

CHAPTER 8

THE POTATO SUPPLY CHAIN

8.1 Introduction

Potatoes are the single most important vegetable product in South Africa with a total production of 1,655,000 tonnes. The estimated gross value for the 2001 potato crop was R2 billion (Statistics SA, 2002). On average, potatoes contributed over 2% to the gross value of all agricultural products in South Africa in 2001, despite the fact that they were cultivated on approximately 0,03% of the arable land. Considering the effectiveness of land use by potatoes and the indisputable value of the product, namely that it is one of the affordable staple foods in a country, it is essential to determine if potato prices are influenced by normal supply and demand forces, and to determine what the impact of the exchange rate is on the industry.

This Chapter focuses on the supply chain of potatoes, and takes into consideration the following steps: (i) production costs and farm–gate prices for potatoes; (ii) transport and marketing costs; (iii) processing costs and margins and prices paid by the consumers. Finally, the net effect of the exchange rate on potato prices is highlighted.

8.2 The Potato supply chain in perspective

The potato industry has operated under free market conditions for many years. As a result, the deregulation process of the agricultural sector during the 1990's did not have a great impact on the potato industry. The South African potato crop is marketed as seed potatoes, table potatoes and potatoes earmarked for processing. Table potatoes sold on fresh markets and directly to consumers comprise the bulk of the produce, as indicated in Table 8.1.

Table 8.1: Utilisation of the South African potato crop

Utilisation	1995		2001	
	Production (Ton)	Percentage	Production (Ton)	Percentage
Table (Local consumption)	1,065,960	71.8	1, 017,114	63.5
Seed	180,139	12.1	208,477	13.0
Processing	152,770	10.3	270,445	16.9
Exports	86,000	5.8	106,000	6.6
Total	1,484,869	100	1,602,036	100

Source: Potato SA (2002)

Figure 8.1 is an illustration of the different marketing channels for table potatoes in South Africa. A summary of volumes of different potato products and marketing channels is presented in Table 8.2

