TWENTY-NINTH ANNUAL SUMMARY OF CHEMICAL LABORATORY REPORTS

SOUTH AFRICAN SUGAR FACTORIES, SEASON 1953-1954

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Introduction

The Twenty-ninth Annual Summary contains in addition to the six usual tables a new table presenting average results from 1925 till 1953. This new table (VII) shows such data as: sucrose and fibre per cent. cane; purities of mixed juice and of final molasses; sucrose and moisture per cent. of bagasse; extraction, recoveries; performance, etc. In addition to the annual averages, Table VII shows averages of periods of ten years, i.e. the average results of the period 1925-34, of the period 1935-44 and of the present period 1945-54.

These ten-yearly averages render a clear picture of the progress achieved by the Natal sugar factories regarding milling and processing. The table shows that Lost Absolute Juice in final bagasse per cent. fibre amounted to 58.4 per cent. as an average value for the period 1925-34; 48.9 per cent. for 1935-44, and 40.3 per cent. for the present period. In the same time boiling house performance improved from 90.6 per cent. to 95.4 per cent. and finally to 96.7 per cent. in the present period. These ten-yearly averages are also convenient when we want to evaluate or compare a yearly result. For example, the 1951 average of 40.2 per cent. for lost absolute juice per cent. fibre is apparently an average figure for present conditions; the present period average being practically the same.

A—General

The 1953-54 season saw production raised to a new record level of 725,430 tons of sugar. The previous record stood at 685,798 tons of sugar, achieved in 1950-51. A total of 6,221,594 tons of cane was supplied to the mills during the 1953-1954 season compared with the previous record of 5,721,390 tons of cane harvested during the 1950-51 season. (See Table A.)

Eighteen instead of nineteen factories were in operation during the 1953-54 season. Esperanza, being in course of transfer from the South Coast to the new site at Pongola, did not crush this season.

TABLE A

Sugar Production in South Africa in Recent Years

Season	Cane Crushed*	Sugar Produced*	Ratio Cane/ Sugar	Ditto 96° Sugar
1945–46 ...	4,607,055	553,074	8.33	8.10
1946–47 ...	3,990,017	474,769	8.40	8.17
1947–48 ...	4,543,255	512,005	8.87	8.62
1948–49 ...	5,216,144	607,845	8.58	8.33
1949–50 ...	4,929,580	561,122	8.79	8.54
1950–51 ...	5,721,390	685,798	8.34	8.11
1951–52 ...	4,805,249	532,505	9.02	8.76
1952–53 ...	5,722,583	670,188	8.50	8.27
1953–54 ...	6,221,594	725,430	8.58	8.35

* Tons of 2,000 lbs.

The tables and the discussions of the results will refer to only sixteen of the eighteen factories, which were in operation during the 1953-54 season, viz. to those sixteen factories which contributed data to our summaries. Since these sixteen factories crushed 99.01 per cent. of all cane crushed during this season and manufactured 99.31 per cent. of all sugar made, the data shown and discussed in this summary are largely representative of the whole Natal Sugar Industry.

We will commence our general review by showing how this record crop was handled compared with previous crops. We collected therefore in Table B the following data:

(i) The number of mills which were in operation during each of the last four seasons.

(ii) The total tons of cane crushed by these mills during each season.

(iii) The aggregate number of hours the mills were open during each season.

(iv) The aggregate number of hours the mills were actually crushing during each season.

(v) An average crushing rate in tons of cane per hour per mill during each season derived by dividing "Total Tons Cane" by "Total Hours Actual Crushing."

(vi) The average number of days mills open during each season.

(vii) The average number of days actual crushing during each season.

(viii) Hours actual crushing per cent. hours mills open for each season.

(ix) Total hours of stoppage per cent. hours mills open.

(x) Hours of stoppage due to cane shortage per cent. hours mills open.

TABLE B

Season	1950–51	1951–52	1952–53	1953–54
(i) Number of Mills .	17	17	17	16
(ii) Tons of Cane Crushed	5,660,093	4,761,650	5,661,604	6,159,770
(iii) Hours Mills Open	76,282	66,075	74,821	75,524
(iv) Hours of Actual Crushing	71,004	60,305	70,274	69,449
(v) Average Crushing Rate per Hour per Mill	80	80	81	89
(vi) Avge. No. of Days Mills open per Season per Mill...	187	162	183	197
(vii) Avge. No. of Days Actual Crushing per Season per Mill	174	148	172	181
(viii) Hours of Actual Crushing per cent. Hours Mills open	93.08	91.27	93.92	91.96
(ix) Total Hours Stoppage per cent. Hours Mills open	6.92	8.73	6.08	8.04
(x) Hours of Cane Shortage per cent. Hours Mills open	2.42	5.43	2.10	4.39

There are two reasons why the average crushing rate (v) was higher last year than previous years. Firstly, because most of the mills crushed faster last year and secondly, because the average of last year does not include Esperanza; a factory with a crushing rate below the average.

A second group of figures depicts the average number of days the mills were open (i.e. the average duration of the season minus the weekend stops) and the average number of days the mills were actually crushing; the overall efficiency and the hours of stoppage.

However, of more importance for the duration of the crop than the average crushing rate per mill (v) is the aggregate crushing rate of all mills (xi) during each season. The latter value is shown in the following table (C). In order to obtain the aggregate crushing rate, the individual crushing rates of all mills have been added up. The table shows that the aggregate crushing rate was 23 t.c.h. higher last year than previous years, notwithstanding that the number of mills in operation was sixteen instead of seventeen.

TABLE C

Season ...	1950–51	1951–52	1952–53	1953–54
UF	96	131	137	145 t.c.h.
ZM	105	100.5	97	98 t.c.h.
FX	90	90	87	90 t.c.h.
EN	16	15	14	15 t.c.h.
AK	90	87	88	94 t.c.h.
DK	30.5	30	31	33 t.c.h.
DL	124	119	121	150 t.c.h.
GL... ...	73	77	81	86 t.c.h.
MV	33	33	36	36 t.c.h.
CK	44	40	42.5	44 t.c.h.
TS... ...	179	169	170	171 t.c.h.
NE	145	134	140	146 t.c.h.
IL... ...	53	49	62	59 t.c.h.
RN	43	42	42	42 t.c.h.
ES... ...	48	44	48	— t.c.h.
SZ... ...	86	88	98	108 t.c.h.
UK	28.5	28.5	28	28 t.c.h.
(XI) Aggregate Crushing Rate:	1284	1277	1322	1345 t.c.h.

B—Milling Control Data

The new Table VII shows how the average extraction is raised from 89.30 per cent. in 1925 to 93.44 per cent. in 1947. From that year on a decline in average extraction is experienced. Since extraction is strongly affected by the fibre content of the cane, we have to consider the variations in fibre per cent. cane simultaneously with extraction figures. Table VII shows that in 1938 cane with the lowest average fibre content, i.e. 14.51 per cent., was crushed. Since 1938 the average fibre content of the cane has been gradually increasing till in 1953 it shows the highest average fibre content, i.e. 16.31 per cent.

Fluctuations in fibre content of the cane do not only affect extraction directly (owing to the resulting variations in bagasse/cane ratio), but they affect the extraction indirectly as well.

Firstly the higher fibre content imposes a heavier load on the mills and secondly maintaining the same quantity of imbibition water, the water to fibre ratio is reduced.

If the same amount of cane has to be crushed in the same time, when cane with 16.5 per cent. fibre arrives at the mills instead of cane with 14.5 per cent. fibre as in 1938, the roller speed has to be stepped up by 14 per cent. To maintain the same water to fibre ratio, imbibition per cent. cane has to be increased by 14 per cent. The higher speed means that there is 14 per cent. less time available for the drainage of the juice which is being squeezed out and

also that there is 14 per cent. less time available for the imbibition water to mix with the juice in the bagasse. These are the indirect adverse effects on mill work due to a higher fibre content of the cane. They are to be added to the direct effect of the higher bagasse to cane ratio.

In the case where the higher fibre content is partly or mainly due to an increase in trash adhering to the cane, there are further adverse effects. For example the higher trash content will affect the millability and will result in a lower mixed juice purity, which in its turn will reduce the boilding hourse recovery.

Returning to Table VII, the ratio "Lost Absolute Juice in final bagasse per cent. fibre" improved from 60.7 per cent. in 1925 to 39.3 per cent. in 1950. It appears, however, that 1950 is a turning point, the figures are increasing again and the average figure for last season is 41.7 per cent. Apparently this increase is due to a steady increase in fibre throughput (i.e. tons of fibre crushed per hour actual crushing) and as far as last year's figure is concerned, the increase is also due to a lower imbibition to fibre ratio.

There is, however, still another figure we want to draw attention to, viz. to "moisture per cent. bagasse." In 1926 the moisture content was a minimum, viz. 49.33 per cent. only. From then on moisture increased until in 1936 a maximum was obtained, viz. 52.76 per cent. moisture. From 1936 the moisture of the bagasse improved again, reaching the lowest value in 1945, viz. 50.19 per cent. At present we are again in a period of increasing moisture content with 52.47 per cent. moisture in bagasse as last year's average.

