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Spoilage as a Marketing Cost of Perishables

By Walter D. Fisher

Spoilage losses are a constant source of difficulty in the measurement and analysis of marketing margins. In the hope of stimulating some discussion on how to handle these losses, the writer presents and evaluates different methods of covering the problem.

THREE METHODS of computing and presenting marketing margins for perishable commodities are here compared. The differences among the methods depend upon the manner of considering spoilage loss. It is held that the procedure of the Bureau of Agricultural Economics of adjusting margins for spoilage loss is appropriate for use in comparing average farm payments with average retail payments, but that other methods are better suited for comparing costs at the same level of marketing.

Definitions of Terms

In this discussion "marketing cost," "marketing margin," and "farm-retail price spread" are considered to be synonymous expressions. All three here mean the difference between the unit price charged the consumer and the unit price paid to the producer. The question of what are comparable units of quantity enters the discussion, but the complications which sometimes cause these three expressions to have different meanings are not considered here. The expression "spoilage loss" is taken to mean the reduction in quantity of a perishable commodity that occurs as the commodity passes from producer to consumer, assuming that the quality and therefore the grade of the commodity finally consumed are the same as when it left the farm. In other words, it is assumed that the producer graded his product before he sold it, and only one grade is being considered. The problem of spoilage is thus differentiated from the problem of grading.

Method 1. "Adjustments" of Margin for Spoilage Loss

Most presentations of marketing spreads and margins make adjustments in the marketing margins to account for the losses by spoilage. These losses themselves do not appear in these presentations but are usually relegated to separate tables or to footnotes. This is the method followed by

the Bureau of Agricultural Economics¹ and by many others.

This type of adjustment can be illustrated by a specific example, somewhat oversimplified. Assume the following situation. A farmer sells a lug of tomatoes of homogeneous quality directly to a retailer. Transportation cost is considered negligible. The original net weight is 50 pounds and the price paid the farmer by the retailer is \$2 per lug. Before the retailer resells the tomatoes to the consumer, 10 pounds, or 20 percent, of the original weight are lost through spoilage. The remaining 40 pounds are sold at retail at 15 cents a pound. We ask: What is the marketing cost between farmer and consumer? What is the farmer's share of the consumer's dollar?

In this example there is no marketing cost between farmer and retailer. The \$2 the retailer paid for the lug of tomatoes is also the farm price. But he received \$6 for the lug (40 × 15 cents) after he threw 10 pounds away. This \$6 may be called an adjusted retail price, because spoilage is allowed for. The difference between them, \$4, is considered the marketing cost or margin.

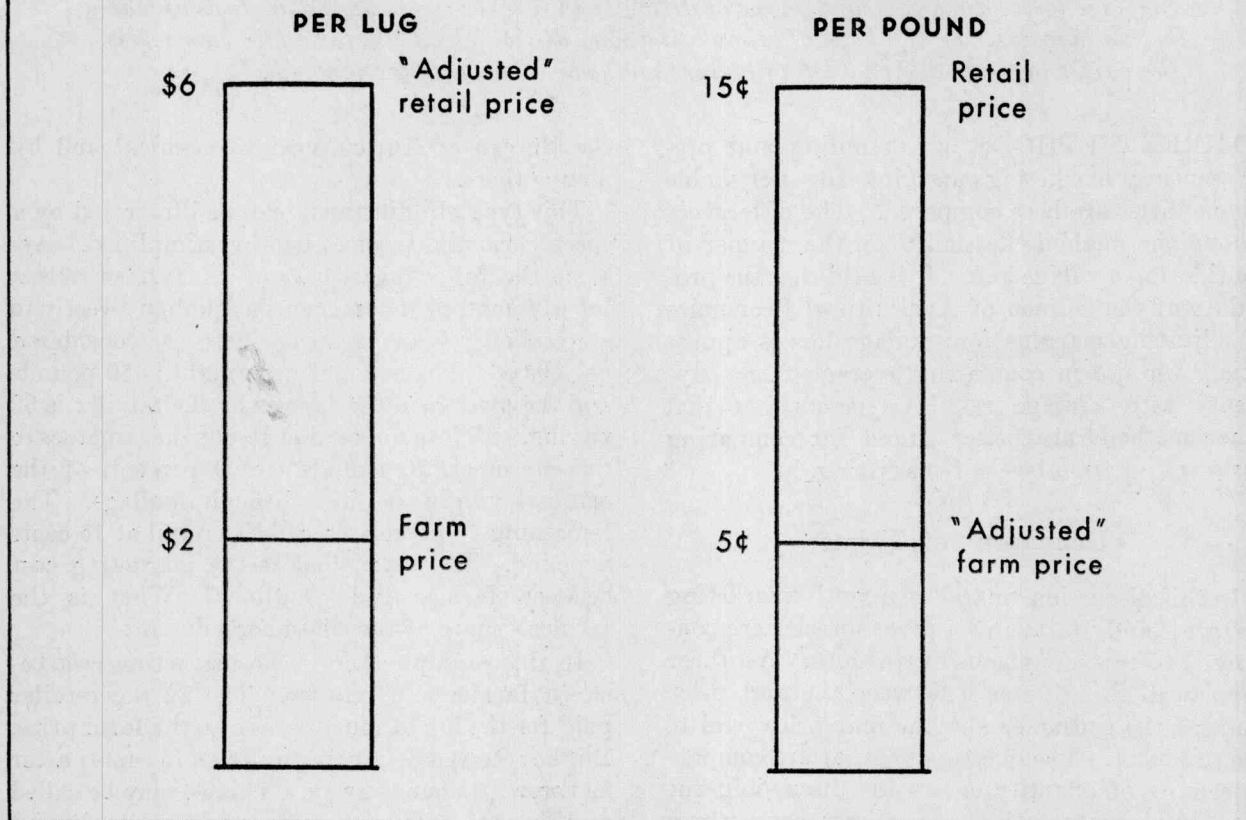
A similar adjustment can be made on the basis of a pound. The retail price charged the consumer is 15 cents but, in order to supply the consumer with 1 pound only, the retailer must buy a somewhat larger quantity so that after a 20-percent spoilage loss 1 pound will remain. The quantity he buys is 1.25 pounds, and the cost of such a quantity to the retailer is 5 cents. The margin is 10 cents or the difference between the two prices—shown in the right-hand bar of figure 1.

