COST COMPUTATION FOR THE AGRICULTURAL PRODUCTS OF LIVESTOCK FARMS[1]

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Abstract:
Agriculture constitutes a specific sector of the national economy. It does not contribute significantly to the increase in the gross domestic product, however, it is expected to fulfill three important functions: economic, social and environmental. The cost computation for the agricultural products is different from other activity sectors. Most of the papers addressing managerial accounting issues refer to manufacturing companies. The ones conducted in the services entities usually refer to not for profit organizations. We consider that our work is a research paper as there is a very small number of works in the area. This article presents the characteristics of the cost computation for the livestock farms. Furthermore, the paper also presents a calculation of the agricultural products obtained in a farm.

Key words: agriculture, cost computation, livestock farms, agricultural products

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Introduction

Agriculture at present plays three major functions: economic, social and spatial. The economic function refers mainly to the farmers' obligation to produce agricultural products in order to meet the requirement of feeding the farmers themselves, as well as other members of the society. At the same time, however, the products produced shall be of appropriate dietary value and quality. Furthermore, these products shall be delivered to the market at prices affordable to the consumers. Farms shall also create work places and provide the farmers and their families with fair incomes generated by their farming business. Additionally, the farmers are required to apply certain agricultural methods which would guarantee that the farmed land preserves its natural and environmental value.

Research methodology

The research conducted in the paper is qualitative. This supposes a series of inductive processes involving the collection and the analysis of some qualitative data in order to define patterns, themes, etc. This paper starts by analyzing the characteristics of cost computation on livestock farms and it appeals to the professional judgment for developing a case study designed to model the process by numerical data.

The characteristics of the cost computation for animals' farms

The characteristics of the agricultural production process and the organizing of the evidence system related to the consumption of resources influence the cost computation of agricultural products.

A first problem with the cost computation of agricultural products refers to the date when the calculation may be performed. Establishing the production cost of agricultural products at short time periods is difficult due to the mismatch between the period when resources are consumed and the moment the production is obtained.

In animal husbandry, the mismatch varies by species and categories of animals. For instance, the mismatch is more pronounced in the case of species and categories of animals such as mature sheep, swine breeding than in the case of categories of young and fattening animals like milch cows, where there is synchronization between costs and obtained production.

Even though the synchronization between costs and production manifests for some animal species and categories, it has still a relative character, situation caused by biological features of the animals. For instance, for animals intended for fattening, the nutrient consumption units per kilo of weight gain is differentiated in the first period (when is greater) compared to the last period (when is lower), of course in terms of rational feeding. For milch cows, after calving, the milk production increases gradually, as after a certain period to become relatively stationary, while the daily consumption of feed has a somewhat constant level.

The relative long time-lag between costs and production, the quantitative irregularity of production, the costs generated especially in the process of administrating and managing farms and agricultural entities, occurring after obtaining production, are criteria to be taken into account in determining the moment when the unit cost computation may be performed.

The unit cost computation of production may be conducted monthly, provided of course the knowledge of both the production and costs. The computation is performed cumulatively throughout the year period some time after the production was obtained.

The monthly computation of unit cost for the agricultural products and the cumulative computation for the entire timeout period elapsed from obtaining the required output is justified due to the mechanism of managing the agricultural entity. The limited character information provided by the unit cost of production during the year is influenced as described in the first place, by the particular production process in agriculture. On the other hand, the monthly computation of the production unit cost based on data from the production reference month should not be considered a definitive cost.

The unit cost of agricultural products, being computed by dividing the actual costs to the amount of output produced, requires that, at the year's end, the farms perform the final computation based on the actual resource consumption level.

The mutual transfer of goods between vegetable farms and livestock farms as well as the consumption of the own production of the same farm subunit, is also a characteristic with implications for unit cost computation for the agricultural products.

