

SEVENTY-FOURTH ANNUAL REVIEW OF THE MILLING SEASON IN SOUTHERN AFRICA (1998-1999)

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Abstract

Performance, throughput and other relevant aspects of the sugar industries in southern Africa are presented and discussed. Climatic conditions were good in the region and a record tonnage of cane was crushed resulting in a record tonnage of sugar being made. Cane quality was very good, except for the northern South African mills, where it was no better than average. Molasses exhaustion was not as good as anticipated, and various reasons for this are discussed. Various other factory processes are discussed and new equipment installations reviewed.

The cane crop

Cane variety and transport

The main cane varieties that were crushed during the season are shown in Table 1. Some 23,6% of the cane crushed was recorded as unknown or mixed varieties, with some mills recording up to half their cane under these categories. Thus, the following comments about the varietal distribution only apply to the consignments of known variety, and it is possible that some trends could change if the variety of all consignments were known. The N12 variety has increased in popularity during this season at the expense of NCo376 and N14. The percentage of N19, which had been increasing since 1994-95, remained the same as in the previous season at just over 10%.

Table 1. Varietal statistics for the 1998-99 season.

Variety	% of cane crushed
N12	25,5
NCo376	16,4
N19	10,3
N14	8,3
N16	6,3

N12 and N16 remain the principal varieties in the Midlands, with the majority of cane in the coastal region being N12 and NCo376. The northern regions still favour N14 and N19, accounting for 79% and 84,6% at ML and KM respectively, and for 64,6% at PG, where N25 is also significant at 16,8%. Transport data for the various mills are given in Table H.

Burning

A number of mills are coming under increasing environmental pressure to stop or reduce cane burning, particularly those near built-up areas such as MS. In some cases, large areas of cane are burnt when optimum conditions (such as wind direction) exist and this cane is then harvested over the following three weeks. This has had noticeable impacts on cane deterioration and has caused some processing problems. This trend is likely to continue and some mills face the prospect of increasing tonnages of green cane being supplied.

Despite these pressures, the trend towards increased burning continues, with 89,5% of the cane delivered having been burnt. Six factories (ML, KM, PG, UF, EN and NB) crush nearly 100% burnt cane.

Cane quality

Cane quality was generally extremely good during the past season, with a slight drop-off from October onwards, as a result of considerable rainfall. However, this was not the case for the northern South African mills where cane is mostly irrigated, at ML, KM and PG, in which region a hot and dry winter was experienced, with extensive rains from October onwards. PG also experienced a severe hailstorm that caused extensive cane damage, especially to eldana-infested carry-over cane and to N25 variety.

ERC % cane, as shown in Figure 1, was considerably better than for the 1997-98 season and even surpassed that of the 1991-92 season, except for the first and last months of the season. It showed an early rise and a sustained peak and only returned to normal levels in November. The season average for South African mills was 11,52%, with the best being 12,51% at EN. DW had a very high pol-based ERC of 13,30%.

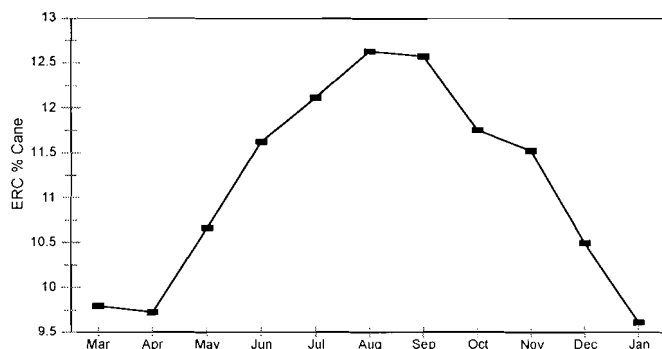


Figure 1. Monthly ERC % cane for the 1998-99 season.

It is interesting to compare the individual mills' average ERC % cane figures for the 1997-98 and 1998-99 seasons, as shown in Figure 2. From this it is clear that cane quality improved greatly throughout the region from UF southwards and was slightly poorer in the northern areas. This can largely be ascribed to ideal climatic conditions, while cane payment bonus schemes in place at AK, DL and MS were thought to have contributed.

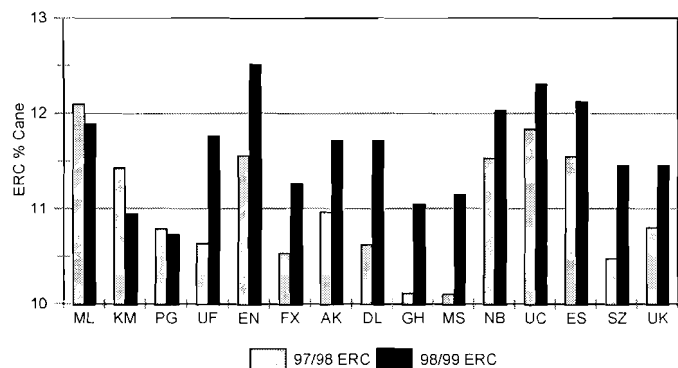


Figure 2. Comparison of South African mills' ERC % cane for the last two seasons.

Fibre % cane recorded a welcome drop to the lowest level since the 1961-62 season, with an average of 14,66%. This has resumed the downward trend that was terminated by the drought that started in the 1992-93 season, as shown in Figure 3. The monthly trend, shown in Figure 4, indicates that the mid-season rise in fibre % cane occurred later than in the previous season although high levels were reached in the Mpumalanga region during January.

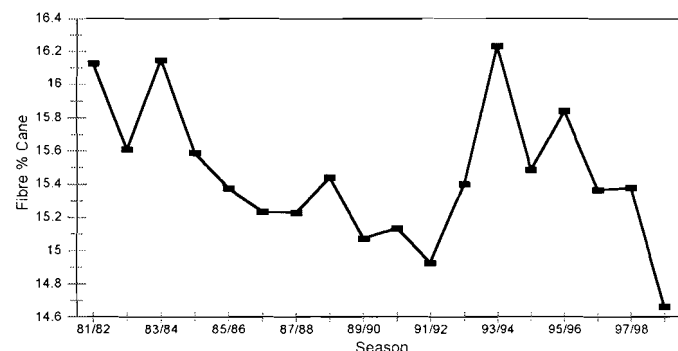


Figure 3: Fibre % cane in the South African industry.

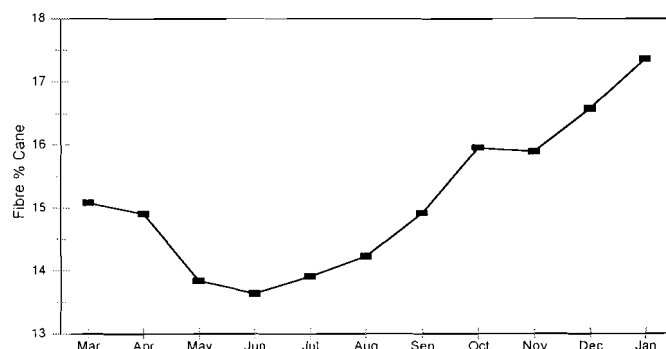


Figure 4. Monthly trends in fibre % cane.

Similarly, the industry average ash % cane dropped to near pre-drought levels at 1,57% (Figure 5). However, the season was characterised by large variations in ash % cane, from a low value of 1,08% in June to a high value of 2,88% in January (Figure 6). The sudden rise in October is a direct result of extensive rain from this time onwards and the high value in January comes from the two Mpumalanga mills crushing at this stage (ML and KM) having experienced considerable rain in December and January (325 mm for ML and 192 mm for KM).

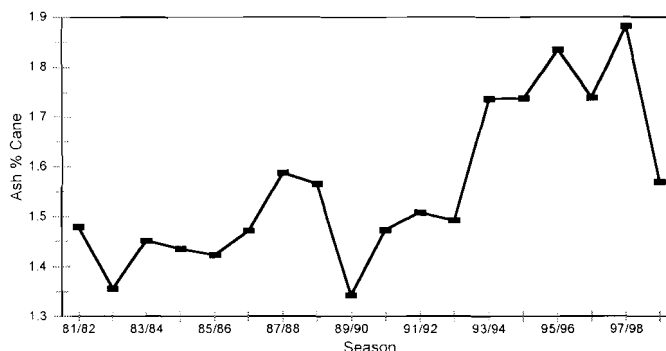


Figure 5. Ash % cane for the South African industry.

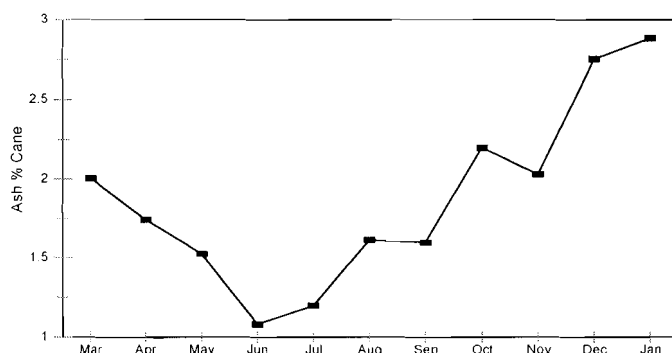


Figure 6. Monthly trends in ash % cane.

Mixed juice purity was good at an industry average of 86,17%, with UC recording a very good purity of 88,56%. Monthly averages are shown in Figure 7 and mill seasonal averages in Figure 8.

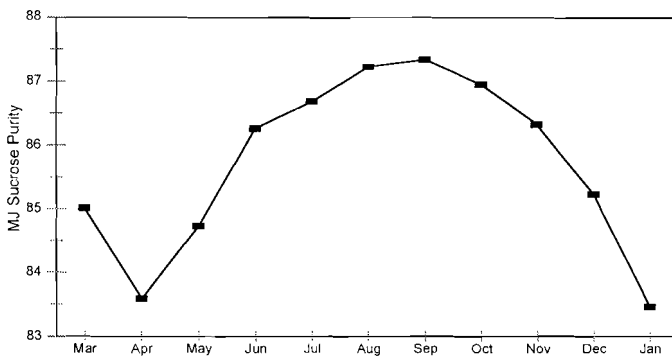


Figure 7. Monthly trends in mixed juice purity.

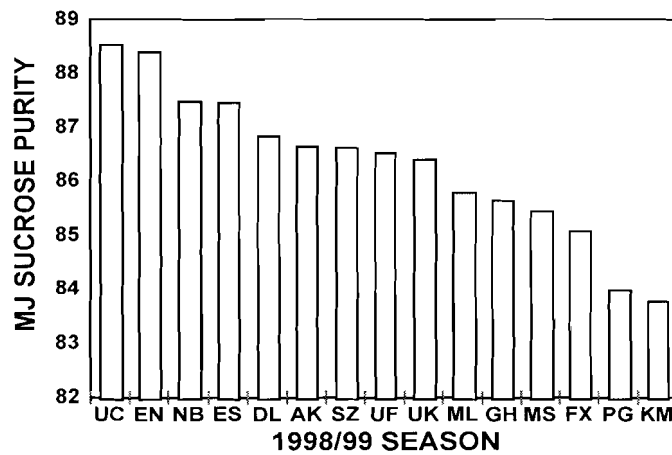


Figure 8. Mixed juice purity for South African mills, 1998-99 season.

Cane tonnage

This season was truly a record one, with many long-standing throughput records being broken at many mills, in particular at AK, DL, MS, UK, UC, NB and ES. Cane tonnage was an all-time record at 22 930 324 tons, beating the 1984-85 record by 574 733 tons. This was achieved despite the early season crop forecasts not being realised as a result of a hot dry winter and extensive cloud cover in summer. The smaller than forecast crop caused erratic cane supplies to some mills (FX, UF, AK, and MS) in the later part of the season, and frequent boil-offs during some weeks.

Sugar production was also at an all-time record of 2 650 256 tons, beating last season's record by just under 230 000 tons. Many mills increased sugar production considerably with ES in particular manufacturing 39% more than in the 1997-98 season. The cane to sugar ratio for the South African industry improved significantly to 8,65, down from 9,15 in the previous season. Cane and sugar tonnages for the last ten seasons in South Africa are shown in Figure 9, and the tonnages for the region for the season are given in Table 2. Monthly tonnages of cane and sugar for the season and the five-year averages are shown in Figure 10 and Figure 11.

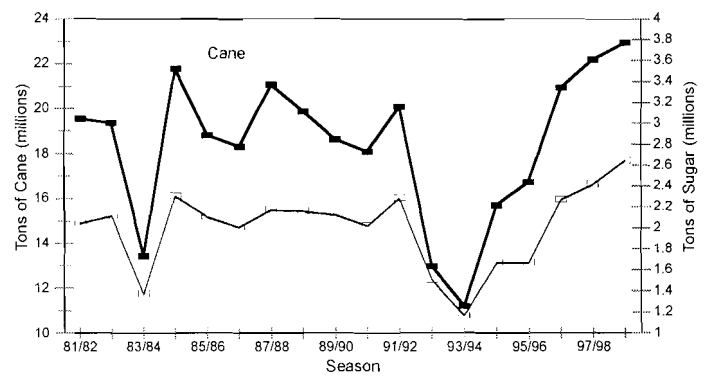


Figure 9. Cane and sugar tonnages in the South African industry.

