

4-1915

## Cost of Producing Farm Crops

O. R. Martin

Follow this and additional works at: <https://egrove.olemiss.edu/jofa>



Part of the [Accounting Commons](#)

---

### Recommended Citation

Martin, O. R. (1915) "Cost of Producing Farm Crops," *Journal of Accountancy*. Vol. 19: Iss. 4, Article 1.  
Available at: <https://egrove.olemiss.edu/jofa/vol19/iss4/1>

This Article is brought to you for free and open access by the Archival Digital Accounting Collection at eGrove. It has been accepted for inclusion in Journal of Accountancy by an authorized editor of eGrove. For more information, please contact [egrove@olemiss.edu](mailto:egrove@olemiss.edu).

# The Journal of Accountancy

Official Organ of the American  
Association of Public Accountants

---

---

Vol. 19

APRIL, 1915

No. 4

---

---

## Cost of Producing Farm Crops

By O. R. MARTIN

The items of cost entering into a manufactured product are commonly grouped as follows:

1. Materials.
2. Labor.
3. General manufacturing expense.

These items of cost may further be divided into:

1. Direct costs: 

}	Materials.
}	Labor.
2. Indirect costs: General manufacturing expense.

In the case of farm crops it will be found convenient to make a slight modification in this classification. In a manufacturing plant the cost of power is considered as an item of general manufacturing expense. On the farm the power is usually supplied by horses, and in this case is more properly to be considered as a direct cost of production. The items of cost entering into farm crops may then be classified as follows:

- I. Direct.
  1. Materials.
  2. Man labor.
  3. Horse labor.
- II. Indirect.
  1. Machinery expense.
  2. Building expense.
  3. Insurance.
  4. Taxes.
  5. Fertilizer expense.
  6. Interest on the investment.
  7. Wages of management.
  8. Miscellaneous expense.

## *The Journal of Accountancy*

### MATERIALS

The chief and practically the only material entering directly into farm crops is seed. The seed may be secured from either of two sources:

1. It may be purchased.
2. It may be produced on the farm.

If purchased, its cost is accurately indicated by the price paid for it. In addition it should be charged with the cost of transporting it to the farm.

If the seed is produced on the farm the question arises as to whether it should be valued at the market price or at the cost of production. Of these, the first-named basis should be used, namely, the market price. If the cost of production is more or less than the market price, it is evident that a loss or gain has been realized, but this loss or gain should be definitely assigned to the production of the seed and not to the production of the crop for which the seed is used. A more accurate, likewise a more significant analysis of farm operations will be secured in this way.

### MAN LABOR

The man labor on the farm may be divided into two classes, viz.: regular labor and extra labor. Regular labor refers to the labor that is employed more or less steadily throughout the year, and that is paid by the month or the season. By extra labor is meant the labor that is hired from time to time and that is usually paid by the day or the hour. One of the most important problems of farm management is the manipulation of the labor supply, and it is essential that detailed information be available in this connection. Therefore, these two types of labor should be kept separate in the accounts, as the cost per hour will be different, the cost per hour of extra labor being much higher, as a rule, than that of the regular labor.

The total cost of labor will consist of the following items:

1. Cash payments of wages.
2. The value of all farm products or services given in part payment of wages.
3. The value of all board and lodging given in part payment of wages.

### *Cost of Producing Farm Crops*

4. The rental value of all dwellings and land occupied by laborers who live on the farm.
5. The value of the labor of the farmer.
6. The value of the labor of members of the farmer's household who do not receive cash wages.

The first of these items is easily ascertained. The second class of items is not so easily determined. If the farm products in question have a market price this price may be used to place a value upon the products. In such cases the farm value, i.e., the market price less the cost of putting the goods on the market, should be used. Most products which are ordinarily given in payment of wages are capable of being valued in this way. Sometimes a part of the farm laborer's remuneration may consist of certain privileges or services, as, for example, the use of a team on certain occasions. The value of such services must necessarily be left to the judgment of the farmer, but if they constitute a part of the remuneration of the laborer they must be included in estimating the total cost of labor.