A high moisture content reduces extraction, boiler efficiency and calorific value of the bagasse. To elucidate the effects of an increase in moisture content, let us consider a mill tandem which crushes cane with 14 per cent. sucrose and 16 per cent. fibre. We presume further that this tandem produces a bagasse (I) of the following composition:

BAGASSE (I)

Moisture	54.00%	Bagasse 37.50% on Cane.
Sucrose	2.50%	Lower Calorific Value 2939
Fibre	42.67%	Btu/lb.

For argument's sake, let us assume that when we pass this bagasse (I) a second time through the last mill, a further quantity of juice will be recovered amounting to 10 per cent. of the original bagasse (I) weight. When the additionally recovered juice has the same composition as the last expressed juice from the original extraction (i.e. 3 per cent. brix and 75 per cent. purity) then a bagasse (II) of the following composition will be obtained:

BAGASSE (II)

Moisture	49.22%	Bagasse 33.75% on Cane.
Sucrose	2.53%	Lower Calorific Value 3353
Fibre	47.41%	Btu/lb.

Accordingly the extraction, which was originally 93.30 will increase to 93.91 per cent., corresponding in this case with a further extraction of 1.7 lbs. of sucrose per ton of cane.

Due to lower final bagasse moisture the lower calorific value is increased and the combustion of the bagasse in mill boiler furnaces will improve. Assuming that due to better combustion the boiler efficiency is raised from 58 to 60 per cent., the heat transferred in the boiler plant will be in the first case:

$2{,}000/100 \times 37.50 \times 2939 \times 58/100 = 1{,}278{,}465$ Btu's per ton and in the second case:

$2{,}000/100 \times 33.75 \times 3353 \times 60/100 = 1{,}357{,}965$ Btu's per ton of cane crushed.

Hence, apart from the fact that an additional amount of 1.7 lbs. of sucrose per ton of cane is extracted, 8 per cent. more steam can be raised, or —what is far more important—8 per cent. less bagasse has to be burned to raise the same amount of steam.

The last figure to be discussed is "Imbibition Efficiency."

TABLE D

Imbibition Efficiency

Season:	1950–51	1951–52	1952–53	1953–54
UF ...	30 (205)	46 (192)	43 (191)	49 (200)
ZM ...	44 (197)	39 (129)	44 (252)	54 (220)
FX ...	38 (209)	36 (225)	49 (224)	56 (189)
EN ...	35 (206)	27 (259)	27 (252)	29 (250)
AK ...	42 (209)	43 (219)	51 (219)	68 (191)
DK ...	92 (165)	65 (187)	80 (202)	63 (182)
DL ...	65 (238)	62 (225)	55 (229)	58 (193)
GL ...	64 (184)	57 (182)	76 (193)	76 (178)
MV ...	45 (195)	52 (192)	44 (228)	49 (228)
CK ...	55 (169)	54 (169)	64 (167)	66 (166)
TS ...	45 (180)	48 (185)	49 (193)	46 (198)
NE ...	43 (228)	39 (237)	42 (240)	47 (226)
IL ...	41 (249)	41 (246)	49 (193)	35 (203)
RN ...	55 (169)	43 (234)	59 (236)	78 (221)
ES ...	42 (236)	40 (249)	41 (226)	— (—)
SZ ...	46 (220)	64 (227)	53 (226)	63 (219)
UK ...	39 (238)	41 (265)	47 (267)	47 (268)

Arithmetical Average:

48 (206) 47 (215) 51 (217) 55 (208)

Averages for more than 200 per cent. Imbibition:

42 (225) 43 (237) 49 (233) 50 (226)

Averages for less than 200 per cent. Imbibition:

57 (177) 54 (184) 56 (187) 62 (185)

In general the efficiency of the mixing of the imbibition water with the juice in the bagasse decreases when the imbibition rate is raised, when other conditions remain the same. There are, however, changes in other conditions, which sometimes interfere and affect the results. We see, however, that the average imbibition efficiency of those factories which apply more than 200 per cent. imbibition is lower than of the factories applying less imbibition water. Table D shows also the effect of the shredder installed in front of the tandem at Gledhow; the imbibition efficiency being raised from 60 to 76 per cent. owing to the improved preparation of the cane previous to extraction. For the time being there are no further definite conclusions to be made. We will, however, continue to collect imbibition efficiency data, because according to our opinion these figures must be helpful to the mill engineer to enable him to decide whether a change in the way the imbibition is applied is an improvement.

C—Boiling House Data

Our discussion of data regarding the boiling house department will also be based on the annual results from 1925 to 1953 as shown in Table VII. This table shows how the average overall recovery improved from 75.12 (i.e. average percentage of the 1925-34 period) to 81.34 (i.e. average of the 1935-44 period) to 83.24 per cent. (the average overall recovery of the present period). This enormous improvement is the combined result of the improvement in extraction (89.83, 92.05 and 93.22 per cent. respectively) and of the improvement in boiling house recovery. The latter value increased from 83.67 (1925-34) to 88.36 (1935-44) and to 89.38 per cent., the average boiling house recovery of the present period.

The highest boiling house recovery ever experienced has been achieved in 1952. In that season an average boiling house recovery was achieved of 89.96 per cent. During that season the mixed juice purity was one of the highest, namely 86.25 and the final molasses purity was the lowest experienced, viz. 39.3.

Last season (1953-54) the mixed juice purity was lower (85.61) and the purity of the final molasses (39.5) slightly higher than in 1952. Accordingly the boiling house recovery dropped from 89.96 to 89.36 per cent.

Table VII shows further that last season's mixed juice purity was lower than the average of the present period (85.96) and also lower than the previous period's average (86.01).

So far the subject of our discussion has been the *quantitative* ratio "boiling house recovery" and we will now consider the *qualitative* figure "boiling house performance."

Table VII shows that the average boiling house performance of the 1925-34 period is 90.6 per cent.; of the 1935-44 period 95.4 per cent., and of the present period 96.8, an increment in performance of nearly 7 per cent. compared with the original 90.6 per cent. figure. The maximum value, i.e. 97.2 per cent. was experienced in 1952. Obviously this maximum was caused by lower sucrose losses in molasses (less molasses owing to a higher mixed juice purity and molasses with a lower sucrose content, owing to a lower purity of the molasses itself).

TABLE E

Sucrose Balance (Sucrose per cent. Sucrose in Cane)

	1950-51	1951-52	1952-53	1953-54
Sucrose in Bagasse (A)...	6.67	7.01	7.00	7.33
Sucrose in Filter Cake (B)	0.37	0.52	0.43	0.49
Sucrose in Final Molasses (C)	8.00	8.61	7.45	7.78
Undetermined Losses (D)	1.34	1.36	1.46	1.59
Boiling House Losses (B)+(C)+(D)	9.68	11.28	9.34	9.86
Total of all Losses (A)+(B)+(C)+(D)	16.35	17.50	16.34	17.19
Overall Recovery... ...	83.65	82.50	83.66	82.81
Sucrose in Cane	100.00	100.00	100.00	100.00

The final molasses weights of those factories which do not report their final molasses weights have again been estimated by assuming that non-sucrose in final molasses amounts to 83 per cent. by weight of non-sucrose in mixed juice. This rule of thumb enabled us to calculate the total loss of sucrose in final molasses of all factories and with the aid of this a complete sucrose-balance could be drawn up.

Drawing of a complete sucrose-balance is even more essential than, for example, calculating boiling house recovery, because the sucrose-balance gives us an insight of the magnitude of the individual losses and by doing so the sucrose balance shows us if and where abnormal losses did occur. Moreover, drawing up a complete sucrose-balance is the only way to assess the magnitude of the undetermined sucrose losses.

Since it interests us to know what the average value for "Undetermined Sucrose Losses per cent. Sucrose in Cane" would be when all abnormal figures for this value were left out, we calculated the averages for each season of all values higher than 0.50

per cent. and lower than 1.75 per cent. The results are shown in Table F. It reveals that when leaving out all values above 1.75 and below 0.50 per cent. the average value is approximately 1 per cent.

TABLE F

Undetermined Losses Percentage of those Factories which showed Percentages lower than 1.75 and higher than 0.50 per cent. in a Certain Season

	1950–51	1951–52	1952–53	1953–54
UF	0.88	0.97	—	1.00
ZM	1.15	0.97	1.24	0.69
FX		0.59	1.04	0.95
AK	0.62	0.92	0.71	1.04
DL			1.12	1.36
GL	1.26	1.26	1.40	1.38
MV	—	—	1.16	1.26
IL	0.92	0.82	—	0.59
RN				1.41
Arithmetical Average	0.97	0.92	1.00	1.08

We see that the averages comprise from five to nine factories only. We hope that in future we will be able to calculate an average comprising more factories.

