SIXTIETH ANNUAL REVIEW OF THE MILLING SEASON IN SOUTHERN AFRICA (1984-1985)

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Abstract

Data for the 1984/85 season in South Africa, Swaziland, Zimbabwe and Malawi are listed and discussed. Both cane harvested and sugar produced reached new records in the first three countries, but Malawi's production was lower than for the 1983 season. Average extraction of South African mills was 97,42 and overall recovery 85,96.

Introduction

The 1984/85 season was the most successful ever in terms of output in Southern Africa, although the low world price of sugar prevented the industry from reaping the full benefits of its record production. The comparative cane and sugar productions of the four countries covered in this report for the past two seasons, are listed in Table 1.

TABLE 1

Cane and sugar production South Africa, Swaziland, Zimbabwe, Malawi 1983/84 and 1984/85 seasons

	Tons cane		Tons sugar	
	1983/84	1984/85	1983/84	1984/85
South Africa	13 422 876	22 355 591	1 377 718	2 370 040
Swaziland	3 562 319	3 586 353	384 613	402 005
Zimbabwe	3 515 737	3 789 499	411 772	438 364
Malawi	1 586 965	1 402 838	175 291	149 898

In both Malawi and Zimbabwe, ethanol and sugar are produced simultaneously and sugar production figures are therefore not directly comparable with those of the other countries.

The season saw the phasing out of the old FX1 mill which closed in early December. The new FX2 mill started production in May and gradually increased its crushing rate to 434 tch at the end of the season. A list of the sugar companies and of the factories which were in operation at the end of the season is given in Table 2. Abbreviations under which the mills are listed in the tables of this report are bracketed.

All the data in the review are as reported by the mills, except for the cane varieties and transport data which were supplied by the Sugar Industry Central Board. The sugar weights listed in Table B_1 are the "made and estimated" weights, while those in Table A are the official end of season production for each mill as furnished by the South African Sugar Association.

The laboratory reports of South African mills (Tables B_1, C_1 and D_1) have been converted to a sucrose basis by applying a pol-to-sucrose ratio, which is determined at weekly intervals on composite samples of mixed juice and final molasses from each mill. The reports from Malawi, Zimbabwe and Swaziland are all pol based (Tables B_2, C_2, D_2).

The sections of this report dealing with transport, cane varieties and the weather were written by contributors from the S.A.S.A. Experiment Station.

The 1984/85 cane crop

The 1984/85 season provided a striking example of the resilience of the cane plant and of its remarkable capacity for recovery when given adequate water. At the end of the 1983/84 season it was suspected that the effect of the drought during the first half of 1983 would be felt in 1984. Although this was the case in certain areas, such as the North Coast, where juice purities were very low at the start of the season, the good rains during the second half of 1983 and in 1984 produced a record cane harvest of 22 355 591 tons.

TABLE 2

Sugar companies and their factories

Name of company	No. of factories	Total cane crushed	Total sugar	Name of factory and abbreviation
Transvaalse Suiker-korporasie Bpk	1	1 609 648	164 189	Malelelane (ML)
C.G. Smith Sugar Ltd	6	8 780 326	969 828	Pongola (PG) Gledhow (GH) Noodsberg (NB) Illovo (IL) Sezela (SZ) Umzimkulu (UK)
Umfolosi Co-op Sugar Planters Ltd	1	783 172	77 823	Umfolosi (UF)
Tongaat-Hulett Sugar Ltd	5	9 855 418	1 012 576	Felixton (FX) Amatikulu (AK) Darnall (DL) Maidstone (MS) Mount Edgecombe (ME)
Entumeni Sugar Milling Co	1	356 761	39 056	Entumeni (EN)
Glendale Sugar Millers (Pty) Ltd	1	414 550	43 874	Glendale (GD)
Union Co-op Ltd	1	555 716	62 695	Dalton (UC)
Swaziland				
Umbombo Ranches Ltd	1	1 195 943	130 862	Big Bend (UR)
Mhlume Sugar Co Ltd	1	1 315 805	148 042	Mhlume (MH)
Royal Swaziland Sugar Corp	1	1 074 605	123 101	Simunye (SM)
Malawi				
The Sugar Corporation of Malawi	1	858 381	88 301	Nchalo (NH)
Dwangwa Sugar Corporation	1	544 457	61 597	Dwangwa (DW)
Zimbabwe				
Triangle Ltd	1	1 858 826	185 565	Triangle (TR)
Hippo Valley Estate Ltd	1	1 930 673	252 799	Hippo Valley (HV)

The geographical distribution of the crop was as follows:

TABLE 3

Geographical distribution of cane production (South African mills 1984/85 season)

		Tons	% total
Transvaal	(ML, PG)	2 523 383	11,3
Zululand	(UF, FX1, FX2, AK, EN)	5 559 379	24,8
North Coast	(DL, GH, GD, MS, ME)	7 625 380	34,1
Midlands	(NB, UC)	1 869 403	8,4
South Coast	(IL, SZ, UK)	4 778 046	21,4

*The Weather and Crop Conditions**

The 1984/85 cane crop grew and matured under conditions more varied than usual. Following the drought, the rainfall after July 1983 was generally higher than the long term mean. De-

* By the Extension Division, SASA Experiment Station.

spite the good rains, there were signs of moisture stress in cane on shallow soils during one or two hot, dry periods.

The rainfall brought by cyclones Demoina and Imboa caused varying degrees of flooding, particularly in the northern part of the cane belt. The flood at UF destroyed about a third of their crop and damaged a good deal more. There was very little damage done to the crop elsewhere and, when the flood water had subsided, stream and river flow and ground water had been restored to average levels.

Subsequent monthly rainfall was above average until September 1984 when it dropped below the long term mean again and the lower South Coast and Midlands were noticeably dry.

The drought conditions of 1982/83 did not reach the lower South Coast and the UK crop for the 1984/85 season was not stressed. This was very much in contrast to crops throughout the rest of the industry of which a portion at least was drought-stressed, carry-over cane. Even at PG and ML the crop was set back, first by poor river flow and restricted irrigation and then, although river flow was high after the floods, by the absence of irrigation while the pumps and canals were under repair.

A further characteristic of the crop processed in 1984/85 at nearly all the mills from Durban north to AK, was that the carry-over cane crushed until July, or even somewhat later, was severely damaged by eldana borer. After July 1984 the number of eldana larvae (and borer damage) recorded in the crop by the millyard surveys was very much reduced.

*Cane Varieties**

The contribution of NCo 376 to the total crush last season decreased by nearly 2% to 65,7% of the total. In 1981/82, NCo 376 accounted for 71,8% of all cane milled and has declined slowly since then. However, in spite of the overall decrease in the popularity of the variety, several mills have actually recorded a small increase in the amount of NCo 376 crushed. These are mainly situated in the coastal belt where smut and mosaic diseases are less prevalent.

The most dramatic change in the variety composition of the crush has been in the Eastern Transvaal. In 1980/81, NCo 376 accounted for approximately 85% of all cane milled, but during last season only 44% of cane milled at ML was NCo 376. N14 is the variety largely responsible for replacing NCo 376 having increased from 0,1% two years ago to 26,9% last season. Other smut-resistant varieties such as N52/219, J59/3 and N11 contributed significantly to the cane milled.

In the southern areas, N12 is increasing in popularity due to its high yield and comparatively good resistance to mosaic. However, since most of the cane of this variety is being used as seedcane, the mill figures probably underestimate the actual area under N12. A relatively large increase in the amount of this variety milled may be anticipated next year.

The amount of N55/805 continued to decline and now stands at slightly under 3% of cane milled. The peak contribution from this variety occurred in the mid-1970's when nearly 12% of the crush was N55/805. However, susceptibility to smut and rust together with cases of poor ratooning have contributed to its demise. The new variety N18 which is smut-resistant and was selected due to its good ratooning is considered to be a likely replacement for N55/805.

Cane quality

Industrial average cane quality data for the past five years are listed in Table 4 and extraneous matter levels in cane for the Tongaat-Hulett mills in Table 5.

Comments received from all South African mills were that cane had been of exceptionally good quality during the season. Examination of the data listed in Table 4 shows however that, except for mixed juice purity, the cane was not of better quality than for the preceding seasons, if one excludes the drought stricken cane processed in 1983. The same applies to extraneous matter in cane as shown in the data listed for the Tongaat-Hulett group mills in Table 5, although some South Coast mills reported cleaner cane which they attribute to the fact that cane growers are now responsible for the transport of their cane. The conclusion that can be drawn from these observations is that juice purity is the most important measure of the processing characteristics of cane, and that every effort should be made to supply the mills with high purity cane.

Purity of the juice depends not only on agronomic and climatic factors but also on the delay between burning, harvesting and crushing. A survey carried out at IL during the past season has shown that the burn-to-crush delay averaged 115 hours and the cut-to-crush delay 77 hours. At the same factory, the percentage of cane with a burn-to-crush delay of over 150 hours (longer delays were not measured) from the beginning of September to end of the season ranged from 15% to 30%. The indications are that the delays at IL are not exceptionally high and could reflect the situation at other mills in South Africa. Surveys of this type should be carried out at all mills. The effect of burn-to-crush and cut-to-crush delays has been studied by Wood *et al*[1,2,3] between 1972 and 1976. The studies have shown that cane deterioration is affected by climatic conditions, temperature of burn, whether the cane is left standing and other factors. The general conclusion was that "except in winter, losses of recoverable sugar during the week following harvest averaged 2 - 3 percent per day". The drop in purity of two cane samples cut and stored in a green house under hot and humid conditions (January weather) is illustrated by the two curves in Figure 1. Even if they reflect extreme conditions these curves give an indication of the marked effect of delays on juice purity, and of the potential drop in purity when applied to delays such as those measured at IL.

*Cane Transport**

1984/85 was the first season during which cane growers were liable for their own transport costs. It is still too early for definite transportation trends to develop because of this change but, on average, deliveries by tractor increased by 22%. The most significant change to tractor transport occurred at AK, DL and GD.

Rail transport by S.A. Railways dropped from 9,8% in 1983/84 to 8,5% for the past season. The main reason for this decrease was the change to road transport at NB and UC by growers in the Kranskop and Pietermaritzburg areas. A major decrease in rail deliveries to ME was caused by the change to road transport by the Richmond growers. At UF, however, rail

* By R. S. Bond, SASA Experiment Station.

* By A. G. de Beer, SASA Experiment Station.

TABLE 4

Cane quality data
South African mills (1980–1984)

	1980	1981	1982	1983	1984
Sucrose % cane	13,34*	12,30	12,86	12,33	12,27
Fibre % cane	15,95	16,13	15,61	16,15	15,62
ERC % cane	11,39	10,46	10,92	10,20	10,54
Ash % cane	1,19	1,48	1,35	1,45	1,46
Mixed juice purity	84,80*	85,67	85,12	84,20	85,69

* Pol % cane and pol purity

TABLE 5

Extraneous matter in cane
Tongaat-Hulett mills (1980 – 1984)

	1980	1981	1982	1983	1984
Trash % cane	5,04	5,16	4,53	4,47	4,77
Tops % cane	2,50	2,25	1,84	3,30	3,34
Ash % cane	1,40	1,69	1,36	1,54	1,64

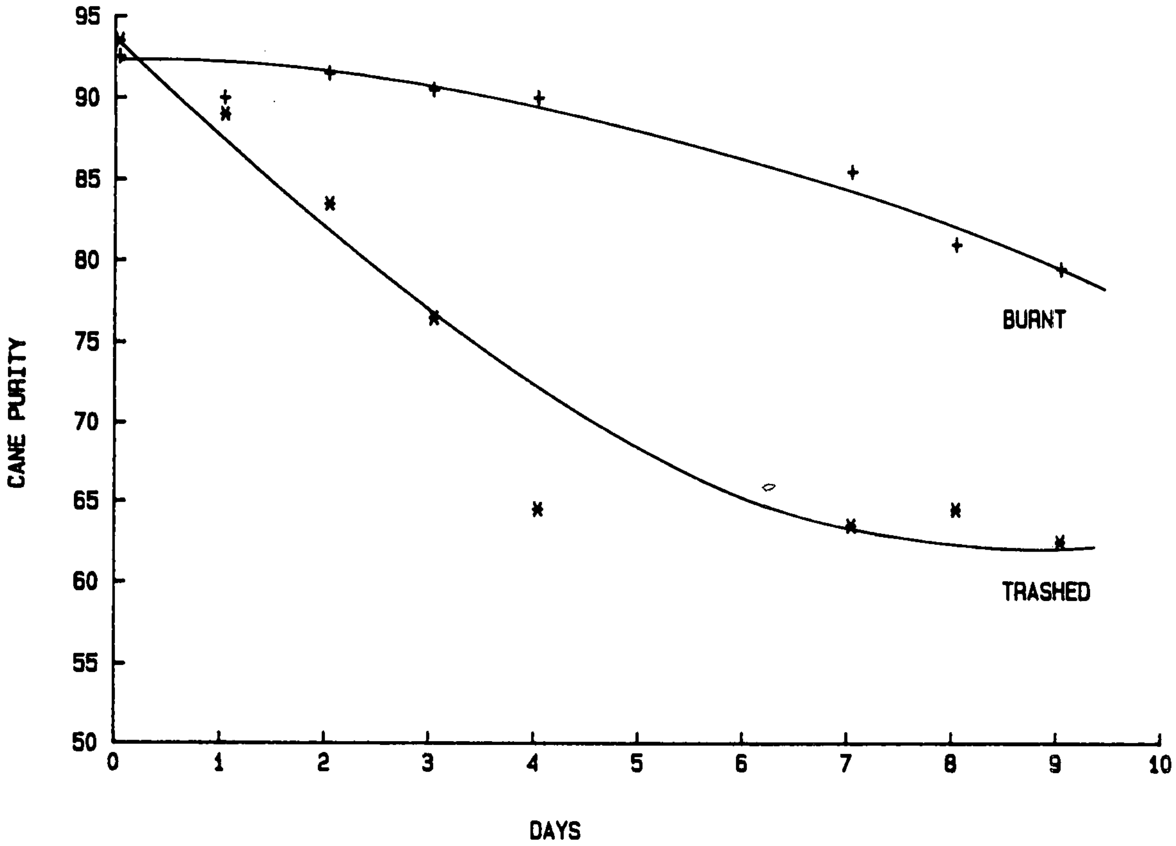

FIGURE 1 Effect of delay between cutting and analysis on cane purity

deliveries increased substantially because of higher cane production at Mkuze. In future, rail deliveries will probably only be significant at mills such as ML, UF, FX, GH and ME.

