CHAPTER 3

THE WHEAT-TO-BREAD VALUE CHAIN

3.1 Industry Overview

Wheat is produced mainly for human consumption with only small quantities of poorer quality wheat marketed as stock feed. Originally, wheat was only produced in the winter rainfall area in the Cape but was since the 1970s also cultivated in the Free State region and increasingly under irrigation in many other production regions.

The Wheat Board controlled wheat marketing until 1997, after which market forces prevailed to determine prices. This has left producers with more opportunities but also with more risks. Prices, overall, are more volatile since they fluctuate between export and import parity prices depending on whether there is a surplus or a shortfall. Wheat consumption in the past decade has remained fairly stable around 2.3 million tonnes per annum. As can be seen in figure 3.1, the domestic demand for wheat often outstrips the supply. Wheat shortfalls need to be imported, which makes the exchange rate an important factor in price determination.
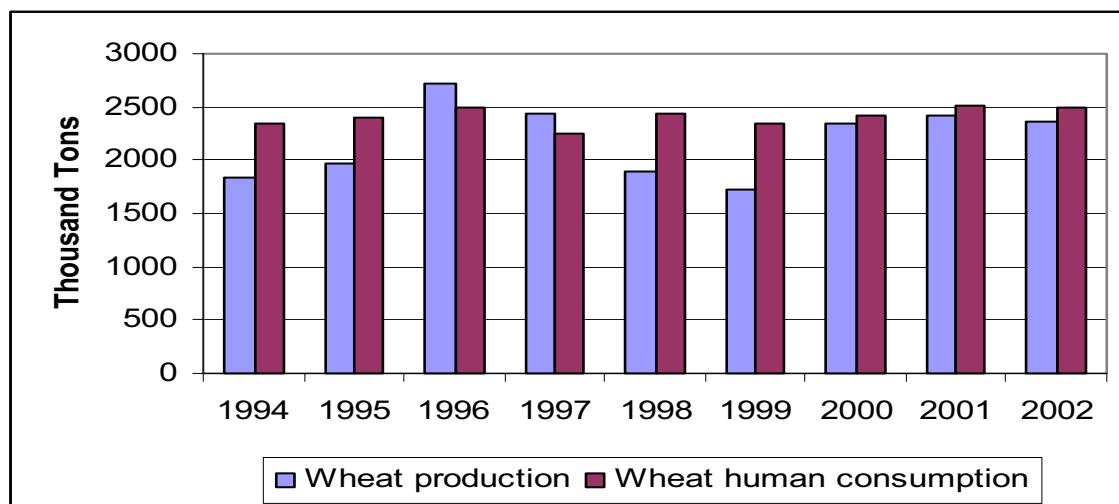

Figure 3.1: Wheat production and consumption between 1994 and 2002
Source: Abstract of Agricultural Statistics, 2003.

The demand for wheat as a staple crop is largely determined by the size, composition, distribution and market behaviour of the population. The composition of the population and the variety of its needs have a major impact on the consumption of the product. A large section of the population of South Africa is poor, and is urbanising at a rapid rate. Urbanisation causes consumers to require more ready-to-eat food. Bread is such a product and as staple food, it is a substitute for maize-meal. Wheaten flour and meal consumption by the processors at provincial levels indicate the effects of demographics. For instance, although Gauteng is smaller than the other provinces in terms of surface area, it has the largest flour and wheaten meal consumption, which correlates strongly with its high population density.

3.2 Market structure

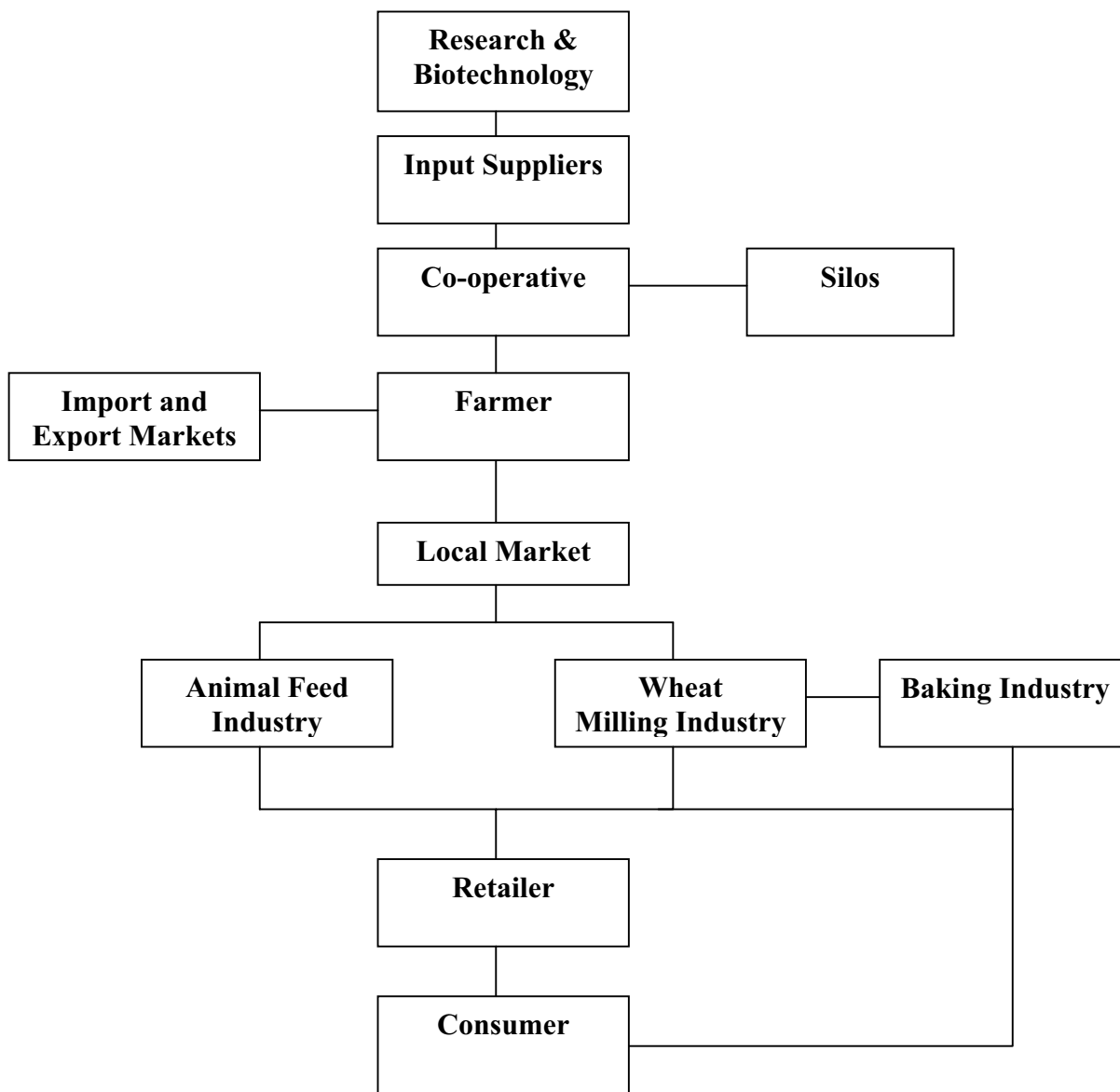Figure 3.2 illustrates the structure of the wheat-to-flour and bread supply chain.

