



Agricultural Cost of Production : Determination of Cash Costs

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1- Definitions (1/3)

- Cash costs are the **out-of-pocket expenses** paid in cash.
- Cash costs depend **on production practices** and on **quantities and prices of inputs**.
- **These inputs are used during the production year.**
- Farmers, for example, might want to know the return of their operations above cash costs **in order to estimate available cash at the end of the production period.**

2 – Definitions (2/3)

This section covers the methodological approaches for estimating the following cash costs:

- **Seed, animal feed, fertilizers, pesticides**
- **Custom services**
- **Veterinary expenses**

1- Definitions (3/3)

- These costs generally vary according to the **quantity produced**, the **area** or the **number of head** of cattle.
- **Some may however be fixed**: insurance expenses, licenses or taxes independent of the production level of the operation (eg. fee for access to water).
- These inputs may be used **in whole** or **in part** during the crop year.
- **These inputs have a one-time effect**, that is to say, immediate or limited to the crop: feed consumed by livestock, pesticides, fertilizers, etc.
- Residual effects of longer-term can sometimes be observed: effect of fertilizers on soil fertility, for example.

2- About the units

- **Revenues and costs must be expressed in a common unit:**
 - **For crops:** unit area (hectare, etc.) or production (tonnes, kilograms, etc.)
 - **For Livestock:** by head or by quantity produced
- **It is recommended to adopt the current sales unit used by producer:** liter of milk, bag of rice, etc. because users and data providers can more easily relate to these unit.
- **To ensure comparability of data on income and costs, it is necessary that each of these indicators are calculated based on the same base:** the same area of culture, the same size of livestock, etc. Otherwise, profitability measures will be biased.

3- Determining cash costs : general considerations (1/2)

- **Cost** = Quantity of input used effectively * purchase price including all fees and taxes.
- If the quantities and input prices are available, **the values** can be directly used. Often accounting records do only included values.
- If one and / or other information is missing, an estimation based on **a current practices and / or local agricultural markets** may be made by the statistician or the enumerator.

Examples:

- **missing quantities, prices available:** the technical coefficients prevailing in the locality are used (example : seed rate per hectare amount of feed per day per head, etc).
- **available quantities, missing prices:** input prices used in local markets.
- **quantities missing, missing prices:** combining the two methods above

4- Estimating fertilizers and plant protection costs (1/2)

Recommended approach:

- **Quantities:** the information is collected at the farm level on the quantities of inputs used during the reference period of the survey, in the unit used by the operator (kilos, bags, etc.).
- **Price:** the price actually paid by the operator per unit of input. If it is self-produced inputs, market prices at the time of the application of inputs are used.
- **Cost:** price* quantities and adjusted to a common reference period with an appropriate inflation rate.

4- Estimating fertilizers and plant protection costs (2/2)

Alternative approaches

If information is available only on the quantities of fertilizers purchased and not used but if it is common practice in the region or country for farmers not to stock these inputs, then the cost estimate can be computed by multiplying the quantities by the appropriate market price as explained above.

If information is available only on the values purchased (and not the quantities), then the cost can be estimated by adjusting these values to the chosen reference period.

If the information collected is too scarce to provide reliable estimates, a standard commodity and region specific application rate can be used (e.g. kg per Ha) to estimate the quantities of fertilizers and plant protection used and costs computed by applying the appropriate market price

4- Estimating fertilizers and plant protection costs (2/2)

Example: Information was collected from a farm on the amount of purchased and owner supplied fertilizer used during the cropping year: 1,000 kg of urea was purchased and 100 kg of compost was produced and used on the farm. As no information was available on the timing of purchase and application of the fertilizer, it was assumed that the fertilizer was bought during the month preceding the growing season (March to September in this example) and that all of the inputs purchased or produced on the farm were used during the growing season. The market prices were USD 300 per metric ton for urea and USD 50 per metric ton for compost at the time of purchase or use. The reference period for the CoP calculation is the last month of the calendar year (December) and the inflation rate measured between February (month corresponding to the purchase or production of fertilizer) and December is 2 percent.

4- Estimating fertilizers and plant protection costs (2/2)

The estimated fertilizer cost is calculated in the following way:

$$\begin{aligned}\text{Cost} &= (1+2\%) * [(1*300) + (0.1*50)] = (1.02) * [300 + 5.0] \\ &= \text{USD } 311\end{aligned}$$

(1+2%) is the factor adjusting prices to the reference period, in this case December.

5- Determination of costs for seeds

Recommended approach

- **Costs** can be estimated by multiplying quantities and unit prices paid to purchase seeds, adjusted to the reference period.
- **Quantities** can be inferred by multiplying standard seed rates by the sowed area.

Alternative approaches

- **Expenses on seeds reported by the farmer can also be directly used to estimate costs**, after the appropriate adjustment to the reference period.
- **If neither information on quantities nor unit prices/expenses is reported by the farmer**, using standard seed rates and market prices can impute the expenses.

6- Determination of costs for animal feed

• Purchased feed:

Costs can be estimated by multiplying the quantity of feed used by the unit price paid for the feed, adjusted to the reference period.

