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Cost Apportionment in Flour Milling

BY RAYMOND W. MCKEE

Reference to the *Accountants' Index*, pages 803 and 804, discloses the fact that a number of articles have been written on the subject of flour-mill accounting and that both the federal trade commission and the United States food administration felt constrained to offer some recommendations on the subject. Moreover it would be foreign to the purpose of this article to take up in detail the various classifications of accounts in use in the milling industry or to discuss to any extent the many methods which are being used to ascertain costs. There are several. Some of them are good; a great many are indifferent; while a few are hopelessly bad. Perhaps the most extensively used of the methods is, with variations by each concern, the following:

Proceeding on the theory that the mill owner is chiefly engaged in the production of high-grade flour, the other commodities milled from the wheat are treated as by-products. In-freight and elevator expenses are usually charged to the cost of wheat, and the wheat account receives credit for sales (at cost, of course) and for grain delivered to the mill. Here, however, the wheat—perhaps properly—loses its identity and is simply charged to the cost of manufacturing flour. As a part compensation for this charge the cost of manufacturing flour receives credit for the value of the by-products produced.

It is, of course, quite apparent that a fallacy exists here, for in lowering the cost of milling flour by this means—with a corresponding charge to by-products inventory—some arbitrary value must be selected for the so-called by-products. And what should this value be? Market price ordinarily seems to govern this pricing, but some concerns use an estimated cost; found by lowering the market price of the products in question by the estimated profit on such products. Obviously it would be as accurate and much easier to estimate the cost thus in the first place, charging the cost of flour with an estimated proportion of the total milling expense.

Now, in a number of industries, notably crude oil and coal-tar refining, a raw product is put through several, often hundreds of, processes, and there are extracted during the course of this processing various products, widely different in character and

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value. In this respect flour milling belongs to this class of industries, since there are produced from the wheat many grades of "patent" flour, a lower grade clear flour, bran, shorts, mixed feed, graham flour, et cetera.

Granting that it is entirely possible to determine with a fair degree of accuracy the process cost of each of the products extracted from the wheat, one is still confronted with the rather puzzling problem of allocating to whatever of the above enumerated products that happen to be milled the largest single item of expense entering into their cost—that is, the cost of the grain milled.

Manifestly if a sixty-pound bushel of wheat, costing say \$2.00, produces 36 pounds of high-grade flour, 6 pounds of clear flour, 10 pounds of bran and 8 pounds of shorts, the cost of the element of the wheat entering into the composition of the high-grade flour, with a market price of say \$5.00, is considerably more than that element which enters into the manufacture of the bran, for example, with a market price of only \$1.00 per hundred. It is obvious that the most valuable part of the wheat is the flour extracted therefrom, while the products of lesser value are produced from the least valuable portion of the grain. It would appear from this that the values of the different products bear some relation to their costs, and that if a selected value for each be used in conjunction with the pounds produced of each of the products, a logical basis for the apportionment of costs can be obtained.

As it usually will be found that both corn and wheat are ground by the same mill, it will be necessary that the various direct and indirect expenses be allocated and classified in such a manner as to reveal as nearly as is determinable the actual costs of each class of manufacture and that the classes so obtained be further subdivided so as to disclose the manufacturing cost (excluding, however, cost of grain used) of each product. No difficulty is usually encountered in this respect; and since the processes are different in each concern no classification of accounts will be offered here. The purpose of the article is rather to discuss a method for the apportionment of the cost of grain to the different products; and indeed in some of the smaller concerns it has been found feasible to apportion milling expense as between corn and wheat on the basis of the pounds produced of each in the ratio to the total pounds of both produced; and for

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the purpose of further apportioning milling expense to products, to use the same method as is proposed for the allocation of the cost of grain.

