LOSS OF SUCROSE IN SOUTH AFRICAN MOLASSES

By

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Abstract

The South African Industry uses sucrose, as determined by chromatographic analytical techniques, rather than pol, in factory balances. Data for about 20 seasons are available and have been used in this presentation to establish trends relevant to the losses of sucrose in South African final molasses. The impacts of such factors as the concentration of fructose, glucose and ash, and operational procedures are presented and discussed. The composition of South African molasses, in terms of specific non-sugars, has been investigated and compared to that of final molasses from a number of other cane producing countries. These results and their impact on sucrose losses are also discussed. Finally, the value and meaningfulness of a number of parameters relevant to the measurement of sucrose lost in molasses are discussed.

Introduction

True sucrose, rather than pol, has been used in the South African factory balances since 1981. This, together with rigorous controls on weighing, sampling and analysis has allowed a meaningful assessment of sucrose losses in factories. The loss of sucrose in final molasses, at around 9 to 10% of the sucrose in raw cane is the highest single source of loss in the South African industry. It has thus received much attention over the years.

Sucrose lost in molasses

The trends over the last 10 seasons are shown in Table 1.

<table>
<thead>
<tr>
<th>Season</th>
<th>Sucrose lost in molasses % in cane</th>
</tr>
</thead>
<tbody>
<tr>
<td>90/91</td>
<td>9.0</td>
</tr>
<tr>
<td>91/92</td>
<td>8.8</td>
</tr>
<tr>
<td>92/93</td>
<td>11.2</td>
</tr>
<tr>
<td>93/94*</td>
<td>12.0</td>
</tr>
<tr>
<td>94/95*</td>
<td>11.0</td>
</tr>
<tr>
<td>95/96*</td>
<td>11.4</td>
</tr>
<tr>
<td>96/97*</td>
<td>9.8</td>
</tr>
<tr>
<td>97/98</td>
<td>9.4</td>
</tr>
<tr>
<td>98/99</td>
<td>9.3</td>
</tr>
<tr>
<td>99/2000</td>
<td>9.3</td>
</tr>
</tbody>
</table>

* Drought stricken seasons.

The effect of drought is evident and as climatic conditions improve the loss in molasses varies around about 9%.

Sucrose lost in molasses

These data yield the following equation.

Sucrose lost in molasses = -3.5 + 0.90 x impurity in MJ
(n = 18; r² = 0.92)

Target purity difference (TPD), which is the difference between the molasses actual true purity and an equilibrium purity calculated from that molasses (Fructose+Glucose)/Ash ratio is an excellent indicator of factory operations with respect to final molasses exhaustion. An analytical survey of final molasses from 15 cane producing countries (Sahadeo and Lionnet, 1999) showed that most of the TPD values fall well within the normal range (-0.5 to +10) found in South Africa. The average TPD value was +5 units, compared to +5 which is an overall average seen in South Africa, as shown in Figure 2.

Molasses factor is the ratio of the mass of sucrose in molasses to the mass of non-sucrose in mixed juice. It thus represents both the melassigenic effect of the non-sucrose and the operational impact in the back-end of the factory.

The trend in molasses factor in the S. African industry is shown in Figure 3.

The trend with time has been investigated by removing data for the four drought stricken seasons (1993/94 to 1996/97).

Then, there are indications that the molasses factor is increasing by about 0.002 every year; the molasses factor was about 0.57 in the mid eighties but is now 0.60.

Conclusion

The use of sucrose, rather than pol, in final molasses is probably the single most important factor in investigating sucrose losses in molasses. The evidence given in the paper shows that climate and operations at the factory have the largest impacts in controlling this loss.

KEYWORDS: Molasses, Target Purity, Losses.
Fig. 1—Relationship between sucrose lost in molasses and the level of impurity in mixed juice.

Fig. 2—TPD for the South African sugar industry.

Fig. 3—Molasses factor in the S. African sugar industry.

REFERENCES