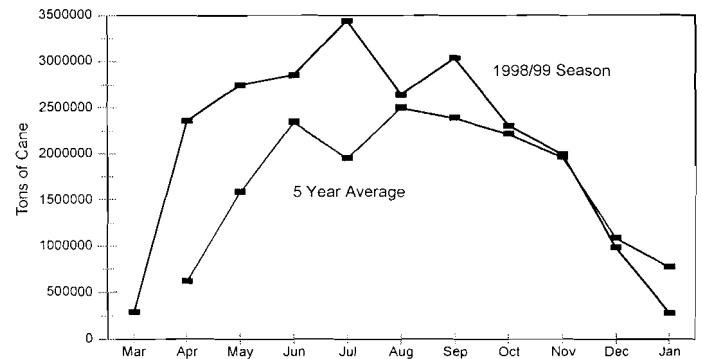


Figure 10. Cane tonnages in the South African industry.

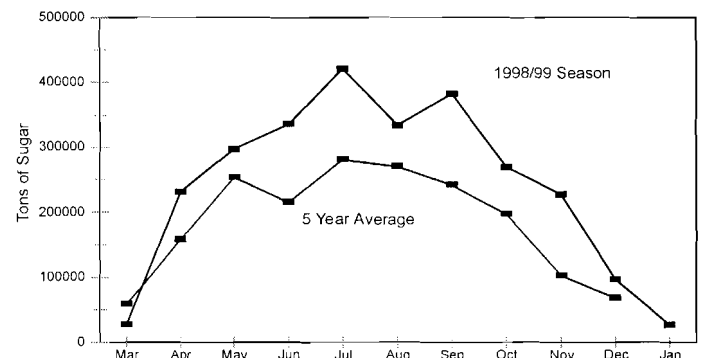


Figure 11. Sugar tonnages in the South African industry.

Table 2. Cane and sugar tonnages for the 1998-99 season.

Country	Tons cane	Tons sugar
South Africa	22 930 324	2 650 256
Zimbabwe	4 780 252	570 038
Swaziland	3 886 432	474 408
Malawi	1 785 862	206 635

Mill performance

Length of season and time efficiency

Most mills started crushing early in the season based on forecasts of large crops, with UC starting first on 6 March 1998. While most stopped well before the Christmas holidays, some continued into January as a result of carried-over cane and frequent 'no cane' stops because of rain, with ML finishing last on 28 January 1999. The overall industry season length was 328 days, with the longest and shortest periods being 301 days at ML and 213 days at FX respectively.

After five seasons with Overall Time Efficiencies (OTEs) below 80%, it is gratifying to record a very good value for South African mills of 81,31% (see Figure 12), with the highest OTEs of 89,72% at SZ2 and 91,30% at TR(D) being recorded. An excellent value of Lost Time Available (LTA) of 2,63% was recorded at SZ1, while the industry average was 7,52%.

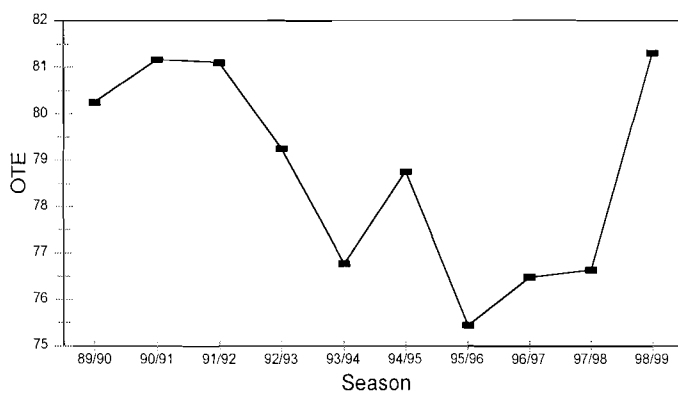


Figure 12. Overall Time Efficiency for South African mills.

Monthly values of 'no cane' stops and 'other' stops for the 1998-99 season are shown in Table 3. GH experienced numerous stops due to breakdowns on the extraction lines, and this has been ascribed to reduced maintenance because of a short off-crop, while ML also experienced many breakdowns, although their mechanical efficiency was improved over the previous season.

As a result of the record crop, this season produced a welcome return to high throughputs. Tons brix per hour and tons sucrose per hour in South Africa were the highest of the decade at 44,87 and 38,66 t/h respectively. The tons of non-sucrose processed per hour was 6,21 t/h, which is about 5% above the 10-year average, reflecting the high mixed juice purity.

Extraction

Extraction in the South African mills was very similar to that of the previous two seasons, at 97,73%, again with eight extraction lines (KM, FX1, FX2, AK, MS1, MS2, SZ1 and UK) exceeding 98%. FX1 reported very good extraction at 98,59% average for the season although FX mill did not crush at its full capacity for any month during the entire sea-

son. Bagasse moistures averaged 51,00% for the South African mills, with the lowest being 45,31% at KM and the highest being 55,04% at MS2, a range of nearly 10 units.

Some comments about individual mills' extraction plants are as follows:

- ML ran the season with an hydraulic drive on one dewatering mill, which was reported to have performed well.
- At KM, crush rates were kept high at the beginning of the season with a consequent decrease in extraction. About 15% billeted cane was crushed which reportedly resulted in poor preparation and a drop in extraction.
- Extraction at PG was improved through changes to preparation equipment and better diffuser sanitation.
- Serious rock damage to preparation equipment at FX was experienced from time to time.
- The whole stalk shredder at NB worked well, but the foundations have had to be strengthened for the next season. During the season, 200 000 tons of chopper harvested cane was processed which reportedly increased throughput through the shredder.
- UK experienced problems with the mixed juice scale and it was subsequently converted to a 3-point compression system.
- In Zimbabwe, HV experienced high wear in the extraction plant because of high sand levels in cane attributed to the extensive use of grab-loading of cane.

Clarification and filtration

The major item of interest in this part of the factory was the trials on the return of clarifier mud to the diffuser, following the paper on this topic presented at the 1998 SASTA Congress (Meadows *et al.*, 1998). Extensive trials were performed at MS and ML, and a two-week trial at KM. Many other mills have expressed interest in the modification, and are planning to do trials this season, while MS will be running with mud recycle from start-up.

Table 3. Monthly values of 'no cane' and 'other' stops in the South African industry, 1998-1999 season.

Month	No cane stops (%)	Other stops (%)
March	5,92	12,75
April	7,22	7,87
May	3,35	5,69
June	1,39	5,35
July	1,39	5,46
August	1,66	6,39
September	4,63	7,91
October	11,21	6,13
November	11,32	6,75
December	16,99	7,39
January 1999	12,01	6,36

These trials were judged successful in terms of having no significant impact on diffuser or boiler performance, and considerable savings in filter operation can be expected. However, there were problems regarding analyses, as mud is returned to a point ahead of the mixed juice scale, but these have been addressed and resolved by the Factory Control Advisory Committee. Mud return to the diffuser can thus be expected to be a permanent feature of many mills.

Clarification was generally good during the season, with some problems occurring once the rains started. Clarifier throughput limited imbibition rates at KM however, and a new short retention time clarifier similar to that at ES will be installed as part of the expansion programme. Mixed juice heating was poor at PG and carryover was experienced at NB and ES, the latter mill modifying its SRI-type clarifier to close to the original design during the off-crop. Both ML and UK reported very good clarification and both consider the use of a short retention time tank before the clarifier essential for this purpose. The syrup clarifier at MS ran throughout the season as this mill bags raw sugar.

Evaporators

The evaporators generally performed well this season, aided by high throughputs and consequently high wetting rates, and several factories were able to run for extended periods before evaporator cleaning was required. Distribution problems at UF caused poor level and flow control while control and hence performance were improved at MS. Scale inhibitors (anti-scalents) were used at UK and SZ, and appear to have helped in maintaining evaporator performance, the main benefit being reported as softer scales.

Syrup storage was again practised at UK and it is estimated that this enabled the crushing season to be shortened by 2½ weeks. Enzymes for hydrolysis of starch were used extensively at DL, GH, ES, SZ and UK, and only towards the end of the season at MS. The other mills reported no enzyme use for this season.

Boiling house

As might be expected from the good cane quality, Boiling House Recovery (BHR) was good having a South African industry average of 88,08%, with the best performer being UC with an excellent value of 91,01%. SM reported a pol-based BHR of 91,51%, but an undetermined pol loss of only 0,02%, a barely plausible figure that demonstrates the perils of reliance on a pol balance. The industry Corrected Reduced Boiling House Recovery (CRB) was 85,68% on average, with MS producing the best figure of 87,26%.

Undetermined loss remained at the same level as the previous season at 2,10% with the best mill in this respect being UC with a loss of only 1,19%. Some mills suffered towards the end of the season with erratic cane supplies and had to boil-off two or three times during certain weeks, thereby increasing the level of undetermined losses.

Molasses exhaustion

The sucrose lost in molasses as a percentage of that in cane was 9,29% for the season, which is lower than the average for the past 10 years (10,09%), but not as good as the 1989-90 value of 8,76%. It is well established that there is a good relationship between the sucrose lost in final molasses and the concentration of impurities in mixed juice. Data for the past 18 seasons in South Africa have been used to produce Figure 13, where the loss in molasses has been plotted against 100-mixed juice purity.

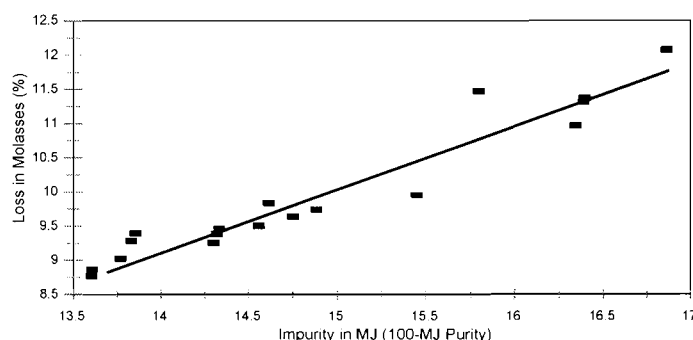


Figure 13. Relation between molasses loss and mixed juice impurity.

The long-term trend is linear, and can be quantified by:
 % lost in mol = -3,46 + 0,903 x impurity in MJ(n=18; r² = 0,92) (1)

The loss for 1998-99 calculated from Equation (1) is 9,02. The actual loss was 9,29, that is, 0,3 units higher than expected from the long term trend, indicating that operational performance may not have been as good as expected.

Target Purity Difference (TPD) is a good indicator of molasses exhaustion. This parameter was poor for the past season, as shown in Figure 14, with an industry average of 5,50. It is evident that TPD has been increasing steadily from 1990-91 to reach the second highest value (5,50) in 1998-99. KM, AK and DL performed well in this regard with TPDs of 3,2, 3,3 and 3,3 respectively, while NB and ES performed very poorly with TPDs of 8,1 and 7,3 respectively. Both NB and ES experience high levels of gums, and recent work has demonstrated a high correlation between gums and TPD.

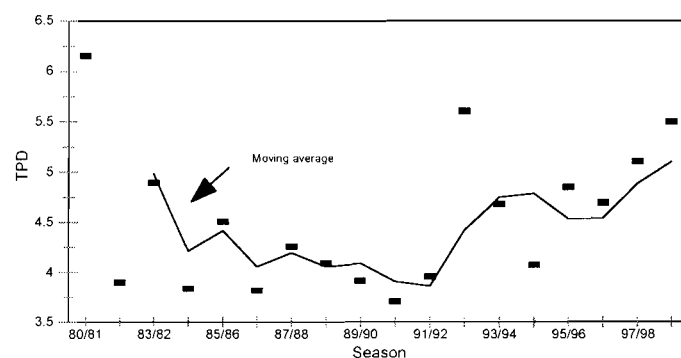


Figure 14. TPD for South African mills.

ciated with the post-harvest deterioration of cane. High concentrations of polysaccharides in the cane would cause the viscosity of molasses to increase. This is not the case for the 1998-99 season, as evident in Figure 18, which shows season averages of weekly molasses viscosities for a set of selected South African mills.

