

FIFTY-FOURTH ANNUAL REVIEW OF THE MILLING SEASON IN SOUTHERN AFRICA (1978-1979)

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Abstract

This report covers the 1978/1979 sugar season in South Africa, Swaziland, Malawi and in two Mozambique mills. Detailed results of mill operation as well as cane varieties and transport data are tabulated. Industrial trends and the performance of some mills are reviewed.

Introduction

The use of new analytical techniques, such as gas chromatography, has cast doubts on the accuracy of some of the basic analyses used for chemical control of sugar factories. These new developments cannot be ignored but, until more accurate analyses are proved practical for industrial control, comparisons based on traditional parameters used in this report should not be rejected. They have served a very useful purpose in stimulating progress through competition although they were primarily developed for internal control of operations in a given factory. Except in a few cases, they give a true reflection of the comparative efficiencies of the various factories.

Some new data have been included in the main tables and are commented on in the review. An attempt has been made to tie up factory performance with available equipment by addition of a table listing installed capacity and power of main items of factory equipment.

The main tables include data for MV which shut down in August 1978. In view of the short season of this mill, its figures have not been included in comparisons between mills. MV's figures do however set a standard of performance in boiling house work which should be used as a target by all mills.

The list of symbols used to designate each mill remains unchanged except for NB which has replaced JB as the symbol for Noodsberg. A key to the symbols can be found in Table A.

All data listed have been calculated from figures as supplied by the mills. Sugar weights were obtained from the South African Sugar Association and cane varieties and cane transport data from the Sugar Industry Central Board. The chapters on Weather, Cane Varieties and Cane Transport have been written by contributors from the Experiment Station.

Highlights of the 1978/79 season

South Africa

Because of quotas, the 1978/79 Season was relatively short and most mills had stopped crushing by mid January. In spite of this sugar production (2 082 513) tons was only about 1 000 tons short of the 1977/78 record.

The better quality of cane is reflected by the smaller cane crop (18 931 778) required to produce this high sugar tonnage. Cane to sugar ratio was 9,09 and juice purity relatively high (85,36). Most mills have reported receiving cleaner cane than during last season but, in general, extraneous matter in cane remained at a high level. Sand and soil in cane once

again created severe operational and maintenance problems in mills.

With the closing down of MV in August, 1978, the number of mills in South Africa has been reduced to seventeen and the industry has lost one of its most efficient units. Cane from MV has been processed at GH and TS during the second half of the season.

The season has been outstanding as far as factory performance is concerned. Extraction (96,63) and overall recovery (86,55) were by far the highest ever recorded and the downward trend of recent years in boiling house recovery has been stopped. There is no doubt that these good results are due

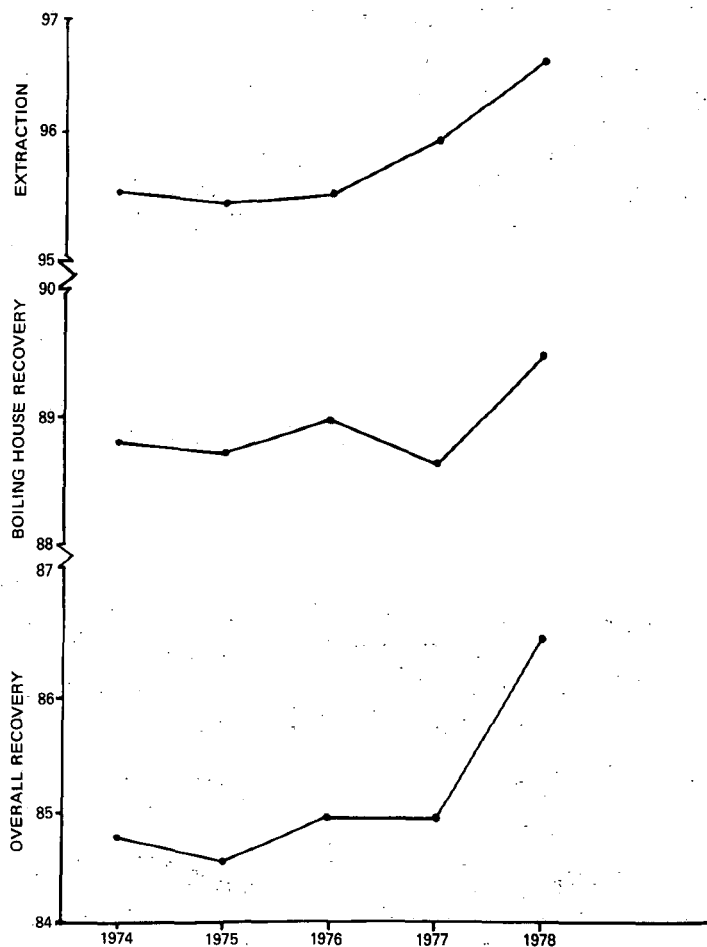


FIGURE 1 Extraction and Recoveries 1974 to 1978.

to improved technology and better mill work but credit must also be given to that imponderable: good "millability" of cane.

In spite of restrictions in cane harvesting, average mill throughput increased to 232 tch. The higher tonnage and a marked improvement in time efficiency (78,67) enabled the season to be completed in an average of 240 crushing days. The shorter season was one of the contributing factors to better mill performance.

Swaziland.

The two Swaziland mills (MH and UR) produced 247 803 tons of sugar from 2 242 378 tons of cane. Sugar production was 23 000 tons higher than for the 1977/78 season.

Cane quality was not as good as during the previous season. Pol % cane was 13,05 at MH and 12,79 at UR and erc % cane 11,23 and 11,14 respectively. Mixed juice purity at both mills was only slightly higher than 1977/78.

Extraction was comparatively low (MH: 93,25, UR: 90,37) but boiling house recovery (MH: 89,92, UR: 90,37) was higher than the average for South African mills (89,58).

Time efficiency at both mills (MH: 83,54, UR: 80,65) was lower than during the previous season but still good by South African standards.

Malawi

Sugar production in Malawi showed a small increase and was 93 476 tons for the season.

Cane quality was not as good as during the previous season. NH reported a pol % cane of 12,70 and erc % cane of 10,86.

There has been a drop in factory performance. Average extraction was 94,28 and boiling house recovery 87,51 while time efficiency fell to 76,46.

Mozambique

Only IC and BZ reported results for the season. Sugar production at both mills was about the same as for the previous season. Pol % cane was 12,91 at BZ and 11,66 at IC and BZ reported a very high fibre in cane (17,12) while erc % cane was 11,16 and 9,95 respectively. Extraction was low at both mills (BZ: 93,34, IC: 93,29). BZ reported a low boiling house recovery and high undetermined loss but IC's boiling house work was very good.

Time efficiency (BZ: 70,07, IC: 61,98) was very low.

The Weather*

Weather conditions varied considerably throughout the year and consequently crop growth also fluctuated. Least variation was experienced in the Natal Midlands and on the South Coast where rainfall was generally above average. Cumulative rainfall for the season was about 10% higher than the long term mean.

Growth conditions were good to excellent at the start of the season due to adequate and sometimes heavy rains. Heavy storms struck parts of the South Coast during April, 1978, causing extensive damage to the crop and field structures. A subsequent aerial reconnaissance of the area revealed, however, that damage was not as severe as had been feared initially. Favourable growth conditions resulted in severe lodging in the midlands where an estimated 50% of the crop was affected by April. Weeds also presented a problem in the wet areas. Abnormal flowering occurred during April and continued through August on the coast.

Rainfall diminished during May when only 46% of the long term mean was recorded but distribution was good and growth still satisfactory. Frost occurred in the midlands in April and again in June in all high lying areas, but crop growth was good. With only 61% of the long term mean recorded, June was also the driest of the winter months which generally received above average rainfall, August being the wettest with 133% of long term average received.

* By J. P. Fourie, S.A.S.A. Experiment Station.

Yields generally exceeded estimates early in the harvesting season and sucrose levels were also higher than normal for the period. These were maintained through July but dropped to match average figures in August. Overcast days and lower than normal temperatures during September and October caused growing conditions to deteriorate but yields were still satisfactory for September. October rainfall was generally much higher than the long term average for the industry, namely 66% above. With excessive rain continuing along the South and North coasts during November weeds became a problem. Ratoon growth in the midlands was retarded during both months due to low temperatures.

Temperatures increased along the North Coast and Zululand during December and growth conditions improved. Desiccating strong winds caused moisture stress in some areas to the north, however. This month also heralded the beginning of the driest three-monthly period, December through February, for the North Coast since 1941. Zululand was also extremely dry. At first growth conditions improved but soon started to deteriorate due to the prolonged drought. The general mean rainfall for December, January and February, 97,6 mm, 91,1 mm and 71,4 mm constituted 84,7%, 76,3% and 58,7% of the respective long term averages.

Cane Varieties*

There was very little change in the varietal position compared with the previous season, but it appears that NCo 376 continues to gain popularity at the expense of such varieties as NCo 310 and N55/805. NCo 376 accounted for just over 65% of the cane crushed in South African mills during 1978/79. Since the growing of sugarcane varieties was first controlled in 1927, only two other varieties have accounted for more than 65% of the cane crushed. These were Uba and Co 281. Uba was of course the only variety permitted by law during the decade 1927 to 1937. Following the release of Co 281 this variety gained rapidly in popularity and in the 1945/46 season Co 281 accounted for 67,78% of all cane crushed. At the end of the next decade NCo 310 was the most popular variety but only accounted for 60% of the cane crushed at its most popular time. By 1966/67, NCo 376 had become the most widely grown variety in South Africa, a distinction it has held for a decade.

There has been a slight decrease in the amount of N55/805 crushed during the past season and this reflects the declining popularity of the variety. Part of the reason for this decline is probably susceptibility to rust and smut, but primarily it is that growers have found the variety to be lacking in yield in ratoon crops.

In variety trials, however, N55/805 has ratooned well under most conditions, and it is not clear why ratooning is poor in commercial fields.

Cane Transport*

A summary of cane transport for South African mills is listed in Table H.

Chopped cane deliveries increased to 2% of the total crop at TS while it decreased by 2% at UF, probably due to the very wet start of their season. The amount of chopped cane is still only 1% of the total produced by the industry.

The proportion of cane transported by Hilo increased by a further 1,1%. Large changes occurred at individual mills, with decreases in Hilo transport of 11,2% at ME, and increases of 5,5% at GD and 15,4% at UK.

* By R. F. Bond, S.A.S.A. Experiment Station.

* By A. G. De Beer, S.A.S.A. Experiment Station.

The bulk of the cane (66,2%) delivered at UK is still by lorry and trailer, but this proportion decreased by 14,9% compared with last year. Tractor deliveries decreased slightly with GD showing the biggest drop (5,0%). It is interesting to note that EN is still receiving 87% of their cane by tractor transport.

Cane quality

The general feeling throughout the industry is that cane was of good quality during the 1978/79 season.

Inspection of Table 1 shows that although cane was easier to mill and to process because of lower fibre and higher juice purity recoverable sugar content of the cane expressed in terms of ERC % cane (10,93)** was only marginally higher than for the previous season (10,89).

TABLE 1
Comparative cane quality data 1965-1978

	1978/79	1977/78	1976/77	1975/76	Average 1965 to 1974
Pol % cane	12,64	12,83	12,43	12,60	13,16*
Fibre % cane	15,22	15,79	15,52	15,67	15,22
Mixed Juice Purity	85,36	84,39	84,47	84,70	84,80†
ERC % Pol in Cane	86,43	84,82	84,80	84,48	—
ERC % Cane	10,93	10,89	10,55	10,69	—

* Sucrose % Cane 1965-1971.

† Spindle Bx pty 1965-1971.

Pol % cane averaged 12,64, the second lowest on record. Fibre (15,22) was significantly lower than for recent years while mixed juice purity (85,36) was one of the highest of the past decade. One of the noticeable features of cane quality during the season was that although juice purity was very low in May, it kept increasing from June to the normal October peak and never fell to the low levels normally found in January. This is shown graphically in Figure 2. Extraneous matter in cane was still the major problem mills had to face in processing cane to sugar. The efforts made during the past years to measure the level of extraneous matter are now bearing fruit and 1978/79 is the first season for which we have reliable industrial data on all the components of extraneous matter. They are listed in Table 2.

TABLE 2
Extraneous matter in cane (season average)

Tops % cane	2,1
Trash % cane	5,3
Total ash % cane	1,6
Ash from soil in cane	1,0

The average for tops and trash has been worked out from data supplied by the five Hulett's mills. Ash % cane is the average of weekly data submitted by fourteen mills.

Ash from soil in cane has been obtained by deducting from total ash in cane the ash content of clean cane (0,6%).

The Hulett's data on tops and trash which have been available for the past four seasons indicate a slight improvement in cane quality. In the case of AK this improvement was more marked and tops and trash dropped from 7,39 in 1975/76 to 4,53 in 1978/79.

