

PRODUCTION COSTS OF FIELD CROPS BY ECONOMIC SIZE OF FARMS IN ROMANIA

Anca DACHIN

Bucharest University of Economic Studies, 6 Romana Square, District 1, 010374, Bucharest, Romania, Email: ancadachin@yahoo.com

Corresponding author: ancadachin@yahoo.com

Abstract

The cost competitiveness is a key topic in agriculture. Knowledge about costs at microeconomic level is a useful instrument for the orientation of producers, as well as for decision makers at aggregate levels. The paper focuses on the empirical analysis of production costs for field crops in Romania, using the methodology and data of the EU Farm Accountancy Data Network. The analysis takes into consideration the economic size of farms and is mostly relevant in the case of specialized farms. The cost structure reveals differences when comparing small with large farms and it provides a benchmark to individual farms when they need to know their position within their size class.

Key words: economic size of farms, field crops, production costs, Romania

INTRODUCTION

In a globalized world, the cost competitiveness is a key topic also in agriculture. Thus, the cost analysis, also in terms of opportunity costs, as well as the international comparison of commodity specific costs became instruments for the orientation of agricultural producers [5]. Countries which are interested in production practices and financial state of farms and in the wellbeing of farmers collect data usually based on statistical surveys, different from one country to the other.

The European Union created an instrument of analysis offered by the methodology of the Farm Accountancy Data Network (EU FADN). The production cost model relies on an accounting system which is different from the one used in financial accounting [6]. Although the data provided by EU Member States for the FADN data base [2] are not completely harmonized, this model is already useful for decision making within EU.

In Romania, the interest for the level and structure of production costs in agriculture increased under the pressure of competition. The indices of costs were not correlated with the indices of production in the last decade (2005-2014), due to variation of weather conditions, but also to the price scissors

between the variation of input prices and prices of agricultural products [1]. The individual performance of farms is however very heterogeneous and is strongly influenced by the economic size of farms. Studies have focused on the analysis of the cost structure in connection to efficiency of production [10]. Special attention is paid to the reduction of costs per ton as a mean to increase the profitability of agriculture on the agribusiness chain, for example the chain of bread cereals [8] and of oilseed products [9].

Although in the EU, but also worldwide, the highest share of agro-food production is in the hands of large producers, in recent years the interest of final consumers for local produced food has increased. The recommendation for the future is that products offered on the market should be produced with less water consumption, fossil fuel, fertilizers etc.[7]. This results into higher quality of food and environment protection, but lower yield per hectare and higher costs per hectare. Consequently, the cost analysis makes the difference between conventional and ecological crops.

The paper focuses on the identification of differences regarding cost structure per hectare for field crops produced in the conventional system in Romania, considering the farm size as main factor of influence.

MATERIALS AND METHODS

The analysis refers to farms which produce field crops, such as cereals, oilseed-crops, sugar beet, rice, hemp, hops, tobacco and potato. Data are provided by the Farm Accountancy Data Network (FADN).

FADN is monitoring the production for the market. The field of observation includes agricultural farms with an economic size over 2,000 Euro (a low limit, suitable for Romania, accepted in the survey,). The economic size of farms included in the FADN survey is based on the Standard Output (SO) of the farm. The data for Romania in 2013 relies on the sample of farms counting initially 6,000 farms, of which only 5,901 were validated by the European Commission [3].

The research method consists of an empirical analysis of production costs per hectare, calculated as average by categories of farms established by RICA, according to the economic size criteria. The data are not suitable for directly estimating the cost of production for specific crops.

RESULTS AND DISCUSSIONS

Production value per farm

The economic size of farms depends on the size of areas cultivated with cereals and other field crops. Thus, In Romania, a small farm according to standard economic size (2,000 ≤ 8,000 euro) cultivates in average 1.73 hectares with cereals and 0.21 hectares with other field crops. The largest farms (over 500,000 euro) cultivates in average 928 hectares with cereals and 408 hectares with other field crops (Table.1). The large scale production has a major favourable impact on the productivity and on the costs per output unit.