When discussing "Final Molasses Data" in our previous summary it was said that time will show that an average purity of 39.0 is not the lowest obtainable purity. To obtain an insight into the progress made during recent years, we collected all final molasses purities equal to or lower than 39.0 in Table G. It shows that the number of factories with molasses purities equal to or lower than 39.0 is consistently increasing. In 1948 and 1949 there were only four factories, but during 1953 there were already eight factories. (This figure would have been nine instead of eight if Esperanza had still been crushing.) Since it indicates progress, this increase in number is very gratifying:

TABLE G

	1948-49	1949-50	1950-51	1951-52	1952-53	1953-54
ZM ...	—	—	—	—	—	37.1
FX ...	—	38.7	38.6	37.8	37.8	38.5
AK ...	—	—	—	—	36.8	37.7
DK ...	37.5*	38.5*	37.6*	38.5*	—	38.4*
DL ...	—	—	38.8	38.6	37.6	37.5
GL ...	38.1	38.9	—	—	—	—
CK ...	—	—	—	38.5	—	38.6
TG ...	—	—	—	—	39.0	38.8
RN ...	—	—	—	39.0	—	—
ES ...	38.3*	38.9*	38.8	37.8	39.0	—
SZ ...	37.8	—	38.2	38.0	37.7	37.5
UK ...	—	—	—	—	39.0*	—
Number of Factories	4	4	5	7	7	8

* Apparent purity.

Table G shows also how the factories with low molasses purity are spread over nearly the whole sugar belt, which implies that over a wide area cane is harvested from which a molasses purity of 39.0 or lower could be obtained.

In previous years a table has been shown which rendered cubic feet of all massecuites per ton of brix in mixed juice. Since there have been so many different boiling systems in operation during the last season, it is rather difficult to show a table rendering representative figures concerning this year.

Last year two more factories introduced the use of C-sugar magma as footing for A- or for B-strikes, or for both strikes. Three factories grained their C-strike in a low purity medium, either a blend of molasses and syrup, or on A-molasses only. It is in particular when graining in a low purity medium is practised that a recording type of conductivity meter shows its usefulness; a reproducable technique being possible only when a *recording* instrument is available.

D.—Chemicals

Per ton of brix in mixed juice the following quantities of chemicals have been consumed during the last four seasons:

TABLE H

Parts per 1000 parts of Brix in Mixed Juice

	1950-51	1951-52	1952-53	1953-54
Lime:				
Average ...	19.80	20.10	19.30	17.20
Maximum ...	26.00	27.58	24.69	24.98
Minimum ...	12.70	15.54	12.82	11.61
Sulphur:				
Average ...	7.84	7.88	7.60	7.09
Maximum ...	10.90	10.62	10.66	9.85
Minimum ...	5.90	4.35	5.05	4.19
Phosphoric Paste:				
Average ...	2.80	2.74	2.48	2.11
Maximum ...	6.20	6.81	3.67	4.55
Minimum ...	0.20	0.19	0.29	0.45

In the Twenty-seventh Annual Summary it has been discussed that theoretically the best base for the consumption of chemicals would be a ratio to non-sugar, i.e. solids minus sucrose and reducing sugars. However, since some factories do not determine the reducing sugars content of their mixed juice, the non-sugar content of all factories is not known. The next best base is a ratio to non-sucrose, i.e. solids minus sucrose. In order to compare the merits of the different bases we show a table hereunder (Table I) rendering the chemical consumption ratios based on cane, sugar, brix and non-sucrose for the last four years. In order to facilitate comparison

the consumption in 1950-51, in each case, has been called "100."

TABLE I

	1950-51	1951-52	1952-53	1953-54
Lime Consumption				
Based on Cane	100	96	94	91
Based on Sugar... ...	100	106	98	96
Based on Brix	100	102	97	87
Based on non-Sucrose.	100	93	99	92
Sulphur Consumption				
Based on Cane	100	95	93	95
Based on Sugar... ...	100	104	97	99
Based on Brix	100	100	97	91
Based on non-Sucrose.	100	92	99	95
Phosphoric Consumption				
Based on Cane	100	93	86	79
Based on Sugar... ...	100	100	88	82
Based on Brix	100	98	88	75
Based on non-Sucrose.	100	89	90	79
Purity of Mixed Juice.	100	98.3	99.8	99.1

The foregoing table shows that the phosphoric consumption shows the biggest variations of all, calculated on cane, on sugar, on brix or on non-sucrose. It means that the amount of phosphoric applied is controlled by other conditions than the amount of solids or non-sugars in mixed juice. Actually the amount of phosphoric used depends more on the personal opinion of the factory manager and on the percentage of white sugar made than on the non-sucrose content of mixed juice.

Lime and sulphur consumption have been lower last season than the previous seasons: in particular the ratio chemicals to brix has been much lower than in previous years.

E—Fuel Data

TABLE J

Season	1950–51	1951–52	1952–53	1953–54
Fibre per cent. Cane ...	15.80	16.28	16.10	16.31
Fibre per cent. Bagasse...	45.19	44.76	43.99	43.94
Bagasse per cent. Cane...	34.96	36.37	36.59	37.13
Moisture per cent. Bagasse	51.22	51.71	52.53	52.47
Lower Calorific Value ...	3176	3136	3064	3067
Available Btu's in Bagasse per 100 lbs. of Cane (based on Lower Calorific Value)	111,033	114,056	112,112	113,878
Lbs. of Steam per 100 lbs. of Cane when all available Bagasse should have been burnt with 70 per cent. Boiler Efficiency	80	82	81	82

The increase of the bagasse per cent. cane figure compared with 1950-51 is partly due to an increase in fibre per cent. cane and partly to a decrease in fibre per cent. bagasse; the lower fibre per cent. bagasse figure being caused by the higher moisture content of the bagasse.

A second effect due to the higher moisture is the lower calorific value of the bagasse.

The bottom row of figures shown in Table J is the number of lbs. of steam which could have been raised per 100 lbs. of cane, when all bagasse was burned with 70 per cent. boiler efficiency. Not all bagasse is burned; approximately 2½ per cent. of the bagasse is used as bagacillo for the rotary vacuum filters and a small part is saved. However, in addition to bagasse, wood and coal are burnt.

Actual figures regarding the average boiler efficiency of the complete boiler plant over the whole season are not available, neither data regarding the steam consumption. The actual average steam consumption, however, is less than shown in Table J, which is based on an average boiler efficiency of 70 per cent.

The growing interest in bagasse as a source of fibre and chemicals, in addition to the high fibre content of the cane grown in Natal, raises the question of installation of recording CO_2/CO-meters and recording feedwater or steam meters as a general measure for all Natal factories must be considered. Recording CO_2/CO-meters will be very helpful when adjusting the amount of combustion air entering the mill boiler furnaces. Recording steam flow or recording feedwater meters will be very helpful to check the steam consumption of the factory.

Table K shows the tons of coal and the tons of wood consumed during the 1953-54 season. Additional columns show the equivalent tons of bagasse for the last four seasons. The equivalent tons of bagasse are the sum of 3.75 times tons of coal plus 1.2 times tons of wood. They represent the number of tons bagasse containing (approximately) the same number of Btu's as the coal and wood burnt.

TABLE K

	1953-54 Season		Equivalent Tons of Bagasse			
	Tons of Coal	Tons of Wood	1950–51	1951–52	1952–53	1953–54
UF ...	1,109	3,752	9,784	13,197	8,483	8,661
ZM ...	—	1,859	1,400	1,849	3,216	2,231
FX ...	2,373	1,713	2,252	2,291	6,315	10,954
EN ...	—	1,633	—	—	3,282	1,960
AK ...	352	2,584	103	675	1,840	4,421
DK ...	7	541	1,224	926	1,562	675
DL ...	231	980	4,599	2,889	5,184	2,042
GL ...	—	—	—	—	—	—
MV ...	380	1,612	4,093	3,376	1,086	3,359
CK ...	—	—	101	—	—	—
TG ...	—	60	156	36	96	72
NE ...	—	—	—	—	—	—
IL ...	—	—	—	—	—	—
RN ...	—	640	—	960	—	768
SZ ...	—	340	1,620	624	392	408
UK ...	—	268	62	178	82	322
ES ...	—	—	24	66	673	—

In order to obtain an insight in general as to whether the use of additional fuel is increasing, Table L is drawn up. Table L shows firstly the sum of tons of additional fuel (expressed in equivalent tons of bagasse) of those ten factories which reported their additional consumption every year. Secondly it shows the corresponding tons of cane crushed by these ten factories and finally the ratio additional fuel to cane crushed.

TABLE L

	1950–51	1951–52	1952–53	1953–54
Equivalent tons of Bagasse of 10 factories...	25,293	26,041	28,256	33,480
Corresponding tons of cane crushed by these factories	3,944,718	3,295,536	3,987,224	4,439,497
Ratio equivalent tons of bagasse per 100 tons of cane crushed (per cent.)	0.64	0.79	0.71	0.75

It shows that relative to cane crushed the consumption of additional fuel did not increase, but it did not decrease either.