Transport by tram decreased by 30%, mainly due to the loss of 2 000 ha of cane land on the Umfolozi flats previously served by this mode of transport. In addition, large areas on the lower Umfolozi flats were out of production with restoration of fields still in progress. Because of the closure of EM, a large proportion of cane previously delivered by tram is now transported to FX2 by road.

A 25% increase in Hilo deliveries at the expense of tractor and lorry transport to NB can be ascribed to two new transport companies operating in the area this season.

Eighty-four percent of all cane was delivered by road with more than 60% of the total arriving at South African mills in Hilo trucks.

The performance of sugar mills

The overall performance of South African sugar mills is reflected by the industrial average overall recoveries and by the cane-to-sugar ratios listed in Table 7.

TABLE 7

Industrial average overall recoveries

Season	Overall recovery	Cane to sugar ratio
1981/82	85,14	9,50
1982/83	85,03	9,10
1983/84	82,83	9,74
1984/85	85,96	9,43
Average 1975-1984	85,22	9,23

Overall recovery was the highest since 1979. It was the result of a good boiling house recovery (88,23) and an exceptionally high industrial average extraction (97,42).

Time efficiency and throughput and length of season

The 1984/85 season started on 2 April, 1984, when DL resumed crushing after a stocktaking stop at the end of March, and ended on 9 March, 1985, when ME finished the season. The overall length of the season was therefore 343 days, but the average number of crushing days was 269, with a maximum of 340 days reported by ME.

The average overall time efficiency (77,06%) was an improvement over the previous year but was lower than that of other recent seasons. Examination of the data listed in Table B_1 shows that the poor average is due to the very low time efficiencies reported by some mills rather than to a general drop in industrial performance. Seven factories (AK, DL, MS, GH, IL, SZ and UK) reported values of over 80% while four (UF, EN, FX1 and FX2) reported less than 70%. The poor performance of some mills was due to the following causes:

(a) The floods at UF in early 1984 which resulted in the loss of 30% of the factory's rolling stock and the production of lodged cane with a reduced bulk destiny. Both these factors affected the regularity of cane supply to the mill.

(b) A cane crop which was much larger than forecast before the season. Some mills which had had a short season in 1983 and had a poor forecast for 1984 had postponed maintenance on some of their equipment. They suffered from poor mechanical efficiency as reflected by high other stops % gross available time.

(c) The phasing out of FX1, the start up problems at FX2, and the closing down of UC and NB for 12 and 16 days respectively over the Christmas and New Year period.

Exceptionally good time efficiencies were reported by GH (88,62%) and IL (87,98%) in South Africa and by HV (91,70%) in Zimbabwe.

The average crushing rate for the industry was 251,28 tons of cane per hour, with the highest value (422,25) reported by SZ and the lowest by EN (70,83).

Extraction

One of the most surprising results of the season has been that, in spite of a record cane crush which has increased the fibre throughput at most mills, the industrial average extraction (97,42) was the highest ever achieved (Table 8). It is worth noting that the lowest extraction (96,35), which was reported by GD, would have been considered exceptionally good in most other cane sugar producing areas of the world.

The general conclusion which can be drawn from an examination of Table 8 is that the investment in extraction plant and auxiliary equipment during the past years has been such that the fibre throughput has now only a marginal effect on the industrial extraction.

TABLE 8

Extraction and fibre throughput South African industrial average (1980-1984)

Season	Extraction	Pol % bagasse	Tons fibre per hour
1980/81	96,89	1,24	34,16
1981/82	97,02	1,10	35,96
1982/83	97,02	1,19	34,76
1983/84	97,02	1,08	33,61
1984/85	97,42	0,99	37,56

The average losses in bagasse during the past season were only 18% of total losses compared to 21% in 1980 and 29% in 1970.

There have been very few changes in equipment in the extraction plant of factories from 1983 to 1984, but a better appreciation has been obtained of some of the new equipment commissioned during the 1983/84 season.

Perforated rollers of the Lotus type have given variable results. At UF, where moisture content has always been on the high side, a perforated top roll on the last mill brought the moisture down from 53,2% in 1983 to 50,0% in 1984, while at GH where moisture in bagasse has always been low (50,2%), there was no noticeable effect.

The billeters installed at the head of the feed tables at FX2 were successful in chopping the cane, but proved to be susceptible to rock damage and were high in maintenance costs. The fixed knives on the billeters will be replaced by swinging knives.

The air cushioned rubber belt feeding the cane knives at FX2 and the scratchers on the two diffusers lived up to expectations. It was noted that the scratcher increased the fibre loading of the diffuser but required a high bed level.

The power consumption on the Spikey roll pressure feeder at AK was measured at 10% of the power absorbed by the mill which it fed compared to 30% for a conventional two roller pressure feeder.

In diffusers, which accounted for 58% of the cane processed in the countries covered by the review during the past season, only minor modifications were carried out. At IL, it was noted that by-passing of juice occurred in the chain channels of the BMA diffuser and openings were cut at chain level to drain some of this juice into the hoppers. MS cut back the lifting screws in the front set of screws in its diffuser to 900 mm from screen level without any effect on flooding.

Average moisture % bagasse was 51,35, and this is in line with the trend towards lower moisture values, which started in 1976. PG reported an exceptionally low value of 46,68 which was achieved at their normal imbibition rate of 363% fibre.

Clarification and Boiling House

Boiling House Recovery (88,23) was the highest since 1979 and reversed the downward trend, which had been noted for the past five years. Reference to Table J will show however that it is still lower than the ten year averages from 1935 to 1984. Boiling house recovery (BHR) is affected by mixed juice purity and the improvement from the previous season reflects an increase in purity from 84,20 in 1983 to 85,69 in 1984. Sugar purity also has an influence on BHR and the high purity of South African VHP sugar adversely affects recovery. Several formulae have been proposed to correct BHR for juice purity, but they have not stood the test of statistical analysis for residual influence of mixed juice purity. The Sugar Milling Research Institute has therefore developed a formula to predict a target BHR from the analysis of mixed juice, in which the effect of juice purity has been reduced to a minimum. Target and actual boiling house recoveries calculated by means of this formula are listed in Table 9.

TABLE 9

Target and actual boiling house recoveries, and recovery index for South African mills 1984/85 season

Mill	Boiling house recovery		Recovery index*
	Actual	Target	
ML	87,1	91,4	95,3
PG	86,5	91,0	95,0
UF	85,7	91,4	93,8
EN	87,4	93,0	94,0
FX1	85,5	92,0	92,9
AK	89,3	92,2	96,9
DL	89,1	92,2	96,8
MS	88,8	91,4	97,2
ME	88,0	92,1	95,5
GD	86,6	92,6	93,5
GH	88,8	92,2	96,3
NB	86,6	91,8	94,4
UC	90,8	93,1	97,5
IL	89,5	92,6	96,6
SZ	90,1	92,5	97,4
UK	91,1	93,5	97,4

$$* \text{ Recovery index} = \frac{\text{Actual BHR}}{\text{Target BHR}} \times 100$$

The highest boiling house recovery in South Africa was reported by UK (91,1), followed by UC (90,8) and SZ (90,1). On the basis of target boiling house recoveries the three leading mills should have been UK (93,5), UC (93,1) and EN (93,0). The recovery index (RI), which is a ratio of actual to target boiling house recovery and can therefore be taken as a measure of boiling house performance was: UC: 97,5, UK: 97,4, SZ: 97,4 and EN: 94,0. The RI values indicate that when a correction is made for the influence of mixed juice purity, there is almost no difference in the boiling house efficiencies of UC, UK and SZ. The work of these three mills can be readily compared because they all produce raw sugar. The case of EN, which produced 54,5% refined sugar, illustrates one of the shortcomings of the target BHR formula. It does not allow for refining losses.

The boiling house recoveries of affiliated mills which are pol based cannot be compared to those of South African mills which are calculated from sucrose data. However, SM in Swaziland reported 91,96 and HV in Zimbabwe 91,34, which indicate excellent boiling house work.

No clarification problems were reported during the season. This was due not only to good quality juices but also to modifications made to clarifiers to improve their performance, and to better attention to the operation of clarifiers and filters. Research work carried out at SZ during the season has confirmed that losses in clarification and filtration can be reduced when the clarifiers are operated at zero mud level and this technique has been followed by many mills. AK reported using only two out of four clarifiers after modifications to the units and SZ, GH, PG and IL reduced the mud retention time in their SRI clarifiers by modifying the angle of the bottom cone.

The improvment which can be obtained with the same equipment from better attention to operation is illustrated by the filter station results at GH which are listed in Table 10.

TABLE 10

Pol % filtercake and purity drop (clear juice to filtrate) GH 1981 to 1984

Season	Pol % filtercake	Purity drop (CJ - filtrate)
1981/82	1,28	3,75
1982/83	1,09	2,95
1983/84	1,05	3,61
1984/85	0,67	1,75

Modifications to evaporators included a new Kestner at ME to replace seven old vessels which operated in parallel as the first effect of the evaporator. Two unfortunate accidents occurred during the season when Kestner vessels fitted with bayonet lock top covers were opened for cleaning while still under pressure. It is essential that vessels fitted with this type of lock should be equipped with a safety device to release pressure before the lock can be opened.

The season saw the commissioning of yet another continuous pan at SZ and the FX2 pan floor where continuous pans are used for all massecuites except for boiling B- and C-seed. There are now thirteen continuous pans in South Africa and one in Swaziland and a better appreciation of their advantages is possible. They have proved to be easy to control and capable of producing sugar to the very strict South African specifications when used for A-massecuite. They require a minimum of cleaning and maintenance and stabilise the steam balance of the factory. On the debit side, continuous pans on low grade massecuites have a lower evaporation rate than batch pans, which can be compensated by a larger heating surface to massecuite volume ratio. Another approach to improving the performance of the pan station was taken by NB, where an Ekato pan stirrer was installed in a C-pan with poor natural circulation. The stirrer proved very effective in improving the evaporation rate and the increase in pan capacity is estimated at 32%. There were no measurable changes in either final molasses purity or crystal size distribution (C.S.D.).

Surveys of South African C-massecuites carried out during the season showed that C-crystals were generally too small and that the physical loss of crystals through the centrifugal screens was the main contributor to the final molasses target purity difference. The two mills with the biggest C-crystals were EN (158 microns) and UC (140 microns), which were also the two mills which showed the best improvement in target purity difference from one season to the next (EN from 7,7 to 4,8 and UC from 4,5 to 2,0).

Continuous centrifugals on A-massecuite have been used in South Africa for a number of seasons on an experimental basis. The first all-continuous A-centrifugal station was commissioned at PG in 1984 with 3 BMA K 1500 continuous machines and an FCB 1000 replacing the old batch centrifugals. In spite of requiring additional wash water, the purity rise across the machines was not very high at 2,5 units for a 99,3 pol sugar. The poor crystal size distribution of the sugar from these centrifugals was of no consequence since the sugar was immediately remelted for refining.

The services: steam, effluents, electricity

Vapour compressors were commissioned at NB and SZ during the season, bringing to three (with PG) the number of mills now equipped to recompress either their first or second effect vapours to exhaust pressure. In spite of high maintenance costs, these compressors have proved to be very successful in reducing the fuel bill at SZ, which uses bagasse for furfural production, and at NB which refines its sugar. At SZ it is estimated that the compressors saved about 48 tons of coal per day, and at NB steam on cane was reduced from 65 to 57%.

At PG the vapour compressor was used for only short periods during the season. As a result of the low moisture content of bagasse and a tight control on process steam usage, the factory reached thermal balance and even had a surplus of bagasse during the second half of the season, although it was refining its total sugar production.

A new boiler was commissioned at MS. Its efficiency is estimated at 90% on coal and 87 to 89% on bagasse. This unit ran continuously for five months during the season without maintenance or cleaning stops.

A horizontal belt filter has been successfully used to dewater smuts at FX2, while SZ has followed the example set by UK and used a settling dam to remove smuts from their wet scrubber effluents. At this mill, a concerted effort in effluent control by the sugar factory and the furfural plant has been successful in drawing wild life back to a lagoon next to the factory which had suffered from severe pollution.

