FORTY-NINTH ANNUAL REVIEW OF THE MILLING SEASON IN SOUTHERN AFRICA (1973-74)

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Except when otherwise stated all data listed in the tables are calculated from figures as reported by the factories

Introduction

This review contains the same tables as those of previous years and the few changes in data listed are commented on in the text. The most important results of the past season are used to illustrate typical South African practices which are described as a service to visitors for the XV ISSCT Congress. An attempt has been made to provide an explanation whenever our practices differ from those normally adopted in other countries.

South Africa has the good fortune to be one of the few cane sugar areas where exchange of technical data is unrestricted and where weekly, monthly and annual summaries of laboratory data of all factories are regularly printed.

The first annual summary was published in the Proceedings of the 1927 Congress of the South African Sugar Technologists' Association. From that year up to 1950 the Experiment Station was responsible for the compilation of the annual summaries which were regularly published by Dr Dodds and various co-authors. The then newly formed Sugar Milling Research Institute took over publication in 1951 and Mr Perk was responsible for this service until his retirement in 1970.

Calculation of the tables was computerised in 1970 but there have been very few changes in the data published since 1927 and the industry has a valuable record of the progress made during the past half century.

Data from sugar factories in neighbouring countries which are affiliated to the SMRI are also published in separate tables (B2, C2, D2 and F2). These include all the mills in Mozambique for which totals and averages are computed, the two factories in Swaziland and the Sugar Corporation of Malawi.

A list of symbols used to designate each mill is given in Table 1.

TABLE I

Mills and their Symbols

Symbol	*Mill*	*Company*
South Africa		
ML	Malelane	Transvaalse Suikerkorporasie Beperk
PG	Pongola	Pongola Sugar Milling Co. Ltd.
UF	Umfolozi	Umfolozi Co-operative Sugar Planters Ltd.
EM	Empangeni	Huletts Corporation Ltd.
FX	Felixton	Huletts Corporation Ltd.
EN	Entumeni	Entumeni Sugar Milling Co. (Pty) Ltd.
AK	Amatikulu	Huletts Corporation Ltd.
DK	Doornkop	Doornkop Sugar Co (Pty) Ltd.
GD	Glendale	Glendale Sugar Millers (Pty) Ltd.
DL	Darnall	Huletts Corporation Ltd.
GH	Gledhow	Gledhow Sugar Co. Ltd.
MV	Melville	Melville Sugar Estates
JB	Jaagbaan	Noodsberg Sugar Co. Ltd.
UC	Dalton	The Union Co-operative Bark & Sugar Co. Ltd.
TS	Tongaat	Tongaat Sugar (Pty) Limited.
ME	Mount Edgecombe	Huletts Corporation Ltd.
IL	Illovo	Illovo Sugar Estates Ltd.
RN	Renishaw	Crookes Brothers Ltd.
SZ	Sezela	Reynolds Brothers Ltd.
UK	Umzimkulu	The Umzimkulu Sugar Co. Ltd.
Mozambique		
LB	Luabo	Sena Sugar Estates Ltd.
MR	Marromeu	Sena Sugar Estates Ltd.
AM	Açucareira de Moçambique	Açucareira de Moçambique S.A.R.L.
BZ	Buzi	Companhia do Buzi S.A.R.L.
IC	Incomati	Sociedade Agricola do Incomati S.A.R.L.
MA	Maragra	Marracuene Agricola Açucareira S.A.R.L.
Swaziland		
MH	Mhlume	Mhlume (Swaziland) Sugar Co. Ltd.
UR	Ubombo Ranches	Ubombo Ranches Ltd.
Malawi		
NH	Nchalo	The Sugar Corporation of Malawi Ltd.

TABLE II

Percent Cane Production in Areas

	Season	Average		
	1973-1974	1970-1973	1961-1970	1952-1960
Transvaal (ML, PG) . .	11,3	10,1	6,9	3,0
Zululand (UF, EM, EN, FX, AK) . .	30,1	30,2	30,9	35,3
North Coast (DL, DK, GH, MV, GD, TS, ME) . . .	36,2	36,4	41,7	46,8
Midlands (JB, UC) . .	6,8	6,6	3,3	—
South Coast (IL, RN, SZ, UK) . . .	15,7	16,9	17,3	14,9

The 1973/74 Season

Inspection of Table J shows that this is the first season in the past five years during which a record was not broken. Cane production was adversely affected by the dry weather during the first months of the year. Cane was of average quality and therefore sugar production was also lower than during the previous season.

The 15 453 687 tons of cane crushed in South Africa yielded 1 731 575 tons of sugar, a cane to sugar ratio of 8,93. Cane production was 3 190 202 tons lower than the 1967/68 record and the weight of sugar produced fell far short of the 1 914 601 tons of the 1972/73 season. Geographical distribution of cane supply is shown in Table II.

Variations in cane quality during the season are shown in Fig. 1. Data for the month of February were not plotted since only a few mills were still grinding after the end of January.

Mozambique also had a poorer season than in 1972/73 and produced 2 839 180 tons of cane and 298 454 tons of sugar with a cane to sugar ratio of 9,51. The drop in production was especially marked at BZ with only 52% of its 1972 sugar production.

The total sugar production of Swaziland remained practically unchanged but UR made about 6 000 tons of sugar more than in the previous season and the production of MH was correspondingly less.

NH in Malawi increased its production from 33 764 to 48 962 over one season.

Length of Season and Time Efficiency

South Africa has traditionally had a long sugar season and cases of factories which have operated throughout the year are not unknown. The long seasons are well suited to processing cane grown over two years, which has been the practice in Natal.

The 1973 season started on the 26th April, 1973 at IL and the last cane was crushed at PG on the 17th February, 1974. Average length of the season was 251 available days which is 17 days less than the previous season. Climatic conditions have, however, severely curtailed the length of the season in some areas, particularly the South Coast, where RN only crushed for 193 days. Two mills, DL and DK, came to a crash stop because of disastrous floods in early February. Fortunately both mills had only a few more days to go to finish this season. In Mozambique, under more tropical conditions, the season is shorter and averaged 194 crushing days.

Time accounts for all mills are listed in Tables B1 and B2. They are based on a 168 hour week. Weekends and public holidays are considered to be days available for crushing.

The effect of the long season on time efficiency is shown in Fig. 2 where monthly average industrial efficiency figures are plotted. Analysis of the averages for the different stops for the past five seasons listed in Table III reveals no particular trend except for an increase in time lost for no cane which is commented upon elsewhere.

SZ reports the highest time efficiency in South Africa with 81,02% but two mills in Mozambique (LB and AM) and UR in Swaziland better this performance. LB reports a record efficiency of 83,81% due to a large extent to its very low scheduled stops of 3,76% as compared to 9,04% for Mozambique as a whole and 11,33% for South Africa. Mechanical and operational stops are grouped under other stops and best results are reported by ME with 2,16% and UC with 2,52%.

The average time lost for lack of cane has increased in South Africa from 5,30% last season to 7,42 this season and monthly variations are plotted in Fig. 2. This increase may be due to rainfall but it is worth noting that whereas only three milling tandems reported percentages of over 10% for these stops in 1972/73, the number has increased to seven this season. The situation is even worse in Mozambique where comparative figures were 14,20 and 6,76 during the past two seasons. MA holds the unenviable record with 37,77% and this mill's results illustrate the crippling effect which a low time-efficiency can have on factory performance.

TABLE III

Time Account for the past Five Seasons (Average for South African mills)

	1973-74	1972-73	1971-72	1970-71	1969-70
Time efficiency .	74,85	77,00	76,01	76,60	76,77
% scheduled stops . .	11,33	11,06	12,00	12,58	12,55
% lack of cane stops.	7,23	5,30	6,39	5,28	5,16
% other stops	6,59	6,64	5,60	5,54	5,52

Cane Varieties and Cane Quality

The cane varieties crushed by all factories are listed in Table G. NCo 376 is still by far the most popular variety and appears to be gaining ground in South Africa with an increase of 2% since last season. A corresponding decrease can be noted in NCo 310 although this variety is still very popular in some areas of Mozambique (100% at MA) and in Malawi (78,5%). N55/805 continues the steady progression already noted in previous reviews and now accounts for 7,5% of all cane crushed in South Africa. There has been a marked reduction in the proportion of "mixed varieties" at MV but unfortunately it is still very high at EM and AK.

Pol in cane was slightly lower than the average of the past ten years but juice purity was higher. Fibre % cane (15,64) was the highest recorded since 1959 but this figure is not strictly comparable with those of previous years because of the inclusion of suspended solids in fibre. If vegetable fibre only is considered, this season's fibre is within the range of values recorded during the past ten years.

Cane Transport

Transport of cane over comparatively long distances is a characteristic of the South African sugar industry. Changes in the geographical pattern of cane growing have tended to increase the distances over which cane has to be transported and to nullify efforts made to reduce transport costs by a redistribution of cane between the mills.

A breakdown of transport for each South African mill is listed in Table H. The average can be misleading if compared to those of previous seasons which did not include UF. Inspection of the table does not reveal any important change in the transport pattern of any of the mills.

Sugar Extraction

Table J shows that since 1961 average industrial mill extraction has not been below 94 and for the past four years it has been well over 95. These extractions are higher than those reported by most sugar industries overseas and this high extraction tradition may be due to three factors. Firstly the cane payment system in force since 1926 and which up to 1972 was based on a fixed overall efficiency and allowed the miller to keep all sugar recovered above this efficiency. Secondly the long season and high tonnages crushed by the mills probably justified the investment in the long milling tandems required to achieve high extractions. Thirdly, the high imbibition rates which also contributed to high milling efficiency. This season's average of 287 percent fibre is the highest on record but, since 1960, this ratio has never been lower than 250.

The high capital and maintenance costs of long milling tandems have, in turn, stimulated interest in diffusers of which six were in operation during the past season. ML, EM, EN and UC processed all their cane in diffusers while the unit at UF processed 29% of this factory's cane with results listed under UF-A. The diffuser at PG was commissioned during the season and came into regular operation only during the last few days. The results listed for that mill can therefore be considered to be milling results.

The average mill extraction of South African mills (95,56) was the same as that of the previous season (95,55) with an almost equal cane crushing rate. For the second year running EN reports the best milling work followed by JB. Comparative mill performance data for the five best mills are listed in Table IV.

JB and especially the B tandem at TS have improved their performance since last season without any major change in equipment. In the case of TS this may be attributed to an increase of 32% in imbibition % fibre while at JB imbibition was lower than last year and the improvement must be credited to better preparation.

Preparation Index is reported for the first time in Table B1. TS-B and ME report indices of over 90 which is very good preparation indeed. Sampling can have an important effect on results and is extremely difficult where whole sticks or pieces of unprepared cane are present. This is the case at UC which does not have a shredder and the PI reported by this factory is too high and applies only to the prepared fraction of the cane.

High moisture content of bagasse has characterized milling in South Africa for the past fifty years. During this half century, moisture content has increased from 50,5 to 53,2, this last figure being the average for the past season. No satisfactory explanation has so far been found for these high moistures which, in South Africa, are associated with high mill peripheral speeds, although lower moistures are reported by factories overseas which run their mills at higher speeds than we do. UC which has a relatively low mill peripheral speed (4 m/min) reports the lowest moisture content (49,8).

