THE EFFECT OF REMOVING BAGACILLO FROM MIXED JUICE ON SUGAR MANUFACTURE

By K. DOUWES DEKKER and P. J. LAUBSCHER.

Introduction.

The practice of removing fine bagasse or bagacillo from mixed juice before it is purified chemically is no new one. It is well known that some of the constituents of bagasse are dissolved by hot alkaline media. What influence bagacillo, in the quantities in which it is present in mixed juice when strained only through a coarse cush-cush strainer, have on sugar manufacture is, however, not so easy to tell.

Peck[1] found that where fine trash was present during clarification (0.17 per cent. by weight on mixed juice) there was a decided increase in the amount of soluble gums present over tests where this was removed by screening through a 100-mesh screen. The lower the acidity, the higher are the soluble gums. From his experiments Peck concludes that, by removing bagacillo from mixed juice before clarification, the gum content of clarified juice could be reduced by 47 per cent. He further points out that this would result in a considerably less viscous final molasses and a raw sugar of better filterability.

Dry bagasse contains 25 to 30 per cent. pentosans, and 22 to 27 per cent. lignin. Suppose we have a mixed juice containing 0.2 per cent. bagacillo, from which a clear juice of 85 per cent. purity and 15 per cent. sucrose can be prepared when bagacillo is removed before clarification. Suppose we now clarify this mixed juice without removing the bagacillo before treatment. One can calculate, assuming the 50 per cent. lignin and pentosans present in the bagacillo to be dissolved completely under the conditions of clarification, that the purity would drop to 84.55 per cent. The organic non-sugars would increase from 2.65 to 2.75 per cent. clear juice, i.e. an increase of 3.8 per cent. on organic non-sugars. More than half of this increase in non-sugars would be due to gums from the pentosans.

Lignin dissolved from bagacillo when it is present during clarification would result in a darker coloured clear juice.

In 1950 the Sugar Milling Research Institute conducted an investigation aiming at—

(*a*) the determination of the bagacillo percentage of Natal mixed juice before and after fine straining;

(*b*) collecting data about the influence of the presence of bagacillo in mixed juice on the manufacturing processes.

The results of this investigation are reported upon in this paper.

Determination of Bagacillo in Juice entering the Natal Sugar Factories.

To determine what quantities of bagacillo are generally present in screened and unscreened juices in Natal, all factories were visited during the 1950 season and the bagacillo content of their mixed juices were determined before and after screening through whatever fine strainers they used.

The most common types of fine strainers used in Natal are the Peck strainer and the Linkbelt vibrating screen. The Peck strainer is well known and need not be described here. The more modern Linkbelt vibrating screen has replaced the Peck strainer at several factories. Details of a Linkbelt vibrating screen, seen in operation at Chakas Kraal, are as follows : length 92 inches, width 34 inches, angle of inclination 5 degrees, vibration frequency 1,680 per minute, and capacity 50 tons per hour. The screen is made of 60 meshes per inch by 40 meshes per inch gauze, the thickness of the wire being 0.009 inches. The size of the openings is therefore 0.008 inch by 0.016 inch. One factory in Natal uses the Hummer vibrating screen. Details of the Hummer screen are as follows : length 48 inches, width 60 inches, backing screen 9 meshes per inch stainless steel, fine screen 80 meshes per inch stainless steel, vibration frequency 3,000 per minute, angle of inclination 24 degrees, capacity 51 tons per hour. Three factories use no fine strainers at all.

The bagacillo content of the juice was determined by collecting duplicate samples of 2 kgm. approximately over a period of about 15 minutes. These samples were then weighed and strained through a 200 meshes per inch sieve (0.003 inch openings). The bagacillo thus removed from the juice was washed well on the sieve and then washed into a tared and dried filter paper. After drying, the bagacillo and filter paper were weighed; thus the percentage of bagacillo in mixed juice, retained by a 200-mesh screen, could be calculated.