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Figure 3.2: The wheat industry structure (Value chain)
Source: Adopted from a report completed for the Competition Commission

3.2.1   Primary Industry

Farmers
The number of commercial farmers involved in wheat production in South Africa ranges currently between 5000 and 6000. The eastern Free State and Western Cape are the main wheat production areas. Deregulation has caused some shifts in production areas. The Western Cape, although a fairly stable production area, is far away from markets, a factor that increases transport costs. The Free State is closer to the major markets but production is more erratic because it is a summer rainfall region

in which a larger variety of crops can be planted. It should also be noted that more and more wheat is grown under irrigation.

3.2.2 Secondary Industry

The secondary industry consists of the wheat milling and baking industries. The animal feed sector does not play a major role in the demand for wheat as only poorer quality wheat that is unsuitable for baking goes to this sector.

Market structure and concentration in the milling industry

After many years of single channel marketing, the grain industry exhibits a large degree of concentration, the result of rationalization and improved capacity utilisation as well as the restrictive registration of millers and bakers during the period of controlled marketing. With the entry into market of small millers deregulation competition within the milling industry has grown. This, in turn, has increased costs as capacity utilization within the industry has decreased from 92% to 78%. The number of large industrial millers declined from 6 in 1996/97 to 4 in 1998/99, with the number of milling units declining from 137 to 109 in the same periods. Currently, the four main milling companies are Genfoods, Pioneer, Tiger and Ruto. Their approximate market shares are 30% for Genfoods, 27% for Pioneer, 20% for Tiger and 10% for Ruto. The remaining 13% of the market share is attributable to the small millers. Aside from increased competition, deregulation has also increased a procurement risk and has forced the milling divisions into a more important role, since price risk management strategies needed to be implemented to minimise the risk.

Most of the major millers have vertically integrated with the plant bakeries. The milling of wheat is a more expensive process than that of maize. Because of the minimum tonnage specified on SAFEX contracts, small-scale millers might find the financing needed to purchase raw material a problem. In addition, imports might also be difficult to finance and small-scale millers might lack bargaining power. Due to the high costs involved in milling wheat, small millers find vertical integration with bakeries too difficult, as it might be impossible to compete with large-scale millers in controlling procurement costs and economies of scale.

In theory, if mills run at full capacity South African mills should, generally, be able to take advantage of economies of scale. This is however not happening, as South African mills do not use their full capacity. Another difficulty is that South African mills will have to compete with subsidised products being imported from the US and EU.

Milled wheat

The milling industry converts wheat to flour for various baking purposes. The main products are cake flour, brown bread flour and white bread flour. Cake flour and white bread flour constitute approximately 70% of the total sales.

Analysis of selected food value chains

As can be seen from figure 3.3, very little growth in the sale of flour has occurred over the past 8 years. On average imported wheat constitutes 23% of the wheat milled for human consumption (SAGIS 2003). Sales to plant bakeries that are linked to mills have also gone down since gradually more chain stores and other retailers have opened their own in-house bakeries.
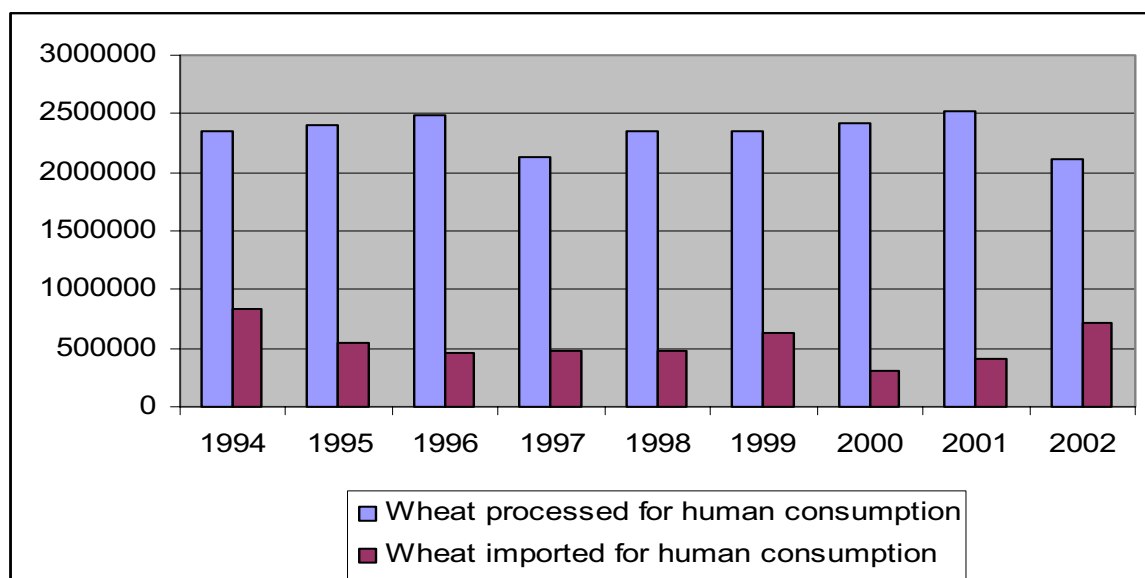