TABLE IV

Milling Performance Data

Factory	Pol % bagasse	Extraction	LAJ % Fibre	Pol % Fibre in bagasse
EN† . .	1,20	97,11	25	2,76
JB . .	1,23	96,76	27	2,68
TS - B .	1,36	96,35	29	2,99
ME . .	1,37	96,61	29	3,02
EM† . .	1,37	95,97	31	3,44

† Diffusion

Clarification and Filtration

Two forms of the defecation process are used in South African mills: hot liming which is gaining in popularity and intermediate liming (at about 70°C) which is found in about half the mills. Factory scale experiments carried out by the SMRI a few years ago have shown that hot liming yielded clearer juice but more mud than intermediate liming and no effect was noted on the quality of sugar. Saccharate liming has been experimented with in at least one mill but has not been adopted industrially. Only one factory did not use flocculants during the past season and phosphoric acid in raw sugar production is only used in the Natal Midlands (JB and UC) because of the low phosphate content of juices. Values for clarifying agents listed in tables D1 and D2 apply to both raw house and back end refineries and sulphur is only used in refining.

Most industrial clarifiers are still of the conventional Dorr type but the new trayless type fast clarifiers have aroused a lost of interest. One unit has been commissioned at UF during the past season and two pilot plants have undergone tests.

A pilot plant for syrup clarification by flotation has been commissioned at JB and preliminary tests were carried out during the season.

The pH values for clarified juice and syrup are listed in Tables C1 and C2. Average clear juice pH was 7,2 in South Africa and 7,1 in Mozambique.

All filters in South Africa are conventional rotary vacuum filters. Early attempts at using cloth filters were unsuccessful and have not been repeated during the past years. Filtrate is recirculated to mixed juice.

Average pol in filter cake for the season was 1,30 while pol lost in filter cake percent pol in cane averaged

0,48. Efficiency of the filter station shows large variations between individual mills. Best results are reported by UK in South Africa and IC in Mozambique with 0,77 and 0,57 pol in cake respectively. Interest is now being shown in reducing the weight of filter cake to bring down transport costs.

Evaporation

The high imbibition rates traditional to the South African sugar industry have led to the general adoption of quintuple effect evaporators.

Bleeding of first and second effect vapour for both juice heating and pan boiling is normal practice. This has led to large area first effects being required and apprehension as to the influence of the comparatively long retention time of juice on undetermined losses. To obviate this, long tube evaporators have been adopted. They proved easier to maintain than Roberts vessels and two types are now found in the industry: the semi-Kestner with tubes about 4 metres long and the full Kestner with 7 metre tubes.

The brix of syrup has increased steadily since the 1951 season (53,3) to an average of 64,2 for South Africa during the past season with Pongola and Mount Edgecombe reporting brixes of over 68.

Addition of amylase enzyme to the third vessel of the evaporator or to a retention tank between the third and fourth vessels is common practice. Rate of addition varies with the starch content of the juices.

Boiling House

Data for South African mills since 1925, listed in Table J show a gradual improvement in both final molasses purity and boiling house recovery up to 1950. After that year there is no systematic trend and improvements in boiling house work have not been sufficient to override the effect of seasonal variations in juice quality.

A better appreciation of boiling house figures listed in the tables will be obtained if one bears in mind that the main objective of the boiling processes used in South Africa is the production of very high quality raw sugars. As a result of conditions outside the control of mills, our juices are of comparatively poor quality with a high starch and ash content. The sugar which is produced from these juices has to be of superior quality because it is sold on very competitive markets. This set of conditions has dictated universal adoption of boiling processes which may appear inefficient from a recovery and capacity point of view but which give the assurance that the raw sugar produced will meet export specifications.

The best boiling house recovery for the season (92,37) is reported by MV closely followed by DL with 92,15. Both these factories follow the same basic boiling process with minor variations and their results (listed in Tables B1, C1 and D1) will be used to illustrate typical South African practice.

In both mills only very high pol (VHP) raw sugar is produced. This sugar is of about 99,5 polarisation and is shipped in bulk either to the Sugar Terminal for blending before export or to the refinery in Durban.

Both mills boil three strikes which are called A, B and C and sell only A sugar. C sugar is remelted and returned to syrup while B sugar is made into a magma and used as footing for the A strike. Excess B sugar is remelted and also returned to syrup.

A close examination of data published in table D1 for each massecuite and of the procedure followed at the two factories to boil each strike reveals minor differences between the two processes.

The first massecuite (A) is boiled on syrup and remelt starting on a footing of B sugar magma. Because of the remelt, the purity of the first massecuite is usually higher than that of syrup.

The practice in all South African mills except MV is to cure A massecuite without cooling. At MV, massecuite is cooled to about 40°C in crystallizers arranged in series for continuous flow and with a retention time of about 10 hours. First massecuite is cured in batch centrifugals and washed with both steam and hot water and the sugar is dried before bulk storage.

The second massecuite (B) is boiled from grain and topped up with A molasses. Grain at both mills is made on A molasses of about 71 purity. B massecuite is cooled in crystallizers. Continuous units with a retention time of about 18 hours are used at DL and batch crystallizers at MV. Curing of the B massecuite is done in batch centrifugals at MV while at DL they have been replaced by continuous machines, a trend which is fairly general in the industry. B sugar is made into a magma with water at DL and with syrup at MV. Excess B sugar is remelted. A few factories remelt all their B sugar and start their A strike on a grain footing.

The third massecuite (C) is also boiled from grain at about 70 purity and the strike is topped up with B molasses only in the case of MV and with B molasses and C wash from the second curing of C sugar at DL. The massecuite is cooled to about 40°C in water cooled crystallizers at MV. DL pioneered the use of series flow crystallizers which have become very popular throughout the industry and boils extremely heavy massecuites. MV is limited by equipment and boils massecuites of lower brix and has to return final molasses diluted to 75 brix and heated to 60°C to the crystallizers as lubricant. This practice which was dictated by underpowered crystallizer drive has given excellent results during the past season. At both factories, as indeed in almost all South African mills, C massecuite is cured in continuous centrifugals. There are two schools concerning C massecuite curing. One favours single curing with the production of C sugar of about 85 purity and the other double curing and a C sugar of about 90. MV is an example of the first case and DL of the second.

Back end refining

Tables B1 and B2 show that five factories in South Africa, all the mills in Mozambique, UR in Swaziland and NH in Malawi produce both white and raw sugar.

Performance figures listed for all those mills are for tel quel production without any adjustment for the additional losses incurred in refining. These have been estimated at 0,6% of raw sugar input in calculating tons of crystals in raws equivalent to the refined sugar production.

In South Africa, ML, PG, GH and SZ operate carbonatation refineries which treat remelted first strike raw sugars. Three white massecuites are usually boiled and returns from the refinery go to syrup in the raw house.

EN and NH in Malawi operate flotation refineries using the Talofloc process.

Chemical Control

The South African Sugar Technologists' Association has always been very active in promoting chemical control. Standardised methods were first issued in 1927 and revised periodically. The latest book of methods was published in 1962, but, pending completion of a new manual on which work is in progress, standardised methods for specific analyses have been circulated to all mills from time to time by the SMRI.

The main developments in chemical control during the past years have been the replacement of hydrometers by refractometers for brix determination and the development of direct methods of analysis for pol, brix and fibre in cane.

The implementation of direct cane analysis revealed that the Clerget method was impractical as a routine analysis for sucrose determination in juices and led to the replacement of sucrose by pol as a measure of sugar input to the factory. The Clerget method has also been abandoned in favour of a chemical method in determining sucrose in final molasses.

The weighing of cane, imbibition water and mixed juice has been normal practice in South Africa for several decades. Evaporation from hot bagasse in diffusion plants has stimulated the replacement of imbibition water weighing by direct bagasse weighing. Entumeni uses a Servobalans scale for this purpose while other factories have used belt weighers which, so far, have not proved as reliable as expected.

Sugar weights are controlled at most mills but the terminal and refinery weights are accepted as official. Molasses is weighed, with varying degrees of accuracy, at all mills while all but five factories weigh their filter cake production. The others use an assumed percentage of cake on cane for control purposes.

Another recent development is the routine measurement of the degree of preparation of cane and its reporting in the form of a Preparation Index. A standardised sampling and analytical method has been developed which makes use of equipment installed in mills for cane analysis for payment purposes.

The determination of suspended solids in mixed juice and the application of a correction to the weight of mixed juice was introduced in 1972.

Comparison of molasses purity achieved in the mills with a target purity is now carried out monthly for each mill and can be considered to have passed from research into chemical control. A new target formula has been developed to replace the Douwes Dekker formula which was based on analyses of Java molasses.

Some aspects of chemical control which apply more specifically to last season's figures or which have been the subject of special attention during the past year are discussed below:

Fibre % Cane: The decision to apply a correction for the weight of suspended solids in mixed juice and add the weight of suspended solids to fibre in bagasse in order to obtain fibre in cane was taken during the 1972 season. It could not be applied to the 1972 final figures and this is the first season for which the fibre % cane reported in the tables includes suspended solids.

Undetermined losses: have been directly affected by the correction for suspended solids and for the first time negative undetermined losses are reported in an annual summary. It is inevitable that there will be losses by decomposition, spillage etc., in even the best run factory and undetermined gains should logically be impossible. The fact that they do occur and persist in spite of thorough investigation is an indirect measure of the accuracy range of our sugar balance.

Losses in final molasses are expressed in terms of sucrose in an otherwise all pol balance. This may affect the level of undetermined losses and comparative data are listed in Table V. They show that in all but four cases sucrose losses are higher than pol losses but the difference between the two values is far from constant. The pol balance expressed as a percentage of cane is also listed. As discussed in the 1971/72 Review, it has the advantage of not being influenced by the pol in cane.

The Target Purity by which molasses exhaustion has been evaluated so far has been based on sucrose, dry solids and sulphated ash. Except for the sucrose determination, these analyses are not carried out as a matter of routine in most sugar factory laboratories. A simpler formula based on more readily available data (ref. brix, conductivity) has therefore been developed by the SMRI. It reads:

$$\text{Target Gravity Purity} = 37{,}27 - 16{,}47 \log r/c$$

where r = reducing sugars % molasses
c = conductivity

Estimated Recoverable Crystal divided by pol in cane (ERC/S) has been proposed by Millers as a factory control parameter indicating potential overall recovery. A *Factory Performance Index* can also be derived by dividing crystal in sugar recovered by ERC: Comparative data for all mills are listed in Table VI.

ERC has been calculated by means of the following formula originally derived for cane evaluation purposes

$$\text{ERC} = aS - bN - cF$$

where S = pol % cane
N = non pol % cane
F = fibre % cane

The factors *a*, *b* and *c* have been calculated from this season's industrial average figures. Factor *a* accounts for losses in filter cake and undetermined losses. Factor *b* is the ratio of sucrose lost in final molasses to non pol in cane and factor *c* is the ratio of pol in bagasse to fibre in cane.

Fuel

High imbibition rates have had an adverse effect on the thermal balance of South African factories, most of which burn additional fuels as a complement to bagasse. The figures listed in Tables D1 and D2 must, however, be interpreted with caution. Several mills supply power to allied industries or for irrigation, others operate refineries and a few sell their bagasse to by-product plants. No allowance is made for this in the figures listed under "Additional Fuels".