Whether the computation is made on the basis of a lug or a pound, the farmer's share of the consumer's dollar comes out 33⅓ percent.

This presentation may seem strange to both the farmer and the consumer. The consumer will note

¹ UNITED STATES BUREAU OF AGRICULTURAL ECONOMICS. PRICE SPREADS BETWEEN FARMERS AND CONSUMERS FOR FOOD PRODUCTS, 1913-44. U. S. Dept. Agr. Misc. Pub. 576. 1945.

MARGINS AS ADJUSTED TO ACCOUNT FOR SPOILAGE LOSSES (METHOD 1.)



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FIGURE 1.

that if he actually buys a full lug of 50 pounds at the retail price of 15 cents, it will cost him \$7.50 whereas the retail price per lug in figure 1 is shown to be only \$6. The farmer may note that the right-hand bar of figure 1 shows his "adjusted" farm price as 5 cents, whereas he actually received from the retailer only 4 cents per pound. These discrepancies are due to the fact that the prices are based on different physical quantities of the commodity—50 pounds at the farm level is considered "equivalent" to 40 pounds at the retail level.

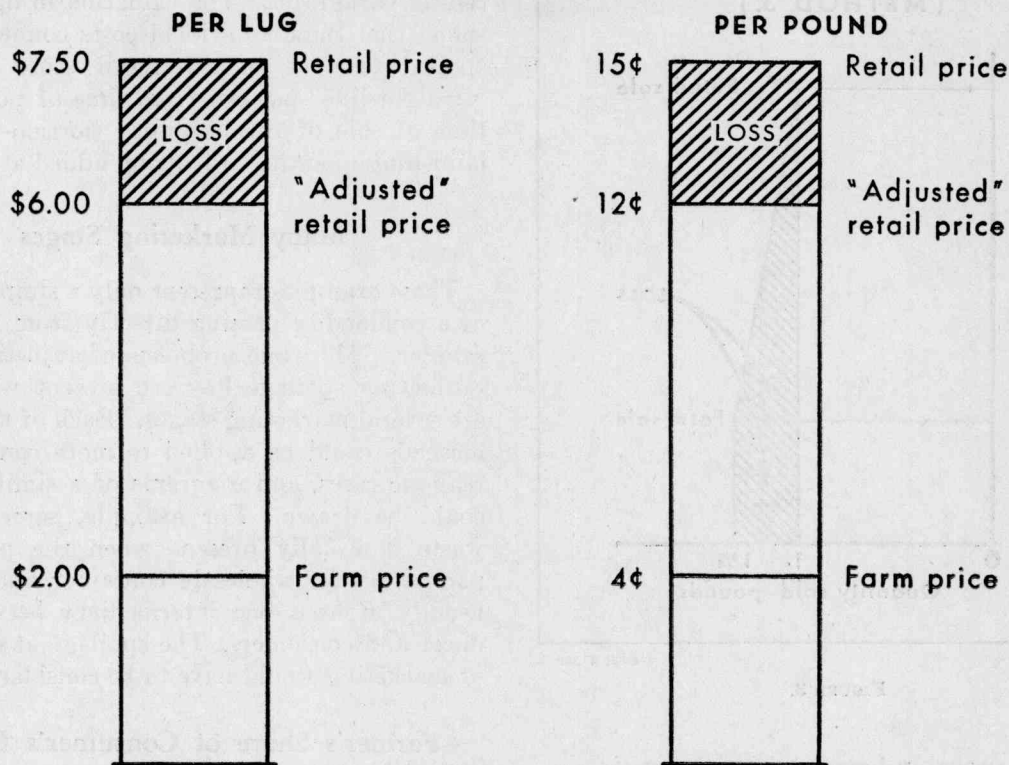
From some viewpoints this equivalence may be questioned. It may be possible for the retailer to avoid the loss by spoilage; if so, the retailer could charge the consumer a lower price per pound and yet have the same gross receipts. The consumer is now paying for the spoilage in the form of a higher price. In other words, the spoilage loss