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

FACTORY.	UF.	ZM.	FX.	EN.	AK.	DK.	DL.	GL.	MV.	CK.	TS.	NE.	IL.	RN.	SZ.	UK.	Totals. Averages.
Crushing period From	**18.6.53**	**4.5.53**	**29.4.53**	**20.5.53**	**1.5.53**	**21.5.53**	**30.4.53**	**7.5.53**	**6.5.53**	**23.4.53**	**27.4.53**	**6.5.53**	**11.6.53**	**20.5.53**	**12.5.53**	**26.6.53**	**23.4.53**
Crushing period To	**27.2.54**	**22.12.53**	**30.1.54**	**3.12.53**	**23.1.54**	**30.12.53**	**14.2.54**	**8.1.54**	**3.12.54**	**4.1.54**	**6.12.53**	**22.12.53**	**14.12.53**	**23.1.54**	**5.1.54**	**13.11.53**	**27.2.54**
CANE CRUSHED Tons of 2,000 lbs.	712,834	424,748	491,811	57,302	472,993	132,599	813,392	413,390	141,505	209,690	731,080	669,093	185,943	184,855	448,030	70,504	6,159,770
CANE CRUSHED *Metric tons*	*646,695*	*385,332*	*445,590*	*51,983*	*429,089*	*120,291*	*737,897*	*375,049*	*128,371*	*190,226*	*663,225*	*607,001*	*168,687*	*167,690*	*406,445*	*63,960*	*5,588,053*
CANE QUALITY																	
Sucrose per cent.	13.79	13.90	13.15	14.37	13.73	13.76	13.78	14.13	13.97	13.79	14.53	14.20	13.20	14.18	14.21	14.21	13.93
Fibre per cent.	13.40	17.13	16.33	16.33	17.49	17.22	16.42	16.90	16.07	16.77	16.04	16.76	18.05	16.80	16.75	16.33	16.31
Java Ration	80.50	76.34	75.39	76.37	76.46	75.31	76.70	76.95	76.40	75.96	77.54	76.82	75.37	76.61	77.78	78.79	77.07
Tons Cane per ton Sugar	8.50	8.69	9.31	8.44	8.70	8.79	8.84	8.23	8.74	8.61	7.93	8.51	8.77	8.37	8.41	8.28	8.55
Tons Cane per ton Sugar of 96° pol.	8.32	8.46	0.04	8.17	8.46	8.52	8.66	7.97	8.50	8.53	7.73	8.18	8.77	8.11	8.15	8.08	8.32
VARIETIES CRUSHED																	
Miscellaneous per cent.	0.05	0.04	6.46	—	0.12	0.03	2.52	9.16	0.23	10.22	0.96	0.29	0.01	0.27	0.29	0.67	2.02
Co. 281 per cent.	3.75	29.38	10.10	3.57	4.64	0.60	3.16	0.23	0.87	0.60	1.28	2.82	5.33	3.74	5.38	39.18	5.71
Co. 301 per cent.	4.41	11.92	18.72	1.39	10.88	28.18	25.10	35.25	41.60	36.02	30.39	56.58	27.10	57.43	49.12	17.72	28.21
Co. 331 per cent.	1.59	7.69	14.35	48.88	54.37	40.97	31.92	14.85	39.24	27.92	21.60	14.68	33.01	8.42	26.61	20.37	22.01
N: Co. 310 per cent.	85.45	50.65	49.55	46.16	29.90	30.12	37.10	40.45	17.96	25.24	45.77	25.62	34.55	30.14	18.39	22.06	41.35
P.O.J.'s per cent.	4.75	0.32	0.82	—	0.09	0.10	0.20	0.06	0.01	—	—	0.01	—	—	0.21	—	0.69
TOTAL RAINFALL during 1953	20.31	40.47	41.39	38.85	36.87	31.97	38.00	38.11	36.09	43.93	46.40	46.99	35.60	39.42	37.66	49.08	37.97
SUGARS																	
Tons of 2,000 lbs. White Sugar	5	116	23,000	4,032	12,495	9,234	3,694	29,617	4,580	11,160	4,464	76,285	—	9,461	24,036	35	212,214
Tons of 2,000 lbs. Government Grade	15,696	37,859	171	1,290	150	2,994	21,013	4,758	8,226	8,166	8,418	504	—	5,023	10,922	1,425	126,615
Tons of 2,000 lbs. Raw Sugar	68,132	10,896	29,660	1,464	41,710	2,853	67,297	15,856	3,387	5,029	79,329	1,808	21,178	7,613	18,306	7,059	381,577
Sugar made and estimated Tons of 2,000 lbs.	83,833	48,871	52,830	6,786	54,355	15,081	92,004	50,232	16,194	24,354	92,211	78,597	21,178	22,097	53,263	8,519	720,405
Sugar made and estimated *Metric tons*	*76,050*	*44,335*	*47,926*	*6,156*	*49,310*	*13,681*	*83,465*	*45,569*	*14,691*	*22,094*	*83,652*	*71,303*	*19,213*	*20,046*	*48,320*	*7,729*	*653,541*
White Sugar per cent. Total Sugars made	—	0.24	44	59	23	61	4	49	28	46	5	Refined Sugars		43	45	—	—
SO_2 p.p.m. in White Sugar	60	42	54	—	51	—	49	—	—	—	—	—	—	—	30	—	—
SO_2 p.p.m. in Government Grade	113	52	66	—	90	—	88	73	—	—	—	—	—	—	55	—	—
Saftey Factor of Raw Sugar	0.30	0.32	0.27	—	0.34	0.14	0.24	—	0.30	—	0.32	—	—	—	—	—	—
Polarization of Government Grade	98.10	98.75	98.45	98.46	98.58	98.20	98.15	97.94	98.21	98.60	98.44	98.52	—	98.33	98.65	98.28	98.42
Polarization of Raw Sugar	98.10	98.16	98.26	98.44	97.80	97.80	97.90	—	98.18	98.16	98.51	98.22	96.00	98.37	98.29	98.28	98.15
Average Polarization of all Sugars	98.10	98.62	98.86	99.17	98.74	99.07	98.03	99.09	98.67	99.20	98.51	99.85	96.00	98.97	99.08	98.28	98.66
OVERALL TIME EFFICIENCY (Hours Actual Crushing per cent Hours Mill Open)	94.98	92.95	94.53	95.07	90.64	89.33	90.20	95.61	92.53	92.89	91.70	96.79	83.74	90.42	86.26	90.9	91.96
Hours of Stoppage due to Shortage of Cane per cent. Hours Mill Open	2.08	3.91	1.72	2.63	2.77	7.82	4.88	2.30	4.60	3.38	4.45	0.57	10.75	8.47	6.51	6.6	4.39
Total Hours of Stoppage per cent Hours Mill Open	5.02	7.06	5.46	4.93	9.37	10.67	9.80	4.38	7.47	7.11	8.30	3.21	16.26	9.56	13.74	9.1	8.04
THROUGHPUT per hour actual crushing:																	
Tons of Cane crushed	145.13	97.62	90.18	14.82	94.10	33.28	150.28	85.71	36.10	44.06	171.06	146.00	59.48	42.11	108.26	27.86	88.70
Tons of Fibre crushed	19.37	16.72	14.73	2.42	16.45	5.73	24.68	14.48	5.80	7.39	27.43	24.46	10.74	7.08	18.13	4.55	14.47
Tons of Brix processed	21.95	14.80	12.80	2.22	13.66	4.91	21.57	13.03	5.46	6.52	27.54	22.81	8.67	6.62	16.62	4.33	13.38
Tons of Sugar bagged	17.07	11.23	9.69	1.76	10.82	3.79	15.33	10.42	4.13	5.12	21.57	17.15	6.78	5.03	12.87	3.36	10.37