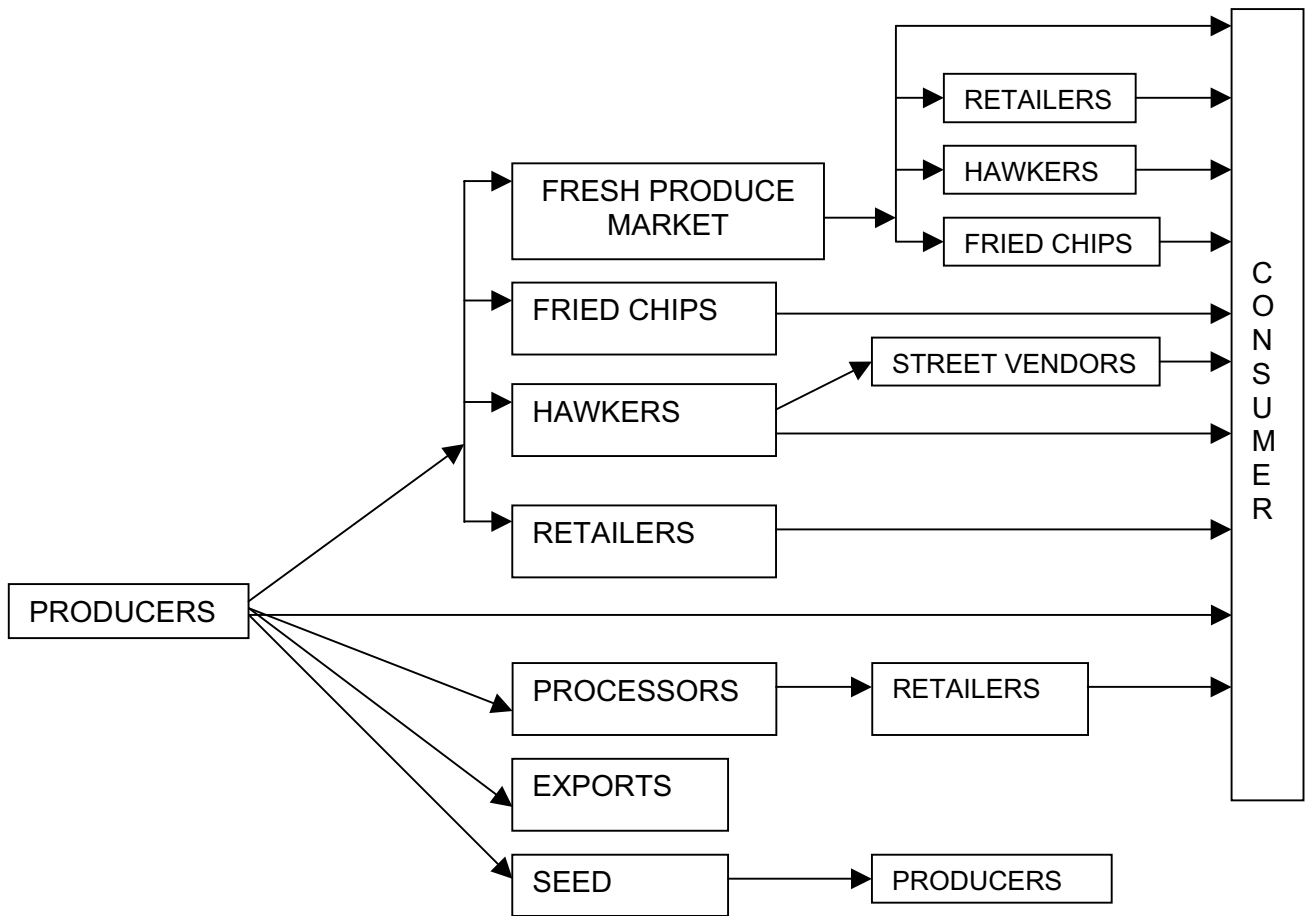


Figure 8.1: Marketing channels for table potatoes

Table 8.2: Marketing statistics

	1995	1996	1998	1999	2000	2001	2002
Fresh produce markets							
Processed	3 498 000	5 100 000	8 500 000	8 401 740	7 768 600	9 249 200	5 250 000
Exports	3 000 000	4 000 000	4 345 000	4 680 000	4 500 000	4 800 000	3 800 000
Formal	58 000 088	58 170 000	50 076 460	53 033 768	50 148 450	51 510 804	39 516 120
Informal	20 000 000	24 999 884	26 000 000	28 000 000	25 604 404	25 716 171	27 800 000
Direct							
Processed	11 779 900	16 800 000	16 576 100	19 410 020	17 850 000	17 795 300	23 210 200
Exports	5 600 000	6 000 000	6 790 200	7 320 000	5 500 000	5 800 000	8 240 000
Urban	14 700 000	15 200 000	8 859 000	9 941 000	8 000 000	7 457 000	7 554 234
Farm	4 000 000	4 200 000	6 927 877	2 861 915	2 500 000	2 000 000	1 648 000
Rural	9 900 000	8 803 688	13 553 408	18 659 645	17 432 693	16 027 456	10 692 600
Seed							
Certified	13 522 298	19 195 206	16 361 038	15 026 226	14 510 619	15 683 786	10 562 538
Uncertified	4 491 402	4 141 708	5 999 478	7 049 531	5 089 749	5 163 908	6 690 871
Total	148 491 688	166 610 486	163 988 561	174 383 845	158 904 515	161 203 625	144 964 563

At present 64,8% of table potatoes is marketed on the 18 fresh produce markets and, from there, between 35% and 40% is channelled through the informal sector. Informal trading creates an enormous welfare effect, because the bulk of these potatoes are pre-packed and distributed further in city centres and townships. The 35,2% potatoes not marketed on the fresh produce markets are designated either for export, processing or direct trade.

Table potatoes

Table 8.3 indicates the various fresh produce markets and the volume of table potatoes traded on these markets for the 2001/2 and 2002/3 seasons. It is significant that the turnover increased with an average of 42% and the supply decreased with an average of 16% between the two seasons.

Seed potatoes

There are approximately 400 seed growers in South Africa, who produce seed potatoes throughout the year. The certified yield per hectare has increased constantly over the past few years.

Table 8.3: Sales volumes of the different fresh produce markets for the 2001/2 and 2002/3 seasons (Potato SA, 2003)

	Turnover (Rand)			Mass (Ton)			R/ton		
	2001/2	2002/3	% change	2001/2	2002/3	% change	2001/2	2002/3	% change
Johannesburg	33245147	481002347	44.7	235793	207064	-1.2	1409.05	2322.96	65
Pretoria	157629550	226785437	45.14	116697	100652	-14	1350.76	2273.04	68
Cape Town	160768525	226786	41.45	120821	98557	-18	1330.63	2307.4	73
Durban	138077927	193194182	39.92	104058	88318	-15	1326.93	2187.48	65
East London	35530270	48555247	36.66	26200	20438	-22	1356.117	2375.734	75
Pietermaritzburg	44143694	64272821	45.6	38511	32668	-15	1146.262	1967.455	72
Springs	64168295	96172362	49.88	49169	43338	-12	1305.056	2219.123	70
Port Elizabeth	50824118	64845046	27.59	35736	27237	-24	1422.211	2380.77	67
Klerksdorp	45413996	63643890	27.59	35736	28629	-19	1270.819	2223.057	75
Bloemfontein	32756913	45622152	39.27	25814	19676	-24	1268.959	2318.67	83
Vereeniging	25993901	35626287	37.06	19865	16051	-19	1308.528	2219.568	70
Welkom	20609420	29517690	43.22	1663	13659	-18	12392.92	2161.043	17
Witbank	5856310	8031584	37.14	4684	3616	-22	1250.28	2221.124	78
Kimberley	13166835	19439918	47.64	10698	8705	-19	1230.775	2233.19	81
Uitenhage	12499462	20069877	18.2	24794	15815	-36	504.1325	1269.041	52
Nelspruit	30653232	36231401	18.2	24794	15815	-36	1236.317	2290.952	85
Total	1170337802	1662421307	42.05	873982	733173	-16	1339.087	2267.434	69

Table 8.4: Seed potato production

Season	Registered plantings	Certified yield
	(Hectares)	(25 kg bags)
1999/2000	9 637,89	5 162 691
2000/2001	9 505,16	4 977 970
2001/2002	8 398,81	4 230 954
2002/2003	8 437,05	3 931 849

Registered seed potato production is executed on 8,000 to 10,000 ha, annually, in six main areas. The annual certified yield amounts from 4,000,000 to 5,200,000 x 25 kg bags. Seed potato production, therefore, comprises approximately 13% of the total potato production. During 2001, approximately 82% of the total potato crop was planted with certified seed in comparison to 74% during 1995 and 50% during 1985.

The import into the country of conventional seed potatoes is not allowed due to the high risk of importing tuber-borne diseases, which will place the local industry at risk. *In vitro* materials as well as mini-tubers from approved institutions are imported, however, to establish new varieties in South Africa.

Processed potatoes

The South African potato processing industry grew by more than 100% from 1991 to 1995. This growth took place primarily in the three main disciplines in the processing industry, namely frozen fries, fresh fries and crisps. During the past five years, this growth slowed down, mainly for economic reasons, and also because there was a shortage of good quality potatoes for processing. The growth that took place since 1991 can be ascribed largely to the following factors:

- €# the changes in economic circumstances
- €# the expansion of the fast-food industry
- €# the higher average income of the population
- €# the rapid rate of urbanisation
- €# the influx of international processing companies

The potato processing industry can be divided into the areas shown in Figure 8.2.