The complexity of agricultural production causes an exchange of activities between production farms or between farms and ancillary sectors. In this context, a solution in evaluating these activities is necessary. The essential coordinate for the evaluation of this activities exchange, which would be considered in the computation of the unit cost, should be the actual level of effort made by the farm subunit.

Since during the year the cost computed by farms and ancillary sectors is not a definitive cost, the standard costs may be used for evaluating the consumption of products from own production or the labour from ancillary sectors. At the year's end, when the definitive computation of agricultural products costs is performed, it is necessary to include in the cost computation this internal consumption at the actual level.

Another issue with implications for the unit cost computation for the agricultural products is represented by the possibility of obtaining both the primary and secondary products from certain crops and types of animals.

The possibility of obtaining two or more primary products from certain crops and livestock categories leads to a system of criteria to identify the main product and the products that are considered to be, from calculation perspective, secondary production. This separation between the main products (with and without computation) and the secondary products (by-products) requires first the selection of calculation procedure and secondly, assessing the main products assimilated to the secondary production.

The computation of production unit cost is based on data on production costs and obtained production, recorded and grouped in the operative accounts of each farm.

The expenses incurred during the period have a direct and an indirect character to cost objects, represented by the categories of crops and animals of the farm. The grouping of data on production costs of farm activities offers the possibility of performing post-computations. Essentially, these works consist of successive operations of allocation of expenses, which at the time of their recording have not been identified on cost objects.

In a generalized form, post-computations, in the order of succession, are as follows:

A. Centralization of production costs and obtained production data;

B. Allocation of indirect costs to cost objects;

C. Establishing domestic consumption and other cost items been assigned to cost objects;

D. Computation of the production unit cost.

A. Centralization of production costs and obtained production data is a step of grouping the data from the farm records, preparing, for this purpose, a "**Summary of production costs and obtained production**". Ordering data in this summary should be made in accordance with the records of the farm where the expenses and the production were recorded currently. Since the computation of the production unit cost starts with this action and the subsequent control based on correlations is difficult to perform, this step is requiring a careful analysis of the data that are centralized.

B. Allocation of indirect costs to cost objects is a complex step, requiring the allocation of both, the costs from ancillary sectors and the indirect cost of the farm. The allocation is carried out by using the supplementing method based on single coefficient. The allocation basis is the total costs assigned to cost objects by this stage.

K farm overhead = Farm overhead/ The sum of the allocation basis of cost object

This coefficient is applied to the allocation basis of each cost object.

By following the above steps, it can be reached the assignment of the both direct costs and farm overheads to cost objects.

If the full cost is computed, then the general overheads and the distribution costs should also be assigned.

The general overhead costs of the agricultural entity are assigned to the production farms based on an allocation basis that is common to the farms, such as: the total of the direct costs and farm overhead, the income recorded for each farm etc.

The general overheads of the agricultural entity allocated to the farms become the subject of the allocation to the cost objects of the farm by using the supplementing method based on single coefficient.

If the distribution costs were not identified for each cost object, then they should be allocated using the supplementing method.

C. Establishing domestic consumption and other cost items been assigned to cost objects is also a complex step in computing the production unit cost. The interdependence of industries that generates the consumption of domestic products, the possibility and the necessity of computing the production cost for young and fattening animals which are weighted for two cost units (kilo of weight gain and kilo of live weight), the existence of unfinished production, etc., determine that in addition to direct costs and farm overhead mentioned above, to include other items of costs. These items relate to the value of the products consumed from own production, costs incurred during the previous period, the input value of young and fattening animals (regardless of source of origin), respectively:

a) *The products from the own production of the farm* consumed in the same period may be: feed, seed, milk for calves etc. Thanks to the bookkeeping of the farm, is easy to include in the production costs the value of the finished products used in domestic consumption.

b) *Costs incurred during the previous period* include the unfinished products and the share of the anticipated expenses.