Sugar production and quality

Sugar production was at a record level in most mills in Southern Africa. The total South African production of 2 370 040 tons was 244 047 tons more than the next best season in 1982/83 and about one million tons higher than the 1983/84 total. SZ produced 266 776 tons of sugar, a record production for Southern Africa. The two big sugar groups in South Africa (Tongaat-Hulett Sugar and C.G. Smith Sugar) each produced about one million tons of sugar (Table 2), which is also thought to be a record for private companies.

The six back end refineries attached to ML, PG, UF, EN, GH and NB refined 25,9% of the season's sugar production in South Africa, and another 25,7% was refined by the Tongaat-Hulett Sugar central refinery in Durban. In Malawi, 36% of the production was refined by back end refineries at NH and DW and 4% in Swaziland by UR. The increase in production of back end refineries since 1970 is shown in Figure 2.

Raw sugar quality was good during the past season and met the strict specifications set by the sugar terminal and by the central refinery. Only two mills sent sugar to the terminal with colour values out of specification and this sugar amounted to only 2,2% of the intake. The average colour of all sugar supplied to the terminal was the lowest since 1979. The average starch value dropped to 110 ppm, and most of the penalties incurred by the mills were for fines which, although lower than for the past five seasons, were still high at 23%.

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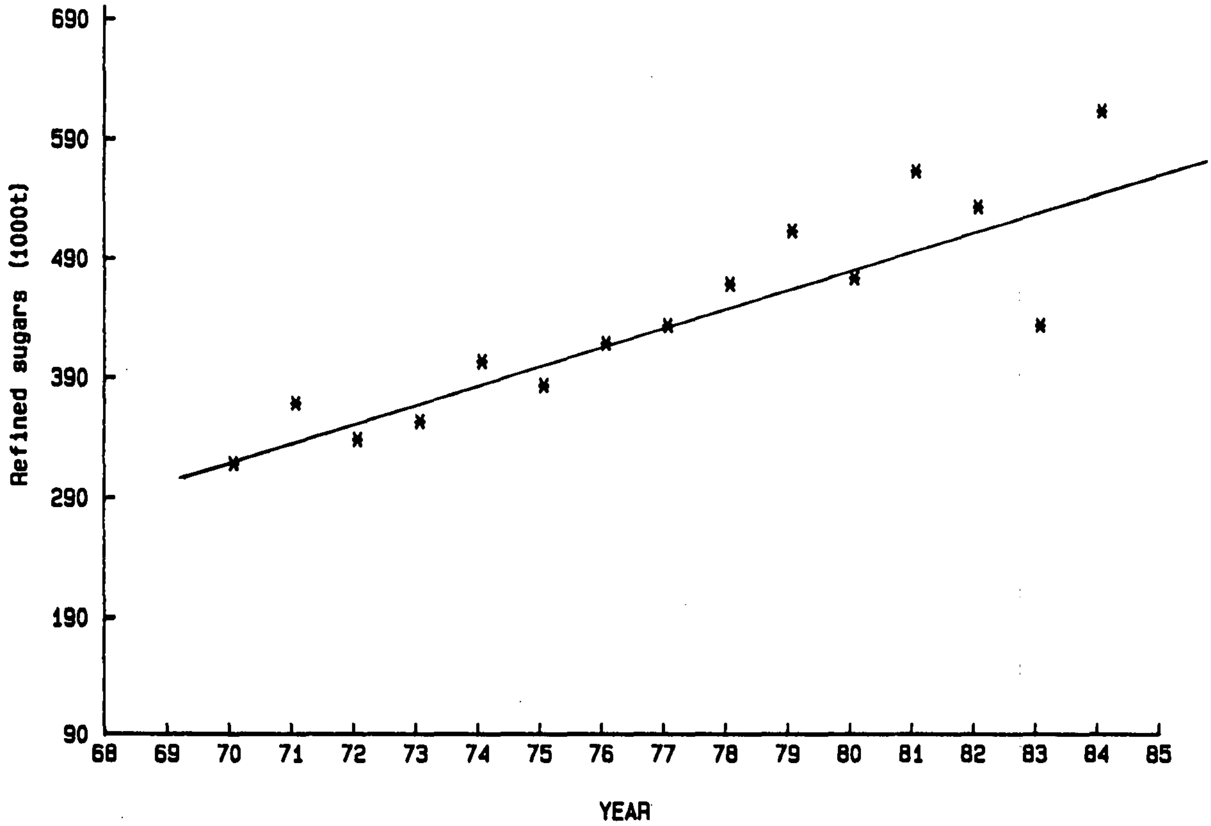

FIGURE 2 Production of South African back end refineries 1970 to 1984

TABLE A
SOUTH AFRICAN SUGAR ASSOCIATION FINAL SUGAR PRODUCTION (SEASON 1984–1985)
(Metric tons)

Mill	Local Market			Export Production		Total
	White	Refinery Raws	Brown	Sugar Equivalent of H.T.M.	Export Raws	
Malelane . . . . (ML)	163 807	–	403	–	–	164 210
Pongola . . . .(PG)	93 666	–	–	–	–	93 666
Umfolosi . . . .(UF)	68 930	1 633	5 152	–	2 142	77 857
Entumeni . . . .(EN)	21 302	592	2 966	–	14 208	39 068
Felixton 1 . . . . (FX1)	–	446	58	–	58 460	58 964
Felixton 2 . . . . (FX2)	–	138 516	–	–	13 796	152 312
Amatikulu . . . . . . (AK)	–	53 548	40	–	189 854	243 442
Darnall . . . .(DL)	–	51 611	–	–	122 333	173 944
Maidstone . . . . . . (MS)	–	145 840	–	–	94 288	240 128
Mount Edgecombe . . . (ME)	–	61 948	74 023	5 846	1 975	143 792
Glendale . . . . (GD)	–	36 475	25	–	7 395	43 895
Gledhow . . . . (GH)	151 987	824	70	–	34 162	187 043
Noodsberg . . . . . .(NB)	113 625	–	–	–	18 653	132 278
Union Co-op . . . . . (UC)*	20 152	–	–	–	42 333	62 693
Illovo . . . . (IL)	–	20 976	4 494	–	107 870	133 340
Sezela . . . . (SZ)	–	136	–	–	266 665	266 801
Umzimkulu . . . . . (UK)	–	1 087	73 278	–	81 897	156 262
TOTAL	633 469	513 655	160 694	5 846	1 056 031	2 369 695

* Refined by NB on behalf of UC

TABLE B_1

CANE CRUSHED AND SUGAR MADE, CANE COMPOSITION, SOUTH AFRICAN MILLS

SYMBOLS OF FACTORIES	ML*	PG†	UF	EN†	FX1			FX2			AK*	DL
					A	B	Average	A*	B*	Average		
Tons sugar made and estimated	164 189	93 571	77 823	39 056	—	—	58 282	—	—	152 701	243 436	174 006
Refined % total sugar	99.75	100,00	88,53	54,51	—	—	—	—	—	—	—	—
Moisture raw sugar	—	—	0,40	0,23	—	—	0,13	—	—	0,13	0,12	0,12
Pol raw sugar	98.51	—	98,58	99,18	—	—	99,36	—	—	99,39	99,40	99,47
Tons of cane crushed total	1 609 648	913 735	783 172	356 761			596 781			1 609 291	2 213 374	1 667 934
Tons of cane crushed per tandem					390 889	205 892		956 616	652 675			
Season started on	30.4.84	19.5.84	3.7.84	4.4.84	—	—	3.5.85	—	—	3.5.84	12.4.84	2.4.84
Season completed on	6.2.85	17.2.85	16.2.85	19.2.85	—	—	9.12.84	—	—	6.3.85	12.2.85	11.2.85
Number of crushing days	283	305	229	322	—	—	221	—	—	308	307	316
Time account												
Overall time efficiency %	73.92	71,06	61,31	67,40	72,38	65,60	69,00	67,42	67,64	67,53	80,89	81,76
Scheduled stops % gross available time	6.99	13,96	7,18	10,13	8,97	9,19	9,08	10,76	10,48	10,62	10,86	10,14
Lack of cane stops % gross available time	13.75	10,58	13,50	6,65	2,57	11,14	6,85	5,78	6,93	6,36	3,42	5.07
Other stops % gross available time	5.34	4,39	18,01	15,82	16,07	14,06	15,07	16,04	14,94	15,49	4,83	3,03
Lost time % available crushing time	6.73	5,82	22,70	19,01	18,17	17,65	17,91	19,22	18,10	18,66	5,64	3,57
Throughputs per hour actual crushing												
Tons of cane crushed	320.61	203,30	232,91	70,83	101,98	59,37	161,35	192,78	190,25	383,03	372,76	270,20
Tons of fibre milled	46.16	29,23	34,80	9,40	15,68	8,69	24,37	33,46	33,12	66,58	54,58	42,16
Tons of brix processed	44.57	28,29	31,31	10,11	—	—	21,30	—	—	52,48	53,03	36,64
Tons of sugar produced	32.72	20,81	23,15	7,76	—	—	15,76	—	—	36,34	41,01	28,38
Tons sucrose in mixed juice	37.54	24,07	26,94	8,84	—	—	18,29	—	—	43,51	45,63	31,47
Tons non-sucrose in mixed juice	7.03	4,22	4,37	1,27	—	—	3,01	—	—	8,97	7,40	5.17
Composition of cane crushed												
Sucrose % cane	11.99	12,13	11,95	12,88	11,68	11,82	11,73	11,41	11,73	11,54	12,50	11.90
Pol % cane	11.84	11,99	11,80	12.75	11,53	11,66	11,57	11,29	11,64	11,43	12,40	11,79
Fibre % cane	15.02	15,16	16,94	14,01	17,15	16,55	16,94	17,75	17,65	17,71	15,15	16,37
Brix % cane	14.43	14,45	14,08	14,98	13,82	14,16	13,94	14,02	14,40	14,17	14,74	14.10
Ash % cane	1.53	—	2,69	1,33	2,48	—	2,48	1,86	1.93	1,89	1,19	—
ERC % cane	10.19	10,39	10,27	11,26	10,00	10,05	10,02	9,48	9,77	9,60	10,79	10,21
ERC % sucrose in cane	84.98	85,68	85,98	87,44	85,64	85,03	85,43	83,10	83,27	83,17	86,36	85,77
Extraction												
Extraction	97.70	97,60	96,82	96,88	96,65	97,07	96,79	98,05	98,21	98,11	97,92	97,84
Corrected reduced extraction	97.63	97,51	96,92	96,31	96,89	97,11	96,97	98,43	98,54	98,47	97,84	97,97
Imbibition % cane	49,25	52,15	45,41	54,28	43,67	52,79	46,82	60,35	60,31	60,34	53,40	51,49
Imbibition % fibre	342	363	304	409	284	361	311	348	346	347	365	330
Preparation index	92	92	88	87	88	88	88	90	90	90	93	93
Pol factor	99.23	101,34	100,11	99,52	98,52	96,74	97,91	97,91	98,68	98,23	100,15	98,88
Brix factor	101.07	101,66	99,99	100,53	99,83	98,84	99,49	100,32	100,71	100,48	101,90	99,48
Recoveries												
Boiling house recovery	87.05	86,45	85,72	87,39	—	—	85,46	—	—	83,30	89,31	89,12
Overall recovery	85.05	84,37	83,00	84,66	—	—	82,72	—	—	81,72	87,46	87,18
Ton cane per ton sugar	9.80	9,77	10,06	9,13	—	—	10,24	—	—	10,54	9,09	9,59
Ton cane per ton 96 sugar	9.41	9.38	9,68	8,80	—	—	9,89	—	—	10,18	8,78	9,26
Balances												
Suc. lost % suc. in cane												
— in bagasse (a)	2.30	2,40	3,18	3,12	—	—	3,21	—	—	1,89	2,08	2,17
— in filter cake (b)	0.59	0,27	0,72	0,61	—	—	0,46	—	—	0,32	0,15	0,37
— in final molasses (c)	10.05	10,13	10,44	8,58	—	—	9,80	—	—	12,67	9,08	8.91
— undetermined (d)	2.00	2,83	2,67	3,03	—	—	3,82	—	—	3,40	1,23	1,36
Boiling house losses (b+c+d)	12.64	13,23	13,83	12,22	—	—	14,08	—	—	16,39	10,46	10,64
Sum of all losses (a+b+c+d)	14.94	15,63	17,01	15,34	—	—	17,29	—	—	18,28	12,54	12.81
Non suc. ratio	1.03	1.03	1,02	1,04	—	—	1,00	—	—	1.01	0,99	1,01
Pol lost % pol in cane												
— in bagasse	2.33	2,43	3,22	3,16	—	—	3,25	—	—	1,90	2,10	2,20
— in filter cake	0.60	0,27	0,72	0,62	—	—	0,47	—	—	0,32	0,15	0,38
— final molasses	9.19	9,48	10,04	8,32	—	—	9,29	—	—	12,36	8,62	8,27
— undetermined	1.76	2,47	2,02	2,38	—	—	3,15	—	—	2,92	0,93	1,13
Fructose ratio FM/MJ	0.86	0,88	0,83	0,77	—	—	0,80	—	—	0,81	0,89	0,77
Glucose ratio FM/MJ	0.73	0,61	0,63	0,64	—	—	0,65	—	—	0,71	0,72	0,59