Acknowledgements

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TABLE V

Sugar Balance

Factory	% pol in cane		% pol in cane		Sucrose lost in mol. % cane
	Pol in mol.	Undet.	Sucrose in mol.	Undet.	
ML	10,06	2,58	10,90	1,74	0,86
PG	9,49	0,95	9,68	0,76	0,72
UF	8,38	1,21	8,99	0,61	0,67
EM	9,42	1,35	9,54	1,24	0,74
FX	9,23	0,69	9,32	0,60	0,72
EN	11,15	2,66	11,06	2,75	0,82
AK	7,89	0,03	7,91	0,02	0,61
DK	6,58	0,95	6,83	0,71	0,51
GD	7,59	0,37	7,55	0,41	0,57
DL	7,41	−0,28	8,03	−0,90	0,60
GH	8,06	2,18	8,63	1,61	0,65
MV	7,32	−0,44	7,44	−0,56	0,57
JB	9,48	1,27	10,12	0,63	0,82
UC	9,67	1,99	9,82	1,83	0,80
TS	7,84	0,57	7,83	0,60	0,60
ME	9,69	1,71	9,99	1,40	0,75
IL	10,60	2,79	10,97	2,43	0,84
RN	7,68	3,00	7,61	3,07	0,56
SZ	8,52	1,75	8,79	1,48	0,66
UK	8,44	2,61	8,81	2,25	0,67
Arith. Average	8,73	—	8,99		

TABLE VI

Performance Figures based on Recoverable Crystal

Factory	ERC/S	Factory Performance Index	Overall Recovery (sucrose)
ML	84,35	99,05	82,54
PG	85,59	97,66	83,40
UF	85,61	99,37	85,41
EM	84,66	99,78	84,83
FX	84,36	100,31	84,87
EN	87,20	94,22	82,02
AK	85,13	101,64	86,79
DK	86,41	99,42	86,11
GD	85,44	99,81	85,55
DL	85,53	102,64	87,91
GH	84,98	100,27	84,80
MV	84,23	103,94	87,79
JB	84,30	100,63	85,16
UC	84,00	99,58	83,67
TS	85,90	101,14	87,13
ME	85,44	98,57	84,88
IL	84,61	95,37	81,26
RN	86,07	95,19	82,41
SZ	84,68	100,45	84,83
UK	84,20	99,89	84,27
Average	85,08	100,00	85,17

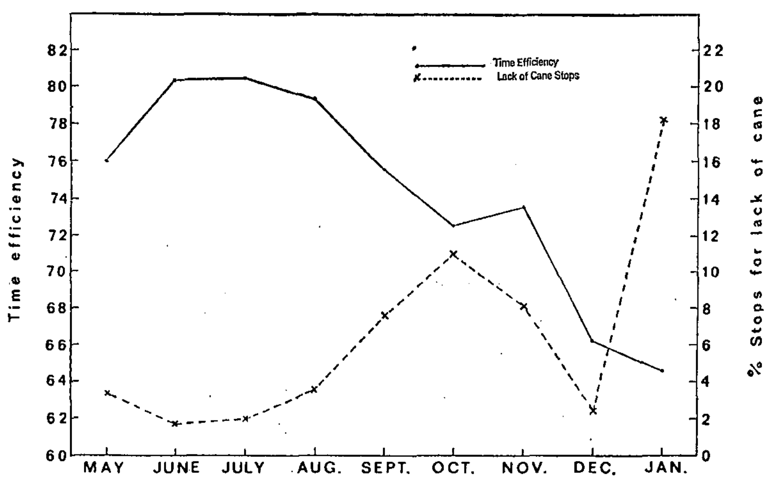

FIGURE 2 Monthly variations in time efficiency (South African Mills)

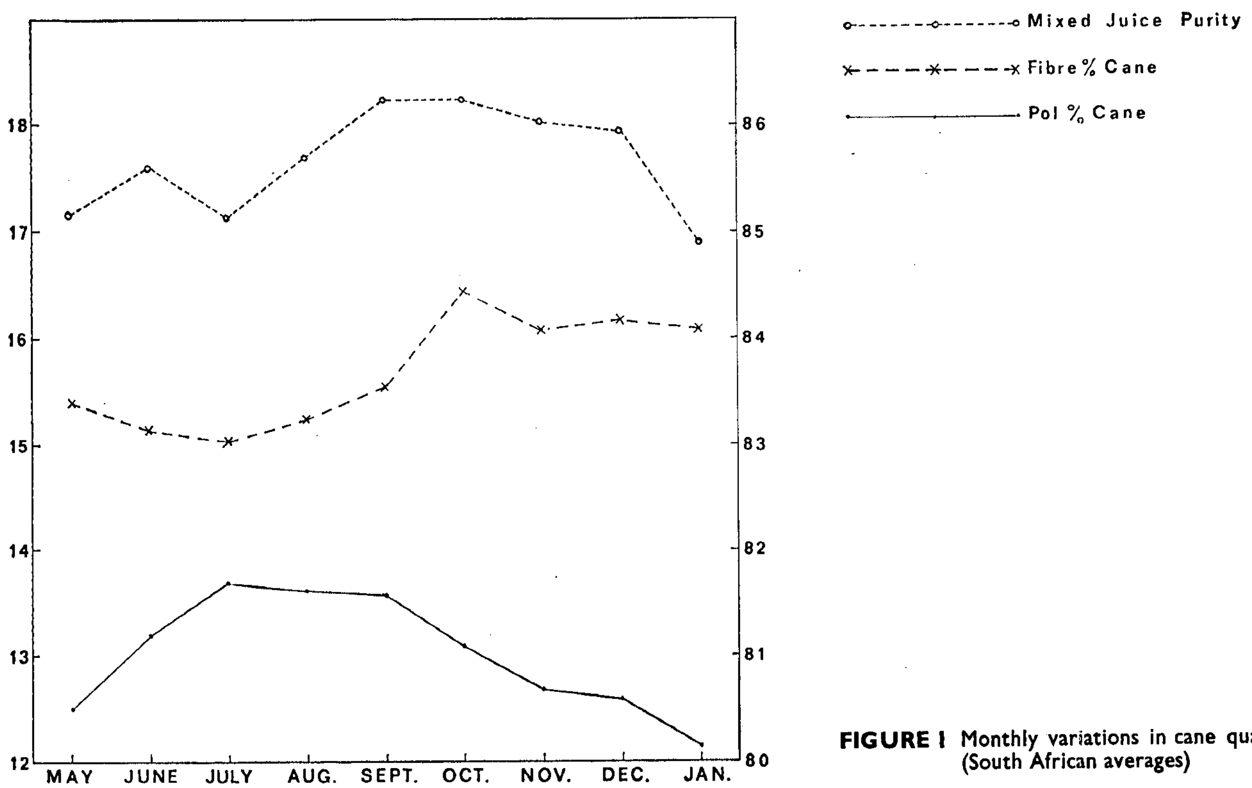

FIGURE 1 Monthly variations in cane quality (South African averages)

TABLE A

SOUTH AFRICAN SUGAR ASSOCIATION FINAL PRODUCTION 1973-74 SEASON
(Metric tons)

Mill	Local Market			Export Market			Total
	White	Refinery Raws	Brown	Very High Pol	Sugar for H.T. Mol. Prod.	Raws for Refined Export	
Malelane . . .	112 851	—	2 160	—	—	—	115 011
Pongola . . .	55 187	—	19 619	—	—	—	74 806
Umfolosi . .	—	694	10 348	102 352	—	—	113 394
Empangeni . .	—	89 615	270	544	9 314	13 603	113 351
Felixton . . .	—	95 259	180	4 708	—	—	100 147
Entumeni . .	11 425	290	1 770	10 383	—	—	23 868
Amatikulu . .	—	62 713	2 310	105 713	—	—	170 736
Doornkop . .	—	2 021	111	37 590	—	—	39 722
Glendale . .	—	21 522	47	137	—	—	21 706
Darnall . . .	—	71 046	259	58 198	—	—	129 503
Gledhow . .	113 179	27 944	45	—	—	—	141 168
Melville . . .	—	17 101	3 064	16 685	—	—	36 850
Jaagbaan . .	—	—	10	80 223	—	—	80 233
Union Co-op .	—	193	102	28 611	—	—	28 906
Tongaat . .	—	63 336	379	110 405	—	—	174 120
Mount Edgecombe .	—	15 605	71 134	11 418	—	—	98 157
Illovo . . .	—	1 115	20 974	31 660	—	—	53 749
Renishaw . .	—	—	15 527	12 398	—	—	27 925
Sezela . . .	71 470	420	115	50 593	—	—	122 598
Umzimkulu . .	—	23	55	65 547	—	—	65 625
Total . . .	364 112	468 897	148 479	727 165	9 314	13 603	1 731 575

TABLE B1

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

SYMBOLS OF FACTORIES	ML	PG	UF A	UF B	EM	FX A	FX B	EN	AK
Tons sugar made*	**115 011**	**74 806**	**113 394**		**113 351**	**100 147**		**23 868**	**170 736**
Percentage of white sugar made	98	74	—		—	—		48	—
Average pol of all sugars made	99,81	99,51	99,28		99,20	99,49		99,67	99,43
Tons crystal made in raw house	115 673	74 613	112 121		112 086	99 370		23 826	169 317
Tons of cane crushed—Total	**1 086 116**	**663 266**	**983 059**		**1 029 657**	**912 849**		**215 600**	**1 506 470**
Tons of cane crushed—per Tandem			**284 752**	**698 307**		**576 962**	**335 887**		
Season started on	30.4.73	22.5.73	11.5.73		3.5.73	3.5.73		7.5.73	4.5.73
Season completed on	15.2.74	17.2.74	18.12.73		20.1.74	21.1.74		30.1.74	12.2.74
Number of crushing days	292	272	222		263	264		269	224
Time account									
Hours crushing % available hours	71,36	66,66	67,12	79,12	80,94	80,36	73,52	76,70	73,22
Hours scheduled stop % available hours	6,75	13,70	1,32	1,36	10,52	10,33	10,28	11,94	9,69
Hours lack of cane % available hours	14,96	5,86	16,84	9,84	3,52	3,90	11,11	4,17	4,25
Hours other stops % available hours	6,94	13,78	14,71	9,68	5,02	5,41	5,09	7,19	12,83
Throughputs per hour actual crushing									
Tons of cane crushed	217,20	153,54	79,78	165,99	209,67	113,75	72,29	43,61	303,07
Tons of fibre milled	29,97	21,06	11,69	22,76	34,71	18,21	12,20	6,14	46,50
Tons of Brix processed	31,95	22,96	36,61		30,33	26,65		6,52	43,43
Tons of sugar produced	22,99	17,31	28,35		23,12	20,42		4,83	34,36
Composition of cane crushed									
Pol % cane	**12,72**	**13,46**	**13,41**		**12,89**	**12,86**		**13,45**	**12,99**
Fibre % cane	**14,67**	**14,19**	**14,67**		**17,05**	**17,18**		**14,60**	**15,91**
Brix % cane	15,46	16,11	14,66		15,41	15,45		15,60	15,50
Tons cane per ton of sugar	9,44	8,87	8,67		9,07	9,11		9,03	8,82
Tons cane per ton of 96° sugar	9,08	8,56	8,38		8,78	8,79		8,70	8,52
Performances									
Imbibition % cane	41,83	29,69	48,58	37,32	49,43	44,07	44,77	43,79	40,65
Imbibition % fibre	303	217	331	272	299	275	265	311	265
Lost absolute juice % fibre	39	45	46	40	31	39	33	25	41
Java ratio	81,40	80,97	80,67	80,61	75,58	77,08	75,41	79,90	78,77
Extraction	95,69	94,50	94,68	95,84	95,97	95,18	95,57	97,11	95,07
Fibre factor	96,19	101,40	100,00	100,00	100,37	104,89	111,11	100,78	106,50
Pol factor	101,05	99,60	99,96	101,00	100,22	99,03	97,75	99,40	97,20
Brix factor	101,80	100,90	—	—	101,20	101,90		101,00	98,60
Pol % fibre in bagasse	3,97	5,40	4,96	4,03	3,14	3,85	3,41	2,76	4,17
Preparation Index	85	86	—	—	84	85	84	—	86
Boiling house recovery	86,83	88,25	89,44		88,39	89,03		84,46	91,29
Overall recovery	83,09	83,40	85,41		84,83	84,87		82,02	86,79
Sucrose balance									
Lost in bagasse (*a*)	4,31	5,50	4,50		4,03	4,67		2,89	4,93
Lost in filter cake (*b*)	0,51	0,67	0,49		0,37	0,54		1,28	0,35
Lost in final molasses (*c*)	10,90	9,68	8,99		9,54	9,32		11,06	7,91
Undetermined losses (*d*)	**1,19**	**0,76**	**0,61**		**1,24**	**0,60**		**2,75**	**0,02**
Boiling house losses ($b+c+d$)	12,60	11,10	10,09		11,15	10,46		15,09	8,28
Sum of all losses ($a+b+c+d$)	16,91	16,60	14,59		15,17	15,13		17,98	13,21