Sugar production and quality

The tonnage of sugar produced (2 082 513) was only about 1 000 tons lower than the 1977/78 record. This tonnage

** ERC Factors : a = 0,990432, b = 0,470584, c = 0,028031.

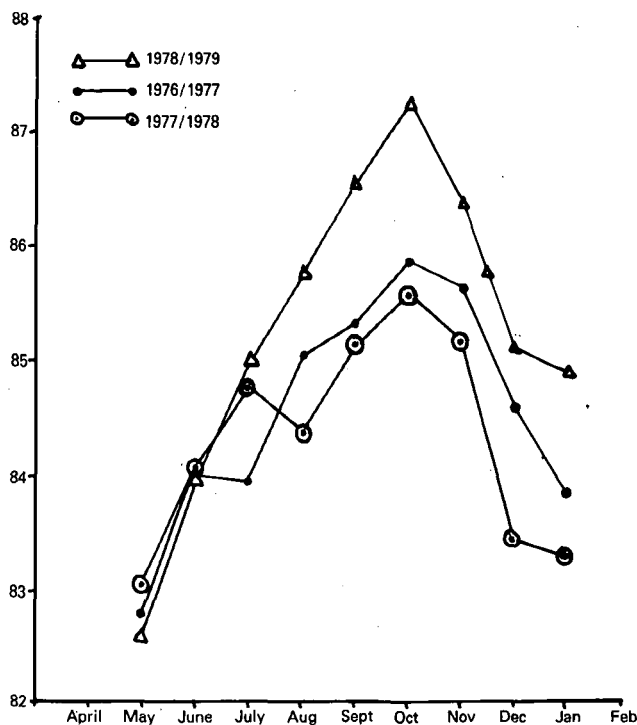


FIGURE 2 Monthly Variations in Mixed Juice Purity.

includes the sugar equivalent of 61,558 tons of High Test Molasses produced at ME and DL. It also includes 12 281 tons of sugar produced by eight mills from cane damaged by the *Eldana* borer. This tonnage of sugar has not been included in the SA Sugar Association final production figures listed in Table A.

Sugar quality was comparable with that of previous seasons. Sugar Terminal statistics show that 60% of the sugar which passed through the terminal was out of specification mainly because of a high percentage of fines. However, the difference between average analysis and specifications was low as indicated by the average penalty per ton of sugar which was only 4 cents.

Time efficiency and crushing capacity

The 1978/79 season has seen the first major improvement in time efficiency since 1973. For the first time in ten years, industrial average time efficiency (78,67) was over 77 and no mill reported less than 70%. Moreover, no fewer than 10 mills finished the season with over 80%.

The most spectacular improvement in time efficiency was reported by GH which jumped from 79,03 in 1977/78 to 87,19 for last season. This good performance has been due to no cane stops (0,70) which were one fifth of the industrial average (3,41) and other stops (2,95) which were one third of industrial average (9,00). The improvement in other stops (mechanical and operational), which is credited to better preventive maintenance, is also reflected by a low value for lost time % available crushing time (GH: 14,21, Ind. Ave.: 24,33). This parameter has been introduced this season and is defined as follows :

$$\text{Lost time \% available crushing time} = \frac{\text{Sum of all stops} \times 100}{100 - \text{Scheduled stops} - \text{no cane stops}}$$

In order to prevent confusion, stops are now expressed as a percentage of gross available time which is defined as 168 hours per week and which includes Sundays and public holidays. Available crushing time on the other hand is defined as gross available time (168 hours per week) minus scheduled and no cane stops.

The shorter season enabled several mills to finish grinding before Christmas and all mills except UF before the beginning of February. It had a favourable effect on both scheduled stops, which in many cases did not have to include Christmas and New Year stops, and on stops for lack of cane.

The performance of mills like GH and EM (84,21) indicates that a time efficiency of 80% would be a reasonable target for all South African mills. It would increase the effective crushing capacity of the industry by 2% or 53 tch. Although increased capacity is not required under present conditions of restricted production, the decrease in length of season which could be achieved would be an effective way of reducing production costs.

Time efficiency curves for GH, EM and the industrial average have been plotted in Figure 3.

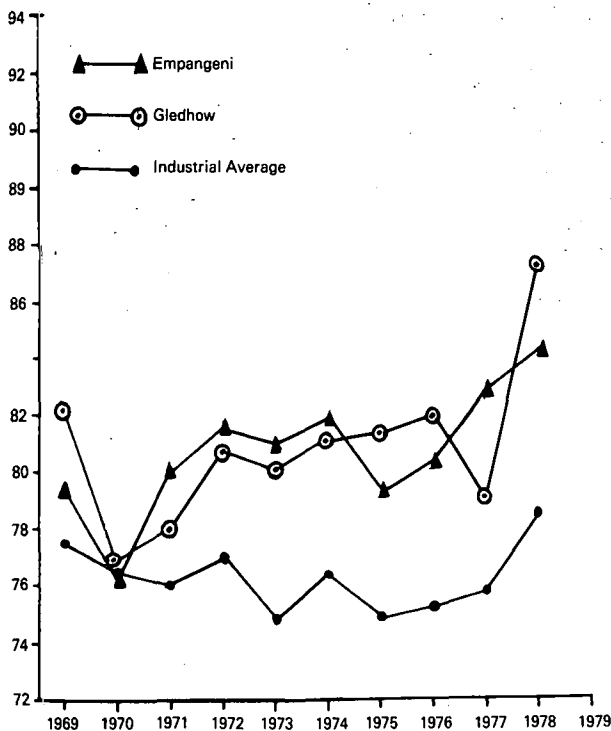


FIGURE 3 Time Efficiency.

In spite of the closing down of MV, industrial crushing capacity increased by 29 tch to 3 978 tch. Most mills were not pushed during the season and this figure is therefore conservative.

Tons of cane per hour increased by 11 tch to an average rate of 232 tch and the highest crushing rate in the industry was reported by AK with 385,95 tch only marginally higher than TS with 384,03.

Extraction

There has been a steady improvement in extraction over the years, but Figure 4 shows that from 1974 to 1977 extraction had reached a plateau. For the 1977/78 season extraction was just below 96 and it looked improbable that anything better than marginal improvement could be achieved for the next few seasons.

This was proved to be wrong and average industrial extraction for 1978/79 was 96,63, an increase of 0,76 points over the previous season.

Table 3 shows that no fewer than nine extraction units finished the season with over 97. Of these, three were cane diffusers, four straight milling tandems and two bagasse diffusers.

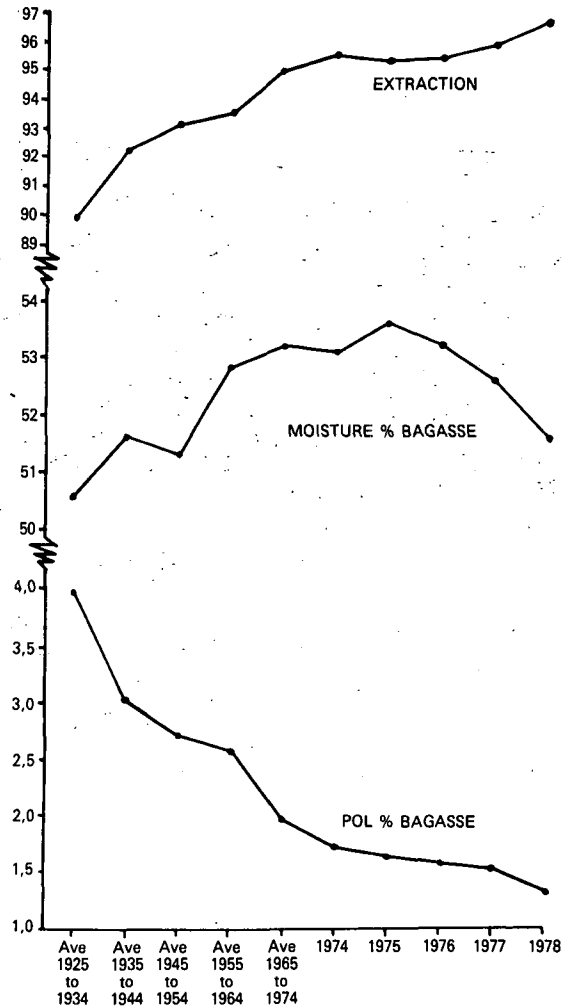


FIGURE 4 Extraction, Pol % Bagasse, Moisture % Bagasse.

The highest extraction (97,58) was recorded by the GH diffuser very closely followed by the straight milling tandem at the same mill (97,56). The small difference between extraction and corrected reduced extraction indicates that these results are due more to good work than favourable cane quality. This is confirmed by the pol in bagasse and moisture in bagasse curves of Figure 4. In both cases there was a marked improvement for the season although for moisture, the industrial average was not higher than it was in the 1930's and the performance of the 1920's still has to be bettered. Inspection of Table 3 shows that all the high extraction mills had a good preparation index (90 to 93) except for SZ (B) which was on the low side at 87. Imbibition % fibre ranged from a massive 402% at PG to 252% at ME which was well below the industrial average of 314.

With the rapid increases in the price of coal, the generally high imbibition rates must be a cause for concern in factories which have to burn additional fuels. The next challenge facing our engineers will probably be to keep the present level of extraction with lower imbibition. ME and EM are setting the pace for this development.

The only major new extraction equipment commissioned during the season was a set of turbines and gears for the mills at UF.

DL installed rotary juice screens which proved unsatisfactory and have now been discarded. UK also tried to improve juice screening by installing zig zag DSM screens. They did not prove superior to ordinary screens.

Another recent trend which has not proved successful in many mills is the use of flangeless top rollers. They have

been abandoned in some cases because of difficulties in preventing juice from getting in the bearings.

SZ experimented with a solid steel cast shaft and roller which proved to be more difficult than cast iron to keep rough. It is still too early to tell whether this one-piece roller will prove to be superior to the traditional steel shaft and cast iron shell roller.

TABLE 3
Milling Performance Data (in decreasing order of corrected reduced extractions)

Factory	Corr. Red. Extr.	Extr.	Pol % Bag.	Moist. Bag.	Imb. % Fibre	P.I.	Power Extr. plant kWh/ tfh
GH (A) (Cane diff.)	97,59	97,58	0,93	52,02	364	90	255,3
GH (B)	97,45	97,56	1,03	49,04	350	90	206,3
TS (B)	97,30	97,35	1,00	52,35	304	91	181,8
SZ (B) (Bag. diff.)	97,34	97,51	1,02	51,05	372	87	168,1
PG (Bag. diff.)	97,23	97,55	1,11	49,02	402	92	153,7
ML (Cane diff.)	97,22	97,33	1,08	51,89	335	91	124,9
DL	97,19	97,22	1,09	52,03	307	93	215,1
TS (A) (Cane diff.)	97,19	97,15	1,00	55,53	310	91	126,6
ME	97,17	97,40	1,11	49,48	252	90	164,3
Ind. Ave.	96,43	96,63	1,35	51,59	314	90	181,3

Clarification and filtration

Analyses of clarified juice and filter cake are listed in Tables C₁ and C₂ while weight of various clarifying agents used will be found in Tables D₁ and D₂.

Clarification as such gave no problems during the season except for localised difficulties of short duration. These included juice foaming which occurred for a few weeks at a couple of mills and excessive bagacillo carry over as a result of a tendency to use screens with larger openings on mixed juice.

PG tried saccharate liming for a large part of the season and ran comparative tests between this process and conventional liming. These failed to show any significant differences between the two processes.

TS used locally burnt MgO mixed with CaO for liming juice during a three weeks trial to assess the effect of MgO on evaporator scaling. The tests were inconclusive.

Concern has been expressed in a number of mills on the apparent purity drop between mixed juice and clear juice. Nine mills reported a drop and the industrial average was 0,11. In some cases investigations by the SMRI have failed to confirm that there was a purity drop and the fact that mixed juice is sampled continuously while clear juice is not may be responsible for this anomaly.

The same explanation may be extended to syrup purity and to the average increase in purity of 0,28 points between clear juice and syrup.

Flocculant addition has decreased from 3,04 to 2,59 ppm on mixed juice. Even the Midlands mills (UC and NB) which were the highest users have been able to reduce flocculant addition from over 10 to 7,66 and 5,16 respectively. At NB this improvement is attributed to automatic dosage of flocculant by means of a DC motor driven pump controlled by a magnetic flow meter which measures juice flow.

Average losses in filter cake were 0,47% for a pol in cake of 1,36 and a weight of filter cake on cane of 4,36. The accuracy of these figures must however be questioned. In many mills, smuts from the wet separators of boilers are added to filter cake before weighing and this weight is then

multiplied by pol in cake, sampled before addition of smuts, to obtain losses in filter cake. Since weight of smuts is estimated at between 2 and 4% on cane the extent of the error is not negligible.

