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J. Brooks Keyes

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## Accounting Problems in the Cane Sugar Industry

BY J. BROOKS KEYES, C.P.A.

Since the outbreak of the European war, the sugar growers have been enjoying a period of phenomenal prosperity, and they are undoubtedly making a higher percentage of profits than any industrial not directly connected with the manufacture of munitions of war. For this reason the industry is being brought more and more to the attention of investors, and large amounts of capital are being furnished for the development of new enterprises. At the same time an objectionable practice has sprung up among investment houses whereby it is represented that sugar stocks are more or less desirable as investments, according to the varying ratios of capital issued, or to be issued, to the number of bags of sugar which the property may be expected to produce. It is represented that the total issue amounts to only so and so much per bag, which is considered a low figure, and the inference is that the percentage of profits will be higher for that reason. As a matter of fact the opposite may be the case, and such statements will then serve only to deceive.

Let us see how it works out. As no figures will be available it is fair to assume that the capital equals exactly the amount of capital assets. Taking two extreme cases to illustrate, let us consider company "A" with a capitalization amounting to \$5 per bag and company "B" which shows an investment of \$12, the output in each case being the same. Company "A" owns nothing but a mill. It is dependent for its cane supply on the farmers or colonos in the adjoining territory. It is also dependent on a railroad, over which it has no control, for prompt and regular delivery of the cane. As to the source of supply, the colonos are usually though not invariably under contract with the mill. However, in many cases these contracts cannot be enforced, because the amount of damages, if collectible at all, would not justify the expense of an action at law. Also in each contract will be found a maximum and minimum acreage provision, and even if the terms of the contract are lived up to it will be found that in times of low prices plantings will be restricted to the minimum and the mill, which at

such times above all requires to run to its maximum capacity in order to show a profit, will find itself with a short supply of cane, delivered (introducing the railroad problem) spasmodically, and the final results will show little or no profit and perhaps a loss. All these contingencies are avoided by company "B" which owns a similar mill, sufficient cane land to insure the mill a capacity supply, and a tributary railroad which guarantees a constant flow of cane to the mill and a minimum of loss through deterioration in transit. At the same time these additional investments are revenue producers in themselves, and will add proportionally to the total income. So it will usually work out that company "B" is a much safer proposition. In any event the amount per bag of output at which a company is capitalized means nothing unless supported by other figures, and without them it may lead to a conclusion not justified by facts. The practice should be discouraged.

The purpose of this article is not to map out any system of accounting for the cane sugar industry, which is one of the most complicated of the single product kind, but merely to give a general idea of the peculiar problems which confront the accountant who is called in to install or correct a system. He who adheres to conventional methods will find that part of his recommendations will be entirely discarded after they have ceased to serve as a source of amusement for the office force, and the rest will, as a result, be viewed with distrust until their worth is proven.

One thing the accountant should keep ever before him. The object of his cost accounting is different from that to be attained in ordinary cases. The cost of the finished product has no connection whatever with the selling price. The latter is entirely beyond the control of the seller and is subject only to the inexorable law of supply and demand—prevailing opinion as to trusts to the contrary notwithstanding. With this in mind it is clear that the first consideration must be to provide a system of accounts which, to the best advantage, will bring excessive costs to the notice of the superintendents, so that economies may be instituted during the process. Of course a final cost per pound of sugar is essential, but this cannot be ascertained until the cane is harvested, ground, and the sugar made, sold and delivered to the buyer. To obtain the desired results it will be found necessary to disregard entirely the

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burden and use only direct operating costs. The inclusion of overhead charges merely clouds the issue and they should be kept in abeyance until the end of the crop, when they may be intelligently apportioned.

Sugar plantations are usually divided into estates which are named, and these are again divided into plots which are numbered. The smaller the plot the easier it is to determine the costs and the cane most suited to the particular piece, but of course there are economic limits beyond which this theory does not apply. In the fields the first problem to be met is the determination of the unit. As the product of the fields is cane it appears obvious that the ton of cane is the unit to be used. A little consideration, however, will soon show that the problem is not as simple as it seems.

In the first place the weight of cane cannot be ascertained until it is harvested, often more than a year from the time it was planted. Secondly, many of the operations of clearing and preparing have nothing to do with the tonnage and would be the same whether the crop amounted to ten or forty tons to the acre. Thirdly, the sugar content of the cane is an important factor, as if it were possible it would be decidedly more profitable to raise cane which averaged thirty tons to the acre than cane which averaged forty tons to the acre, if the amount of sugar recovered in each case were the same. The proper method is to start with the acre as the unit and continue with it until the cane has reached a point where it is possible to estimate the tonnage, and then in addition use these estimates, correcting them from time to time as opportunity offers. Comparisons should be available one year with another on each piece, but as conditions are so vitally dependent on the weather, such comparisons are often of less value than those made with other properties at the same date.