* Figures supplied by S.A. Sugar Association

THROUGHPUTS AND TIME ACCOUNTS, PERFORMANCES AND LOSSES
(Season 1973 - 1974)

DK	GD	DL	GH	MV	JB	UC	TS A	TS B	ME	IL	RN	SZ	UK	Totals and Averages
39 722	**21 706**	**129 503**	**141 168**	**36 850**	**80 233**	**28 906**	**174 120**		**98 157**	**53 749**	**27 925**	**122 598**	**65 625**	**1 731 575**
—	—	—	80	—	—	—	—		—	—	—	58	—	—
99,59	99,43	99,51	99,87	99,36	99,41	99,62	99,50		98,58	99,03	99,02	99,76	99,49	99,45
39 469	21 515	128 942	141 663	36 568	79 408	28 869	172 746		96 022	52 843	27 494	122 640	65 254	1 720 440
340 402	**189 633**	**1 099 183**	**1 256 513**	**322 725**	**759 635**	**282 772**	**1 526 626**		**856 510**	**503 085**	**245 296**	**1 083 840**	**590 452**	**15 453 687**
							496 629	**1 029 997**						
14.5.73	8.5.73	3.5.73	14.5.73	11.5.73	24.5.73	2.5.73	4.5.73		16.5.73	26.4.73	24.5.73	30.4.73	18.5.73	26.4.73
7.2.74	24.1.74	12.2.74	27.1.74	16.1.74	14.12.73	22.12.73	6.2.74		26.1.74	20.1.74	2.12.73	29.12.73	13.12.73	17.2.74
269	262	286	259	251	205	235	279		256	270	193	244	210	251
72,44	70,64	78,14	79,83	71,15	75,07	78,53	73,03	80,79	74,87	73,55	71,36	81,02	74,68	74,88
15,17	13,69	8,63	14,65	12,72	8,77	14,03	6,13	7,97	16,76	10,07	15,19	11,92	14,98	11,33
5,84	13,02	5,41	2,76	7,29	10,49	4,92	11,65	2,16	6,21	11,87	6,42	2,74	7,40	7,23
6,55	2,65	7,82	2,76	8,84	5,67	2,52	9,19	9,08	2,16	4,51	7,04	4,32	2,95	6,59
73,00	42,81	205,89	252,78	75,93	206,89	63,76	102,67	191,01	186,22	106,37	74,70	233,41	157,19	170,23
10,30	6,30	30,05	39,38	12,38	30,82	8,43	16,03	28,53	27,82	14,99	12,21	36,13	22,93	25,54
10,54	8,30	30,41	36,99	10,89	29,27	8,85	42,57		28,02	15,59	11,06	34,62	23,33	24,84
8,52	4,90	24,31	28,40	8,69	21,85	6,53	33,49		21,36	11,36	8,51	26,40	17,50	19,06
13,50	**13,30**	**13,36**	**13,23**	**12,94**	**12,32**	**12,20**	**13,02**		**13,31**	**13,02**	**13,68**	**13,30**	**13,14**	**13,08**
14,58	**15,10**	**15,17**	**16,23**	**16,77**	**16,04**	**14,01**	**15,60**		**15,48**	**14,68**	**16,93**	**16,13**	**15,19**	**15,64**
15,89	15,88	15,93	15,83	15,62	14,85	14,93	15,36		15,87	15,78	16,04	16,02	16,02	15,66
8,57	8,74	8,47	8,90	8,74	9,47	9,76	8,77		8,72	9,36	8,78	8,84	8,98	8,93
8,26	8,44	8,43	8,56	8,44	9,15	9,41	8,46		8,49	9,07	8,51	8,51	8,66	8,62
36,43	42,94	48,71	39,28	44,48	45,14	22,52	46,35	44,07	45,57	38,10	35,91	51,86	50,12	45,04
258	292	334	252	273	303	170	297	295	305	270	220	335	343	288
55	53	42	41	42	27	46	36	29	29	43	39	40	43	38
78,78	77,99	78,48	78,23	76,83	77,81	—	78,08	77,83	79,31	79,07	76,63	78,24	78,82	75,00
93,96	93,81	95,40	95,72	95,05	96,76	95,76	95,25	96,35	96,61	94,97	93,85	95,59	95,56	95,55
101,50	101,53	101,60	105,38	106,77	109,42	100,00	102,80	99,00	106,88	104,19	104,13	106,49	106,29	—
98,80	98,88	98,70	99,64	98,67	97,49	94,22	99,00	97,90	96,34	98,55	96,99	98,18	98,39	—
100,20	100,90	99,20	100,70	101,50	98,80	—	100,40		97,60	99,80	98,00	100,00	100,00	—
5,78	5,55	4,21	3,63	3,93	2,68	3,91	4,00	3,17	3,02	4,65	5,14	3,79	4,00	3,88
87	87	83	89	80	87	75	90	91	90	83	74	89	83	—
91,65	91,19	92,15	88,59	92,37	88,01	87,37	90,78		87,86	85,57	87,80	88,74	88,19	89,13
86,11	85,55	87,91	84,80	87,79	85,16	83,67	87,13		84,88	81,26	82,41	84,83	84,27	85,17
6,04	6,19	4,60	4,28	4,95	3,24	4,24	4,01		3,39	5,03	6,15	4,41	4,44	4,45
0,31	0,30	0,35	0,69	0,38	0,85	0,44	0,45		0,33	0,31	0,76	0,50	0,23	0,48
6,83	7,55	8,03	8,63	7,44	10,12	9,82	7,81		9,99	10,97	7,61	8,79	8,81	8,96
0,71	**0,41**	**—0,90**	**1,61**	**—0,56**	**0,63**	**1,83**	**0,60**		**1,40**	**2,42**	**3,07**	**1,48**	**2,25**	**0,94**
7,85	8,26	7,48	10,92	7,26	11,60	12,10	8,85		11,73	13,71	11,45	10,77	11,29	10,39
13,89	14,45	12,09	15,20	12,21	14,84	16,33	12,87		15,12	18,74	17,59	15,17	15,73	14,83

TABLE C1

ANALYSIS OF BAGASSE, JUICES, FILTER SOUTH AFRICAN MILLS

SYMBOLS OF FACTORIES	ML	PG	UF A	UF B	EM	FX A	FX B	EN	AK
Final Bagasse									
Pol % bagasse	1,71	2,39	1,99	1,75	1,37	1,70	1,52	1,20	1,80
Moisture % bagasse	54,01	52,00	56,25	53,48	53,92	52,57	52,54	54,31	53,47
Fibre % bagasse	43,03	44,26	40,12	43,42	43,63	44,16	44,57	43,48	43,17
Bagasse % cane	32,12	30,98	36,47	31,66	37,96	36,16	37,82	32,26	35,49
LCV in kJ per kg bagasse	6 867	6 388	6 405	6 972	6 899	7 157	7 171	6 828	6 803
First expressed juice									
Brix	18,06	19,08	19,21	18,70	19,17	18,81	19,64	18,85	19,01
Apparent purity	86,53	87,09	88,20	88,22	88,92	88,14	87,86	89,30	88,50
Last expressed juice									
Brix	1,97	—	2,43	1,45	1,26	1,85	1,54	1,24	1,52
Apparent purity	75,28	—	75,18	71,64	63,45	72,12	71,64	53,97	65,52
Purity drop	11,25	—	13,02	16,58	25,47	16,02	16,22	35,33	22,98
Residual juice purity	56,30	63,90	55,74	54,21	55,20	54,93	53,93	60,01	54,70
Purity drop	30,23	23,19	32,46	34,01	33,72	34,14	33,86	29,29	33,80
Mixed juice									
Mixed juice % cane	109,71	98,71	112,10	105,66	111,47	107,91	106,95	111,54	105,16
Brix	13,91	15,15	13,48	14,02	12,98	13,16	13,61	13,41	13,62
Apparent purity	84,05	85,06	85,64	86,03	85,50	85,64	85,41	87,33	86,18
Purity drop	2,48	2,03	2,56	2,19	3,42	2,50	2,45	1,97	2,32
Suspended solids % mixed juice	0,79	0,48	0,60	0,65	0,45	0,85	0,67	0,46	0,54
Reducing sugars / sucrose ratio	6,60	5,70	3,74		3,67	4,80		3,44	3,95
Clarified juice									
Brix	12,92	14,34	13,44		12,86	11,94		13,48	12,88
Apparent purity	84,80	86,16	86,31		86,40	85,63		86,94	87,11
Reducing sugars / sucrose ratio	6,60	4,45	3,66		2,92	4,62		3,55	3,83
Average pH	7,18	7,33	7,00		7,30	7,20		7,53	7,09
Filter cake									
Pol % filter cake	1,52	1,97	1,32		1,08	1,16		3,44	0,91
Filter cake % cane	4,24	4,56	5,00		4,46	6,00		5,00	5,00
Syrup									
Brix	65,76	68,02	59,79		62,60	62,50		66,47	63,10
Apparent purity	86,18	85,74	87,02		86,80	86,89		87,79	88,86
Reducing sugars / sucrose ratio	6,41	4,74	3,96		2,74	4,25		3,14	3,22
Average pH	5,82	6,54	6,30		6,40	6,60		7,03	6,49
Final molasses									
Refracto Brix	85,44	85,36	87,97		88,24	88,28		83,85	85,49
Pol / Refracto Brix purity	36,69	41,79	38,19		—	39,75		—	36,71
Sucrose / Refracto Brix purity	39,76	42,63	40,93		39,42	40,14		44,75	36,78
Percentage reducing sugars	21,47	15,69	14,73		12,50	16,38		10,12	17,70
Percentage sulphated ash	12,03	—	17,54		—	—		8,97	13,34
Reducing sugars / ash ratio	1,78	—	0,84		—	—		1,13	1,33
Molasses at 85° Ref Brix % cane	4,10	3,59	3,46		3,67	3,51		3,91	3,29

CAKE, SYRUP AND FINAL MOLASSES
(Season 1973 - 1974)