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

FACTORY	UF.	ZM.	FX.	EN.	AK.	DK.	DL.	GL.	MV.	CK.	TS.	NE.	IL.	RN.	SZ.	UK.	Averages.
SUCROSE BALANCE (Surcrose per cent. Surcose in Cane)																	
Sucrose in Bagasse (A)	6.46	8.36	9.63	8.62	8.65	7.00	10.34	6.33	8.25	7.13	4.72	5.57	7.48	6.00	6.84	6.90	7.33
Sucrose in Filter Cake (B)	0.65	0.58	0.44	0.90	0.62	0.42	0.73	0.30	0.47	0.43	0.17	0.50	0.31	0.25	—	0.48	0.49
Sucrose in Final Molasses (C)	8.22	8.71	8.24	7.22	7.08	8.49	7.08	6.78	9.19	7.16	7.72	7.97	8.84	8.91	—	—	7.78†
Sucrose in Undetermined Losses (D)	1.00	0.69	0.95	1.56	1.05	2.20	1.36	1.38	1.26	1.67	1.90	3.34	0.59	1.41	—	—	1.59†
Sucrose lost in Boiling House (B)+(C)+(D)	9.87	9.98	9.63	9.68	8.74	11.11	9.17	8.46	10.92	9.26	9.82	11.81	9.74	10.57	10.27	9.51	9.86
Total of all losses (A)+(B)+(C)+(D)	16.33	18.34	19.26	18.30	17 39	18.11	19.51	14.79	19.17	16.39	14.51	17.38	17.22	16.57	17.02	16.41	17.19
LOST ABSOLUTE JUICE PER CENT. FIBRE	*45.5*	*44.9*	*54.7*	*48.9*	*44.7*	*36.1*	*57.7*	*35.1*	*46.6*	*37.7*	*28.7*	*31.2*	*49.3*	*32.2*	*37.7*	*39.7*	*41.70*
BOILING HOUSE PERFORMANCE	*96.9*	*97.5*	*97.9*	*96.1*	*97.7*	*94.8*	*96.8*	*98.0*	*96.1*	*97.3*	*97.1*	*95.2*	*97.8*	*96.7*	*96.8*	*97.5*	*96.91*
Imbibition Water per cent. Fibre	176	220	189	250	191	182	193	178	228	166	198	226	203	221	219	268	200
Imbibition Water per cent. Cane	23.5	37.7	30.8	40.9	33.3	31.4	31.7	30.1	36.7	27.9	31.7	37.9	36.7	37.2	36.6	43.7	32.66
EXTRACTION	93.5	91.6	90.4	91.4	91.4	93.0	89.7	93.7	91.8	92.9	95.3	94.4	92.5	94.0	93.2	93.1	92.67
BOILINGHOUSE RECOVERY	89.4	89.1	89.3	89.4	90.4	88.1	89.8	91.0	88.1	90.0	89.7	87.5	89.5	88.8	89.0	89.8	89.36
OVERALL RECOVERY	83.7	81.7	80.7	81.7	82.6	81.9	80.5	85.2	80.8	83.6	85.5	82.6	82.8	83.4	82.9	83.6	82.81
FINAL BAGASSE																	
Surcrose per cent.	2.93	2.88	3.24	3.55	2.77	2.66	3.45	2.40	3.23	2.63	1.99	2.16	2.56	2.39	2.74	2.96	2.75
Moisturejper cent.	52.29	53.76	53.86	49.51	55.68	49.24	55.85	51.44	50.83	51.89	50.86	51.31	49.42	49.84	49.15	46.70	52.47
Fibre per cent.	43.96	42.40	41.80	46.01	40.79	47.46	39.71	45.40	45.02	44.84	46.42	45.92	47.19	47.29	47.29	49.36	43.94
Weight per cent Cane	30.36	40.8	39.1	35.5	42.9	36.3	41.3	37.2	35.7	37.4	34.6	36.6	38.5	35.6	35.4	33.08	37.13
Lower Calorific Value (7650—18S—86.4W Btu/.lb.)	*3079*	*2941*	*2938*	*3308*	*2839*	*3348*	*2763*	*3163*	*3200*	*3120*	*3220*	*3178*	*3334*	*3401*	*3354*	*3562*	*3067*
FIRST EXPRESSED JUICE																	
Brix	19.64	21.07	20.06	20.87	20.28	20.54	20.60	21.04	21.02	20.63	21.39	21.16	20.20	21.05	20.59	20.50	20.56
Purity (Apparent)	87.22	86.4	87.0	90.21	88.6	88.95	87.16	88.3	87.0	87.98	87.6	87.33	86.74	87.90	88.71	87.85	87.48
LAST EXPRESSED JUICE																	
Brix	3.16	3.61	4.16	2.42	4.06	3.99	4.27	4.41	3.70	3.92	2.32	2.50	2.47	4.47	4.26	3.70	3.55
Purity (Apparent)	78.48	75.0	74.8	79.30	78.4	80.31	77.74	76.3	77.9	80.78	73.5	75.47	69.24	79.30	77.11	74.69	76.46
Purity Drop from First Expressed Juice	8.74	11.4	12.2	10.91	10.2	8.64	9.42	12.0	9.1	7.20	14.1	11.86	17.50	8.60	11.60	13.16	11.02
MIXED JUICE																	
Brix	16.24	15.59	15.48	14.18	16.04	15.50	15.88	16.37	14.99	16.34	16.59	15.42	14.48	15.16	15.16	14.06	15.79
Purity (Gravity)	85.28	83.98	83.72	87.86	86.43	86.78*	86.03	87.08	84.68	86.57	85.91	85.80	83.88	84.74*	86.28	85.09*	85.61
Reducing Sugar/Surcose Ratio	2.66	4.43	4.67	2.89	3.85	—	4.36	3.16	4.49	3.57	—	3.44	3.56	3.60	3.14	—	3.66
Purity Drop from First Expressed Juice	1.94	2.4	3.3	2.35	3.85	2.17	1.13	1.2	2.3	1.41	1.7	1.53	2.86	3.16	2.43	2.76	1.87
CLARIFIED JUICE																	
Brix	15.41	16.35	14.71	12.75	14.59	15.75	15.00	16.46	15.07	16.41	16.07	16.36	14.66	16.30	14.83	—	15.93
Purity (Apparent)	85.98	84.9	84.9	88.91	86.9	87.64	86.53	88.0	85.4	87.51	86.9	93.15	86.08	85.40	86.78	86.4	86.41‡
Reducing Sugar/Sucrose Ratio	2.56	3.82	4.05	2.69	3.62	—	4.20	—	4.20	—	—	1.48	3.04	3.48	3.94	—	3.53‡
pH	7.18	7.44	7.0	7.0	7.4	7.0	7.3	6.79	7.2	—	7.37	6.90	—	—	7.13	7.2	—
FILTER CAKE																	
Sucrose per cent.	5.24	1.59	0.80	2.02	1.00	0.96	1.82	0.82	1.31	1.27	0.40	0.61	1.03	0.54	1.10	1.35	1.05
Weight per cent Cane	1.81	5.13	7.17	6.42	8.39	6	5.52	4.94	5	4.65	5.99	11.62	4	6.70	—	5.06	5.86‡
SYRUP																	
Brix	58.11	50.12	52.11	60.42	55.36	51.0	52.39	54.68	54.10	52.00	50.44	63.10	60.53	59.51	56.02	54.7	55.02
Purity (Apparent)	86.13	84.8	84.8	89.54	87.2	88.42	86.63	88.1	86.0	87.61	86.5	92.93	85.94	85.90	86.81	86.7	86.46‡
Reducing Sugar/Sucrose Ration	2.55	3.67	4.02	2.14	3.55	—	4.10	2.87	3.80	—	—	1.48	2.83	3.59	2.38	—	3.31‡
pH	6.96	7.11	6.9	—	6.9	6.8	7.0	6.80	7.0	—	—	7.28	—	—	6.74	7.0	—

‡N.E. not included in average figure. †Estimated weighted mean. *Apparent Purity.

Table III.—MASSECUITES, RUN-OFFS, FINAL MOLASSES AND CHEMICALS.