The third item of labor cost presents a more difficult problem. As a rule, when board and lodging are given the laborer in part payment of wages, the laborer temporarily becomes a member of the farmer's household. Therefore if the actual cost of board is to be used as the basis of this valuation it will be necessary to extend the cost accounts into the farmer's household. Such a procedure is not satisfactory. The farmer's household expenses should be kept separate from the farm expenses, as the private affairs of the farmer bear no direct relation to the cost of operation of the farm. The profitableness of the farm is in no manner affected whether the farmer lives in a one-thousand-dollar house or whether he lives in a ten-thousand-dollar house. Changes in the farmer's household expenses ought not to have any influence on the cost of operation of the farm any more than that a merchant's household expenses should help to determine the rate of profitableness of his business.

In addition, the determination of the cost of board on the farm involves so many arbitrary values that accuracy in the majority of cases is impossible. It will be necessary to keep a complete record of the time of the women in performing the various household duties, a value will have to be assigned to their work, a value will have to be placed upon all garden and other produce used in the

household, and other problems of a like nature will arise, an accurate solution of which is exceedingly difficult. In view of these facts it will be found a better plan to value the board at the price that could ordinarily be obtained for it.

It often happens that farm laborers who are married are given houses to live in, together with a certain amount of garden space and possibly some live stock and poultry. These privileges are to be considered as part payment of wages. A value should be placed upon them and the amount added to the cost of labor. It is difficult to lay down a general rule as to what this value shall be and how it shall be determined, but it should always be sufficient to cover all expenses connected with furnishing such accommodation.

With respect to the labor of the proprietor care must be exercised to separate the portion of his time devoted to ordinary manual labor from the portion of his time given over to what may be termed managerial duties. Almost every farmer spends a large proportion of his time doing ordinary farm work which is on a par with the work of his employees. This is spent directly on particular enterprises and its cost should be charged to these enterprises, the cost being the same as in the case of the labor of the employees. However, every farmer spends more or less of his time in managing and superintending the farm. This labor is supposedly of a higher grade than the ordinary manual labor, and accordingly a higher value should be placed upon it. In addition, it is not so directly assignable to particular enterprises. The following plan has been adopted by the Illinois agricultural experiment station as a practicable one for making this distinction.

Assign a value to the proprietor's labor for the year, including in this valuation both kinds of labor. Keep a record of the manual labor of the proprietor together with the enterprises upon which it is spent. Ascertain the average rate per hour of the employees' labor by dividing the total cost of their labor by the total number of hours they have worked. Ascertain the value of the proprietor's manual labor using the same rate per hour. The difference between this amount and the total value assigned to the proprietor's labor will represent the value of his managerial labor and should be charged to a separate account properly labeled to indicate its character. The manual labor cost will then be distributed together with the cost of the labor of the employees

## *Cost of Producing Farm Crops*

among the different enterprises in accordance with the time spent on each. The managerial labor will be distributed among the different enterprises in accordance with the plan for distributing the miscellaneous expense. As an illustration of the plan let us assume the value of the proprietor's labor for the year to be estimated at \$600. At the end of the year the labor records show that the proprietor worked 2,000 hours at ordinary manual labor. Suppose the average cost of the employees' labor is found to be 18 cents per hour. Multiplying the number of hours the proprietor spent in ordinary manual labor, i.e., 2,000 by 18 cents gives the cost of the proprietor's manual labor which is \$360. Subtracting \$360 from \$600 gives a remainder of \$240 which represents the value of the proprietor's managerial labor.

The labor account must also include the value of the labor spent in the operation of the farm by members of the farmer's family even though these do not receive wages as such. The valuation of this labor should be based upon the average cost per hour of the labor that is regularly paid for.

If the total cost of the labor at the end of the month is divided by the number of hours actually worked that month, as shown by the labor record, the average cost per hour can be ascertained. The labor cost may then be distributed among the various departments or enterprises of the farm in accordance with the amount of time actually spent in the operation of each. All labor spent in the operation of the farm should be converted into man-hours; for example, if a boy is working on the farm and accomplishes one-half as much work in a given time as a man, each hour of his time should be recorded as five-tenths man-hour.