* Cane diffuser
† Bagasse diffuser

THROUGHPUTS AND TIME ACCOUNTS, PERFORMANCES AND LOSSES (SEASON 1984–1985)

MS			ME	GD†	GH			NB	UC*	IL*	SZ			UK	Totals & Averages
A*	B	Average			A*	B	Average				A*	B*	Average		
–	–	240 405	143 746	43 874	–	–	187 064	132 783	62 695	133 332	–	–	266 776	156 302	2 370 040
–	–	–	–	–	–	–	81,25	85,97	–	–	–	–	–	–	25,89
–	–	0.10	0,24	0.12	–	–	0,10	0,09	0,11	0,11	–	–	0,09	0,18	0,13
–	–	99.47	98,89	99.33	–	–	99,40	99,44	99,43	99,43	–	–	99,44	99,11	99,35
1 281 177	1 093 993	2 375 170	1 392 868	414 550	556 461	1 218 397	1 774 858	1 313 687	555 716	1 173 916	1 117 153	1 141 298	2 258 451	1 345 679	22 355 591
–	–	4.4.84	4.4.84	1.5.84	–	–	25.4.84	26.4.84	7.5.84	9.4.84	–	–	7.5.84	7.5.84	2.4.84
–	–	2.3.85	9.3.85	16.2.85	–	–	7.2.85	1.2.85	28.1.85	15.1.85	–	–	6.2.85	23.2.85	9.3.85
–	–	333	340	292	–	–	289	282	267	282	–	–	276	293	269
84.76	81.89	83.33	77,83	76.88	88.18	89,06	88,62	74,93	78,71	87,98	81,08	81,85	81,47	80,48	77,06
5.47	4.61	5.04	11,38	4.67	6.86	7,16	7,01	11,55	5,88	4,95	5,70	6,18	5,94	12,49	8,73
2.39	5.85	4.12	6,70	9.43	1.22	0,94	1,08	5,83	8,54	3,12	6,47	3,17	4,82	3,12	6,48
7.37	7.66	7.52	4,08	9.02	3.74	2,85	3,30	7,69	6,87	3,95	6,75	8,79	7,77	3,91	7,73
8.00	8.55	8.28	4,99	10.50	4.06	3,10	3,58	9,31	8,02	4,29	7,69	9,70	8,70	4,63	9,12
189.25	170.18	359.43	219,67	77.42	92.43	199.46	291,89	260,12	117,01	197,77	209,62	212,63	422,25	238,16	251,28
30.41	26.52	56.93	30,51	10.69	14.85	29,60	44,45	35,34	16,55	28,27	32,59	33,06	65,65	33,07	37,56
–	–	48.02	29,90	10.79	–	–	40,17	35,71	16,62	28,78	–	–	63,54	34,21	35,06
–	–	36.38	22,67	8.19	–	–	30,76	26,30	13,21	22,47	–	–	49,85	37,66	26,65
–	–	40.72	25,49	9.38	–	–	34,60	30,30	14,46	24,95	–	–	55,04	30,11	30,04
–	–	7.30	4,41	1.41	–	–	5,57	5,41	2,16	3,83	–	–	8,50	4,10	5,02
11.68	11.62	11.64	11,90	12.57	12.20	12,11	12,14	11,98	12,68	12,96	13,46	13,35	13,40	13,10	12,27
11.56	11.44	11.49	11,72	12.46	12.10	11,99	12,02	11,75	12,56	12,83	13,36	13,24	13,30	13,02	12,14
16.27	16.34	16.29	14,65	14.38	16.23	15,67	15,85	14,75	14,51	14,47	15,93	15,94	15,94	14,79	15,62
14.05	13.91	13.97	14,18	14.71	14.42	14,25	14,30	14,33	14,73	15,14	15,82	15,76	15,79	15,24	14,56
1.00	1.69	1.32	1,59	–	–	–	–	1,49	1,45	1,46	1,02	1,02	1,02	1,15	1,46
9.90	9.88	9.88	10,20	10.93	10.49	10,46	10,47	10,24	11,09	11,29	11,66	11,53	11,59	11,45	10,54
84.79	85.03	84.82	85,69	86.96	85.97	86,33	86,22	85,45	87,43	87,11	86,63	86,34	86,48	87,37	85,87
97.63	96.88	97.19	97,46	96.35	97.62	97,71	97,86	97,24	97,48	97,37	97,27	97,15	97,21	96,48	97,42
97.88	97.13	97.44	97,29	95.93	97.81	97,71	97,74	96,98	97,24	97,12	97,24	97,12	97,18	96,02	97,42
59.13	50.29	55.06	37,77	39.66	61.92	55,10	57,24	42,61	37,21	54,88	62,84	60,65	61,73	43,08	51,48
368	323	347	272	287	385	371	375	314	263	384	404	390	397	310	344
91	91	91	90	86	92	92	92	89	91	91	91	91	91	91	91
101.08	100.62	100.87	98,03	99.70	99.66	99,11	99,28	99,80	100,34	99,74	100,02	100,25	100,14	99,71	99,63
102.63	102.00	102.34	97.70	100.54	100.13	99,30	99,56	101,31	101,27	100,25	101,25	101,63	101,45	100,68	100,71
–	–	88.81	87,97	86.58	–	–	88,75	86,59	90,75	89,52	–	–	90,13	91,05	88,23
–	–	86.40	85,74	83.61	–	–	86,69	84,20	88,46	87,16	–	–	87,61	87,84	85,96
–	–	9.88	9,69	9.45	–	–	9,49	9,89	8,86	8,80	–	–	8,47	8,61	9,43
–	–	9.54	9,41	9.13	–	–	9,12	9,51	8,55	8,50	–	–	8,18	8,34	9,10
–	–	2.71	2,54	3.65	–	–	2,32	2,76	2,52	2,63	–	–	2,79	3,52	2,58
–	–	0.30	0.57	0.41	–	–	0,20	0,64	0,09	0,14	–	–	0,16	0,38	0,34
–	–	9.80	9.53	10.77	–	–	8,92	10,43	8,12	8,57	–	–	8,26	6,97	9,40
–	–	0.79	1.63	1.55	–	–	1,86	1,97	0,80	1,50	–	–	1,18	1,29	1,73
–	–	10.89	11.73	12.73	–	–	10,98	13,04	9,01	10,21	–	–	9,60	8,64	11,47
–	–	13.60	14.27	16.38	–	–	13,30	15,80	11,53	12,84	–	–	12,39	12,16	14,05
–	–	0.96	1.03	1.10	–	–	1,02	1,03	1,05	1,02	–	–	0,99	0,98	1,01
–	–	2.75	2.58	3.68	–	–	2,34	2,82	2,55	2,65	–	–	2,81	3,54	2,61
–	–	0.31	0.57	0.41	–	–	0,20	0,65	0,09	0,14	–	–	0,16	0,38	0,34
–	–	9.27	8.78	10.29	–	–	8,68	9,33	7,13	7,98	–	–	7,74	6,56	8,83
–	–	0.16	1.01	1.25	–	–	1,23	1,33	0,91	1,23	–	–	0,96	1,11	1,33
–	–	0.87	0.82	0.98	–	–	0,83	0,80	0,89	0,88	–	–	0,98	0,75	0,85
–	–	0.71	0.62	0.82	–	–	0,68	0,49	0,43	0,64	–	–	0,73	0,55	0,66

TABLE C_1

ANALYSIS OF BAGASSE, JUICES, FILTER SOUTH AFRICAN MILLS

SYMBOLS OF FACTORIES	ML*	PG†	UF	EN†	FX1			FX2			AK*	DL
					A	B	Average	A*	B*	Average		
Final bagasse												
Pol % bagasse	0,88	1,04	1,22	1,36	1,22	1,13	1,19	0,61	0,56	0,59	0,83	0,78
Moisture % bagasse	52,30	46,68	49,88	52,74	49,57	49,89	49,68	51,32	52,09	51,58	51,38	51,48
Fibre % bagasse	45,99	51,42	48,07	44,86	48,01	47,88	47,97	47,23	46,60	46,93	46,97	46,90
Bagasse % cane	31,30	27,96	31,08	29,57	32,02	30,57	31,53	36,75	37,35	36,96	31,18	33,26
Ash % bagasse	4,07	–	–	2,04	–	–	2,68	–	–	4,27	2,47	–
LCV in kJ per kg bagasse††	6 600	–	–	6 886	–	–	7 397	–	–	6 708	7 106	–
Mixed juice												
Mixed juice % cane	117,95	124,19	114,33	124,71	111,65	122,22	115,52	123,60	122,96	123,34	122,22	118,22
Brix	11,79	11,21	11,76	11,44	11,68	11,03	11,44	10,91	11,32	11,07	11,64	11,47
Sucrose purity	84,23	85,08	86,04	87,44	86,55	85,16	86,04	82,93	82,79	82,87	86,04	85,88
Apparent purity	83,16	84,08	84,98	86,51	85,39	83,92	84,87	82,05	82,12	82,08	85,30	85,03
Purity difference (MJ-DAC)	−0,36	0,81	1,24	0,55	0,84	−0,19	0,46	−0,45	−0,34	−0,41	−0,26	0,90
Pol/sucrose ratio	0,9873	0,9883	0,9877	0,9894	0,9866	0,9854	0,9861	0,9894	0,9919	0,9901	0,9914	0,9901
Reducing sugars/pol ratio	7,73	7,16	8,20	4,74	–	–	5,05	–	–	5,11	5,05	7,03
Suspended solids % mixed juice	0,53	0,63	1,75	0,60	1,60	1,56	1,59	0,32	0,20	0,27	0,42	0,65
Clarified juice												
Brix	12,09	11,03	11,59	12,15	–	–	11,04	–	–	10,09	11,22	10,70
Apparent purity	82,65	83,22	85,25	85,70	–	–	83,93	–	–	81,79	84,67	85,31
Purity difference (CJ-MJ)	−0,50	−0,86	0,26	−0,81	–	–	−0,94	–	–	−0,29	−0,63	0,28
Reducing sugars/pol ratio	7,73	6,99	8,20	4,66	–	–	5,52	–	–	5,66	5,05	6,80
Average pH	7,2	7,1	7,1	7,4	–	–	7,0	–	–	7,1	7,0	7,0
Filter cake												
Pol % filter cake	2,10	0,86	1,43	1,91	–	–	1,00	–	–	2,02	0,64	0,90
Filter cake % cane	3,39	3,79	5,97	4,12	–	–	5,44	–	–	1,82	2,97	4,92
Filter wash index	97,5	101,6	101,5	94,2	–	–	103,6			109,9	103,7	107,2
Purity difference (CJ-filtrate)	5,22	1,05	2,84	1,30	–	–	1,00	–	–	5,49	1,48	–
Syrup												
Brix	65,79	66,66	61,62	62,56	–	–	68,06	–	–	64,53	67,14	65,72
Apparent purity	83,13	83,96	85,70	86,21	–	–	85,47	–	–	82,10	85,27	85,83
Purity difference (Syrup-MJ)	−0,02	−0,12	0,71	−0,31	–	–	0,60	–	–	0,02	−0,03	0,80
Reducing sugars/pol ratio	7,94	6,48	7,45	4,35	–	–	5,73	–	–	5,84	5,58	6,38
Average pH	6,3	6,0	6,4	6,6	–	–	6,1	–	–	5,8	6,1	6,3
Final molasses												
Refracto brix	87,81	81,19	79,80	83,99	–	–	81,05	–	–	84,30	81,51	83,08
Pol/refracto brix purity	31,47	33,88	37,67	36,10	–	–	36,69	–	–	37,33	35,16	32,96
Suc/refracto brix purity	34,87	36,63	39,64	37,62	–	–	39,21	–	–	38,64	37,36	35,89
Pol/sucrose ratio	0,9024	0,9250	0,9503	0,9596	–	–	0,9357	–	–	0,9661	0,9412	0,9184
Purity difference (true-target)	3,0	3,8	4,2	4,7	–	–	6,7	–	–	5,0	4,0	2,7
Reducing sugars %	17,66	11,13	9,51	11,55	–	–	12,32	–	–	12,70	12,38	13,08
Sulphated ash %	15,13	14,67	15,24	14,86	–	–	13,69	–	–	14,04	14,17	15,01
Reducing sugar/ash ratio	1,17	0,76	0,62	0,78	–	–	0,90	–	–	0,90	0,87	0,87
Fructose %	9,4	6,6	5,6	6,5	–	–	7,0	–	–	6,8	7,0	7,5
Glucose %	8,3	4,5	3,9	5,0	–	–	5,3	–	–	5,8	5,3	5,5
Final mol at 85 brix % cane	4,07	3,95	3,70	3,46	–	–	3,45	–	–	4,45	3,58	3,48

* Cane diffuser
† Bagasse diffuser
†† LCV = 18 309 − 31,14Bx % bagasse − 207,63 moisture % bagasse − 196,05 ash % bagasse.

