THIRTY-THIRD ANNUAL SUMMARY OF CHEMICAL LABORATORY REPORTS

by Chs. G. M. PERK

A.—PRODUCTION DATA FOR SOUTH AFRICAN SUGAR FACTORIES IN RECENT YEARS

TABLE A

CANE and SUGAR PRODUCTION from 1948 till 1957 inclusive.

(Tons of 2,000 lbs.)

Season	Cane Crushed	Sugar Produced	Season	Cane Crushed	Sugar Produced
1948-49	5,216,144	607,845	1953-54	6,221,531	725,529
1949-50	4,929,580	561,122	1954-55	7,374,241	828,555
1950-51	5,721,300	685,789	1955-56	8,005,990	938,980
1951-52	4,805,249	532,505	1956-57	7,533,371	848,645
1952-53	5,722,583	670,188	1957-58	8,594,618	959,872

As a result of the constantly-increasing demand for sugar on the local market, the Sugar Industry has been forced into an early start of the milling season and in consequence some thousands of tons of cane were crushed which could have produced at least 10 per cent more sugar when harvested at a more normal starting time. Another setback was the heavy flowering experienced this season and sucrose failed to rise to its expected peak. Unusually heavy and persistent rains—though of inestimable value to next season's crop—aggravated the position for the 1957-58 crop. Flooding rivers and consistent rain interfered considerably with the harvesting of the sugar crop, hampered haulage and delayed planting operations. When the Umfolozi and Umhlatuzi rivers burst their banks extensive damage was done to growing crops. In particular the low-lying cane fields in the Umfolozi area where the river took a new course across the fields planted with cane, great losses were incurred. Flooding of the Pongola river did damage to the tramline bridge approaches, while the flooding of the Umfolozi tramline bridge forced the Umfolozi mill to close several times in October, owing to shortage of cane. Destruction of the railway bridge across the Ifafa river affected South Coast supplies. The collapse of a span of the railway bridge across the Tugela river at Mandeni cut off the normal daily flow of 1,300 tons of sugar from Zululand to Durban. Moreover, harvesting had to be stopped in two areas in Zululand, because of the need to divert cane to mills north of the Tugela River.

The following Table shows the monthly rainfall in inches compared with the normal:

	1957	1958	Normal
January	3.91	9.16	4.22
February	5.89	7.25	4.75
March...	4.62	2.80	5.42
April	6.49	—	2.53
May	0.72	—	2.06
June	0.31	—	1.55
July	1.34	—	1.09
August	1.10	—	1.41
September	7.15	—	2.40
October	6.17	—	3.45
November	3.93	—	4.25
December	4.17	—	4.76

However, in spite of all these misfortunes, a record crop has been made. The sugar produced amounts to 959,872 tons or 20,892 tons more than in the 1955-56 season. To produce this quantity of sugar 8,594,618 tons of cane had to be cut and crushed, or 388,628 tons more than in the 1955-56 season, the previous record season.

Two factories exceeded the 100,000 tons of sugar mark. Tongaat made 115,813 tons and Darnall 110,066 tons of raw sugar and government grade. Natal Estates bagged also more than 100,000 tons of sugar, i.e. 100,633 tons; however, about 7 per cent of the sugar bagged did not originate from their own cane, but from remelted outside raws. When we realise that more than half the sugar bagged had been remelted in order to produce refined sugar, then we may conclude that the achievement of Natal Estates is certainly at par with the others.

We want to place on record that during this season a third refinery plant was commissioned, i.e. the new refinery department of Sezela. The process applied by Sezela differs from that used by Natal Estates in that Sezela produces raw sugar first. This sugar is afterwards converted into refined white sugar by applying the carbonatation process to the raw sugar melt.

In the coming season Gledhow will follow Sezela, while Umfolozi will follow suit in the 1959-60 season. Gledhow will also apply the carbonatation process, but Umfolozi will use sulphitation to purify the melt.

Another event of the coming season will be the commissioning of the first of the two factories planned for Swaziland.

B.—GENERAL

As Shire's Mill closed down after completion of the 1955-56 season, this season again there were eighteen mills in operation. However, this Annual Summary records the results of seventeen mills only, i.e. of those mills which operate within the mutual control scheme. Since these seventeen mills crushed 99.2 per cent of all cane crushed and produced 99.2 per cent of all sugars made, the data recorded in this Annual Summary are largely representative for the whole South African Sugar Industry.

Table B (shown underneath) renders a comparison of the main operational data as obtained in recent years.

TABLE B

Comparison of General Results of Recent Years

Season	1954-55	1955-56	1956-57	1957-58
Lost Absolute Juice per cent Fibre	44.1	45.5	42.1	40.9
Boiling House Performance	97.4	97.9	97.7	98.5
Sucrose Extraction	92.4	92.3	92.9	93.4
Boiling House Recovery ...	90.0	90.5	89.8	90.4
Overall Recovery	83.2	83.6	83.4	84.4
Tons Cane/Tons Sugar	8.87	8.51	8.87	8.93
Sucrose per cent Cane	13.34	13.87	13.35	13.11
Fibre per cent Cane	16.03	15.74	15.81	15.38

The reduction in percentage of juice lost indicates a material improvement in milling performance. This improvement started in 1956 and is continued during the last season.

The increase in boiling house performance is a gradual, but a persistent one. The average of the decade 1925-1934 included values to 90.6 per cent, in the next decade (1935-1944) it has gone up to 95.4 per cent, and the average of the 1945-1954 period is 96.8 per cent. Over the same periods the lost juice percentage was reduced from 58.4 per cent, *via* 48.9 per cent to 45.5 per cent (see Table VII at the end of this Summary).

The improvement in milling performance is partly due to extension of the tandems, partly to improved technique. The improvement in boiling house performance is a result of lower final molasses purity, and lower undetermined losses.

As a result of the improved mill performance and assisted by the lower fibre percentage of the cane, the sucrose extraction was higher than in previous years. Owing to the higher boiling house performance the boiling house recovery figure is higher than expected with a view to the low juice purity.

The ratio between tons of cane and tons of sugar has been high this season, notwithstanding the higher overall recovery, as a result of the low sucrose content and the low juice purity of the cane.

NOTE

All data under the heading "Sezela" in the different tables in this Annual Summary refer to the performance of the raw house side of this factory-cum-refinery. This holds, too, for the quantity of sugar mentioned for Sezela in Table I. However, the total quantities of white sugar, government grade and raw sugars for all seventeen factories shown in Table I refer to the actual sugar bagged and delivered by these factories. The difference in total amount of sugars in this table and in Table A (on the first page of the Summary) is the sugar made by Glendale.

We want, once more, to draw attention to Table VII, the last table at the end of the Summary. This table will be particularly useful when results of previous years are to be compared. By request the results of Taiwan (Formosa) and Java have been included but the data of Queensland, also requested, have not been included. As the weighing of mixed juice is not standard practice in Queensland, Queensland's figures are less suitable for comparison with the results of other countries where weighing of mixed juice and imbibition water is standard practice. (Table VI).

C.—CANE QUALITY

TABLE C

Comparison of Results Between: Cane Harvested during the July-November period and Cane Harvested during earlier and later months of the same Harvesting Season

	Per cent. Total Cane	Ratio Cane/ Sugar	Sucrose Per cent. Cane	Fibre Per cent. Cane	Purity Mixed Juice
MEAN 1945-1954					
Optimum Period...	70.09	8.35	14.14	16.06	86.20
Balance of Crop ...	29.91	9.24	12.98	16.05	85.43
1955-56 SEASON					
Optimum Period...	59.14	8.13	14.45	15.60	86.39
Balance of Crop ...	40.86	9.12	13.04	15.95	85.27
1956-57 SEASON					
Optimum Period...	68.18	8.51	13.84	15.70	86.19
Balance of Crop ...	31.82	9.76	12.29	16.02	83.84
1957-58 SEASON					
Optimum Period...	60.31	8.44	13.73	15.24	85.86
Balance of Crop ...	39.69	9.77	12.18	15.59	84.24

The difference in results between the optimum period and the balance of the crop is affected by the ratio between the tonnages of cane harvested in the optimum period and the balance of the crop, but this is not the case when we compare the results of the different optimum periods. To facilitate this comparison, we have drawn up Table D.

TABLE D

Comparison of Results of the Optimum Periods of Recent Years

Season	Ratio Cane/ Sugar	Sucrose per cent Cane	Fibre per cent Cane	Purity Mixed Juice
1950-51 ...	7.92	14.79	15.99	86.69
1951-52 ...	8.88	13.47	16.36	84.94
1952-53 ...	8.16	14.39	15.98	86.71
1953-54 ...	8.26	14.32	16.31	86.07
1954-55 ...	8.53	13.79	15.96	86.42
1955-56 ...	8.13	14.45	15.60	86.39
1956-57 ...	8.51	13.84	15.70	86.19
1957-58 ...	8.44	13.73	15.24	85.86

Table D reveals that we have to go as far back as the 1951-52 season to find an optimum period with a lower sucrose content and a lower juice purity than last season. Owing to the improved factory per-

formance—milling as well as processing—and assisted by the lower fibre content of the cane, the cane to sugar ratio is not only better than that of the optimum period of the 1951-52 season but also lower than that of the 1954-55 season.

D.—THE VARIETAL TRENDS

The underfollowing Table E shows that the main change in the varieties at present in commercial cultivation is the steady replacement of the older Co. varieties by the newer N:Co. varieties. This change began with the replacement of **Co.281**, but now also **Co.301** is rapidly declining in importance and the first signs that **Co.331** (the last Co. variety to be distributed) is losing ground, have appeared.

N:Co.310 is still increasing but the increase is slowing down now the extension has passed the 50 per cent mark. Regarding the newer varieties, it seems that **N:Co.293** reached its summit with 3.22 per cent in the 1956-57 season and **N:Co.339** has taken the lead now with 4.26 per cent in last season. **N:Co.376** and **N:Co.292**, two other promising newer varieties, will be regularly recorded in future.