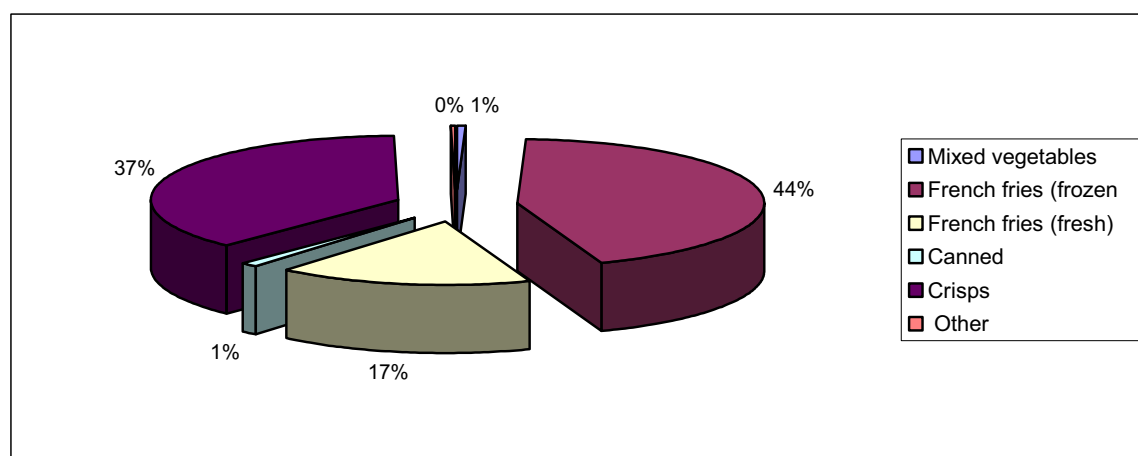


Figure 8.2: Products from the potato processing industry.

Source: Potato SA, 2002

Mixed vegetables represent approximately 0,78% of the total processing industry in South Africa, and have shown a decline in production since 1997. The cultivars most commonly used for mixed vegetables are Vanderplank, Buffelspoort and BP1.

Frozen French fries represent 43,9% of the total processed potato products in South Africa. There has been a large increase in the manufacturing of this product over the last couple of years. The expansion is mainly caused by today's fast-paced life-style. The growth in production is also the result of expansion of the existing facilities.

Fresh French fries represent approximately 16,5% of the total processed potato products in South Africa. The manufacturing of fresh French fries has shown a decrease over the last couple of years. This decrease in production is the result of a decrease in the number of companies involved in the industry, and the strong increase in frozen French fries production, which took over a large part of the market. A number of small processors contribute mainly to the above production.

Only limited quantities of potatoes are canned in South Africa. This canned food is mainly in the form of mixed vegetables, to which potatoes can contribute up to 20% of the mixture. These days skinned baby potatoes are also canned. The above industry is not very big and represents approximately 1,2% of the total volume of potatoes for processing.

Crisps

Crisps represent approximately 37,4% of the total processed potato production in South Africa. The steady growth in production over the past five years is the result of an expansion of the existing factories, and an increase in the number of companies involved in the industry, although certain factories and smaller companies closed down during 2000 and 2001. The cultivars most commonly used for crisps are Hertha, Pimpernel, Lady Rosetta, Fiana, Crebella and Ernstestoltz.

Other processed products include *inter alia* hash browns, potato bites, dehydrated products, baby food, etc. They represent approximately 0,4% of the total processed potato production in South Africa.

8.3 Production

Potato production in South Africa is a high yield, high-risk enterprise with good income potential for producers, yet it is an affordable food available to most people (rich and poor). The most significant changes in the production patterns in potatoes during the past two decades can be attributed to the implementation of irrigation technology and a major shift from dry land production towards irrigation production, as indicated in Table 8.5. High production costs compelled the introduction of irrigation technology by farmers to manage high risks and price fluctuations characteristic of dry land potato production.

Dry land production decreased from 33,543 ha in 1991 to an all-time low of 12,915 ha in 2000, whereas irrigation production increased from 32,251 ha in 1991 to 38,000 ha in 2002/3. In 2002/2003 there was a decline in irrigated hectares planted with potatoes as farmers shifted to maize because of the higher prices of maize. One of the major risk factors associated with dry land production is “over production” in good years with market prices below production costs, while, “under production” in dry years would result in very good market prices. The resultant fluctuation in quantity and price places a heavy burden on the infrastructure at fresh produce markets and impacts negatively on consumer preferences.

Table 8.5: Potato production trends in South Africa since 1991

Year	Production (1 000 tons)	Hectares planted			Percentage	
		Dry land	Irrigation	Total	Dry land	Irrigation
1991	1 215	33 543	32 251	66 064	50,77	49,23
1992	1 134	27 224	32 642	59 866	45,47	54,53
1993	1 316	20 262	35 649	55 911	36,24	63,76
1994	1 321	18 421	36 776	55 197	33,37	66,63
1995	1 552	15 302	40 444	55 746	27,45	72,55
1996	1 571	16 175	42 473	58 648	27,58	72,42
1997	1 605	15 074	40 073	55 147	27,33	72,67
1998	1 586	13 761	40 111	53 872	25,54	74,46
1999	1 631	14 935	41 747	56 680	26,35	73,65
2000	1 655	12 915	40 278	53 193	24,28	75,72
2001	1 602	14 101	39 685	53 786	26,22	73,78
2002/3	1 449	10 811	38 488	49 299	21,93	78,07

Production regions

Potatoes are produced all over South Africa in different climatic regions as indicated in figure 8.3. This results in a continuous supply of potatoes throughout the year. Consequently, domestic consumers have almost continuous access to fresh potatoes.