CAKE, SYRUP AND FINAL MOLASSES
(Season 1984 - 1985)

MS			ME	GD†	GH			NB	UC*	IL*	SZ			UK	Average
A*	B	Average			A*	B	Average				A*	B*	Average		
0.76	1.05	0.89	1.04	1.47	0,86	0,90	0,89	1,12	1,06	1,08	1,12	1,17	1,15	1,52	0,99
54.56	52.89	53.81	50.24	53.19	50,77	50,01	50,26	51,74	51,60	52,65	50,22	49,85	50,03	51,27	51,35
43.98	45.03	44.45	47.79	44.33	47,57	48,26	48,03	46,21	46,70	45,49	47,53	47,83	47,68	45,85	46,76
36.53	34.60	35.67	29.06	31.16	33,78	30,75	31,76	29,40	30,29	31,42	32,70	32,51	32,60	30,28	31,97
–	–	1.76	2.46	–	–	–	–	3,25	2,49	3,72	–	–	2,32	2,32	2,82
–	–	6 739	7 335	–	–	–	–	6 866	7 056	6 591	–	–	7 396	7 121	7 174
122.60	115.69	119.52	108.71	108,49	128,15	124,35	125,57	113,21	106,92	123,46	130,14	128,14	129,14	112,79	119,51
11.02	11.40	11.19	12.52	12.85	10.81	11,03	10,96	12,13	13,29	11,79	11,59	11,71	11,65	12,73	11,67
84.40	85.33	84.81	85.24	86.91	85.94	86,27	86,16	84,86	87,00	86,68	86,80	86,44	86,62	88,02	85,69
83.48	83.97	83.70	83.91	86,11	85,20	85,36	85,31	83,16	86,15	85,84	86,11	85,70	85,90	87,44	84,74
−0.06	0.61	0.24	1.53	0,69	0.92	1,08	1,03	−0,05	0,06	0,63	0,63	0,52	0,57	1,15	0,46
0.9891	0.9841	0.9871	0.9844	0.9908	0,9914	0,9894	0,9900	0,9800	0,9902	0,9903	0,9920	0,9914	0,9916	0,9934	0,9889
–	–	6.24	6.50	5,42	–	–	5,10	7,88	4,62	5,05	–	–	4,02	4,04	5,76
0.17	0.65	0.38	0.70	0,52	0,13	0,67	0,50	1,03	0,34	0,14	0,29	0,30	0,30	0,80	0,56
–	–	10.68	11.90	12.43	–	–	10,61	12,01	13,57	11,69	–	–	11,32	12,47	11,56
–	–	82.97	84.05	86.49	–	–	85,15	84,60	85,96	85,44	–	–	86,02	87,28	84,54
–	–	−0.73	0.15	0.38	–	–	−0,16	1,43	−0,19	−0,40	–	–	0,12	−0,15	−0,20
–	–	5.96	6.81	5.83	–	–	4,76	6,34	5,02	5,17	–	–	4,23	3,86	5,74
–	–	7.2	7.0	7,0	–	–	7,0	7,1	7,0	7,1	–	–	7,0	7,1	7,1
–	–	0.89	0.93	1,88	–	–	0,67	1,35	1.06	1,47	–	–	1,47	0,98	1,13
–	–	3.99	7.21	2,75	–	–	3,66	5,67	1,10	1,19	–	–	1,45	5,05	3,70
–	–	104.8	105.2	103,4	–	–	103,3	101,0	97,9	100,9	–	–	102,8	102,1	100,9
–	–	0.61	1.37	1,53	–	–	1,75	1,34	2,20	1,27	–	–	1,70	0,72	1,59
–	–	68.66	66.54	67.50	–	–	66,88	66,84	67,38	66,12	–	–	64,82	70,78	66,48
–	–	83.99	84.77	86.93	–	–	85,76	84,86	86,44	85,74	–	–	86,33	87,66	85,34
–	–	0.29	0.87	0.82	–	–	0,45	1,70	0,29	−0,10	–	–	0,43	0,23	0,60
–	–	6.14	7.16	6.43	–	–	4,63	6,17	5,31	5,47	–	–	4,79	4,63	5,88
–	–	6.1	6.0	6.5	–	–	6,1	6,3	6,3	6,1	–	–	6,0	6,3	6,2
–	–	83.22	80.17	82.62	–	–	81,84	82,00	84,64	83,76	–	–	81,11	81,30	82,58
–	–	34.93	33.09	38.86	–	–	34,70	32,57	30,64	33,78	–	–	33,85	33,90	34,34
–	–	37.41	36.51	41.05	–	–	36,05	37,15	35,23	36,60	–	–	36,43	36,25	36,95
–	–	0.9337	0.9064	0.9466	–	–	0,9627	0,8768	0,8696	0,9227	–	–	0,9292	0.9353	0,9295
–	–	4.4	4.3	8,0	–	–	3,4	4,4	2,0	3,8	–	–	3,0	2,2	3,9
–	–	13.54	13.35	13,28	–	–	11,93	11,97	10,56	12,27	–	–	12,06	11,14	12,68
–	–	14.51	13.21	13,70	–	–	14,13	13,03	14,17	14,16	–	–	14,07	15,06	14,27
–	–	0.93	1.01	0.97	–	–	0,84	0,92	0,75	0,87	–	–	0,86	0,74	0,89
–	–	7.6	7.8	7,4	–	–	6,7	7,9	7,6	7,4	–	–	7,2	6,7	7,3
–	–	5.9	5.5	5,8	–	–	5,2	4,1	3,0	4,9	–	–	4,9	4,5	5,3
–	–	3.59	3.66	3,88	–	–	3,54	3,96	3,44	3,57	–	–	3,58	2,96	3,67

TABLE D_1

MASSECUITES, EXHAUSTIONS, CLARIFYING AGENTS AND ADDITIONAL FUELS SOUTH AFRICAN MILLS (Season 1984–1985)

Symbols of Factories	ML	PG	UF	EN	FX1	FX2	AK	DL	MS	ME	GD	GH	NB	UC	IL	SZ	UK	Averages
Brix in mixed juice % cane	13.90	13.92	13.44	14,27	13,19	13,66	14,23	13,56	13,37	13,61	13,94	13,76	13,73	14,21	14,55	15.05	14,36	13,95
A-massecuite																		
m^3 per ton brix in mixed juice	1,06	1,11	1,01	1,27	0,98	1,10	1,01	0,97	1,03	1,02	1,12	1,13	1,11	1,01	1,00	1,01	1,02	1,04
Ref. brix of massecuite	92,84	92,27	92,01	91,95	93,44	92,95	92,31	92,44	91,73	91,45	91,75	92,75	92,15	92,21	93,27	92,52	91,92	92,37
Purity of massecuite	83,34	84,39	85,28	86,02	84,93	83,22	85,97	86,85	84,71	84,89	86,81	86,97	85,06	86,21	87,33	86,28	87,01	85,60
Purity of A-molasses	66,18	67,85	69,41	72,23	68,08	68,26	68,29	67,92	67,59	67,56	73,88	69,45	66,36	66,21	69,42	69.08	69,79	68,36
Purity drop	17,16	16,54	15,87	13,79	16,85	14,96	17,68	18,93	17,12	17,33	12,93	17,52	18,70	20,00	17,91	17.70	17,22	17,24
Exhaustion	60,88	60,96	60,83	57,73	62,15	56,64	64,85	67,94	62,36	62,93	57,02	65,94	65,35	68,66	67,06	65.97	65,51	63,65
Purity of A-massecuite – purity syrup	0.21	0,43	−0,42	−0,19	−0,54	1,12	0,70	1,02	0,72	0,12	−0,12	1,21	0.19	−0,23	1,59	0.45	−0,65	0,60
Purity of remelt	84.50	84,39	87,35	87,62	88,29	85,67	86,54	88,62	83,37	84,82	86,51	88,59	—	87,60	86,17	87.57	86,09	86,31
B-massecuite																		
m^3 per ton brix in mixed juice	0,49	0,44	0,42	0,40	0,33	0,40	0,32	0,33	0,40	0,39	0,15	0,41	0,42	0,36	0,35	0.36	0,39	0,39
Ref. brix of massecuite	95,14	93,09	95,13	92,96	95,27	94,05	93,71	93,17	93,29	92,33	93,42	94,21	94,32	94,98	94,24	93,48	93,10	93,82
Purity of massecuite	67,82	68,65	68,78	72,41	68,63	69,03	69,22	68,45	67,05	68,25	74,05	70,29	66,95	66,51	69,93	70.24	70,00	68,93
Purity of B-molasses	41,90	46,39	48,31	51,47	46,95	47,91	45,68	43,98	47,34	46,53	52,95	47,53	44,39	40,49	46,03	44.54	45,02	45,86
Purity drop	25,92	22,26	20,47	20,94	21,68	21,12	23,58	24,47	19,71	21,72	21,10	22,76	22,56	26,02	23,90	25.70	24,98	23,08
Exhaustion	65,78	60,48	57,58	59,59	59,55	58,74	62,67	63,81	55,82	59,52	60,56	61,71	60,59	65,74	63,33	65.97	64,91	61,83
C-massecuite																		
m^3 per ton brix in mixed juice	0,30	0,28	0,23	0,26	0,27	0,30	0,24	0,28	0,26	0,27	0,26	0,25	0,27	0,22	0,23	0,24	0,22	0,26
Ref. brix of massecuite	98,10	95,46	97,50	96,87	97,67	96,02	96,83	95,65	95,65	95,95	96,09	96,67	95,10	96,67	95,98	95,95	97,01	96,32
Purity of massecuite	51,75	53,35	52,77	54,42	55,28	54,50	53,53	54,40	54,44	54,74	55,79	51,65	51,18	47,68	53,33	52,14	52,27	53,14
Apparent purity of C-molasses	31,47	33,88	37,67	36,10	36,69	37,33	35,16	32,96	34,93	33,09	38,86	34,70	32,57	30,64	33,78	33,85	33,90	34,34
Purity drop	20,28	19,47	15,10	18,32	18,59	17,17	18,37	21,44	19,51	21,65	16,93	16,95	18,61	17,04	19,55	18,29	18,37	18,80
Crystal content	29,03	28,11	23,62	27,77	28,70	26,31	27,43	30,59	28,83	31,05	26,61	25,09	26,25	23,75	28,34	26,53	26,96	27,58
Exhaustion	57,18	55,19	45,91	52,68	53,12	50,27	52,93	58,79	55,26	59,11	49,63	50,26	53,93	51,53	55,36	53,03	53,17	53,88
Total volume of all raw massecuites m^3 per ton brix in mixed juice	1,85	1,83	1,66	1,93	1,80	1,58	1,57	1,58	1,69	1,67	1,89	1,80	1,81	1,59	1,58	1,61	1,63	1,69
White sugar massecuite Kg sugar per m^3 white massecuite	665	526	801	625	—	—	—	—	—	—	—	543	556	—	—	—	—	—
Tons limestone per 1 000 tons white sugar	—	49,7	—	—	—	—	—	—	—	—	—	40,5	—	—	—	—	—	—
Tons coke per 1 000 tons white sugar	—	5,6	—	—	—	—	—	—	—	—	—	4,0	—	—	—	—	—	—
Tons phos. acid per 1 000 tons white sugar	—		—	0,82	—	—	—	—	—	—	—	—	0.86	—	—	—	—	—
Tons sulphur per 1 000 tons white sugar	0,1	0,1	6,2	—	—	—	—	—	—	—	—	0,1	—	—	—	—	—	—
Phos. acid ppm mixed juice	—	—	—	—	—	—		—	—	—	—	—	26,28	—	0,35	—	—	—
Flocculant ppm mixed juice	1,4	6,2	4,9	3,0	3,5	4,4	5,6	2,2	1,7	1,9	1,4	3,6	5,5	3,1	6,3	5.8	1,0	3.8
Tons lime per 1 000 tc	1,9*	1,0	1,5*	0,8*	0,7	1,2	0,6	0,6	0,9	0,6	0,6	1,3*	0,8*	0,4	0,6	0.5	0,6	0.9
Enzyme ppm sugar	—	3,2	—	29,8	37,3	4,5	2,0	14,1	21,2	19,0	55,4	9,8	9,5	13,2	6,0	5.7	17,1	11,2
Additional fuels per 1 000 tc																		
Tons of coal	28,99	10,07	12,63	61,50	78,19	17,34	1,16	—	5,82	0,43	12,54	—	11,54	5,02	1,79	14,19	0,23	—
Tons of wood	—	0,38	—	1,25	—	0,20	—	0,74	0,08	0,14	3,36	—	1,04	2,52	0,41	0,22	0,22	—
Converted into bagasse***	115,96†	40,74	50,52	247,50†	312,76†	69,60†	4,64	0,89	23,38†	1,89	54,19	—	47,61	23,10	7,65	57,02†	1,18	—

* Includes lime used in refinery
† Part of bagasse used for by-products
*** 1 ton coal equivalent to 4 tons of bagasse
1 ton firewood equivalent to 1,2 tons of bagasse

TABLE B_2

CANE CRUSHED AND SUGAR MADE, CANE COMPOSITION, THROUGHPUTS AND TIME ACCOUNTS, PERFORMANCE AND LOSSES SWAZILAND, MALAWI AND ZIMBABWE MILLS (SEASON 1984 - 1985)