### HORSE LABOR

The principal items comprising the cost of maintaining farm work horses are:

1. Feed.
2. Labor (man).
3. Cost of shelter.
4. Harness expense.
5. Depreciation.
6. Interest on the investment.

In addition, miscellaneous items, such as veterinary fees, shoeing, insurance and the like will need to be included when they occur.

Feed is easily the item of chief importance in teams expense, and if it is to be ascertained accurately, much care will need to be exercised. In considering the cost of feed it will be found convenient to divide the same into two classes, viz.:

1. Feed purchased.
2. Feed produced on the farm.

The farmer, as a rule, does not find it necessary to buy feed for his horses. When he does, its cost is accurately represented by the price he pays for it.

In estimating the value of products raised on the farm which are in turn consumed on the farm, such as feed, the market price should be used whenever it is available. It may be well to state briefly several reasons why this plan should be followed. One of these is that estimated or arbitrary valuations, although they cannot be wholly avoided in farm cost accounting, should never be used when more definite bases of valuation can be secured. A second reason is that since the farmer can actually realize the market price for his products, if he chooses to use these products on the farm their logical cost to him is the price he could obtain for them. A third and perhaps the most important objection to using the cost of production as a basis for valuation is that the very products for which we are seeking a value are important items in determining the cost of production. For example, feed is the most important item comprising the cost of horse labor, and horse labor, in turn, is one of the most important items in the cost of production of farm crops.

In using the market price for determining the value of feed, due allowance should be made for the cost of transportation to the market. The feed is worth to the farmer the price he could get for it less the cost of placing it on the market. This is commonly known as the farm value.

Some of the products raised on the farm which are used as feed for horses do not have a definite market price. In such cases an approximate valuation is at times necessary. Pasturage is a product of this kind. When there are regular pasturage rental charges obtaining in the community, as is usually the case, these should be used; if not it will be necessary to ascertain the cost of maintaining the pasture, and this cost will need to be distributed among the live stock in accordance with the use they make of the pasture. The use of the pasture can be recorded in terms of

### *Cost of Producing Farm Crops*

pasture days, a pasture day representing one animal on pasture one day. Where live stock of different sizes uses the same pasture it may be assumed, in the absence of a more accurate measure, that their consumption will correspond to their weight. For example, it is estimated that 1,000 pounds of sheep will consume approximately as much pasturage as 1,000 pounds of horses.

The amount of labor spent in caring for the horses will be secured from the labor record. This is valued at the regular rate for labor as determined each month from the labor account.

The cost of shelter will be difficult to ascertain accurately. Since the buildings of the farm serve a variety of purposes, being used in connection with practically all farm enterprises, it will be more convenient to consider the distribution of the buildings expense separately. In ascertaining the total teams expense, however, it is essential that the teams be assigned their proper share of the expense of maintaining the farm buildings.

All items of harness expense, such as repairs, replacements, depreciation, and interest on the investment add to the cost of horse labor. Repairs and replacements of harness will be definite charges to the teams expense account, made as they occur. The depreciation of the harness should be estimated at the end of each year. The interest on the investment in harness equipment should be estimated at the current rate of interest and based on the average value of the harness equipment for the year.

The decline in the value of work horses is an item to be included in the cost of horse labor. In estimating the depreciation it is better to consider each animal separately, for in the case of younger horses we may even have appreciation rather than depreciation. Although no attempt should be made to adjust the valuation of horses directly to changes in the market price, such changes must be taken into account in estimating the depreciation. Merely as a guide in estimating the depreciation it may be noted that horses are generally considered to reach a maximum value at from five to six years of age and that their period of usefulness extends on the average until they have reached the age of fifteen, i.e., a period of ten years. During this period, then, the depreciation would amount to 10% a year. It should be remembered, however, that there will be many cases in which the period of usefulness ends sooner than this or continues longer. The value of a horse at the end of the period of usefulness is a quantity which



may for all practical purposes be left out of consideration in this connection.

Interest on the investment in the teams must be taken into account if accurate horse labor costs are to be secured. The problem of interest on the investment is the same in the case of all items of farm equipment and may therefore be considered independently.