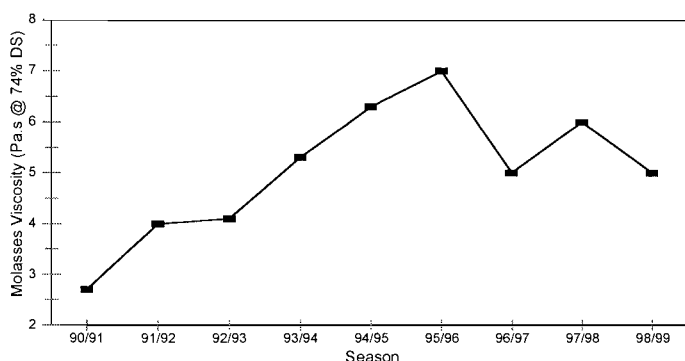


Figure 18. Molasses viscosities for a set of selected South African mills (season averages).

It therefore appears that viscosity was not a problem this season, which suggests that crystal elongation was not caused by high oligosaccharide levels. The average width of the crystals in C-masseccuite is, however, very close to the minimum limit, and this is a cause for concern. More attention should therefore be paid to increasing C-crystal size to improve exhaustions.

Power house and energy

Most boiler stations performed well during the season with fewer problems because of lower sand levels in cane leading to lower ash levels, although UF experienced some boiler superheater tube failures. KM burnt excess bagasse and exported power for revenue, although their expansion will create a bottleneck on HP steam for a few years until the installation of a new boiler to complete the expansion. Both FX and MS will introduce cogeneration for revenue for the 1999-2000 season.

Effluent and environmental issues

Several mills (FX, AK, DL, MS) have embarked on drives to minimise effluent by judicious recycling of spills and drains to process. MS is now striving to become a 'zero-effluent' factory, which in effect means that they may discharge clean water only, essentially being condensate. This means that all sump spillages will have to be returned to the process, generally to MJ. Many areas have to be bunded to separate spillages from stormwater, and increasing use of biocides is expected. It will be interesting to see what effect this strategy will have on mill performance in the coming years, particularly on undetermined loss.

Another issue that has arisen with the idea of returning clarifier mud to diffusers is that of smuts disposal. FX in particular disposes of smuts in filtercake, and the possible loss of this waste stream means that alternative methods will have to be found. In addition, some mills report that smuts dams are nearly full, and that new ones will have to be constructed, a problem where available land is limited, or solid waste disposal sites will have to be used.

New equipment

In general, little new equipment was installed during the 1999 off-crop, with the notable exception of KM, where a major expansion is being undertaken. The existing front end has been duplicated identically, as has the evaporator station. A new 10,3 m diameter short residence time clarifier was installed, similar to the ES clarifier. New pans, crystallisers and centrifuges were supplied in the boiling house, and a new rotary louvre sugar dryer was installed. A new inclined tube settler is the core of the upgraded water filtration plant, and cooling capacity was doubled by a duplicate set of towers.

New B and C continuous centrifugals were installed at ML, A and C continuous centrifugals and a refinery batch centrifugal at UF and an A batch centrifugal at UK. New continuous pans were installed at UF (C) and NH (B), and an A-pan from GD was installed and commissioned at NB during the season.

Refined sugar quality

Refined sugar colour has continued to improve, with the industry average for the past season as reported by the factories being 39, with ML and HR producing sugar well under 40 ICUMSA colour.

Acknowledgements

The assistance of Mr M Achary in the analysis of the data and the preparation of the tables and graphs is gratefully acknowledged. The SA Sugar Association Cane Testing Service, SA Sugar Terminals and the mill laboratories are also thanked for their information and data. Thanks are also due to the various factory staff who spent time discussing the progress of their seasons with the authors.

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- Meadows, DM, Schumann, GT and Soji, C (1998). Farewell to filters: the recycle of clarifier mud to the diffuser. *Proc S Afr Sug Technol Ass* 72: 198-203.
- Morel du Boil, PG (1991). The role of oligosaccharides in crystal elongation. *Proc S Afr Sug Technol Ass* 65: 171-178.

Molasses factor (tons sucrose in molasses/tons non-sucrose in mixed juice) is another useful indicator of exhaustion. Again, this parameter has been increasing over the past eight seasons, as shown in Figure 15. An increase in molasses factor can be due to increases in the melassigenic properties of the non-sucrose. If this is due to relative increases in the concentration of ash, then the TPD will not change. The molasses factor can also increase if the TPD rises without a change in melassigenic properties. This would represent poorer crystallisation and/or centrifuging operations.

The molasses factor was recalculated for a constant TPD value of 4, for the past 18 seasons. These values and the actual molasses factors have been plotted against season in Figure 16.

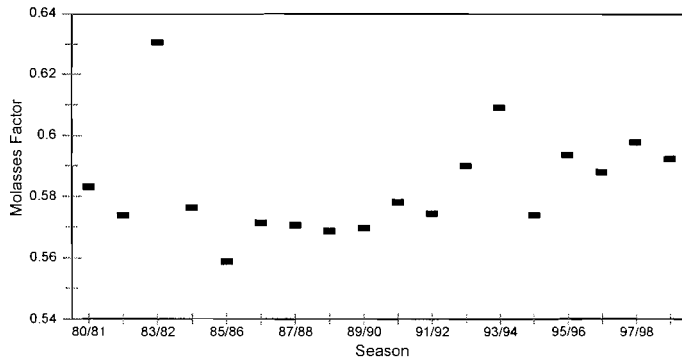


Figure 15. Molasses factor for South African mills.

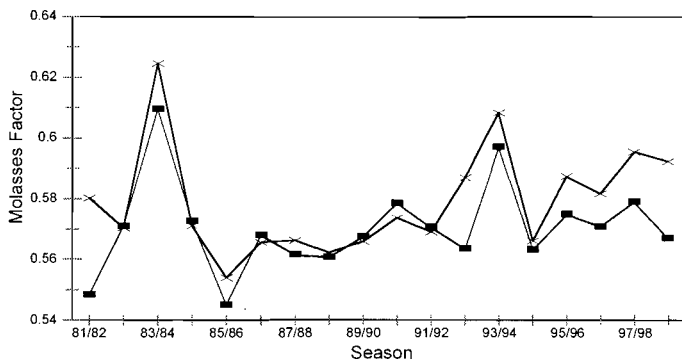


Figure 16. A comparison of actual molasses factors and those calculated at a TPD of 4 units.

The following comments may be made:

- The sharp increases in 1983-84 and 1993-94 are present on both curves. This indicates that there was an increase in the melassigenic properties.
- The data for the past four seasons are disturbing. The molasses factor values at a TPD of 4,0 are steady at around 0,57, while the actual factors show an increasing trend to a current value of 0,59. This indicates that performance, as measured by TPD, and not melassigenic properties is involved.

This raises a question about possible reasons for the higher TPD values. Increases in the throughput of non-sucrose

could produce more C-masseccuite and thus reduce retention time in crystallisers and/or impact on centrifugal capacity. However, the average throughput of non-sucrose/hour has been 5,9 tons/hour for the past ten seasons. This is nearly identical to the average for the past four seasons.

The average size of the crystals in C-masseccuite for the last 11 seasons is shown in Figure 17. There is no doubt that the C-crystal width has been decreasing in South Africa. The minimum size has been set at 120 µm to prevent or reduce crystal loss through C-centrifugal screens. For the past three seasons the average has been about 123 µm, which is very close to the limit. The decrease in crystal width has been accompanied by an increase in the elongation ratio (length/width) of the C-crystals. The trend in this ratio is shown in Table 4.

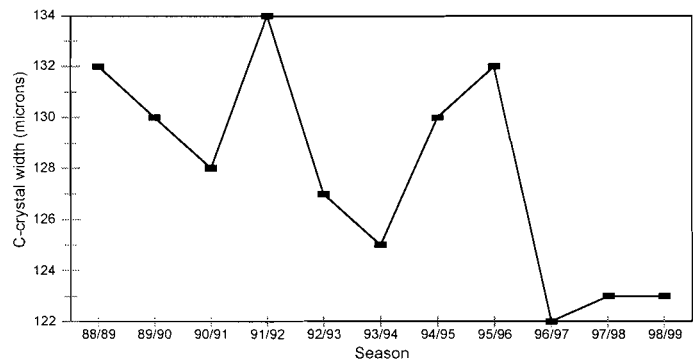


Figure 17. C-crystal width for South African mills.

Table 4. Trend in the elongation ratio of C-crystals.

Season	Elongation Ratio
1988/89	1,67
1989/90	1,67
1990/91	1,64
1991/92	1,72
1992/93	1,75
1993/94	1,67
1994/95	1,71
1995/96	1,80
1996/97	1,91
1997/98	1,91
1998/99	1,83

Over the past four seasons, therefore, C-crystals have been elongated. Two classes of compounds, namely oligosaccharides and polysaccharides, have been conclusively shown to cause crystal elongation in the raw house (Morel du Boil, 1991). The presence of these compounds in the juice is asso-

TABLE B1
CANE CRUSHED AND SUGAR MADE, CANE COMPOSITION, THROUGHPUTS AND TIME ACCOUNTS, PERFORMANCES AND LOSSES
SOUTH AFRICAN MILLS (SEASON 1998 - 1999)

SYMBOLS OF FACTORIES	ML *	KM *	PG *	UF *	EM **	FX-A *	FX-B *	FX-AVE	AK *	DL	MS-A *	MS-B *	MS-AVE
TONS SUGAR MADE AND ESTIMATED	203351	156754	123280	142678	57928	-	-	250581	207062	174788	-	-	235493
Refined % total sugar	-	-	82.63	67.40	-	-	-	-	-	-	-	-	-
Moisture % all sugar	0.11	0.09	0.04	0.06	0.19	-	-	0.12	0.16	0.17	-	-	0.10
Pol all sugar	99.30	99.40	99.85	99.83	99.28	-	-	99.44	99.26	99.34	-	-	99.50
Tons cane crushed total	1706003	1411946	1185726	1225284	462294			2175156	1728484	1471318			2077934
Tons cane crushed per tandem						1044940	1130216				881425	1196509	
Season started on	02-Apr-98	01-Apr-98	18-Mar-98	15-Apr-98	02-Apr-98	-	-	16-Apr-98	01-Apr-98	02-Apr-98	-	-	15-Apr-98
Season completed on	28-Jan-99	20-Jan-99	19-Dec-98	06-Dec-98	19-Dec-98	-	-	15-Nov-98	28-Nov-98	29-Nov-98	-	-	16-Dec-98
Number of crushing days	301	294	276	235	261	-	-	213	241	241	-	-	245
TIME ACCOUNT													
Overall time efficiency %	75.53	80.15	77.76	75.74	77.23	78.64	80.38	79.50	84.17	79.48	86.27	85.48	85.87
Sched.stops% gross avail.time	4.98	2.84	4.77	3.94	8.33	8.36	8.32	8.34	6.73	5.28	3.61	3.90	3.76
Lack of cane % gross " "	10.69	11.04	6.31	10.43	5.88	8.36	6.71	7.54	6.41	7.90	5.25	4.80	5.02
Other stops % gross " "	8.59	5.44	11.00	9.34	8.33	4.26	4.55	4.40	2.54	7.09	4.65	5.43	5.04
Foreign matter % gross " "	0.21	0.54	0.16	0.56	0.23	0.38	0.04	0.21	0.15	0.25	0.22	0.40	0.31
Lost time % avail.crush.time	10.21	6.35	12.40	10.98	9.74	5.14	5.35	5.25	2.93	8.19	5.11	5.97	5.55
Force majeure stops (hours)	0	0	0	0	8.17	0	0	0	5.25	0	0	0	0
THROUGHPUTS PER CRUSHING HOUR													
Tons cane	316.88	251.60	233.26	286.17	95.69	259.23	277.99	537.30	355.37	319.49	179.69	238.58	418.93
Tons fibre	46.89	38.17	32.98	40.59	12.39	38.57	41.14	79.73	53.24	45.70	26.51	35.59	62.21
Tons brix in mixed juice	49.63	38.12	34.24	43.68	14.91	40.09	41.98	82.09	54.49	48.45	26.88	35.35	62.32
Tons sucrose in mixed juice	42.58	31.94	28.76	37.80	13.18	34.08	35.76	69.84	47.22	42.08	23.02	30.16	53.18
Tons non-suc. in mixed juice	7.05	6.18	5.48	5.88	1.73	6.02	6.22	12.24	7.27	6.37	3.86	5.19	9.06
Tons of sugar produced	37.77	27.93	24.25	33.32	11.99	-	-	61.90	42.57	37.95	-	-	47.48
COMPOSITION OF CANE CRUSHED													
Sucrose % cane	13.75	12.95	12.66	13.60	14.21	13.33	13.06	13.19	13.50	13.54	13.06	12.90	12.97
Pol % cane	13.58	12.74	12.49	13.47	14.07	13.18	12.92	13.05	13.38	13.44	12.96	12.78	12.86
Fibre % cane	14.80	14.44	14.27	14.71	14.01	14.97	14.88	14.92	15.39	15.18	14.75	14.92	14.85
Brix % cane	16.20	15.69	15.28	15.96	16.32	15.97	15.62	15.79	15.77	15.90	15.44	15.28	15.35
Ash % cane	2.13	2.03	1.63	1.84	1.28	1.74	1.75	1.75	1.01	1.32	1.53	1.60	1.57
ERC % cane	11.87	10.93	10.71	11.76	12.51	11.35	11.13	11.24	11.70	11.71	11.23	11.07	11.14
ERC % sucrose in cane	86.31	84.42	84.63	86.50	88.01	85.16	85.22	85.19	86.70	86.44	85.97	85.79	85.87
EXTRACTION													
Extraction (sucrose based)	97.70	98.03	97.41	97.14	96.97	98.59	98.50	98.55	98.43	97.25	98.06	98.01	98.03
Corrected reduced extraction	97.48	97.86	97.17	96.76	96.11	98.50	98.42	98.46	98.34	96.93	97.94	97.92	97.93
Imbibition % cane	52.72	42.35	41.67	49.77	47.67	54.37	50.32	52.27	59.03	45.44	45.24	52.94	49.67
Imbibition % fibre	356	295	295	351	368	365	340	352	394	318	307	355	335
Preparation index	92	91	91	-	90	92	92	92	93	91	90	90	90
Pol factor	99.48	100.51	98.82	98.80	99.02	99.55	97.75	98.62	98.97	99.31	99.14	99.11	99.12
Brix factor	100.62	102.25	100.55	100.53	100.01	102.14	100.17	101.12	100.20	100.43	99.70	99.62	99.66
RECOVERIES													
Boiling house recovery (sucrose)	88.09	86.92	84.20	88.01	90.29	-	-	88.12	89.49	89.61	-	-	88.69
C. R. B.	85.62	85.87	83.98	86.36	85.62	-	-	86.83	86.99	86.54	-	-	87.26
Overall recovery (sucrose)	86.06	85.21	82.03	85.49	87.55	-	-	86.84	88.09	87.14	-	-	86.95
Tons cane per ton sugar	8.39	9.01	9.62	8.59	7.98	-	-	8.68	8.35	8.42	-	-	8.82
Tons cane per ton 96 pol sugar	8.11	8.70	9.25	8.26	7.72	-	-	8.38	8.07	8.13	-	-	8.51
BALANCES													
Suc. lost % suc. in cane													
- lost in bagasse (a)	2.30	1.97	2.59	2.86	3.03	-	-	1.45	1.57	2.75	-	-	1.97
- lost in filter cake (b)	0.43	0.05	0.06	0.43	0.34	-	-	0.26	0.04	0.82	-	-	0.12
- lost in final molasses (c)	8.89	10.31	11.41	9.42	7.08	-	-	9.84	8.46	7.88	-	-	9.51
- undetermined losses (d)	2.32	2.46	3.91	1.80	2.00	-	-	1.61	1.85	1.41	-	-	1.45
Boiling house losses(b+c+d)	11.64	12.82	15.39	11.65	9.42	-	-	11.70	10.34	10.10	-	-	11.08
Sum of all losses(a+b+c+d)	13.94	14.79	17.97	14.51	12.45	-	-	13.16	11.91	12.86	-	-	13.05
Non sucrose ratio	1.00	1.01	1.05	0.99	0.97	-	-	1.04	1.04	0.99	-	-	0.98
Fructose ratio FM/MJ	0.90	0.88	0.88	0.78	0.84	-	-	0.96	0.89	0.82	-	-	0.96
Glucose ratio FM/MJ	0.77	0.56	0.68	0.62	0.70	-	-	0.73	0.70	0.67	-	-	0.78