FACTORY	UF.	ZM.	FX.	EN.	AK.	DK.	DL.	GL.	MV.	CK.	TS.	NE.	IL.	RN.	SZ.	UK.	Averages‡
A-MASSECUITE																	
Per cent. brix	93.0	93.4	94.1	91.5	92.5	91.2	92.8	91.3	90.7	89.8	93.1	91.2	92.5	93.1	92.2	91.8	92.2
Apparent purity	84.2	84.7	84.0	89.6	84.9	86.8	85.4	88.4	85.0	87.6	87.2	94.3	84.6	84.6	84.9	86.0	85.7
Cub. feet per ton of brix	*24.3*	*18.9*	*22.9*	*24.3*	*24.2*	*24.6*	*21.4*	*25.3*	*22.7*	—	—	*41.2*	*21.9*	*20.2*	*22.8*	*24.7*	*22.9*
Apparent purity of run-off	66.5	62.2	64.9	75.6	65.6	68.7	66.4	70.1	67.9	70.9	70.6	83.5	63.3	66.7	67.0	68.1	67.4
Drop in purity	17.8	22.5	19.1	14.1	19.3	18.0	19.0	18.3	17.1	16.7	16.6	10.8	21.3	17.9	17.9	17.9	18.3
Crystal per cent. massecuite	49.5	55.6	51.2	52.7	51.9	52.6	52.4	55.9	48.3	51.7	52.5	59.6	53.6	50.0	50.0	51.6	51.8
B-MASSECUITE...																	
Per cent. brix	95.8	97.4	97.9	94.6	95.7	94.1	96.4	94.4	93.2	94.4	95.6	93.5	95.0	97.5	95.6	94.5	95.6
Apparent purity	72.1	69.9	69.4	73.2	71.2	75.6	70.1	72.3	73.2	72.6	75.3	84.6	76.1	70.4	71.1	76.4	72.3
Cub. feet per ton of brix	*10.0*	*13.0*	*10.3*	*9.4*	*11.8*	*13.0*	*10.2*	*10.6*	*14.4*	—	—	*19.0*	*16.3*	*9.2*	*6.5*	**9.1**	*10.8*
Apparent purity of run-off	50.2	44.2	45.9	55.8	45.5	50.9	44.7	47.2	49.8	48.7	51.9	63.55	51.0	50.2	47.8	54.8	48.6
Drop in purity	21.9	25.7	23.5	17.4	25.7	24.7	25.4	15.1	23.4	24.0	23.4	21.0	25.1	20.2	23.3	21.6	23.7
Crystal per cent. massecuite	42.1	44.9	42.5	37.2	45.1	47.4	44.3	44.9	43.1	44.1	46.5	53.9	48.6	39.5	42.7	45.2	44.0
C-MASSECUITE																	
Per cent. brix	99.7	89.0	98.3	97.2	97.1	97.9	98.4	94.7	95.7	96.4	98.3	98.3	95.4	99.0	97.8	96.8	97.5
Apparent purity	59.8	59.5	58.5	62.1	59.2	63.2	59.2	60.4	59.5	61.4	62.2	71.9	64.9	59.3	62.2	59.3	60.3
Cub. feet per ton of brix	*7.1*	*8.7*	*6.8*	*7.9*	*6.9*	*7.9*	*6.8*	*7.0*	*8.1*	—	—	*8.6*	**12.2**	*9.8*	*9.95*	*8.2*	*7.9*
Purity of run-off	38.6	37.1	38.5	40.8	37.9	38.4	38.1	38.9	42.0	38.6	38.8	47.2	41.7	39.6	39.2	40.2	38.9
Drop in purity	21.2	22.4	20.0	21.3	21.3	24.8	21.0	21.5	17.5	22.8	23.4	24.8	23.2	19.7	23.0	19.1	21.4
Crystal per cent. massecuite	34.4	34.9	32.0	35.0	33.3	39.4	33.5	33.3	29.9	35.8	37.6	46.1	37.9	32.3	37.0	30.9	34.1
TOTAL CUB. FEET OF MASSECUITES																	
Per ton of sugar bagged	53.3	53.4	53.0	52.6	54.2	57.4	48.8	53.6	60.0	51.2	—	91.4	64.5	51.6	52.1	54.0	53.5
Per ton of brix in mixed juice	*41.4*	*40.5*	*40.1*	*41.6*	*42.9*	*45.5*	*38.5*	*42.9*	*45.2*	*40.2*	—	*68.7*	*50.4*	*39.2*	*40.4*	*42.0*	*41.6*
FINAL MOLASSES																	
Per cent. brix	96.52	93.78	90.32	89.60	89.64	89.18	89.45	82.28	85.50	86.89	90.68	99.41	86.31	93.16	88.96	91.2	90.01
Gravity purity	*39.5*	*37.1*	*38.5*	*40.8**	*37.7*	*38.4**	*37.5*	*39.3*	*42.0*	*38.6*	*38.8*	*47.3*	*42.8*	*39.4*	*37.5*	*40.2**	*39.46*
Per cent. Reducing Sugars	17.47	12.89	11.82	—	14.08	—	15.08	12.33	13.30	—	12.53	8.86	9.46	—	—	—	—
Per cent. Sulphated Ash	18.23	14.95	16.28	—	12.38	—	13.20	—	—	—	—	15.56	12.40	—	—	—	—
Reducing Sugars/Ash Ration	0.96	0.86	0.73	—	1.14	—	1.14	—	—	—	—	0.57	0.76	—	—	—	—
Weight (at 85 per cent. brix) per cent. cane	3.38	3.85	3.32	2.94	3.05	3.19	3.06	2.86	3.56	3.01	3.40	2.81	3.20	3.77	—	—	3.44†
CHEMICALS																	
Lime—lbs. per ton of Cane	5.09	6.89	5.55	8.10	6.05	3.42	4.24	5.71	7.56	4.78	4.91	—	6.28	6.22	7.43	6.41	5.58
lbs. per ton of Sugar	44.25	59.88	51.71	68.36	52.60	29.31	37.52	47.0	66.07	14.14	38.95	—	55.16	52.04	62.55	53.06	47.75
Parts per 1,000 parts of brix	*16.48*	*22.72*	*19.56*	*27.07*	*20.82*	*11.61*	*14.78*	*18.79*	*24.98*	*16.16*	*15.24*	—	*21.50*	*19.78*	*24.23*	*20.62*	*17.20*
Sulphur—lbs. per ton of Cane	2.28	2.99	2.34	3.59	2.64	1.24	1.74	2.62	2.97	2.01	1.74	—	2.48	2.57	2.12	2.75	2.30
lbs. per ton of Sugar	19.34	25.96	21.74	30.30	23.01	10.59	15.42	21.58	25.94	17.33	13.79	—	21.85	21.50	26.28	22.77	19.68
Parts per 1,000 parts of brix	*7.52*	*9.85*	*8.22*	*12.00*	*9.11*	*4.19*	*6.80*	*7.19*	*9.80*	*6.80*	*5.39*	—	*8.50*	*8.16*	*10.18*	*8.85*	*7.09*
Phosphoric—lbs. per ton of Cane	0.14	0.71	0.60	0.60	0.72	1.34	0.44	1.18	0.87	0.91	0.62	—	0.73	0.97	1.18	0.77	0.68
lbs. per ton of Sugar	1.17	6.18	5.64	5.06	6.29	11.49	3.90	9.69	7.59	7.82	4.92	—	6.40	8.13	9.89	6.34	5.85
Parts per 1,000 parts of brix	*0.45*	*2.34*	*2.14*	*2.00*	*2.49*	*4.55*	*1.54*	*3.88*	*2.87*	*3.07*	*1.92*	—	*2.50*	*3.09*	*3.83*	*2.46*	*2.11*

The averages regarding massecuites and run-offs do not include those of EN, NE and IL.

*Apparent Purity.

†Estimated weighted mean.

Table IV.—COMPARATIVE RESULTS FOR RECENT YEARS.

COUNTRY	NATAL.									
YEAR	1944.	1945.	1946.	1947.	1948.	1949.	1950.	1951.	1952.	1953.
CANE										
Sucrose per cent.	13.67	14.28	14.21	13.32	13.89	13.52	14.19	13.33	13.87	13.93
Fibre per cent.	15.83	15.99	16.21	15.80	15.90	16.19	15.80	16.28	16.10	16.31
JAVA RATIO	77.38	77.36	77.03	76.99	76.98	76.47	77.42	76.56	77.04	77.07
JUICE QUALITIES										
Purity of First Expressed Juice	88.35	88.36	88.22	88.48	88.12	88.64	88.70	87.60	88.60	87.48
Purity of Last Expressed Juice	75.8	75.9	75.1	75.0	75.5	67.2	75.8	74.5	76.2	76.46
Purity of Mixed Juice	86.19	86.23	85.9	86.24	85.92	86.22	86.40	84.92	86.25	85.61
Purity of Syrup	87.81	87.82	87.44	87.98	87.54	87.93	87.60	96.20	87.65	86.46
Purity Drop First to last Expressed Juice	12.60	12.42	13.08	13.45	12.58	12.48	12.90	13.10	12.40	11.02
Purity Drop First to Mixed Juice	2.16	2.13	2.36	2.24	2.20	2.42	2.30	2.68	2.35	1.87
Purity Drop First to Syrup	0.52	0.52	0.75	0.47	0.56	0.71	1.10	1.40	1.20	1.02
Purity Increase Mixed Juice to Syrup	1.63	1.61	1.60	1.75	1.64	1.71	1.30	1.30	1.40	0.85
Reducing Sugar/Sucrose Ratio of Mixed Juice	3.49	3.38	3.30	2.95	3.67	3.11	3.12	3.52	2.92	3.66
Reducing Sugar/Suctose Ratio of Syrup	2.89	2.84	2.80	2.62	3.07	2.55	2.81	3.25	2.66	3.31
EXTRACTION AND RECOVERIES										
Sucrose lost in manufacture % Cane	2.30	2.42	2.42	2.26	2.33	2.25	2.32	2.33	2.26	2.39
Sucrose in Sugar % Sucrose in Cane (Overall Rec.)	83.14	83.30	82.94	83.73	83.19	83.35	83.65	82.50	83.66	82.81
Sucrose in Mixed Juice % Sucrose in Cane (Extraction)	93.13	93.28	93.07	93.44	93.32	92.94	93.33	92.98	93.00	92.67
Sucrose in Sugar % Sucrose in Mixed Juice (B.H. Rec.)	89.27	89.29	89.12	89.61	89.14	89.68	89.63	88.72	89.96	89.36
Imbibition % Fibre	213	219	217	218	214	208	206	215	217	200
Imbibition % Cane	33.7	35.0	35.2	34.4	34.1	33.7	32.8	35.0	34.9	32.7
Lost Absolute Juice % Fibre in Bagasse	41.1	39.3	40.5	39.8	39.8	41.0	39.3	40.2	40.9	41.7
Boiling House Performance	96.4	96.4	96.7	96.8	96.5	96.9	96.88	96.66	97.2	96.91
BAGASSE										
Sucrose per cent.	2.73	2.77	2.79	2.54	2.67	2.66	2.72	2.57	2.65	2.75
Moisture per cent.	50.23	50.19	50.32	50.46	50.53	50.84	51.22	51.71	52.53	52.47
Lower Calorific Value	*3261*	*3264*	*3252*	*3244*	*3236*	*3209*	*3176*	*3136*	*3063*	*3067*
FILTER CAKE										
Sucrose per cent.	1.17	1.13	0.96	1.06	1.29	1.12	1.20	1.28	0.94	1.05
Weight % Cane	5.22	5.64	5.91	5.99	5.90	5.91	5.51	5.68	6.34	5.86
GRAVITY PURITY OF FINAL MOLASSES	42.37	41.98	41.75	41.10	41.53	41.39	40.50	40.28	39.33	39.46
Average Polarisation of All Sugars	98.62	98.73	98.70	98.83	98.93	98.84	98.77	98.80	98.63	98.66
YIELD										
Tons Cane per Ton Sugar	8.67	8.29	8.36	8.84	8.55	8.76	8.32	8.98	8.50	8.55
Tons Cane per Ton 96° Sugar	8.44	8.08	8.14	8.60	8.31	8.52	8.09	8.73	8.27	8.32
SUCROSE BALANCE										
Sucrose in Bagasse % Sucrose in Cane (A)	6.87	6.72	6.93	6.56	6.68	7.06	6.67	7.01	7.00	7.33
Sucrose in Filter Cake % Sucrose in Cane (B)	0.37	0.35	0.28	0.32	0.36	0.34	0.37	0.52	0.43	0.49
Sucrose in Molasses % Sucrose in Cane (C)	—	—	—	—	—	—	—	8.61	7.45	7.78
Undetermined Sucrose % Sucrose in Cane (D)	9.62	9.63	9.85	9.39	9.77	9.25	1.34	1.36	1.46	1.59
Boiling House Losses % Sucrose in Cane (B) + (C) + (D)	9.99	9.98	10.13	9.71	10.13	9.59	9.68	11.28	9.34	9.86
Total Losses % Sucrose in Cane (A) + (B) + (C) + (D)	16.86	16.70	17.06	16.27	16.81	16.65	16.35	17.50	16.34	17.19