In order to correlate the percentages of bagacillo in mixed juice with the type of cane milled and with the milling equipment, the type of cane milled while the test was done was noted and various data about the milling equipment were compiled.

Results of Bagacillo Determinations.—The results of the bagacillo determinations are given in Table I.

TABLE I.—BAGACILLO IN MIXED JUICE AT DIFFERENT MILLS.

Date.	Name of Mill.	No. of sets of cane knives.	No .of crush-ers.	No. of shred-ders.	No. of mills.	Size of openings in cush-cush strainer.	Type of fine strainer.	No. of meshes per inch.	Size of openings in fine strainer gauze.	Type of cane milled during experiment.	Percentage of bagacillo in mixed juice before fine strainer.	Percentage of bagacillo in mixed juice after fine strainer.
2/ 8/50	Umfolozi... ...	1	1	0	6	1/16″	Peck	80	0.007″	Co.301+P.O.J.	0.27	0.075
5/12/50	,, ...	1	1	0	6	1/16″	Peck	80	0.007″	Co.301	0.195	—
8/ 9/50	Empangeni ...	1	2	0	6	1/16″	Peck	80	0.0075″	Co.301	0.215	0.05
18/ 9/50	Felixton	2	1	0	6	1/16″	Peck	80	0.0075″	—	0.19	0.055
21/ 9/50	Entumeni ...	–	–	–	–	—	None	—	—	Co.281	0.13	—
4/ 8/50	Amatikulu ...	2	1	1	5	1/8″	Peck	80	0.006″	Co.281	0.50	0.13
8/12/50	,, ...	2	1	1	5	1/8″	Peck	80	0.006″	—	0.20	0.05
	Darnall—											
18/ 7/50	No. 1 tandem	1	1	0	4	1/16″	Peck	80	0.0075″	Co.301	0.18	0.06
	No. 2 tandem	1	1	0	4	1/16″						
	Gledhow—											
26/ 7/50	Crusher juice	2	1	0	5	3/32″	Link belt vibrating	60×40	0.008″	Co.301	0.26	0.12
14/12/50	Crusher juice	2	1	0	5	3/32″	Link belt vibrating	60×40	0.008	Co.301	0.215	0.08
8/ 9/50	Melville	1	1	0	5	1/16″	Peck	40	0.016″	—	0.26	0.12
14/ 7/50	Chakas Kraal...	1	1	1	5	1/16″	Link belt vibrating	60×40	0.008″	—	0.265	0.11
12/12/50	,, ,,	1	1	1	5	1/16″	Link belt vibrating	60×40	0.008″	—	0.19	0.065
8/ 9/50	Tongaat	–	1	1	5	—	None	—	—	Co.281	0.175	—
14/ 7/50	Natal Estates...	–	1	1	5	—	Peck	—	—	—	0.175	0.055
17/ 8/50	Illovo	2	2	0	5	0.074″	Peck	80	0.0075″	Co.301	0.245	0.02
10/10/50	,, ...	2	2	0	5	0.074″	Peck	80	0.0075″	Co.301	0.255	0.08
24/ 8/50	Renishaw ...	–	–	–	–	—	Link belt vibrating	60×40	—	Co.301	0.175	0.06
17/ 8/50	Esperanza ...	1	1×5 roller	0	4	—	Hummer	120	0.005″	Co.281	0.125	0.06
16/10/50	,, ...	1	,,	0	4	—	Hummer	120	0.005″	Co.301	0.145	0.07
24/ 8/50	Sezela	2	1	0	5	0.036″	Peck	80	0.007″	Co.281	0.09	0.015
17/10/50	,, ...	2	1	0	5	0.036″	Peck	80	0.007″	Co.281	0.115	0.065
	Average										**0.20**	**0.07**

Influence of Bagacillo on Sugar Manufacture.

In order to allow us to study the effect of bagacillo on manufacturing results, the management of Umfolozi kindly agreed to operate this factory during the months September and November, 1950, without the Peck strainer.