A new parameter to control filter work has been introduced for the first time this season. It is "Filter Wash Index" which is defined as brix of mixed juice divided by brix of clarified juice multiplied by 100. Average value for this index was 103 and it ranged from a high of 108 at ME to a low of 98 at UC. The fact that washing is not the only factor responsible for good filter work is proved by NB which reported the lowest pol in cake (0,73) with a filter wash index of 103.

Processing

In general juices have been relatively easy to process during the season. High viscosities have become normal with our boiling process and most mills are equipped to deal with them.

Exceptionally high viscosities and elongated grain did however create problems in some mills specially during September and October.

Two mills (ME and DL) had to modify their process to produce high test molasses (HTM) during part of the season. The HTM was produced from syrup as a parallel stream with normal sugar production and has been converted to equivalent sugar and molasses in the tables of this review. It did however reduce the load on the boiling house of ME and DL and had a favourable influence on their boiling house recovery.

The procedure used for conversion of HTM into equivalent sugar is based on Total Sugars As Invert (TSAI) in HTM. TSAI is calculated for corresponding sugar and molasses production and the ratio of sugar produced to total TSAI is established. This ratio is then applied to the tonnage of TSAI in HTM actually produced.

Various aspects of boiling house work are commented on below :

(a) *Boiling house recovery.* (89,58) was the highest since 1964 and it is encouraging to see that the downward trend in BHR which has been a feature of past seasons has been reversed (Figure 1). BHR and pol losses values for the five mills with the highest boiling house recoveries are listed in Table 4. In spite of having one of the lowest mixed juice purities in the industry (83,66), the best boiling house work was done by NB. This was also the case for ME while the other leading factories (DL, IL and UK) benefited from the above average juice purities.

TABLE 4
Boiling House Data
(in decreasing order of boiling house recovery)

Factory	Mixed Juice Purity	Boiling House Recovery	Pol Losses Final Mol.	Pol Losses Filter Cake	Pol Losses Undt.
NB	83,66	91,23	6,96	0,31	1,25
DL*	86,77	91,05	7,30	0,50	0,92
IL	86,16	90,61	7,32	0,43	1,30
ME*	83,79	90,44	7,10	0,47	1,75
UK	85,95	90,28	7,46	0,50	1,41
Ind. Ave.	85,36	89,59	8,16	0,47	1,44

* Partially on high test molasses production.

(b) *Molasses losses* are the main constituents of boiling house losses. They are listed for the five mills with the lowest pol losses in molasses in Table 5 together with some of the factors which may have affected them. NB and ME with the lowest juice purities succeeded in producing the lowest purity molasses (35,23 and 35,93 respectively). This enabled those two mills to keep down their molasses losses (6,96 and 7,10) in spite of having a relatively high weight of molasses at 85 brix on cane.

We have a yardstick for estimating the efficiency of molasses exhaustion. It is the purity difference between achieved and target purity. Arithmetical average values for each mill are listed in Table C and for the five mills with the lowest molasses losses in Table 5. Only NB was better than target by 0,3 points while GD, SZ and UK came close with less than 1 point over target. Industrial average difference between mill and target purity was 2,1 points. Research carried out so far has not yet yielded a formula to estimate a target weight of molasses. We have to rely on ratios, the shortcomings of which are revealed by inspection of Table 5 in which molasses factor and non-pol ratio are listed.

A new ratio introduced for the first time in these tables is reducing sugars in final molasses % reducing sugars in mixed juice listed in tables B₁ and B₂. This ratio ranges from 77,68 at PG to 129,96 at AK with an industrial average of 95,39. The range of values casts doubts on the accuracy of reducing sugars analyses in many mills.

TABLE 5
Molasses Data (in decreasing order of pol losses in mol.)

Factory	Pol Losses Final Mol.	Mol. 85 Bx % Cane	Pty. Final Mol.	Mo-lasses** Factor	Non Pol Ratio	Pty. Diff. Mill—Target
NB . . .	6,96	3,51	35,23	45,3	0,94	-0,3
ME* . . .	7,10	3,37	35,93	44,5	0,90	1,7
DL* . . .	7,30	3,27	38,56	55,3	0,97	1,6
IL . . .	7,32	3,29	37,76	53,6	0,97	0,9
UK . . .	7,46	3,17	38,08	51,5	0,91	0,9
Ind. Ave. .	8,16	3,53	37,99	54,5	0,96	2,1

* Partially on high test molasses production.

** Molasses factor = Sucrose in mol. % non pol in mixed juice.

(c) *Masseccuite* data are listed in D₁ and D₂. There has been a decrease from 1,72 to 1,65 in the total volume of masseccuites boiled per ton of brix in mixed juice. A masseccuite accounted for 1,05 m³, B masseccuites for 0,40 and C masseccuites for 0,22. ML and EN achieved very significant reduction in volume of A masseccuite but no mill approached the very high standard set by MV (0,85). The low values reported by ME and DL are due to the fact that these factories produced high test molasses.

Difficulties have been experienced by almost all mills in meeting the standard for grain size distribution on export sugar and no less than 335 845 tons of sugar were penalised for fines. There is therefore a strong incentive to modify boiling schemes to improve grain size.

It is suggested that this could be achieved by increasing grain size of B sugar used as footing for the A strike.

With the general use of continuous centrifugals to process B masseccuite, B sugar grain size has been allowed to drop to about 0,25 mm. Increasing the average grain size to 0,45 mm would make it easier to melt crushed crystals resulting from continuous centrifugation without remelting

grain and would improve the crystal size distribution in the A footing. It would also reduce the number of cuttings required to produce A sugar and the chances of having varying sizes of sugar crystal. An additional advantage of producing larger B grain would be to reduce the volume of B sugar which has to be remelted.

Larger B crystals used as footing would increase the ash and colour content of the A sugar and each factory will have to determine the maximum size B crystal which can be used according to local conditions. Sugar penalised for ash during the season totalled only 27 742 tons indicating that this should not be the limiting factor. However 100 482 tons were penalised for colour which may prove much more important than ash.

Data accumulated during the season indicates that it may not be necessary to boil C masseccuite at a very high brix to obtain good exhaustion. NB and GD boiled at 95,78 and 95,84 brix respectively and had the two lowest purity differences between true and target molasses purity. The same two factories together with IL and SZ boiled C masseccuites at lower purity than industrial average (52,08). This practice may also have influenced the good results which they obtained.

C masseccuite volume could not be measured at TS because this factory has a fully continuous process from pan to centrifugals. The FCB continuous pan has once again operated satisfactorily during the season. The pan was started on the 16th May 1978 and stopped on the 20th January 1979. During those eight months it was emptied only once, for the Christmas stop, and was never washed.

(d) *Centrifugation* of C masseccuite has been unsatisfactory in some mills. Increases in purity of up to 4 points across the centrifugals have been reported. In some cases this increase was due to excessive dilution of masseccuite in the centrifugals specially by steam while, in other cases, the presence of very fine grain in the masseccuite shows that poor boiling or crystallizer work should be blamed rather than centrifugation.

Variations in final molasses brix listed in tables C₁ and C₂ are a clear indication of ineffective use of centrifugal wash water and steam in many factories.

(e) *New Developments*

Automatic pan boiling by conductivity meters controlled by a microprocessor was introduced at AK. The cost of the equipment is reported to be relatively low and it has worked successfully during the season. At ME pan automation has been extended to all units and the entire pan station operated automatically during the season. Cooling of final molasses to reduce deterioration before storage has been introduced in more mills during the past season. In a typical installation at EM, a liquid heat exchanger is used to cool molasses from 65 to 42°C using injection water at 38°C.

Overall factory performance

Two parameters are available to rate overall performance of factories. They are: overall recovery and factory performance index. Overall recovery is affected by pol and fibre content of cane, by mixed juice purity and by the reducing sugars to ash ratio in mixed juice. These factors can have as much if not more influence on overall recovery than the work done by the mill.

Factory performance index (FPI) has been developed to be independent of cane quality but is unfortunately, also affected by the reducing sugar ash ratio of juice and by

inaccuracies in juice analysis. It is the ratio of sugar recovered to recoverable sugar as determined by the erc formula. It is based on industrial data and by definition the industrial average FPI must be 100. In Table 6 the FPI and overall recovery of all mills are given. The mills have been listed in decreasing order of FPI.

For the third year in succession NB had the highest FPI in the industry (103,71), followed by ME (102,24) and TS (101,13). Two newcomers to the above average mills were UC (100,67) and ML(100,65). Both these factories have shown a marked improvement in performance during the past two seasons. Although they were below average AK, PG, UK, IL, FX and EM reported FPI values which are still very high. The last three mills (EN, GD, UF) however were noticeably lower than industrial average both in FPI and Overall Recovery.

TABLE 6
Factory Performance Index and Overall Recovery
(in decreasing order of FPI)

Factory	F.P.I.	Overall Recovery
NB	103,71	88,59
ME	102,24	88,09
TS	101,13	87,78
DL	100,85	88,50
UC	100,67	85,04
ML	100,65	85,94
SZ	100,42	86,71
GH	100,27	86,90
Ind. Ave.	100,00	86,55
AK	99,96	86,89
PG	99,84	85,97
UK	99,79	87,02
IL	99,75	87,28
FX	99,20	85,60
EM	98,81	85,29
EN	95,22	83,87
GD	94,98	82,23
UF	94,34	82,35

Boilers and fuels

The additional fuels burnt by mills are listed in tables D₁ and D₂. As usual these figures must be interpreted with caution because in the majority of factories bagasse is not used solely to raise steam for raw sugar production.

The industrial picture is very encouraging. The amount of additional fuel used converted into equivalent bagasse per 1000 tc. was 37,68 compared to 67,52 for the previous season. Very definite improvements in additional fuel used were reported by ML, EN, FX, GD, GH, TS, and SZ while three mills (DL, ME and UK) used practically no additional fuel.

The calorific value of bagasse can be found in Tables C₁ and C₂. In Table C₁ two different calorific values are listed. The first (A) has been calculated according to the well known Von Pritzelwitz van der Horst formula (LCV = 17795 — 42 pol % bagasse — 201 moisture % bagasse). It is comparable to values listed for preceding seasons. The second set of figures (B) has been calculated from the new SMRI formula (LCV = 18309 — 31,14 brix % bagasse — 207,63 moisture % bagasse — 196,05 ash % bagasse). The main difference between the two formula is the inclusion of ash % bagasse in formula (B). Values of ash % bagasse used are also listed in Table D.

Unfortunately some mills did not report values for ash while others carried out these determinations only during the second half of the season. As a result an industrial average could not be calculated.

Equipment and power

Equipment and power used for raw sugar production are listed in Tables K₁ and K₂.

These tables have been calculated on the basis of installed capacity and power and only equipment used during the season has been included. They do not therefore necessarily reflect the requirements of each mill. For example, there are many cases of large installed boiler capacity to suit future expansion in grinding capacity. The industrial averages should therefore be used with caution.

Tables of this type are of value if they are used to analyse the performance of mills that do particularly good work. They then provide a guide as to equipment required to reach this performance. On the other hand, these tables should not be used indiscriminately to condemn mills that do below average work in spite of apparent equipment surplus. In many cases these mills use old equipment which cannot be compared with modern machinery of the same nominal capacity. If the mills in these tables were listed in terms of depreciated value of equipment per ton of cane the picture would be very different.

Total installed power of the extraction plant comprises all drives from the feeder table to the bagasse conveyor, including cane knives, shredder, carriers, imbibition pumps and mixed juice pump to the juice scale. The only mill house equipment which has not been included are gantries. Average installed power was 181,3 kW/tfh. with a very high value of 255,5 kW/tfh. for the diffuser at GH. This is an unusual situation since cane diffusers require less power than milling tandems and all other diffusers in the industry operate below or at average power requirement. The lowest power for any extraction plant is 63,2 kW/tfh. for the bagasse diffuser at NH while ML, TS (A) and EM achieve very good extraction with diffusers at about 125 kW/tfh.

Cane preparation equipment averaged 82,3 kW/tfh. and again maximum value (190,4) was reported by GH (A). The extreme values of GH (A) are partially due to the fact that the diffuser train operated at only 85% of rated capacity.

Mill roller volume has been calculated on the basis of nominal volume of all rollers in the tandem. Feeder rollers have not been included except for one roller for each pressure feeder. Average mill roller volume of straight milling tandems was 1,15 m³/tfh. with the maximum (1,56) reported by GH (B) and the minimum by MH (0,61). DL (1,05) shows that excellent extraction can be obtained with a comparatively low mill roller volume.

On average there were 11,1 m² of cane diffuser screen area per ton of fibre per hour but ML had an extraction of 97,33 with only 10,6 m²/tfh. Bagasse diffuser screen area averaged 8,41 m²/tfh with PG reporting a very high 14,8 m² and NH (A) the minimum value of 4,6 m². SZ (B) achieved one of the highest extractions of the season (97,51) with only 5,8 m²/tfh.