The structure of field crop production shows that in larger farms (over 50,000 euro) cereals represent about 55-60% of the total field crop production value. The next significant crop in this dimensional category is the oilseeds production, which contributes with about 18-24% to the total crop production value per farm. All together these two crops represent 74-85% of the total value of production.

Table 1. Areas cultivated with cereals and other field crops, by economic size of farms, 2013

| Economic size of farms | Cereals (common wheat, durum wheat, rye, oat, mixed summer cereals, corn, other cereals) | Other field crops (Pulses, potatoes, sugar beet, oleaginous crops, hops, tobacco, other industrial crops) |
|------------------------|---|--|
| Euro | Hectare | Hectare |
| 2,000 ≤ 8,000 | 1.73 | 0.21 |
| 8,000 ≤ 25,000 | 5.35 | 1.06 |
| 25,000 ≤ 50,000 | 26.88 | 7.52 |
| 50,000 ≤ 100,000 | 79.52 | 27.3 |
| 100,000 ≤ 500,000 | 283.3 | 117.25 |
| ≥ 500,000 | 928 | 408.42 |

Source: FADN Report for Romania. Standard results, 2013, p. 26

In the largest farms, over 500,000 euro, the production of cereals and oilseed crops contributes with 85% to the total value of agricultural production, which indicates that they are specialised in these crops.

Specific costs per hectare

The specific costs for crops are calculated as the sum of costs of seeds and seedlings, fertilizers and soil improvers, crop protection products and other specific crop costs. In order to calculate specific costs per hectare, the total specific costs per farm were divided by the average Utilized Agricultural Area (UAA) per farm (Table 2).

Table 2. Specific costs for crops, average per farm and per hectare, 2013

| Economic size of farms | Specific costs for field crops, in average per farm | Utilized Agricultural Area (UAA) per farm | Specific costs per hectare |
|------------------------|---|---|----------------------------|
| Euro | Euro | Hectare | Euro/ha |
| 2,000 ≤ 8,000 | 676 | ... | ... |
| 8,000 ≤ 25,000 | 2,446 | 13.45 | 181.86 |
| 25,000 ≤ 50,000 | 9,496 | 57.77 | 164.38 |
| 50,000 ≤ 100,000 | 26,499 | 137.44 | 192.80 |
| 100,000 ≤ 500,000 | 100,732 | 449.63 | 224.03 |
| ≥ 500,000 | 354,424 | 1,413.79 | 250.69 |

(...) no data regarding UAA

Source: own calculations based on FADN Report for Romania, 2013[3] and EU FADN database [2]

The variation of specific costs per hectare between size classes may have several causes. The crops produced are mixed in different proportion (most farms are not strictly specialized), therefore the costs of seeds are specific and may have also different prices (the costs for seeds and seedlings considered by the above calculations include also horticultural crops). In addition, smaller farms

may have less costs per hectare for high quality seeds, for fertilizers, soil improvers or crop protection because they have lower financial resources.

For comparison, we may take the example of the FADN standard economic size 50,000 ≤ 100,000 euro. In Romania, this category registered in 2013 an average of 80 hectares cultivated with cereals (table 1), while the average specific costs were 192.8 euro/hectare in 2013. These costs are significantly lower than those estimated according to the standard technology recommended by “Kuratorium für Technik und Bauwesen” [4]. In this second case the costs (exclusively costs for irrigation) for the conventional production, calculated for 80 hectares cultivated area, were estimated at about 638 euro/hectare for wheat, 427 euro/hectare for rye and 467 euro/hectare for corn. The cost differential results in productivity differential. For example, in Romania, the yield per hectare for wheat varied in the last decade from 1.54 tons in 2007 to 3.78 tons in 2015. The present potential output is 5 tons wheat/hectare associated with higher costs, while the foreign standard for potential output is 7.89 tons of wheat/hectare.