During these months, samples were collected for analysis and the factory staff made special observations. The results of these analyses and observations were compared with similar results for the months October and December in which the Peck strainer was operated.

It was realised from the beginning that, due to normal fluctuations in the quality of the cane milled, drawing of definite conclusions might be somewhat difficult, but it was decided that attempting to obtain comparable results was worth while.

Results of Factory Observations.—The factory staff of Umfolozi reported the following observations :—

1. During the months that bagacillo was not removed from the mixed juice (September, November) it was noticed that bagacillo accumulated in the troughs bringing the juice from the sulphur tower to the tempering tanks, forming a layer of 6 inches to 12 inches on the juice. This caused a little inconvenience because it had to be cleaned out regularly.
2. It was further noticed that during these months it was difficult to work the filter cake to the usual sucrose content, consequently the loss in filter cake was about doubled. With bagacillo already present in the muds, less bagacillo had to be added to these before filtering through the Oliver Campbell filters. During the months when the Peck strainers did not operate, the workers in the factory had difficulty in screening just the right quantity of bagacillo from bagasse for filtering purposes. Mr. J. O. Duchenne thought this to be the cause of large quantities of filter cake produced during November, during which month the filtration station had difficulty in handling all the filter cake produced.
3. The oil of the Bach subsider in the first month of the experiment appeared to get slowly fouled by floating bagasse particles and then had to be replaced. In November, however, this inconvenience was no longer experienced.

Table II gives the main figures of the control laboratory at Umfolozi for the four months of the experiment, and Table III gives the analyses of the final molasses produced in these months and the

bagacillo content of the filter cake. These analyses were made at the Sugar Milling Research Institute.

TABLE II.

FACTORY CONTROL DATA, UMFOLOZI.

	Averages. Sept.	Oct.	Nov.	Dec.
Fibre per cent. cane	13.25	13.31	13.40	13.91
Extraction	94.23	94.21	93.98	94.28
Imbibition per cent. cane... ...	28.96	28.21	27.77	29.65
Overall recovery...	84.25	83.17	84.44	81.59
Boiling house recovery	89.41	88.32	89.85	86.54
Boiling house performance ...	97.90	95.78	97.69	95.08
Purity mixed juice	84.41	83.96	84.47	82.38
Purity clarified juice...	85.24	85.45	86.02	85.08
Purity rise during clarification:..	0.81	1.49	1.55	1.80
Kopke clarity of clarified juice...	40.0	45.2	42.3	41.2
Bagacillo per cent. mixed juice .	0.188	0.061	0.178	0.069
Filter cake per cent. cane... ...	4.56	4.33	5.35	6.33
Sucrose per cent. filter cake ...	1.25	0.73	1.56	0.56
Moisture per cent. filter cake ...	72.14	69.72	71.61	71.04
Average polarization of all sugars	98.24	98.47	98.23	98.40
Average moisture of all sugars...	0.68	0.53	0.60	0.62
Percentage white sugar	0.10	0.29	2.59	10.43
Final molasses per cent. cane ...	3.19	3.93	3.07	4.13
Clerget purity of final molasses .	39.78	40.68	40.10	41.89
Sucrose lost in filter cake	0.41	0.23	0.60	0.28
Sucrose lost in final molasses ...	8.65	10.67	8.57	11.92
Sucrose lost undetermined	1.53	0.78	0.99	1.26

TABLE III.

ANALYSIS OF UMFOLOZI MOLASSES.

Month:	Sept.	Oct.	Nov.	Dec.
Sucrose per cent.	38.56	38.66	38.97	40.30
Dry matter per cent.	79.30	79.34	80.60	79.94
True purity	48.63	48.73	48.35	50.42
Reducing sugar per cent. ...	11.62	12.56	11.14	11.06
Sulphated ash per cent. ...	16.66	15.98	18.03	16.46
Gums per cent.	1.78	1.60	1.81	2.19
Organic non-sugar per cent. .	12.46	12.14	11.96	12.12
Viscosity in centipoises—				
(1) 75 refr. brix 30°C. ...	832	1062	1290	4278
(2) 75 refr. brix 40°C. ...	453	539	603	1754
(3) 80 refr. brix 30°C. ...	5816	5295	6435	15280
(4) 80 refr. brix 40°C. ...	2410	2272	2581	6117
Bagacillo per cent. Filter Cake.	27.4	24.6	25.0	24.5

Note.—All analyses were done in duplicate.