An illustration will serve better. The following set of figures therefore, will be assumed. It must be remembered, however, that the figures are used for purposes of illustration and that it is not represented that they are based on the experience of any one concern, nor upon an average or standard experience. They are entirely arbitrary. Let us assume:

MILLING EXPENSE:

Labor and superintendence	\$1,139.50
Power	1,094.75
Light, heat and water	72.35
Repairs	1,597.56
Depreciation	447.54
Insurance	153.81
Laboratory	10.00
Proportion of clearing accounts.....	10.00
Miscellaneous supplies and expense.....	80.00
Total milling expense	\$4,605.51
Pounds of wheat milled	1,527,273
Pounds of corn milled	316,181
Total	1,843,454
Per cent of wheat to total.....	82.848%
Per cent of corn to total.....	17.152%
Total	100.000%

We will now assume that the cost of wheat milled, including a proper proportion of elevator expense, is as follows:

Cost of wheat products:	Pounds	Amount
Cost of wheat milled	1,527,273	\$24,220.16
Total milling expense	<u>\$4,605.51</u>	
Amount thereof applicable to wheat	82.848%	3,815.57
Total cost of wheat products milled	1,527,273	\$28,035.73

Allocated to products as follows:

	Value per 100 pound				
	100 pounds	produced units			
Flour; high-grade	\$2.63	x 7,272.29 =	19,126.12	62.139	\$17,421.12
Flour; clear	1.87	x 3,080.00 =	5,759.60	18.712	5,246.05
Bran966	x 732.87 =	707.95	2.300	644.82
Shorts	1.25	x 1,366.42 =	1,708.02	5.549	1,555.70
Mixed feed.....	1.03	x 2,221.45 =	2,288.09	7.434	2,084.18
Graham, etc.	1.91	x 452.20 =	863.70	2.806	786.98
Miscellaneous	2.21	x 147.50 =	325.98	1.060	297.18
			30,779.46	100.000	
					\$28,035.73

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Cost of corn products:		
Cost of corn milled	Pounds	Amount
Total milling expense	316,181	\$3,277.24
	<u>\$4,605.21</u>	
Amount thereof applicable to corn	17.152%	789.94
Total cost of corn products milled	<u>316,181</u>	<u>\$4,067.18</u>

Allocated to products as follows:

	Value per 100 pound			Per cent.	Amount
	100 pounds	100 pound units produced			
Chops	\$1.07 x	2,238.26 =	2,394.94	58.713	\$2,387.96
Meal	1.75 x	776.05 =	1,358.09	33.295	1,354.17
Miscellaneous	2.21 x	147.50 =	325.98	7.992	325.05
			<u>4,079.01</u>	<u>100.000</u>	<u>\$4,067.18</u>

Summary of milling costs:

	Pounds milled	Total cost	Cost per cwt.
Flour; high-grade	727,229	\$17,421.12	\$2.39554
Flour; clear	308,000	5,246.05	1.70326
Bran	73,287	644.82	.87985
Shorts	136,642	1,555.70	1.13852
Mixed feed	222,145	2,084.18	.93821
Graham, etc.	45,220	786.68	1.73967
Miscellaneous (wheat)	14,750	297.18	2.01478
Miscellaneous (corn)	14,750	325.05	2.20372
Chops	223,826	2,387.96	1.06688
Meal	77,605	1,354.17	1.74495
	<u>1,843,454</u>	<u>\$32,102.91</u>	<u>\$1.74145</u>

To the costs obtained by the above method should be added the cost of containers, and such containers should be considered when a physical inventory is taken.

The method possesses the advantage of placing before the mill executive a cost statement from which he can determine upon which of the products a profit is being made and upon which a loss is being sustained. No product is burdened with an unproportionate amount of expense and thus will not show a paper loss; on the other hand no products are treated as a miscellaneous ("velvet") income with which to credit something, at the expense of another product. Nor do the opening and closing inventories contain at any time an anticipated profit, as might be the case where the method of crediting by-products to cost of flour is used.

A number of refinements are often desirable and changes are of course necessary when it is desired to adapt the general method to a specific case.