Values listed for juice heater capacity include diffuser juice heaters and heaters used in rotation. Average capacity was 7,3 m³/tch. with high values of 12,7 and 12,9 reported by ML and EN because of the heaters supplied with the De Smet diffusers.

Separate averages have been worked out for conventional (2,5 m³/tch.) and trayless (0,7 m³/tch.) clarifiers. They indicate that retention time in conventional clarifiers is 3,5 times greater than in the trayless units.

There were 31,4 m²/tch. of evaporator capacity for the industry as a whole and individual mills ranged from 54,0 at GH to 25,7 at FX.

Because of the number of pans which are used to boil different grades of massecuite, pan capacity could not be calculated for each massecuite. Average total pan capacity of the industry was 1,5 m³/tch. Crystallizer capacity has been expressed as air cooled (A) and water cooled (W) for each type of massecuite. Most mills have different ratios of both types of crystallizers for each duty, and an industrial average would be meaningless.

A comparison of centrifugal capacity is not easy. In the case of batch centrifugals, capacity has been calculated using the formula given by Hugot¹ which has been simplified to exclude the constant "K" which is the same for a given grade of massecuite and the rotational speed (m²) since speed is not critical in centrifugation of A massecuite.

The formula can therefore be simplified to D^3H where D = basket diameter and H basket height.

For continuous centrifugals, there is so far no completely satisfactory formula and the formula $Q = 2 kW^2V$ given by Hugot¹ has been used. It has been simplified to $Q = W^2V$ because the centrifugals are compared for the same duty. In this formula Q = centrifugal capacity in tons of massecuite per hour, W = rotational speed in radians/sec. and V is the volume of the cone formed by the basket.

Data on centrifugals listed in the tables show that batch centrifugals are no longer used on B massecuite in South Africa while they are still used on B and C massecuite at BZ and IC in Mozambique. The differences in both B and C massecuite continuous centrifugal capacity between South

African mills are very large. UF with 106,9 for B and 172,9 for C shows very good use of available continuous centrifugal capacity.

When comparing steam and power generation capacity, one should bear in mind that a large number, if not the majority of mills, generate steam and power for refineries, by-product plants, irrigation pumps etc. In the case of electricity, the data logged has been limited to steam driven alternators.

Boiler capacities are generally very large even for factories which produce only raw sugar. The two Swaziland mills (MH and UR) with 0,52 tons steam/tch are better than the generally accepted rule of thumb of 55% steam on cane, while AK (0,59), ME (0,57), GD (0,54) and GH (0,55) are the South African mills with the lowest installed boiler capacity per ton of cane.

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TABLE A
SOUTH AFRICAN SUGAR ASSOCIATION FINAL SUGAR PRODUCTION 1978/79 SEASON
(Metric tons)

Mill	Local Market			Export Market		Total
	White	Refinery raws	Brown	Very high pol	Sugar equivalent of H.T. molasses produced	
Malelane (ML)	162 443	—	2 242	—	—	164 684
Pongola (PG)	54 953	—	31 388	—	—	86 341
Umfolosi (UF)	61 259	20 061	8 998	41 478	—	131 796
Entumeni (EN)	12 386	52	1 809	15 175	—	29 422
Empangeni (EM)	—	77 791	228	32 232	8 418	118 669
Felixton (FX)	—	28 866	100	70 941	—	99 907
Amatikulu (AK)	—	9 946	110	195 299	—	205 355
Darnall (DL)	—	120 229	—	25 990	16 586	162 805
Mount Edgecombe (ME)	—	8 160	66 208	17 144	23 910	115 422
Glendale (GD)	—	12 046	31	15 539	—	27 616
Melville (MV)	—	—	20	20 296	—	20 316
Gledhow (GH)	117 074	2 538	—	33 732	—	153 344
Noodsberg (NB)	—	—	18	121 332	—	121 350
Union Co-op (UC)	—	22 809	134	28 974	—	51 917
Tongaat (TS)	—	114 678	200	95 031	—	209 909
Illovo (IL)	—	88	4 315	77 817	—	82 220
Sezela (SZ)	63 705	729	—	115 565	—	179 999
Umzimkulu (UK)	—	2 300	27 067	79 792	—	109 159
TOTAL	471 820	420 293	142 868	986 337	48 914	2 070 232

* The figures listed in table A do not include 12 280 tons of sugar produced by eight mills from cane damaged by *Eldana* borer. They therefore differ from sugar tonnages listed in other tables.

**TABLE B,
CANE CRUSHED AND SUGAR MADE, CANE COMPOSITION,
SOUTH AFRICAN MILLS**

SYMBOLS OF FACTORIES	ML	PG	UF	EN	EM	FX			AK	DL	ME
						A	B	Average			
Tons sugar made *	164 925	87 411	131 984	29 422	119 016			100 011	213 666	164 695	115 422
Refined % total sugar	98,64	64,09	—	42,10	—			—	—	—	—
Tons high test molasses made	—	—	—	—	—			—	—	24 966	36 592
Average pol all sugars	99,91	99,44	99,56	99,70	99,28			99,38	99,40	99,45	99,42
Average moisture all sugars	0,04	0,17	0,14	0,12	0,08			0,13	0,12	0,14	0,11
Tons of cane crushed Total	1 486 344	798 271	1 255 131	260 102	1 121 648			929 210	1 903 218	1 416 871	1 055 245
Tons of cane crushed per tandem						605 443	323 767				
Season started on	1.5.78	2.5.78	5.6.78	13.5.78	27.4.78			3.5.78	20.4.78	20.4.78	19.4.78
Season completed on	18.1.79	12.12.78	27.2.79	3.1.79	13.1.79			12.1.79	22.12.78	22.12.78	30.12.78
Number of crushing days	263	228	268	236	262			255	247	223	256
Time account											
Time efficiency per cent	72,55	75,82	70,09	74,98	84,21	82,56	76,48	80,44	83,50	84,21	81,79
Scheduled stops % gross available time	7,41	12,63	3,35	10,22	9,15	9,55	9,73	9,61	8,65	8,61	9,78
Lack of cane stops % gross available time	5,93	5,19	6,47	2,72	1,53	0,84	5,27	2,38	1,41	3,12	4,40
Other stops % gross available time	14,11	6,36	20,09	12,08	5,11	7,05	8,51	7,56	6,45	4,06	4,02
Lost time % available crushing time	31,67	29,42	33,17	28,73	17,67	19,45	27,67	22,31	18,34	17,89	21,21
Throughputs per hour actual crushing											
Tons of cane crushed	324,92	192,21	278,42	61,20	213,15	120,32	70,23	190,55	385,95	284,97	210,39
Tons of fibre milled	48,07	26,33	36,04	7,84	35,53	18,36	11,24	29,60	54,11	43,61	29,26
Tons of brix processed	48,67	28,36	38,63	9,05	29,55	—	—	26,67	55,83	41,71	30,03
Tons of sugar produced	36,05	21,05	29,28	6,92	22,62	—	—	20,53	43,34	33,12	22,99
Tons pol in cane	41,91	24,35	35,39	8,23	26,26	14,93	8,98	23,91	49,59	37,22	25,84
Tons non pol in cane	8,71	4,98	6,43	1,40	5,18	2,89	1,82	4,71	9,73	6,44	5,55
Composition of cane crushed											
Pol % cane	12,90	12,67	12,71	13,45	12,32	12,41	12,70	12,51	12,85	13,06	12,28
Fibre % cane	15,44	14,40	14,21	13,46	17,67	16,54	16,90	16,66	14,46	16,00	14,53
Brix % cane	15,58	15,26	15,02	15,74	14,75	14,81	15,28	14,97	15,37	15,32	14,92
ERC % pol in cane	85,92	86,24	87,38	88,21	85,75	86,20	85,76	86,05	86,64	87,48	85,60
ERC % cane	11,08	10,92	11,11	11,86	10,56	10,69	10,90	10,76	11,13	11,43	10,51
Extraction											
Extraction	97,33	97,55	94,37	95,51	96,19	95,73	95,67	95,71	96,46	97,22	97,40
Corrected reduced extraction	97,22	97,23	93,25	94,32	96,66	95,83	95,93	95,86	96,08	97,19	97,17
Imbibition percent cane	49,57	55,08	34,13	37,15	39,99	44,25	46,17	44,92	49,98	46,92	35,07
Imbibition percent fibre	335	402	264	290	240	290	289	290	355	307	252
Preparation index	91	92	81	88	85	93	92	93	94	93	90
Pol factor	99,48	99,07	97,44	99,68	99,94	99,39	98,48	99,06	99,26	99,58	99,11
Brix factor	100,30	99,71	97,62	100,33	101,26	100,44	99,99	100,28	100,52	99,98	99,96
Recoveries											
Boiling house recovery	88,30	88,13	87,26	87,81	88,67			89,44	90,08	91,03	90,44
Overall recovery	85,94	85,97	82,35	83,87	85,29			85,60	86,89	88,50	88,09
Factory performance index	100,65	99,84	94,34	95,22	98,81			99,20	99,96	100,85	102,24
Tons cane per ton sugar	9,01	9,13	9,51	8,84	9,45			9,28	8,90	8,60	9,15
Tons cans per ton 96 sugar	8,66	8,82	9,17	8,51	9,14			8,97	8,60	8,30	8,88
Balances											
Lost in bagasse (a)	2,67	2,45	5,63	4,49	3,81			4,29	3,54	2,78	2,60
Lost in filter cake (b)	0,46	0,42	0,71	0,79	0,46			0,57	0,26	0,50	0,47
Lost in final molasses (c)	8,66	8,84	9,60	7,97	9,67			8,06	8,01	7,30	7,10
Undetermined losses (d)	2,27	2,32	1,71	2,88	0,77			1,48	1,30	0,92	1,75
Boiling house losses (b + c + d)	11,39	11,58	12,02	11,64	10,90			10,11	9,57	8,72	9,32
Sum of all losses (a + b + c + d)	14,06	14,03	17,65	16,13	14,71			14,40	13,11	11,50	11,92
Red. Sug. in F.M. % R.S. in M.J.	99,34	77,68	108,63	110,11	119,22			105,01	129,96	79,06	101,56
Non pol ratio	1,00	1,01	1,04	0,89	1,00			0,94	0,95	0,97	0,90

* Figures supplied by S.A. Sugar Association. Include sugar equivalent of high test molasses.

THROUGHPUTS AND TIME ACCOUNTS, PERFORMANCE AND LOSSES (Season 1978 - 1979)