Figure 3.3:   **Wheat imported for human consumption, and wheat processed for human consumption (tons)**

The baking industry market structure and concentration

The baking industry is the major client of the milling industry. According to the South African Chamber of Baking, bakers can be defined as: wholesale bakers who operate industrial bakeries, independent bakers who operate stand-alone bakeries, retail bakers who operate in-store bakeries, and emerging bakers originating from previously disadvantaged groups using less than 1000 kg of flour per week.

Clearly, deregulation also had an impact on the baking industry, with the main effect being an explosion of the number of bakeries. At time of deregulation, approximately 3000 bakers were registered with the Wheat Board with approximately 80% of the bread production in the hands of 6 large baking groups. Currently, the number of baking units is estimated at 7900, of these 85 are wholesale bakeries, 600 are in-store corporate bakeries, 3700 are independent bakers, and 3500 are franchise bakers (this includes franchise in-store bakeries, biscuit, pie and pizza outlets). The main growth in the number of bakeries arose from the franchise in-store bakeries. It is estimated that 53,200 informal bakers operate in non-licensed premises (note: this includes people baking for home industries and cake decorators).

According to the National Chamber of Milling, bread flour sales decreased by 3% for the period 1990-92 to 1999-2001, while in the same period the cake flour sales increased by 87%, the increase of which was caused by the rapid growth of baking outlets. This is an interesting phenomenon, particularly when it has also been noted

that the sale of white and brown bread loaves grew by 5.2% and 25%, respectively. The main reason for this is the decrease in the statutory bread mass from 800g to 700g per loaf.
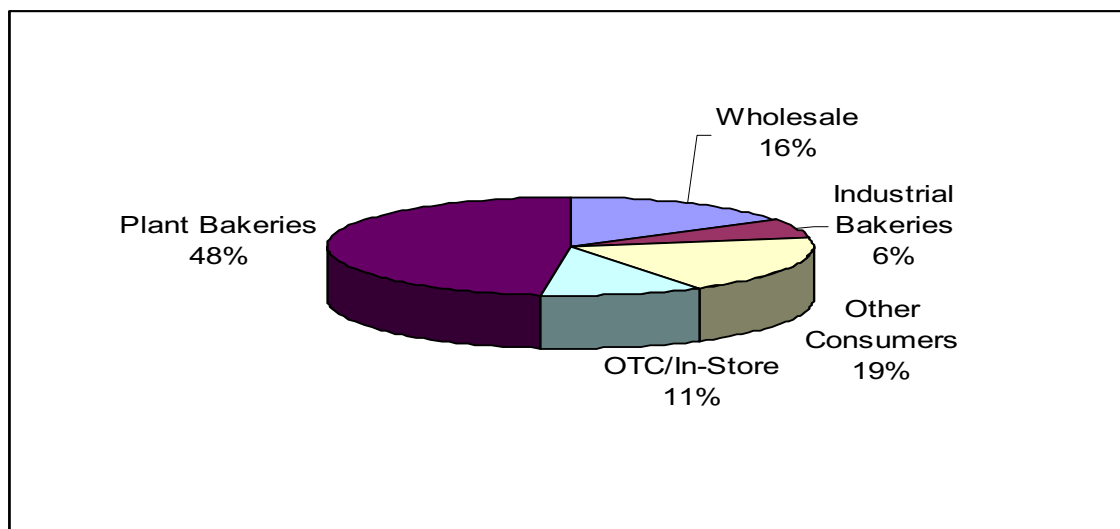

Figure 3.4:   Domestic share of flour consumption by baker category, 1995/96
Source: BTT 1999

3.3   Price formation at various levels in the supply chain

Similarly to maize, the South African market for wheat and wheat products was until recently, controlled in a single channel system, with producer and consumer prices set by Government. In those days, there were no price risks and there was no need for traders. These days, the producer price of wheat is determined in a way similar to that of maize through the SAFEX futures market, as discussed in Chapter 1.

3.4   Unpacking the wheat-to-bread value chain

A sound understanding of the dynamic functioning of the wheat-to-bread supply chain requires the unpacking of the supply chain into five main levels through which value adding occurs. The five main levels are the farmers, the millers, the bakers, the retailers, and the consumers.

3.4.1   The methodology, the definitions and the results

The different prices in the five main levels in the value chain are: the average producer price that the farmer receives as reported by SAFEX; the mill door price; the bakers' wholesale price; and the consumer price as reported in the AC Nielsen database. As previously stated, the number of role players in the milling and baking industry has expanded, although the industrial large-scale millers and bakers still have the largest portion of the market share in the production and sales of bread. It is for this reason that calculations of the mill door and bakers wholesale prices are based on information supplied by both the Chamber of Milling and the South African Chamber of Baking. The information supplied to the Committee included costs of production and distribution. As with the maize-to-maize meal supply chain, certain assumptions needed to be made. These assumptions were:

⊄# The producer price (also know as the farm gate price) is derived from the SAFEX spot price minus the average transport differential and the handling costs. This will be considered as the price between the farmer and the miller.