Discussion of Results.

From Table I it is seen that the average, highest and lowest percentage of bagacillo found in different Natal mixed juices, before being strained, was 0.2 per cent., 0.5 per cent. and 0.09 per cent. Most factories have some type of fine strainer and it was found that the average, maximum and minimum percentage of bagacillo in mixed juice after passing the fine strainers was 0.07 per cent., 0.12 per cent. and 0.015 per cent. on the mixed juice weight. Fine strainers appear to remove about two-thirds of the bagacillo in mixed juice.

Owing to insufficient figures, it is not possible to correlate the quantity of bagacillo in the juice with the milling eqiupment. The matter is further complicated by the fact that some factories do not pump the juice directly from below the cush-cush strainers to the fine strainers, but the juice flows into a tank from where it is pumped to the fine strainers. It appears that some of the bagacillo settles out in these tanks. Sand is found with the bagacillo removed by the fine strainers to a greater or lesser extent, and this has a considerable influence on the bagacillo determinations.

The first criteria of Table II showing different data for the two periods under observation are those for Boiling House Performance and Boiling House Recovery. The recovery data for the months the Peck strainer was *not* in operation (September and November) were definitely higher than for October and December. This unexpected result appears to be mainly due to the production of greater amounts of final molasses in October and December.

Purity of clarified juice data do not indicate that relatively large amounts of non-sugar have been introduced during these months. It has been reported, however, that in December, Umfolozi had to work considerable quantities of deteriorated cane and the production of final molasses in the third week of December rose to 6.43 per cent. on cane.

Summarising, we do not think that the obvious conclusion from these data—that owing to a smaller molasses production, the cutting-out of the Peck strainer will increase the recovery of a factory—is correct.

No definite conclusion can be drawn about the undetermined losses, but the data for sucrose lost in filter cake indicate that cutting-out the Peck strainer increases the loss of sucrose in this substance. This seems to be due to a higher sucrose percentage and not to an increased weight of filter cake. For a better understanding of the quantities involved, a number of characteristic data on filter cake composition have been compiled in Table IV.

TABLE IV.

COMPOSITION OF FILTER CAKE.

	Mixed juice, unstrained.	Mixed juice, finely strained.
Bagacillo in mixed juice per cent. mixed juice	0.2	0.07
Filter cake per cent. mixed juice	4.96	5.33
Dry substance per cent. filter cake...	28.1	29.6
Total bagacillo per cent. dry substance filter cake	26.2	24.6
Bagacillo originating from mixed juice per cent. filter cake	4.0	1.4
Bagacillo originating from mixed juice per cent. dry substance filter cake...	15.3	5.7
Bagacillo added to Bach mud per cent. dry substance filter cake	10.9	18.9
Sucrose per cent. filter cake	1.41	0.65
Sucrose per cent. dry substance in filter cake .	5.0	2.6
Precipitated non-sugars in filter cake per cent. dry substance	68.8	72.8
Total bagacillo per cent. precipitated non-sugars	38.1	33.8

Data in Table IV illustrate the observation of the factory staff that the workers had some difficulty in adjusting the correct amount of bagacillo to be added to the mud prior to filtration. When finely-strained mixed juice was worked, the amount of bagacillo added to the Bach-mud was 18.9 per cent. on dry substance of filter cake. When "unstrained" mixed juice was worked, which contained 0.2 per cent. of bagacillo, 10.9 per cent. only had to be added. Generally speaking, the workers succeeded very well in adding the correct quantity of bagacillo, as is apparent from the nearly identical percentages of bagacillo in filter cake (Table III).