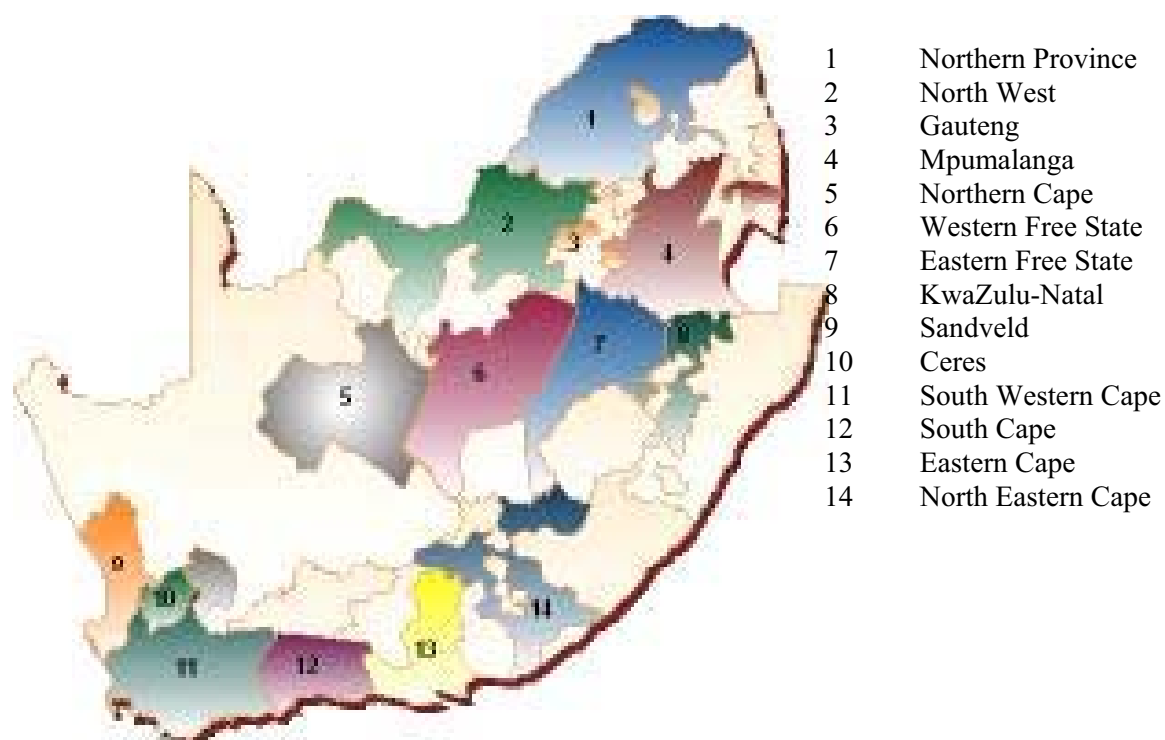


Figure 8.3: Production regions of South Africa

Source: Potato SA, 2003

Table 8.6 clearly illustrates the Eastern Free State as the major dry land producing area with 9,094 ha of dry land potatoes and 1,506 ha potatoes under irrigation. Limpopo with 6,973 ha under irrigation is the region with the most potatoes under irrigation. The region with the most producers is the western Free State with 174, followed by the Sandveld and the eastern Free State with 151 and 132 producers, respectively.

Production costs

Production costs of potatoes vary between R20,915 per ha for dry land production to more than R42,000 for both seed production and the production of table potatoes under irrigation. A summary of average production costs for the 2002/2003 season is provided in Table 8.7.

Table 8.6: South African potato production in the 16 regions during 2001

Region	Hectares			Producers	
	Dry land	Irrigation	Total	On list	Planted
Sandveld	-	7 558	7 558	151	143
Ceres	-	1 285	1 285	53	43
South Western Cape	-	589	589	79	34
Southern Cape	-	472	472	34	20
Northern Cape	-	1 786	1 786	56	22
Eastern Cape	-	2 640	2 640	77	60
North Eastern Cape	1 378	823	2 201	94	60
Western Free State	2 722	3 884	6 606	174	117
South Western Free State	85	1 786	1 871	80	51
Eastern Free State	9 094	1 506	10 600	132	117
KwaZulu-Natal	-	3 483	3 483	103	53
Mpumalanga	822	3 789	4 611	75	73
Marble Hall	-	1 591	1 591	27	24
Limpopo	-	6 973	6 973	95	95
Northwest	-	925	925	67	20
Gauteng	-	595	595	17	15
Total	14 101	39 685	53 786	1 314	947

Source: Potato SA, 2000

A breakdown of the average production costs needed for the production of potatoes shows that seed is the largest input component (18,2% of total input costs), followed by transport (10,9%), fertiliser (10,5%), chemicals (10,4%) and packaging (10,3%). An index of the different inputs was used to calculate the respective contributions of the various inputs to the increase in production costs since 1995. Figure 8.4 indicates the contributions of the different inputs since 1995.

Table 8.7: Average production costs for potatoes in South Africa (per ha)

Costs	Seed production (R)	Commercial production		Processing (R)
		Dry land (R)	Irrigation (R)	
Soil preparation, spraying and harvesting	1 420	1 050	1 420	1 420
Seed	8 802	3 815	7 725	7 800
Fuel & lubricants	2 500	1 200	2 500	2 500
Fertilizer	4 500	2 150	4 500	4 590
Water & electricity	1 700		1 700	1 700
Disease-, pest- and weed control	4 500	2 600	4 000	4 200
Repair & maintenance	3 750	1 900	3 750	3 750
Packaging	3 000	1 500	5 000	
Marketing	2 700	2 000	3 200	
Transport	4900	2 000	4 900	
Certification & laboratory fees	1 090			
Other	3 700	2 700	3 700	3 700
Total Costs	42 562	20 915	42 395	29 660