* Cane diffuser

** Bagasse diffuser

TABLE B1 (continued)
CANE CRUSHED AND SUGAR MADE, CANE COMPOSITION, THROUGHPUTS AND TIME ACCOUNTS, PERFORMANCES AND LOSSES
SOUTH AFRICAN MILLS (SEASON 1998 - 1999)

SYMBOLS OF FACTORIES	GH-A *	GH-B	GH-AVE	NB	UC *	ES *	SZ-A *	SZ-B *	SZ-AVE	UK *	INDUSTRY
TONS SUGAR MADE AND ESTIMATED	-	-	173879	198859	102970	171372	-	-	289455	161856	2650306
Refined % total sugar	-	-	80.65	100.00	-	-	-	-	-	-	-
Moisture % all sugar	-	-	0.03	0.02	0.08	0.12	-	-	0.10	0.06	0.10
Pol all sugar	-	-	99.83	99.93	99.45	99.36	-	-	99.45	99.48	99.51
Tons cane crushed total			1587143	1723301	831383	1429666			2524887	1389799	22930324
Tons cane crushed per tandem	537089	1050054					1264647	1260240			
Season started on	-	-	27-Mar-98	07-Mar-98	06-Mar-98	19-Mar-98	-	-	23-Mar-98	15-Apr-98	06-Mar-98
Season completed on	-	-	20-Dec-98	20-Dec-98	19-Dec-98	19-Dec-98	-	-	20-Dec-98	23-Jan-99	28-Jan-99
Number of crushing days	-	-	268	288	288	275	-	-	272	283	328
TIME ACCOUNT											
Overall time efficiency %	81.25	84.67	82.96	85.24	83.27	84.69	87.48	89.72	88.62	79.18	81.31
Sched.stops% gross avail.time	3.45	4.72	4.09	5.28	8.12	3.72	5.23	4.86	5.04	10.41	5.70
Lack of cane % gross " "	4.66	2.68	3.67	3.25	2.03	3.40	4.87	2.49	3.66	3.68	6.01
Other stops % gross " "	9.38	7.28	8.33	6.08	6.22	7.61	2.36	2.75	2.56	5.86	6.61
Foreign matter % gross" "	1.25	0.64	0.95	0.16	0.36	0.57	0.06	0.18	0.12	0.87	0.38
Lost time % avail.crush.time	10.35	7.92	9.12	6.66	6.95	8.25	2.63	2.97	2.80	6.89	7.52
Force majeure stops (hours)	0	0	0	12.84	0	9	0	0	0	0	35.26
THROUGHPUTS PER CRUSHING HOUR											
Tons cane	102.99	193.05	297.94	288.59	144.17	256.44	229.24	215.86	444.72	254.54	296.08
Tons fibre	14.78	27.15	42.19	37.49	18.43	34.06	34.17	32.19	66.30	37.24	42.38
Tons brix in mixed juice	15.38	28.14	43.80	44.12	22.03	39.45	34.36	32.30	66.60	38.28	44.87
Tons sucrose in mixed juice	13.10	24.18	37.28	38.60	19.51	34.51	29.90	27.85	57.76	33.08	38.66
Tons non-suc. in mixed juice	2.28	3.96	6.28	5.52	2.52	4.94	4.46	4.45	8.90	5.20	6.21
Tons of sugar produced	-	-	32.64	33.30	17.86	30.74	-	-	50.98	29.64	35.65
COMPOSITION OF CANE CRUSHED											
Sucrose % cane	13.04	12.92	12.96	13.76	13.90	13.83	13.31	13.17	13.24	13.26	13.36
Pol % cane	12.90	12.79	12.83	13.59	13.76	13.66	13.17	13.03	13.10	13.13	13.22
Fibre % cane	14.56	14.85	14.75	13.96	12.90	13.90	15.04	15.06	15.05	14.92	14.66
Brix % cane	15.68	15.45	15.52	15.96	15.89	16.00	15.54	15.53	15.53	15.59	15.74
Ash % cane	1.51	1.46	1.48	1.11	1.01	1.86	0.00	0.00	0.00	0.00	1.57
ERC % cane	11.08	11.01	11.03	12.02	12.29	12.11	11.54	11.34	11.44	11.44	11.52
ERC % sucrose in cane	84.93	85.21	85.12	87.38	88.41	87.55	86.74	86.13	86.44	86.29	86.23
EXTRACTION											
Extraction (sucrose based)	97.52	96.96	97.15	97.22	97.37	97.29	98.02	97.97	97.99	98.04	97.73
Corrected reduced extraction	97.29	96.64	96.86	96.51	96.58	96.66	97.90	97.86	97.88	97.88	97.48
Imbibition % cane	49.28	37.11	41.23	34.45	37.29	51.42	51.91	58.02	54.96	63.91	49.06
Imbibition % fibre	343	264	291	265	292	387	348	389	369	437	343
Preparation index	92	91	91	91	93	91	90	89	90	92	91
Pol factor	99.59	99.30	99.40	98.68	98.09	99.41	99.16	98.52	98.84	99.60	99.11
Brix factor	101.29	100.29	100.63	100.08	99.60	100.49	100.00	100.25	100.12	100.80	100.48
RECOVERIES											
Boiling house recovery (sucrose)	-	-	86.86	86.21	91.01	88.50	-	-	87.87	89.16	88.08
C. R. B.	-	-	85.32	82.38	86.10	84.25	-	-	84.80	86.47	85.68
Overall recovery (sucrose)	-	-	84.39	83.82	88.62	86.10	-	-	86.11	87.41	86.09
Tons cane per ton sugar	-	-	9.13	8.67	8.07	8.34	-	-	8.72	8.59	8.65
Tons cane per ton 96 pol sugar	-	-	8.78	8.33	7.79	8.06	-	-	8.42	8.29	8.35
BALANCES											
Suc. lost % suc.in cane	-	-	-	-	-	-	-	-	-	-	-
- lost in bagasse (a)	-	-	2.85	2.78	2.63	2.71	-	-	2.01	1.96	2.27
- lost in filter cake (b)	-	-	0.25	0.58	0.10	0.12	-	-	0.13	0.07	0.25
- lost in final molasses (c)	-	-	9.77	9.37	7.47	9.11	-	-	9.86	8.85	9.29
- undetermined losses (d)	-	-	2.74	3.45	1.19	1.96	-	-	1.90	1.70	2.10
Boiling house losses(b+c+d)	-	-	12.76	13.41	8.76	11.19	-	-	11.89	10.63	11.65
Sum of all losses(a+b+c+d)	-	-	15.61	16.18	11.38	13.90	-	-	13.89	12.59	13.91
Non sucrose ratio	-	-	1.00	1.11	0.99	1.06	-	-	1.04	0.99	1.02
Fructose ratio FM/MJ	-	-	0.86	0.91	0.84	0.88	-	-	0.91	0.94	0.90
Glucose ratio FM/MJ	-	-	0.65	0.75	0.50	0.59	-	-	0.71	0.78	0.69

* Cane diffuser

** Bagasse diffuser

TABLE B2
CANE CRUSHED AND SUGAR MADE, CANE COMPOSITION, THROUGHPUTS AND TIME ACCOUNTS, PERFORMANCES AND LOSSES
SWAZILAND, MALAWI AND ZIMBABWE MILLS
(SEASON 1998 - 1999)