DK	GD	DL	GH	MV	JB	UC	TS A	TS B	ME	IL	RN	SZ	UK	Totals and Averages
2,41	2,45	1,82	1,61	1,74	1,23	1,82	1,78	1,36	1,37	1,99	2,29	1,67	1,69	1,69
54,00	51,86	53,42	52,40	52,36	52,11	49,76	52,45	54,82	52,32	53,77	52,06	52,53	54,32	53,19
41,70	43,83	43,23	44,35	44,27	45,90	46,55	44,50	42,90	45,36	42,80	44,55	44,06	42,25	43,67
33,81	33,59	33,81	35,25	36,92	32,57	28,44	35,04	34,78	33,05	32,91	36,68	35,11	34,51	34,33
6 840	7 268	6 981	7 195	7 198	7 269	7 717	7 178	6 719	7 221	6 904	7 235	7 166	6 806	7 033
19,14	19,24	19,31	19,15	19,13	18,31	17,95	19,09	18,90	19,34	19,12	20,13	19,33	19,32	18,99
89,50	88,68	88,19	88,34	88,04	86,50	87,37	88,20	88,14	86,78	86.13	88,70	87,96	86,27	87,84
—	—	2,49	—	1,16	—	—	—	—	1,11	—	2,60	0,79	—	1,63
—	—	73,12	—	71,25	—	—	—	—	66,02	—	75,11	69,62	—	69,86
—	—	15,07	—	16,79	—	—	—	—	20,76	—	13,59	18,34	—	17,98
56,37	56,37	53,16	47,06	49,94	56,87	48,76	59,55	61,29	55,07	58,40	67,92	49,41	49,81	55,16
33,13	32,31	35,03	41,28	38,10	29,63	38,61	28,61	26,85	31,71	27,73	20,78	38,55	36,46	32,68
102,62	109,35	114,90	104,04	107,56	112,56	94,09	111,31	109,30	112,52	105,19	99,23	116,75	115,61	108,81
14,07	13,19	12,86	14,07	13,33	12,56	14,75	13,04	13,25	13,37	13,94	14,92	12,70	12,84	13,42
87,79	86,51	86,30	86,50	85,79	84,28	84,24	86,27	86,24	85,48	84,28	86,75	85,74	84,61	85,66
1,71	2,17	1,89	1,84	2,25	2,22	3,13	1,93	1,90	1,30	1,85	1,95	2,22	1,66	2,18
0,47	0,35	0,50	0,63	0,43	1,02	0,83	0,41	0,41	0,48	0,55	0,58	0,55	0,52	0,58
3,78	5,31	4,47	3,86	3,33	6,55	5,36	5,28		5,30	5,09	3,33	4,43	4,81	4,70
12,60	13,07	11,72	11,52	12,38	12,41	15,03	12,78		12,93	13,31	15,97	12,50	12,38	13,02
88,11	87,70	86,77	86,39	86,77	85,20	84,55	86,60		85,52	85,26	87,52	85,92	86,27	86,30
3,80	4,76	4,33	3,95	3,27	6,14	5,04	4,31		5,05	4,72	3,29	4,35	4,68	4,37
7,20	7,09	7,30	7,24	7,00	7,10	7,10	7,36		7,30	6,85	7,21	7,10	7,11	7,17
0,85	1,29	0,94	2,10	0,98	1,86	1,62	1,24		0,80	1,19	2,14	1,14	0,77	1,30
4,99	3,13	4,97	4,31	5,00	5,67	3,31	4,73		5,60	3,41	4,89	5,85	4,00	4,85
63,70	62,59	65,69	63,15	66,76	61,56	65,13	67,47		68,34	60,33	61,35	63,73	63,61	64,20
88,72	88,15	87,14	86,92	87,44	85,63	84,37	86,57		86,36	84,75	88,19	86,44	85,43	86,82
3,75	4,30	4,08	3,93	3,51	5,92	5,08	4,35		4,98	4,08	3,06	3,97	5,07	4,24
6,60	6,60	6,40	6,57	6,40	6,40	6,30	6,25		6,30	6,33	6,72	6,30	6,65	6,46
88,62	87,03	89,27	85,01	84,65	88,33	82,17	87,22		87,59	86,18	84,32	82,13	81,94	86,19
36,80	37,62	34,19	37,13	37,69	36,10	37,92	36,45		41,03	40,63	39,56	37,95	35,31	37,90
38,17	37,42	37,05	39,77	38,31	38,52	38,60	36,32		42,33	42,02	39,13	39,13	36,84	39,15
17,44	16,13	17,38	15,53	16,08	17,90	13,11	18,53		17,25	16,37	16,14	16,62	16,71	16,76
14,64	15,43	—	—	—	12,57	11,67	14,85		—	11,79	15,33	14,16	14,20	13,47
1,19	1,05	—	—	—	1,42	1,12	1,25		—	1,39	1,05	1,17	1,17	1,20
2,84	3,16	3,41	3,88	2,96	3,81	3,65	3,29		3,70	4,00	3,13	3,51	3,70	3,52

TABLE D1
MASSECUITES, EXHAUSTIONS, CLARIFYING
SOUTH AFRICAN MILLS

SYMBOLS OF FACTORIES	ML	PG	UF	EM	FX	EN	AK	DK	GD
Brix in mixed juice % cane	**14,49**	**14,95**	**14,86**	**14,47**	**14,33**	**14,96**	**14,33**	**14,44**	**14,43**
A-Massecuite									
m^3 per ton Brix in mixed juice	1,22	1,00	0,86	0,97	0,99	1,30	1,01	0,95	1,00
Brix of massecuite	91,56	91,74	92,19	92,47	92,66	92,11	94,13	92,82	91,63
Purity of massecuite	83,97	87,38	87,44	87,10	86,80	86,87	89,62	90,84	88,57
Purity of A-molasses	69,33	71,40	70,17	68,70	72,40	75,41	70,19	75,30	73,34
Purity drop	14,64	15,98	17,27	18,40	14,40	11,46	19,43	15,54	15,23
Exhaustion*	56,85	63,94	66,21	67,49	60,10	53,65	72,73	69,26	64,50
Purity A mc — Purity Syrup	**—2,21**	**—1,64**	**0,42**	**0,30**	**—0,09**	**—0,92**	**0,76**	**2,12**	**0,42**
B-Massecuite									
m^3 per ton Brix in mixed juice	0,46	0,34	0,34	0,35	0,31	0,58	0,31	0,30	0,40
Brix of massecuite	94,60	92,46	93,09	95,15	93,61	95,50	94,19	93,08	92,98
Purity of massecuite	71,42	75,34	66,93	69,30	73,00	77,02	70,38	75,74	74,61
Purity of B-molasses	45,34	56,38	51,33	52,30	51,20	55,22	49,62	56,04	50,82
Purity drop	26,08	18,96	15,60	17,00	21,80	21,80	20,76	19,70	23,79
Exhaustion *	66,81	57,69	47,89	51,42	61,19	63,21	58,55	59,17	64,83
C-Massecuite									
m^3 per ton Brix in mixed juice	0,32	0,29	0,25	0,26	0,27	0,27	0,24	0,26	0,21
Brix of massecuite	97,05	94,39	94,25	97,97	95,76	96,62	96,53	94,69	95,00
Purity of massecuite	56,50	61,41	58,92	56,60	60,30	60,57	57,43	61,25	54,95
Purity of C-molasses	36,69	41,79	38,19	39,00	39,70	45,12	36,71	36,80	37,62
Purity drop	19,81	19,62	20,73	17,60	20,60	15,45	20,72	24,45	17,33
Crystal content **	30,36	33,70	31,60	28,18	32,71	27,20	31,60	36,63	26,00
Exhaustion *	55,38	54,89	56,92	50,98	56,65	46,48	57,01	63,16	50,55
White sugar massecuites									
Kgs sugar per m^3	632	681	—	—	—	619	—	—	—
Total volume of all raw massecuites									
m^3 per ton Brix in mixed juice	2,00	1,63	1,45	1,58	1,57	2,15	1,56	1,51	1,61
Clarifying agents									
Tons limestone per 1 000 T.C.	—	5,96	—	—	—	—	—	—	—
Tons coke per 1 000 T.C.	—	0,64	—	—	—	—	—	—	—
Tons lime per 1 000 T.C.	2,30	—	0,54	0,92	0,53	1,27	0,52	0,40	0,70
Tons sulphur per 1 000 T.C.	0,02	0,01	—	—	—	—	—	—	—
Phosphoric acid ppm mixed juice	—	—	—	—	—	41,50	—	—	—
Flocculents ppm mixed juice	1,43	1,37	4,20	2,56	2,10	4,16	0,36	4,70	2,10
Additional fuels per 1 000 T.C.									
Tons of fuel oil	—	—	—	—	—	—	—	6,17	—
Tons of coal	19,32	20,46	11,08	0,62	36,78	25,92	2,22	—	—
Tons of wood	—	—	—	2,87	—	8,56	—	14,95	1,87
Converted into bagasse***	77,28	81,85	44,32	5,92	147,12	113,95	8,88	54,94	2,24

$$* \text{ Exhaustion} = \frac{10\,000 \text{ (Pty massecuite—Pty run off)}}{\text{Pty massecuite (100—Pty run off)}}$$

$$** \text{ Crystal content} = \frac{\text{(Pty massecuite—Pty run off)}}{\text{100—Pty run off}} \times \text{Bx. Massecuite}$$

AGENTS AND ADDITIONAL FUELS
(Season 1973 - 1974)

DL	GH	MV	JB	UC	TS	ME	IL	RN	SZ	UK	Totals and Averages
14,77	**14,63**	**14,34**	**14,15**	**13,87**	**14,49**	**15,05**	**14,66**	**14,80**	**14,83**	**14,84**	**14,60**
0,93	1,07	1,12	1,06	1,06	1,06	0,95	1,12	1,05	1,06	0,99	1,04
93,40	92,37	91,59	92,11	91,87	93,20	91,99	91,92	91,40	91,20	91,54	92,20
88,32	89,71	88,60	87,40	85,69	87,70	87,00	86,49	88,52	87,34	86,77	87,61
71,02	72,20	72,40	70,60	69,24	71,30	71,37	69,44	73,94	71,78	71,50	71,55
17,30	17,51	16,20	16,80	16,45	16,40	15,63	17,05	14,58	15,56	15,27	16,06
67,59	70,21	66,25	65,38	62,40	65,16	62,75	64,50	63,20	63,13	61,75	64,43
1,18	**2,79**	**1,16**	**1,80**	**1,32**	**1,13**	**0,64**	**1,74**	**0,33**	**0,90**	**1,34**	**0,79**
0,28	0,32	0,36	0,34	0,44	0,39	0,30	0,29	0,38	0,37	0,29	0,36
93,57	93,06	92,87	93,50	92,78	93,20	93,03	92,47	92,76	91,86	92,96	93,34
71,10	73,29	72,60	73,30	70,06	71,50	71,32	71,32	74,55	72,73	73,21	72,44
45,81	48,51	48,10	52,20	48,57	50,10	50,78	50,35	50,89	52,79	52,54	50,95
25,29	24,78	24,50	21,10	21,49	21,40	20,54	20,97	23,66	19,94	20,67	21,49
65,64	65,66	65,02	60,22	59,64	59,98	58,51	59,22	64,62	58,07	59,11	60,48
0,23	0,26	0,21	0,31	0,28	0,24	0,30	0,34	0,25	0,28	0,31	0,27
98,82	94,84	95,55	95,25	94,68	95,60	95,73	97,45	94,36	96,18	94,50	95,76
53,78	57,12	54,60	60,60	56,12	54,90	61,35	60,85	58,43	58,42	58,41	58,13
34,19	37,13	37,69	36,10	37,93	36,45	41,03	40,63	39,56	37,95	35,31	37,90
19,59	19,99	16,91	24,50	18,19	18,45	20,32	20,22	18,87	20,47	23,10	20,23
29,41	30,15	25,93	36,52	27,74	27,70	32,98	33,19	29,55	31,73	33,74	31,00
55,35	55,66	49,70	63,27	52,22	52,78	56,17	55,97	53,43	56,47	61,13	56,00
—	724	—	—	—	—	—	—	—	523	—	—
1,44	1,65	1,69	1,71	1,78	1,69	1,55	1,75	1,68	1,72	1,59	1,67
—	4,78	—	—	—	—	—	—	—	3,06	—	—
—	0,53	—	—	—	—	—	—	—	0,39	—	—
0,69	1,36	0,53	0,78	0,73	0,32	0,70	0,37	0,67	1,63	0,57	0,82
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	177	156	—	—	—	—	—	—	—
1,03	2,08	2,30	7,77	5,15	0,08	—	6,01	6,57	1,11	1,89	3,00
—	—	—	—	—	—	—	—	—	0,04	—	—
—	4,41	5,87	—	5,29	17,24	0,20	6,68	—	3,51	—	—
1,58	1,20	3,42	2,85	0,60	0,20	—	15,29	4,20	0,19	0,34	—
1,90	19,08	27,58	3,42	24,76	69,20	0,80	45,07	5,04	14,51	0,41	36,56

*** 1 m³ fuel oil is equivalent to 5,5 tons of bagasse of 6 978 kJ / kg.
1 ton fuel oil is equivalent to 6 tons of bagasse of 6 978 kJ / kg.
1 ton coal is equivalent to 4 tons of bagasse of 6 978 kJ / kg.
1 ton firewood is equivalent to 1,2 tons of bagasse of 6 978 kJ / kg.