In ascertaining the cost of horse labor proper allowance should always be made for items which tend to decrease this cost. The chief item of this character will be the natural increase in the horses. The expense in connection with the raising of colts should be included in teams expense and the value of the colts should be considered a deduction from teams expense. A problem of importance to the farmer is to determine to what extent he can reduce the cost of horse labor by raising colts. When it is desired to ascertain definitely the amount of such reduction it is a simple matter to separate the expense of the colts from the expense connected with the other horses.

After the total cost of horse labor has been ascertained it is necessary to distribute this cost among the different enterprises of the farm. This should be done in accordance with the time the horses have been used in connection with each enterprise. The horse labor record will give this information. Dividing the total cost of horse labor by the total number of hours worked will give the cost of horse labor per hour, and multiplying the rate per hour by the number of hours spent on an enterprise will give the share of the cost of horse labor assignable to that enterprise. In the case of man labor it was suggested that the cost of labor per hour be ascertained for each month, and that the cost of man labor be distributed over the enterprises monthly. In the case of horse labor it will be more satisfactory to ascertain the cost per hour only at the end of the year. There are several reasons why this should be done.

1. The items of cost of horse labor are more varied than in the case of man labor and do not permit readily of accurate monthly charges.

2. The time the horses work varies so much at different times of the year that even if the cost for each month could be secured accurately and a monthly rate obtained by dividing the total number of hours the horses worked that month into the total cost,

## *Cost of Producing Farm Crops*

such a rate would not result in a just distribution of horse labor cost. The farmer can rarely buy and sell horse power as he needs it. In order to have sufficient horse power available in the summer months he must keep and feed horses in comparative idleness during the winter months. Figures collected by the Minnesota agricultural station show that the farm work horse in Minnesota averages about three hours of work a day during the year. In the winter months the average working time for a horse is approximately one hour a day, whereas in the summer months the average rises to five and six hours a day. A part of horse labor costs of the winter months is therefore justly to be assigned to the enterprises upon which the horses are used in the summer.

### MACHINERY EXPENSE.

The principal items comprising the cost of maintenance and operation of farm machinery are as follows:

1. Repairs and replacements.
2. Supplies.
3. Cost of shelter.
4. Insurance and taxes.
5. Depreciation.
6. Interest on the investment.

The cost of repairs and replacements will be indicated by cash expenditures for this purpose and by the cost of the labor spent in caring for and repairing machinery. Supplies such as oil, binder twine and the like will also be represented by cash expenditures. Insurance and taxes, if there are any, will be represented in similar manner. The machinery should be charged with a just proportion of the buildings expense, the amount of the charge being determined by the extent to which the buildings are used for housing machinery.

A general rate of depreciation is not practicable for farm machinery. The rate of depreciation of all classes of machinery will not be the same on any two farms and the rate of depreciation of separate items will vary even more widely. Some of the factors combining to determine the rate are as follows:

1. The character of the implement.
2. The amount of its use.
3. The intelligence displayed in using it.

4. The care it receives when idle.

5. The promptness and adequacy of repairs when needed.

Statistics collected by the Minnesota agricultural experiment station show that the average annual depreciation of all classes of farm machinery is about 7.3%. Most writers on the subject consider 10% a safe average rate, but accurate results can only be secured when each machine is considered separately.

The interest on the investment in farm machinery should be calculated at the current rate of interest obtaining in the community and should be based on the average value of the machinery for the year.

The machinery should be classified according to the enterprises in connection with which it is used. Both the Minnesota and the Illinois agricultural experiment stations have classified machinery as follows:

1. Corn machinery.
2. Grain machinery.
3. Hay machinery.
4. Dairy machinery.
5. All-crop machinery.
6. Miscellaneous machinery.

If the expense of each of these classes of machinery is kept separate it will be much easier to secure a just distribution of the machinery costs among the different enterprises. In the case of the specialized machinery (corn, hay, dairy) all the costs will be charged to the respective enterprises. Only in the event that there are several units composing one enterprise—such as when more than one field is devoted to the raising of corn—will it be necessary to keep a record of the work done by the specialized machines for the purpose of distributing their costs, and only in this case when it is desired to keep a separate record for each field or unit. In the case of the machines used in connection with more than one enterprise it is necessary to keep a record of the work done by the machines on each enterprise. The rate per hour for such machines can be found by dividing the total number of hours they are used into the total cost of maintaining and operating them.