The value of unfinished goods is assigned to cost objects (crops, animal categories) as a result of the inventory and measurement operation at the ending of the previous financial year. The unfinished production structure in the vegetable industry includes the value of crops sown in autumn for the next year harvest and the value of autumn fields. The unfinished production structure in the livestock industry includes the existing young and fattening animals and the costs incurred during the fourth quarter for production sheep category.

c) *The value of input for young and fattening animals.* In the case of young and fattening animals the cost of production is computed per kilo of weight gain and per kilo of live weight. The production expressed as kg has a corresponding value in the direct and indirect costs corresponding to the period and the category of animals.

In the case of production expressed as kilos of live weight, which is based on the initial weight, the weight input and the accumulated weight gain, the unit cost computation requires that the value items related to total weight to be also considered. In this case, the information related to the direct and indirect costs calculated for categories of animals is completed with:
- The value of the existing young and fattening animals;
- The value of the inputs from own production (calves from the milch cows);
- The value of the inputs from the subunits of the entity;
- The value of the inputs from movements from the category below the age;
- The value of the inputs from acquisitions.

These items are included in the costs at prices that vary by source of origin of animals. Any losses from natural disasters should be deducted from the costs, resulting in computing the costs related to the obtained production.

D. The computation of production cost per unit is the final stage of calculation. To determine the unit cost of production, together with the complete and accurate determination of production costs, the proper identification of production on cost objects is of particular importance. Fundamentally, the computation of production unit cost is related to the two terms respectively, production costs and obtained production. Vegetable production refers to the production resulting from the harvest, as expressed in appropriate units (t / wheat, t / corn, etc.).

The measurement of zootechnical production raises some specific issues arising from the objective of the calculation of production unit cost. Thus, for young and fattening animals, the weight gain and the total weight should be known. The weight

gain is determined by monthly weighing of animals for fattening (cattle, sheep, and swine). If there were no movements during the period, the weight gain results on the relationship:

$$Sp = Gf - Gi \quad \text{where:}$$

Sp = accumulated weight gain during the month;
Gf = animals weight at the end of the month;
Gi = animals weight at the beginning of the month.

More often, during the month, there are movements in animals stock that should be taken into account in calculating the accumulated weight gain, which in this case is computed as follows:

$$Sp = (Gf + Gis) - (Gi + Gin), \text{ where:}$$

Gis = weight of input animals during the month;
Gin = weight of output animals during the month.

For the categories of young and fattening animals, in addition to measure the weight gain is also necessary to know the total weight of the animals for that category, which is calculated according to the relationship:

$$Gvt = Gi + Gin + Sp$$

The transformation based on equivalence calculations of a product which is obtained from a particular crop or animal specie is also subject of the unit cost calculation. For instance, the number of piglets weaned during a period is determined based on the unweaned piglets, too. The equivalent to the theoretical calculation of piglets weaned is: two unweaned piglets = one weaned piglet.

The computation of the unit cost of products is made by applying differentiated procedures based on the features of production obtained. To compute the production unit cost, agricultural entities use: simple division method, the remaining value method and the equivalence index method (fodder crops).

Case study – Cost computation for a livestock farm

Computation of the unit cost for a livestock farm (as a part of an agricultural entity) based on the following information for a year.

a) Animals at the beginning of the year:
   a. Milch cows: 40 head; 10,000 kg; lei 75,000;
   b. 0-6 months calves: 20 head; 800 kg; lei 5,500;

b) Expenses incurred:
   a. Milch cows: lei 120,000;
   b. 0-6 months calves: lei 30,000;
   c. Farm overheads: lei 22,500 – allocated in proportion to the costs above;
   d. General overheads allocated to the farm: lei 8,625 - allocated in proportion to farm expenses;

c) Production:
   a. From milch cows:
      i. Milk: 192,000 l, from which 8,000 l consumed by the 0-6 months calves;
      ii. Calves: 38 head; 1,140 kg; value of calves at birth lei 4,000;
      iii. Manure: lei 700;
   b. From calves:
      i. Weight gain in kilo: 5,000 kg;
      ii. Manure: lei 225;

d) Changes in animal stock:
   a. Acquisition of milch cows: 2 head; 560 kg; lei 5,000;
   b. Calves category:

i. Input in own production from milch cows: according to the information above;
ii. Acquisitions: 5 head; 300 kg; lei 2,950;
iii. Sales: 10 head; 700 kg; lei 4,900.