Bagacillo in filter cake averages 35 per cent. on precipitated non-sugars. According to Whalley,[2] a higher percentage would have caused a better retention of mud particles, provided the bagacillo particles have the right size and uniformity.

Returning to Table II, we notice that the increase in purity from mixed to clarified juice was slightly greater when finely-strained mixed juice was worked, which (accidentally ?) agrees with the higher percentage of precipitated non-sugars shown in Table IV.

The Kopke clarity of mixed juice was highest in October when the Peck strainer was operated, but the December data is inconclusive.

Polarization and moisture percentage of the sugar produced does not seem to be influenced by the Peck strainer, and the slight increase of the clerget purity of final molasses from September to December also does not allow us to conclude a preference for the operation of the Peck strainer.

Table III gives more information on the properties of the final molasses, samples of which have been analysed at the Sugar Milling Research Institute.

The purity data for the months September, October and November are practically equal and do not indicate that cutting-out the Peck strainer causes a higher purity final molasses. The December figure is higher, but it has already been mentioned that during that month badly deteriorated cane was milled,which could explain the higher purity.

The percentage of gums was lowest in October when the Peck strainer was operated. The differences for September and November are, however, small, and it is not known what practical consequences follow from slightly higher gum contents. It is, however, probably significant that the percentage of gums in December, when fermented cane was milled, was highest.

The viscosities of the final molasses samples were also determined. For these determinations the precision Hoeppler viscometer was used, which apparatus, working on the falling ball principle, is quite suitable for measuring the viscosity of dark coloured liquids. It is hoped that on another occasion there will be ample opportunity to discuss the relationship between viscosity and exhaustability of final molasses.

At the moment we want to draw attention only to the enormous effect of temperature and concentration on viscosity. A rise in temperature of 10°.C usually reduces the viscosity to half the original value; the effect of variations in brix depend on the concentration, the effect being more pronounced at higher brix values.

Table III shows that at 75° refractometric brix, both at 30°C. and 40°C., the December sample is much more viscous than the September, October and November samples, the viscosity of which gradually increases in this sequence.

At 80° brix, the December sample also shows the highest viscosity, but the viscosity of the October sample appears to be lower than the viscosity of the September and November samples.

Summarising, we conclude from the data of Table III that the effect of cutting out the Peck strainer on the viscosity of final molasses has been slight and that such effect is apt to be obscured by factors such as milling deteriorated cane.

Samples were also taken from the raw sugar produced in September, October, November and December. We were specially interested in the gum contents of these samples, which appeared to be very low. Semi-quantitative tests did not show an appreciable difference in gum content for the four months of observation.

Mr. Duchenne determined the filterability of these samples, using the Elliott filtration apparatus, and found 128, 125, 126 and 118 for September, October, November and December respectively. Cutting out the Peck strainer did not affect the quality of the sugar.

Experiment at Chakas Kraal.

Earlier in the season, the management of the Chakas Kraal factory had kindly agreed to carry out the experiment which has now been done at Umfolozi, on the influence of bagacillo on sugar manufacture, but the experiment had to be discontinued. Chakas Kraal uses a Dorr clarifier, and it was found that if bagacillo was not removed before the juice was clarified, the clear juice from the clarifier was turbid. Umfolozi uses Bach clarifiers.

Influence of Bagacillo on the Calculated Weight of Sucrose in Mixed Juide.

The weight of sucrose entering the boiling house in mixed juice is found by multiplying the weight of mixed juice by the percentage of sucrose.

It is apparent that whatever amount of bagacillo is present, the weight of it is included in the weight of mixed juice. On the other hand, since for the Clerget analysis of the mixed juice sample the Recommended Methods prescribe the dry lead acetate method of clarification, the sucrose percentage figure resulting from this determination is independent of the amount of bagacillo. It records the sucrose percentage of the liquid of the mixed juice mixture.

The result is that the weight of sucrose in mixed juice is incorrectly calculated, the error being proportionate to the percentage of bagacillo present.