TABLE B2

CANE CRUSHED AND SUGAR MADE, CANE COMPOSITION, THROUGHPUTS AND TIME ACCOUNTS, PERFORMANCES AND LOSSES

(MOZAMBIQUE, SWAZILAND AND MALAWI MILLS)

(Season 1973 - 1974)

SYMBOLS OF FACTORIES	LB	MR	AM	BZ	IC	MA	Totals and Averages	MH	UR	NH
Tons sugar made	80 003	61 527	75 226	19 198	36 699	25 801	298 454	83 812	87 339	48 962
Percentage of white sugar made . .	49	76	32	49	57	42	51	1	25	31
Average pol of all sugar made . .	99,02	99,36	98,31	98,64	99,12	98,60	98,86	98,56	98,91	97,07
Tons crystal made	78 994	61 207	73 422	18 811	36 353	25 309	294 096	81 937	86 019	46 804
Tons of cane crushed	780 508	573 433	668 634	181 701	387 395	247 510	2 839 180	801 713	794 158	479 871
Season started on	21.5.73	23.5.73	19.4.73	5.6.73	17.5.73	18.7.73	19.4.73	29.4.73	7.5.73	4.4.73
Season completed on	17.12.73	14.12.73	14.10.73	30.9.73	25.1.74	30.1.74	30.1.74	10.1.74	12.1.74	28.12.73
Number of crushing days	211	206	179	118	254	197	194	257	251	269
Time account										
Hours crushing % available hours .	83,81	76,79	82,55	72,14	63,66	38,53	68,93	80,01	81,13	78,38
Hours scheduled stops % avail. hours	3,76	2,77	9,16	15,29	15,66	8,44	9,04	4,50	7,59	7,25
Hours lack of cane % avail. hours .	6,90	13,08	1,45	6,27	15,17	37,77	14,20	10,92	7,81	4,32
Hours other stops % avail. hours .	5,53	7,35	6,83	6,30	5,51	15,26	7,83	4,57	3,47	10,04
Throughputs per hour actual crushing										
Tons of cane crushed	184,82	151,95	188,62	95,95	100,34	136,62	149,02	163,40	163,30	96,50
Tons of fibre milled	29,77	22,09	25,73	14,73	14,47	20,54	22,11	23,06	22,03	14,34
Tons of Brix processed	23,88	21,44	28,50	13,67	13,18	21,10	20,64	23,09	24,33	13,77
Tons of sugar produced	18,85	16,21	21,21	9,40	9,46	14,16	16,58	16,98	17,87	9,68
Composition of cane crushed										
Pol % cane	12,49	13,26	13,63	13,14	11,33	13,84	12,91	12,36	13,06	12,36
Fibre % cane	16,11	14,54	13,64	15,35	15,39	15,66	15,03	14,46	13,49	14,86
Brix % cane	14,15	15,60	16,19	16,06	14,17	15,03	15,31	15,17	15,85	16,98
Tons cane per ton sugar	9,76	9,32	8,89	9,46	10,56	9,59	9,51	9,57	9,09	9,80
Tons cane per ton 96° sugar . . .	9,46	9,00	8,68	9,21	10,23	9,34	9,23	9,32	8,82	9,69
Performances										
Imbibition % cane	28,35	24,62	38,37	25,17	31,85	36,01	31,41	34,48	27,76	36,33
Imbibition % fibre	176	179	281	164	221	230	209	244	206	244
Lost absolute juice % fibre . . .	45	56	42	62	43	56	49	42	39	—
Java ratio	—	—	81,55	75,85	77,80	74,06	78,55	80,88	80,74	79,64
Extraction	91,15	91,24	93,95	89,56	93,40	92,90	92,19	93,75	95,08	95,11
Pol % fibre in bagasse	6,86	7,99	6,04	8,93	5,18	6,53	6,79	5,47	4,76	4,07
Boiling house recovery	89,17	88,14	86,36	88,57	88,75	79,92	87,29	88,89	87,59	84,23
Overall recovery	81,28	80,41	81,14	79,33	82,89	74,25	80,47	83,34	83,28	80,11
Sucrose balance										
Lost in bagasse (*a*)	8,85	8,76	6,05	10,44	6,60	7,10	7,81	6,25	4,92	4,89
Lost in filter cake (*b*)	0,69	0,37	0,32	0,83	0,20	1,21	0,53	0,83	0,42	0,70
Lost in final molasses (*c*)	8,04	8,32	10,77	8,17	9,02	11,22	9,20	8,65	9,35	10,10
Undetermined losses (*d*)	1,13	2,13	1,72	1,23	1,29	6,22	1,99	1,38	2,03	4,19
Boiling house losses ($b+c+d$) . .	9,87	10,82	12,81	10,23	10,51	18,65	11,72	10,41	11,80	15,00
Sum of all losses ($a+b+c+d$) . .	18,72	19,59	18,86	20,67	17,11	25,75	19,53	16,66	16,72	19,89

TABLE C2

ANALYSIS OF BAGASSE, JUICES, FILTER CAKE, SYRUP AND FINAL MOLASSES (MOZAMBIQUE, SWAZILAND AND MALAWI)

(Season 1973 - 1974)

SYMBOLS OF FACTORIES	LB	MR	AM	BZ	IC	MA	Totals & Averages	MH	UR	NH
Final bagasse										
Pol % bagasse	2,98	3,41	2,73	3,92	2,40	2,80	2,99	2,50	2,11	1,60
Moisture % bagasse	53,25	52,91	51,35	50,90	50,39	52,29	52,18	50,89	52,61	53,66
Fibre % bagasse	43,44	42,67	45,20	43,90	46,33	42,87	44,04	45,70	44,33	41,04
Bagasse % cane	37,10	34,03	30,25	34,96	31,16	35,10	33,75	30,86	30,48	37,83
LCV in kJ per kg bagasse	7 017	7 017	7 359	7 399	7 566	7 167	7 181	7 461	7 132	6 942
First expressed juice										
Brix	C.L.	C.L.	19,42	20,05	17,44	20,49	19,16	S 18,41	S 19,07	S 19,03
Apparent purity	C.L.	C.L.	86,07	86,38	83,49	85,31	85,36	83,02	84,62	83,13
Last expressed juice										
Brix	S 5,75	S 5,04	1,53	5,63	3,72	2,19	3,98	S 3,34	S 2,34	S 3,98
Apparent purity	77,22	77,76	76,47	73,71	72,08	76,25	75,58	73,92	67,18	76,63
Purity drop	10,85	8,79	9,60	12,67	11,41	9,06	9,78	9,10	17,44	6,50
Mixed juice										
Mixed juice % cane	91,29	91,99	108,12	90,21	100,69	94,55	97,33	103,61	97,28	98,51
Brix	S 14,23	S 15,34	13,97	15,80	13,17	15,51	14,67	S 13,64	S 15,31	S 14,84
Apparent purity	86,55	85,73	84,77	82,57	80,56	83,29	84,98	82,03*	83,12	81,77
Purity drop	1,52	0,82	1,30	3,81	2,93	2,02	—	0,99	1,50	1,36
Reducing sugars/sucrose ratio	4,31	3,63	7,63	8,62	6,84	3,87	5,55	6,64	5,04	4,18
Clarified juice										
Brix	S 13,93	S 14,22	13,62	15,59	12,79	15,29	14,24	S 13,20	S 14,73	13,89
Apparent purity	88,59	85,87	85,32	86,27	81,94	84,63	85,44	84,76	85,05	86,47
Reducing sugars/sucrose ratio	4,14	3,77	6,94	6,04	6,15	3,55	5,03	5,33	4,85	3,89
Average pH	7,0	7,0	7,0	7,0	7,1	7,5	7,1	7,2	7,3	7,2
Filter cake										
Pol % filter cake	1,59	0,98	1,48	2,78	0,57	3,38	1,55	1,48	1,12	1,98
Filter cake % cane	5,44	5,00	2,93	3,94	4,04	4,96	4,43	3,16	4,89	4,37
Syrup										
Brix	S 65,97	S 60,12	65,33	56,70	60,28	59,29	61,57	S 63,07	S 65,88	57,29
Apparent purity	85,51	86,52	85,08	87,74	83,48	84,84	85,28	83,39	84,87	84,64
Reducing sugars/sucrose ratio	3,32	3,19	7,05	4,80	6,26	3,94	4,77	5,12	4,72	3,83
Average pH	6,6	6,8	—	7,0	6,5	6,4	6,6	6,6	6,4	6,7
Final molasses										
Refracto Brix	S 82,37	S 88,10	84,95	85,45	S 95,14	S 81,66	85,83	S 90,98	S 93,25	S 89,34
Pol/Refracto Brix purity	—	—	40,58	40,25	35,78	46,34	—	36,40	35,72	37,38
Sucrose/Refracto Brix purity	42,38	41,67	—	40,13	36,59	S 45,17	41,08	—	38,12	39,12
Percentage reducing sugars	14,90	21,20	18,95	—	19,70	—	16,49	18,49	18,02	11,98
Percentage sulphated ash	14,14	—	14,48	—	14,57	14,47	—	—	14,30	—
Reducing sugars/ash ratio	1,05	—	1,31	—	1,35	—	—	—	1,26	—
Molasses 85° Ref. Brix % cane	S 2,79	S 3,11	4,26	3,15	S 3,28	S 3,76	3,37	3,46	S 3,77	3,76

S = Spindle Brix   * Gravity purity

TABLE D2

MASSECUITES, EXHAUSTIONS, CLARIFYING AGENTS AND ADDITIONAL FUELS
(MOZAMBIQUE, SWAZILAND AND MALAWI MILLS)
(Season 1973 - 1974)