Symbols of Factories	MH			UR	SM	NH			DW*	HV			TR		
	A*	B	Average			A†	B	Average		A*	B*	Average	A*	B	Average
Tons raw sugar	—	—	148 042	114 833	123 101	—	—	55 211	31 440	—	—	252 799	—	—	185 565
Tons white sugar	—	—	—	16 029	—	—	—	33 090	30 157	—	—	—	—	—	—
Total sugar, tons	—	—	148 042	130 862	123 101	—	—	88 301	61 597	—	—	252 799	—	—	185 565
White % total sugar	—	—	—	12,25	—	—	—	37,47	48,96	—	—	—	—	—	—
Pol raw sugar	—	—	98,68	98,65	98,60	—	—	98,49	99,11	—	—	98,98	—	—	99,27
Moisture raw sugar	—	—	0,29	0,32	0,28	—	—	0,28	0,13	—	—	0,16	—	—	0,15
Tons of cane crushed — total			1 315 805					858 381				1 930 673			1 858 826
Tons of cane crushed — per tandem	649 644	666 161		1 195 943	1 074 605	324 980	533 401		544 457	995 732	934 941		1 106 043	752 783	
Season started on	—	—	1.5.84	30.4.84	1.5.84	—	—	12.4.84	16.5.84	—	—	25.4.84	—	—	9.4.84
Season completed on	—	—	12.12.84	17.12.84	5.12.84	—	—	17.11.84	28.10.84	—	—	6.12.84	—	—	24.12.84
Number of crushing days	—	—	226	232	219	—	—	220	166	—	—	226	—	—	260
Time account															
Overall time efficiency %	80,66	82,98	81,82	75,85	79,08	70,91	79,91	75,40	83,82	91,91	91,50	91,70	88,57	81,28	85,11
Scheduled stop % gross available time	5,25	5,79	5,52	5,75	3,42	11,04	10,71	10,87	8,23	2,81	3,22	3,01	5,39	6,11	5,73
Lack of cane stops % gross available time	7,18	6,15	6,66	7,69	14,60	6,45	3,70	5,08	1,16	0,24	0,26	0,25	0,77	4,81	2,69
Other stops % gross available time	6,90	5,08	5,99	10,71	2,91	11,60	5,68	8,64	6,79	5,04	5,03	5,04	5,27	7,80	6,46
Lost time % available crushing time	7,88	5,77	6,82	12,37	3,55	14,06	6,64	10,28	7,49	5,20	5,21	5,21	5,61	8,76	7,06
Throughputs per hour actual crushing															
Tons of cane crushed	149,99	148,52	297,51	285,02	259,93	88,72	129,38	218,10	163,66	206,46	196,71	403,17	200,39	164,92	365,31
Tons of fibre milled	22,36	20,78	43,14	40,90	31,67	12,89	18,87	31,76	26,55	30,72	29,14	59,86	30,49	24,58	55,07
Tons of brix processed	21,23	20,74	41,97	39,85	37,29	12,54	18,32	30,86	26,01	33,27	32,75	66,02	31,22	25,38	56,60
Tons of sugar produced	—	—	33,47	31,18	29,77	—	—	22,48	18,51	—	—	52,77	—	—	—
Tons pol in cane	19,00	18,94	37,94	35,54	32,78	10,93	15,99	26,92	23,27	29,46	28,99	58,46	27,95	22,91	50,86
Tons of non pol in mixed juice	—	—	5,59	5,84	5,37	—	—	5,04	3,62	—	—	8,81	—	—	7,19
Composition of cane crushed															
Pol % cane	12,75	12,75	12,75	12,47	12,61	12,32	12,36	12,34	14,22	14,27	14,74	14,50	13,95	13,89	13,93
Fibre % cane	15,32	15,11	15,21	14,79	13,17	14,53	14,58	14,56	16,22	15,19	15,16	15,18	15,65	15,39	15,54
Brix % cane	14,98	14,74	14,88	15,25	15,04	14,79	14,84	14,82	16,75	16,71	17,21	16,95	16,05	16,20	16,11
ERC % cane	11,04	11,17	11,11	10,50	10,85	10,52	10,55	10,54	12,32	12,42	12,88	12,64	12,28	12,12	12,22
ERC % pol in cane	86,59	87,60	87,10	84,17	86,01	85,35	85,32	85,33	86,60	87,06	87,35	87,20	88,03	87,24	87,71
Extraction															
Extraction	96,49	95,29	95,88	95,64	97,39	96,19	96,08	96,12	96,17	97,75	98,02	97,88	98,05	96,22	97,31
Corrected reduced extraction	96,41	94,81	95,61	95,37	96,65	96,02	95,91	95,95	96,17	97,51	97,76	97,63	97,93	95,90	97,11
Imbibition % cane	55,28	41,42	46,50	43,66	47,82	33,37	30,79	31,77	48,04	52,69	62,94	57,66	50,52	50,34	50,45
Imbibition % fibre	368	296	332	304	392	230	211	218	296	354	425	388	332	338	334
Preparation Index	86	87	87	90	90	84	86	85	89	92	92	92	89	89	89
Recoveries															
Boiling house recovery	—	—	90,82	90,62	91,96	—	—	85,84	XXX	—	—	91,34	—	—	XXX
Overall recovery	—	—	87,07	86,67	89,56	—	—	82,51	—	—	—	89,41	—	—	—
Tons cane per ton sugar	—	—	8,89	9,14	8,73	—	—	9,72	—	—	—	7,64	—	—	—
Tons cane per ton 96° sugar	—	—	8,65	8,88	9,36	—	—	9,42	—	—	—	7,41	—	—	—
Pol balance															
Lost in bagasse (a)	—	—	4,12	4,36	2,61	—	—	3,88	3,83	—	—	2,12	—	—	2,69
Lost in filter cake (b)	—	—	0,36	0,15	0,24	—	—	0,74	0,09	—	—	0,01	—	—	0,17
Lost in final molasses (c)	—	—	7,35	7,52	7,12	—	—	11,05	—	—	—	7,52	—	—	—
Undetermined losses (d)	—	—	1,09	1,30	0,47	—	—	1,83	—	—	—	0,95	—	—	—
Boiling house losses (b+c+d)	—	—	8,80	8,97	7,83	—	—	13,62	—	—	—	8,48	—	—	—
Sum of all losses (a+b+c+d)	—	—	12,92	13,33	10,44	—	—	17,50	—	—	—	10,60	—	—	—
Red. sugars in F.M. % R.S. in M.J.	—	—	—	86,21	74,22	—	—	98,16	—	—	—	—	—	—	—
Non pol ratio	—	—	1,03	0,97	0,92	—	—	0,79	—	—	—	1,02	—	—	—

* Cane diffuser † Bagasse diffuser XXX Simultaneous production of sugar and alcohol. N.B. All extraction and recovery figures listed in Table B_2 are based on pol.

TABLE C_2
ANALYSIS OF BAGASSE, JUICES, FILTER CAKE, AND FINAL MOLASSES SWAZILAND, MALAWI AND ZIMBABWE MILLS
(Season 1984–1985)

SYMBOLS OF FACTORIES	MH			UR	SM	NH			DW*	HV			TR		
	A*	B	Average			A†	B	Average		A*	B*	Average	A*	B	Average
Final bagasse															
Pol % bagasse	1,38	1,97	1,67	1,62	1,23	1,48	1,59	1,55	1,62	1,05	0,95	1,00	0,86	1,64	1,18
Moisture % bagasse	51,51	51,52	51,52	53,57	51,92	52,05	49,80	50,68	49,11	49,56	49,98	49,77	50,00	50,82	50,33
Fibre % bagasse	46,23	45,92	46,08	42,65	45,49	45,89	47,96	47,16	48,35	48,50	48,20	48,35	48,51	46,63	47,74
Ash % bagasse	—	—	—	—	2,92	—	—	—	—	—	—	—	—	—	—
Bagasse % cane	32,47	30,47	31,45	33,65	26,78	31,67	30,40	30,88	33,56	30,68	30,73	30,70	31,37	31,96	31,61
LCV in kJ per kg bagasse	—	—	—	—	68,77	—	—	—	—	—	—	—	—	—	—
Mixed juice															
Mixed juice % cane	122,81	110,95	116,81	110,02	121,04	101,70	100,38	100,88	114,49	122,02	132,21	126,95	119,95	118,38	118,84
Brix	11,60	12,58	12,07	12,71	11,85	13,90	14,11	14,03	13,88	13,21	12,59	12,90	13,05	13,00	13,04
Apparent purity	86,34	87,03	86,69	85,34	85,60	83,86	83,86	83,86	86,07	86,53	86,79	86,66	87,80	86,87	87,43
Reducing sugars/pol ratio	—	—	4,53	5,72	5,61	—	—	3,49	5,22	—	—	4,38	—	—	6,52
Suspended solids % mixed juice	0,26	1,01	0,62	0,40	0,82	—	—	—	—	0,26	0,26	0,26	0,36	0,41	0,38
Clarified juice															
Brix	—	—	12,09	12,80	11,64	—	—	13,41	13,00	—	—	12,62	—	—	12,77
Apparent purity	—	—	86,59	84,68	85,10	—	—	87,70	86,69	—	—	86,77	—	—	86,89
Purity difference (CJ-MJ)	—	—	−0,10	−0,66	−0,50	—	—	3,84	0,62	—	—	0,11	—	—	−0,54
Reducing sugars/pol ratio	—	—	4,52	5,32	4,67	—	—	2,81	5,27	—	—	4,47	—	—	4,96
Average pH	—	—	7,2	7,1	7,0	—	—	7,0	7,2	—	—	6,9			7,2
Filter cake and filtrate															
Pol % filter cake	—	—	1,91	0,53	0,92	—	—	2,75	0,62	—	—	0,26	—	—	0,94
Moisture % filter cake	—	—	—	—	72,38	—	—	72,16	73,11	—	—	72,45	—	—	73,07
Filter cake % cane	—	—	4,46	3,58	3,23	—	—	3,32	2,01	—	—	0,56	—	—	2,48
Filter wash index	—	—	1,00	0,99	1,02	—	—	1,05	1,07	—	—	1,02	—	—	1,02
Purity difference (CJ – filtrate)	—	—	3,89	2,56	1,19	—	—	3,98	—	—	—	2,70	—	—	—
Syrup															
Brix	—	—	59,49	64,33	65,02	—	—	67,87	64,66	—	—	65,98	—	—	64,82
Apparent purity	—	—	86,25	86,18	85,24	—	—	86,89	87,06	—	—	86,74	—	—	86,85
Purity difference (syrup–MJ)	—	—	−0,44	0,84	−0,36	—	—	3,03	0,99	—	—	0,08	—	—	−0,58
Reducing sugars/pol ratio	—	—	3,69	5,25	5,02	—	—	4,32	5,51	—	—	4,68	—	—	5,07
Average pH	—	—	6,4	6,4	6,3	—	—	6,6	6,6	—	—	6,1	—	—	6,4
Final molasses															
Refracto brix	—	—	81,75	84,19	83,74	—	—	79,76	—	—	—	86,74	—	—	—
Pol/refracto brix purity	—	—	34,03	33,18	33,71	—	—	44,30	—	—	—	33,96	—	—	—
Percentage reducing sugars	—	—	—	17,51	16,08	—	—	10,53	—	—	—	—	—	—	—
Percentage sulphated ash	—	—	—	14,40	17,16	—	—	15,88	—	—	—	—	—	—	—
Reducing sugars/ash ratio	—	—	—	1,22	0,94	—	—	0,66	—	—	—	—	—	—	—
Mol at 85 refracto brix % cane	—	—	3,24	3,33	3,13	—	—	3,62	—	—	—	3,78	—	—	—

* Cane diffuser
† Bagasse diffuser

TABLE D_2

MASSECUITES, EXHAUSTIONS, CLARIFYING AGENTS AND ADDITIONAL FUELS SWAZILAND, MALAWI AND ZIMBABWE MILLS (Season 1984 - 1985)

Symbols of Factories	MH	UR	SM	NH	DW	HV	TR
Brix in mixed juice % cane	14,10	13,98	14,35	14,15	15,89	16,37	15,50
A-massecuite							
m^3 per ton brix in mixed juice	0,93	0,97	0,97	0,85	1,26	0,95	0,89
Ref. brix of massecuite	93,58	91,50	93,25	91,70	92,44	92,42	91,94
Purity of massecuite	84,94	86,93	84,23	85,51	88,94	86,88	87,63
Purity of A-molasses	65,86	69,64	67,41	71,93	77,34	66,16	72,02
Purity drop	19,08	17,29	16,82	13,58	11,60	20,72	15,61
Exhaustion	65,80	65,51	61,27	56,58	57,56	70,48	63,67
Purity A-massecuite - purity syrup	−1,31	0,75	−1,01	−1,38	1,88	0,14	0,78
B-massecuite							
m^3 per ton brix in mixed juice	0,36	0,39	0,27	0,46	0,69	0,39	0,23
Ref. brix of massecuite	94,84	93,47	93,39	94,59	92,59	94,66	90,71
Purity of massecuite	68,44	70,25	66,49	75,16	73,88	68,56	72,46
Purity of B-molasses	45,05	46,70	45,78	60,00	53,43	45,02	51,17
Purity drop	23,39	23,55	20,71	15,16	20,45	23,54	21,29
Exhaustion	62,19	62,90	57,45	50,43	59,44	62,45	60,17
C-massecuite							
m^3 per ton brix in mixed juice	0,21	—	0,25	0,32	—	0,24	—
Ref. brix of massecuite	97,39	96,04	97,62	97,49	—	97,02	—
Purity of massecuite	52,77	54,76	54,82	59,98	—	51,37	—
Apparent purity of C-molasses	34,03	33,18	33,71	44,30	—	33,96	—
Purity drop	18,74	21,58	21,11	15,68	—	17,41	—
Crystal content	27,66	31,14	31,09	27,44	—	25,58	—
Exhaustion	53,83	58,98	58,09	46,93	—	51,32	—
Total volume all raw massecuites							
m^3 per ton brix in mixed juice	1,50	—	1,49	1,63	—	1,57	—
White sugar massecuites							
Kg sugar per m^3 white massecuite	—	555	—	504	572	—	—
Clarifying agents and chemicals							
Tons lime per 1 000 tons cane	0,46	0,68	0,56	1,20*	1,43*	0,54	0,58
Tons sulphur per 1 000 tons white sugar	—	0,02	—	—	0,03	—	—
Tons phosphoric acid per 1 000 tons white sugar	—	—	—	0,91	—	—	—
Flocculant ppm mixed juice	3,6	1,7	0,9	1,6	1,7	1,4	—
Enzyme ppm sugar	—	—	2,7	—	5,8	—	—
Additional fuels per 1 000 tons cane							
Tons of coal	2,50	5,19	3,50	0,55	—	5,61	12,71†
Tons of wood	—	—	—	—	—	—	—
Converted into bagasse	10,00	20,76	14,0	2,20	—	22,44	50,84