GD	MV	GH			NB	UC	TS			IL	SZ			UK	Totals and Averages
		A	B	Average			A	B	Average		A	B	Average		
27 616	20 316			153 344	121 350	51 917			210 038	82 220			179 999	109 159	2 082 513
—	—			76,33	—	—			—	—			34,66	—	22,66
99,38	99,40			99,81	99,36	99,55			99,43	99,42			99,63	99,34	99,48
0,12	0,12			0,08	0,11	0,10			0,12	0,10			0,10	0,14	0,12
259 367	185 825			1 388 443	1 112 378	515 226			1 875 351	735 314			1 642 334	991 498	18 931 778
		494 744	893 699				993 303	882 048			1 139 650	502 684			
5.5.78	1.5.78		24.4.78		13.4.78	10.4.78		17.5.78		20.4.78		1.5.78		1.5.78	10.4.78
28.1.79	17.8.78		2.12.78		17.12.78	17.12.78		22.1.79		20.12.78		16.12.78		2.1.79	27.2.79
269	109		223		249	252		251		245		230		247	240
70,19	83,98	85,81	87,96	87,19	80,82	75,12	84,03	79,22	81,77	80,88	80,23	76,45	79,07	75,55	78,67
11,11	8,54	9,59	8,91	9,15	7,03	11,01	3,53	4,62	4,04	8,52	8,62	9,32	8,83	14,46	8,92
2,76	0,70	0,82	0,64	0,70	3,78	4,99	0,94	2,45	1,15	3,54	3,31	4,22	3,59	4,13	3,41
15,95	6,77	3,78	2,49	2,95	8,37	8,08	11,50	13,71	12,54	7,06	7,84	10,01	8,50	5,86	9,00
34,61	17,65	15,83	13,31	14,21	21,51	29,62	16,71	22,36	19,37	21,74	22,45	27,23	23,91	30,03	24,33
57,23	85,33	108,25	189,35	297,60	230,73	113,66	198,58	185,45	384,03	155,36	257,02	119,03	376,05	222,52	232,05
7,52	12,51	16,65	27,56	44,21	33,14	16,03	30,67	28,20	58,87	20,50	35,41	17,09	52,50	30,49	33,56
8,20	11,98	—	—	42,73	32,76	15,35	—	—	55,17	22,12	—	—	53,55	31,34	33,21
6,11	9,33	—	—	32,87	25,16	11,45	—	—	43,01	17,37	—	—	41,21	24,47	25,53
7,38	10,58	13,90	23,86	37,76	28,22	13,41	25,36	23,35	48,71	19,79	32,33	15,02	47,35	27,99	29,34
1,52	2,32	2,49	4,36	6,85	6,23	3,18	4,81	4,54	9,35	3,68	6,48	3,01	9,49	5,36	5,77
12,89	12,40	12,84	12,60	12,69	12,23	11,80	12,77	12,59	12,69	12,74	12,58	12,62	12,59	12,58	12,64
13,57	15,14	15,89	15,42	15,59	15,63	15,17	15,89	15,83	15,86	14,03	14,49	14,75	14,57	14,53	15,22
15,55	15,12	15,14	14,90	14,99	14,93	14,60	15,19	15,04	15,12	15,11	15,10	15,15	15,11	14,99	15,13
86,38	85,33	87,11	87,03	87,06	85,07	84,27	86,63	86,39	86,52	87,19	86,41	86,30	86,38	86,77	86,43
11,14	10,58	11,18	10,97	11,04	10,41	9,94	11,06	10,88	10,98	11,11	10,87	10,89	10,88	10,91	10,93
94,71	95,62	97,58	97,56	97,57	97,10	95,55	97,15	97,35	97,24	96,32	96,23	97,51	96,62	96,39	96,63
93,65	95,48	97,59	97,45	97,50	96,99	95,37	97,19	97,36	97,27	95,66	95,79	97,34	96,26	95,95	96,43
36,57	40,51	55,92	50,98	52,74	46,89	39,65	47,87	46,20	47,09	39,83	45,87	53,44	48,19	44,19	45,36
278	276	364	350	355	326	281	310	304	307	382	333	372	345	322	314
89	83	90	90	90	87	91	91	91	91	90	90	87	89	91	90
99,66	99,54	100,21	99,25	99,60	99,93	98,37	100,40	99,80	100,12	99,64	99,47	100,83	99,88	99,65	99,41
100,69	100,84	100,72	100,03	100,28	101,16	100,99	101,37	100,89	101,14	100,51	100,82	101,47	101,02	100,69	100,38
86,83	92,11			89,07	91,23	89,01			90,27	90,61			89,74	90,28	89,58
82,23	88,07			86,90	88,59	85,04			87,78	87,28			86,71	87,02	86,55
94,98	103,25			100,27	103,71	100,67			101,13	99,75			100,42	99,79	100,00
9,37	9,10			9,05	9,17	9,92			8,93	8,94			9,12	9,07	9,09
9,06	8,79			8,70	8,86	9,57			8,62	8,64			8,79	8,77	8,77
5,29	4,38			2,43	2,90	4,45			2,76	3,68			3,38	3,61	3,37
0,89	0,45			0,37	0,31	0,37			0,70	0,43			0,33	0,50	0,47
8,67	7,29			8,76	6,96	9,31			8,15	7,32			7,74	7,46	8,16
2,92	— 0,19			1,54	1,25	0,83			0,62	1,30			1,85	1,41	1,44
12,48	7,55			10,67	8,52	10,51			9,47	9,05			9,92	9,37	10,07
17,77	11,93			13,10	11,42	14,96			12,23	12,73			13,30	12,98	13,44
83,16	90,95			95,36	80,65	103,32			88,23	80,59			86,99	72,55	95,39
0,95	0,94			0,99	0,94	0,91			0,99	0,97			0,92	0,91	0,96

**TABLE C,
ANALYSIS OF BAGASSE, JUICES, FILTER
SOUTH AFRICAN MILLS**

SYMBOLS OF FACTORIES	ML	PG	UF	EN	EM	FX			AK	DL	ME	GD
						A	B	Average				
Final bagasse												
Pol % bagasse	1,08	1,11	2,30	2,07	1,33	1,59	1,57	1,58	1,48	1,09	1,11	2,33
Moisture % bagasse	51,89	49,02	54,64	52,84	50,15	51,13	51,13	51,19	51,11	52,03	49,48	50,85
Fibre % bagasse	46,25	49,18	41,68	43,91	47,35	45,85	45,70	45,80	45,94	45,92	48,27	44,98
Bagasse % cane	31,99	27,86	31,06	29,18	35,21	33,28	35,01	33,88	30,69	33,33	28,81	29,23
Ash % bagasse	4,14	4,17	1,21	—	3,44	—	—	3,36	2,82	1,06	2,43	—
LCV in kJ per kg (A)	7 321	7 894	6 715	7 087	7 659	7 451	7 415	7 438	7 459	7 291	7 802	7 477
bagasse* (B)	6 678	7 257	6 612	—	7 144	—	—	6 928	7 053	7 234	7 490	—
Residual juice, apparent purity .	57,62	62,13	62,56	61,94	53,18	52,71	52,62	52,68	50,32	53,21	49,40	55,98
Mixed juice												
Mixed juice % cane	117,58	127,22	103,06	107,97	104,78	110,97	111,17	111,04	119,29	113,59	106,26	107,34
Brix	12,74	11,60	13,46	13,70	13,23	12,44	12,81	12,57	12,13	12,88	13,43	13,35
Apparent purity	83,82	83,73	86,47	86,83	85,47	86,06	85,37	85,82	85,66	86,77	83,79	85,20
Purity difference (MJ-DAC)	0,36	0,16	1,66	0,84	0,83	—	—	1,24	1,02	1,15	0,79	1,45
Reducing sugars/pol ratio	7,36	6,47	4,30	3,53	4,15	—	—	4,61	3,97	4,85	6,11	6,28
Suspended solids % mixed juice	0,55	0,55	1,23	0,61	0,96	1,15	0,81	1,03	0,31	0,61	0,58	0,40
Clarified juice												
Brix	12,76	11,40	13,77	13,53	12,65	—	—	12,08	11,89	11,66	12,46	12,82
Apparent purity	83,26	83,25	86,71	86,66	85,16	—	—	85,43	85,72	87,14	83,64	85,44
Purity difference (C.J. — M.J.)	-0,56	-0,48	0,34	-0,17	-0,31	—	—	-0,39	0,06	0,37	-0,05	0,24
Reducing sugars/pol ratio	7,48	6,34	4,55	3,55	4,29	—	—	4,35	4,01	4,69	6,35	6,87
Average pH	7,12	7,30	7,21	7,07	6,90	—	—	7,10	7,11	7,10	7,10	7,17
Filter cake												
Pol % filter cake	2,38	1,27	1,81	3,53	1,35	—	—	1,25	1,23	0,97	1,01	2,14
Filter cake % cane	2,49	4,22	5,00	3,00	4,22	—	—	5,64	2,69	6,66	5,70	5,34
Filter wash index†	100	102	98	101	105	—	—	104	104	110	108	104
Syrup												
Brix	61,04	67,30	63,32	57,33	63,76	—	—	66,67	66,31	67,54	67,21	70,12
Apparent purity	83,08	83,83	86,95	87,14	85,26	—	—	86,55	85,65	87,45	84,55	85,94
Purity diff. (Syrup — C.J.)	-0,18	0,38	0,24	0,48	0,10	—	—	1,12	-0,07	0,31	0,91	0,50
Reducing sugars/pol ratio	8,05	5,33	4,57	4,66	4,31	—	—	3,04	3,89	4,48	6,40	5,56
Average pH	6,17	6,50	6,29	6,42	6,90	—	—	6,10	6,50	6,30	6,00	6,61
Final molasses												
Refracto brix	85,59	82,32	79,96	82,56	79,55	—	—	80,93	80,41	85,57	80,36	81,86
Pol/refracto brix purity	31,63	32,11	39,30	38,49	37,80	—	—	35,79	35,02	34,29	29,80	35,26
Sucrose/refracto brix purity	36,70	38,16	41,11	38,33	39,32	—	—	37,91	37,94	38,56	35,93	37,76
True purity diff. (target-mill)	2,8	1,2	3,8	3,5	3,8	—	—	2,0	2,3	1,6	1,7	0,3
Percentage reducing sugars	22,26	14,58	14,31	14,80	14,85	—	—	16,67	17,49	15,00	20,80	17,01
Percentage sulphated ash	13,16	14,98	14,85	12,72	12,45	—	—	14,43	14,01	15,66	13,18	14,91
Reducing sugars/ash ratio	1,69	0,97	0,96	1,00	1,19	—	—	1,16	1,25	0,96	1,58	1,14
Molasses at 85 refracto brix % cane	4,15	4,13	3,68	3,28	3,70	—	—	3,31	3,46	3,27	3,37	3,61
Sucrose lost in molasses % pol in cane	10,04	10,56	10,13	7,94	10,03	—	—	8,53	8,68	8,20	8,39	8,99

* LCV calculated by the following formulae (A) LCV = 17 795 — 42 pol. % bag. — 201 moisture % bagasse.

(B) LCV = 18 309 — 31,14 brix % bagasse — 207,63 moisture % bagasse — 196,05 ash % bagasse.

$$\dagger \text{ Filter Wash Index} = \frac{\text{Brix of mixed juice}}{\text{Brix of clarified juice}} \times 100$$

CAKE, SYRUP AND FINAL MOLASSES
(Season 1978 - 1979)

MV	GH			NB	UC	TS			IL	SZ			UK	AVER-AGES
	A	B	Average			A	B	Average		A	B	Average		
1,66	0,93	1,03	0,99	1,16	1,57	1,00	1,00	1,00	1,57	1,58	1,02	1,41	1,57	1,35
51,83	52,02	49,04	50,10	50,73	54,70	55,53	52,35	54,03	52,91	50,79	51,05	50,87	49,42	51,59
44,87	46,06	48,84	47,85	46,87	42,04	42,38	45,45	43,82	44,18	46,00	46,70	46,21	47,51	45,83
32,68	33,40	29,80	31,08	30,65	33,35	36,44	33,46	35,04	29,86	29,95	30,74	30,19	28,84	31,56
—	1,81	2,32	2,07	3,00	3,85	1,52	1,51	1,52	1,28	—	—	—	5,69	—
7 307	7 301	7 894	7 683	7 549	6 736	6 591	7 231	6 892	7 094	7 520	7 491	7 511	7 795	7 368
—	7 093	7 606	7 437	7 114	6 095	6 416	7 075	6 726	6 981	—	—	—	6 838	—
50,45	48,39	48,74	48,62	48,44	47,85	47,75	45,40	46,64	53,90	49,22	45,54	48,09	51,30	52,22
107,84	122,52	121,18	121,66	116,24	106,10	111,43	112,73	112,04	109,96	115,92	122,71	118,00	115,35	113,80
13,02	11,84	11,78	11,80	12,21	12,73	12,95	12,68	12,82	12,95	12,19	11,79	12,07	12,19	12,58
84,47	86,37	86,15	86,23	83,66	83,48	85,97	85,73	85,86	86,16	85,66	85,06	85,48	85,95	85,36
1,35	—	—	1,02	0,72	0,51	—	—	1,08	1,13	—	—	1,21	1,18	1,14
5,74	—	—	4,94	7,04	4,93	—	—	5,21	5,96	—	—	4,94	5,42	5,27
0,44	0,41	0,71	0,60	1,09	1,01	0,41	0,55	0,48	0,76	0,61	0,32	0,52	0,72	0,67
12,43	—	—	11,69	11,81	12,95	—	—	12,19	12,11	—	—	11,76	11,87	12,18
84,20	—	—	85,97	84,13	83,91	—	—	85,19	85,44	—	—	85,51	86,60	85,25
-0,27	—	—	-0,26	0,47	0,43	—	—	-0,67	0,28	—	—	0,03	0,65	-0,11
5,53	—	—	4,42	6,29	5,35	—	—	4,64	5,60	—	—	4,79	5,25	5,28
7,06	—	—	7,29	7,00	7,50	—	—	7,10	7,17	—	—	6,90	7,10	7,12
1,40	—	—	1,34	0,73	4,71	—	—	1,77	1,41	—	—	0,90	1,33	1,36
4,00	—	—	3,47	5,22	0,91	—	—	5,00	3,87	—	—	4,59	4,78	4,35
105	—	—	101	103	98	—	—	105	107	—	—	103	103	103
68,16	—	—	68,63	61,94	57,64	—	—	68,02	67,59	—	—	65,11	67,29	56,21
85,12	—	—	85,89	84,70	84,47	—	—	85,28	85,71	—	—	85,88	86,74	85,53
0,92	—	—	-0,08	0,57	0,56	—	—	0,09	0,27	—	—	0,37	0,14	0,28
6,21	—	—	4,43	5,65	5,09	—	—	4,50	5,07	—	—	4,83	5,38	5,08
6,24	—	—	6,12	6,40	6,90	—	—	6,36	6,32	—	—	6,20	6,35	6,37
83,93	—	—	84,49	80,15	86,12	—	—	87,21	80,03	—	—	79,84	83,23	82,46
31,18	—	—	36,45	28,51	35,38	—	—	34,56	33,29	—	—	33,87	34,80	34,34
35,79	—	—	39,34	35,23	38,24	—	—	37,67	37,76	—	—	37,99	38,08	37,99
-0,4	—	—	2,5	-0,3	5,2	—	—	2,6	1,6	—	—	0,8	0,9	2,1
17,94	—	—	16,16	18,12	15,94	—	—	16,53	16,85	—	—	14,70	14,75	16,74
14,92	—	—	14,90	13,16	13,73	—	—	14,96	13,56	—	—	13,86	14,64	14,11
1,20	—	—	1,08	1,38	1,16	—	—	1,10	1,24	—	—	1,06	1,01	1,19
3,41	—	—	3,59	3,51	3,65	—	—	3,52	3,29	—	—	3,34	3,17	3,53
8,36	—	—	9,45	8,59	10,06	—	—	8,88	8,30	—	—	8,57	8,15	9,03