Since the weight of sucrose in mixed juice constitutes the main part of the weight of sucrose in cane, this quantity is also calculated somewhat in error.

A factory omitting to remove by fine screening the usual 0.15 per cent. of fine bagacillo, has to pay round about 0.15 per cent. more for cane than is concurrent with the actual weight of sucrose which entered the mill.

Conclusions.

1. Fine screening of mixed juice through a Peck strainer or vibrating screen reduces the content of bagacillo in Natal mixed juice from 0.2 to 0.07 per cent. on the average. Individual deviations from these average data appeared to be small.

2. An attempt to study the effect on manufacturing results of a higher percentage of bagacillo in mixed juice, caused by cutting out the link-belt vibrating screen at Chakas Kraal, had to be discontinued, due to turbid clear juice drawn off from the Dorr subsider.

3. The resumption of this investigation at Umfolozi showed that the effect of cutting out the Peck strainer could easily be obscured by factors such as milling deteriorated cane.

4. It was found that in the months the Peck strainer was cut out, the sucrose percentage of filter cake was definitely higher.

5. Some inconvenience was also experienced by the factory staff in running the various operating processes. This inconvenience was, however, not serious.

6. Probably mainly due to causes as mentioned sub 2, other detrimental effects could not definitely be ascertained.

7. Attention was drawn to the influence of bagacillo in the weight of sucrose calculated as having entered the mill.

We want to express our gratitude to the management of Umfolozi for permitting us to carry out this investigation, and to the mill's staff, in particular Messrs. Duchenne and Hardy, for their unrestricted co-operation.

REFERENCES.

[1] Int. Sugar Jnl. 1921, vol. XXIII, p. 158
[2] Q.S.S.C.T., 1949, 109.
[3] I.S.S.C.T. Proceedings of 6th Congress 1938, p. 964.

Sugar Milling Research Institute,
Durban.
March, 1951.

The President said the paper was indicative of the valuable work being undertaken by the S.M.R.I. and also of the way in which the Institute was collaborating with the mills in Natal. He hoped that the work would increase as the years went on.

Mr. Wheeler said he would like to know the difference in clarity of the sugar solution when the juice was screened and when it was not screened. Was the final product improved by the use of screens ?

Mr. Laubscher said that Table 2 showed the Kopke clarity of clarified juice. Tests with screens were not made and he was unable to say whether the final product was improved. It was difficult to know what the influence would be on the colour of sugar.

Mr. Wheeler said he had asked the questions because he had carried out tests and found gums were removed by a strainer. When it was not used he found bagacillo in the sugar itself and the solution of sugar was not nearly as clear when the Peck strainer was not in operation.

Dr. Douwes Dekker said he assumed Mr. Wheeler was talking about raw sugar. It was recorded that the filterability of the sugars had not been determined, but the S.M.R.I. did not possess the Elliott apparatus.

Mr. du Toit said he was surprised that the effect of bagacillo was negligible. He referred to the statement "assuming the 50 per cent. lignin and pentosans present in the bagacillo to be dissolved completely" and said that while he would agree that some would dissolve, 50 per cent. seemed a very high figure.

Mr. Laubscher asked if the 50 per cent. of lignin and pentosans present were completely dissolved, what would be the reduction in purity ? The idea of introducing this was to get an indication of the drop in purity which was theoretically possible when these substances were dissolved.

Mr. du Toit said he could only remember the Natal Estates getting a filterability figure like 120 per cent. He asked whether it would be possible to get figures from other factories to see how they compared. He

asked for information about the Elliott filterability of the raw sugar made.

Mr. Duchenne said the figures for filterability were 128/125/126/118 for the four months September to December and 133 for February. These figures were obtained in spite of probable high gum contents and reflected an effective elimination of gums with their clarification process. They effected a clarification and settling of the syrup as well, having to make 2,500 tons of white sugar during the period October to March.