SYMBOLS OF FACTORIES	MH-A *	MH-B	MH-AVE	UB-A *	UB-B	UB-AVE	SM	NH *	DW *	HV-A *	HV-B *	HV-AVE	TR-A *	TR-B	TR-AVE
TONS SUGAR MADE AND ESTIMATED	-	-	153512	-	-	184087	136809	119274	87361	-	-	275696	-	-	294342
Refined % total sugar	-	-	46.09	-	-	50.08	0.00	35.13	58.92	-	-	4.99	-	-	0.00
Moisture % all sugar	-	-	0.15	-	-	0.20	0.27	0.28	0.10	-	-	0.18	-	-	0.24
Pol all sugar	-	-	99.33	-	-	99.36	99.01	99.04	99.67	-	-	99.04	-	-	98.90
Tons cane crushed total			1265309			1537773	1083350	1101885	683977			2332280			2447972
Tons cane crushed per tandem	584643	680666		815635	722138					1148230	1184050		1630447	817525	
Season started on	-	-	27-Apr-98	-	-	22-Apr-98	20-Apr-98	17-Apr-98	05-May-98	-	-	14-Apr-98	-	-	17-Mar-98
Season completed on	-	-	07-Jan-99	-	-	24-Dec-98	12-Dec-98	22-Dec-98	23-Nov-98	-	-	31-Dec-98	-	-	15-Dec-98
Number of crushing days	-	-	255	-	-	246	236	249	202	-	-	261	-	-	273
TIME ACCOUNT															
Overall time efficiency %	69.60	78.64	74.10	84.46	83.13	83.80	65.89	73.98	89.53	88.39	88.10	88.25	91.30	67.82	79.75
Sched.stops% gross avail.time	4.12	4.23	4.17	4.60	4.60	4.60	4.48	4.07	4.94	2.45	2.55	2.50	3.25	12.44	7.77
Lack of cane % gross " "	16.03	7.66	11.86	4.63	4.01	4.32	16.70	5.33	1.15	1.25	1.73	1.49	1.13	8.30	4.66
Other stops % gross " "	10.07	9.43	9.75	5.96	7.93	6.94	12.80	16.57	4.30	7.91	7.61	7.76	4.29	11.13	7.66
Foreign matter % gross " "	0.17	0.05	0.11	0.35	0.32	0.34	0.13	0.05	0.08	0.00	0.00	0.00	0.03	0.31	0.16
Lost time % avail.crush.time	12.64	10.71	11.63	6.59	8.71	7.65	16.27	18.30	4.58	8.21	7.95	8.08	4.49	14.10	8.76
Force majeure stops (hours)	0	0	0	0	0	0	20	0	18.08	0	0	0	64.53	65.5	65.02
THROUGHPUTS PER CRUSHING HOUR															
Tons cane	138.46	144.07	282.84	160.62	145.95	306.76	296.03	249.57	158.17	207.23	214.54	421.75	274.98	191.70	480.28
Tons fibre	19.82	21.26	41.17	21.73	20.02	41.77	34.44	38.53	24.17	31.30	32.14	63.44	39.31	26.76	68.12
Tons brix in mixed juice	21.91	22.62	44.58	23.99	24.54	48.53	47.64	37.37	26.74	34.09	32.17	66.26	42.50	29.73	74.32
Tons pol in mixed juice	18.96	19.53	38.53	20.18	20.63	40.80	40.45	31.95	23.47	29.00	27.46	56.47	36.37	25.56	63.70
Tons non-pol. in mixed juice	2.95	3.09	6.05	3.81	3.92	7.73	7.19	5.42	3.27	5.09	4.70	9.79	6.13	4.17	10.62
Tons of sugar produced	-	-	34.31	-	-	36.72	37.38	27.01	20.20	-	-	49.85	-	-	57.75
COMPOSITION OF CANE CRUSHED															
Pol % cane	14.09	13.87	13.97	12.94	14.51	13.68	14.05	13.37	15.15	14.40	13.22	13.80	13.51	13.81	13.61
Fibre % cane	14.95	14.86	14.90	14.30	14.25	14.28	12.44	15.46	15.28	15.35	15.23	15.29	14.51	14.34	14.45
Brix % cane	16.58	16.32	16.44	15.69	17.57	16.57	16.77	15.89	17.45	17.21	15.77	16.48	16.24	16.58	16.36
Ash % cane	-	-	-	1.71	1.51	1.62	0.95	-	-	0.53	0.53	0.53	-	-	-
ERC % cane	12.17	11.98	12.07	10.93	12.30	11.57	12.06	11.44	13.30	12.30	11.28	11.78	11.48	11.75	11.57
ERC % pol in cane	86.38	86.39	86.39	84.43	84.74	84.59	85.83	85.58	87.79	85.40	85.32	85.36	85.00	85.12	85.04
EXTRACTION															
Extraction (pol based)	97.17	97.76	97.48	97.04	97.37	97.21	97.24	95.76	97.96	97.18	96.86	97.02	97.90	96.58	97.45
Corrected reduced extraction	96.76	97.53	97.18	96.57	96.78	96.67	96.00	95.67	97.73	96.91	96.71	96.81	97.64	96.01	97.11
Imbibition % cane	50.36	55.15	52.94	37.96	54.76	45.85	37.30	44.85	47.68	47.19	42.09	44.60	52.50	50.34	51.78
Imbibition % fibre	352	374	364	281	399	337	321	290	312	312	281	296	367	361	365
Preparation index	91	91	91	93	93	92	90	92	89	92	92	92	91	91	91
Pol factor	99.66	98.47	99.02	94.77	105.02	99.62	98.04	-	100.00	104.53	95.93	100.17	-	-	98.87
Brix factor	102.20	100.86	101.48	95.82	106.39	100.81	99.35	-	101.22	105.48	96.67	101.01	-	-	101.45
RECOVERIES															
Boiling house recovery (pol)	-	-	88.47	-	-	89.43	91.51	83.73	85.80	-	-	87.44	-	-	89.67
Overall recovery (pol)	-	-	86.25	-	-	86.94	88.98	80.18	84.05	-	-	84.84	-	-	87.39
Tons cane per ton sugar	-	-	8.24	-	-	8.35	7.92	9.24	7.83	-	-	8.46	-	-	8.32
Tons cane per ton 96 pol sugar	-	-	7.97	-	-	8.07	7.68	8.96	7.54	-	-	8.20	-	-	8.07
BALANCES															
Pol lost % pol in cane															
- lost in bagasse (a)	-	-	2.52	-	-	2.79	2.76	4.24	2.04	-	-	2.98	-	-	2.55
- lost in filter cake (b)	-	-	0.16	-	-	0.15	0.15	0.11	0.35	-	-	0.06	-	-	0.19
- lost in final molasses (c)	-	-	8.63	-	-	8.82	8.09	12.59	11.33	-	-	8.76	-	-	8.59
- undetermined losses (d)	-	-	2.45	-	-	1.31	0.02	2.88	2.23	-	-	3.37	-	-	1.29
Boiling house losses(b+c+d)	-	-	11.24	-	-	10.27	8.25	15.58	13.91	-	-	12.19	-	-	10.07
Sum of all losses(a+b+c+d)	-	-	13.75	-	-	13.06	11.02	19.82	15.95	-	-	15.16	-	-	12.61
Non pol ratio	-	-	1.06	-	-	0.90	1.00	1.07	0.94	-	-	0.97	-	-	1.10

* Cane diffuser

TABLE C1
ANALYSES OF BAGASSE, JUICES, FILTER CAKE, SYRUP AND FINAL MOLASSES
SOUTH AFRICAN MILLS (SEASON 1998 - 1999)

SYMBOLS OF FACTORIES	ML *	KM *	PG *	UF *	EN **	FX-A *	FX-B *	FX-AVE	AK *	DL	MS-A *	MS-B *	MS-AVE
FINAL BAGASSE													
Pol % bagasse	0.97	0.93	1.12	1.27	1.48	0.59	0.61	0.60	0.69	1.21	0.78	0.75	0.76
Moisture % bagasse	52.96	45.31	49.65	51.43	52.79	51.50	52.40	51.97	49.89	51.07	52.82	55.04	54.13
Fibre % bagasse	45.39	52.70	48.28	46.29	44.66	46.92	46.00	46.44	48.70	46.55	45.68	43.61	44.46
Bagasse % cane	32.60	27.28	29.28	30.64	29.00	31.72	32.17	31.95	30.77	30.73	32.30	34.21	33.40
Ash % bagasse	4.61	4.16	4.24	5.27	2.49	-	-	3.55	2.29	-	-	-	1.71
LCV in kJ per kg bagasse ##	6359	8025	7105	6529	6782	-	-	6774	7459	-	-	-	6693
MIXED JUICE													
Mixed juice % cane	120.18	115.07	112.39	119.13	118.66	122.66	118.15	120.31	128.26	114.72	112.95	118.82	116.33
Brix % mixed juice	13.03	13.17	13.06	12.81	13.13	12.61	12.78	12.70	11.95	13.22	13.24	12.47	12.79
Sucrose purity	85.80	83.79	84.00	86.53	88.42	84.99	85.18	85.09	86.66	86.85	85.65	85.32	85.46
Apparent purity	84.71	82.40	82.90	85.69	87.51	84.02	84.25	84.14	85.91	86.20	84.96	84.54	84.72
Purity difference(MJ - DAC)	-0.11	-0.18	-0.30	-0.16	0.47	-0.68	-0.52	-0.60	-0.03	0.66	0.56	0.44	0.49
(Glucose + fructose) % sucrose	6.22	8.14	6.83	4.56	4.00	-	-	5.76	4.57	5.03	-	-	5.00
Suspended solids % mixed juice	0.19	0.05	0.12	0.44	0.90	0.07	0.07	0.07	0.32	0.76	0.22	0.23	0.23
Pol/sucrose ratio	0.9873	0.9833	0.9869	0.9903	0.9897	0.9885	0.9892	0.9889	0.9913	0.9925	0.9919	0.9908	0.9913
CLARIFIED JUICE													
Brix % clarified juice	12.82	12.92	12.72	12.61	13.31	-	-	11.77	11.74	12.89	-	-	12.68
Apparent purity	83.76	82.22	82.97	84.70	86.56	-	-	83.28	85.12	85.64	-	-	83.27
Purity difference(CJ - MJ)	-0.95	-0.18	0.07	-0.99	-0.95	-	-	-0.86	-0.79	-0.56	-	-	-1.45
Average pH	7.2	7.0	7.0	7.2	7.1	-	-	7.0	7.1	7.0	-	-	7.0
FILTER CAKE													
Pol % filter cake	2.11	1.98	0.93	1.18	1.38	-	-	1.35	0.77	2.62	-	-	1.09
Moisture % filter cake	70.78	66.19	60.65	70.78	66.18	-	-	73.93	74.62	68.93	-	-	73.79
Filter cake % cane	2.82	0.33	0.84	4.97	3.47	-	-	2.50	0.71	4.22	-	-	1.47
Filter wash index	101.7	101.9	102.7	101.6	98.7	-	-	107.9	101.8	102.6	-	-	100.9
Purity diff. (CJ - filtrate)	1.90	4.90	2.66	1.32	0.64	-	-	1.63	1.40	1.45	-	-	3.69
SYRUP													
Brix % syrup	67.60	64.04	61.68	61.99	62.03	-	-	63.86	65.66	62.05	-	-	66.62
Apparent purity	83.97	82.35	82.89	84.52	86.85	-	-	83.90	85.80	86.22	-	-	84.15
Purity difference(Syrup - MJ)	-0.74	-0.05	-0.01	-1.17	-0.66	-	-	-0.24	-0.11	0.02	-	-	-0.57
Average pH	6.0	6.0	6.2	6.3	6.2	-	-	6.0	6.2	6.2	-	-	6.1
FINAL MOLASSES													
Refractometer brix	83.86	85.64	83.95	84.44	84.75	-	-	83.41	89.37	88.45	-	-	85.04
Pol / refractometer brix purity	33.19	28.97	33.77	37.10	34.81	-	-	32.39	33.02	33.24	-	-	34.53
Sucrose / refractometer brix purity	36.24	35.57	36.97	38.80	37.29	-	-	35.94	35.71	35.76	-	-	37.33
Sulphated ash %	13.65	14.71	14.04	15.44	13.58	-	-	14.34	15.44	15.32	-	-	13.82
(Glucose + fructose) / ash ratio	1.27	1.13	1.01	0.70	0.99	-	-	1.02	0.88	0.96	-	-	1.04
Fructose %	8.96	9.56	7.91	6.10	7.72	-	-	8.35	7.88	8.41	-	-	8.20
Glucose %	8.41	7.10	6.23	4.73	5.69	-	-	6.24	5.75	6.27	-	-	6.21
TPD based on molasses (made)	6.8	3.2	5.8	5.4	6.5	-	-	4.1	3.3	3.3	-	-	5.5
TPD based on mixed juice	7.6	5.5	8.2	7.7	8.4	-	-	5.4	5.1	5.7	-	-	6.2
Final molasses at 85 brix % cane	3.97	4.42	4.60	3.88	3.18	-	-	4.25	3.76	3.51	-	-	3.89
Pol/sucrose ratio	0.9159	0.8145	0.9135	0.9562	0.9335	-	-	0.9014	0.9246	0.9296	-	-	0.9248

* Cane diffuser

** Bagasse diffuser

LCV = 18309 - 31,14 Bx % bagasse - 207,63 moisture % bagasse - 196,05 ash % bagasse

TABLE C1 (continued)
ANALYSES OF BAGASSE, JUICES, FILTER CAKE, SYRUP AND FINAL MOLASSES
SOUTH AFRICAN MILLS (SEASON 1998 - 1999)