TABLE E

Percentage Ratios of the Varieties Crushed during Recent Years

Season	1954–55	1955–56	1956–57	1957–58
Co.301... ...	20.97	14.93	12.05	7.18
Co.331... ...	25.27	23.46	23.16	20.92
N:Co.310 ...	49.41	55.66	57.00	60.05
N:Co.292 ...	—	—	—	—
N:Co.293 ...	0.10	1.00	3.22	3.00
N:Co.339 ...	0.05	1.35	1.77	4.26
N:Co.376 ...	—	—	—	—
Rest	4.20	3.60	2.80	4.59

E.—GENERAL FACTORY PERFORMANCE

The usual statistical data regarding the time efficiency achieved and the length of the season are tabulated in the following schedule. As a result of the early start, the rains and the floods, the required number of weeks to crush the bigger crop have been higher than expected on account of an only slightly increased crushing rate and a lower time efficiency.

TABLE F

Season	1955-56	1956-57	1957-58
Number of Factories Crushing	17	17	17
Total Tons of Cane Crushed ...	7,917,674	7,468,376	8,508,184
Total Hours Mill Open	84,832	79,081	91,633
Number of Weeks Mill Open .	35	32	37
Total Hours Actual Crushing	77,390	72,881	81,949
Number Actual Crushing Days	190	179	201
Mean Time Efficiency	91	92	89
Total Hours of Stoppage per cent Hours Mill Open	9	8	11
Hours Cane Shortage per cent Hours Mill Open...	4	4	6

Table G shows the individual crushing rates (t.c.h.) of all factories in recent years. Again it has to be mentioned that the crushing rates in general have been adversely affected by the rains.

TABLE G

Individual Crushing Rates (t.c.h.) in Recent Years

Season ...	1953-54	1954-55	1955-56	9156-57	1957-58	Increase per cent
PG ...	—	49	65	72	79	60
UF ...	145	151	158	155	176	21
ZSM ...	98	113	127	124	126	29
FX ...	90	100	135	148	149	66
EN ...	15	16	17	17	18	20
AK ...	94	103	106	101	103	10
DK ...	33	40	42	42	50	52
DL ...	150	171	182	184	188	25
GL ...	86	97	109	112	117	36
MV ...	36	40	50	51	52	44
CK ...	44	43	42½	42	41	—
TS ...	171	174	190	194	200	17
NE ...	146	152	157	159	164	12
IL ...	59	64	71	64	65	10
RN ...	42	42	44	43	44	—
SZ ...	108	124	118	130	136	26
UK ...	28	31	33	32	36	30
Aggregate Crushing Rate (t.c.h.):	1,345	1,511	1,647	1,670	1,744	30
Arithmetical Average Crushing Rate (t.c.h.):	84	89	97	98	103	23
Weighted Mean Crushing Rate (t.c.h.):	89	93	102	102	104	17

F.—REGARDING THE MILLING TRAINS

The average performance of all tandems in recent years is shown in the next table.

TABLE H

Season	1955-56	1956-57	1957-58
Tons Fibre per hour ...	16.06	16.20	15.96
Imbibition per cent Fibre	204	222	224
Lost Absolute Juice per cent Fibre... ...	45.5	42.1	40.9
Sucrose per cent Cane ...	13.87	13.35	13.11
Fibre per cent Cane	15.74	15.81	15.38
Imbibition per cent Cane	32.1	35.2	34.5
Sucrose Extraction ...	92.32	92.93	93.36
Sucrose per cent Bagasse.	2.91	2.60	2.47
Moisture per cent Bagasse	53.18	53.12	53.06

The top half of the table shows the performance based on fibre, i.e. lost absolute juice per cent fibre, the crushing rate in tons fibre per hour and the ratio between imbibition water applied and fibre. We see that the performance is improving from 1955-56 on. The lower half of the table shows the sucrose extraction and since this figure is strongly affected by the fibre content of the cane, sucrose extraction alone cannot be used for evaluating the mill performance. It is a purely quantitative figure and suitable only for financial calculations.

The following table reveals the individual performances and the part each factory has played in

the general improvement. The last column shows the difference between last year's performance and the performance in 1954-55.

TABLE I

Individual Percentages of Lost Absolute Juice in Recent Years

Season	1954-55	1955-56	1956-57	1957-58	Reduction (−) Increase (+)
PG ...	60.2	55.0	46.3	42.0	−18.2
UF ...	51.6	53.6	43.8	45.6	−6.0
ZSM	47.7	53.1	55.5	51.3	+3.6
FX ...	54.2	57.5	47.3	44.5	−9.7
EN ...	50.5	45.3	45.1	45.3	−5.2
AK ...	45.0	47.5	38.0	40.2	−4.8
DK ...	49.2	47.5	50.9	53.5	+4.3
DL ...	56.7	49.3	36.1	38.3	−18.4
GL ...	46.0	43.9	48.2	50.9	+4.9
MV ...	46.6	48.8	47.2	47.2	+0.6
CK ...	49.8	47.5	48.0	43.5	−6.3
TS ...	29.1	31.0	34.5	33.9	+4.8
NE ...	31.8	36.0	37.2	29.6	−2.2
IL ...	43.0	43.8	37.2	32.0	−11.0
RN ...	35.6	38.0	36.8	30.4	−5.2
SZ ...	37.1	39.4	37.9	38.2	+1.1
UK ...	43.6	44.9	45.7	47.1	+3.5
Mean ...	44.08	45.46	42.08	40.91	−3.17

Table I shows that Pongola is gradually improving, notwithstanding the fact that the crushing rate is gradually increasing too. As a result of the difficulties encountered during the last season Umfolozi's improvement came to a stop. The average lost juice percentage of ZSM shows a slight improvement, notwithstanding the high crushing rate. Another factory crushing far above the capacity rating of its tandem is Gledhow and last season it crushed even faster than the previous season, i.e. 17.26 t.f.h. against 16.98 t.f.h. With a view to the further increase in crushing rate it is not surprising that the average percentage for lost juice increased again.

Another factory we want to draw attention to is Natal Estates. During the off-season another mill (with the same big size of rollers as the crusher-mill) was installed at the rear of the train, while the front side of the train was strengthened by replacing the motivator of the crusher-mill by a more powerful one. Notwithstanding that the fibre crushing rate was increased from 25.97 (1956-57) to 26.74 tons per hour, the lost juice percentage dropped from 37.2 to 29.6 per cent.

We also want to draw attention to Illovo's figures. During the off-season the second crusher was dismantled, but during the season a shredder of the Searby type was installed in its place. Last season when operating with two crushers 37.2 per cent of juice was lost. In the beginning of this season when operating with one crusher, lost juice amounted to 39.0 per cent. This ratio improved immediately after the shredder had been installed; the best monthly figure with shredder being 26.3 per cent lost juice on fibre.

Renishaw has also to be mentioned. Here the lost juice dropped from 37 to 30 per cent.

TABLE J

Degree of Mixing (Imbibition Efficiency)

Season	1954-55	1955-56	1956-57	1957-58
PG	59	57	47	52
UF	53	46	53	50
ZSM	51	54	55	54
FX	58	54	43	39
EN	25	29	27	30
AK	64	67	45	42
DK	64	62	65	82
DL	59	46	44	46
GL	92	71	65	64
CK	85	85	52	62
MV	42	51	44	47
TS	51	52	51	49
NE	40	39	37	37
IL	44	32	44	44
RN	61	53	57	54
SZ	62	68	69	63
UK	51	59	50	53

The imbibition water and the diluted juices used for maceration can mix only with the juice present in open cells. Hence, the degree of mixing is related to the percentage of cells opened by the crushing action of the mill units. Further, the earlier a high per-percentage of cells are opened, the greater is the opportunity for the diluted juices to mingle with the juice present in these opened cells. In this connection we draw attention to the fact that the three tandems, where the shredder precedes the first crushing unit, show the highest figures for degree of mixing.

G.—REGARDING THE PERFORMANCE OF THE BOILING HOUSE

To evaluate the results in a qualitative manner, the boiling house performance data are used, the boiling house recovery figure being a purely quantitative evaluation like sucrose extraction. Table K shows the b.h.p. figures of the individual factories for recent years and it shows, too, which factories have contributed to the rise in the average figure.

TABLE K

Boiling House Performance

Season	1954-55	1955-56	1956-57	1957-58
PG	94.6	96.7	97.3	98.3
UF	97.1	97.2	97.8	97.5
ZSM	97.6	97.8	97.6	95.8
FX	98.2	98.3	97.5	98.0
EN	95.9	96.0	96.3	95.4
AK	98.7	99.4	97.5	99.3
DK	95.1	96.3	96.3	97.2
DL	97.3	98.5	97.6	98.5
GL	97.2	98.0	98.0	98.9
MV	97.9	97.0	96.9	98.8
CK	96.6	95.9	95.8	97.2
TS	98.4	97.8	96.3	98.6
NE	95.9	97.9	97.4	98.9
IL	99.1	98.0	99.1	99.7
RN	97.5	97.9	97.2	98.5
SZ	97.5	98.5	98.6	100.0
UK	99.2	98.0	98.7	98.7
Mean	97.43	97.92	97.44	98.45

We want to mention here, especially those factories which show a big improvement in recent years. For example, the Pongola mill which increased its b.h.p. figure from 94.6 (in 1954) to 98.3 per cent (1957); Doornkop from 95.1 to 97.2; Darnall from 97.3 to 98.5; Gledhow from 97.2 to 98.9; Natal Estates from 95.9 per cent to 98.9 per cent; Renishaw from 97.5 to 98.5, and finally Sezela from 97.5 per cent to 100.0 per cent b.h.p.

There are two factors which particularly affect the magnitude of the b.h.p., i.e. the purity of the final molasses and the undetermined sucrose losses. In the next table (Table L) the purities of the final molasses of individual factories for recent years are compiled. As also the averages for each season are shown, the table shows too which factories have contributed to the drop in final molasses purity.