Dr. Douwes Dekker said Mr. Duchenne's statement about the slight difference in filterability of the average samples was more or less borne out by the similarity of the gum contents. He asked Mr. Duchenne to let him have the filterability data which would be included in the paper.

Mr. Rault said it was a pity that the more detailed part of this paper referred to Umfolozi factory conditions, where the fibre content of cane was the lowest and the canes sent to the mill generally in a cleaner condition than at North and South Coast factories. He had been struck by the difference in response to clarification between Natal Estates juices and those of Umfolozi where a straightforward preliming of raw juice at about 11 pH produced a bright supernatant liquor, while in their case the same treatment invariably gave a murky juice, attributed to the amount of cellulosic or semi-cellulosic matter in suspension, attacked by lime at high temperature. He hoped the S.M.R.I. would continue their investigations in other factories not so favourably situated as Umfolozi.

Dr. Douwes Dekker, speaking on the practical advice to be drawn from this investigation, said that the aim had been to collect exact data on the effect of cutting out the fine screening of mixed juice. While Chaka's Kraal had been unable to continue the experiment, due to turbid effluent from the Dorr subsider, which experience unfortunately has not been recorded in analytical data, the test at Umfolozi showed that processing was not seriously affected. Loss in filter cake, however, appeared to be somewhat higher. The slightness of the propitious result of fine screening as found at Umfolozi, could be compared with Dr. Honig's statement: "There was a time when the sugar industry was accepting vibrating screens to remove as completely as possible the finely suspended matter in mill juices, because it was considered to be advantageous for the clarification results. This fashion of fine screening has passed its zenith."

Dr.Honig, of course, did not consider that the weight of mixed juice was reduced, on the average, by somewhat more than 0.1 per cent., nor the effect of this reduction on the weight of sucrose in cane computed with this figure.

Mr. Walsh asked Mr. McKenna what his experience was at Chaka's Kraal.

Mr. McKenna replied that they had worked without the screen for about ten days and the juice was so cloudy that the use of the screen had to be resumed. While the screen was working there was a high degree of clarity.

Mr. Walsh said that a study of the paper showed that investigations should be extended to cover varying conditions in different areas. It would be dangerous to form definite conclusions on this subject from the results obtained in one factory, particularly as this factory was not truly representative of the average conditions applying in the sugar belt.

Mr. Hendry said he did not think that the factories making white sugar would like to discard their juice sieves.

Mr. Dymond said he had always considered the efficient straining of mill juices was warranted for several reasons. Firstly, an excess of bagacillo led to errors in the weight of mixed juice and the determination of sucrose in it. Secondly, the subsequent action of lime and heat caused an increase of non-sugars by dissolving up to 13 per cent. of the bagasse particles and increased colour products which were important when making plantation whites.

Mr. Duchenne said that they at Umfolozi would much rather that Chaka's Kraal had done the tests, but they had eventually accepted the necessity for getting facts about the effects of bagacillo on manufacture. At first sight it seemed wrong to first screen the bagacillo on a Peck strainer and later on return dried bagacillo to settlings going to Oliver Campbell filters. However, if straining were omitted, the sucrose lost in filter cake increased two or threefold. Apart from other disadvantages, (1) the juices from the Bach clarifiers had small varying quantities of cellulosic material in suspension, and (2), the oil layer on the Bach formed a paste with part of the bagacillo. This eventually precipitated and thinned the oil layer. The heavier sucrose loss was probably due to the high sucrose content of bagacillo in juice, i.e. 10 to 12 per cent. This apparently could only be reduced by milling and not by spraying.

Mr. Hendry said he would like to correct the idea that the use of fine bagasse at the Oliver filter was similar to allowing it to remain in the mixed juice. At the Oliver filter it was only a short time in contact with the mud, which was a different thing from allowing it to go through the clarification process.

Mr. Dymond said it was often impossible to compare one mill with another for many reasons. Mr. Duchenne's method of juice clarification could be taken as an example; it might work at Umfolozi but it certainly would not at Darnall.