Farming overheads

Farming overheads do not depend on specific production lines. They include costs for current upkeep for equipment, energy, contract works and other farming overheads. These non-specific costs of crops, per hectare, were calculated as the overheads per farm divided by the average Utilized Agricultural Area (UAA) per farm (Table 3).

Table 3. Farming overheads, average per hectare, 2013

| Economic size of farms | Current upkeep for equipment | Energy | Contract works | Other farming overheads | TOTAL non-specific costs |
|------------------------|------------------------------|---------|----------------|-------------------------|--------------------------|
| Euro | Euro/ha | Euro/ha | Euro/ha | Euro/ha | Euro/ha |
| 2,000 ≤ 8,000 | ... | ... | ... | ... | ... |
| 8,000 ≤ 25,000 | 45.95 | 76.51 | 66.02 | 17.17 | 205.65 |
| 25,000 ≤ 50,000 | 21.85 | 55.46 | 52.41 | 9.21 | 138.93 |
| 50,000 ≤ 100,000 | 17.59 | 68.75 | 51.33 | 9.33 | 147.00 |
| 100,000 ≤ 500,000 | 17.75 | 78.78 | 39.03 | 12.83 | 148.39 |
| ≥ 500,000 | 22.81 | 118.41 | 42.26 | 24.39 | 207.87 |

(...) no data regarding UAA

Source: Ibid

The dimension of costs in the case of total overheads per hectare is comparable by economic size classes, but there are some

explainable differences. The highest costs of current upkeep of equipment are registered by smaller farms (8,000 ≤ 25,000 euro), due to prevailing externalization of repair and maintenance services, which require higher costs.

Depreciation

The highest depreciation per hectare occurs in the case of the largest farms, with farm size over 500,000 euro (table 4). These farms, which have almost exclusively mechanized operations in the field, have invested in tractors and agricultural equipment and have a far better technical endowment, with high power machines, compared to medium and small farms.

Table 4. Depreciation, average per hectare, 2013

| Economic size of farms | Depreciation, average per farm | Depreciation per hectare |
|------------------------|--------------------------------|--------------------------|
| Euro | Euro | Euro/ha |
| 2,000 ≤ 8,000 | 898 | ... |
| 8,000 ≤ 25,000 | 1,321 | 98.22 |
| 25,000 ≤ 50,000 | 2,930 | 50.72 |
| 50,000 ≤ 100,000 | 6,069 | 44.16 |
| 100,000 ≤ 500,000 | 28,521 | 63.43 |
| ≥ 500,000 | 149,069 | 105.44 |

(...) no data regarding UAA

Source: Ibid

At the same time, in farms with a smaller economic size (8,000 ≤ 25,000 euro) depreciation per hectare is almost as high as in the large farms. They have technical endowment that allows the proper execution of agricultural work (for their own production and for other smaller producers demanding for services), but they are generating high cost due to the small cultivated area.

Payment for external factors

Payments for external factors consist of payments for the third parties for inputs and include wages and social security payments, rent paid for agricultural land and for rentals, as well as interest paid. These payments per farm and per hectare (Table 5) depend on the mechanization degree of agricultural operations and implicitly on the skills of the employees, as well as on the supply/demand balance on local markets of the production factors.

Payments for external factors per hectare

increase with farm size. Larger cultivated land areas require mechanized operations and consequently higher skilled agricultural workers who receive comparatively better salaries.

Data regarding the amount that could be received by unpaid workers are not available, thus implicit costs are not estimated and the labour costs are distorted. It is likely that workers without employment contract are mainly active in small and medium farms.