SYMBOLS OF FACTORIES	GH-A *	GH-B	GH-AVE	NB	UC *	ES *	SZ-A *	SZ-B *	SZ-AVE	UK *	INDUSTRY
FINAL BAGASSE											
Pol % bagasse	1.02	1.32	1.21	1.38	1.25	1.33	0.89	0.89	0.89	0.81	1.00
Moisture % bagasse	52.54	49.71	50.71	50.55	54.00	50.68	47.94	48.66	48.30	52.55	51.00
Fibre % bagasse	45.12	47.37	46.57	47.04	43.91	47.13	50.21	49.48	49.84	45.72	47.06
Bagasse % cane	31.80	29.69	30.40	27.62	29.12	28.18	29.69	30.14	29.91	32.00	30.42
Ash % bagasse	-	-	-	2.31	2.57	5.32	-	-	4.33	3.71	3.10
LCV in kJ per kg bagasse ##	-	-	-	7287	6530	6677	-	-	7375	6619	6958
MIXED JUICE											
Mixed juice % cane	117.48	107.42	110.83	106.83	108.17	123.24	122.22	127.88	125.04	131.92	118.65
Brix % mixed juice	12.71	13.57	13.26	14.31	14.13	12.48	12.26	11.70	11.98	11.40	12.77
Sucrose purity	85.16	85.91	85.65	87.48	88.56	87.48	87.03	86.23	86.63	86.41	86.17
Apparent purity	84.20	85.04	84.75	86.38	87.66	86.33	86.11	85.28	85.70	85.61	85.22
Purity difference (MJ - DAC)	0.53	1.40	1.10	0.01	-0.26	0.07	0.65	-0.12	0.26	0.36	0.11
(Glucose + fructose) % sucrose	-	-	5.48	5.00	3.88	4.76	-	-	4.87	4.60	5.31
Suspended solids % mixed juice	0.18	0.73	0.53	0.91	0.10	0.50	0.11	0.11	0.11	0.22	0.33
Pol/sucrose ratio	0.9887	0.9899	0.9895	0.9874	0.9899	0.9869	0.9894	0.9890	0.9892	0.9907	0.9890
CLARIFIED JUICE											
Brix % clarified juice	-	-	13.18	14.24	14.58	12.19	-	-	11.22	11.10	12.51
Apparent purity	-	-	84.50	86.28	86.89	86.24	-	-	85.30	84.90	84.61
Purity difference (CJ - MJ)	-	-	-0.25	-0.10	-0.77	-0.09	-	-	-0.40	-0.71	-0.61
Average pH	-	-	7.1	7.1	6.8	7.1	-	-	7.1	6.9	7.0
FILTER CAKE											
Pol % filter cake	-	-	1.09	1.10	1.55	1.51	-	-	1.52	0.95	1.44
Moisture % filter cake	-	-	71.62	74.96	72.57	71.82	-	-	75.22	69.16	72.08
Filter cake % cane	-	-	3.00	7.30	0.86	1.15	-	-	1.14	1.00	2.35
Filter wash index	-	-	100.6	100.5	96.9	102.4	-	-	106.7	102.7	102.1
Purity diff. (CJ - filtrate)	-	-	-0.28	2.27	3.09	1.77	-	-	1.07	0.66	1.88
SYRUP											
Brix % syrup	-	-	64.85	71.10	67.33	63.04	-	-	64.49	65.47	64.99
Apparent purity	-	-	84.63	86.41	87.54	86.32	-	-	85.74	85.28	84.98
Purity difference (Syrup - MJ)	-	-	-0.12	0.03	-0.12	-0.01	-	-	0.04	-0.33	-0.24
Average pH	-	-	5.9	6.1	6.1	6.1	-	-	6.0	6.0	6.1
FINAL MOLASSES											
Refractometer brix	-	-	80.90	84.86	80.17	80.35	-	-	80.47	80.39	83.64
Pol / refractometer brix purity	-	-	35.21	34.94	33.94	34.57	-	-	35.67	34.63	33.93
Sucrose / refractometer brix purity	-	-	37.63	37.90	38.29	38.81	-	-	39.03	37.31	37.20
Sulphated ash %	-	-	13.01	11.27	12.27	11.28	-	-	12.61	12.64	13.54
(Glucose + fructose) / ash ratio	-	-	0.97	1.24	0.87	1.05	-	-	0.99	1.05	1.02
Fructose %	-	-	7.40	8.27	7.17	7.62	-	-	7.33	7.64	7.96
Glucose %	-	-	5.16	5.66	3.47	4.27	-	-	5.10	5.57	5.84
TPD based on molasses (made)	-	-	5.6	8.1	5.6	7.3	-	-	6.7	5.5	5.5
TPD based on mixed juice	-	-	7.8	10.0	8.5	9.3	-	-	8.5	7.0	7.3
Final molasses at 85 brix % cane	-	-	3.96	4.00	3.19	3.82	-	-	3.94	3.70	3.93
Pol/sucrose ratio	-	-	0.9356	0.9219	0.8865	0.8909	-	-	0.9139	0.9283	0.9121

* Cane diffuser

** Bagasse diffuser

LCV = 18309 - 31,14 Bx % bagasse - 207,63 moisture % bagasse - 196,05 ash % bagasse

TABLE C2
ANALYSES OF BAGASSE, JUICES, FILTER CAKE, SYRUP AND FINAL MOLASSES
(SEASON 1998 - 1999)

SYMBOLS OF FACTORIES	MH-A*	MH-B	MH-AVE	UB-A*	UB-B	UB-AVE	SM	NH*	DW*	HV-A*	HV-B*	HV-AVE	TR-A*	TR-B	TR-AVE
FINAL BAGASSE															
Pol % bagasse	1.33	0.99	1.14	1.34	1.33	1.33	1.57	1.65	1.06	1.33	1.34	1.34	0.92	1.51	1.12
Moisture % bagasse	49.55	51.07	50.39	50.15	49.69	49.94	50.11	52.23	45.74	48.02	49.04	48.54	51.16	51.98	51.44
Fibre % bagasse	47.91	46.99	47.40	47.23	47.69	47.44	47.15	45.09	52.38	49.48	48.44	48.95	46.29	44.60	45.72
Bagasse % cane	29.88	31.41	30.70	28.65	28.76	28.70	24.67	34.24	29.17	30.53	30.93	30.73	30.88	31.30	31.02
Ash % bagasse	-	-	-	-	-	3.79	2.75	-	-	-	-	1.74	-	-	-
LCV in kJ per kg bagasse ##						7118	7282	-	-			7812			
MIXED JUICE															
Mixed juice % cane	120.48	123.74	122.24	109.31	126.00	117.15	112.62	110.61	118.51	116.66	111.16	113.87	121.61	119.04	120.75
Brix % mixed juice	13.14	12.69	12.89	13.66	13.35	13.50	14.29	13.54	14.27	14.10	13.49	13.80	12.71	13.03	12.81
Apparent purity	86.52	86.34	86.42	84.10	84.04	84.07	84.90	85.50	87.76	85.08	85.38	85.22	85.58	85.96	85.71
Purity difference(MJ - DAC)	-0.62	-0.73	-0.68	0.68	0.35	0.52	-0.01	1.55	-0.08	0.65	0.95	0.79	0.22	0.00	0.34
Suspended solids % mixed juice	0.52	0.08	0.28	0.71	0.42	0.56	0.71	0.02	-	0.21	0.22	0.22	0.18	0.32	0.22
CLARIFIED JUICE															
Brix % clarified juice	-	-	13.13	-	-	13.64	13.93	13.88	14.05	-	-	14.16	-	-	12.48
Apparent purity	-	-	86.96	-	-	84.48	84.89	84.71	88.26	-	-	84.82	-	-	84.80
Purity difference(CJ - MJ)	-	-	0.54	-	-	0.41	-0.01	-0.79	0.50	-	-	-0.40	-	-	-0.91
Average pH	-	-	7.1	-	-	7.2	7.0	7.1	6.6	-	-	7.0	-	-	6.8
FILTER CAKE															
Pol % filter cake	-	-	0.98	-	-	0.82	0.64	2.23	2.60	-	-	1.62	-	-	1.03
Moisture % filter cake	-	-	69.36	-	-	-	69.63	67.76	72.75	-	-	73.59	-	-	-
Filter cake % cane	-	-	2.30	-	-	2.48	3.26	0.68	2.02	-	-	0.50	-	-	2.47
Filter wash index	-	-	98.2	-	-	99.0	102.6	97.5	101.5	-	-	97.4	-	-	102.7
Purity diff.(CJ - filtrate)	-	-	0.49	-	-	0.00	1.88	4.56	-	-	-	3.32	-	-	1.27
SYRUP															
Brix % syrup	-	-	64.36	-	-	61.15	66.71	62.12	59.54	-	-	53.17	-	-	64.94
Apparent purity	-	-	86.78	-	-	84.46	86.17	84.74	88.70	-	-	85.12	-	-	85.23
Purity difference(Syrup - MJ)	-	-	0.36	-	-	0.39	1.27	-0.76	0.94	-	-	-0.10	-	-	-0.48
Average pH	-	-	6.0	-	-	6.0	6.1	6.3	6.5	-	-	6.1	-	-	6.2
FINAL MOLASSES															
Refractometer brix	-	-	83.28	-	-	82.69	85.50	81.68	83.59	-	-	84.38	-	-	83.83
Apparent purity	-	-	35.45	-	-	35.39	32.73	42.74	47.30	-	-	35.86	-	-	33.48
Purity difference(true-target)	-	-	-	-	-	4.06	-	-	-	-	-	10.88	-	-	-
Reducing sugars % #	-	-	19.07	-	-	19.04	18.05	-	16.02	-	-	20.57	-	-	-
Sulphated ash %	-	-	-	-	-	12.24	13.51	-	-	-	-	13.37	-	-	14.45
Reducing sugars/ash ratio	-	-	-	-	-	1.56	1.34	-	-	-	-	1.54	-	-	-
Final mol at 85 brix % cane	-	-	4.00	-	-	4.01	4.09	4.63	4.27	-	-	3.97	-	-	4.11

* Cane diffuser

Reducing sugars determined by Lane & Eynon method.

LCV = 18309 - 31,14 Bx % bagasse - 207,63 moisture % bagasse - 196,05 ash % bagasse

**TABLE D1
MASSECUITES, EXHAUSTIONS, CLARIFYING AGENTS AND ADDITIONAL FUELS.
SOUTH AFRICAN MILLS (SEASON 1998-1999)**

SYMBOLS OF FACTORIES	ML	KM	PG	UF	EN	FX	AK	DL	MS	GH	NB	UC	ES	SZ	UK	INDUSTRY
A - MASSECUITE																
m ³ per ton brix in mixed juice	1.27	1.08	1.19	1.18	1.07	0.96	0.98	1.04	1.13	1.20	1.05	0.99	1.01	1.00	1.07	
Refractometer brix of massecuite	93.86	93.28	91.44	92.95	91.82	92.82	93.27	92.65	92.55	92.82	92.14	92.46	92.92	92.89	92.80	
Purity of massecuite	85.13	82.51	84.37	85.20	87.48	85.63	85.01	85.44	84.27	85.85	86.80	86.96	85.18	84.98	85.26	
Purity of A - molasses	69.38	63.43	69.58	69.61	72.46	67.61	64.70	68.78	66.62	69.78	72.36	72.13	67.98	66.13	68.31	
Purity drop	15.75	19.08	14.79	15.59	15.02	18.02	20.31	16.86	17.65	16.07	14.44	14.83	17.95	18.85	16.95	
Exhaustion	60.42	63.23	57.63	60.21	62.34	64.97	67.68	62.46	62.75	61.94	60.19	61.19	65.24	65.49	62.73	
Purity of A-massecuite - purity syrup	1.16	0.16	1.48	0.68	0.63	1.73	-0.79	-0.78	0.12	1.22	0.39	-0.58	-0.39	-0.30	0.28	
Purity of remelt	84.26	85.66	84.74	84.69	85.55	88.26	83.12	83.56	84.60	84.91	86.22	86.83	83.24	83.22	84.75	
B - MASSECUITE																
m ³ per ton brix in mixed juice	0.52	0.35	0.51	0.48	0.39	0.33	0.28	0.38	0.27	0.45	0.51	0.34	0.35	0.33	0.38	
Refractometer brix of massecuite	95.79	96.32	93.78	94.75	93.40	95.37	95.04	93.63	93.62	94.69	95.43	93.81	95.00	93.69	94.69	
Purity of massecuite	69.30	63.46	69.66	69.67	73.85	70.43	66.26	68.67	66.76	70.42	72.60	72.57	68.33	68.11	68.13	
Purity of B - molasses	49.76	41.87	48.61	49.12	53.15	46.27	44.29	49.86	48.18	47.21	50.60	48.41	46.92	47.09	47.82	
Purity drop	19.54	21.59	21.05	20.55	20.70	24.16	21.97	18.81	18.58	23.21	22.00	24.16	21.41	21.02	21.31	
Exhaustion	56.12	58.53	58.80	57.97	59.83	63.84	59.32	54.63	53.71	62.43	61.34	64.63	59.03	58.33	59.08	
C - MASSECUITE																
m ³ per ton brix in mixed juice	0.25	0.13	0.40	0.26	0.25	0.31	0.24	0.24	0.25	0.22	0.29	0.21	0.23	0.25	0.26	
Refractometer brix of massecuite	97.67	97.89	96.76	97.80	96.01	97.49	97.40	96.16	96.69	96.87	97.54	96.77	96.80	95.81	96.99	
Purity of massecuite	53.60	51.79	51.29	53.66	56.36	55.62	53.95	53.56	54.80	53.24	55.85	53.53	52.45	56.14	54.14	
Purity of C - molasses	33.19	28.97	33.77	37.10	34.81	32.39	33.02	33.24	34.53	35.21	34.94	33.94	34.57	35.67	33.93	
Crystal content	29.83	31.45	25.60	25.74	31.74	33.49	30.44	29.27	29.94	26.96	31.35	28.70	26.45	27.75	29.68	
Exhaustion	56.98	62.03	51.58	49.06	58.65	61.77	57.92	56.83	56.51	52.27	57.55	55.40	52.09	53.33	56.49	
TOTAL VOLUME ALL RAW MASSECUITES	2.04	1.56	2.10	1.93	1.71	1.59	1.50	1.66	1.55	1.80	2.00	1.59	1.57	1.61	1.71	
m ³ per ton brix in mixed juice																
WHITE SUGAR MASSECUITES	533	-	568	701	-	-	-	-	-	555	569	-	-	-	-	565
Kg sugar per m ³ massecuite																
Tons limestone/1000 tons white sugar	-	-	64.24	-	-	-	-	-	-	35.52	-	-	-	-	-	-
Tons coke/1000 tons white sugar	-	-	8.19	-	-	-	-	-	-	5.03	-	-	-	-	-	-
Tons phosphoric acid/1000 tons white sugar	-	-	-	-	-	-	-	-	-	-	1.10	-	-	-	-	-
Tons sulphur/1000 tons white sugar #	0.04	-	0.32	2.32	-	-	-	-	-	0.05	0.01	-	-	-	-	-
Phosphoric acid ppm mixed juice	-	-	-	-	-	-	0.95	-	-	-	0.22	48.92	21.57	-	-	-
Flocculant ppm mixed juice	1.22	1.75	2.81	2.03	3.07	3.95	3.58	3.06	4.96	4.26	5.30	4.03	6.74	5.09	4.13	3.88
Tons lime per 1000 tons cane	2.36	0.46	-	0.95	-	0.46	0.59	-	0.92	-	0.70	0.46	0.51	0.52	-	0.62
Enzyme ppm sugar	-	-	-	-	-	-	-	25.94	1.97	17.83	-	-	5.10	9.93	-	4.59
ADDITIONAL FUELS PER 1000 TONS CANE																
Tons of coal	39.39	3.64	12.07	9.14	10.18	12.80	0.86	0.71	12.11	14.60	5.45	3.29	3.15	-	2.01	-
Tons of wood	-	0.04	0.09	-	0.36	-	0.04	0.27	0.02	-	-	0.33	0.25	0.07	0.21	-
Converted into bagasse **	157.57	14.60	48.37	36.54	41.16	51.20	3.50	3.18	48.48	56.39	21.82	13.54	12.88	0.09	8.31	-