⊄# The transport costs from the farm gate to the silo are calculated as the average SAFEX transport differential to all the major maize silos.

⊄# The handling costs are based on responses from millers re their estimated average handling costs and the storage day tariffs per tonne.

⊄# It is assumed that the millers are closer to the silos than the farmers.

⊄# The calculation of the income from the sales of bran is based on calculations provided by the Chamber of Milling re realizations from various extraction rates. The price of bran is 90% of the price of chop which is calculated as follows:

  o =[0.99ton-(extraction rate*0.99ton)+(screenings of 0.1ton)]
    * [0.7*yellow maize price]
  o =[amount of chop per tonne] * [price of chop]

⊄# There is a 4-month time lag between the monthly average SAFEX spot price and the average monthly retail price.

⊄# Specific mill site costs are only available on an annual basis. Therefore, the monthly mill site costs are kept constant for every year. These costs run from July to June.

⊄# Baking costs are also annual but run from January to December.

⊄# The cost of bread flour between the milling and baking divisions can be neglected, as this is an internal transfer within the group and not determined by market forces. Thus, to determine the cost of production of bread there is no separate margin for the milling and baking divisions.

⊄# The Committee has no information on the retailers' costs for selling bread.

Similarly to maize, statistical tests showed that the level of correlation between the producer price and the consumer price is highest when the producer price is lagged by four months. This implies that it takes four months from the time when the miller buys the wheat until the loaf of bread appears on the shelf of the retailer. The introduction of lagged producer prices in these calculations would have a marked influence on the outcome of the supply chain analysis. It was decided, therefore, to discuss this important issue with a number of role players in the market. Through these discussions, it was determined that a four-month hedging strategy is in fact common practice among the major milling companies. Although some of the smaller mills indicated that they make use of shorter hedging strategies, it was, nevertheless, decided to make use of the four-month lagged producer prices in the analysis.

The extraction rates between brown and white bread differ and, therefore, separate supply chains were calculated. The extraction rate from 1 tonne of wheat is 0.81 tonnes of brown bread flour or 0.76 tonnes of white bread flour. Similarly, 1 tonne of brown bread flour can produce 2275 loaves of brown bread while 1 tonne of white bread flour produces 2135 loaves (standard 700g loaves). Thus from 1 tonne of wheat, 1842 loaves of brown bread or 1622 loaves of white bread can be produced.

Table 3.1 shows the average wheat–to-brown-bread supply chain for the period February 2000 to December 2002. Table 3.2 shows the average wheat–to- white-bread supply chain for the same period. The average wheat producer price is

calculated by taking the SAFEX price and subtracting the farmers' transport to the silo, as well as the handling and storage costs. This is the price that farmers actually get for their wheat. The mill door price, or the cost to the millers of actually getting the wheat to the mill is calculated in a similar way. It is the SAFEX price plus transport, handling and storage costs from the silo to the mill, less the income from bran. From the mill door price it is possible to calculate the cost of milling which in this case is on average R633/ton. Adding the cost of milling to the cost of wheat and dividing this by the extraction rate of brown bread flour, the cost of producing 1 tonne of brown bread flour is on average R2525.73. The cost of baking includes the cost of flour (47%), packaging (4%), other raw materials (11%), production labour (9%), distribution costs (19%), and overheads (9%). Overall, the cost of producing one loaf of brown bread is on average 234.64 c/loaf. The average retail price for the period is 283.76 c/loaf, thus the average profit margin for the period was 49.12 c/loaf. The profit of 49.12 c/loaf is divided amongst the miller, the baker and the retailer. Because the Committee does not have information regarding the price for which bread flour is sold to the baker and the price for which bread is sold to the retailer, it is not possible to establish the respective shares in this profit.

Table 3.1: Average wheat to brown bread supply chain for the period February 2000 to December 2002

	Source	Units	
1. Wheat avg. producer price lagged 4 months	calculated	R/ton	**1356.43**
1a)Transport cost: Farm gate to silo	estimated	R/ton	96.57
1b) Handling & storage cost: Costs of farmer	estimated	R/ton	16.40
2. Wheat avg. nearby contract lagged 4 months	SAFEX	R/ton	1469.40
2a)Transport cost: Silo to Mill door	estimated	R/ton	76.57
2b) Handling & storage cost: Costs of miller	estimated	R/ton	20.40
Income from sales of bran	calculated (no lag)	R/ton bran	154.16
3. Mill door price (1+ 1a + 1b +...)	calculated	R/ton grain	**1412.21**
Wheat millers cost: conversion from wheat to wheat flour			
Production cost (milling cost)	NAMM	R/ton grain	86.83
Packing cost	NAMM	R/ton grain	13.66
Administration, Warehouse and selling	NAMM	R/ton grain	148.60
4. **Mill site costs**		R/ton grain	249.10
Distribution costs	NAMM	R/ton grain	126.10
Total mill site costs	NAMM	R/ton grain	375.20
Fixed Capital cost	NAMM	R/ton grain	54.82
Floating Capital costs	NAMM	R/ton grain	203.61
Total Millers Costs	Calculated	R/ton grain	633.63
5. Cost of production of wheat flour for brown bread			
Conversion cost	Calculated	R/ton grain	633.63
Average cost of wheat (Mill door price)	Calculated	R/ton grain	1412.21
Total wheat flour cost for brown bread	calculated	R/ton grain	2045.84
Average extraction rate for brown bread flour	NAMM		0.81
6. Brown bread bakers cost of production			
Average cost of brown bread flour	calculated	R/ton meal	2525.73
Extraction rate of brown bread from 1 ton flour	SACB	loaves/ton	2275.00
Cost of flour per loaf	calculated	c/loaf	111.02
Packaging	SACB	c/loaf	10.30
Other Raw Materials	SACB	c/loaf	26.74
Production Labour	SACB	c/loaf	21.59
Distribution	SACB	c/loaf	44.84
Overheads	SACB	c/loaf	20.14
7. Cost of producing brown bread	calculated	c/loaf	**234.64**
8. Brown bread retail price	AC Nielsen	c/loaf	**283.76**
Brown bread profit margin from miller to retailer			49.12

Table 3.2: Average wheat-to-white-bread supply chain for the period February 2000 to December 2002.