#### BUILDINGS EXPENSE.

Buildings expense consists of:

1. Repairs and replacements.

## *Cost of Producing Farm Crops*

2. Insurance and taxes.
3. Depreciation.
4. Interest on the investment.

The repairs and replacements will be represented by the cost of the materials and supplies purchased for that purpose and by the value of the labor spent in repairing buildings. This latter will be secured from the labor record in the case of the regular farm labor that has been so employed, whereas the value of extra labor that has been employed for this purpose will usually be represented by cash payments.

Only ordinary repairs and replacements should be included in buildings expense. If any extraordinary repairs or replacements are necessary because of some unusual occurrence, such as a fire or a storm, these items should be charged directly to the profit and loss account. If such items should be included in the cost accounts these latter would not be of value for purposes of comparison, since the costs of this one year would contain items not ordinarily a part of the cost of farm operation.

The insurance premiums and the payments for taxes are always definitely ascertainable. The amount of the depreciation will vary greatly, depending upon such things as the character of the construction of the building, the promptness and adequacy of repairs and the use to which the building is put. For the more substantial farm buildings it is generally estimated that 3% will be a fair annual allowance for depreciation; in the case of the buildings of cheaper construction the rate will probably rise as high as 5%. Interest on the investment is to be estimated at the current rate of interest on the average value of the buildings.

The buildings on the farm are used for a variety of purposes and it is a difficult problem for the accountant to distribute their cost of maintenance among the different farm enterprises making use of the buildings. The best basis of distribution will be found to be the space occupied in connection with each enterprise. Frequently there will be a certain amount of building space not directly assignable to particular enterprises, and in such cases a certain proportion of the buildings expense will need to be considered miscellaneous farm expense and will be distributed among all the farm enterprises in accordance with the plan adopted for distributing such miscellaneous expense.

## *The Journal of Accountancy*

### INSURANCE AND TAXES.

Charges for insurance will be associated with particular assets and will thus form a part of the expense of maintaining such assets. At the end of the year the insurance should be distributed among the accounts representing this expense and in this way it will be definitely charged to the various farm enterprises in accordance with the use they make of the assets.

Charges for taxes will be of a similar character. If there remains at the end of the year any undistributed portion of insurance and taxes it should be charged to miscellaneous expense. Care must be exercised in the case of insurance charges to apportion these accurately to the period to which they belong, as frequently the premiums paid are for insurance extending over a term of several years.

### FERTILIZER EXPENSE.

The accountant has two distinct problems with which to deal in connection with fertilizer costs. He must place a value upon the fertilizer and he must distribute it among the different crops upon some accurate and just basis.

Fertilizer may be purchased or it may be in the form of barn manure which is produced on the farm. In the first case its valuation is simple, the value being represented by the price paid for it plus the cost of transportation. When manure is produced on the farm its valuation becomes more difficult. There have been many attempts made to value the manure produced by the live stock on the farm and different bases have been used, such as:

1. Value according to increased crop yields.
2. Value according to the market price of the fertilizer constituents.

Attention may be directed to certain experiments of this character conducted by the Ohio agricultural experiment station at Wooster, Ohio, the results of which are set forth in their bulletin No. 246. According to these experiments the value of fresh steer manure was found to be \$2.92 a ton when based upon the market price of the fertilizer constituents and \$3.73 a ton when based upon the value of increased crop yields. In the case of weathered steer manure the figures were found to be \$1.80 when based upon the value of the fertilizer constituents and \$2.93 when based upon the value of increased crop yields. In addition to making an allow-

### *Cost of Producing Farm Crops*

ance for the variation in the fertilizer constituents of the manure from the different kinds of farm live stock, it must be noted that the net return from a ton of barn manure under general farming conditions depends upon the soil, the methods of cultivation, and the crops grown.