Care must be taken that the superintendents are not swamped with figures. It must be remembered that on all plantations there will be two crops, one maturing during the current year and one the following year. Each crop again may be composed of three distinct classes of cane, distinguished by the time of planting, and for each class there will be fifteen or twenty operating accounts. Again bearing in mind that each plantation is divided into many estates and each estate into many plots all requiring distinct accounts, it will be apparent that there is great danger of the maze

of figures being pigeon-holed against a time which never comes. To guard against such an occurrence every dispensable figure should be omitted, and the cost sheets as made for use on the estates should contain only the per acre costs of the preparing accounts and the per estimated ton costs of the cultivation accounts as soon as such estimates are available, up to that time per acre costs being given for both. For comparison of total costs a third column should show the total cost per acre up to the time tonnage estimates can be made, and after such time the total cost per estimated ton only.

Thus when the land is being prepared for planting the superintendents will be able to compare their per acre costs with the other estates and with the previous years, and, after the cane is up, the per estimated ton costs of cultivation and of the total cost of crop in the same way. This will leave out, as far as the superintendents are concerned, the per estimated ton costs of preparing and the per acre costs of the cultivation and of the total cost of crop, but the value of these figures is not such that they should be allowed to involve the cost sheets.

Total amounts expended under the various heads should always be omitted. These figures will show the cumulative cost of cane at the date of the sheet. It must be borne in mind that during the preparing and planting the acreage figures are constantly increasing until the entire piece is planted. By this method the direct costs are determined in total, but the intermediate costs are of course merged in the average of the whole and are not available. Likewise when the cultivation charges begin to appear they will be divided by the total acreage under cultivation, and the costs will start at a low figure and steadily increase to the maturity of the crop.

It is therefore evident that another form must be prepared which will show the cost of the operations as they take place. Whether or not a greater amount of fertilizing or irrigating increases the tonnage so that the per estimated ton figures are favorable, it will still be necessary to know that in the actual application of fertilizer or water the work has been economically done. This form will show the actual operations for the month or other convenient period. As one of its functions will be to show the amount of work done on each place for the period, the number

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of acres weeded or fertilized, for example, will be given, and the per acre cost, but not the total amounts expended. These per acre costs will remain constant to some degree and will furnish an important check on the economy of operation.

Before leaving the field work it may not be out of place to mention an interesting although not complicated situation which arises when it becomes necessary to make out the federal income tax return. From first to last each crop is on the books for about two years, and at the close of the fiscal year the operating accounts of the next crop are placed on the balance sheet among the working assets under the caption "growing crops." When making out the return, however, it will be apparent that they must be considered as charges against income, otherwise they can never be deducted at all.

On account of the great variety of supplies needed in the process and the difficulty in replenishing stocks due to the distance from northern markets, it is generally found necessary to keep on hand at the plantation a quantity of general supplies, the value of which runs into large figures. The account is handled on the perpetual inventory basis, which needs no further elucidation. By this method two important objects are achieved. The value of supplies used in repairs and operations may be accurately determined, as is necessary for the cost accounts, and the total value of the stock on hand may be more easily kept at the lowest figure consistent with safety. A third object is to supply the inventory figure used in connection with the preparation of monthly profit and loss accounts; but the accountant will do well to put little emphasis on this phase of the accounting. While eminently necessary as a continuous record, the intermediate figures, owing to the nature of the business, are of little value and less interest.

For the financial office, forms must be prepared which will show the amounts of expenses for the month, the totals to date and for the same period the preceding year, increase or decrease, etc., but these may be easily prepared. However, they will be of little value in comparison one year with another, unless due consideration be given in the case of the cane to the stage of development of each crop, and in the case of the mill to the varying dates on which grinding may begin.