Source: Potato SA

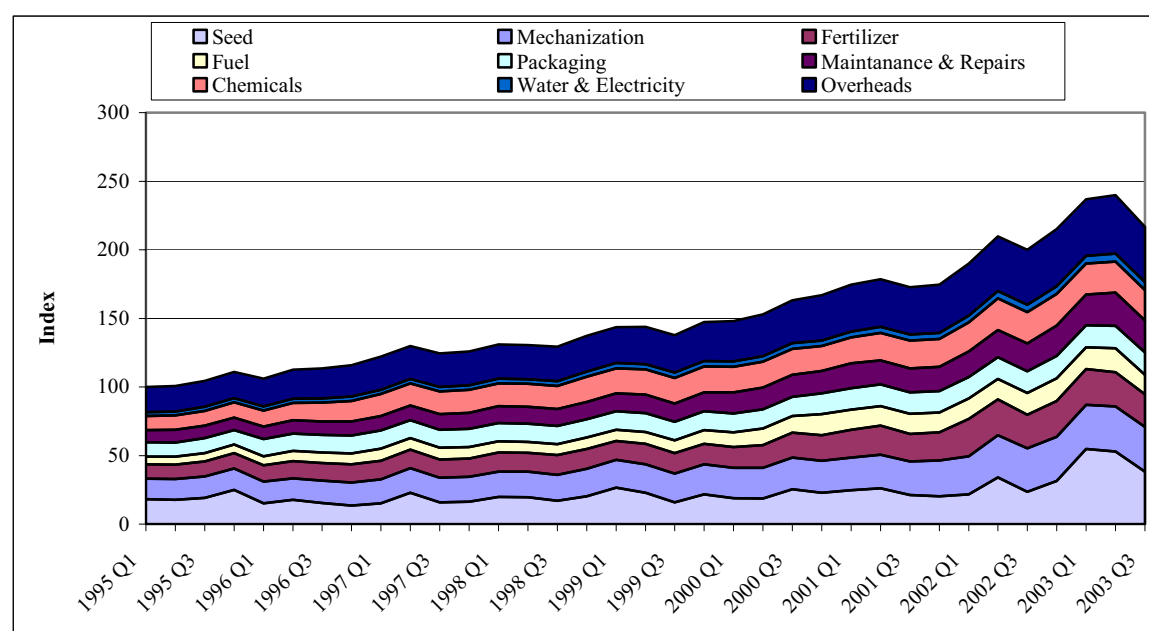


Figure 8.4: An index of relative contributions of different inputs to the production cost for potatoes since 1995

The comparison of the index for potato prices and production costs is indicated in Figure 8.5, which shows that potato prices “caught up” with production costs during the 2002 season. The prices received for potatoes during the third quarter of 2002 exceeded the index prices for inputs during the same period. Average potato prices during that period varied from R27-00 to R31-50 per 10 kg but they decreased to less than R20-00 per 10 kg from January 2003 onwards.

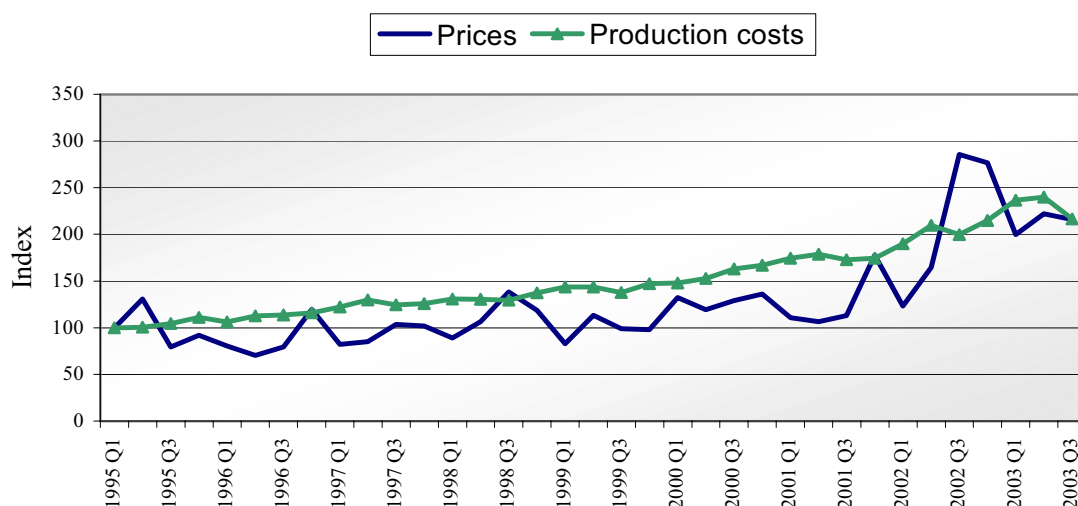


Figure 8.5: Comparison of the index of potato prices against the index for production costs

8.4 Price trends for fresh potatoes

It is believed that potato prices are driven by supply and demand with distinctive seasonal trends. According to Potato South Africa, 63% of the potato crop is delivered on the fresh produce markets, and market prices therefore act as a barometer for producer prices in other sectors of the potato industry. Processors entering into contracts with producers confirmed that market prices serve as a major barometer when contract prices with producers are negotiated. It is evident from Table 8.7 and Figure 8.6 that potato prices and the supply of potatoes on fresh produce markets are negatively correlated.

Potato prices decline with increase in supply, and vice versa. An *a priori* observation of supply and price trends, as indicated in figure 8.6, indicates a decline in supply and an increase in price during the period January 2000 until July 2003. The main reason for the dramatic increase in price during the third quarter of 2002 was a decline in supply during the months August (4,9 million x 10 kg), September (4,8 million x 10kg) and October 2002 with 5 million x 10 kg. The total supply of potatoes on the fresh produce markets during those three months adds up to 14,8 million x 10 kg pockets, compared to 21,3 million x 10kg during the same period in 2001 and 19,2 million x 10 kg pockets during that period in 2000. This represents a decline of 30% in supply in the third quarter of 2002 compared to the same period in the previous year.