Table V.—AVERAGE MANUFACTURING RESULTS BY MONTHLY PERIODS FOR NATAL SUGAR FACTORIES REPORTING TO THE SUGAR MILLING RESEARCH INSTITUTE, SEASON 1953-1954.

Period ended		30 May, 1953.	27 June 1953.	1 Aug., 1953.	29 Aug., 1953.	26 Sept., 1953.	31 Oct., 1953.	28 Nov., 1953.	2 Jan., 1954.	30 Jan., 1954.	27 Feb., 1954.
Tons of 2,000 lbs. Cane Crushed	This period	—	660,473	956,685	742,000	687,891	912,555	694,241	594,467	251,520	103,882
	To date	556,056	1,216,529	2,173,214	2,915,214	3,603,105	4,515,660	5,209,901	5,804,368	6,055,888	6,159,770
Tons of 2,000 lbs. Sugar made and estimated	This period	—	77,584	116,921	91,730	85,495	109,860	79,640	63,327	25,059	10,366
	To date	60,424	138,007	254,928	346,658	432,153	542,013	621,653	684,980	710,039	720,405
Tons of Cane per Ton of Sugar	This period	—	8.51	8.18	8.09	8.05	8.31	8.72	9.39	10.04	9.98
	To date	9.20	8.81	8.52	8.41	8.34	8.33	8.38	8.47	8.53	8.55
Sucrose per cent. Cane	This period	—	13.82	14.49	14.72	14.83	14.31	13.57	12.75	12.04	12.18
	To date	13.10	13.49	13.97	14.16	14.29	14.29	14.20	14.05	13.96	13.93
Fibre per cent. Cane	This period	—	16.29	16.11	16.20	16.27	16.42	16.61	16.69	16.10	15.13
	To date	16.25	16.27	16.20	16.20	16.22	16.26	16.30	16.34	16.33	16.31
Java Ratio	This period	—	77.75	77.69	76.57	77.19	76.62	76.12	76.01	76.72	77.41
	To date	77.85	77.79	77.75	77.43	77.53	77.35	77.19	77.08	77.07	77.07
Sucrose per cent. Bagasse	This period	—	2.61	2.81	2.83	2.85	2.84	2.67	2.67	2.87	2.84
	To date	2.53	2.57	2.68	2.72	2.74	2.76	2.75	2.74	2.75	2.75
Moisture per cent. Bagasse	This period	—	52.06	52.04	52.21	52.11	52.57	52.54	54.48	54.49	53.61
	To date	52.46	52.24	52.16	52.17	52.16	52.24	52.28	52.36	52.45	52.47
Imbibition per cent. Cane	This period	—	34	33	34	34	33	33	31	28	23.43
	To date	33	34	33	33	33	33	33	33	33	32.66
Extraction	This period	—	93.1	92.9	92.8	92.8	92.6	92.5	91.9	90.9	91.72
	To date	92.9	93.0	93.0	93.0	92.9	92.9	92.8	92.8	92.7	92.67
Boiling House Recovery	This period	—	89.5	89.6	89.2	89.1	89.8	89.7	89.5	89.2	89.32
	To date	88.4	89.0	89.3	89.2	89.2	89.3	89.4	89.4	89.4	89.36
Overall Recovery	This period	—	83.4	83.3	82.9	82.8	83.1	83.0	82.3	81.0	81.92
	To date	82.1	82.8	83.0	83.0	82.9	83.0	83.0	82.9	82.8	82.81
Purity of Mixed Juice	This period	—	85.1	85.1	85.4	86.6	96.8	86.5	85.2	83.8	83.11
	To date	84.6	84.9	85.0	85.1	85.4	85.7	85.8	85.7	85.6	85.61
Reducing Sugar/Sucrose Ratio of Mixed Juice	This period	—	3.98	4.40	3.73	3.66	2.86	3.05	3.65	4.58	4.14
	To date	4.47	4.20	4.29	4.14	4.04	3.68	3.62	3.65	3.65	3.66
Gravity Purity of Final Molasses*	This period	—	38.6	38.8	39.5	41.1	41.1	40.7	39.3	38.0	38.94
	To date	37.2	38.5	38.6	38.9	39.3	39.6	39.8	39.8	39.8	39.46

*Arithmetical Average.

Table VI.—COMPARATIVE RESULTS FOR RECENT YEARS.

COUNTRIES	British Guiana		Jamaica	Puerto Rico		Mauritius		Natal		Philippines		Queensland	
YEAR	1951	1952	1953	1951/52	1952/53	1951	1952	1952	1953	1950/51	1951/52	1951	1952
CANE													
Sucrose per cent.	10.61	10.88	12.18	12.98	13.05	13.03	13.26	13.87	13.93	13.24	12.67	15.55	14.89
Fibre per cent.	14.76	14.82	14.31	13.48	13.94	11.77	11.84	16.10	16.31	11.72	11.71	13.31	12.88
JUICES													
Purity of First Expressed Juice	82.5	82.5	84.0	83.4	83.9	87.4	88.3	88.6	87.5	85.5	83.6	88.4	88.1
Purity of Last Expressed Juice	75.8	75.7	76.4	70.7	71.1	74.4	74.5	76.2	76.5	77.6	76.5	—	—
Purity of Mixed Juice	80.4	80.3	82.2	80.7	81.0	84.9	85.9	86.3	85.6	85.1	83.3	87.3	87.1
Reducing Sugar/Sucrose Ratio	8.47	8.70	7.95	—	—	4.6	4.0	2.9	3.7	—	—	1.7	1.9
Purity of Syrup	81.7	81.8	84.0	82.3	82.6	85.3	86.0	87.6	86.5	86.3	84.8	87.4	87.2
Purity Drop First to Mixed Juice	2.2	2.2	1.8	2.7	2.9	2.5	2.4	2.4	1.9	0.4	0.3	1.1	0.9
Purity Drop First to Syrup	0.8	0.7	—	1.1	1.3	2.1	2.3	1.0	1.0	0.8	1.2	1.1	0.9
JAVA RATIO	75.92	75.56	78.89	78.97	78.25	81.27	80.48	77.04	77.07	79.44	79.71	81.71	82.28
BAGASSE													
Sucrose per cent.	3.06	3.10	2.38	2.57	2.61	2.95	2.77	2.65	2.75	3.83	3.70	2.69	2.61
Moisture per cent.	46.40	46.68	45.40	49.46	49.25	46.30	46.30	52.53	52.47	49.02	48.90	48.51	88.25
Lower Calorific Value	*3586*	*3561*	*3684*	*3331*	*3348*	*3597*	*3556*	*3064*	*3067*	*3346*	*3358*	*3411*	*3434*
EXTRACTION	91.4	91.4	94.4	94.0	94.1	94.6	95.0	93.0	92.7	92.5	92.5	95.2	95.4
Imbibition % Fibre	147	159	134	170	176	167	184	217	200	117	115	273	245
Lost Absolute Juice % Fibre	*49.7*	*49.7*	*33.4*	*43.7*	*41.3*	*45.7*	*42.5*	*40.9*	*41.7*	*60.3*	*60.3*	—	—
FILTER CAKE													
Sucrose per cent.	2.05	1.81	2.40	2.70	2.94	6.6	6.2	0.9	1.0	3.69	3.41	3.4	3.71
Weight % Cane	2.69	2.78	2.28	3.96	4.00	1.92	1.89	6.3	6.5	1.88	1.87	3.6	3.26
PURITY OF FINAL MOLASSES	31.0	31.0	33.2	30.8	31.5	37.9*	37.8*	39.3*	39.5*	36.5*	36.6*	44.8*	43.6*
RECOVERIES													
Sucrose % Cane lost in manufacture	2.03	2.07	1.94	1.86	2.00	2.09	2.00	2.27	2.39	1.90	1.95	2.38	2.19
Overall Recovery	80.8	81.0	84.1	84.8	84.6	84.0	84.9	83.7	82.8	85.4	84.4	84.7	85.3
Boiling House Recovery	88.4	88.6	89.1	90.3	90.0	88.7	89.4	90.0	89.4	92.3	91.2	88.9	89.4
YIELD													
Tons of Cane per Ton of Sugar	11.27	10.99	9.46	9.35	8.81	8.99	8.75	8.50	8.55	8.74	9.24	7.49	7.72
Tons of Cane per Ton of 96°	11.20	10.91	9.37	9.22	8169	8.78	8.52	8.27	8.32	8.62	9.12	7.29	7.50
LOSSES													
Sucrose in Bagasse % Sucrose in Cane (A)	8.60	8.65	5.57	6.01	5.93	5.40	5.00	7.00	7.33	7.47	7.50	4.78	4.65
Sucrose in Filter Cake % Sucrose in Cane (B)	0.52	0.46	0.45	0.87	0.90	1.00	0.88	0.43	0.49	0.53	0.51	0.73	0.74
Sucrose in Molasses % Sucrose in Cane (C)	8.22	8.58	8.33	7.71	7.87	7.90	7.20	7.45	7.78	6.84	8.05	6.71	6.56
Undetermined Sucrose % Sucrose in Cane (D)	1.84	1.35	1.54	0.58	0.64	1.80	2.00	1.46	1.59	—0.28	—0.43	3.08	2.75
Boiling House Losses % Sucrose in Cane (B)+(C)+(D)	10.58	10.39	10.32	9.16	9.41	10.70	10.10	9.34	9.86	7.09	8.13	10.52	10.05
Total Losses % Sucrose in Cane (A)+(B)+(C)+(D)	19.18	19.04	15.89	15.17	15.35	15.10	15.10	16.34	17.19	14.56	15.63	15.30	14.70
AVERAGE POLARISATION OF ALL SUGARS	96.64	96.68	96.91	97.32	97.36	98.40	98.50	98.63	98.66	97.41	97.32	98.68	98.75