Coming to the mill itself we find its activities divided into two general operations—the extraction of juice from the cane and the extraction of sugar from the juice. Three units are immediately available, the ton of cane, juice and sugar. In practice, as far as the cost accounts are concerned, only two are used, the ton of cane and the ton of sugar. To attempt to use either of these units exclusively will produce absurd results; and, however great the temptation to use the same divisor in detail and total so that the additions will check, it cannot be done if the figures are to mean anything at all. The accountant should determine what divisor is necessary in the case of each intermediate item and use it. Both units of production should be applied to the totals and the unit costs so determined will not prove to be the totals of their integral parts. The mill work will be covered by fifteen to twenty-five operating and as many repair accounts, most of which are composed of two elements, namely, supplies and labor, which should be shown separately. The cane unit should be used on the cane purchased (the mill in effect purchasing all its cane), the inward freight, unloading, weighing, crushing and milling; and from this point the sugar unit should be used through the many processes of the boiling house and until the finished product is delivered to the buyer. No attempt should be made to apply either of these units to the credit accounts until they are closed.

Through it all the same fundamental principle should be kept in mind. The total cost of the finished product is a thing with which the accountant is not concerned until the crop is over and the books closed. If his system can be so designed that the excessive intermediate costs can be immediately discovered and corrected, the totals will look after themselves. Not only should all overhead charges be absolutely excluded, but also the greater part of the mill repairs. This may call for a word of explanation. Between crops comes what is known as the idle season. As a matter of fact it is sometimes a busy season in the mill, as at that time must the general overhauling be done and extraordinary repairs be made. These accounts should be closed when grinding begins and not used as a basis of costs until the end of the year. Of course during the grinding season repairs are constantly being made, but these are incident to the operation of the mill, their costs are readily ascertained, and they should be included in the mill operat-

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ing costs. Indirect labor and general expenses, in so far as they are not dependent on or a part of the operations, should also be excluded from the cost sheets. Such items are more easily supervised in total by comparisons than when divided by the production units.

It is customary for the mill to pay all inward freight charges on cane purchased, prices being based on cane delivered at the railroad siding. Whether such cane comes from estates or colonos makes no difference as far as the mill accounts are concerned. The most accurate method of determining these freights if the railroad be owned is to divide the total expenses for the year on a ton mileage basis among the various sources of cane supply. The objection to such a method lies in the fact that the railroad will almost always do other work, sometimes for the estates and sometimes for outsiders, so that an element of receipts would enter into the calculations, and it would be necessary to apportion the expenses over this work. Carrying this idea further the road might eventually become a public carrier in which case such a method would be out of the question. The best method is to keep the railroad accounts entirely distinct, no matter how small the system, and use freight rates common to the locality. The final profit or loss on operations, after allowing for depreciation of equipment, should be treated separately at the end of the year.

In the foregoing, emphasis has been laid on the great necessity of eliminating from the cost accounts all items not directly connected with the actual operations. Conversely the same amount of care should be taken in order that every equitable charge be taken up on the books. The following are two examples of operating charges which do not arise from a direct outlay of cash. Part of the preparing of the fields is done by tractor or steam plows, the larger companies having a number of such machines which represent a large investment. A per diem charge for their use should be made. If no former records are available it will be necessary to estimate the yearly amount of the current repairs, the depreciation figure and the actual cost of operating, fuel and labor. This total divided by the estimated number of work days gives a basis for the per diem charge to the estates. This charge may be finally adjusted to a fairly accurate figure.



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A great deal of the preparing as well as most of the hauling of the cane to the sidings is done by bulls, thousands of them being owned for this purpose. In their case it is usually possible to obtain a local yoke day rate as a basis for the charge; if not, a tentative rate should be made, to be adjusted when more accurate information is available. To obtain such information an account should be opened under some such name as "working cattle" and to this account should be charged interest on the cattle investment account, losses due to death and other causes, pasturage, fodder and general care. The credits will be increases on account of births and revaluations and work done by the cattle, the balance showing whether or not it is necessary to revise the yoke day charge.

The item of pasturage suggests one more question which may as well be settled. Many of the estates give part and some all of their acreage over to pasturage for the cattle, and in order that these estates may receive credit for this the working cattle account is charged at a fixed rate per head per day. These credits will offset a rental charge or serve as income on capital invested. At the end of the year when the books are closed and all indirect and overhead charges properly distributed, the cost of production per pound of sugar may be accurately determined. However, if any part of the cane is purchased from colonos, the accountant should be careful to qualify his statement that his client can produce sugar at a certain figure by the clause "with sugar quoted at so much per pound in the New York market," because cane payments and some other accounts are based wholly or in part on this quotation, and its rise or fall will produce a corresponding proportional fluctuation in the total cost of sugar produced, which can in no way be controlled by the planter.

In conclusion, the accountant may approach his task, confident that if properly done it will result in great savings to his client, even though first cost and subsequent expenses be heavy. There can be no doubt that a modern system of cost accounts is as necessary in the sugar business as it is in any other, if the competition of the world is to be met.