	Source	Units	

Part 4

1. Wheat avg. producer price lagged 4 months	**Calculated**	R/ton	**1356.43**
1a)Transport cost: Farm gate to silo	Estimated	R/ton	96.57
1b) Handling & storage cost: Costs of farmer	Estimated	R/ton	16.40
2. Wheat avg. nearby contract lagged 4 months	SAFEX	R/ton	1469.40
2a)Transport cost: Silo to Mill door	Estimated	R/ton	76.57
2b) Handling & storage cost: Costs of miller	Estimated	R/ton	20.40
Income from sales of bran	Calculated (no lag)	R/ton bran	176.83
3. Mill door price (1+ 1a + 1b +...)	Calculated	R/ton grain	1389.54
Wheat millers cost of conversion from wheat to wheat flour			
Production cost (milling cost)	NAMM	R/ton grain	86.83
Packing cost	NAMM	R/ton grain	13.66
Administration, Warehouse and selling	NAMM	R/ton grain	148.60
4. Mill site costs		R/ton grain	249.10
Distribution costs	NAMM	R/ton grain	126.10
Total mill site costs	NAMM	R/ton grain	375.20
Fixed Capital cost	NAMM	R/ton grain	54.82
Floating Capital costs	NAMM	R/ton grain	203.61
Total millers costs		R/ton grain	633.63
5. Cost of production of wheat flour for white bread			
Conversion cost	Calculated	R/ton grain	633.63
Average cost of wheat (mill door price)	Calculated	R/ton grain	1389.54
Total wheat flour cost for white bread	Calculated	R/ton grain	2023.17
divided by average extraction for white bread	NAMM		0.76
6. White bread bakers cost of production			
Average cost of white bread flour	Calculated	R/ton meal	2662.07
Extraction rate of brown bread from 1 ton flour	SACB	loaves/ton	2135.00
Cost of flour per loaf	Calculated	c/loaf	124.69
Packaging	SACB	c/loaf	10.30
Other Raw Materials	SACB	c/loaf	26.74
Production Labour	SACB	c/loaf	21.59
Distribution	SACB	c/loaf	44.84
Overheads	SACB	c/loaf	20.14
7. Cost of producing white bread	Calculated	c/loaf	248.30
8. White bread retail price	AC Nielsen	c/loaf	327.84
White bread profit margin from miller to retailer	Calculated	c/loaf	79.54

The calculations performed above were duplicated for white bread production, the main differences being the extraction rates. Due to the different extraction rate the cost of producing a loaf of white bread is on average 248.17 c/loaf, 13.66 c/loaf more than the cost of producing brown bread. The average retail price of white bread is 327.84 c/loaf, thus the profit margin for the miller, baker and retailer combined is 79.54 c/loaf, 32.42 cents more per loaf compared to a loaf of brown bread. Although this may seem high the reader is reminded that VAT is paid on white bread and not on brown bread. Thus if VAT is removed from the average retail price of white bread the profit margin is 39.27 cents per loaf, 9.85 c/loaf less than the profit on brown bread.

The higher cost of producing white bread is mainly attributable to the different extraction rate.

3.4.2   Trends in margins and spreads

Although it is not possible at this time to differentiate the various profit margins within the supply chain, it is possible to look at how the profit margin has changed over time. Figure 3.5 shows how the profit margin on brown bread (based on the calculations above) has changed between February 2000 and December 2002 (data not available for 2003). On the graph a line was drawn indicating the average profit margin for the period Feb 00-Feb02. February 2002 was chosen because it is here (with the 4 month time lag) that the SAFEX wheat prices increased rapidly. The average profit margin for the period was 43.60 c/loaf. As can be seen in the figure the profit margin increased to a maximum value of 88.47 c/loaf, a 102.9% increase in profit margin.
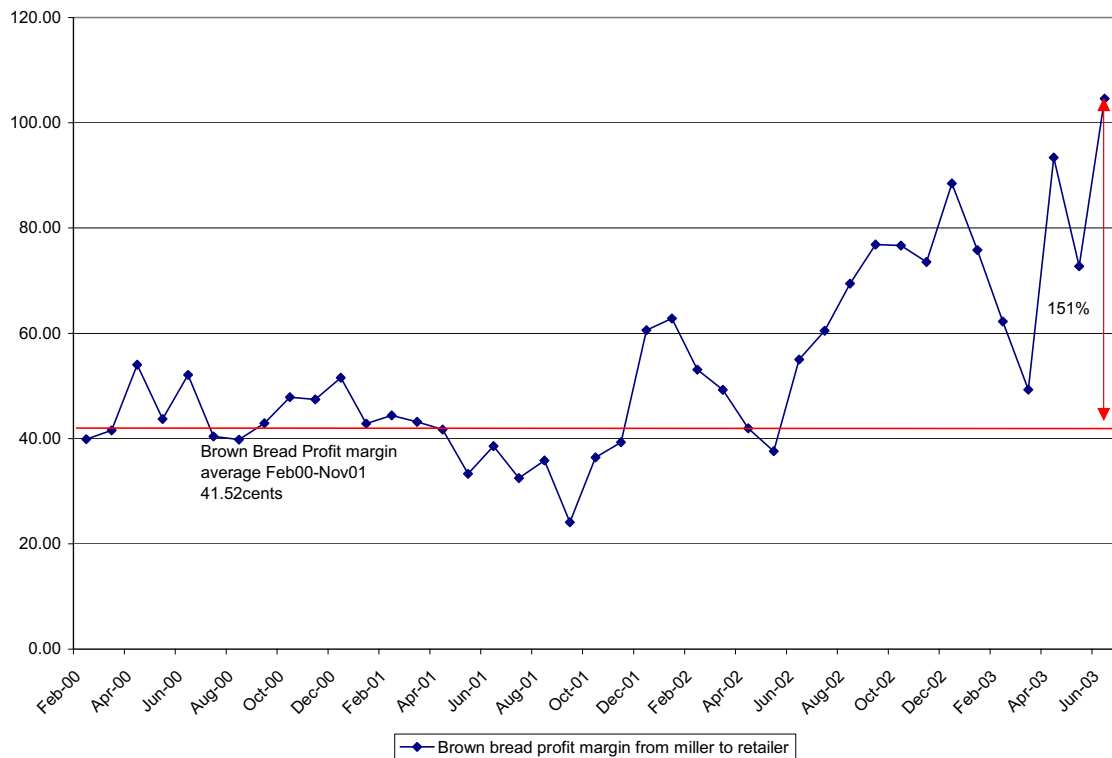
Figure 3.5: Brown bread profit margin from miller to retailer: Feb 2000-June 2003

