CORE SAMPLER PROCEDURE AND ANALYSIS
AS A METHOD FOR CANE PAYMENT

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ABSTRACT

Currently the most acceptable system for the purchase of sugar cane is with a core sampler as the sampling tool and then subjecting the sample to laboratory analysis and factor adjustment to arrive at a fair payment.

INTRODUCTION

Although it is difficult to develop an internationally acceptable system in every aspect the optimum system would embody the following:

(1) The selection of an impartial and representative sample from the cane delivered by the grower.

(2) A retention of the samples' identification from the point it is taken through the analysis to the point of payment.

(3) A method of analysis that accurately and rapidly determines the available sugars with respect to the sugar and fiber content of the cane.

(4) A determination of what proportion of the total value of the cane shall be allotted to the grower.

There exists some doubt among growers in many areas that they are not always properly reimbursed by the processor for their cane. On the other hand, the processors sometimes feel that the growers might be using devious schemes to conceal the true quality of cane and as a result the processor ends up overpaying the growers. Many of the older, incomplete sampling systems gave rise to this suspicion among growers and processors alike, especially in areas where cane is mechanically harvested or loaded.

Recently updated core sampling technology and equipment have been introduced to the sugar industry. It has made a major contribution in the development of the optimum system for evaluating cane quality. Its use through-
out the sugar world is expanding rapidly as both cane growers and processors discover its many benefits and advantages.

MATERIALS

(1) Coring device with shredder and subsampler
(2) Laboratory press
(3) Refractometer
(4) Polarimeter or automatic saccharimeter
(5) Drying ovens
(6) Scales
(7) Normal sugar laboratory accessories

METHOD

The corer fulfills the prime objective of a sampling system in that it obtains a representative and impartial sample of the cane delivered by the grower. The system of analysis of the sample can be one of many used throughout the world. A description of one which is highly recommended is reviewed herein.

The procedure and method of analysis is relatively simple. The core tube penetrates the cane diagonally and extracts a representative 25-30 pounds of cane from the load. This sample is then further disintegrated in either a pre-breaker or shredder. A sub-sample is utilized to obtain a proportionate 4 to 5 pounds of the core. From this, 1000 grams is taken and placed in the steel perforated container of the hydraulically operated cane sample press. The press applies a pressure of around 3625 PSIG for about 3 minutes. The resulting juice and press residue is then weighed and analyzed to obtain:

1. Bagasse % cane
2. Moisture % bagasse
3. Extracted juice brix
4. Extracted juice pol

With this data and by using the absolute juice method together with the assumption that the extracted juice and residual juice have the same composition the following can be calculated:

\[
(1) \quad \text{Fiber} \% \text{ cane} = F  \\
(2) \quad \text{Pol} \% \text{ cane} = P  \\
(3) \quad \text{Brix} \% \text{ cane} = B
\]

The theoretical sugar yield in terms of 96° sugar per gross ton of cane is obtained from:

\[
\text{TRS} = \text{pol} \% \text{ cane} \times \text{pol extraction} \times \text{retention} \times 1/0.96
\]
The effect of cane fiber and the influence of leaf trash is taken into account in the extraction segment. This is done by assuming a constant reduced extraction for an average absolute juice bagasse % fiber for the area or for a specific mill.

The retention is obtained by use of the Winter-Carp formula and an assumed boiling house efficiency for the area or for a specific mill.

The basic yield formula (TRS) as shown was developed for Louisiana conditions by Dr. Harold S. Birkett of F.C. Schaffer and Associates. It uses an average absolute juice in bagasse percent fiber of 56.7. This reduces the basic formula to:

$$\text{TRS} = (0.28 \times S - 0.08 \times B) \times \frac{100 - 56.7F}{100 - F}$$

For other sugar areas or for a specific factory there would be a slight variation in the above formula.

To obtain the commercial recoverable sugar (CRS), in terms of 96° sugar per gross ton of cane, the TRS is multiplied by a liquidation factor. This factor is a ratio of the actual sugar recovered by a factory to the theoretical recovery as predicted by the corer. This factor generally ranges between 0.8 and 0.9. Actually, the need for the factor can be partly attributed to the simplified steps and assumptions used in the development of the TRS formula. In addition there are losses in the interval between the time of sampling and the time the cane is milled. These losses may come from the deterioration during storage, damage in handling and by cane washing where such is used.

DISCUSSION

The grower soon learns to respect the integrity of the corer and recognizes that the judgment factor or human element in the selection and processing of his sample has been eliminated. He immediately realizes that leaf trash, soil and stale cane will foster a payment penalty. On the other hand, he understands quickly that by delivering cane of good quality he will receive an equitable return for his efforts. Growers who deliver cane of inferior quality will be properly penalized.

The proportion of the total value of the cane that shall be allotted to the grower is a determination to be arrived at between grower and processor or prescribed by government agencies.

Another potential benefit to the grower is that the corer system can provide useful information and data to aid his agricultural operation. The yields of specific varieties, plant cane, ratoons, soil types, weeding and fertilizer programs in terms of sugar can be compiled and logged to the advantage of even the smallest grower. In the case of administration cane, this agronomic data is also helpful in that it permits adjustments that can also develop increased yields, improved cane quality and lower production costs.
The sugar factory processor also benefits from the corer in that he will not be placed in the position of having paid the grower too much for his cane. With good quality cane and depending on the formula used for payment, the return can be profitable for the processor. Moreover, the factory’s problems are substantially reduced with the processing of cane and juices of good quality.

In addition, the corer system can be a valuable tool to the processor. It closely predicts the amount of sugar or pol a factory should produce. If the factory’s daily or run production is at variance with what the corer system predicts, the variance or deviations from the norm can be quickly analyzed and early corrective action taken in the milling or processing operation. The data obtained by the corer system also supplements the data from the routine factory control. It can provide a direct determination of both fiber and pol percent cane. Finally, another benefit of the more recent core samplers is that one person can operate the corer with ease. The operator can obtain the sub-sample, provide the identification code and transmit it to the laboratory for analysis. Since the cycle time for carts and trailers is 1.5 to 2.15 minutes, respectively, the corer can obtain between 120 and 160 representative samples in an eight-hour period.

CONCLUSIONS

So far, the above method seems to be the most impartial and practical method of payment. It is very representative, is not time-consuming and it responds very well to the trash content in the cane — as evidence by the results in the Louisiana factories, where it is used extensively, since all the cane is mechanically harvested and loaded.

Colombia, Puerto Rico, Venezuela and Louisiana have this system or a modification of this system in operation and are obtaining quite satisfactory and encouraging results, as reported to the Louisiana ASSCT by Mr. Roland Habert, Manager of St. Martinville Sugar Co-op in 1976, and followed by Dr. Harold Birkett’s paper presented at the Louisiana Convention of the ASSCT in February this year.

REFERENCES

PROCEDIMIENTO DE MUESTRA DE CORAZON Y ANÁLISIS
COMO MÉTODO PARA EL PAGO DE CAÑA

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RESUMEN

Hoy día el sistema más aceptable para la compra de caña dulce
es con un mostrador de corazón como un instrumento para sacar
muestras y después someterlas a un análisis de laboratorio y ajuste
del factor para llegar a un pago justo.