As Illovo obtained the lowest molasses purity this year, we want to mention this factory first: the purity dropped from 40.5 in 1954 to 33.4 in 1957. Secondly we want to draw attention to the achievements of Sezela. Notwithstanding the fact that a refinery department was added to the factory plant, Sezela kept its molasses purity on the same low level, because Sezela could keep the purity of its final strike below 60° purity, a necessity for proper exhaustion.

TABLE L

Gravity Purity of Final Molasses

Season	1954-55	1955-56	1956-57	1957-58
PG	41.8	41.1	40.9	38.2
UF	38.9	39.7	38.5	39.5
ZSM	37.8	38.2	37.7	40.0
FX	38.8	39.7	40.4	38.8
EN	41.7*	42.6*	41.4*	42.0*
AK	38.9	39.3	41.0	38.9
DK	39.3*	38.7*	39.1*	39.9*
DL	37.3	39.4	40.1	38.9
GL	38.7	38.3	38.4	38.5
MV	39.7	40.2	42.2	38.9
CK	39.2	39.6	39.1	38.4
TS	38.5	39.1	40.8	39.0
NE	47.2	45.4	46.7	43.6
IL	40.5	40.3	35.6	33.4
RN	38.6*	39.2*	39.5*	36.3*
SZ	36.8	35.4	34.7	34.1
UK	38.5*	38.3*	38.1	37.4
Mean	39.29	39.58	39.88	38.52

* Apparent Purity

The third factory to be mentioned is Natal Estates —not because of its low purity—but because of the drop in purity of final molasses, i.e. from 47.2 in 1954 to 43.6 in 1957. Where the purity of the A-strike is as high as 93.3 and only three successive strikes are boiled, a result of 43.6 purity is really an achievement. Another achievement to be mentioned is the drop in purity of Pongola's final molasses, i.e. from 41.8 in 1955 to 38.2 in 1957.

TABLE M

Undetermined Sucrose Losses (Per cent Sucrose in Cane) for Recent Years

Season	1954-55	1955-56	1956-57	1957-58
PG	2.59	1.46	0.84	0.30
UF	1.06	1.55	1.48	1.42
ZSM	0.95	1.06	1.12	1.83
FX	1.17	(unkn)	(unkn)	1.08
EN	1.54	1.18	0.78	1.71
AK	0.74	0.66	1.46	0.61
DL	1.12	0.72	1.24	0.65
DK	2.71	1.34	2.27	(unkn)
GL	1.54	1.33	1.50	1.10
MV	1.34	0.77	1.58	1.13
CK	(unkn)	0.94	(unkn)	1.39
TS	1.36	1.32	1.88	1.42
NE	3.30	1.84	1.82	1.12
IL	0.45	0.96	0.82	1.05
RN	0.74	0.90	1.21	1.04
SZ	(unkn)	(unkn)	(unkn)	(unkn)
UK	(unkn)	(unkn)	(unkn)	(unkn)
Weighted Mean (estimated)...	1.44	1.21	1.44	1.04

Table M regarding the undetermined losses is also worthwhile studying. We see how the undetermined sucrose losses of Natal Estates dropped from 3.30 per cent to 1.12 per cent and of Pongola where these losses were reduced from 2.59 to 0.30 per cent. It is a matter of regret, however, that the undetermined sucrose losses of three of the seventeen factories cannot be shown. By estimating the weight of final molasses of these three factories an average undetermined sucrose loss for all seventeen factories was calculated. The estimation of the unknown molasses weights have been made by assuming for each of these three factories an appropriate figure for the ratio between non-sucrose present in total final molasses and non-sucrose present in mixed juice. Table N shows these ratios for the individual mills for recent years.

TABLE N

Ratio between Non-Sucrose in Mixed Juice and Non-Sucrose in Total Final Molasses

Season	1954-55	1955-56	1956-57	1957-58
PG	0.82	0.81	0.80	0.83
UF	0.82	0.74	0.74	0.70
ZSM	0.88	0.86	0.93	0.88
FX	0.75	(unkn)	(unkn)	0.76
EN	0.77	0.83	0.78	0.88
AK	0.74	0.70	0.76	0.81
DK	0.87	0.83	0.82	(unkn)
DL	0.86	0.80	0.77	0.79
GL	0.84	0.82	0.79	0.74
MV	0.76	0.79	0.76	0.74
CK	(unkn)	(unkn)	(unkn)	0.85
TS	0.79	0.76	0.81	0.73
NE	0.52	0.54	0.56	0.59
IL	0.68	0.75	0.89	0.86
RN	0.88	0.83	0.74	0.78
SZ	(unkn)	(unkn)	(unkn)	(unkn)
UK	(unkn)	(unkn)	(unkn)	(unkn)
Arithmetical Average ... ... (excl. NE)	0.80	0.79	0.78	0.80

H.—LIME, SULPHUR AND PHOSPHORIC CONSUMPTIONS

In Table III (at the end of this Summary) the consumptions of lime, sulphur and phosphoric paste for each mill as well as the average consumptions for sulphitation and for defecation factories are shown. The consumptions are indications in pounds of clarifying agents per ton of cane and per ton of sugar but also as parts per 1,000 parts of brix present in mixed juice.

Sulphitation has been practised during the whole season by Entumeni, Doornkop, Gledhow, Chaka's Kraal, Renishaw and Sezela and for part of the season by ZSM and Pongola.

Defecation has been used exclusively by Umfolozi, Felixton, Amatikulu, Darnall, Melville, Tongaat, Illovo and Umzimkulu, and for part of the season by ZSM and Pongola.

NOTE—The consumption ratios reported in Table III at the end of this Summary refer to the average consumptions over the whole season for each factory. In the last column of Table III the consumption ratios for defecation and sulphitation are shown separately.

Table I.—CANE CRUSHED, CANE QUALITY, VARIETIES, SUGARS PRODUCED, TIME ACCOUNT AND THROUGHPUT

FACTORY...	PG	UF	ZSM	FX	EN	AK	DK	DL	GL	MV	CK	TS	NE	IL	RN	SZ	UK	Totals Averages
Crushing period—From	**10.6.57**	**31.5.57**	**1.5.57**	**1.4.57**	**29.5.57**	**1.4.57**	**14.6.57**	**1.4.57**	**26.4.57**	**16.4.57**	**17.4.57**	**7.5.57**	**8.5.57**	**23.5.57**	**29.5.57**	**13.6.57**	**17.5.57**	**1.4.57**
—To	**22.2.58**	**22.1.58**	**17.2.58**	**10.2.58**	**17.2.58**	**21.12.57**	**1.2.58**	**12.1.58**	**13.1.58**	**18.1.58**	**22.1.58**	**11.1.58**	**18.1.58**	**18.3.58**	**9.2.58**	**11.2.58**	**26.12.57**	**18.3.58**
CANE CRUSHED—Tons of 2,000 lb.	363,591	705,550	698,769	818,527	90,082	541,048	193,669	992,381	596 037	261,465	214,490	989,542	819,602	293,419	203,738	578,559	147,716	8,508,184
—*Metric tons*	329,844	640,065	633,913	742,555	81,721	490,831	175,694	900,273	540,716	237,197	194,582	897,698	743,531	266,131	184,828	524,860	134,005	7,716,923
CANE QUALITY																		
Sucrose per cent	14.30	13.14	13.43	12.13	13.23	13.24	13 32	12.93	13.18	13.12	12.86	13 33	13 15	12.77	13.13	13.14	13.64	13.11
Fibre per cent	14.53	14.19	16.74	15.51	14.17	16.01	14 51	15.01	14.79	15.23	14.99	14.46	16.29	15.45	16.48	16.58	15.46	15.38
Java Ratio	80.50	80.04	77.63	77.85	79.37	77.91	78.78	77.87	78.07	79.03	77.26	79.06	77.45	79.04	78.53	78.49	79.45	78.73
Tons Cane per ton Sugar	8.08	9.05	9.15	9.80	9.15	8.80	9.05	8.93	9.04	8.96	9.27	8.54	8.80	9.04	8.87	8.67	8.56	8.93
Tons Cane per ton of 96° Sugar	7.88	8.83	8.90	9.55	8.84	8.55	8.75	8.71	8.72	8.73	8.97	8.31	8.46	8.73	8.58	8.44	8.34	8.67
VARIETIES CRUSHED																		
Co.301 per cent	0.17	1.48	2.01	4.94	0.36	0.96	4.30	6.57	9.67	18.59	9.50	9.95	13.90	2.37	16.57	14.04	2.97	7.18
Co.331 per cent	3.28	6.10	7.31	17.01	41.57	22.78	25.14	20.72	10.20	23.26	32.00	30.09	22.21	29.32	34.25	43.34	28.98	20.92
N:Co.310 per cent	94.26	86.76	86.14	65.90	37.84	73.38	52.37	60.70	50.47	46.09	49.87	45.09	51.28	52.13	36.51	29.38	58.61	60.05
N:Co.293 per cent	1.19	0.15	0.90	0.55	16.62	0.78	15.43	3.91	5.06	1.38	3.19	3.14	2.26	8.65	5.68	3.19	3.95	3.00
N:Co.339 per cent	0.83	4.25	2.34	2.57	3.40	1.60	2.27	3.75	2.39	7.97	3.41	10.13	5 82	5.78	3.63	3.25	3.73	4.26
Other Varieties per cent	0.27	1.26	1.29	9.03	0.21	0.50	0.49	4.35	22.21	2.71	2.03	1.60	4.53	1.75	3.36	6.80	1.76	4.59
TOTAL RAINFALL, Year 1957 (ins.)	37.10	54.80	48.28	58.62	49.51	45.01	49.79	48.32	51.49	49.16	52.12	46.60	42.25	57.47	44.52	38.00	40.58	47.86
SUGARS																		
—White Sugar	3,332	—	9,715	—	5,803	—	12,610	—	52,314	—	10,811	—	92,415	19,162	13,869	—	21	284,411
Tons of 2,000 lb.—Government Grade	19,733	17,309	60,191	8,338	1,912	7,125	4,185	3,940	5,733	6,713	6,539	19,445	667	6,195	4,214	—	8,550	180,797
—Raw Sugar	21,947	60,687	6,469	75,136	2,134	54,345	4,557	107,118	7,878	22,480	5,790	96,368	—	7,052	4,885	66,648	8,689	485,535
Total Sugar made—Tons of 2,000 lb.	45,012	77,996	76,375	183,474	9,849	61,470	21,352	111,066	65,925	29,193	23,140	115,813	93,082	32,409	22,968	66,648	17,260	950,743
—*Metric tons*	40,826	70,757	69,272	75,711	8,935	55,753	19,366	100,737	59,806	26,483	20,992	105,064	84,444	29,395	20,836	60,523	15,658	862,324
White Sugar per cent Total Sugar Made	7.40	—	12.72	—	60.20	—	59.35	—	79.35	—	46.72	—	99.28	59.13	60.38	—	0.12	29.91
Ave rage Polarization of All Sugars	98.37	98.37	98.68	98.47	99.33	98.80	99.26	98.51	99.53	98.52	99.18	98.55	99.89	99.39	99.24	98.77	98.46	90.83
TIME ACCOUNT																		
Hours Actual Crushing per cent. Hours Mill Open	91.34	83.29	91.68	84.31	94.10	93.50	82.14	88.42	94.73	88.05	93.24	93.50	95.70	76.60	92.28	87.47	90.69	89.43
Hours of Stoppage due to Shortage of Cane per cent. Hours Mill Open	2.33	12.94	3.47	3.02	2.44	3.28	6.15	5.03	2.63	6.76	3.54	2 92	2.68	19.77	6.19	6.52	6.15	5.61
Hours Mechanical Losses per cent. Hours Mill Open	6.31	2.12	2.92	3.21	2.04	3.22	11.71	6.56	2.64	5.20	3.21	3.53	1 62	1.40	1.53	3.20	3.16	3.69
THROUGHPUTS																		
Tons of Cane crushed per hour Actual Crushing	78.63	176–16	125.56	149.08	17.67	102.58	50.32	188.15	116.67	52.32	40.61	200.4	164.18	64 88	43 61	135.52	36.20	103.82
Tons of Fibre milled per hour Actual Crushing	11.42	25.00	21.76	23.12	2.60	16.42	7.30	28.24	17.26	7.97	6.09	28.98	26.74	10 02	7.19	22.47	5.60	15.96
Tons of Brix processed per hour Actual Crushing	12.37	26.14	17.78	20.15	2.49	14.85	7.08	26.91	16.46	7.45	5.69	29.45	24.03	9.28	6.38	19.34	5.28	14.94
Tons of Sugar bagged per hour Actual Crushing	9.73	19.47	13.72	15.20	1.93	11.65	5.56	21.06	12.90	5.84	4.38	23.46	18 65	7.17	4.92	15.63	4.23	11.63

