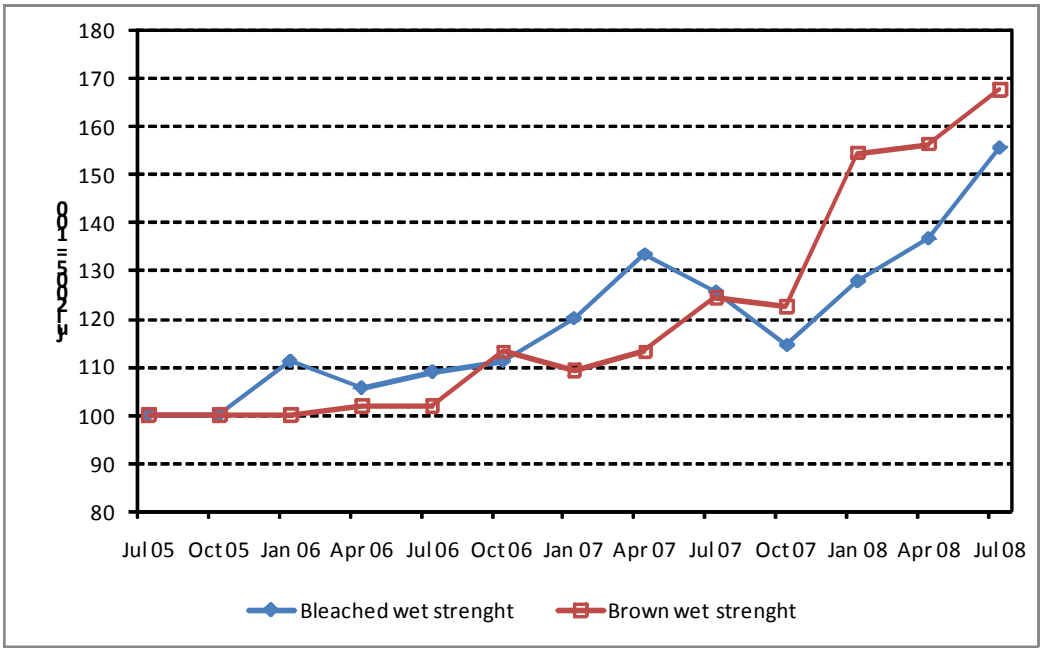

Figure 10 Price indices of paper (July 2005=100)
Source: SAPPI and Gerber Paper, 2008.

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 - Vegetables include indices of producer prices for potatoes, onions, sweet potatoes, tomatoes, green beans, carrots, gem squashes, cabbage, lettuce pumpkins and green mealies.

PPI - Potatoes is the price index for producer prices for potatoes.

Appendix B: Composition typical of production costs

Table B.1 shows the different input cost components included in a typical input cost budget.

Table B.1: Input cost components.

Seed	Seed production: registration & lab
Fertilisation	Packaging material
Foliar feed	Transport to market
Herbicides	Market commission
Insecticides, fungicides and seed treatment	Mechanisation (implements, vehicles & pack shed)
Crop insurance	Irrigation (electricity, water and repair)
Seed transport and storage	Regular labour and hired management
Casual labour	Admin and other overheads
Consultants	Interest paid (production credit)

Appendix C: "All other" cost items

The "All other" cost category includes:

Foliar feed
Herbicides
Crop insurance
Seed transport and storage
Casual labour
Consultants
Seed production: registration and lab fees
Mechanisation (implements, vehicles and pack shed)
Irrigation (electricity, water and repair)
Regular labour and hired management
Admin and other overheads
Interest paid (production credit)