may be in some sense a real cost of marketing to the consumer, but it is not shown as such in figure 1.

Method 2. Inclusion of Spoilage Loss Valued at Retail Price

Another type of presentation would show this spoilage loss as a cost of marketing. The retail price per lug is considered to be \$7.50—the price for the same full lug of produce as was sold on the farm. The difference between this figure and the \$6 actually received by the retailer for the 40 pounds is indicated as loss (fig. 2). This procedure assumes that the 10 pounds thrown away is worth as much per pound as the remaining quantity that was sold—in other words, the physical loss is valued at the retail price. The \$6 is the same adjusted retail price that appears in figure 1. It could also be called "retailer's realization."

MARGINS INCLUDING SPOILAGE LOSSES VALUED AT THE RETAIL PRICE (METHOD 2.)



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FIGURE 2.

This presentation can also be made on a pound basis. The farm price is taken as the actual price per pound received by the farmer, which is 4 cents. The retailer's realization is the amount that the retailer actually received for the crate or for the lug, divided by the original weight of 50 pounds. This amount is 12 cents a pound. It can be also regarded as the price per pound which the retailer could afford to charge the consumer if he had sustained no loss whatever, since the gross return on 50 pounds at 12 cents is the same as on 40 pounds at 15 cents.

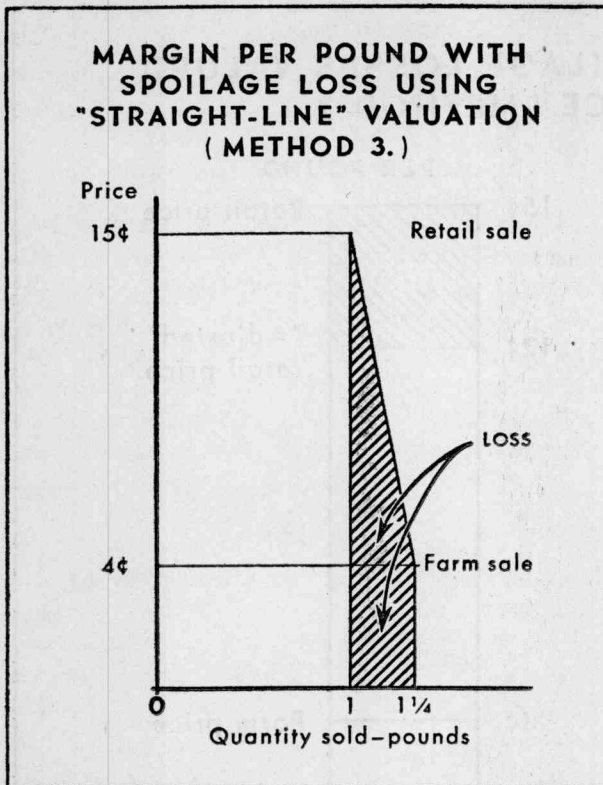
This presentation has the advantage that it directly illustrates the size of the spoilage loss in relation to the retail margin. Whether the loss itself is considered a part of the retail margin or whether it is considered as a separate item in the cost of marketing would be a matter of definition

of words. In any case, it is closely connected with the function of retailing.

This presentation has the disadvantage that it puts a rather arbitrary money value on the physical loss—the retail price. Moreover, the word "loss" suggests that spoilage is avoidable as well as undesirable.

Method 3. Inclusion of Spoilage Loss Showing Variable Quantity

It might be argued that a more reasonable valuation of the loss would be at the price paid by the retailer rather than at his selling price. By that method the value of the loss would only be 1 cent per pound instead of 3 cents. This would be the cost to the retailer of the extra $\frac{1}{4}$ pound needed by him in order to move 1 pound out of his store. But such a valuation ignores the fact that the re-



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FIGURE 3.

tailer will probably have additional costs in connection with the extra quantity while it is in his store; for example, his labor force must unpack it, display it, and possibly water it, before it is thrown away. Such items of cost cannot be computed exactly, but it seems clear in principle that the additional cost involved is higher than merely the cost of the material itself.