Table. II.—SUCROSE BALANCE, RECOVERIES, BAGASSE, JUICES, FILTER CAKE AND SYRUP.

FACTORY...	PG	UF	ZSM	FX	EN	AK	DK	DL	GL	MV	CK	TS	NE	IL	RN	SZ	UK	Averages
SUCROSE BALANCE (Sucrose per cent. Sucrose in Cane)																		=
Sucrose in Bagasse (A)	6.04	6.73	9.30	7.27	7.21	7.10	8.45	5.99	8.13	7.81	6.86	5.18	4.83	5.33	5.52	6.48	7.80	6.64
Sucrose in Filter cake (B)	0.81	0.80	0.40	0.44	1.27	0.25	0.56	0.36	0.31	0.21	0.41	0.33	0.47	0.32	0.28	—	0.34	0.45
Sucrose in Final Molasses (C)	7.70	8.27	8.14	8.44	7.71	7.29	—	7.70	6.91	7.04	8.10	6.53	7.29	7.26	7.95	—	—	7.44
Undetermined Losses (D)	0.30	1.42	1.83	1.08	1.71	0.61	—	0.65	1.10	1.13	1.39	1.42	1.12	1.05	1.04	—	—	1.04
Lost in Boiling House (B)+(C)+(D)	8.81	10.49	10.37	9.96	10.69	8.15	9.18	8.71	8.32	8.38	9.90	8.28	8.88	8.63	9.27	6.93	7.88	8.93
Total of all Losses (A)+(B)+(C)+(D)	14.85	17.22	19.67	17.23	17.90	15.25	17.63	14.70	16.45	16.19	16.76	13.45	13.71	13.96	14.79	13.43	15.68	15.58
LOST ABSOLUTE JUICE PER CENT. FIBRE	**42.0**	**45.6**	**51.3**	**44.5**	**45.3**	**40.2**	**53.5**	**38.3**	**50.9**	**47.2**	**43.5**	**33.9**	**29.6**	**32.0**	**30.4**	**38.2**	**47.1**	**40.91**
BOILING HOUSE PERFORMANCE	**98.3**	**97.5**	**95.8**	**98.0**	**95.4**	**99.3**	**97.2**	**98.5**	**98.9**	**98.8**	**98.6**	**98.6**	**98.9**	**99.7**	**98.5**	**100.0**	**98.7**	**98.45**
Imbibition per cent. Fibre	195	213	217	236	231	250	188	298	206	218	200	183	222	243	227	194	238	224.12
Imbibition per cent. Cane	28.3	30.3	36.2	36.6	32.7	40.0	27.5	44.8	30.55	33.2	29.97	26.48	36.11	37.65	37.33	32.30	36.72	34.46
SUCROSE EXTRACTION	94.0	93.3	90.7	92.7	92.8	92.9	91.6	94.0	91.87	92.2	93.14	94.82	95.17	94.67	94.48	93.52	92.2	93.36
BOILING HOUSE RECOVERY	90.6	88.8	88.6	89.3	88.5	91.2	90 0	90.7	90.94	90.9	89.37	91.28	90.66	90 89	90.19	92.57	91.5	90.43
OVERALL RECOVERY	85.2	82.8	80.3	82.8	82.1	84.8	82.4	85.3	83.55	83.8	83.24	86.55	86.29	86.04	85.21	86.57	84.3	84.42
FINAL BAGASSE																		
Sucrose per cent. Bagasse	2.67	2.71	3.11	2.36	3.03	2.50	3.47	2.20	2.97	2.91	2.58	2.14	1.77	2.12	2.08	2.35	3.15	2.47
Moisture per cent. Bagasse	51.30	52.79	54.24	55.35	49.45	54.19	50.96	54.46	55.25	53.02	52.68	52.29	52.13	49.00	50.12	51.06	50.18	53.06
Fibre per cent. Bagasse	44.96	43.50	41.71	41.44	46.75	42.62	44.01	42 60	40.97	43.23	43.91	44.94	45.38	48.23	47.21	45.71	45.75	43.65
Weight of Bagasse per cent. Cane	32.31	32.62	40.13	37.43	31.44	37.57	32.46	35 24	36.10	35.24	34.15	32.19	35.89	32.04	34.91	36.28	33.79	35.22
Lower Calorific Value (7650-18S-86.4W-btu/lb.)	**3170**	**3040**	**2908**	**2825**	**3323**	**2923**	**3185**	**2905**	**2823**	**3017**	**3052**	**3094**	**3114**	**3371**	**3282**	**3196**	**3258**	**3021**
FIRST EXPRESSED JUICE																		
Brix	20.39	19.05	19.84	18.16	18.92	19.45	19.03	19.10	19.28	19.07	19.04	19.28	19.37	18.65	19.13	19.07	19.53	19.20
Apparent Purity	87.2	86.2	87.2	85.8	88.7	87.4	88 5	86 9	87.4	87.1	87.4	87.5	87.6	86.6	87.4	87.8	87.9	87 3
LAST EXPRESSED JUICE																		
Brix	3.52	3.33	3.79	2.18	2.11	2.33	6.40	2.34	4.11	3.11	3.76	2.49	1.71	2 33	2.75	3.67	3.95	3.17
Apparent Purity	71.6	73.1	76.6	73.1	81.0	78.2	80.2	74.7	78.4	77.6	75.7	77.1	71.1	76.9	77.5	73.8	77.5	76.1
MIXED JUICE																		
Brix	16.39	15.19	14.73	13.62	13.93	14.13	14 83	13 06	14.93	14.54	14.63	15.58	14.61	13.54	14.29	14.87	14.16	14.50
Apparent Purity	84.9	82.5	—	—	—	—	86.7	—	—	85.00	—	—	—	83.7	84.7	85.8	85.9	—
Gravity Purity	85.4	82.6	86.0	83.2	86.9	85.0	—	84 9	85.8	—	85.4	86 0	85.5	84.5	—	86.1	86.3	85.1
Reducing Sugars/Sucrose Ratio	2.54	3.59	3.30	4.72	3.06	3.98	—	4.56	3.36	3.30	4.21	—	3.60	4.94	3.26	3.19	—	3.69
CLARIFIED JUICE																		
Brix	17.20	15.19	15.24	12.67	13.98	13.20	15.33	12.35	13.62	13.77	13.62	15 42	14.33	13.39	14.90	14.62	13 97	14.28
Apparent Purity	86.1	86.1	86.3	83.6	87.1	85.92	87.3	85.8	87.1	85.7	86.2	87.0	91.4	86.1	85.2	86.7	86.5	86.5
Reducing Sugars/Sucrose Ratio	2.38	3.36	3.09	4.33	2.79	3.74	—	4.32	3.36	3.10	—	—	1.73	4.35	3.22	3.11	—	3 30
Average pH	7.3	7.1	7.2	7.3	—	7.2	6.8	7.4	7.0	7.3	6.8	7.2	—	7.2	7.2	—	7.4	7.2
FILTER CAKE																		
Sucrose per cent. Filter cake	1.80	2.12	1.07	0.78	2.60	0.75	1.48	0.81	0 82	0.55	1.00	0.99	0.54	1.63	0.77	1.70	1.16	1.03
Weight of Cake per cent. Cane	6.40	3.24	5.00	6.83	6.74	4.40	5.00	5.80	5.03	5.00	5.31	4.39	11.48	2.50	4.80	—	4	5.76
SYRUP																		
Brix	56.3	58.5	50.2	51.6	59.1	52.9	54.3	55.8	56.5	51.8	48.7	48.5	56.2	59.1	59.2	60.1	59.3	55.2
Apparent Purity	85.6	86.1	86.2	84.1	87.4	86.4	88.5	86.1	88.3	86.6	86.5	87.1	91.2	85.7	85.5	86.8	87.0	86.8
Reducing Sugars/Sucrose Ratio	1.78	3.36	3.00	4.22	3.10	3.29	—	4.00	2.91	3.00	—	—	1.83	4.35	3.31	2.41	—	3.12
Average pH	7.0	6.6	6.9	6.9	—	7.1	—	6.9	6.94	7.3	—	—	—	6.8	7.0	—	6.9	6.9

Table III.—MASSECUITES AND MOLASSES, CHEMICALS.