TABLE D,
MASSECUITES, EXHAUSTIONS, CLARIFYING AGENTS AND ADDITIONAL FUELS
SOUTH AFRICAN MILLS (Season 1978 - 1979)

SYMBOLS OF FACTORIES	ML	PG	UF	EN	EM	FX	AK	DL	ME	GD	MV	GH	NB	UC	TS	IL	SZ	UK	Averages
Brix in mixed juice % cane	14,98	14,76	13,88	14,79	13,86	13,95	14,47	14,64	14,27	14,33	14,04	14,36	14,20	13,50	14,37	14,24	14,24	14,11	14,31
A-masseците																			
m ³ per ton brix in mixed juice	1,12	1,17	1,02	1,19	1,06	1,00	0,98	0,96	0,82	0,99	0,85	1,12*	1,01	1,02	1,11	1,07	1,04	0,96	1,03
Brix of massecuite	91,91	92,29	91,93	90,94	92,52	92,51	91,94	92,93	92,42	92,34	92,90	92,88	92,12	92,09	93,12	93,95	92,64	92,19	92,49
Purity of massecuite	84,56	84,99	86,60	86,09	85,27	86,80	86,73	87,72	83,88	86,61	85,90	88,16	84,82	84,63	85,44	87,50	86,79	86,25	86,18
Purity of A-molasses	69,55	67,02	71,20	72,79	70,93	70,40	68,52	72,15	66,60	70,10	62,20	70,55	65,80	67,81	69,40	68,00	67,29	68,67	69,24
Purity drop	15,01	17,97	15,40	13,30	14,34	16,40	18,21	15,57	17,28	16,51	23,70	17,61	19,02	16,82	16,04	19,50	19,50	17,58	16,94
Exhaustion*	58,29	64,11	61,75	56,78	57,85	63,83	66,70	63,73	61,68	63,75	72,99	67,83	65,57	61,74	61,35	69,64	68,69	65,06	63,90
Purity A-masseците—purity syrup	1,48	1,16	-0,35	-1,05	0,01	0,15	1,08	0,27	-0,67	0,67	0,78	2,27	0,12	0,19	0,16	1,79	0,91	-0,41	0,61
B-masseците																			
m ³ per ton brix in mixed juice	0,50	0,43	0,42	0,57	0,46	0,41	0,34	0,36	0,24	0,38	0,24	0,43	0,42	0,48	0,44	0,39	0,39	0,35	0,40
Brix of massecuite	93,95	93,62	93,93	95,30	93,36	96,46	94,14	93,91	93,28	93,76	94,52	94,52	94,48	93,88	93,17	93,90	93,69	93,18	93,97
Purity of massecuite	70,35	67,94	70,20	72,69	70,80	71,20	69,58	72,15	66,44	69,72	62,10	70,45	64,99	67,72	69,40	68,33	68,17	69,47	69,42
Purity of B-molasses	45,20	47,32	50,00	50,38	52,06	48,40	45,80	46,92	44,06	50,46	39,71	47,69	40,62	49,81	49,22	42,98	46,46	45,80	47,05
Purity drop	25,15	20,62	20,20	22,31	18,74	22,80	23,78	25,23	22,38	19,26	22,39	22,76	24,37	17,91	20,18	25,35	21,71	23,67	22,38
Exhaustion*	65,24	57,61	57,55	61,85	55,21	62,06	63,06	65,88	60,22	55,76	59,80	61,76	63,15	52,69	57,26	65,06	59,48	62,86	60,87
C-masseците																			
m ³ per ton brix in mixed juice	0,30	0,28	0,26	0,25	0,27	0,23	0,23	0,19	0,24	0,21	0,17	0,24	0,21	0,28	—	0,21	0,22	0,23	0,22
Brix of massecuite	97,50	94,84	95,43	96,50	97,31	97,77	97,01	97,05	96,38	95,84	97,26	96,09	95,78	96,05	96,05	96,23	96,39	96,31	96,35
Purity of massecuite	53,14	52,48	52,50	53,34	54,89	53,24	54,47	53,49	53,90	50,92	45,66	51,21	43,32	53,85	52,76	49,65	49,01	52,44	52,08
Purity of C-molasses	31,63	32,11	39,30	38,33	37,80	35,79	35,02	34,29	29,80	35,26	31,18	36,45	28,51	35,38	34,56	33,29	33,87	34,80	34,34
Purity drop	21,51	20,37	13,20	15,01	17,09	17,45	19,45	19,20	24,10	15,66	14,48	14,76	14,81	18,47	18,20	16,36	15,14	17,64	17,74
Crystal content**	30,67	28,46	20,75	23,49	26,74	26,57	29,04	28,36	33,09	23,18	20,46	22,32	19,84	27,54	26,71	23,60	22,07	26,06	26,03
Exhaustion*	59,20	57,17	41,42	45,63	50,06	51,05	54,95	54,63	63,69	47,50	46,08	45,35	47,82	53,08	52,71	49,39	46,71	51,59	51,87
White sugar massecuites																			
Kg sugar per m ³ white massecuites	669	557	732	576	—	—	—	—	—	—	—	651	—	—	—	—	506	—	627
Total volume all raw massecuites																			
m ³ per ton brix in mixed juice	1,92	1,88	1,70	2,01	1,79	1,74	1,55	1,51	1,30	1,58	1,26	1,79	1,64	1,78	—	1,67	1,65	1,54	1,65
Clarifying agents and chemicals																			
Tons limestone per 1 000 tc	—	4,31	—	—	—	—	—	—	—	—	—	3,86	—	—	—	—	2,06	—	—
Tons coke per 1 000 tc	—	0,44	—	—	—	—	—	—	—	—	—	0,42	—	—	—	—	0,22	—	—
Tons lime per 1 000 tc	2,11†	1,27‡	1,15‡	1,15‡	1,04	0,62	0,69	0,55	0,56	0,70	0,55	1,33‡	0,66	0,68	0,56	0,61	1,27‡	0,52	0,93
Tons sulphur per 1 000 tons white sugar	0,13†	0,13†	7,50†	—	—	—	—	—	—	—	—	0,07†	—	—	—	—	0,09†	—	—
Phos. acid ppm mixed juice	—	—	—	38,03†	—	—	—	—	—	—	—	—	0,01	—	—	—	—	—	—
Flocculant ppm mixed juice	0,29	3,69	5,10	3,54	1,87	3,03	1,22	0,96	2,74	4,13	1,20	3,05	5,16	7,66	0,54	5,44	4,00	0,52	2,59
Enzyme ppm sugar	—	14,21	42,41	56,08	19,36	42,55	—	16,76	8,96	170,23	19,58	24,24	17,33	—	14,56	42,53	9,00	13,37	18,90
Additional fuels per 1 000 tc																			
Tons of coal	26,40	18,75	12,17	17,04	2,55	35,78	2,80	—	0,26	17,92	2,21	1,16	0,52	12,93	5,62	2,73	5,81	0,32	—
Tons of wood	—	—	0,79	2,15	5,13	—	—	1,27	0,09	0,96	2,10	0,30	1,35	—	0,11	0,18	0,24	0,34	—
Converted into bagasse***	105,60§	75,00	49,61	70,73	16,34	143,13§	11,19§	1,53	1,14	72,84	11,34§	4,99	3,70	51,72	22,59§	11,15	24,04§	1,67	37,68

* Exhaustion = $\frac{10\ 000 (\text{Pty. massecuite} - \text{Pty. run off})}{\text{Pty. massecuite} (100 - \text{Pty. run off})}$ ** Crystal content = $\frac{(\text{Pty. massecuite} - \text{Pty. run off})}{(100 - \text{Pty. run off})} \times \text{Bx massecuite}$

*** 1 ton coal equivalent to 4 tons of bagasse
1 ton firewood equivalent to 1,2 tons of bagasse

† Used for refining

‡ Includes lime used in refinery

§ Factory exported bagasse

TABLE B₂
CANE CRUSHED AND SUGAR MADE, CANE COMPOSITION,
THROUGHPUTS AND TIME ACCOUNTS, PERFORMANCE AND LOSSES
MOZAMBIQUE, SWAZILAND AND MALAWI MILLS
(Season 1978 - 1979)

SYMBOLS OF FACTORIES	BZ	IC	MH	UR	NH		Average
					A	B	
Tons raw sugar	21 257	28 098	120 480	111 378			68 765
Tons white sugar	4 287	2 614	—	15 945			24 711
Total sugar, tons	25 544	30 712	120 480	127 323			93 476
White % total sugar	16,78	8,51	—	12,52			26,44
Average pol all sugars	98,51	98,35	98,56	98,82			97,82
Average moisture all sugars	0,30	0,37	0,42	0,29			0,45
Tons of cane crushed — Total	250 439	307 165	1 085 465	1 156 913			872 597
Tons of cane crushed — Per tandem					357 092	515 505	
Season started on	1.6.78	19.6.78	1.5.78	1.5.78			12.4.78
Season completed on	14.12.78	21.12.78	6.1.79	9.1.79			7.1.79
Number of crushing days	197	186	251	254			271
Time account							
Hours crushing % gross available time	70,07	61,98	83,54	80,65	74,20	78,02	76,46
Hours scheduled stops % gross available time	6,65	14,14	6,24	7,48	7,04	7,30	7,19
Hours lack of cane % gross available time	11,29	6,43	4,00	7,49	9,57	4,56	6,61
Hours other stops % gross available time	11,99	17,45	6,22	4,38	9,18	10,13	9,74
Lost time % available crushing time	36,47	47,87	18,34	22,75	30,93	24,94	27,39
Throughputs per hour actual crushing							
Tons of cane crushed	75,95	111,59	216,89	235,40	80,87	111,04	194,91
Tons of fibre milled	13,00	13,89	31,22	31,97	12,69	17,40	30,09
Tons of brix processed	10,77	14,71	31,63	33,40	—	—	27,64
Tons of sugar produced	7,75	11,16	24,07	25,90	—	—	20,56
Tons pol in cane	9,81	13,01	28,30	30,11	10,29	14,08	24,37
Tons non pol in cane	1,86	2,92	5,90	5,74	2,22	2,99	5,21
Composition of cane crushed							
Pol % cane	12,91	11,66	13,05	12,79	12,73	12,68	12,70
Fibre % cane	17,12	13,03	14,94	13,58	15,69	15,67	15,68
Brix % cane	15,36	14,28	15,77	15,23	15,48	15,37	15,41
ERC % pol in cane	86,41	85,32	86,02	87,09	85,44	85,57	85,52
ERC % cane	11,16	9,95	11,23	11,14	10,88	10,85	10,86
Extraction							
Extraction	93,34	93,29	93,25	94,06	94,50	94,13	94,28
Corrected reduced extraction	94,11	91,94	92,67	93,14	94,65	94,29	94,44
Imbibition percent cane	33,29	26,62	23,87	19,01	36,32	35,80	35,59
Imbibition percent fibre	194	214	166	140	231	229	230
Preparation index	—	—	82	—	77	83	81
Recoveries							
Boiling house recovery	83,36	90,40	89,92	90,37			87,51
Overall recovery	77,81	84,33	83,85	85,00			82,51
Factory performance index	89,37	97,97	96,74	97,05			95,42
Tons cane per ton sugar	9,80	10,00	9,01	9,09			9,33
Tons cane per ton 96 sugar	9,55	9,76	8,78	8,83			9,16
Pol balance							
Lost in bagasse (a)	6,66	6,71	6,75	5,94			5,72
Lost in filter cake (b)	0,57	0,27	0,63	0,44			1,01
Lost in final molasses (c)	9,47	8,11	7,74	7,90			9,25
Undetermined losses (d)	5,48	0,57	1,03	0,72			1,24
Boiling house losses (b + c + d)	15,52	8,95	9,40	9,06			11,50
Sum of all losses (a + b + c + d)	22,18	15,66	16,15	15,00			17,22
Red. sug. in F.M. % R.S. in M.J.	73,68	79,56	85,95	101,75			55,52
Non pol ratio	0,84	0,81	0,76	0,94			0,85