** 1 TON COAL EQUIVALENT TO 4 TONS OF BAGASSE
1 TON FIREWOOD EQUIVALENT TO 1,2 TONS OF BAGASSE
1 TON SULPHUR DIOXIDE EQUIVALENT TO 0,5 TONS OF SULPHUR

TABLE D2
MASSECUITES, EXHAUSTIONS, CLARIFYING AGENTS AND ADDITIONAL FUELS
SWAZILAND, MALAWI AND ZIMBABWE MILLS (SEASON 1998 - 1999)

SYMBOLS OF FACTORIES	MH	UB	SM	NH	DW	HV	TR
A - MASSECUITE							
m ³ per ton brix in mixed juice	1.36	1.37	0.95	1.24	1.26	1.12	1.09
Refractometer brix of massecuite	92.77	92.85	93.27	91.60	91.03	91.12	92.16
Purity of massecuite	88.67	83.80	85.39	86.15	90.04	86.71	84.67
Purity of A - molasses	72.31	71.35	67.05	72.29	77.50	69.67	66.70
Purity drop	16.36	12.45	18.34	13.86	12.54	17.04	17.97
Exhaustion	66.63	51.86	65.18	58.06	61.90	64.79	63.73
Purity of A-massecuite - purity syrup	1.89	-0.66	-0.78	1.41	1.34	1.59	-0.56
Purity of remelt	86.39	85.84	86.24	89.08	94.14	87.09	83.65
B - MASSECUITE							
m ³ per ton brix in mixed juice	0.46	0.45	0.30	0.55	0.25	-	0.47
Refractometer brix of massecuite	93.57	94.30	96.86	93.79	92.26	-	94.91
Purity of massecuite	73.00	67.86	67.88	73.23	75.89	-	67.20
Purity of B - molasses	51.99	46.24	45.04	54.29	58.51	-	46.67
Purity drop	21.01	21.62	22.84	18.94	17.38	-	20.53
Exhaustion	59.95	59.26	61.22	56.58	55.20	-	57.29
C - MASSECUITE							
m ³ per ton brix in mixed juice	0.30	0.25	0.26	0.28	0.45	-	0.28
Refractometer brix of massecuite	96.66	96.91	98.83	95.58	92.86	-	97.22
Purity of massecuite	56.19	52.81	55.21	57.54	69.03	-	54.09
Purity of C - molasses	35.45	35.39	32.73	42.74	47.30	35.86	33.48
Crystal content	31.05	26.13	33.03	24.70	38.29	-	30.13
Exhaustion	57.18	51.06	60.54	44.92	59.73	-	57.29
TOTAL VOLUME ALL RAW MASSECUITES							
m ³ per ton brix in mixed juice	2.13	2.07	1.52	2.07	1.96	-	1.83
WHITE SUGAR MASSECUITES							
Kg sugar per m ³ massecuite	545	-	-	471	550	-	-
Tons phosphoric acid/1000 tons white sugar	-	-	-	0.79	-	-	-
Tons sulphur/1000 tons white sugar #	0.24	0.06	-	0.21	0.05	-	-
Phosphoric acid ppm mixed juice	-	-	-	-	-	-	-
Flocculant ppm mixed juice	1.1	2.6	1.5	5.3	3.0	1.2	2.9
Tons lime per 1000 tons cane	1.3	0.4	-	0.7	1.2	0.5	0.3
Enzyme ppm sugar	-	-	-	-	-	-	-
ADDITIONAL FUELS PER 1000 TONS CANE							
Tons of coal	28.30	9.91	3.37	-	-	6.94	3.82
Tons of wood	-	-	-	1.45	0.14	0.05	-
Converted into bagasse **	113.22	39.65	13.47	1.74	0.17	27.82	15.29

** 1 TON COAL EQUIVALENT TO 4 TONS OF BAGASSE

1 TON FIREWOOD EQUIVALENT TO 1,2 TONS OF BAGASSE

1 TON SULPHUR DIOXIDE EQUIVALENT TO 0,5 TONS OF SULPHUR

TABLE E
COMPARATIVE MANUFACTURING DATA OF RECENT YEARS
(SOUTH AFRICAN MILLS)

Season	1998/99	1997/98	1996/97	1995/96	1994/95
Throughput and time efficiency					
Tons cane per hour	296.08	285.04	275.57	268.50	246.90
Tons fibre per hour	42.38	42.65	41.20	41.35	37.19
Time efficiency	81.31	76.64	76.48	75.45	78.76
Cane					
Sucrose % cane	13.36	12.62	12.60	11.87	12.54
Fibre % cane	14.66	15.38	15.36	15.84	15.49
Mixed juice					
Sucrose purity	86.17	86.15	85.38	83.60	83.66
(Glucose + Fructose) / ash in M.J.	1.34	1.14	1.24	1.29	1.26
Milling					
Imbibition % fibre	343	334	337	356	366
Extraction (sucrose based)	97.73	97.74	97.72	97.69	97.87
Pol % bagasse	1.00	0.90	0.90	0.83	0.83
Moisture % bagasse	51.00	51.12	51.40	51.70	51.27
Bagasse % cane	30.42	31.78	31.96	33.01	32.05
LCV bagasse kJ/kg	6958	6793	6798	6696	6878
Available kJ in bag./kg brix in M.J.	13967	15073	15069	15941	15025
Recoveries					
Boiling house recovery (sucrose based)	88.08	88.09	87.82	85.93	86.50
Overall recovery (sucrose based)	86.09	86.10	85.82	83.94	84.66
Tons cane per ton sugar	8.65	9.15	9.20	9.99	9.37
Filter cake					
Pol % filter cake	1.44	1.26	1.29	1.01	0.88
Filter cake % cane	2.35	2.44	2.48	2.59	3.18
Final molasses					
Brix % final molasses	83.64	82.91	82.97	81.72	82.20
Sucrose / refractometer brix purity	37.20	37.53	37.28	37.34	36.87
Tons final molasses at 85 bx % cane	3.93	3.72	3.91	4.25	4.39
Average sugar polarisation	99.51	99.50	99.50	99.47	99.44
Sucrose lost % sucrose in cane					
Lost in bagasse	2.27	2.26	2.28	2.31	2.13
Lost in filter cake	0.25	0.24	0.25	0.22	0.22
Lost in final molasses	9.29	9.40	9.84	11.37	10.97
Undetermined losses	2.10	2.00	1.81	2.15	2.02
Lost in boiling house	11.65	11.64	11.90	13.74	13.21
Total losses	13.91	13.90	14.18	16.06	15.34
M³ massecuite per ton Brix in M.J.					
A - massecuite	1.07	1.08	1.04	1.00	0.98
B - massecuite	0.38	0.39	0.36	0.34	0.36
C - massecuite	0.26	0.25	0.26	0.29	0.29
Total	1.71	1.69	1.64	1.63	1.63
Exhaustion of massecuites					
A - massecuite	62.73	62.58	63.22	63.20	64.79
B - massecuite	59.08	59.23	60.98	58.62	59.87
C - massecuite	56.49	55.42	55.93	55.77	56.40
Brix of syrup	64.99	64.42	64.74	64.36	64.93

TABLE F
AVERAGE MANUFACTURING RESULTS BY MONTHLY PERIODS
FOR SOUTH AFRICAN MILLS (SEASON 1998 - 1999)