FACTORY	PG	UF	ZSM	FX	EN	AK	DK	DL	GL	MV	CK	TS	NE	IL	RN	SZ	UK	Averages
A-MASSECUITE																		
Cub. feet per ton of Brix†	23.93	25.92	22.38	23.78	17.42	23.27	—	29.40	26.68	28.33	23.80	22.78	39.00	34.14	24.43	24.09	22.52	26.46
Brix of Massecuite	91.9	93.0	93.3	92.0	90.8	91.9	90.9	93.1	90.9	92.1	91.2	93.0	91.7	91.6	93.1	92.6	91.6	92.0
Purity of Massecuite	85.5	84.1	86.0	81.9	87.2	84.4	87.6	83.4	89.7	81.0	86.6	86.6	93.3	84.0	84.9	85.6	86.4	85.8
Purity of Molasses	69.2	64.8	67.3	67.0	64.3	65.7	74.4	66.2	75.7	60.9	66.6	67.9	82.0	64.7	67.6	69.2	68.3	68.3
Drop in Purity	16.3	19.3	18.7	14.9	22.9	18.7	13.3	17.2	14.0	20.1	20.0	18.7	11.3	19.3	17.3	16.4	18.1	17.5
Crystal per cent. Massecuite	48.6	51.0	53.4	41.5	58.3	50.1	47.1	47.4	52.4	47.3	54.6	54.2	57.6	50.0	49.7	49.3	52.4	50.8
B-MASSECUITE																		
Cub. feet per ton of Brix†	8.35	9.76	11.84	12.50	12.58	11.13	—	11.56	14.23	11.14	11.68	10.96	18.81	10.48	11.74	13.83	9.45	12.14
Brix of Massecuite	95.4	95.9	97.8	94.8	96.1	95.1	94.9	95.4	95.3	94.5	96.1	95.0	95.7	93.0	97.4	96.5	93.7	95.4
Purity of Massecuite	72.4	72.2	72.5	69.6	69.6	71.3	78.3	71.0	75.8	67.4	69.9	73.8	79.1	72.2	72.0	78.7	75.3	73.0
Purity of Molasses	51.0	51.4	47.0	48.2	53.8	47.0	57.3	47.3	49.2	47.1	44.5	50.7	57.8	48.9	49.4	46.8	52.8	50.0
Drop in Purity	21.4	20.7	25.5	21.4	15.7	24.3	21.0	23.7	26.6	23.2	25.4	23.1	21.3	23.3	22.6	31.9	22.5	23.0
Crystal per cent. Massecuite	41.7	40.9	47.0	39.2	32.7	43.6	46.4	42.9	49.9	39.3	44.0	44.5	47.8	42.4	43.5	57.8	44.7	43.9
C-MASSECUITE																		
Cub. feet per ton of Brix†	7.16	8.09	7.06	7.57	12.39	6.71	—	6.66	7.12	6.36	7.54	7.42	8.26	8.50	7.36	7.60	8.58	7.44
Brix of Massecuite	99.0	98.6	100.3	96.1	97.7	96.8	97.8	97.3	96.5	96.7	97.0	97.7	98.8	97.0	99.7	99.7	96.6	97.8
Purity of Massecuite	58.1	60.8	58.6	57.6	60.1	58.7	62.3	58.6	57.8	54.9	59.2	59.5	65.7	56.3	59.8	59.0	58.1	59.1
Purity of Molasses	38.2	38.5	39.0	38.5	42.0	38.1	40.0	38.5	37.5	38.9	38.4	39.0	43.6	33.4	36.9	33.4	35.2	38.2
Drop in Purity	19.9	22.3	19.6	19.1	18.2	20.6	22.2	20.1	20.3	16.0	20.8	20.5	22.1	22.9	22.9	25.6	22.9	20.9
Crystal per cent. Massecuite	31.9	35.8	32.2	29.8	30.6	32.2	36.2	31.8	31.3	25.3	32.8	32.8	38.7	33.3	36.2	38.26	34.2	33.1
TOTAL CUB. FEET OF ALL MASSECUITES																		
Per ton of Sugar Made	50.13	55.10	53.49	58.13	54.75	52.41	—	60.81	61.26	58.44	55.91	51.66	85.16	68.79	56.52	56.33*	50.58	57.82
Per ton of Brix† processed	39.44	42.77	41.28	43.86	42.41	41.11	—	47.58	48.04	45.84	43.02	41.59	66.07	53.13	43.53	45.51*	40.55	46–04
FINAL MOLASSES																		
Brix	91.8	90.8	91.9	89.8	90.0	89.6	88.4	88.1	86.4	89.0	89.6	87.8	92.5	90.8	89.4	93.2	88.8	90.29
Apparent Purity	38.0	38.5	39.0	38.5	42.0	38.1	40.0	38.5	37.5	—	—	—	—	29.8	36.3	33.5	35.2	—
Gravity Purity	38.2	39.5	40.0	38.8	—	38.9	—	38.9	38.5	38.9	38.4	39.0	43.6	33.4	—	34.1	37.4	38.52
Reducing Sugars per cent.	—	17.10	15.47	15.00	—	14.68	—	18.01	12.29	12.47	—	15.11	10.22	19.57	—	—	—	14.99
Sulphated Ash per cent.	—	19.32	14.22	11.80	—	12.20	—	12.24	—	—	—	—	12.62	14.02	—	—	—	13.77
Reducing Sugars/Ash Ratio	—	1.13	1.09	1.27	—	1.20	—	1.47	—	—	—	—	0.81	1.40	—	—	—	1.09
Weight of Molasses (at 85° Brix) per cent. Cane	3.40	3.24	3.22	3.11	2.87	2.93	*unknown*	3.01	2.74	2.80	3.10	2.54	2.59	3.26	3.20	*unknown*	*unknown*	2.98
CONSUMPTION OF LIME AND OTHER CLARIFYING AGENTS																	Sulph.	Def.
Lime—lbs. per ton of Cane	3.30	1.42	3.19	0.97	6.37	1.47	4.49	1.25	5.07	0.88	4.76	0.96	—	1.21	5.72	4.73	1.74	4.69	1.23
lbs. per ton of Sugar	26.66	12.81	29.21	9.54	58.28	12.92	40.61	11.22	45.87	7.91	44.16	8.24	—	10.91	50.77	40.99	14.91	41.87	11.06
parts per 1,000 parts of Brix†	8.26	4.97	11.28	3.60	22.57	5.07	15.94	4.37	17.99	1.24	17.00	3.28	—	4.21	19.55	16.56	5.98	15.77	4.29
Sulphur—lbs. per ton of Cane	1.33	—	1.15	—	2.73	—	1.78	—	2.00	—	2.00	—	—	—	2.26	1.98	—	1.89	—
lbs. per ton of Sugar	10.74	—	10.55	—	24.98	—	16.19	—	18.13	—	18.50	—	—	—	20.03	17.19	—	16.91	—
parts per 1,000 parts of Brix†	3.09	—	4.07	—	9.67	—	6.36	—	7.11	—	7.11	—	—	—	7.71	6.94	—	6.37	—
Phosphoric—lbs. per ton of Cane	0.20	0.02	0.32	—	1.01	—	1.51	—	0.64	—	0.88	—	—	—	0.76	0.26	0.63	0.58	0.02
lbs. per ton of Sugar	1.64	0.14	2.92	—	9.22	—	13.66	—	5.79	—	8.21	—	—	—	6.71	2.21	5.40	5.20	0.18
parts per 1,000 par s of Brix†	0.47	0.05	1.13	—	3.57	—	5.36	—	2.27	—	3.16	—	—	—	2.58	0.89	2.16	1.96	0.07

† Brix present in Mixed Juice

* Exclusive jelly strikes and refinery boilings

Table IV.—COMPARATIVE RESULTS OF FINAL DATA FOR RECENT YEARS.