Possibly a more accurate, but at the same time more complicated, way of illustrating spoilage loss is shown in figure 3. The quantity sold at each marketing stage is indicated by a horizontal distance, and the unit price charged is indicated by a vertical distance. Thus, a $1\frac{1}{4}$ -pound lot is sold at the farm level and 1 pound is sold at the retail level; 4 cents per pound is charged at the farm level and 15 cents at the retail level. The fact that $\frac{1}{4}$ pound is lost between farm sale and retail sale is indicated by the diagonal line; the money value of the loss is indicated by the shaded part of the chart. The value of the loss is smaller than in figure 2— $2\frac{3}{8}$ cents as compared with 3 cents. The rectangular portion of the shaded

area (1 cent) represents the extra quantity needed by the retailer valued at his purchase price. The triangular portion ($1\frac{3}{8}$ cents) represents the additional costs of the retailer mentioned in the preceding paragraph. The valuation in figure 3 assumes that these additional costs connected with spoiled produce in the retail store follow a "straight-line" pattern from time of purchase to time of sale of the unspoiled portion—with diminishing quantities requiring added attention.

Many Marketing Stages

These examples represent only a simplified case of a commodity passing directly from farmer to retailer. The same problems of adjusting for or evaluating spoilage loss are present when there are several marketing stages. Each of these three methods could be applied to more complex and realistic cases, and diagrams of a similar nature could be drawn. For example, some physical waste is usually present when the produce is packed in the wholesale container and there is usually at least one intermediary between producer and consumer. The spoilage at each stage of marketing would have to be considered.

Farmer's Share of Consumer's Dollar

The method to be chosen for treatment of spoilage and marketing costs depends on the purpose at hand. If the purpose is simply to compare payments made to farmers for produce with retail payments made by consumers for the food yielded by this produce, then the adjustment procedure of method 1 and the use of "farm-produce equivalent" seem necessary.

In general, a given quantity of produce sold at retail means a somewhat larger quantity of produce at the farm. Payments to farmers include the value of that part which later becomes spoiled. Sales to consumers do not include this part. In a large population the ratio of the former figure to the latter may be regarded as the farmer's share of the consumer's dollar.

Indeed, it is not necessary, in computing the farmer's share, to require that the unit of goods sold at retail be physically identical with that sold by the farmer. Shrinkage may have taken place through evaporation of water. Processing operations may have greatly changed the physical form or composition of the original product.

Several byproducts may have been sold. In any of these cases a "farm-produce equivalent" of the retail weight can be computed. This is what is done by BAE. In cases in which farm produce is processed, the "farmer's share of the consumer's dollar" could be interpreted also as the ratio of the cost of the raw material to the final value of the processed produce.

Comparisons of Costs

If the purpose of a research worker is to compare marketing costs and detect inefficiencies as between different groups of dealers in the same commodity, a good case can be made for presenting spoilage loss directly, as in methods 2 and 3. There is an arbitrary element in setting money values on spoilage by these methods; still, comparisons between loss figures at the same level of marketing may be interesting and significant.

For example, two retailers may be compared. One who has a high loss fraction may charge consumers higher prices than his competitor a few blocks away who has a much lower loss. Actually, the main influence determining the retailer's markup may be the size of this spoilage item. If the information on spoilage is available, the procedure of adjusting retail margins for loss would not show this difference at all.

The concept of a spoilage or shrinkage "constant" for a population of firms may mask wide variation within the population. Great differences in amount of loss by spoilage have been observed among different firms that do approximately the same kind of business. Many recent publications on marketing point to spoilage loss as an indication that improvement in marketing is

possible; growers' organizations are often urged to assist retailers in reducing this loss. This viewpoint suggests that this loss be treated as a cost of marketing.

Spoilage and Alternatives

The above discussion does not imply a final judgment that all spoilage losses represent inefficient marketing methods and that the costs of these losses can be entirely avoided. The losses arise partly from the nature of consumer demands and preferences. Housewives like to buy frequently and in small units. This means that retailers must constantly have produce on hand even though they may be able to buy only infrequently. The consequence is physical deterioration, and it may reasonably be held that this deterioration is due to the efforts of the retailer to meet the demand of his trade.

To avoid spoilage, other costs may have to be incurred, such as more frequent transportation from source of supply, or more labor to sprinkle and maintain a display of produce.

A marketing firm may be regarded as an enterprise, seeking to find the best allocation of various inputs—raw materials, labor, and others—that will result in lowest total cost for the output it can dispose of at market prices. The emphasis that has been given to spoilage in this discussion reflects only a tentative hypothesis that raw-material outlays may be excessive, and total unit costs may therefore be higher than the desired minimum. Empirical research is necessary to test this hypothesis. The suggested methods of presenting loss by spoilage roughly indicate its importance and the possibility of improvement.