Similarly to brown bread, the calculation was done for white bread with the results presented in figure 3.6 below.
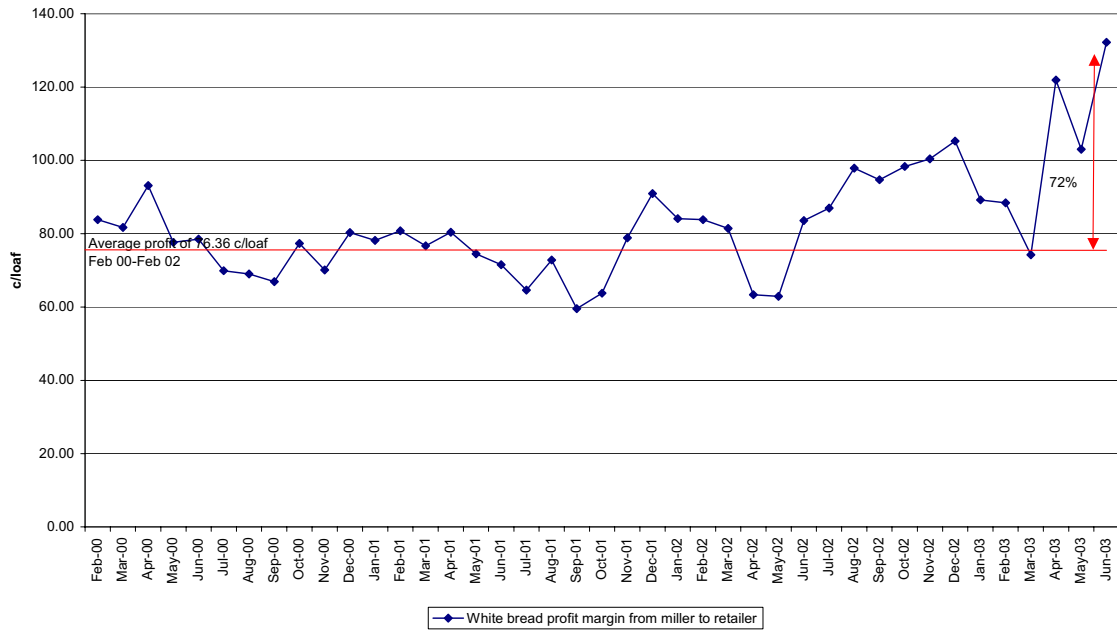
Figure 3.6: White Bread profit margin from miller to retailer: Feb 2000-June 2003

Figures 3.5 and 3.6 clearly indicate that the profit margins for both brown bread and white bread have increased, with the profit margin on brown bread increasing at a faster rate. Figure 3.7 (below) shows how the profit on brown bread as a share of the costs has increased over time.
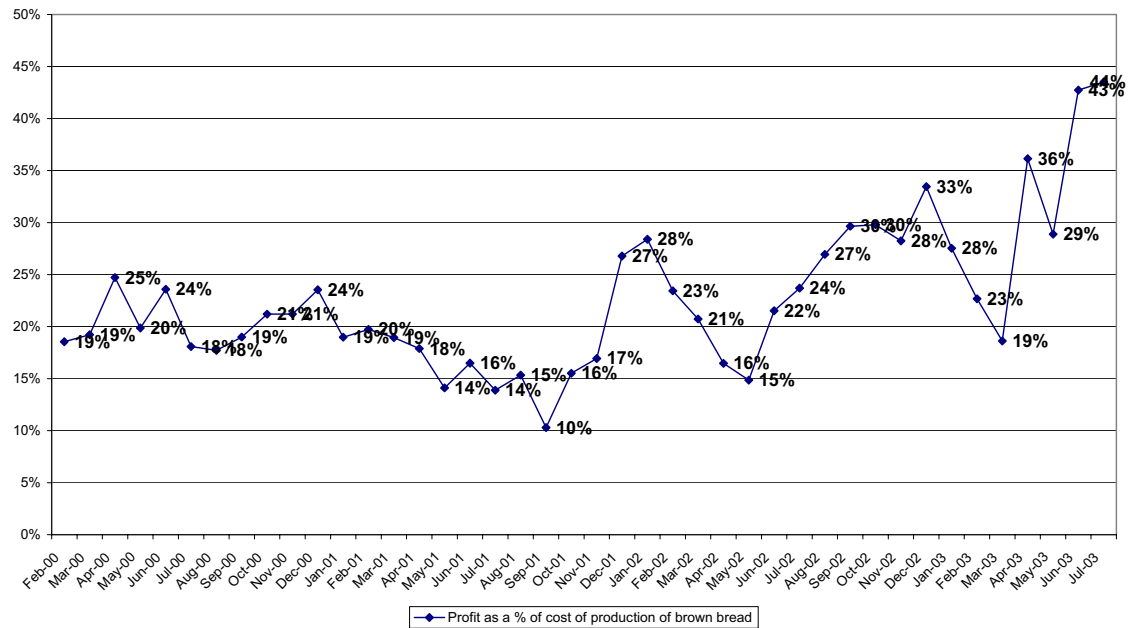