* Includes lime used in refinery
† Includes coal used for irrigation power generation

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

Season	1984/85	1983/84	1982/83	1981/82	1980/81
Throughput and time efficiency					
Tons cane per hour	251,28	217,42	232,96	233,87	224,86
Tons fibre per hour	37,56	33,61	34,76	35,96	34,16
Time efficiency	77,06	74,40	78,39	77,45	79,02
Cane					
Pol % cane	12,14	12,23	12,75	12,20	13,34
Fibre % cane	15,62	16,15	15,61	16,13	15,95
Juice					
Apparent purity of mixed juice	84,74*	83,49	84,37	84,94	84,80
Reducing sugars/pol ratio (mixed juice)	5,76	6,06	5,80	5,27	5,25
Milling					
Imbibition % fibre	344	356	345	341	344
Extraction	97,42	97,02	97,02	97,02	96,89
Pol % bagasse	0,99	1,08	1,19	1,10	1,24
Moisture % bagasse	51,35	52,68	51,35	51,57	52,10
Bagasse % cane	31,97	34,14	32,13	33,24	33,35
LCV bagasse kJ/kg	7 174	6 906	7 153	7 050	6 985
Available kJ in bagasse/kg brix in mixed juice	16 438	16 597	15 676	16 827	15 283
Recoveries					
Boiling house recovery	88,23†	85,37†	87,64†	87,75†	88,17
Overall recovery	85,96†	82,83†	85,03†	85,14†	85,42
Tons cane per ton sugar	9,43	9,74	9,10	9,50	8,73
Filter cake					
Pol % filter cake	1,13	1,07	1,11	1,09	1,18
Filter cake % cane	3,70	4,18	3,87	4,19	4,62
Final molasses					
Brix	82,58	81,35	82,03	82,78	82,44
Gravity purity	36,95	38,22	36,56	37,15	38,70
Weight at 85 Bx % cane	3,67	4,36	4,03	3,69	4,12
Average sugar polarisation	99,50	99,50	99,48	99,30	99,42
Pol balance					
Lost in bagasse	2,61	3,00	3,01	3,00	3,11
Lost in filter cake	0,34	0,36	0,34	0,37	0,41
Lost in final molasses	8,83	11,10	9,27	9,23	9,46
Undetermined losses	1,33	2,02	1,62	1,55	1,60
Lost in boiling house	10,50	13,48	11,23	11,15	11,47
Total losses	13,11	16,48	14,24	14,15	14,58
M^3 massecuite per ton brix in mixed juice					
A-massecuite	1,04	1,06	1,05	1,07	1,05
B-massecuite	0,39	0,41	0,42	0,42	0,42
C-massecuite	0,26	0,29	0,27	0,26	0,26
Total	1,69	1,75	1,73	1,75	1,73
Exhaustion of massecuites					
A-massecuite	63,65	61,80	62,61	62,99	62,93
B-massecuite	61,83	59,87	61,29	60,61	59,58
C-massecuite	53,88	49,99	52,48	50,93	49,98
Brix of syrup	66,48	66,76	67,32	66,46	66,95

† Sucrose basis.

TABLE F

AVERAGE MANUFACTURING RESULTS BY MONTHLY PERIODS FOR SOUTH AFRICAN MILLS (Season 1984–1985)

End of Monthly Period		April 28 1984	June 2 1984	June 30 1984	July 28 1984	Sept. 1 1984	Sept. 29 1984	Oct. 27 1984	Nov. 25 1984	Dec. 29 1984	Feb. 3 1985	March 2 1985	March 10 1985
Tons of sugar made and estimated	Month	41 468	209 944	215 577	229 299	305 319	267 134	259 967	258 157	274 503	246 924	60 518	1 230
	To-date	41 468	251 412	466 989	696 288	1 001 607	1 268 741	1 528 708	1 786 865	2 061 368	2 308 292	2 368 810	2 370 040
Tons cane crushed	Month	564 750	2 288 748	2 104 216	2 138 741	2 778 165	2 362 149	2 291 048	2 267 314	2 462 888	2 362 762	708 511	26 299
	To-date	564 750	2 853 498	4 957 714	7 096 455	9 874 620	12 236 769	14 527 817	16 795 131	19 258 019	21 620 781	22 329 292	22 355 591
Tons cane crushed per hour actual crushing	Month	248.02	242.26	245.09	250,55	250,87	250,27	253,60	254,34	255,83	246,49	270,43	—
	To-date	248.02	242.48	243.58	245,64	247,09	247,70	248,61	249,38	250,18	249,78	250,44	251,28
Sucrose % cane	Month	9.19	10.88	11,90	12,30	12,62	12,89	12,96	13,02	12,85	12,22	10,49	10,61
	To-date	9.19	10.55	11,12	11,48	11,80	12,01	12,16	12,27	12,35	12,33	12,27	12,27
Fibre % cane	Month	15.88	15.18	15,03	15,17	15,39	15,45	15,86	16,09	16,15	16,00	16,47	15,42
	To-date	15.88	15.32	15,15	15,15	15,26	15,26	15,36	15,46	15,55	15,60	15,62	15,62
Tons cane per ton sugar	Month	13,34	10.90	9,76	9,33	9,10	8,84	8,81	8,78	8,97	9,57	11,71	—
	To-date	13,34	11.35	10,62	10,19	9,86	9,64	9,50	9,40	9,34	9,37	9,43	9,43
Extraction	Month	97.01	97.19	97,41	97,45	97,54	97,63	97,56	97,44	97,40	97,38	97,13	96,92
	To-date	97,01	97.16	97,27	97,33	97,40	97,44	97,46	97,44	97,44	97,43	97,42	97,42
Imbibition % fibre	Month	341	346	348	342	350	346	340	338	348	348	326	277
	To-date	341	345	346	345	346	346	345	344	345	345	344	344
Pol % bagasse	Month	0,79	0.95	0,99	1,02	0,99	0,98	1,00	1,03	1,02	0,98	0.86	1,08
	To-date	0,79	0.92	0,95	0,97	0,98	0,98	0,98	0,99	1,00	0,99	0,99	0,99
Moisture % bagasse	Month	54,18	53.07	51,69	51,11	51,20	50,75	50,45	50,77	50,95	51,22	52,59	49,61
	To-date	54.18	53,30	52,64	52,19	51,91	51,69	51,49	51,37	51,31	51,30	51,35	51,35
Boiling house recovery	Month	83,84	86.34	88,01	89,01	88,90	89,63	89,33	89,36	88,63	87,34	83,85	—
	To-date	83,84	85,57	86,67	87,43	87,87	88,24	88,42	88,55	88,56	88,42	88,30	88,23
Overall recovery	Month	81.35	83.92	85,73	86,74	86,72	87,51	87,15	87,07	86,33	85,05	81,44	—
	To-date	81,35	83.14	84,31	85,10	85,58	85,98	86,18	86,28	86,29	86,15	86,03	85,96
Mixed juice sucrose purity	Month	80.60	82.88	85,18	86,20	87,02	87,07	87,08	87,04	86,02	84,43	81,19	83,82
	To-date	80.60	82.48	83,68	84,48	85,23	85,61	85,85	85,99	86,00	85,82	85,69	85,69
RS/pol ratio in mixed juice	Month	10.76	8.46	6,97	6,08	4,91	4,76	4.56	4,68	5,24	6,00	6,80	7,68
	To-date	10.76	8.85	8,00	7,37	6,63	6,24	5,95	5,77	5,70	5,73	5,76	5,76
Pol/sucrose ratio in mixed juice	Month	0,9728	0.9795	0,9822	0,9859	0,9895	0,9930	0,9947	0,9938	0,9915	0,9900	0.9882	0,9826
	To-date	0,9728	0.9784	0,9801	0,9820	0,9842	0,9861	0,9875	0,9884	0.9888	0,9890	0.9889	0,9889
Purity final molasses	Month	32.53	31.50	30,97	32,68	35,29	36,09	36,35	35,85	35,44	34,84	36,76	—
	To-date	32.53	31.69	31,39	31,76	32,68	33,30	33,76	34,03	34,21	34,29	34.88	34,34
Sucrose lost in final molasses % sucrose in cane	Month	12.54	11.44	9,51	9,03	8,78	8,51	8,53	8,36	9,01	10,38	13,70	—
	To-date	12.54	11.63	10,67	10,14	9,73	9,48	9,32	9,18	9,16	9,29	9,41	8,83
Undetermined lost sucrose % sucrose in cane	Month	—	1.51	1,87	1,36	1,71	1,28	1,52	1,66	1,73	1,58	1,59	—
	To-date	—	2,05	1,97	1,77	1,75	1,65	1,63	1,65	1,66	1,65	1,65	1,33
Pol/sucrose ratio FM	Month	0.9089	0.8700	0,8733	0,8946	0,9300	0,9547	0,9602	0,9630	0,9641	0,9446	0.9576	—
	To-date	0.9089	0.8772	0,8756	0,8811	0,8943	0,9056	0,9140	0,9204	0,9261	0,9283	0.9295	0,9295

TABLE G
CANE VARIETIES AND RAINFALL
(Season 1984 - 1985)

SYMBOLS OF FACTORIES	CANE VARIETIES CRUSHED (Percentage by Weight)																						Rainfall during season (mm)
	NCo 376	NCo 310	NCo 293	NCo 382	N 13	NCo 334	N 53/216	CB 36/14	N 6	N 52/219	N 55/805	N 7	N 8	J 59/3	N 11	N 14	N 12	Mixed Varieties	Unknown and other varieties	N 16	NCo 339	N 15	
ML	44,4					2,1				12,6				6,8	3,9	26,9		0,3	2,3			0,2	581
PG	59,8	0,7				0,5				3,6				0,1	2,9	17,7		1,2	12,6	0,2			854
UF	34,1	19,1		2,1						0,6	6,9		9,9		0,6	0,4	0,5	24,8	0,2				740
EN	87,5		10,9					0,2			0,7				0,1		0,3						1 270
FX1	44,6	8,7							0,1	0,1	4,0	0,2	2,8		0,6	0,3	0,2	0,1	37,2		0,3		712
FX2	40,2	3,5								0,2	0,9		1,1		0,1	0,5	0,3	0,4	52,0				1 436
AK	62,5	1,5	0,5		0,3						2,9		0,2		0,1	0,2	0,5	1,5	29,1				938
DL	89,1	0,3	0,1		0,2						4,8		0,3		0,2		0,1	2,1	2,3				1 379
ME	66,5	1,0	19,3	0,2	0,2			0,5			4,7	0,1	0,6		0,3		0,6	4,3	1,1				1 214
MS	90,9	0,3	0,4	0,1	0,6		0,1			0,1	5,4		0,2		0,5		0,2	0,5					1 111
GH	90,6	0,2	0,5	0,1	0,4						3,5		0,1		0,1		0,2		3,7				722
NB	21,8		54,9	6,5	0,2		2,0	0,5	0,5		1,2	0,1	0,2		1,1		2,2	0,4	7,7				511
UC	11,3		62,5	2,4			0,1		0,6	0,3	0,2		0,2		0,5		1,3		19,8				623
GD	99,2												0,2		0,1								1 033
IL	58,2		18,9		0,2		0,2	0,1			3,8	1,0			0,4		1,2	0,6	14,8				602
SZ	87,6	0,8			0,1				0,1	0,1	1,8				2,1		0,3	0,9	5,4				973
UK	70,2	0,7	5,8		0,8				0,1	0,4	0,8			0,2	0,8		2,0	0,2	17,2	0,1			823
Average S.A. Mills	65,7	1,6	7,6	0,5	0,2	0,1	0,1			1,1	2,7	0,1	0,6	0,5	0,9	2,7	0,6	1,7	12,1				
MH	85,0					2,2				0,2					0,1	12,5							404
UR	74,0									7,0						18,0		1,0					398
SM	82,5					0,9				7,5				2,1	0,1	6,8		0,1					336
NH	75,0	20,1								0,6						0,4		2,4	1,5				76
DW	72,9	12,4								0,3								2,1	12,3				39
HV	96,6									0,4									3,0				300
TR	98,9														0,1				1,0				307