* *Gravity Purity*

Table VII—COMPARATIVE DATA OF REPORTING NATAL FACTORIES FROM 1925 TO 1953 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	19.19	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	92.64	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
Average ...	13.84	15.95	8.57	8.33	93.22	89.38	83.24	34.2	213	2.68	51.14	40.3	85.96	3.29	40.8	96.8	18 of 20	99.3

The President, in thanking Mr. Perk for his paper, said that it was of great economic importance to this Association. The amount of work involved in the compilation of such data was of enormous help in improving the efficiency of the Industry.

Mr. McKenna said imbibition efficiency puzzled him. At one factory, applying equivalent amounts of imbibition efficiency could not show the same results as at another factory.

Mr. Perk, in replying, said that for the time being he could not draw further conclusions. He had made an exception for the case of Gledhow. Owing to the better preparation of the cane before crushing as a result of the Searby Shredder installed in front of the existing milling train during the 1951-52 off-season, Gledhow's figures of the last two seasons had been considerably higher. Last year he had already noticed this increase, he had waited, however, till this increase was confirmed by this year's figure before drawing attention to the fact. Notwithstanding the fact that these imbibition efficiency figures are now calculated for the third year in succession, it was not always possible for him to explain why a figure had been higher one year than another.

Mr. King commented upon the fact that Uba no longer featured in our figures although it did yeoman service in days gone by. Mr. King asked that the percentage of new varieties be recorded in future.

Mr. Perk replied that he had inquired of the Experiment Station which varieties should be mentioned in Table No. 1.

Mr. King was anxious to know if any of the new varieties would be recorded separately in any future annual summary of laboratory reports.

Mr. Perk replied that when a new variety was crushed in a greater proportion, it would be recorded separately; the decision would be made in collaboration with the Experiment Station.

The President said that in the past when Uba was generally maligned we seldom saw such high fibre figures as are common to-day, although Uba was supposed to be a very hard cane.

Mr. Phipson thought that the explanation could be that in these days cane was dirtier than it was in the old days. In those days cane was generally burned as compared with the present practice of hand trashing.

Mr. A. D. Elysee supported this view and said that in spite of increased mill efficiency the moisture content of bagasse could not be reduced to the 45 per cent. which was shown in years gone by. He did not understand the imbibition efficiency figures shown on Table D. The efficiency figure had risen but the extraction had fallen to 93.

Mr. Rault said that he could not understand the value of the imbibition efficiency figure. A very reduced imbibition, causing a loss of extraction could very well shew a high efficiency of absorbtion and would be misleading information. On the other hand an increased imbibition with a lower absorbtion efficiency could still be profitable if it raised the extraction. The factor which counted was to put the maximum amount of sugar in the bag, even if the imbibition efficiency were not at the optimum.

Mr. Perk pointed out that the extraction does not increase proportional to the increase in imbibition. Each further quantity of imbibition water will have a smaller effect. When increasing the imbibition ratio the extraction will increase but the effect of the imbibition will decrease: the efficient use of the water will decrease. We see this reflected in the average figures shown at the end of Table D: the imbibition efficiency of those mills which apply less imbibition is higher. Apart from this fact stands the question of the extraction being lower or higher.

The way the formula for the calculation of "Imbibition Efficiency" is derived is shown in Appendix 1 of the Twenty-seventh Annual Summary.

Mr. Du Toit said that as he understood it a high imbibition figure might well be accompanied by a lower extraction. In reply to Mr. King he said that it had been necessary to stop detailing the proportion of some of the older varieties in the Annual Summary. In the same way as the newer varieties were crushed in greater proportion so they would be recorded yearly. Mr. Du Toit said that much new matter of value was now shown in the report, particularly that in the last table, namely the ten-year averages. He thought however that some of these average figures should be regarded with reserve for instance, although the new canes now grown had a higher sucrose content and the table appeared to show this, much of this was in fact due to the year 1934 being included in the first ten-year average. As far as fibre per cent. cane was concerned the year 1938 in which the lowest figure was shown was the year in which the highest proportion of Co.290 was crushed. It was always considered a low fibre cane. N:Co 310 was actually a low fibre cane and although crushed in increasing quantity during the past three years, this low fibre was not reflected in the figures. This was probably due to the fact that it had a lot of adhering trash. It was generally reported that the trash content of cane had increased recently and he thought that this might be the cause of the increased fibre figure. As far as increase in throughput was concerned he would have liked Mr. Perk to have indicated how far towards the maximum we could go without serious loss in efficiency. He made a plea for the republication of a table which had been shown many years in the past

shewing the figures obtained during the optimum sucrose period of the crop as compared with the balance of the season. Now due to the extension of the crushing season some of the real increases in sucrose content and purity had been obscured in the annual averages.

The President asked if anyone could remember for how many years now had cane been hand-trashed. He asked this because over the last twenty years there had been very little difference in the fibre average figures. He thought that this might be due to the increase in the trash content of the cane but when comparing our figures with those of other countries it should be remembered that our crop was about two years old. In other countries the cane was much younger and so they showed a correspondingly lower fibre figure.

Mr. Rault said he would like to know what the real fibre contents of the various varieties were as compared with the apparent figures as recorded at the factories, for the latter were fictitiously increased by extraneous matter sent in with the cane stalks. Systematic tests at Natal Estates' factory had shewn artificial rises of 4 per cent. of fibre through this cause and this meant that nearly 25 per cent. extra bagasse was forced through the rollers. The efficiency figure was adversely affected by crushing this trash and trying to extract sugar from material which originally did not contain any.

Dr. Dodds inquired if in the past years when an imbibition bath was used at Natal Estates if any increase in efficiency could have been attributed to it. He said that apparently at three factories in Java such diffusion baths were used with success, at one time at least.

Mr. Perk confirmed Dr. Dodds' remark that hot maceration had been used by three Java factories. The method used in those factories was according to the Nobel patent, which implies that the bagasse be heated with the aid of steam to 70°C. At that temperature the cane cells are killed and diffusion can occur. Accordingly the extraction was higher than with cold maceration or than with the ordinary imbibition method. The high steam consumption of the Nobel maceration prevented, however, a more general introduction.

Mr. Rault, replying to Dr. Dodds, said that when a maceration bath was used at Natal Estates good results were achieved but owing to difficulty experienced in feeding the mills and the excessive time required to repair any damage to the mechanism as well as finally the need for extra throughput, it had to be discarded.

Mr. Antonowitz supported the view that imbibition could be used wastefully. At Umfolosi they had reduced the imbibition per cent. fibre from 200 to 150 without any loss in extraction.