Solution - Computation of production cost

1. Allocation of farm overhead costs:

K = lei 22,500 / (lei 120,000 + lei 30,000) = 0.15;

Farm overheads allocated to the milch cows category = 0.15 * lei 120,000 = lei 18,000;

Farm overheads allocated to the 0-6 months calves category = 0.15 * lei 30,000 = lei 4,500;

2. Allocation of general overheads: just to compute the full cost. The allocation is based on the total of the direct and farm overhead costs assigned to cost objects.

Direct and farm overheads allocated costs for milch cows = lei 120,000 + lei 18,000 = lei 138,000;

Direct and farm overheads allocated costs for 0-6 months calves = lei 30,000 + lei 4,500 = lei 34,500;

K = 8,625/(lei 138,000 + lei 34,500) = 0.05;

General overheads for milch cows = 0.05 * lei 138,000 = lei 6,900;

General overheads for 0-6 months calves = 0.05 * lei 34,500 = lei 1,725;

3. Milk used in own production:
   a. 0-6 months calves: lei 5,554.4;

4. Computation of production cost for milk:

Elements	Cows
1. Direct costs	120,000
2. Farm overhead	18,000
3. Manure	700
4. The value of the produced calves	4,000
5. Total production cost for milk $(1 + 2 - 3 - 4)$	133,300
6. Production (liters of milk)	192,000
7. Production cost per unit for milk	0.6943
8. General overhead	6,900
9. Full cost for milk $(5 + 8)$	140,200
10. Full cost for 1 l milk	0.7302

5. Computation of production cost for 0-6 months calves

In this case, the unit cost is computed per kilo of weight gain and per kilo of live weight.

The live weight is computed as follows:

Weight at the year's beginning + Input from own production + Weight gain + Acquisitions = 800 + 1,140 + 5,000 + 300 = 7,240 kg

Elements	0-6 months calves
1. Direct costs	30,000.00
2. Farm overheads	4,500.00
3. Consumed milk (0.6943*8,000)	5,554.40
4. Manure	225.00
5. Production cost for the weight gain $(1 + 2 + 3 - 4)$	39,829.40
6. Weight gain	5,000.00
7. Production cost per kilo of weight gain (5/6)	7.97
8. Value of input from own production	4,000.00
9. Value of the calves from the beginning of the year	5,500.00
10. Value of acquisitions	2,950.00
11. Total value for total weight $(5 + 8 + 9 + 10)$	52,279.40
12. Kilos of calves at the beginning of the year	800.00
13. Kilos of calves produced	1,140.00
14. Kilos of calves bought	300.00
15. Total kilos of calves $(6 + 12 + 13 + 14)$	7,240.00
16. Production cost per kilo of live weight (11/15)	7.22
17. General overhead	1,725.00
18. Full cost $(5 + 17)$	41,554.40
19. Full cost per kilo of weight gain (18/6)	8.31
20. Total value for total weight $(11 + 17)$	54,004.40
21. Full cost per kilo of live weight (20/15)	7.46

Conclusions

Securing fair incomes for the farmers is at present a very important issue, widely discussed in Europe. Any such discussion shall be supported, however, with some tools which will effectively support any further steps aimed at resolving this issue. The cost of the agricultural products is one of them. This research paper presented an attempt to calculate the cost of milk and calf as examples of agricultural products.

The future research will focus on applying different computation methods, such as the target costing.

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