TABLE H
TRANSPORT SUMMARY SOUTH AFRICAN MILLS
(Season 1984 - 1985)
PERCENT OF CANE TRANSPORTED

MILLS	ML	PG	UF	EN	FX2	FX1	AK	DL	ME	MS	GH	NB	UC	GD	IL	SZ	UK	Average
South African Railways	8.0		38.2		32.7	47.1	5.3		24.6		11.1	0.1	0.3					8.5
Trams		97.0	48.4			52.7												7.0
Hilo	81.7		4.9		55.4		74.0	72.8	65.9	91.7	68.7	50.0	20.0	53.6	97.8	65.8	46.0	61.1
Lorry and Trailer		2.9		10.8	0.3		2.1	5.4	8.5	0.8	2.4	28.9	51.0	18.7		33.8	51.2	11.5
Tractor	10.1		8.3	89.1	11.4		18.4	21.6	0.8	7.3	17.6	20.8	28.5	27.6	2.1	0.1	2.6	11.6

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

PERIOD (SEASON)	Percent Cane		Cane/Sugar Ratio		Extraction	Pol % Fibre in Bagasse	Percent Bagasse		Imbibition Percent		Mixed Juice		Final Molasses Purity	Boiling House Recovery	Overall Recovery
	Sucrose	Fibre	Tel Quel	96 Pol Sugar			Pol	Moisture	Cane	Fibre	Purity	Reducing Sugar Ratio			
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	88,36	81,34
1945	14.28	15.99	8.29	8.08	93.28	6,01	2,77	50,19	35,0	219	86,23	3,38	42,0	89,29	83,30
1946	14.21	16.21	8.36	8.14	93.07	6,08	2,79	50,32	35,2	217	85,86	3,30	41,8	89,12	82,94
1947	13.32	15.80	8.84	8.60	93.94	5,53	2,54	50,46	34,4	218	86,24	2,95	41,1	89,61	83,73
1948	13.89	15.90	8.55	8.31	93.32	5,81	2,67	50,53	34,1	214	85,92	3,67	41,5	89,14	83,19
1949	13.52	16.19	8.76	8.52	92.94	5,82	2,66	50,84	33,7	208	86,22	3,11	41,4	89,68	83,35
1950	14.19	15.80	8.32	8.09	93.33	6,02	2,72	51,22	32,8	206	86,40	3,12	40,5	89,63	83,65
1951	13.33	16.29	8.98	8.73	92.98	5,74	2,57	51,71	35,0	215	84,92	3,52	40,3	88,72	82,50
1952	13.87	16.10	8.50	8.27	93.00	6,02	2,65	52,53	34,9	217	86,25	2,92	39,3	89,96	83,66
1953	13.93	16.31	8.55	8.32	92.67	6,25	2,75	52,47	32,7	200	85,61	3,66	39,5	89,36	82,81
1954	13.34	16.03	8.87	8.65	92.40	6,32	2,75	52,92	30,7	191	85,86	3,28	39,3	90,04	83,20
Average 1945-1954	13.79	16.06	8.60	8.36	93.04	5,95	2,69	51,32	33,8	210	85,95	3,29	40,7	89,46	83,23
1955	13.87	15.74	8.51	8.28	92.32	6,76	2,91	53,18	32,1	204	85,96	3,40	39,6	90,51	83,56
1956	13.35	15.81	8.87	8.62	92.93	5,98	2,60	53,12	35,2	222	85,49	3,32	39,9	89,79	83,44
1957	13.11	15.38	8.93	8.67	93.36	5,66	2,47	53,06	34,5	224	85,10	3,69	38,5	90,43	84,42
1958	13.12	15.92	9.09	8.82	92.87	5,89	2,55	52,38	32,9	207	84,46	4,30	39,1	89,49	83,11
1959	13.66	15.92	8.74	8.44	92.86	6,16	2,66	53,26	34,6	218	85,52	3,51	40,3	89,42	83,04
1960	13.69	15.22	8.70	8.41	93.35	5,98	2,60	53,01	36,2	238	85,63	3,31	40,3	89,40	83,45
1961	13.75	14.52	8.51	8.26	94.21	5,50	2,43	52,54	36,7	253	86,04	3,31	39,5	89,72	84,53
1962	13.29	15.49	8.97	8.73	94.15	5,02	2,24	52,17	41,2	266	83,36	5,11	39,6	87,81	82,67
1963	13.55	15.50	8.66	8.42	94.08	5,16	2,29	52,46	39,8	258	85,30	3,44	39,4	89,60	84,30
1964	13.90	15.38	8.42	8.20	94.16	5,23	2,34	52,64	39,4	256	85,52	3,32	39,9	89,65	84,42
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
1965	12.99	15.57	9.20	8.97	93.99	5,00	2,20	52,98	40,6	261	84,22	3,73	39,9	87,67	82,40
1966	13.72	15.09	8.63	8.40	94.22	5,24	2,29	53,52	39,9	262	85,06	3,63	40,6	88,38	83,27
1967	12.92	15.01	9.28	9.06	94.15	5,04	2,19	53,47	39,2	261	83,41	3,81	38,8	87,52	82,33
1968	13.11	15.32	9.06	8.83	94.74	4,51	1,98	53,32	41,1	268	83,60	4,23	39,4	87,40	82,72
1969	12.88	15.03	9.10	8.86	94.98	4,30	1,89	53,30	41,2	274	84,25	4,17	38,3	88,58	84,13
1970	13.61	15.34	8.64	8.34	95.41	4,06	1,80	53,07	43,2	285	84,99	3,80	38,9	88,57	84,51
1971	12.97	14.82	8.93	8.63	95.91	3,58	1,61	52,66	41,1	277	85,14	4,20	39,4	89,41	85,76
1972	13.26	14.82	8.77	8.47	95.55	3,98	1,75	52,85	41,3	279	86,66	4,17	40,0	89,48	85,50
1973	13.08	15.64	8.93	8.62	95.55	3,87	1,69	53,19	45,0	288	85,66	4,70	39,2	89,13	85,17
1974	13.08	15.59	8.97	8.65	95.49	3,94	1,73	53,10	44,6	286	85,01	5,05	38,4	88,76	84,76
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
1975	12.60	15.67	9.33	9.00	95.38	3,87	1,68	53,52	43,7	279	84,70	5,31	38,8	88,68	84,58
1976	12.43	15.52	9.41	9.08	95.48	3,79	1,66	53,20	41,7	281	84,47	5,58	38,2	88,99	84,97
1977	12.83	15.79	9.12	8.80	95.87	3,51	1,56	52,55	45,6	302	84,39	5,67	38,3	88,62	84,96
1978	12.64	15.22	9.07	8.77	96.63	2,95	1,35	51,59	45,4	314	85,36	5,27	38,0	89,58	86,55
1979	12.96	15.49	8.85	8.54	96.92	2,70	1,23	52,04	49,1	333	85,40	5,11	38,3	89,48	86,73
1980	13.34	15.95	8.73	8.42	96.89	2,73	1,24	52,10	52,2	344	84,80	5,25	38,7	88,17	85,42
1981	12.30	16.13	9.50	9.18	97.02	2,38	1,10	51,57	52,4	341	85,67	5,27	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	5,80	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	6,06	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	5,76	37,0	88,23	85,96
Average 1975-1984	12.66	15.71	9.23	8.91	96.57	2.90	1,31	52,20	48,8	324	84,98	5,51	37,9	88,25	85,22

TABLE K

EQUIPMENT AND POWER USED SOUTH AFRICAN AND SWAZILAND MILLS

SYMBOLS OF FACTORIES	ML	PG	UF	EN	FX2 A	FX2 B	AK	DL	MS A	MS B
Extraction plant										
Total installed power kW/tfh . . .	126	139	249	143	225	227	143	186	128	198
Cane preparation kW/tfh	94	86	93	54	153	155	90	84	90	75
Mills: Total roller volume m³/tfh .	0,24	0,55	1,12	0,66	0,41	0,41	0,48	1,14	0,19	1,24
Diffuser: Screen area m²/tch† . .	(C)1,58	(B)1,92	—	(B)1,09	(C)4,03	(C)4,08	(C)1,70	—	(C)2,00	—
Clarification and Evaporation										
Juice heaters: Heating surface m²/tch°	7,2	6,0	9,1	8,5	10,9		5,5	4,1	6,8	
Clarifiers: Volume m³/tch	(E)3,7	(T)0,9	(T)1,5	(E)2,6	(T)1,5		(E)2,1	(E)1,9	(E+T)1,9	
Evaporators: Heating surface m²/tch	34,2	53,9	50,2	41,4	75,4		35,7	39,3	32,9	
Filters: Screening area m²/tch . .	0,34	0,55	0,76	0,66	0,86		0,30	0,55	0,44	
Boiling house										
Vacuum pans: Volume m³/tch . .	1,6	1,5	1,9	2,3	0,7	¶ 1,4	1,5	1,4	0,9	¶ 0,5
Crystallisers: Volume A m³/tch . .	*1,18* —	*0,74* **1,07**	*1,44* —	*0,80* **0,51**	—	*2,11*	*1,35* —	*1,46* —	—	**1,16**
Volume B m³/tch . .	*0,41* **0,52**	*0,74* **1,33**	*0,73* —	*1,24* —	—	**1,41**	*0,46* **0,90**	*1,15* —	*0,10*	**0,75**
Volume C m³/tch . .	0,41 **1,57**	0,60 **1,48**	*1,35* **0,64**	*2,72* —	—	**2,66**	*0,46* **1,80**	— **2,29**	*0,22*	**1,71**
Centrifugals										
Batch: A mcte. D³ H/tch ‡ . . .	73,7	89,8***	67,6	39,2	43,1		51,6	46,1	39,7	
Continuous: B mcte. W² V/tch § .	170,3	144,0	206,7	269,4	266,4		125,6	108,3	97,7	
C mcte. W² V/tch . .	231,0	288,0	248,0	361,2	399,5		329,8	328,9	244,3	
Steam and power generation										
Electricity ** kW/tch	64,9	39,4	25,8	56,5	78,3		21,5	31,5	57,0	
Boilers: M.C.R. Tons steam/tch . .	0,73	0,91	0,59	0,95	1,17		0,61	1,08	1,06	

Crystallizers: Italic figures denote air cooled. Bold figures denote water cooled.

† C - Cane diffuser, B - bagasse diffuser
‡ D - Basket diameter, H - Basket height
§ W - Speed of rotation, V - Volume of cone formed by basket
¶ Continuous pans
** Electricity generated by steam driven prime movers.
E - Conventional clarifiers, T - Trayless clarifiers
M - Average milling tandems, d - Average diffusers
*** Continuous 'A' centrifugals.
N - batch 'B' centrifugals
° Excluding diffuser juice heaters

FOR RAW SUGAR PRODUCTION
(Season 1984 - 1985)

ME	GD	GH		NB	UC	IL	SZ		UK	TOTALS & AVERAGES S.A. MILLS	UR	SM
		A	B				A	B				
140	158	263	188	216	173	194	162	157	181	194(M) 172(d)	164	256
59	60	202	90	106	94	112	101	98	91	99	82	85
1,18	0,88	0,42	1,27	1,17	0,57	0,31	0,35	0,34	0,94	0,69	1,16	1,18
–	(B)1,70	(C)2,26	–	–	(C)1,95	(C)1,74	(C)1,93	(C)1,90	–	2,32(C) 1,57(B)	(C)1,38	–
6,7	4,6	6,5		8,0	6,7	4,9	7,8		6,6	6,9	5,4	6,3
(E)2,4	(E)2,3	(T)1,3		(E)3,6	(E+T)2,2	(E+T)1,9	(T)0,9		(E)2,2	2,6(E) 1,2(T)	2,3(E)	(E)3,6
36,6	25,7	42,1		48,4	35,8	43,4	53,5		31,5	42,5	35,2	32,9
0,68	0,63	0,64		0,67	0,64	0,28	0,30		0,51	0,55	0,46	0,54
			¶			¶		¶			¶	
1,8	1,3	1,4	0,4	1,5	1,7	1,0 0,9	1,3	0,4	1,5	–	1,3 0,3	1,3
1,27 –	*1,63* **0,28**	*2,27*	–	*1,75* –	*1,21* –	*1,49* **0,55**	*0,40*	**1,59**	*0,46* **0,88**	–	*1,36* –	*0,78* –
1,27 –	*1,59* –	*1,52*	–	*1,29* –	*0,62* **0,89**	*0,35* **1,54**	*0,36*	**1,06**	*0,46* **0,88**	–	*1,75* –	*0,26* –
2,04 –	*1,37* **0,28**	–	**1,37**	*0,32* **1,94**	*0,62* **1,33**	0,18 **2,02**	*0,28*	**1,42**	*0,42* **1,23**	–	– **1,75**	– **2,23**
44,1	71,5	39,2		44,0	70,2	53,1	31,7		39,3	50,3	24,3	32,0
133,3	17,9(N) 115,3	185,4		140,2	150,1	192,0	152,5		132,9	161,9	6,5(N) 135,1	135,1
266,5	245,0	300,8		306,9	436,0	274,0	261,9		292,3	300,9	168,9	180,2
41,0	58,1	46,6		38,4	25,6	43,0	39,8		25,2	43,3	33,3	26,9
0,75	0,62	1,00		0,63	0,72	0,89	0,92		0,72	0,83	0,65	0,63