End of month period	28 MAR		2 MAY		30 MAY		27 JUN		1 AUG		29 AUG		3 OCT		31 OCT		28 NOV		2 JAN		30 JAN		27 FEB	
	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999
Tons of sugar made and estimated	27832	231506	259338	335628	297705	335628	892671	420649	333825	381918	269455	227835	2298518	2029063	269455	2650306	2650306	227835	97055	26898	2650306	2650306	0	2650306
To-date	27832	259338	557043	892671	557043	892671		1313320	1647145	2029063	2298518	2526353	2298518	2029063	2298518	2650306	2650306	2526353	2623408	2650306	2650306	2650306	0	2650306
Tons cane crushed	290518	2358399	2648917	2854046	2749228	2854046	8252191	3443381	2640301	3038246	2305880	1991100	19679999	17374119	2305880	22653002	22653002	1991100	981903	277322	22930324	22930324	0	22930324
To-date	290518	2648917	5398145	8252191	5398145	8252191		11695572	14335873	17374119	19679999	21671099	19679999	17374119	19679999	22653002	22653002	21671099	22653002	22653002	22930324	22930324	0	22930324
Tons cane crushed per hour actual crushing	221.69	283.09	274.75	323.55	319.48	323.55	304.87	313.29	307.86	295.35	293.31	300.47	303.78	305.23	293.31	290.95	290.95	300.47	296.60	296.08	296.08	296.08	0.00	296.08
To-date	221.69	274.75	304.87	304.87	304.87	304.87		307.30	307.41	305.23	303.78	300.47	303.78	305.23	303.78	296.60	296.60	300.47	296.60	296.08	296.08	296.08	0.00	296.08
Sucrose % cane	11.51	11.59	12.50	13.43	12.50	13.43	12.52	13.95	14.46	14.41	13.52	13.34	13.44	13.43	13.52	12.31	12.31	13.34	13.38	13.36	13.36	13.36	0.00	13.36
To-date	11.51	11.58	12.05	12.52	12.05	12.52		12.94	13.22	13.43	13.44	13.43	13.44	13.43	13.44	13.38	13.38	13.43	13.38	13.36	13.36	13.36	0.00	13.36
Fibre % cane	15.09	14.90	14.37	13.64	13.84	13.64	14.12	13.91	14.23	14.92	15.95	15.89	14.40	14.23	14.40	16.57	16.57	15.89	14.62	14.66	14.66	14.66	0.00	14.66
To-date	15.09	14.92	14.37	14.12	14.37	14.12		14.06	14.09	14.23	14.40	14.54	14.40	14.23	14.40	14.62	14.62	14.54	14.62	14.66	14.66	14.66	0.00	14.66
Tons cane per ton sugar	10.44	10.19	9.69	8.50	9.23	8.50	9.24	8.19	7.91	7.96	8.56	8.74	8.56	7.96	8.56	10.12	10.12	8.74	8.63	8.65	8.65	8.65	0.00	8.65
To-date	10.44	10.21	9.69	9.24	9.23	9.24		8.91	8.70	8.56	8.56	8.58	8.56	8.56	8.56	8.63	8.63	8.58	8.63	8.65	8.65	8.65	0.00	8.65
Extraction (sucrose based)	96.83	97.43	97.59	97.79	97.78	97.79	97.66	97.83	97.77	97.86	97.67	97.80	97.74	97.86	97.67	97.56	97.56	97.80	97.56	97.23	97.23	97.23	0.00	97.23
To-date	96.83	97.37	97.59	97.66	97.59	97.66		97.72	97.73	97.75	97.74	97.75	97.74	97.75	97.74	97.74	97.74	97.75	97.74	97.74	97.74	97.74	0.00	97.74
Limblition % fibre	286	327	338	340	338	340	333	338	341	350	341	364	341	350	341	372	372	364	343	343	343	343	0	343
To-date	286	323	330	333	330	333		335	336	338	339	341	339	338	339	343	343	341	343	343	343	343	0	343
Pol % bagasse	1.16	0.96	0.96	1.05	0.96	1.05	1.00	1.05	1.09	1.01	0.96	0.90	0.96	1.01	0.96	0.89	0.89	0.90	0.89	0.86	0.86	0.86	0.00	0.86
To-date	1.16	0.98	0.97	1.00	0.97	1.00		1.01	1.03	1.02	1.01	1.00	1.01	1.02	1.01	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Moisture % bagasse	51.90	51.41	51.29	51.13	51.29	51.13	51.30	51.06	50.93	50.44	50.75	51.00	51.00	50.44	50.75	50.74	50.74	51.00	50.99	51.85	51.85	51.85	0.00	51.85
To-date	51.90	51.47	51.38	51.30	51.38	51.30		51.23	51.17	51.04	51.00	51.00	51.00	51.04	51.00	50.99	50.99	51.00	50.99	51.00	51.00	51.00	0.00	51.00
Boiling house recovery (sucrose based)	85.67	86.44	86.36	87.99	88.18	87.99	87.99	88.10	88.98	88.71	88.08	87.33	88.47	88.71	88.08	81.81	81.81	87.33	88.10	86.44	86.44	86.44	0.00	86.44
To-date	85.67	86.36	87.32	87.99	87.32	87.99		88.34	88.47	88.52	88.47	88.36	88.47	88.52	88.47	88.10	88.10	88.36	88.10	88.06	88.06	88.06	0.00	88.06
Overall recovery (sucrose based)	82.95	84.23	84.09	85.93	86.22	85.93	85.93	87.17	87.00	86.81	86.03	85.40	86.47	86.81	86.03	79.81	79.81	85.40	86.11	84.04	84.04	84.04	0.00	84.04
To-date	82.95	84.09	85.21	85.93	85.21	85.93		86.33	86.46	86.53	86.47	86.37	86.47	86.53	86.47	86.11	86.11	86.37	86.11	86.09	86.09	86.09	0.00	86.09
Mixed juice sucrose purity	85.02	83.60	84.73	86.26	84.73	86.26	84.99	86.58	87.23	87.34	86.95	86.32	86.23	87.34	86.95	85.22	85.22	86.32	86.20	83.46	83.46	83.46	0.00	83.46
To-date	85.02	83.75	84.26	84.99	84.26	84.99		85.52	85.86	86.13	86.23	86.24	86.23	86.13	86.23	86.20	86.20	86.24	86.20	86.17	86.17	86.17	0.00	86.17
Pol/sucrose ratio in mixed juice	0.9866	0.9822	0.9827	0.9853	0.9827	0.9853	0.9837	0.9875	0.9911	0.9938	0.9950	0.9946	0.9884	0.9938	0.9950	0.9910	0.9910	0.9946	0.9891	0.9843	0.9843	0.0000	0.9843	
To-date	0.9866	0.9827	0.9827	0.9837	0.9827	0.9837		0.9849	0.9861	0.9876	0.9884	0.9890	0.9884	0.9876	0.9884	0.9891	0.9891	0.9890	0.9891	0.9890	0.9890	0.9890	0.0000	0.9890
Sucrose / refractometer brix purity in final molasses	40.09	36.02	34.78	35.59	34.78	35.59	35.60	36.42	37.43	38.48	38.61	38.68	36.77	38.48	38.61	42.28	42.28	38.68	37.20	37.39	37.39	37.39	0.00	37.39
To-date	40.09	36.45	35.61	35.60	35.61	35.60		35.84	36.13	36.53	36.77	36.95	36.77	36.53	36.77	37.20	37.20	36.95	37.20	37.20	37.20	37.20	0.00	37.20
Sucrose lost in final molasses % sucrose in cane	11.75	10.95	9.49	8.63	10.22	9.63	9.63	8.57	8.48	8.86	9.32	9.65	9.11	8.86	9.32	12.37	12.37	9.65	9.29	10.10	10.10	10.10	0.00	10.10
To-date	11.75	11.03	10.22	9.63	10.22	9.63		9.29	9.13	9.08	9.11	9.16	9.11	9.08	9.11	9.29	9.29	9.16	9.29	9.29	9.29	9.29	0.00	9.29
Undetermined lost sucrose % sucrose in cane	1.85	2.00	1.85	1.76	1.85	1.76	1.85	1.83	2.06	1.89	2.06	2.51	2.06	1.89	2.06	5.12	5.12	2.51	2.09	2.94	2.94	2.94	0.00	2.94
To-date	1.85	1.98	1.91	1.85	1.91	1.85		1.85	1.89	1.89	1.91	1.96	1.91	1.89	1.91	2.09	2.09	1.96	2.09	2.10	2.10	2.10	0.00	2.10
Pol/sucrose ratio FM	0.9177	0.8903	0.8570	0.8607	0.8570	0.8607	0.8706	0.8840	0.9106	0.9453	0.9714	0.9649	0.9714	0.9453	0.9714	0.9760	0.9760	0.9649	0.9760	0.9215	0.9215	0.9215	0.0000	0.9215
To-date	0.9177	0.8934	0.8756	0.8706	0.8756	0.8706		0.8745	0.8813	0.8930	0.9024	0.9085	0.9024	0.8930	0.9024	0.9120	0.9120	0.9085	0.9120	0.9121	0.9121	0.9121	0.0000	0.9121

TABLE H
TRANSPORT SUMMARY SOUTH AFRICAN MILLS (SEASON 1998 - 1999)
PERCENT OF CANE TRANSPORTED

MILLS	MIL	KM	PG	UF	EN	FX	AK	DL	MS	GH	NB	UC	ES	SZ	UK	AVERAGE
SOUTH AFRICAN RAILWAYS																
TRAMS	-	-	-	-	-	24.1	-	-	-	-	-	-	-	-	-	2.3
UNKNOWN	-	-	-	58.0	-	-	-	-	-	-	-	-	-	-	-	3.1
ARTICULATED TRUCK DRIVEN VEHICLES																
- Interlink	-	-	3.3	28.7	27.9	51.9	61.2	29.4	82.3	59.2	16.6	6.7	75.4	82.0	80.0	45.3
- Tri-Axle	-	-	-	-	-	-	-	5.5	-	16.2	1.1	1.4	6.3	-	-	2.0
- Hilo	95.3	100.0	27.5	9.5	-	3.9	0.5	4.4	0.5	19.5	4.9	6.7	1.6	9.4	6.7	19.4
RIGID CHASSIS VEHICLES																
- Truck	-	-	-	-	-	-	-	-	-	-	24.0	24.5	-	6.7	8.1	3.9
- Lorry	-	-	-	-	8.1	-	-	1.5	0.1	0.1	9.7	25.0	0.1	1.9	0.4	2.2
TRACTOR DRIVEN VEHICLES																
- Hilo	-	-	8.1	1.2	-	-	10.9	35.9	1.6	-	15.7	15.4	15.5	-	-	6.5
- Rig	-	-	-	0.1	64.0	20.0	24.2	22.0	3.3	5.0	28.0	16.1	-	-	0.7	9.8
- Interlink	4.7	-	61.2	2.5	-	0.1	3.1	1.2	12.2	-	0.2	4.2	1.3	-	4.2	5.6

**TABLE J
COMPARATIVE DATA OF REPORTING S.A. MILLS FROM 1925 ONWARDS**

PERIOD (SEASON)	Percent Cane		Cane / Sugar Ratio		Extraction Pol based	Pol % fibre in Bagasse	Percent Bagasse		Imbibition Percent		Mixed Juice		Final Molasses Sucr/brix Purity Chem.suc. Pol based	Bolling House Recovery Pol based	Overall Recovery Pol based
	Pol	Fibre	Tel Quel	96 Pol Sugar			Pol	Moisture	Cane	Fibre	Purify Pol based	Reducing Sugar % Pol			
Average 1925 - 1934	13.19	15.78	9.86	9.64	89.83	8.86	3.88	50.57	27.6	175	85.09	3.65	45.3	83.67	75.12
Average 1935 - 1944	13.53	15.30	8.96	8.73	92.05	7.05	3.11	51.60	32.6	213	86.01	3.22	43.3	88.56	81.34
Average 1945 - 1954	13.79	16.06	8.60	8.36	93.04	5.95	2.59	51.32	33.8	210	85.95	3.29	40.7	89.46	83.23
Average 1955 - 1964	13.53	15.49	8.75	8.49	93.43	5.73	2.51	52.78	36.3	235	85.24	3.67	39.6	89.58	83.69
Average 1965 - 1974	13.16	15.22	8.95	8.68	95.00	4.35	1.91	53.15	41.7	274	84.80	4.15	39.3	88.49	84.06
Average 1975 - 1980	12.80	15.61	9.09	8.77	96.20	3.26	1.45	52.50	46.3	309	84.85	5.37	38.4	88.92	85.54
1981 onwards data are sucrose based	Sucrose				Sucrose based						Sucrose based		Sucrose based	Sucrose based	Sucrose based
1981	12.30	16.13	9.50	9.18	97.02	2.38	1.10	51.57	52.4	341	85.67	6.94	37.1	87.75	85.14
1982	12.86	15.61	9.10	8.79	97.02	2.57	1.19	51.35	51.5	345	85.12	5.59	36.6	87.64	85.03
1983	12.33	16.15	9.74	9.40	97.02	2.37	1.08	52.68	55.0	356	84.20	5.69	38.2	85.37	82.83
1984	12.27	15.62	9.43	9.11	97.42	2.12	0.99	51.35	51.5	344	85.69	5.28	37.0	88.23	85.96
1985	13.13	15.38	8.88	8.57	97.47	2.25	1.04	51.64	52.9	358	84.55	6.28	36.3	87.51	85.30
Average 1981 - 1985	12.58	15.78	9.33	9.01	97.19	2.34	1.08	51.72	52.7	349	85.05	5.96	37.0	87.30	84.85
1986	12.80	15.24	9.08	8.76	97.66	2.03	0.95	51.27	54.3	368	85.44	5.44	36.7	87.70	85.65
1987	12.00	15.23	9.67	9.33	97.63	1.94	0.91	51.24	52.6	357	85.25	5.76	36.8	87.84	85.76
1988	12.61	15.44	9.16	8.83	97.60	2.04	0.96	50.92	53.0	355	85.70	5.43	36.8	88.33	86.21
1989	13.17	15.07	8.72	8.41	97.67	2.11	0.98	51.61	53.5	366	86.40	4.94	36.7	88.74	86.87
1990	12.91	15.14	8.92	8.60	97.75	1.98	0.92	51.62	54.1	368	86.23	5.00	37.0	88.50	86.51
Average 1986 - 1990	12.70	15.22	9.11	8.79	97.66	2.02	0.94	51.33	53.5	363	85.80	5.31	36.8	88.22	86.16
1991	13.04	14.93	8.77	8.42	97.95	1.85	0.87	47.07	54.4	375	86.39	4.80	37.1	88.88	87.06
1992	13.82	15.40	8.57	8.23	97.81	1.79	0.93	51.92	55.1	387	83.61	6.49	37.4	85.92	84.05
1993	12.53	16.23	9.56	9.22	97.75	1.78	0.93	51.52	60.1	380	83.14	5.55	38.2	85.05	83.14
1994	12.54	15.49	9.37	8.99	97.87	1.77	0.83	51.27	55.1	366	83.66	6.14	36.9	86.50	84.66
1995	11.73	15.84	9.99	9.64	97.68	1.78	0.83	51.70	54.9	356	83.60	6.09	37.3	85.93	83.94
Average 1991 - 1995	12.73	15.58	9.25	8.90	97.81	1.79	0.86	50.70	56.5	373	84.08	5.81	37.4	86.46	84.57
1996	12.60	15.36	9.20	8.88	97.72	1.92	0.90	51.40	50.4	337	85.38	5.23	37.3	87.82	85.82
1997	12.62	15.38	9.15	8.83	97.74	1.91	0.90	51.12	49.9	334	86.15	4.72	37.5	88.09	86.10
1998	13.36	14.66	8.65	8.35	97.73	2.11	1.00	51.00	48.1	343	86.17	5.31	37.2	88.08	86.03
Average 1996 - 1998	12.86	15.13	9.00	8.69	97.73	1.98	0.93	51.17	48.8	338	85.90	5.09	37.3	88.00	86.00