Figure 3.7: Profit on brown bread as % of production costs

Generally speaking, the main reasons for increases in profit margins are when increases in the output prices or decreases in the costs occur. The milling and baking costs for white and brown bread are the same. Figures 3.8 and 3.9 give an indication of how these have changed over the past three years.
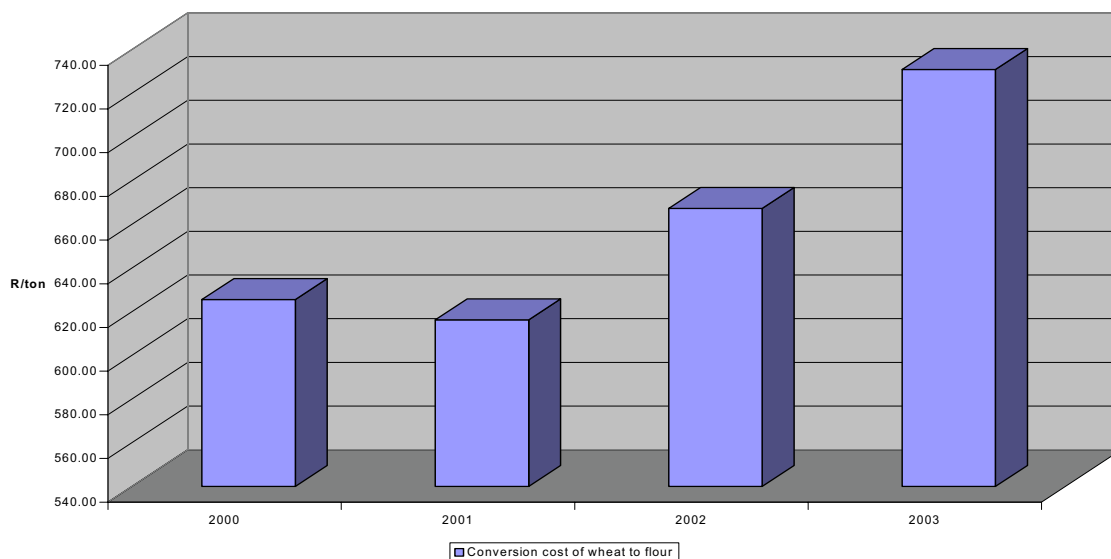
Figure 3.8: Conversion costs of wheat to flour 2000 - 2003

The conversion costs of wheat to flour have increased mainly due to increases in the cost of floating and fixed costs.
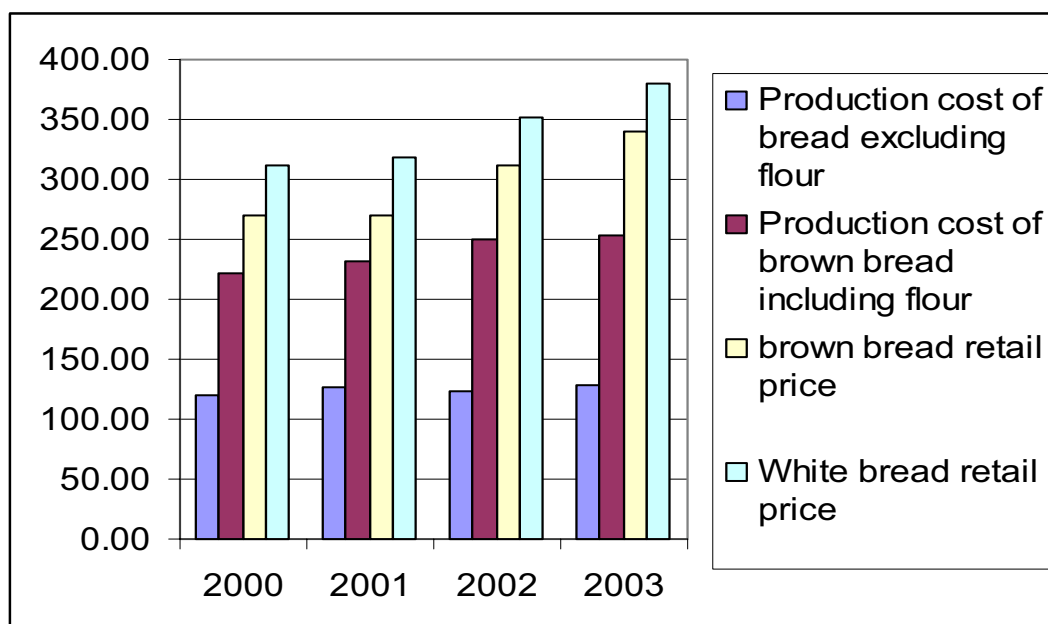

Figure 3.9: Bread production costs and bread prices in comparison

The bread production costs - not including flour - increased in 2001 mainly due to a growing cost of packaging, other raw materials and overheads. In 2002 costs decreased slightly but did not return to the previous 2000 levels as overhead costs together with other costs continued to increase.