COUNTRY	SOUTH AFRICA									
YEAR	1948.	1949.	1950.	1951.	1952.	1953.	1954.	1955.	1956.	1957
CANE										
Sucrose per cent....	13.89	13.52	14.19	13.33	13.87	13.93	13.34	13.87	13.35	13.11
Fibre per cent.	15.90	16.19	15.80	16.28	16.10	16.31	16.03	15.74	15.81	15.38
JAVA RATIO	76.98	76.47	77.42	76.56	77.04	77.07	77.39	77.87	77.94	78.73
JUICE QUALITIES										
Purity of First Expressed Juice	88.12	88.64	88.70	87.60	88.60	87.48	87.94	88.00	87.33	87.3
Purity of Last Expressed Juice	75.5	67.2	75.8	74.5	76.2	76.46	76.81	76.67	75.84	76.1
Purity of Mixed Juice	85.92	86.22	86.40	84.92	86.25	85.61	85.86	85.96	85.49	85.1
Purity of Syrup	87.54	87.93	87.60	96.20	87.65	86.46	87.13	87.19	86.62	86.8
Purity Drop First to last Expressed Juice	12.58	12.48	12.90	13.10	12.40	11.02	11.13	11.33	11.49	11.2
Purity Drop First to Mixed Juice	2.20	2.42	2.30	2.68	2.35	1.87	2.08	2.04	1.84	2.2
Purity Drop First to Syrup	0.56	0.71	1.10	1.40	1.20	1.02	1.27	0.81	0.71	0.5
Purity Increase Mixed Juice to Syrup	1.64	1.71	1.30	1.30	1.40	0.85	0.81	1.23	1.13	1.7
Reducing Sugar/Sucrose Ratio of Mixed Juice	3.67	3.11	3.12	3.52	2.92	3.66	3.28	3.40	3.32	3.69
Reducing Sugar/Sucrose Ratio of Syrup	3.07	2.55	2.81	3.25	2.66	3.31	3.01	3.02	2.85	3.12
EXTRACTION AND RECOVERIES										
Sucrose lost in manufacture % Cane	2.33	2.25	2.32	2.33	2.26	2.39	2.24	2.26	2.21	2.04
Sucrose in Sugar % Sucrose in Cane (Overall Rec.)	83.19	83.35	83.65	82.50	83.66	82.81	83.20	83.56	83.44	84.42
Sucrose in Mixed Juice % Sucrose in Cane (Extraction)	93.32	92.94	93.33	92.98	93.00	92.67	92.40	92.32	92.93	93.36
Sucrose in Sugar % Sucrose in Mixed Juice (B.H. Rec.)	89.14	89.68	89.63	88.72	89.96	89.36	90.04	90.51	89.79	90.43
Imbibition % Fibre	214	208	206	215	217	200	191	204	222	224
Imbibition % Cane	34.1	33.7	32.8	35.0	34.9	32.7	30.7	32.1	35.2	34.5
Lost Absolute Juice % Fibre in Bagasse	39.8	41.0	39.3	40.2	40.9	41.7	44.1	45.5	42.1	40.9
Boiling House Performance	96.5	96.9	96.88	96.66	97.2	96.91	97.43	97.92	97.44	98.45
BAGASSE										
Sucrose per cent....	2.67	2.66	2.72	2.57	2.65	2.75	2.75	2.91	2.60	2.47
Moisture per cent.	50.53	50.84	51.22	51.71	52.53	52.47	52.92	53.18	53.12	53.06
Lower Calorific Value	*3236*	*3209*	*3176*	*3136*	*3063*	*3067*	*3028*	*3003*	*3014*	*3021*
FILTER CAKE										
Sucrose per cent....	1.29	1.12	1.20	1.28	0.94	1.05	1.18	1.18	1.00	1.03
Weight % Cane	5.90	5.91	5.51	5.68	6.34	5.86	5.48	5.28	5.08	5.76
GRAVITY PURITY OF FINAL MOLASSES	41.53	41.39	40.50	40.28	39.33	39.46	39.29	39.58	39.88	38.52
Average Polarization of All Sugars	98.93	98.84	98.77	98.80	98.63	98.66	98.51	98.65	98.83	98.83
YIELD										
Tons Cane per Ton Sugar	8.55	8.76	8.32	8.98	8.50	8.55	8.87	8.51	8.87	8.93
Tons Cane per Ton 96° Sugar	8.31	8.52	8.09	8.73	8.27	8.32	8.65	8.28	8.62	8.67
SUCROSE BALANCE										
Sucrose in Bagasse % Sucrose in Cane (A)	6.68	7.06	6.67	7.01	7.00	7.33	7.60	7.68	7.07	6.64
Sucrose in Filter Cake % Sucrose in Cane (B)	0.36	0.34	0.37	0.52	0.43	0.49	0.54	0.47	0.43	0.45
Sucrose in Molasses % Sucrose in Cane (C)	—	—	7.97	8.61	7.45	7.78	7.22	7.08	7.62	7.44
Undetermined Sucrose % Sucrose in Cane (D)	9.77	9.25	1.34	1.36	1.46	1.59	1.44	1.21	1.44	1.04
Boiling House Losses % Sucrose in Cane (B) + (C) + (D)	10.13	9.59	9.68	11.28	9.34	9.86	9.26	8.76	9.49	8.93
Total Losses % Sucrose in Cane (A) + (B) + (C) + (D)	16.81	16.65	16.35	17.50	16.34	17.19	16.80	16.44	16.56	15.58

Table V.—AVERAGE MANUFACTURING RESULTS BY MONTHLY PERIODS FOR S.A. SUGAR FACTORIES REPORTING TO THE SUGAR MILLING RESEARCH INSTITUTE, SEASON 1957-1958

Period ending		27 April, 1957	1 June, 1957	29 June, 1957	27 July, 1957	31 Aug., 1957	28 Sept., 1957	2 Nov., 1957	30 Nov., 1957	28 Dec., 1957	1 Feb., 1958
Tons of 2,000 lbs. Cane Crushed ...	This period	—	701,953	916,475	981,841	1,253,483	934,807	1,045,756	915,146	808,930	640,551
	To date ...	216,654	918,587	1,835,062	2,816,903	4,070,386	5,005,193	6,050,949	6,966,095	7,775,025	8,415,576
Tons of 2,000 lbs. Sugar Made and Estimated	This period	—	67,769	97,472	109,774	152,174	114,703	125,684	105,272	88,788	64,597
	To date ...	18,522	86,291	183,763	293,537	445,711	560,414	686,098	791,370	880,158	944,749
Tons of Cane per Ton of Sugar	This period	—	10.36	9.40	8.94	8.24	8.15	8.32	8.69	9.11	9.92
	To date ...	11.70	10.64	9.99	9.60	9.13	8.93	8.82	8.80	8.83	8.91
Sucrose per cent. Cane	This period	—	11.55	12.54	13.01	14.06	14.21	13.96	13.34	12.88	12.18
	To date ...	10.56	11.32	11.93	12.30	12.84	13.10	13.24	13.26	13.22	13.14
Fibre per cent. Cane	This period	—	15.31	15.17	15.15	15.05	15.13	15.40	15.51	15.81	16.08
	To date ...	15.55	15.36	15.27	15.23	15.17	15.16	15.21	15.25	15.30	15.36
Java Ratio	This period	—	79.33	79.18	79.06	77.46	78.96	78–35	77.41	77.00	77.33
	To date ...	79.16	79.29	79.23	79.18	78.60	79.02	78.90	78.70	78.53	78.44
Sucrose per cent. Bagasse	This period	—	2.16	2.39	2.44	2.58	2.62	2.61	2.51	2.49	2.45
	To date ...	1.95	2.11	2.25	2.31	2.40	2.44	2.47	2.47	2.47	2.47
Moisture per cent. Bagasse	This period	—	53.97	52.71	52.94	52.87	52.89	53.03	52.93	53.10	52.99
	To date ...	54.76	54.16	53.44	53.27	53.15	53.10	53.09	53.07	53.07	53.06
Extraction	This period	—	93.40	93.40	93.50	93.66	93.61	93.45	93.26	93.02	92.55
	To date ...	93.26	93.37	93.39	93.44	93.52	93.53	93.52	93.49	93.44	93.38
Boiling House Recovery	This period	—	88.56	89.81	90.89	91.25	91.16	91.06	91.11	90.44	88.60
	To date ...	85.59	87.90	88.91	89.64	90.18	90–38	90.50	90–61	90.59	90.45
Overall Recovery	This period	—	82.71	83.89	85.01	85.47	85.34	85.10	84.98	84.13	82.00
	To date ...	79.82	82.07	83.03	83.76	84.33	84.54	84.64	84.71	84.65	84.46
Purity of Mixed Juice	This period	—	82.90	84.38	85.12	85.41	86.60	86.59	85.62	84.88	85.33
	To date ...	79.94	82.23	83.34	83.99	84.47	84.89	85.20	85.25	85.07	85.09
Reducing Sugar/Sucrose Ratio of Mixed Juice	This period	—	5.46	4.26	3.60	3.35	3.14	2.96	3.20	3.73	4.48
	To date ...	7.35	5.47	4.74	4.32	4.01	3.78	3.72	3.56	3.59	3.66
Reducing Sugar/Sucrose Ratio of Syrup...	This period	—	4.37	3.57	3.15	3.08	2.82	2.60	2.90	3.18	2.45
	To date ...	6.11	4.60	3.98	3.66	3.51	3.38	3.13	3.21	3.19	2.47
Gravity Purity of Final Molasses ...	This period	—	37.6	37.8	38.0	39.0	39.5	41.1	38.8	39.1	37.7
	To date ...	35.9	37.1	37.5	37.7	38.0	38.3	38.8	38.8	38.8	38.7
Brix of Final Molasses	This period	—	87.3	90.9	89.6	90.3	91.2	89.8	89.5	90.9	89.5
	To date ...	87.5	87.3	89.0	89.2	89.5	89.8	89.8	89.8	89.8	89.9

Table VI.—COMPARATIVE RESULTS FROM OTHER COUNTRIES FOR RECENT YEARS.