SYMBOLS OF FACTORIES	LB	MR	AM	BZ	IC	MA	Totals and Averages	MH	UR	NH
Brix in Mixed Juice % Cane . . .	**12,92**	**15,34**	**13,97**	**15,79**	**13,17**	**15,51**	**14,45**	**13,64**	**15,31**	**14,84**
A-Massecuite										
m³ per ton Brix in mixed juice . .	1,01	0,75	0,74	0,74	0,92	0,79	0,83	0,98	0,96	0,89
Brix of massecuite	S 91,07	S 92,36	90,82	90,33	S 92,79	92,56	91,66	S 92,77	S 91,54	90,71
Purity of massecuite	86,92	85,02	83,71	86,07	85,38	85,24	85,39	84,49	86,20	83,66
Purity of A-molasses	73,12	70,18	66,13	72,26	67,66	68,39	69,62	67,55	68,36	68,25
Purity drop	13,80	14,84	17,58	13,81	17,72	16,85	15,77	16,94	17,84	15,41
Exhaustion	59,06	58,53	62,00	57,84	64,17	62,54	60,69	61,79	65,41	58,02
Purity A mc-Purity Syrup . . .	1,41	−1,50	−1,37	−1,67	1,90	0,40	0,11	1,10	1,33	−0,98
B-Massecuite										
m³ per ton Brix in mixed juice . .	0,38	0,48	0,39	0,43	0,40	0,40	0,41	0,49	0,35	0,29
Brix of massecuite	S 92,53	S 95,11	92,28	90,96	S 95,82	93,49	93,37	S 93,72	S 94,35	92,97
Purity of massecuite	75,02	74,60	74,32	77,11	73,74	76,06	75,14	74,00	71,86	72,33
Purity of B-molasses	54,17	56,24	58,01	58,07	50,13	59,42	56,01	47,66	47,97	53,41
Purity drop	20,85	18,36	16,31	19,04	23,61	16,64	19,14	26,34	23,89	18,92
Exhaustion	60,64	56,24	52,26	58,89	64,20	53,91	57,69	62,89	63,89	56,14
C-Massecuite										
m³ per ton Brix in mixed juice . .	0,30	0,27	0,28	0,29	0,25	0,28	0,28	0,29	0,32	0,27
Brix of massecuite	S 96,87	S 99,33	94,25	93,48	S 99,24	95,90	96,51	S 96,85	S 97,76	96,56
Purity of massecuite	61,53	62,44	60,65	61,86	58,56	64,32	61,56	60,76	58,77	58,41
Purity of C-molasses	38,47	36,51	40,58	40,25	35,78	46,34	39,66	36,40	35,72	37,38
Purity drop	23,06	25,93	20,07	21,61	22,78	17,98	21,90	24,36	23,05	21,03
Crystal % massecuite	36,30	40,56	31,82	33,81	35,20	32,14	35,03	37,09	35,05	32,42
Exhaustion	60,91	65,40	55,69	58,47	60,57	52,10	58,95	63,04	61,02	57,49
White sugar massecuites										
kgs sugar per m³	—	—	—	—	—	—	—	—	503	673
Total volume of all raw massecuites										
m³ per ton Brix in mixed juice . .	1,69	1,50	1,41	1,46	1,57	1,47	1,52	1,76	1,63	1,45
Clarifying agents										
Tons lime per 1 000 T.C. . . .	1,78	1,51	0,94	1,29	*1,26	1,39	—	1,04	0,97	1,45
Tons sulphur per 1 000 T.C. . .	0,25	0,01	—	0,05	0,31	—	—	—	—	—
Phosphoric acid ppm mixed juice .	2,12	1,02	2,07	—	1,20	1,62	—	—	—	—
Flocculents ppm mixed juice . .	1,12	2,84	4,32	3,66	3,00	6,08	—	0,62	1,27	1,78
Additional fuels per 1 000 T.C.										
Tons of fuel oil	1,18	0.95	—	—	—	—	—	—	—	—
Tons of coal	0,38	7,86	7,50	—	—	—	—	4,23	9,74	—
Tons of wood	4,15	17,09	—	0,07	—	—	—	—	—	8,89
Converted into bagasse	13,58	57,65	30,00	0,08	—	—	—	16,91	38,96	10,67

* Also used 0,25 tons Magox per 1 000 T.C.

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

SEASON	1973/74	1972/73	1971/72	1970/71	1969/70
CANE					
Sucrose % cane	13,08	13,26	12,97	13,61	12,88
Fibre % cane	15,64	14,82	14,82	15,34	15,03
JUICES					
Brix of first expressed juice	18,99	18,95	18,55	20,10	19,00
Purity of first expressed juice	87,84	88,67	86,83	86,83	86,08
Purity of mixed juice	85,66	86,66	85,14	84,99	84,25
Reducing sugars/sucrose ratio	4,70	4,17	4,29	3,86	4,17
MILLING					
Imbibition % fibre	288	279	277	285	274
Imbibition % cane	45,04	41,35	41,05	43,17	41,22
Extraction	95,55	95,55	95,91	95,41	94,98
Pol % bagasse	1,69	1,75	1,61	1,80	1,89
Moisture % bagasse	53,19	52,85	52,66	53,07	53,30
Bagasse % cane	34,33	33,70	32,97	34,61	34,18
LCV bagasse kJ/kg	7 033	7 099	7 143	7 052	7 005
Available kJ in bagasse/kg Brix mixed juice	16 537	16 183	16 119	15 967	16 479
RECOVERIES					
Boiling House recovery	89,13	89,48	89,41	88,57	88,58
Overall recovery	85,17	85,50	85,76	84,51	84,13
Tons cane per ton sugar	8,93	8,77	8,93	8,64	9,10
FILTER CAKE					
Pol % filter cake	1,30	1,34	1,34	1,46	1,58
Filter cake % cane	4,85	4,77	4,73	4,82	4,49
FINAL MOLASSES					
Gravity purity	39,16	40,03	39,40	38,94	38,43
Weight @ 85° Brix % cane	3,52	3,30	3,26	3,69	3,55
AVERAGE SUGAR POLARISATION	99,45	99,46	99,36	99,38	98,68
SUCROSE BALANCE					
Lost in filter cake	0,48	0,48	0,49	0,51	0,55
Lost in final molasses	8,96	8,46	8,43	8,96	9,01
Undetermined losses	0,94	1,11	1,23	1,43	1,29
Lost in Boiling House	10,39	10,05	10,15	11,05	10,85
Lost in bagasse	4,45	4,45	4,09	4,59	5,02
Total losses	14,83	14,50	14,24	15,64	15,87
m^3 MASSECUITE PER TON BRIX MIXED JUICE					
A-Massecuite	1,04	1,01	1,02	1,00	0,94
B-Massecuite	0,36	0,36	0,35	0,36	0,36
C-Massecuite	0,27	0,23	0,26	0,27	0,28
Total	1,67	1,60	1,63	1,63	1,58
EXHAUSTION OF MASSECUITES					
A-Massecuite	64,43	64,10	63,38	64,75	65,01
B-Massecuite	60,48	60,57	60,72	61,06	60,96
C-Massecuite	56,00	54,87	56,85	55,21	56,25
PURITY RISE					
A-Massecuite purity	87,61	88,22	87,60	87,60	87,11
Syrup purity	86,82	87,36	86,53	86,37	85,45
Rise	0,79	0,86	1,07	1,29	1,66
BRIX OF SYRUP	64,20	63,22	62,53	62,12	61,03

TABLE FI

AVERAGE MANUFACTURING RESULTS BY MONTHLY PERIODS FOR SOUTH AFRICAN MILLS
(Season 1973 - 1974)

END OF MONTHLY PERIOD		June 2 1973	June 30 1973	July 28 1973	Sept. 1 1973	Sept. 30 1973	Oct. 27 1973	Dec. 1 1973	Dec. 29 1973	Jan 31 1974	Feb. 17 1974
TONS SUGAR MADE AND ESTIMATED	Month	163 881	213 782	219 896	264 316	204 723	181 685	225 149	137 334	108 617	12 192
	To-date	163 881	377 663	597 558	861 874	1 066 597	1 248 283	1 473 432	1 610 766	1 719 383	1 731 575
TONS CANE CRUSHED	Month	1 527 906	1 865 946	1 854 153	2 250 162	1 752 389	1 630 247	2 078 973	1 289 743	1 064 705	139 463
	To-date	1 527 906	3 393 852	5 248 004	7 498 166	9 250 555	10 880 803	12 959 776	14 249 519	15 314 224	15 453 687
TONS CANE CRUSHED PER HOUR ACTUAL CRUSHING	Month	164,63	172,91	171,21	170,37	170,00	166,85	169,22	171,73	175,34	193,00
	To-date	164,63	169,08	169,83	169,99	169,99	169,51	169,46	169,67	170,05	170,23
POL % CANE	Month	12,50	13,22	13,72	13,64	13,59	13,09	12,71	12,62	12,11	11,15
	To-date	12,50	12,89	13,19	13,32	13,37	13,33	13,23	13,18	13,10	13,08
FIBRE % CANE	Month	15,37	15,12	15,08	15,27	15,55	16,43	16,08	16,17	16,08	15,66
	To-date	15,37	15,23	15,18	15,21	15,27	15,44	15,55	15,60	15,64	15,63
TONS CANE PER TON 96° SUGAR .	Month	9,00	8,43	8,14	8,22	8,26	8,66	8,91	9,06	9,46	11,12
	To-date	9,00	8,68	8,48	8,40	8,37	8,42	8,50	8,54	8,60	8,62
LOST ABSOLUTE JUICE % FIBRE .	Month	39	38	36	38	37	39	38	40	42	41
	To-date	39	38	37	37	37	38	38	38	38	38
IMBIBITION % FIBRE	Month	288	287	293	292	290	283	285	281	282	316
	To-date	288	287	290	290	290	289	288	288	287	288
POL EXTRACTION	Month	95,49	95,69	95,82	95,82	95,76	95,39	95,48	95,25	94,87	93,97
	To-date	95,49	95,60	95,68	95,72	95,73	95,68	95,65	95,61	95,57	95,55
POL % BAGASSE	Month	1,65	1,70	1,73	1,71	1,70	1,68	1,65	1,69	1,74	1,94
	To-date	1,65	1,68	1,70	1,70	1,70	1,70	1,69	1,69	1,69	1,69
MOISTURE % BAGASSE	Month	53,68	53,47	53,27	53,06	52,97	52,90	52,95	53,11	53,46	54,14
	To-date	53,68	53,56	53,46	53,34	53,27	53,21	53,17	53,16	53,18	53,19
BOILING HOUSE RECOVERY . .	Month	89,31	90,10	89,69	89,39	89,29	88,78	88,74	88,22	88,29	82,42
	To-date	89,31	89,76	89,73	89,63	89,56	89,45	89,34	89,24	89,18	89,13
OVERALL RECOVERY	Month	85,28	86,21	85,94	85,65	85,50	84,69	84,73	84,02	83,76	77,45
	To-date	85,28	85,81	85,86	85,79	85,74	85,58	85,45	85,33	85,23	85,17
MIXED JUICE PURITY	Month	85,11	85,59	85,11	85,68	86,23	86,24	86,04	85,99	84,90	82,66
	To-date	85,11	85,38	85,28	85,40	85,56	85,66	85,72	85,74	85,69	85,66
R.S. / SUCROSE RATIO	Month	5,24	4,83	5,08	4,80	4,28	4,27	4,27	4,34	5,20	6,75
	To-date	5,24	5,01	5,03	4,96	4,83	4,75	4,67	4,64	4,68	4,70
PURITY OF FINAL MOLASSES . .	Month	38,20	38,04	38,05	38,67	39,72	40,27	40,37	40,22	39,09	40,89
	To-date	38,20	38,12	38,09	38,27	38,54	38,80	39,04	39,14	39,14	39,16
SUCROSE LOST IN FINAL MOLASSES % SUCROSE IN CANE	Month	9,14	8,38	8,82	8,75	8,78	9,27	9,09	9,24	9,32	12,55
	To-date	9,14	8,71	8,75	8,75	8,76	8,83	8,87	8,90	8,93	8,96
UNDERTERMINED LOST SUCROSE % SUCROSE IN CANE	Month	0,58	0,64	0,60	0,94	1,01	0,94	1,15	1,48	1,26	3,66
	To-date	0,58	0,62	0,61	0,71	0,77	0,79	0,85	0,90	0,93	0,94

TABLE F2

AVERAGE MANUFACTURING RESULTS BY MONTHLY PERIODS FOR MOZAMBIQUE MILLS
(Season 1973 - 1974)