TABLE C₂
ANALYSIS OF BAGASSE, JUICES, FILTER CAKE, SYRUP AND FINAL MOLASSES
MOZAMBIQUE, SWAZILAND AND MALAWI MILLS
(Season 1978 - 1979)

SYMBOLS OF FACTORIES	BZ	IC	MH	UR	NH		Average
					A	B	
Final bagasse							
Pol % bagasse	2,35	2,86	2,71	2,36	1,81	2,05	1,95
Moisture % bagasse	50,02	50,50	51,98	54,53	56,89	53,94	55,15
Fibre % bagasse	46,76	45,48	44,37	42,24	40,63	43,15	42,12
Bagasse % cane	36,61	27,37	32,44	32,15	38,62	36,31	37,25
LCV in kJ per kg bagasse*	7642	7513	7233	6736	6285	6866	6628
Last expressed juice							
Apparent purity	73,99	72,18	74,44	73,42	72,83	71,25	71,90
Mixed juice							
Mixed juice % cane	96,68	99,25	91,43	86,86	97,69	99,49	98,75
Brix	14,67	13,28	15,95	16,34	14,86	14,39	14,58
Apparent purity	84,98	82,51	83,42	84,77	82,89	83,34	83,16
Reducing sugars/pol ratio	6,60	6,78	5,96	5,56	—	—	7,26
Suspended solids % mixed juice	—	0,59	0,60	—	—	—	—
Clarified juice							
Brix	13,79	13,20	S 15,52	15,90	—	—	13,80
Apparent purity	84,99	83,56	85,72	85,50	—	—	85,51
Purity difference (C.J. — M.J.)	0,01	1,05	2,30	0,73	—	—	2,35
Reducing sugars/pol ratio	6,23	6,29	5,67	4,67	—	—	4,75
Average pH	6,70	7,03	7,00	7,00	—	—	7,10
Filter cake and filtrate							
Pol % filter cake	1,93	1,05	2,77	1,12	—	—	3,07
Filter cake % cane	3,81	3,01	2,97	5,01	—	—	4,20
Filter wash index	106	100	102	102	—	—	105
Syrup							
Brix	53,75	58,73	63,82	64,32	—	—	65,28
Apparent purity	85,90	84,03	85,44	85,58	—	—	85,11
Purity difference (Syrup — C.J.)	0,91	0,47	0,28	0,08	—	—	— 0,40
Reducing sugars/pol ratio	5,04	6,58	5,27	4,80	—	—	5,02
Average pH	6,50	6,55	6,20	6,30	—	—	6,60
Final molasses							
Refracto brix	86,88	S 92,91	87,56	85,18	—	—	79,83
Pol/refracto brix purity	42,47	35,37	36,96	34,44	—	—	39,04
Sucrose/refracto brix purity	44,82	36,06	37,97	37,90	—	—	40,16
Purity difference (target — mill)	—	—	5,3	—	—	—	2,6
Percentage reducing sugars	17,62	20,23	19,97	19,76	—	—	12,44
Percentage sulphated ash	—	—	13,71	13,97	—	—	—
Reducing sugars/ash ratio	—	—	1,46	1,41	—	—	—
Molasses at 85 refracto brix % cane	3,40	S 3,15	3,22	3,45	—	—	3,64
Sucrose lost in molasses % pol in cane	10,02	8,27	7,96	8,70	—	—	9,79

* Calculated by formula A of table C₁

S = Spindle brix

TABLE D₂
MASSECUITES, EXHAUSTIONS, CLARIFYING AGENTS AND ADDITIONAL FUELS
MOZAMBIQUE, SWAZILAND AND MALAWI MILLS
(Season 1978 - 1979)

SYMBOLS OF FACTORIES	BZ	IC	MH	UR	NH
Brix in mixed juice % cane	14,18	13,18	14,58	14,20	14,40
A-masseците					
m ³ per ton brix in mixed juice	0,72	1,05	0,98	0,90	0,86
Brix of massecuite	90,66	S 92,34	93,47	S 92,30	91,57
Purity of massecuite	84,35	85,67	84,95	85,70	85,26
Purity of A-molasses	68,25	68,41	67,10	68,20	70,46
Purity drop	16,10	17,26	17,85	17,50	14,80
Exhaustion	60,12	63,78	63,87	64,21	58,76
Purity A-masseците — purity syrup	— 1,55	1,64	— 0,49	0,12	0,15
B-masseците					
m ³ per ton brix in mixed juice	0,49	0,30	0,29	0,43	0,43
Brix of massecuite	90,78	S 94,84	94,68	S 95,10	94,20
Purity of massecuite	75,48	72,61	72,59	71,10	74,90
Purity of B-molasses	58,89	50,25	49,51	46,80	53,48
Purity drop	16,59	22,36	23,08	24,30	21,42
Exhaustion	53,46	61,90	62,97	64,24	61,47
C-masseците					
m ³ per ton brix in mixed juice	0,31	0,24	0,25	0,26	0,29
Brix of massecuite	92,40	S 97,00	97,80	S 99,10	96,49
Purity of massecuite	63,83	58,02	58,18	52,20	58,65
Purity of C-molasses	42,47	35,37	36,96	37,90	39,04
Purity drop	21,36	22,65	21,22	14,30	19,61
Crystal content	34,31	33,99	32,92	22,82	31,04
Exhaustion	58,17	60,40	57,86	44,11	54,85
White sugar massecuites					
Kg sugar per m ³ white massecuite	499	631	—	446	506
Total volume all raw massecuites					
m ³ per ton brix in mixed juice	1,52	1,59	1,52	1,59	1,58
Clarifying agents and chemicals					
Tons lime per 1 000 TC	2,74	0,97	0,71	1,03	1,88
Tons sulphur per 1 000 tons white sugar	7,23	2,68	—	—	—
Phosphoric acid ppm mixed juice	2,68	3,28	—	—	—
Flocculant ppm mixed juice	2,07	0,66	1,77	1,82	—
Enzyme ppm sugar	—	0,04	9,13	—	—
Additional fuels per 1 000 TC					
Tons of coal	—	—	2,81	2,35	—
Tons of wood	28,24	—	0,28	—	1,68
Converted into bagasse	33,89	—	11,57	9,40	2,02

TABLE E
COMPARATIVE MANUFACTURING DATA OF RECENT YEARS
(South African Mills)

SEASON	1978/79	1977/78	1976/77	1975/76	1974/75
Throughput and Time Efficiency					
Tons cane per hour	233,60	221,40	211,84	191,35	168,78
Tons fibre per hour	33,78	33,41	31,46	28,72	25,25
Time efficiency	78,57	75,89	75,22	74,79	76,37
Cane					
Pol % cane	12,64	12,83	12,43	12,60	13,08
Fibre % cane	15,22	15,79	15,52	15,67	15,59
Juice					
Purity of mixed juice	85,36	84,39	84,47	84,70	85,01
Reducing sugars/pol ratio (mixed juice)	5,27	5,67	5,58	5,31	5,05
Milling					
Imbibition % fibre	314	302	281	279	286
Extraction	96,63	95,87	95,48	95,38	95,49
Pol % bagasse	1,35	1,56	1,66	1,68	1,73
Moisture % bagasse	51,59	52,55	53,20	53,52	53,10
Bagasse % cane	31,56	33,90	33,96	34,59	34,18
LCV bagasse kJ/kg	7 368	7 167	7 032	6 967	7 049
Available kJ in bagasse/kg brix in mixed juice	16 250	16 665	16 984	16 983	16 348
Recoveries					
Boiling house recovery	89,58	88,62	88,99	88,68	88,76
Overall recovery	86,55	84,96	84,97	84,58	84,76
Tons cane per ton of sugar	9,09	9,12	9,41	9,33	8,97
Filter cake					
Pol % filter cake	1,36	1,43	1,39	1,33	1,28
Filter cake % cane	4,35	4,45	4,27	4,62	4,70
Final molasses					
Brix	82,46	82,09	83,23	84,14	85,60
Gravity purity	37,99	38,31	38,23	38,75	38,39
Weight at 85 Bx % cane	3,53	3,83	3,60	3,64	3,71
Average sugar polarisation					
	99,48	99,47	99,42	99,49	99,50
Pol Balance*					
Lost in bagasse	3,37	4,13	4,52	4,62	4,51
Lost in filter cake	0,47	0,49	0,48	0,49	0,46
Lost in final molasses	8,16	8,77	8,45	9,52	9,26
Undetermined losses	1,44	1,64	1,58	0,79	1,01
Lost in boiling house	10,07	10,90	10,51	10,80	10,73
Total losses	13,44	15,03	15,03	15,42	15,24
m³ massecuite per ton brix mixed juice					
A-massecuite	1,08	1,05	1,06	1,05	1,04
B-massecuite	0,40	0,41	0,40	0,38	0,36
C-massecuite	0,22	0,26	0,24	0,28	0,27
Total	1,70	1,72	1,70	1,71	1,67
Exhaustion of massecuites					
A-massecuite	63,90	62,54	62,16	62,74	63,59
B-massecuite	61,21	60,98	61,84	61,44	62,09
C-massecuite	52,02	51,21	54,00	54,32	56,08
Brix of syrup					
	65,15	66,26	65,52	64,51	64,72

* 1974/75 and 1975/76 sucrose balance

TABLE F
AVERAGE MANUFACTURING RESULTS BY MONTHLY PERIODS
FOR SOUTH AFRICAN MILLS
(Season 1978 - 1979)

END OF MONTHLY PERIOD		April 28 1978	May 27 1978	July 1 1978	July 29 1978	Sept. 2 1978	Oct. 1 1978	Oct. 28 1978	Dec. 2 1978	Dec. 30 1978	Jan. 27 1979	Feb. 27 1979
Tons sugar made and estimated	Month	28 167	174 250	303 536	258 835	317 332	254 789	234 115	293 359	152 795	51 961	13 374
	To-date	28 167	202 417	505 953	764 788	1 082 120	1 336 909	1 571 024	1 864 383	2 017 178	2 069 139	2 082 513
Tons cane crushed	Month	323 591	1 797 720	2 846 584	2 312 032	2 770 786	2 155 400	2 047 628	2 625 196	1 436 388	480 108	136 345
	To-date	323 591	21 221 311	4 967 895	7 279 927	10 050 713	12 206 112	14 253 741	16 878 937	18 315 325	18 795 433	18 931 778
Tons cane crushed per hour actual crushing	Month	207,66	227,48	231,91	231,11	233,53	236,23	238,31	234,74	221,64	240,08	273,72
	To-date	207,66	224,22	228,56	229,36	230,49	232,95	233,71	234,17	233,14	233,39	233,60
Pol % cane	Month	10,40	11,29	12,24	12,76	13,08	13,54	13,15	12,83	12,37	12,31	12,28
	To-date	10,40	11,15	11,77	12,09	12,36	12,57	12,65	12,68	12,65	12,65	12,64
Fibre % cane	Month	15,70	15,13	14,75	14,78	14,99	15,02	15,46	15,73	16,02	16,09	15,83
	To-date	15,70	15,22	14,95	14,90	14,92	14,94	15,01	15,13	15,20	15,22	15,22
Tons cane per ton sugar	Month	11,49	10,32	9,38	8,93	8,73	8,46	8,75	8,95	9,40	9,57	10,21
	To-date	11,49	10,46	9,82	9,52	9,29	9,13	9,07	9,05	9,08	9,09	9,09
Corrected reduced extraction	Month	95,86	96,19	96,15	96,42	96,57	96,56	96,67	96,68	96,52	95,95	93,65
	To-date	95,86	96,05	96,15	96,24	96,33	96,37	96,42	96,46	96,47	96,45	96,43
Imbibition % fibre	Month	301	305	313	321	321	322	316	315	301	290	232
	To-date	301	304	309	313	315	316	316	316	315	314	314
Pol extraction	Month	95,45	96,15	96,41	96,74	96,88	96,93	96,88	96,77	96,46	95,84	93,71
	To-date	95,45	96,05	96,26	96,42	96,56	96,63	96,67	96,68	96,67	96,65	96,63
Pol % bagasse	Month	1,37	1,35	1,41	1,35	1,33	1,35	1,30	1,29	1,32	1,49	2,27
	To-date	1,37	1,35	1,38	1,38	1,36	1,36	1,35	1,34	1,34	1,35	1,35
Moisture % bagasse	Month	54,08	52,62	52,15	51,50	51,22	51,17	50,92	51,06	51,45	52,83	52,99
	To-date	54,08	52,85	52,46	52,15	51,90	51,77	51,65	51,55	51,55	51,58	51,59
Boiling house recovery	Month	87,09	88,84	89,96	90,24	89,96	89,67	89,30	89,50	88,70	88,11	84,57
	To-date	87,09	88,59	89,41	89,69	89,77	89,75	89,68	89,66	89,59	89,58	89,58
Overall recovery	Month	83,13	85,42	86,72	87,30	87,15	86,92	86,52	86,67	85,55	84,44	79,25
	To-date	83,13	85,10	86,07	86,48	86,68	86,72	86,69	86,69	86,60	86,56	86,55
Mixed juice purity	Month	82,26	82,60	83,95	85,00	85,75	86,72	87,25	86,40	85,09	84,83	84,77
	To-date	82,26	82,56	83,38	83,92	84,44	84,87	85,22	85,40	85,38	85,36	85,36
RS/pol ratio in mixed juice	Month	7,44	6,96	6,09	5,73	5,13	4,51	3,98	4,53	5,41	5,58	5,29
	To-date	7,44	7,03	6,47	6,22	5,90	5,64	5,39	5,25	5,26	5,27	5,27
Purity final molasses	Month	37,53	36,13	36,20	37,09	38,06	39,07	39,64	39,20	38,51	39,29	39,99
	To-date	37,53	36,34	36,26	36,52	36,94	37,30	37,62	37,85	37,91	37,94	37,99
Pol lost in final molasses % pol in cane	Month	9,84	8,58	7,90	7,71	8,01	7,88	8,15	8,13	8,88	9,63	12,57
	To-date	9,84	8,76	8,25	8,07	8,05	8,02	8,04	8,05	8,12	8,15	8,16
Undetermined lost pol % pol in cane	Month	1,93	1,69	1,37	1,33	1,27	1,65	1,67	1,47	1,51	1,08	1,22
	To-date	1,93	1,73	1,51	1,45	1,40	1,45	1,48	1,48	1,49	1,47	1,44