The milling and baking processes for white and brown bread are the same, the only differences in costs being that of wheat due to the different extraction rates. Because of the different extraction rates it costs less to produce a loaf of brown bread than it

does to produce a loaf of white bread. The difference is approximately 13.66 c/loaf. Based on the fact that it is cheaper to produce a loaf of brown bread than white, and that no VAT is paid on brown bread, it is expected that brown bread is cheaper for the consumer than white bread. This is in fact the case. Because of the VAT issue, it is expected that the difference in price would be at least 14%. Figure 3.10 shows the percentage difference in retail price between white and brown bread for the period February 2000 to October 2003.
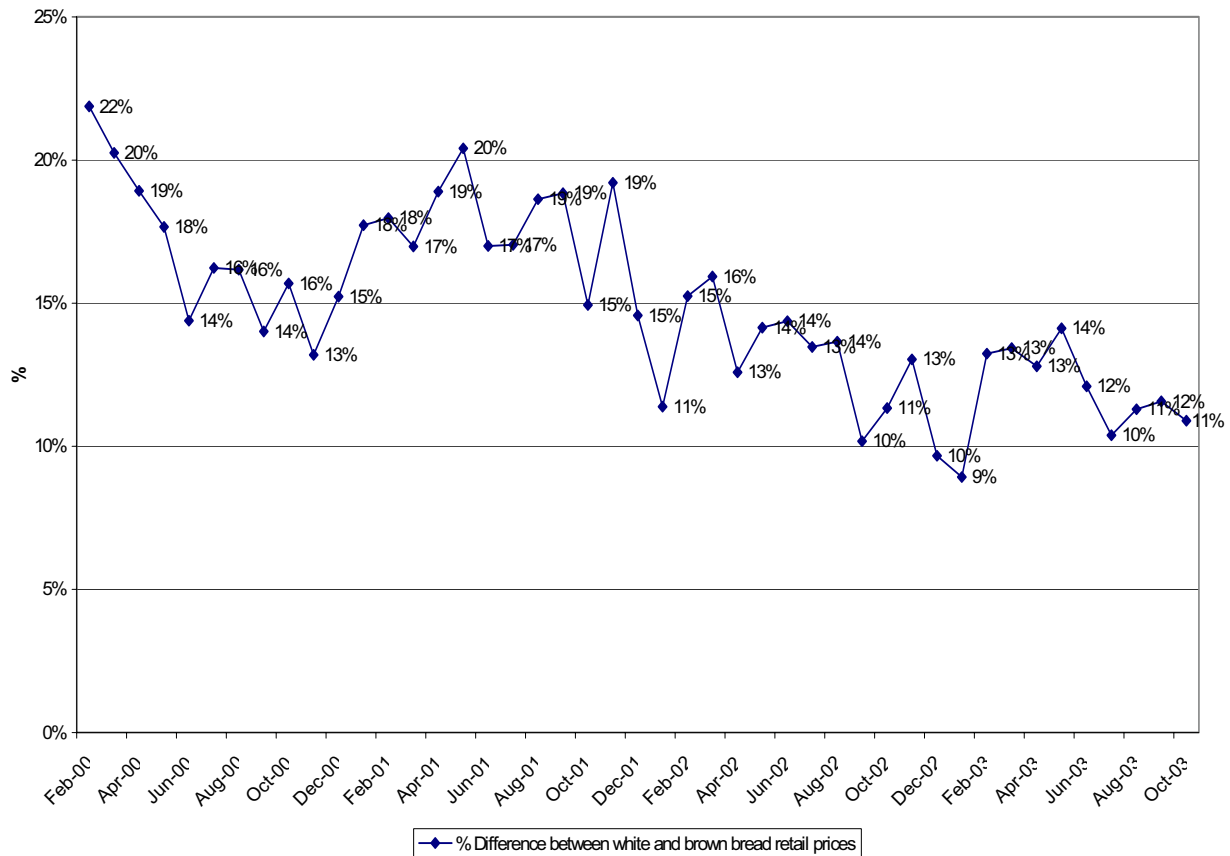

Figure 3.10: The percentage difference between brown and white bread retail prices

The figure indicates that the "gap" between the two retail prices is getting smaller. The percentage difference in retail prices in February 2000 was 22% but in July 2003 only 10%. The first time the price difference went below 14% was in November 2000, then again in January 2002 and again in April 2002, after which it consistently remained below 14%. Thus, the two prices are converging below the 14% VAT difference. The retail price of brown bread (although cheaper to produce and not carrying VAT) appears to get closer to the more expensive white bread. One explanation for this can be derived from what was stated previously, namely that the profit margin on brown bread has increased at a much faster rate than that of white bread. Could it be that someone in the supply chain is pushing up the price of brown bread faster than that of white bread in the hope that the consumer will not notice because the goods are so similar?

**3.5	Summary**

Although it is not possible to establish the profit margins at the various stages of the supply chain, it is clear that the profit shared from miller to retailer has increased over the past three years. This largely explained by the continuous increase in retail prices. Considering various confidential pieces of information, it is possible that a large share of the miller to retail margin goes to the retailer. Previous estimates by the National Agricultural Marketing Council show that retailers take a 20% margin on bread sales.

It is also clear that the margin on brown bread has increased faster than that of white bread. This is borne out by the fact that the differences between white and brown bread retail prices are moving closer together. The difference between the two bread prices should be at least 14% due to the VAT exemption on brown bread. This, however, has not been the case for most of 2003, and the consumer has thus not fully benefited from this exemption from VAT. Of the role players in the wheat-to-bread supply chain, the only players that can alter the price of the final product are the bakers and the retailers.