COUNTRIES	Ethiopia	Taiwan (Formosa)	Philippines	British Guiana	Jamaica	Java	Mauritius	Trinidad	South Africa	
YEARS	1956–57	1955–56	1955–56	1956	1956	1956	1955	1957	1956	1957
CANE										
Sucrose per cent	14.15	14.51	12.97	11.06	12.78	13.77	14.24	12.17	13.35	13.11
Fibre per cent	12.29	12.56	11.64	15.05	14.10	13.98	11.57	14.10	15.81	15.38
JUICES										
Brix per cent of First Expressed Juice	19.98	—	19.13	17.21	19.08	19.7	19.47	18.57	19.63	19.20
Purity of First Expressed Juice	83.7	—	85.6	83.0	85.4	87.6	89.8	84.5	87.3	87.3
Purity of Last Expressed Juice	76.4	75.8	78.2	75.9	77.2	79.5	75.2	75.4	75.8	76.1
Purity of Mixed Juice	82.7	85.3	85.2	81.0	83.4	85.5	87.5	82.5	85.5	85.1
Reducing Sugar/Sucrose Ratio	7.23	4.55	—	7.93	7.18	—	3.7	7.8	3.32	3.69
MILLING DATA										
Imbibition per cent Fibre	152	175	98	182	127	134	217	163	222	224
Lost Absolute Juice per cent Fibre	57.9	38.7	62.1	47.7	35.1	50.0	39.0	42.8	42.1	40.9
Imbibition per cent Cane	18.6	24	11.5	27.3	17.9	18.6	25.1	23.0	35.2	34.5
Sucrose Extraction	91.6	96.2	92.5	91.6	94.2	92.6	95.6	93.5	92.9	93.4
Sucrose per cent Bagasse	4.34	2.41	3.82	2.95	2.55	3.48	2.68	2.65	2.60	2.47
Moisture per cent Bagasse	49.60	41.35	49.35	48.59	47.76	47.50	47.40	49.12	53.12	53.06
Lower Calorific Value of Bagasse	3310	4034	3317	3399	3478	3475	3506	3358	3014	3021
BOILING HOUSE DATA										
Boiling House Performance	92.1	101.6	99.1	99.0	98.2	98.9	97.8	101.0	97.4	98.5
Boiling House Recovery	83.3	93.3	91.5	89.5	90.0	90.7	91.2	92.1	89.8	90.4
Undetermined Losses per cent Sucrose in Cane	4.70	0.57	0.53	1.49	1.39	0.48	—	0.36	1.44	1.04
AVERAGE POLARIZATION OF ALL SUGARS	99.55	98.79	97.94	97.13	97.50	99.0	98.5	97.0	98.83	98.83
FILTER CAKE										
Sucrose per cent Cake	5.42	2.69	2.45	1.32	2.06	4.30	6.0	1.48	1.00	1.03
Cake per cent Cane	3.14	4.84	2.24	3.49	2.48	4.60	1.53	3.25	5.79	5.76
Gravity Purity	37.8	32.2*	37.19	30.7*	33.2*	35.9	37.2	31.1*	39.9	38.5
OVERALL RECOVERY	76.3	89.79	84.66	81.9	84.8	84.0	87.2	86.1	83.4	84.4
TONS CANE per TON OF 96° SUGAR	8.89	7.57	8.92	10.59	8.86	8.98	7.93	9.16	8.62	8.67

* *Apparent Purity.*

Table VII—COMPARATIVE DATA OF REPORTING S.A. FACTORIES FROM 1925 TO 1957 INCLUSIVE.

	Per cent. Cane		Tons of Cane per ton of		Extraction	Boiling House Recovery	Overall Recovery	Imbibition		Bagasse		Lost Absolute Juice per cent. Fibre	Mixed Juice		Purity Final Molasses	Boiling House Performance	Number of factories reporting of factories in operation	Percentage of crop covered
	Sucrose	Fibre	Sugar	96° Sugar				Per cent. Cane	Per cent. Fibre	Per cent. Sucrose	Per cent. Moisture		Purity	Reducing Sugar Ratio				
1925	12.55	15.88	10.77	10.46	89.30	81.98	73.28	—	—	4.03	49.38	60.7	84.47	—	44.5	89.4	11 of 25	60.4
1926	12.23	16.01	9.92	9.74	90.86	81.97	74.48	—	—	3.53	**49.33**	52.8	84.65	—	45.3	88.8	13 of 23	73.3
1927	13.66	16.27	9.69	9.48	89.30	83.01	74.13	—	—	4.06	49.89	58.3	85.47	—	46.1	89.6	14 of 21	81.0
1928	13.75	15.88	9.49	9.30	89.47	83.90	75.06	26.3	166	4.10	50.01	59.8	84.90	3.86	45.3	90.8	14 of 25	83.3
1929	12.95	15.52	10.06	9.87	89.02	84.39	75.13	25.5	164	4.07	50.69	63.2	86.04	3.35	45.1	90.7	16 of 25	91.0
1930	13.66	15.82	9.59	9.40	89.78	83.80	74.77	26.6	168	4.20	50.66	57.4	85.88	3.35	45.9	90.2	17 of 23	94.9
1931	13.84	15.75	9.53	9.33	89.40	83.27	74.39	27.9	177	4.22	50.09	60.0	85.27	3.55	45.0	90.0	16 of 22	94.5
1932	13.48	15.65	9.61	9.40	89.86	84.27	75.73	29.7	190	3.83	51.89	58.4	85.30	3.09	45.1	91.1	16 of 23	94.4
1933	13.88	15.78	9.28	9.03	90.28	84.88	76.63	30.4	193	3.71	51.62	55.9	84.92	4.01	44.9	92.2	15 of 23	90.0
1934	11.88	15.24	10.67	10.40	91.07	85.20	77.59	30.2	198	3.05	52.11	57.7	84.02	4.21	45.6	92.9	17 of 23	96.5
Average ...	13.19	15.78	9.86	9.64	89.83	83.67	75.12	27.6	175	3.88	50.57	58.4	85.09	3.65	45.3	90.6	15 of 23	85.9
1935	13.65	15.92	9.19	8.96	90.64	86.52	78.40	33.0	208	3.48	51.93	54.2	86.49	**2.65**	46.6	93.0	17 of 23	97.1
1936	13.30	15.01	9.29	9.06	91.08	87.44	79.64	32.4	216	3.40	52.76	55.6	85.43	3.04	43.9	94.6	17 of 23	96.2
1937	13.92	15.14	8.80	8.58	91.53	87.85	80.41	31.8	210	3.40	52.01	52.4	85.60	3.23	43.7	95.0	17 of 23	96.4
1938	13.64	**14.51**	8.89	8.66	91.90	88.48	81.31	31.7	218	3.30	52.17	53.1	86.36	3.08	43.1	95.4	17 of 23	96.6
1939	13.41	14.85	8.95	8.73	92.24	88.88	81.98	31.3	211	3.11	51.79	49.6	86.46	3.27	42.7	95.7	19 of 22	98.5
1940	13.19	15.56	9.26	9.03	91.91	87.98	80.86	32.6	209	3.02	51.60	48.9	85.34	3.81	42.9	95.3	19 of 22	99.0
1941	14.00	15.66	8.62	8.39	92.37	88.40	81.66	34.8	222	3.03	51.50	45.1	85.67	3.35	43.4	95.6	19 of 22	98.5
1942	13.40	15.24	8.93	8.69	92.69	88.98	82.48	32.8	215	2.88	51.24	45.1	85.96	3.07	43.2	96.2	19 of 22	98.4
1943	13.14	15.26	8.98	8.74	92.97	88.84	83.52	31.6	207	2.76	50.80	43.8	**86.56**	3.18	41.8	96.7	19 of 22	98.6
1944	13.67	15.83	8.67	8.44	93.13	89.27	83.14	33.7	213	2.73	50.23	41.1	86.19	3.49	42.4	96.4	19 of 22	98.4
Average ...	13.53	15.30	8.96	8.73	92.05	88.36	81.34	32.6	213	3.11	51.60	48.9	86.01	3.22	43.3	95.4	18 of 22	97.8
1945	**14.28**	15.99	**8.29**	**8.08**	93.28	89.29	83.30	35.0	219	2.77	50.19	39.3	86.23	3.38	42.0	96.4	19 of 21	99.0
1946	14.21	15.21	8.36	8.14	93.07	89.12	82.94	**35.2**	217	2.79	50.32	40.5	85.86	3.30	41.8	96.7	19 of 21	99.2
1947	13.32	15.80	8.84	8.60	**93.44**	89.61	83.73	34.4	218	2.54	50.46	39.8	86.24	2.95	41.1	96.8	18 of 20	99.8
1948	13.89	15.90	8.55	8.31	93.32	89.14	83.19	34.1	214	2.67	50.53	39.8	85.92	3.67	41.5	96.5	18 of 20	99.1
1949	13.52	16.19	8.76	8.52	92.94	89.68	83.35	33.7	208	2.66	50.84	41.0	86.22	3.11	41.4	96.9	18 of 20	99.2
1950	14.19	15.80	8.32	8.09	93.33	89.63	83.65	32.8	206	2.72	51.22	**39.3**	86.40	3.12	40.5	96.9	17 of 19	99.2
1951	13.33	16.29	8.98	8.73	92.98	88.72	82.50	35.0	215	2.57	51.71	40.2	84.92	3.52	40.3	96.7	17 of 19	99.5
1952	13.87	16.10	8.50	8.27	93.00	89.96	83.66	34.9	217	2.65	52.53	40.8	86.25	2.92	39.3	97.2	17 of 19	99.3
1953	13.93	16.31	8.55	8.24	92.67	89.36	82.81	32.7	200	2.75	52.47	41.7	85.61	3.66	39.5	96.9	16 of 18	99.3
1954	13.34	16.03	8.87	8.65	92.40	90.04	83.20	30.7	191	2.75	52.92	44.1	85.86	3.28	39.3	97.4	17 of 19	99.2
Average ...	13.79	15.96	8.60	8.36	93.04	89.46	83.23	33.8	210	2.69	51.32	40.6	85.95	3.29	40.7	96.8	18 of 20	99.3
1955	13.87	15.74	8.51	8.28	92.32	**90.51**	83.56	32.1	204	2.91	53.18	45.5	85.96	3.40	39.6	97.9	17 of 19	99.1
1956	13.35	15.81	8.87	8.62	92.93	89.79	83.44	35.2	222	2.60	53.12	42.1	85.49	3.32	39.9	97.4	17 of 18	99.2
1957	13.11	15.38	8.93	8.67	93.36	90.43	**84.42**	34.5	**224**	**2.47**	53.06	40.9	85.10	3.69	**38.5**	**98.5**	17 of 18	99.2

Mr. Thumann commented on Table F, saying there was a remarkable improvement in extraction and in lost absolute juice per cent fibre with an increase of imbibition per cent fibre of only two per cent. He said this would lead one to believe that improved milling and not the increase in imbibition had improved the extraction.