Table 5. Payment of external factors, average per hectare, 2013

| Economic size of farms | Wages and social security | Rent paid | Interest paid | Total payments of external factors |
|------------------------|---------------------------|-----------|---------------|------------------------------------|
| Euro | Euro/ha | Euro/ha | Euro/ha | Euro/ha |
| 2,000 ≤ 8,000 | ... | ... | ... | ... |
| 8,000 ≤ 25,000 | 70.04 | 40.00 | 1.93 | 111.97 |
| 25,000 ≤ 50,000 | 60.43 | 57.35 | 2.30 | 120.08 |
| 50,000 ≤ 100,000 | 60.77 | 68.83 | 4.15 | 133.75 |
| 100,000 ≤ 500,000 | 58.27 | 81.98 | 9.70 | 149.95 |
| ≥ 500,000 | 97.24 | 86.15 | 22.28 | 205.67 |

(...) no data regarding UAA

Source: Ibid

In large farms the interest paid are significant, since in most cases investments were financed by bank credits.

CONCLUSIONS

The analysis of FADN data regarding the level and structure of production costs is a valuable source of information about the microeconomic level in agriculture, despite some data deficits. The main findings are:

- The total costs per hectare are meaningful if they are calculated by economic size of farms, even if in Romania many small farms and subsistence producers are excluded from the data base;
- The lowest total costs per hectare are registered for the economic size 25,000 ≤ 50,000 Euro, mainly due to the level of operational costs (specific costs and overheads). At the same time, in the largest farms (over 500,000 euro) these costs are the highest.
- The production cost model is mostly relevant in the case of specialized farms. For the multi-product farms more information is needed to fill the absence of enterprise specific data. In Romania most of the large

farms are specialized in cereals and oilseed production, which makes the analysis of cost components suitable and allows the observation of differences between costs at farm level and a certain average level of the group it belongs to.

ACKNOWLEDGEMENTS

This paper has been supported by the research project ADER 13.1.2., research period 2015-2018. The project is coordinated by the Research Institute for Agricultural Economics and Rural Development and financed by the Romanian Ministry of Agriculture and Rural Development.

REFERENCES

- [1] Cofas, E., Ursu, A. (2016), The Analysis of Value Structure of Agricultural Production for Conventional Agriculture, Scientific Papers Series Management, Economic Engineering and Rural Development, Vol.16, Issue 1, 109 – 114
- [2] Farm Accountancy Data Network (FADN), http://ec.europa.eu/agriculture/rca/database/consult_std_reports_en.cfm
- [3] MARD (2013). Rețeaua de informații contabile agricole (RICA), Raport RICA pentru România, 2013, <http://www.madr.ro/docs/ind-alimentara/rca/Raport-final-Rica-2013.pdf>
- [4] Kuratorium für Technik und Bauwesen, <https://www.ktbl.de/>
- [5] Langrell, S. et al, 2012, Sustainability and Production Costs in the Global Farming Sector: Comparative Analysis and Methodologies, European Commission, Joint Research Centre, Report 25436
- [6] Barkaszi, L., Keszthelyi, S., Csátári, E.K., Pest, K., 2009, FADN Accountancy Framework and Cost Definition, Farm Accountancy Cost Estimation and Policy Analysis of European Agriculture (FACEPA)
- [7] Tănașă, L., Brumă, I.S., Doboș, S., 2014, Revirimentul agriculturii tradiționale autohtone prin intermediul circuitelor agroalimentare scurte de aprovizionare, în: Alexandri, C. et.al, Perspectivele agriculturii și dezvoltării rurale prin prisma noii PAC 2014 – 2020, Editura Academiei Române, 229-244
- [8] Turek, A. (coord), 2007, Competitivitatea pe filiera cerealelor panificabile, Cartea Universitară, București, 71-75, 113-115
- [9] Turek, A. (coord), 2007, Organizarea filierei oleaginoaselor în România, decalaje față de Uniunea Europeană, Cartea Universitară, București, 65 -78, 157 – 158
- [10] Zahiu, L., Toma, E., Dachin, A., Alexandri, C. (coord), 2010, Agricultura în economia României-între așteptări și realități, Editura Ceres, București, 182-188.