Table 8.7: Number of 10 kg potatoes sold on all fresh produce markets and prices in cents per 10 kg received from Jan 2000 to July 2003

Month	Number (10 kg)	Price (c/10 kg)	Month	Number (10 kg)	Price (c/10kg)
Jan-00	7467279	1324.251	Oct-01	6871046	1375.482
Feb-00	6050465	1314.986	Nov-01	7881758	1767.109
Mar-00	6633031	1093.921	Dec-01	6079257	1872.044
Apr-00	6416453	1184.99	Jan-02	7715441	1352.657
May-00	8556859	1205.743	Feb-02	6591308	1131.168
Jun-00	7282310	973.986	Mar-02	7264869	990.3464
Jul-00	9191980	976.7952	Apr-02	6657229	1205.968
Aug-00	6377551	1272.187	May-02	7999653	1497.728
Sep-00	6380368	1395.115	Jun-02	5751305	1940.724
Oct-00	6440101	1471.047	Jul-02	7076656	2150.526
Nov-00	9327862	1117.567	Aug-02	4979832	2717.245
Dec-00	6700784	1245.649	Sep-02	4895905	3188.858
Jan-01	7861172	1123.359	Oct-02	5012983	3171.388
Feb-01	6630400	1018.974	Nov-02	7435127	2247.744
Mar-01	6899330	977.6518	Dec-02	5770603	2384.029
Apr-01	6904152	1060.756	Jan-03	6523037	1927.426
May-01	9171791	1030.983	Feb-03	5555961	1787.075
Jun-01	7698324	906.6085	Mar-03	5764176	1915.232
Jul-01	9675261	983.2467	Apr-03	5534517	2017.84
Aug-01	7427170	1004.177	May-03	7079028	2181.157
Sep-01	7020636	1196.733	Jun-03	5612483	2069.261
Oct-01	6871046	1375.482	Jul-03	6253923	1833.752

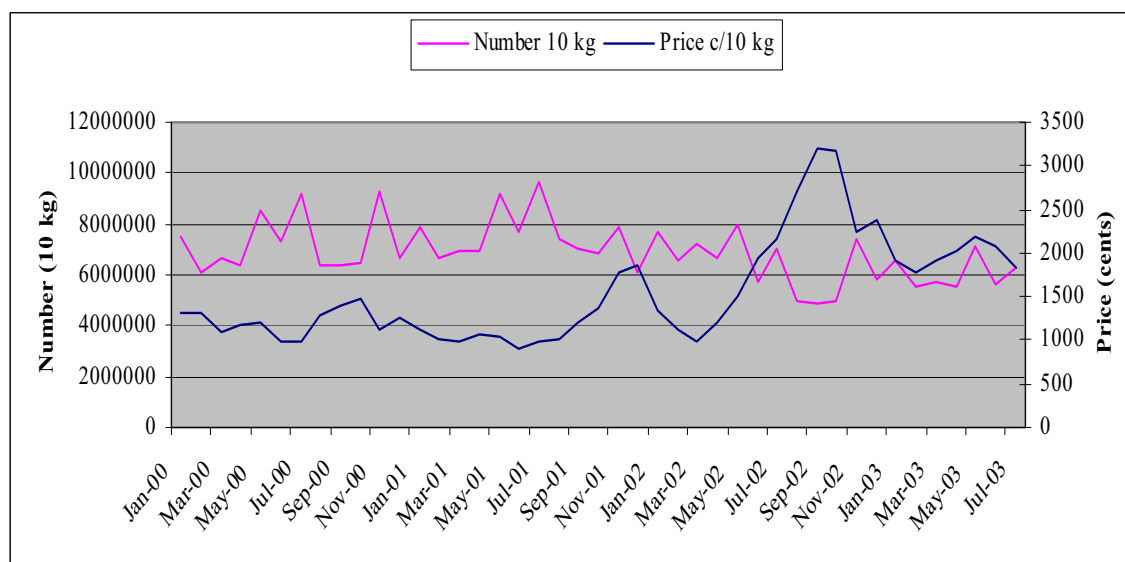


Figure 8.6: Comparison of number sold on fresh produce markets and prices received

The seasonal supply and price trends in potatoes are evident from the graph in figure 8.6. It can also be hypothesised, however, that the exchange rate had an impact on the price of potatoes. To test this hypothesis both a log-log regression as well as a correlation test were run, both with the same result, namely that the impact of the exchange rate on

potato prices was insignificant and that the potato prices were mainly determined by the supply on fresh produce markets.

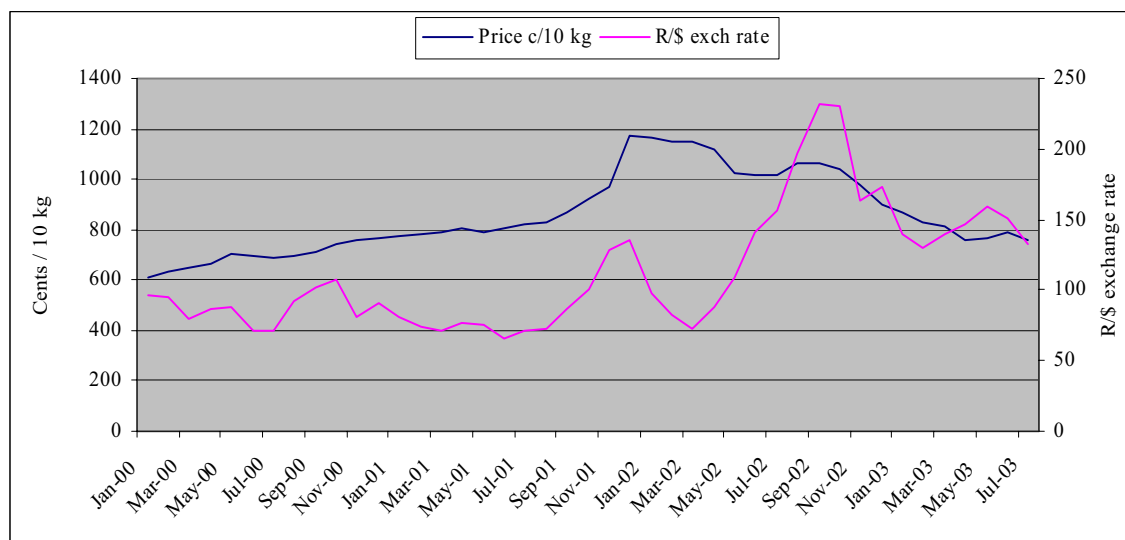


Figure 8.7: Exchange rate and potato price trends on fresh produce markets for the period January 2000 until July 2003