END OF MONTHLY PERIOD		June 2 1973	June 30 1973	July 28 1973	Sept 1 1973	Sept 30 1973	Oct 27 1973	Dec 1 1973	Dec 29 1973	Jan 31 1974	FINAL
TONS SUGAR MADE AND ESTIMATED	Month	12 683	33 845	31 401	66 348	49 964	30 199	27 315	10 612	8 153	441
	To-date	12 683	46 527	66 498	136 497	192 248	200 014	259 079	289 860	298 013	298 454
TONS CANE CRUSHED	Month	135 474	376 290	297 886	621 143	424 387	262 623	254 720	124 511	99 186	10 278
	To-date	135 474	511 764	677 948	1 355 720	1 839 425	1 860 389	2 426 444	2 729 717	2 828 902	2 839 180
TONS CANE CRUSHED PER HOUR ACTUAL CRUSHING	Month	185,44	148,78	125,12	172,39	151,41	144,22	145,40	134,95	115,01	120,06
	To-date	185,44	157,00	138,81	161,54	151,08	146,22	150,68	149,13	149,15	149,02
POL % CANE	Month	11,88	11,05	12,69	12,91	14,05	14,11	13,24	11,41	10,81	9,97
	To-date	11,88	11,27	12,07	12,24	12,65	13,01	12,96	13,00	12,92	12,91
FIBRE % CANE	Month	12,68	14,42	14,27	14,81	15,00	15,43	16,11	16,57	17,69	17,81
	To-date	12,68	13,96	13,76	14,38	14,60	14,73	14,86	14,92	15,02	15,03
TONS CANE PER TON 96° SUGAR	Month	10,43	10,82	9,24	9,08	8,25	8,47	9,02	11,39	11,79	—
	To-date	10,43	10,71	9,92	9,65	9,30	9,05	9,10	9,15	9,21	9,23
LOST ABSOLUTE JUICE % FIBRE	Month	44	45	54	66	48	58	54	—	—	—
	To-date	44	45	52	56	48	47	49	50	49	49
IMBIBITION % FIBRE	Month	298	200	220	207	210	208	193	183	182	—
	To-date	298	224	228	218	212	220	209	210	209	209
POL EXTRACTION	Month	94,22	93,13	92,23	92,75	92,51	92,45	90,65	—	91,01	—
	To-date	94,22	93,43	92,67	92,98	92,66	93,00	92,36	92,23	92,20	92,19
POL % BAGASSE	Month	2,45	2,37	3,08	2,75	3,09	3,01	3,37	—	2,88	—
	To-date	2,45	2,39	2,89	2,65	2,83	2,77	2,96	2,99	2,99	2,99
MOISTURE % BAGASSE	Month	51,43	52,31	51,64	51,48	52,22	51,85	52,40	—	49,57	—
	To-date	51,43	52,10	51,81	51,77	52,10	51,87	52,17	52,26	52,17	5 ,18
BOILING HOUSE RECOVERY . .	Month	82,15	86,23	88,96	88,29	89,45	86,95	88,75	84,73	82,72	—
	To-date	82,15	85,08	86,42	87,33	88,08	87,62	88,22	87,54	87,40	87,29
OVERALL RECOVERY	Month	77,40	80,30	82,05	81,89	82,75	80,38	80,45	73,81	75,28	—
	To-date	77,40	79,49	80,09	81,20	81,61	81,49	81,48	80,74	80,58	80,47
MIXED JUICE PURITY	Month	81,61	81,97	83,41	86,05	87,08	87,10	86,13	84,52	78,52	73,78
	To-date	81,61	81,87	82,36	84,18	84,81	85,08	85,33	85,23	85,02	84,98
R.S./SUCROSE RATIO	Month	11,39	7,32	6,31	5,56	4,21	6,04	4,59	6,21	8,38	10,55
	To-date	11,39	8,46	7,86	6,53	5,74	6,03	5,59	5,45	5,54	5,55
PURITY OF FINAL MOLASSES . .	Month	RS41,33	RS38,72	RS39,06	RS41,66	RS40,80	RS42,50	RS41,60	RS41,03	RS40,48	—
	To-date	RS41,33	RS39,59	RS39,38	RS40,35	RS40,29	RS40,72	RS40,67	RS41,10	RS41,08	RS41,08
SUCROSE LOST IN FINAL MOLASSES % SUCROSE IN CANE	Month	13,70	10,08	8,45	8,79	8,22	9,72	8,29	8,45	10,42	—
	To-date	13,70	11,09	10,23	9,60	9,11	9,32	8,97	9,11	9,15	9,13
UNDETERMINED LOST SUCROSE % SUCROSE IN CANE	Month	2,75	2,26	1,29	1,50	1,10	1,85	1,40	4,34	4,33	—
	To-date	2,75	2,40	1,94	1,69	1,47	1,66	1,44	1,87	1,94	2,06

TABLE G
CANE VARIETIES
(Season 1973 - 1974)

SYMBOLS OF FACTORIES	ML	PG	UF	EM	FX	EN	AK	DK	GD	DL	GH	MV	JB	UC
CANE VARIETIES CRUSHED														
N.Co. 376	74,2	45,4	6,8	18,1	29,7	73,7	22,5	80,9	60,6	78,2	70,9	74,5	18,4	4,5
N.Co. 310	11,9	51,9	62,3	13,5	19,4	1,4	0,4	0,2	5,4	2,0	1,6	0,5	0,2	—
N.Co. 293	—	0,1	—	—	—	17,2	0,1	4,8	2,4	—	0,2	—	45,3	77,4
N.50/211	—	—	0,5	0,1	0,3	0,5	0,1	—	0,6	0,2	0,3	0,1	0,8	—
N.Co. 382	0,4	0,1	9,6	0,3	6,1	2,1	0,1	1,1	0,3	—	0,8	—	23,6	16,1
Co. 331	—	—	—	—	—	—	—	—	4,4	—	—	—	1,6	1,0
N.Co. 339	—	—	0,4	—	—	—	—	—	—	—	0,1	0,1	—	—
N.Co. 292	—	—	—	—	—	—	—	—	—	—	—	—	—	—
N.Co. 334	5,9	0,1	—	—	—	—	—	0,6	—	—	0,1	0,4	—	—
Co. 281	—	—	—	—	—	—	—	—	—	—	—	—	—	—
N.51/539	—	—	—	—	—	—	—	—	—	—	0,2	0,2	0,1	—
N.51/168	—	—	0,6	0,2	0,8	—	—	—	0,2	—	—	—	—	0,1
N.53/216	—	—	—	0,1	1,2	1,0	0,1	1,5	1,4	0,3	1,1	0,3	1,2	0,2
CB. 36/14	—	0,6	0,5	0,1	0,7	0,4	0,1	0,4	—	0,1	0,4	0,8	2,4	0,6
CB. 38/22	—	0,2	0,6	—	0,1	0,1	—	—	—	—	—	—	—	—
N. 55/805	—	0,2	10,8	3,7	11,9	3,1	2,5	10,1	16,0	12,2	12,8	2,9	0,2	—
N. /6	—	—	—	—	0,2	—	—	—	—	0,1	—	—	0,1	0,1
Mixed Varieties	7,5	1,0	7,3	63,3	28,8	—	73,6	—	8,1	6,6	10,8	19,8	5,5	—
Rainfall during 1973 (in mm)	674	773	955	1 110	1 557	1 096	1 041	1 202	859	1 064	840	921	984	1 168

AND RAINFALL

TS	ME	IL	RN	SZ	UK	Average South African Mills	LB	MR	AM	BZ	IC	MA	MH	UR	NH
70,9	49,4	49,2	82,3	81,8	84,9	51,83	45,0	47,3	98,9	95,0	71,5	—	87,4	68,6	19,4
2,0	4,0	4,1	2,9	1,6	1,4	10,31	15,0	29,0	1,1	5,0	12,7	100,0	9,1	21,2	78,5
0,4	2,4	29,7	—	0,3	5,8	5,46	—	—	—	—	—	—	—	—	—
2,1	0,8	0,4	1,2	0,4	—	0,50	—	—	—	—	—	—	—	—	—
2,0	0,3	7,5	1,7	0,8	0,1	3,19	27,2	20,2	—	—	—	—	—	—	—
—	—	—	—	—	0,1	0,18	—	—	—	—	—	—	—	—	—
0,2	0,2	—	—	—	—	0,09	—	—	—	—	—	—	—	—	—
—	—	1,7	0,7	—	—	0,08	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	0,47	—	—	—	—	—	—	2,5	5,0	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
0,2	—	—	0,1	—	0,1	0,08	—	0,6	—	—	—	—	—	—	—
0,3	—	0,1	—	0,1	—	0,17	0,2	0,7	—	—	—	—	—	—	—
1,0	0,4	0,4	0,6	2,4	0,2	0,70	0,2	0,6	—	—	—	—	—	—	—
0,7	—	1,5	—	1,7	0,3	0,61	0,6	—	—	—	—	—	0,1	0,4	—
—	—	—	—	—	—	0,10	1,8	0,4	—	—	—	—	—	0,3	—
13,9	17,8	4,1	9,0	3,6	6,2	7,48	—	0,4	—	—	—	—	0,8	4,5	—
0,1	—	0,3	0,7	0,1	0,2	0,10	—	—	—	—	—	—	—	—	—
5,6	24,0	0,5	0,3	6,6	0,1	18,66	10,00	0,8	—	—	15,7	—	—	—	2,0
938	1 082	844	788	815	835	—	1 067	1 316	944	890	972	1 526	906	718	724

TABLE H

TRANSPORT SUMMARY SOUTH AFRICAN MILLS
(Season 1973 - 1974)
Percent of cane transported

	ML	PG	EM	FX	EN	AK	DK	GD	DL	GH	MV	JB	TS	ME	IL	RN	SZ	UK	UF	Aver-* age	UC
South African Railways . . .	16,0	—	29,3	61,7	—	10,8	—	—	—	15,7	—	21,9	—	15,9	3,7	—	2,9	—	22,7	13,0	7,2
Bogey trucks (narrow gauge) . .	—	—	—	—	—	—	—	—	—	—	—	—	—	—	20,4	—	—	—	—	0,7	—
Tram	—	100,0	33,6	38,2	—	—	41,4	—	—	—	—	—	—	—	1,0	—	—	—	75,9	14,8	—
Hilo	84,0	—	15,1	0,1	—	61,6	—	16,3	71,5	77,2	47,2	18,8	90,6	67,3	74,9	59,5	93,8	—	—	50,0	—
Lorry	—	—	0,6	—	96,4	2,7	13,9	34,2	12,8	4,3	38,7	42,4	4,1	16,7	—	20,4	2,8	35,4	1,4	10,0	92,8 (Lorry and Tractor)
Tractor	—	—	21,3	—	3,5	24,9	44,6	49,4	15,7	2,8	13,9	16,1	5,2	—	—	19,9	0,3	6,5	—	9,2	
Trailer	—	—	0,1	—	—	—	—	—	—	—	—	0,6	—	—	—	—	—	57,9	—	2,3	—

* Average does not include UC

TABLE J

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

Period (Season)	Percent Cane		Cane/Sugar Ratio		Extraction	Lost Absol. Juice % Fibre	Percent Bagasse		Imbibition Percent		Mixed Juice		Final Molass. 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	58	3,88	50,57	27,6	175	85,09	3,65	45,3	83,67	75,12
Average 1935-1944	13,33	15,30	8,96	8,73	92,05	49	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	39	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	40	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	40	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	40	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	41	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	39	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	40	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	41	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	42	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	44	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	41	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	45	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	42	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	41	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	42	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	43	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	42	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	39	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	37	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	37	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	37	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	41	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	38	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	38	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	38	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	34	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	34	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	31	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**	**29**	**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	39	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	38	1,69	53,19	**45,0**	**288**	85,66	4,70	39,2	89,13	85,17