Dr. Douwes Dekker said that he agreed that the slight increase in imbibition only did not explain the better performance of the mills in 1957-58. Better milling must have been the main cause of the lower figure for Lost Juice, assisted by the slight drop in fibre throughout. The improvement of the extraction figure was, of course, also partly due to a lower fibre percentage of the cane.

Mr. Rault agreed that additional equipment at his mill and not increased imbibition resulted in much better figures. He said that increasing imbibition alone, in the past did not improve extraction. They found that reducing the amount of water applied at the last mill from 35 per cent to 30 per cent and under, led to a better efficiency of that particular mill and also to much lower moisture per cent bagasse. The higher percentage of water had previously given poor feeding and caused higher roller speed and slipping.

Mr. du Toit said that the improved juice loss per unit of fibre took place with but little increased imbibition and a lower fibre per cent cane. He understood that Dr. Douwes Dekker had previously stated that a low fibre per cent cane led to a higher juice loss per unit of fibre. If that were correct, then last year's results were still more creditable.

Dr. Douwes Dekker said in reply that statistical examination of Java milling results had shown that Re-absorption tended to be smaller when cane with a higher fibre content was milled. The loss of juice per cent fibre depended, however, not only on Re-absorption but also on the filling of the discharge opening. If the Java relationship would also hold for Natal mills, i.e., if we might assume that the lower fibre percentage of the cane in 1957-58 in itself would induce a higher Re-absorption, the reduced loss of absolute juice would be due to a better filling of the discharge openings and—in Mr. du Toit's words—"the results were still more creditable".

Mr. du Toit said he agreed that throughput of fibre was most important, but he wanted to know if a statement had been made to the effect that fibre per cent cane effected the lost juice in fibre. He said that in spite of flood disasters we had a very good growing season and that accounted largely for an increase in crop. The excellent rains of last season led to a record yield of tons of cane per acre. Other contributory factors were the better varieties now planted and the more fertilizer applied. While we might regret the low sucrose content last season, the same conditions which led to low sucrose percentage also gave us a record yield of sugar per acre. The tons of cane per ton of sugar in the out of optimum part of the season was very high and the cane of a very much lower quality than of previous years. If we could have crushed the amount of cane, which, of course, was not possible, during the optimum period, we would have produced another 60,000 tons of sugar. Another point was that as far as the calculating of boiling house performance was concerned, he considered that the formula would have to be altered as Sezela was already reaching figures of over 100 per cent.

Dr. Douwes Dekker replying to Mr. du Toit's last point, said that if more factories achieved B.H.P.—figures above 100, modification of the formula might have to be considered. In this connection, he recalled that eight years ago—when the B.H.P. was introduced as a criterion—many people said that the figure of 100 would never be achieved. We now apparently had already reached that stage.

Mr. Rault said: (*a*) that the flowering of the cane could not be blamed for the low sucrose content of this season. They found at Natal Estates that some of the flowered cane was very much higher in sucrose than the unflowered cane in the same field.

(*b*) That in their milling experience they had found that when some of the early units did not do very good work, a lot could be recovered in the rest of the train.

(*c*) In the case of the excellent figures shown at Sezela, for boiling house, this was based on an intermediary product which was further handled in the factory before being placed on the market as a refined sugar. It would be very interesting to know the recovery or boiling house performance in terms of final marketed refined sugar, such as has been always shown in his factory refinery at Natal Estates.

Dr. Douwes Dekker agreed that for the sake of comparison, it would be very desirable if Sezela, and in the near future, also Gledhow and Umfolozi, would agree to include the refining stage in their figures. A proper comparison of losses from cane to white sugar could then be made. Replying to Mr. Rault's last remark, he said he was sure that Mr. Rault would agree that it was better to extract the maximum amount of sucrose from the 'earlier' mills of the train, rather than be satisfied with a poor extraction by the crusher and No. 1 mill which had to be made good by the last mills.

Mr. Rault mentioned that the substantial rise in boiling house recovery was a direct result of higher yields realised in the first boilings, through re-designing the equipment for discharging the stiff

boiled massecuite. This improvement had in consequence, decreased the duty on the over-loaded second boilings, both in volume and purity of massecuite, resulting in a smaller loss in final molasses and undetermined.

Mr. Campbell supported Mr. Rault in his statement, saying that they got a very much better yield of sugar per cubic foot of massecuite last year from the first massecuite equivalent to an increased bagging of 5 to 8 tons of sugar per pan boiled.

Mr. Barnes said that though it appeared desirable to crush a higher proportion of cane during the optimum period, the cost of increasing mill capacity to do this would be heavy, and difficulties would arise with labour and transport. He suggested that varietal studies should be undertaken to see if it were possible to select canes which were more suitable for early, middle, and late season reaping, as had been done with some degree of success in other countries. This might lead to an extension of the milling season. He suggested that attention to this aspect might be given by the S.M.R.I. and the Experiment Station. An analysis of returns from varieties now in cultivation, at different times of the year, would be helpful.

Mr. Dodds said it was obvious that when there was a heavy rainfall this led to a higher production of sugar, notwithstanding occasional appreciable destruction of cane by floods. The yield of cane per acre would eventually be considerably increased, even if the sucrose content per cent cane was diminished.

Mr. Galbraith said the question of not publishing the refinery returns had been Company policy. They had decided to take out three sets of figures, one for the refinery, one for the raw house and a figure giving an over-all recovery from sucrose in cane to sucrose recovered in refined sugar. They had not published their Refinery results at this stage but actually speaking it was a policy adopted by other refineries. He said he had never yet seen any figures from the Rossburgh refinery and said he recollected that when Illovo were refining, they never published their Refinery figures. It was hoped that in time Sezela would publish the desired results.

Dr. Douwes Dekker said they would all be very grateful when the figures of the Sezela refinery were published. If this was done then others would follow.

Mr. Galbraith said that Natal Estates also produced refined sugar direct from the cane, but their method was quite different from that adopted by Sezela. At Mt. Edgecombe only a portion of the refined sugar was made from remelted raw sugar, the balance being made directly from the carbonated juice. Hence apparently only one set of figures were taken out, which were published. At Sezela 100 per cent of the sugar from the cane was first produced as raw, which was then remelted and carbonated. This made it possible and desirable to treat the factory as two units, one being the raw house, and one the refinery.

Mr. W. A. Campbell said they had made raw sugar and had refined it just as Sezela are doing now.

Mr. du Toit said although he agreed very largely with what Mr. Barnes said he could not allow some of his remarks to pass completely unchallenged. He was aware that cost, labour, etc. made it impossible to crush all cane during the optimum period. He did not think it possible to get any variety that would show a maximum sucrose in any other time than their normal time—September/October. If we got a cane which showed high sucrose, such as N:Co.310, it would show a relatively high sucrose probably both early and late in the season but still have its peak at our climatic optimum period. He did not think it possible to get a variety which would show a peak sucrose in May or June or a late ripening variety showing a peak in December or January.

Mr. Rault stated that last year Mr. Perk had estimated that through the addition of another unit (6th Mill) Natal Estates would be able to pass through 29 tons of fibre per hour without effect on extraction. They were afraid that putting more canes through might not increase their extraction efficiency, but they actually improved in both directions i.e., increased throughput as well as extraction. Shortage of labour and cane supplies were limiting factors for the crushing rate of the past season and they are satisfied that Mr. Perk's judgment was quite correct and that in the future, the additional 6th Mill unit would be the means of raising further the crushing rate whilst not losing the main purpose of this capital expenditure i.e., additional revenue by improved extraction.

Mr. Boyes said he would like to put forward the suggestion that a low molasses purity does not necessarily follow a low third massecuite purity. He quoted some figures for last year where the optimum purity in May was about 59.5°, in June about 58°, in July 57°, in August 57.5°, and gradually went up until in November it was 60.5° and in December 61.5°. He suggested that to boil a strike below 60° purity was not always the best practice. The figures depend on a number of factors, e.g. size of third centrifugal station and the glucose content of molasses, which was known to be extremely high at Sezela. He said they had a very good third centrifugal station and were even able to boil massecuites as low as 54°. By varying the massecuite purities and averaging results for each monthly period it was possible to arrive at the optimum purities.

Dr. Douwes Dekker said that the purity of final molasses as produced in a factory depended on many

factors. Non-sucrose composition was important, other factors were the available cooling time, the brix of the strike, the size of the crystals, the purity of the strike a.o., since most factors varied from strike to strike, the final molasses purities also fluctuated, sometimes not inconsiderably. He asked if he had correctly understood that Mr. Boyes' data were to that extent reliable that he could conclude with confidence that in certain periods of the season, a rise in strike purity of say 60 to 61 or 62 would be associated with a noticeable drop in molasses purity.

Mr. Boyes said that the quality of the final sugar and the purity of final molasses were connected.

Dr. Douwes Dekker said that in general it was better to have a low purity of final strike.

Mr. Boyes said one season's work was not enough to draw conclusions, but he found that towards the end of the season massecuite purities of over 60° gave the lowest purities for exhaust molasses. Gillette's work on low grade crystallisation gives a detailed explanation of this subject.

Dr. Douwes Dekker, in reply to a question by Mr. Rault, stated that some mills in Australia have already started to weigh the mixed juice. Until mixed juice was weighed there would always be uncertainty as to the accuracy of the factory figures.

Mr. Galbraith said that according to the figures shown in the report, Sezela had the lowest glucose ratio of mixed juice in the country, with the exception of Pongola, so that the low final molasses purity could not be ascribed to this factor in the case of Sezela.