Figure 8.7 illustrates the trends in the exchange rate as well as the potato prices for the period January 2000 until July 2003. However, no *a priori* conclusion can be drawn merely from this graph. Further tests were run, therefore, to confirm the above results. A measuring and comparison of volatility of real potato prices and the exchange rate was done. By comparing volatility calculations for the exchange rate and potato prices, which is time varying, it was concluded that the real price of fresh potatoes was not affected by the exchange rate¹.

Another important aspect in determining the price trends in the market for fresh potatoes is tracking the margin between the price at the fresh produce market and the average retail price for a 10kg bag of potatoes. This is reflected in Figure 8.8 and shows some interesting trends. Despite the fact that the margin peaked at R20 per bag in January 2003, for the rest of 2003 the margin stayed at a normal R10 per bag. To an outsider it may seem that the January 2003 appointment of the Food Pricing Monitoring Committee had a dramatic impact because retail margins suddenly dropped back to normal levels of R10 per bag.

¹ Volatility in the exchange rate is already calculated in the study titled “Investigation into the supply chain of beef” which is to be submitted together with this report to the Food Price Monitoring Committee.

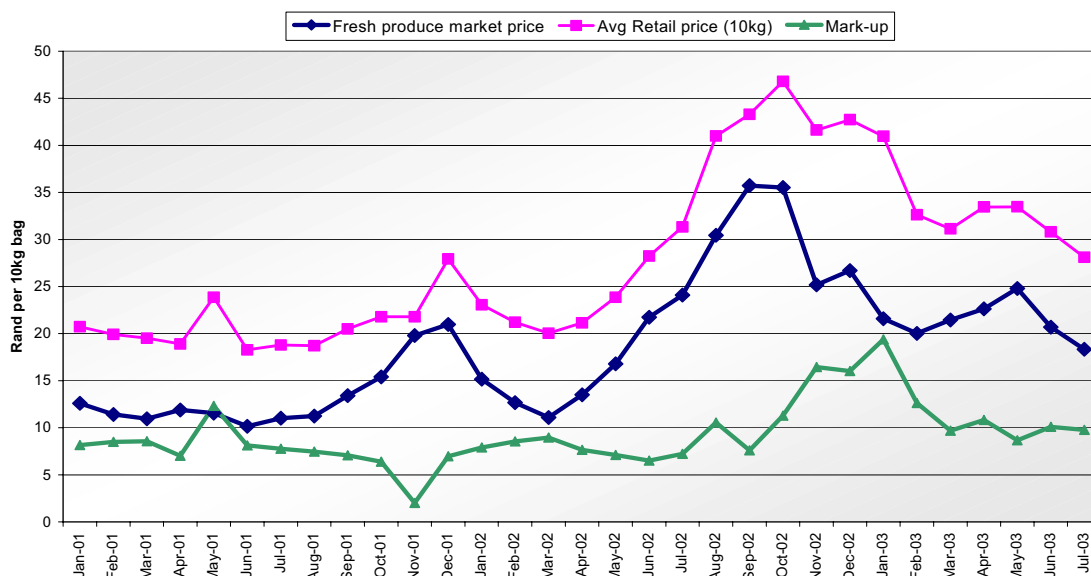


Figure 8.8: Producer and retail prices and mark-up for fresh potatoes (10kg bag): January 2001 – July 2003

8.5 Price trends for processed potatoes

The processing industry mainly makes use of forward contracts with potato producers. The processors negotiate product prices with producers and in some instances they supply and support producers to obtain the necessary inputs. Long-term relationships are normally established between the processors and their suppliers. It is, therefore, imperative that both parties experience a win-win situation in contract production. The prices on the fresh produce markets, therefore, serve as an important determinant of contract prices. For many years the gross margin figures for contract farmers have been below the earnings of producers focusing on fresh potato markets, but contracting protects them from the volatility of the prices on the fresh produce markets.

Figure 8.9 shows that input contract prices (prices received by the potato producers) were less volatile than prices received on the fresh produce markets. Contract prices during the same period were 25% lower than prices received on the fresh produce markets. Output prices for the processed produce, however, increased steeply since July 2002. The gap between the input and output prices is illustrated in figure 8.10. The reason for the increase in the margins can be contributed to a combination of increased production costs and a time lag effect on contract prices. Processors were very hesitant to supply a breakdown of their production costs for fear that their competitors might obtain this information. A breakdown of detailed production costs, however, might shed light on the real reasons for the increase in consumer prices for processed potatoes.