Although such experiments emphasize very clearly the importance of utilizing the barn manure in the operation of the farm, they do not furnish a practical basis for determining fertilizer cost as one of the items in the cost of producing farm crops. Especially is this true in the case of the value determined upon the basis of increased crop yields, for in this case it would mean that the value of the factor of production is determined by the return it brings. If this same basis were adopted in valuing the other items in the cost of production the cost of a farm crop would be exactly the same as the income, leaving no room whatsoever for a profit. Objection may also be made to this basis upon the ground that it places a value upon the manure which is higher than the price at which the farmer could dispose of it if he chose to do so or the price he would have to pay for it in the event of purchase.

A more practical plan will be to value the manure as nearly as possible in accordance with its market value, making due allowance for the cost of transportation. It is important to secure as just a valuation of the manure as possible for the purpose of crediting the live stock as well as for the purpose of securing accurate crop production costs. In determining the value of the manure the cost of distributing it should not be taken into account, i.e., the live stock should be given credit for it in accordance with its value at the barn. The cost of distribution should be borne by the various crops, since this will vary with the location of the field and the difficulty or ease of access to it.

The chief difficulty in distributing the fertilizer expense among the crops is that the benefit of the manure is not confined to one crop or to one year. The amount of fertility supplied by the application of fertilizer to the soil which is consumed by a single crop varies with the soil, the crop and many other conditions. With loam or clay soils a fair distribution in a four year rotation in which manure is used but once might be 40% to the first crop, 30% to the second, 20% to the third, and 10% to the fourth crop after applying manure. In such a case the best plan is to charge

all the fertilizer cost to the crop and then credit it with the value of the fertilizer still in the soil, carrying this balance over as a charge against the next crop. Where annual applications are made, which are fairly constant in amount and character, the value of the fertilizer remaining in the soil may be ignored, since this amount will be practically constant from year to year. In such a case the entire value of each application will be charged to the crop for that year. The fertilizer record will show the amount of fertilizer that has been applied to each field.

INTEREST ON THE INVESTMENT.

There is a difference of opinion among accountants with respect to whether or not interest on the investment is to be considered an item in the cost of production. Interest on the investment may be said to represent the service of the fixed capital employed in the operation of the farm. The factors of production on the farm may be divided into three classes, viz.: land, labor and farm equipment. The service furnished by labor is represented by the current expenditures for labor in the form of cash and miscellaneous services. It is not necessary to make a permanent investment of capital in labor. In the case of land and farm equipment, however, in addition to the current costs represented by actual expenditures, it is necessary to invest a certain amount of capital permanently. All capital, as such, has an earning power. If the farmer does not invest his capital in land and farm equipment he will be able to realize a return from it by investing it elsewhere. If he does not realize a return on his investment in land and farm equipment at least equal to the return he would realize if his money were invested elsewhere it is obvious he is operating his farm at a loss.

Much of the opposition to including interest on the investment as a part of the cost of production is due to the confusion between the interest which is actually paid out on money borrowed and the interest which represents the service performed by capital. It is true that if the interest charge were represented by actual payments of interest on money borrowed the cost of production would vary with the extent of the farmer's indebtedness, which is absurd. But such interest is to be considered a deduction from profit, not an item in the cost of production. The interest on the investment that does constitute a part of the cost of production is the earning

## *Cost of Producing Farm Crops*

power of the capital that is invested in the land and farm equipment, whether it is wholly or only partly owned by the proprietor of the farm.

### MISCELLANEOUS EXPENSE.

As will appear from the preceding discussion most of the indirect items of cost (machinery expense, buildings expense, insurance, taxes, fertilizer expense, interest on investment) can be converted into direct costs and charged directly to particular products. There are, however, on every farm certain items of expense which are miscellaneous in character and which are not associated with any particular enterprise but are nevertheless essential incidents in the operation of the farm. Such miscellaneous expenses add to the cost of producing farm products and some basis must be secured in accordance with which they can be distributed justly among the different farm enterprises.

The general aim in cost accounting is to distribute the general expense among the departments or enterprises in the proportion which the operations of these departments or enterprises bear to the total operations of the concern. Man labor is the most important item in the cost of farm products, and the proportion in which the different farm enterprises share in the total cost of man labor is undoubtedly the most accurate index to their share in the total farm operations. The miscellaneous expense on the farm, therefore, will be distributed most accurately by charging to each enterprise the same proportion of miscellaneous expense which the man labor charged to that enterprise bears to the total cost of man labor.