TABLE G
CANE VARIETIES AND RAINFALL
 (Season 1978 - 1979)

SYMBOLS OF FACTORIES	CANE VARIETIES CRUSHED (Percentage by weight)																				Rainfall (mm) during 1978
	NCo 376	NCo 310	NCo 293	N 50/211	NCo 382	Co 331	NCo 339	NCo 292	NCo 334	N 51/168	N 53/216	CB 36/14	N 55/805	N 6	N 52/219	N 7	N 8	J 59/3	Mixed Vari's	Un- known	
ML	91,2	0,3							5,2						0,8				0,1	1,9	688
PG	80,8	8,9							1,6				0,1		0,4				0,7	6,9	662
UF	14,2	44,3			4,5		0,3					0,4	15,2	0,2			0,4		19,6	0,1	1 036
EN	90,0		5,5								0,2	0,5	3,4								1 313
EM	39,2	10,0			0,2					0,3	0,6		8,1						0,3	40,5	1 345
FX	44,0	21,8			3,1		0,1			0,1	0,3	0,1	13,9	0,6			1,4		0,2	13,6	1 486
AK	78,7	2,7	0,2								0,2	0,5	10,7				0,5		1,5	4,3	1 162
DL	78,7	0,4	0,5								0,1	0,1	16,2						3,3	0,1	914
ME	51,7	1,3	14,3									0,1	19,0						8,6	4,5	1 076
GD	92,9	4,4				0,6							1,9								931
MV	73,3	0,2										0,3	2,4						23,1	0,3	494
GH	79,1	0,7	0,2		0,1		0,1				0,3	0,4	8,3						4,5	5,8	845
NB	22,2	0,1	41,1	0,1	17,4	0,4					1,7	5,1	2,1	0,4					0,3	8,5	981
UC	13,5		60,5		9,2						1,4	1,4	0,3	0,1					0,1	12,8	837
TS	81,2	1,2	0,1		0,2						0,2		12,4						4,1		1 011
IL	62,9	0,1	18,1		0,6						0,1	2,0	8,7	1,7		0,2			1,6	2,5	1 176
SZ	82,6	2,1						0,8			0,1	0,1	7,6	0,6					0,6	5,7	1 640
UK	77,0	0,8	8,1		0,3							0,1	8,6	0,5						4,0	1 644
Average South African Mills	65,4	5,6	6,2		1,8				0,4		0,3	0,6	9,0	0,2	0,1		0,1		3,2	6,3	—
IC	92,2				2,2															5,6	897
MH	89,9								4,5		5,5							0,1			926
UR	95,3								2,7						1,6				0,4		635
NH	27,2	67,4																	5,4		935

TABLE H
TRANSPORT SUMMARY SOUTH AFRICAN MILLS
 (Season 1978 - 1979)
 Percent of Cane Transported

MILLS	ML	PG	UF	EN	EM	FX	AK	DL	ME	GD	MV	GH	NB	UC	TS	IL	SZ	UK	Average
South African Railways	15,2		31,9		29,7	59,5	7,5		29,3			13,9	8,0	9,3		1,6			12,0
Chopped Cane			14,5												2,0				1,0
Tram		100	51,4		36,6	40,5													11,5
Hilo	80,0				15,3		69,1	76,8	56,9	39,3	47,1	64,2	43,0	15,6	89,6	97,9	97,6	28,1	54,7
Lorry and Trailer				12,9			3,7	7,1	12,9	30,8	22,8	2,8	29,5	60,2	0,8		2,0	66,2	9,7
Tractor	4,7		2,1	87,0	18,3		19,5	16,0	0,6	29,8	30,2	19,0	19,3	14,7	7,4	0,3	0,2	5,5	10,7

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

**TABLE K,
EQUIPMENT AND POWER USED
SOUTH AFRICAN MILLS**

SYMBOLS OF FACTORIES	ML	PG	UF		EN	EM	FX		AK	DL
			(A)	(B)			(A)	(B)		
Extraction plant										
Total installed power kW/tfh . . .	124,9	153,7	213,9	—	161,2	123,3	180,2	162,4	181,7	215,1
Cane preparation kW/tfh	90,0	69,4	61,3	—	54,2	29,0	93,4	72,4	93,2	91,3
Mills: Total roller volume m ³ /tfh . . .	0,30	0,58	1,04	—	0,79	0,72	1,30	1,35	0,59	1,05
Diffuser: Screen area m ² /tfh	10,6	14,8	—	—	7,5	5,1	—	—	9,6	—
Clarification and evaporation										
Juice heaters: Heating surface m ² /tch	12,7	7,3	7,6	—	12,9	8,4	6,1	—	6,8	6,1
Clarifiers: Volume m ³ /tch	3,8	0,8	0,6	—	3,0	3,4	2,2	—	2,1	1,6
Evaporators: Heating surface m ² /tch	29,2	38,6	37,0	—	47,9	29,1	25,7	—	31,3	31,0
Boiling house										
Vacuum pans: Volume m ³ /tch	1,5	1,6	1,5	—	2,2	1,6	1,4	—	1,4	1,4
Crystallisers: Volume A m ³ /tch	1,11	—	<i>0,72</i>	<i>0,48</i>	0,92	<i>0,49</i>	1,05	—	1,32	—
B m ³ /tch	0,25	<i>0,25</i>	0,45	<i>0,16</i>	0,69	<i>0,82</i>	1,59	—	0,44	<i>0,88</i>
C m ³ /tch	0,86	<i>0,62</i>	0,81	<i>0,54</i>	—	<i>2,65</i>	0,35	<i>1,64</i>	0,57	<i>1,26</i>
Centrifugals										
Batch: A Mcte D ³ H/tch †	65,8	45,6	67,8	—	60,5	51,2	43,5	—	43,0	43,7
E Mcte D ³ H/tch	—	—	—	—	—	—	—	—	—	—
Continuous:										
B Mcte W ² V/tch §	168,0	121,8	106,9	—	251,8	167,0	140,5	—	141,4	95,7
C Mcte W ² V/tch	227,9	335,0	172,9	—	310,3	367,5	307,2	—	333,5	330,0
Steam and power generation										
Electricity** kW/tch	59,1	26,0	25,1	—	40,9	18,8	28,9	—	20,7	24,6
Boilers: M.C.R. Tons steam/tch	0,73	0,71	0,57	—	0,73	0,72	0,68	—	0,59	0,84

* Average of straight milling tandems only

† C — Cane diffusers, B — bagasse diffusers

‡ D — Basket diameter, H — Basket height

§ W — Speed of rotation, V — Volume of cone formed by basket

¶ Continuous 'C' pan

** Electricity generated by steam driven prime movers.

E — Conventional clarifiers, T — Trayless clarifiers

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

FOR RAW SUGAR PRODUCTION

(Season 1978-1979)

ME	GD	GH		NB	UC	TS		IL	SZ		UK	AVERAGES	
		(A)	(B)			(A)	(B)		(A)	(B)			
164,3 64,9 1,26 —	174,6 66,9 1,18 —	255,3 190,4 0,52 12,7	206,3 93,8 1,56 —	194,0 54,3 1,24 —	175,3 96,7 0,59 14,2	126,6 79,1 0,19 12,3	181,8 66,4 1,25 —	200,8 74,5 0,81 —	159,8 81,1 1,01 —	168,1 74,6 0,57 5,8	207,7 99,4 1,00 —	181,3 82,3 1,15* (C) 11,1 (B) 8,41†	
7,0 2,5 31,4	6,2 3,2 33,2	8,1 0,8 54,0	—	8,0 2,0 27,8	9,5 0,8 36,8	7,5 2,2 43,7	—	5,5 2,9 32,9	6,7 0,4 26,9	—	7,3 2,1 33,4	7,3 2,5 (E) 0,7 (T) 31,4	
1,8 1,30 0,57 0,55	1,9 — 1,69 0,37 0,73	1,5 — 1,85 1,50 0,37	— — — — 1,34	1,5 — 1,47 1,47 0,37	— — — — 2,21	1,7 — 1,24 1,54 0,63	0,87 0,52 0,16 0,36	12m ³ /h 0,21 0,30 0,89 1,96	1,7 0,63 — — 1,96	1,4 0,45 0,90 0,43	0,57 0,57 0,35 1,19	1,5 0,69 1,07 0,45	0,76 0,38 1,34 —
39,5 —	48,4 —	38,6 —	—	48,0 —	40,4 —	37,2 —	—	63,5 —	34,9 —	—	39,5 —	47,7 —	
129,7 319,8	156,3 221,2	137,5 275,3	—	162,8 346,0	136,9 370,9	116,5 255,4	—	184,2 286,9	119,1 243,2	—	96,7 266,0	143,1 292,3	
42,8 0,57	35,0 0,54	23,5 0,55	—	43,3 0,79	26,4 0,74	26,0 0,47	—	32,2 0,67	15,4 0,59	—	28,7 0,62	28,0 0,65	

TABLE K₂
EQUIPMENT AND POWER USED FOR RAW SUGAR PRODUCTION
MOZAMBIQUE, SWAZILAND AND MALAWI MILLS
(Season 1978-1979)

SYMBOLS OF FACTORIES	BZ	IC	MH	UR	NH	
					(A)	(B)
Extraction Plant						
Total installed power kW/tfh	153,0	125,1	171,8	204,7	63,2	172,7
Cane preparation kW/tfh	31,3	29,7	64,3	103,2	30,1	141,8
Mills: Total roller volume m ³ /tfh	1,30	1,04	0,61	0,75	0,24	1,33
Diffusers: Screen area m ² /tfh	—	—	—	—	4,6	—
Clarification						
Juice heaters: Heating surface m ² /tch.	7,7	4,4	5,7	6,0	4,4	—
Clarifiers: Volume m ³ /tch	4,5	5,5	3,1	2,6	3,4	—
Evaporators: Heating surface m ² /tch	40,4	30,0	24,8	31,7	29,9	—
Boiling House						
Vacuum Pans: Volume m ³ /tch.	2,3	1,2	1,3	1,2	1,5	—
Crystalliser: Volume A m ³ /tch	1,49	0,95	0,99	1,20	0,97	—
B m ³ /tch	1,86	0,85	1,15	0,60	1,05	—
C m ³ /tch	4,47	2,52	0,23 0,92	0,18 1,08	0,16 2,05	—
Centrifugals						
Batch: A Mcte D ³ h/tch †	36,6	21,5	39,2	29,4	86,2	—
B Mcte D ³ h/tch	42,1	48,8	43,1	15,7	28,8	—
C Mcte D ³ h/tch	80,0	28,6	—	—	—	—
Continuous: B Mcte W ³ V/tch §	—	—	—	81,8	—	—
C Mcte W ³ V/tch	—	—	221,9	204,4	262,7	—
Steam and Power Generation						
Electricity ** kW/tch	26,3	18,0	16,1	17,8	26,9	—
Boilers M.C.R. Tons steam/ tch	0,99	0,54	0,52	0,52	0,64	—

§D—Basket diameter, H—Basket height

†W—Speed of rotation, V—Volume of cone formed by basket

**Electricity generated by steam driven prime movers

Crystallizers: Bold figures denote air-cooled, Italic figures denote water-cooled