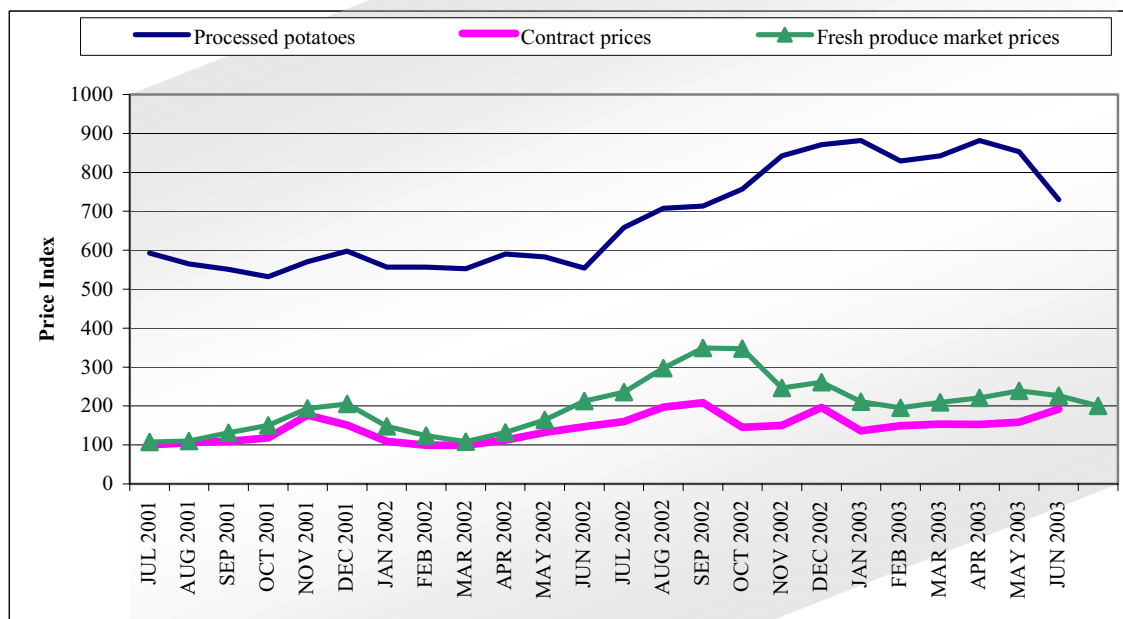


Figure 8.9: Index of input and output prices for contract (processing) potatoes in comparison to fresh produce market prices for the period July 2001 to June 2003

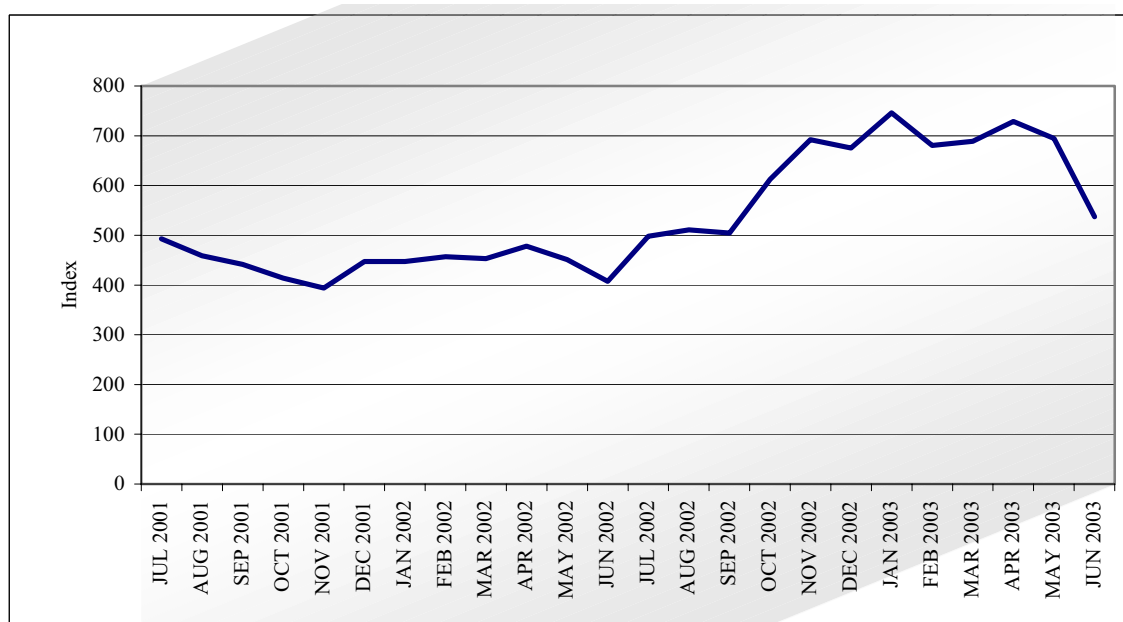


Figure 8.10: Difference in input and output prices in the processing industry for the period July 2001 to June 2003

It is clear from figure 8.10 that the gap between the input and output prices increased from July 2002, but began to decline steeply from May 2003 onwards. The reason for the sudden decline in margins might be attributed to either the impact of the time lag effect on potato producer prices or on processing costs.

8.6 Conclusion

Two major shifts in the production and processing of potatoes will have a significant impact on the potato industry in the future. The first is the continuation of the shift from dry land production towards irrigation. Because over and under production during good

and poor seasons will be eliminated, this will ensure a more constant supply and, therefore, greater price stability within the sector.

The second shift is the continuation of the present increase in production of processed potatoes at the cost of fresh potatoes. As their per capita income increases, consumers tend to prefer processed food. The movement towards processed potatoes might enable more producers to enter into forward contracts with processors. An increase in the number of contract farmers and irrigation cultivation will ensure a much more stable industry with less supply and price volatility than in the past.

The results obtained in this study indicate that the major price determinants in the potato industry are the normal supply and demand forces as expected in a free market system. Exogenous factors such as export prices or imports do not play a major role. From the results it can be concluded that the exchange rate does not have a significant impact on potato prices at farm gate level, neither is this the case on the fresh produce markets. The steep increase in potato prices during the second half of 2002 was mainly due to an under supply of potatoes on the fresh produce markets during this period. It seems, however, that output prices in the processing industry did follow the exchange rate of the previous season. Information obtained thus far is not sufficient to determine the key variables that influenced the increase in consumer prices for processed potatoes. The profits of the processing industry increased during the months November 2002 to May 2003, and it seems that they were guilty of making larger profits than normal during this period of the year.

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