• Self produced feed:

If the farmer supplies his own feed, then it should be valued at the price he would have received had he sold the feed in the market place.

• Measurement issues

Markets for farm-produced feed such as straw may be very thin or non-existent → impedes the use of market prices to impute costs for owner-supplied feed.

6- Determination of costs for animal feed

Example 1

The statistical unit is a farm producing cattle for slaughter. Information is available on the quantity of maize-based meals used on the farm during the calendar year (500 tonnes). Corn waste for silage is used to complete the feeding of the cattle (150 tonnes) produced on the same agricultural holding. The average price of the maize-based meal for the preceding year was USD 200 / tonne. As there is no market for corn silage, the price used is an estimate based on the price of grain: USD 25 / tonne. The annual inflation rate is 2.5 percent.

6- Determination of costs for animal feed

The estimated feed cost is:

$$\begin{aligned}\text{Cost / year} &= (1+2.5\%) * [(500*200) + (150*25)] \\ &= (1.025) * [100,000 + 3,750] \\ &= \text{USD } 106,344\end{aligned}$$

The number of cattle fed is 250 head.

The feed cost per head is therefore: Cost / year / head = USD 425

6- Determination of costs for animal feed

Example 2

Assume now that monthly market prices for animal feed is available and that the feeding rates are uniformly distributed over the year (500/12=41.67 tonne/month).

Monthly inflation rates are also available according to the information provided in the table below:

6- Determination of costs for animal feed

Months	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sep	Oct	Nov	Dec
Meals price (USD/ton)	185	185	185	185	205	205	205	205	210	210	210	210
Current month value ('000 USD)	7.71	7.71	7.71	7.71	8.54	8.54	8.54	8.54	8.75	8.75	8.75	8.75
Inflation rates, %	0.20	0.20	0.10	0.20	0.20	0.30	0.30	0.20	0.20	0.20	0.20	0.20
Dec. value ('000 USD)	7.86	7.86	7.79	7.86	8.71	8.80	8.80	8.71	8.93	8.93	8.93	8.93

The total cost is: $\text{Cost/year} = 7,860 + 7,860 + \dots + 8,930 = \text{USD } 102,110$

And the cost per head: $\text{Cost/year/head} = \text{USD } 408$

The costs of maize-based meals is slightly lower in example 2 (USD 102,110) than in example 1 (USD 106,344) because the inflation adjustments are done on a monthly basis: the annual inflation rate is applied to the value of feedstuff used in January, the February to December rate is used to adjust the feed value for February and so on. In example 1, the annual inflation rate was applied to the full value of the feedstuff used, implicitly assuming that all the feedstuff had been used at the beginning of the year.

7- Customs operations: definitions

- Refers to the **services hired by the farmers** such as machinery, contracts for fertilization, etc.
- Customs operations range from simple farm tillage or harvesting to virtually any and all of the farm operations.
- **It usually consists of hiring a combination of inputs** such as machinery together with fuel, animals for draught, labour and in some cases expendable inputs such as fertilizer or pesticides.
- **In some cases, neighbouring farmers might choose to exchange services on each other's farms.** These "rental" markets are widespread among smallholderS

7- Customs operations: valuation methods

- **General principle:** custom services should be valued at the cost to the farmer of the services purchased.
- In the case of valuing services traded with a neighbour (no money) then the statistician should **value the input at the cost of purchasing the service from the market or by building up the cost as if it was owner supplied.**
- In the cases in which these services are not purchased but are provided at no charge or as part of an exchange agreement with other farmers, **the opportunity cost should be imputed.**

8- Veterinary expenses : definition

- **These costs should include medications and supplements administered to animals that are not mixed with feed, if included.** Some examples include administered vitamins, hormones, medications used to counter external and internal parasites.
- **Veterinary fees and costs associated with products (needles, gloves and other supplies) used to administer these products should also be included.** These costs are generally attributable to one commodity, unless different types of animals are raised on the farm.
- **These costs are often recorded separately.**

8- Veterinary expenses : valuation methods

- They should be estimated by **multiplying quantities (e.g. number of visits) by unit prices**
- **OR by using the values provided in farm records.** This might be more relevant if farmers purchase a given package of veterinary services and do not pay on a per visit basis.

9- Estimating cost related to fallow land

- Farmers may leave part of their land **fallow** as a risk management strategy to improve the prospects of improved production on that land in the following year
- If this occurs, **costs incurred on this fallowed land should be included** and attributed as part of the cost of production.
- The expenses of maintaining and working the fallowed land should be estimated and charged against the cost of production **using the pre-productive cost methodology** or by including the area and associated costs of the fallowed land with the planted area of the crop in question.

References

- **AAEA Task Force on Commodity Costs and Returns (2000).** *Commodity Costs and Returns Estimation Handbook*. United States Department of Agriculture: Ames, Iowa, USA.
- **Global Strategy to Improve Agricultural and Rural Statistics (2016),** Handbook on Agricultural Cost of Production Statistics, Handbook and Guidelines, pp.58-62. FAO: Rome.