THE EFFECT OF SUBSIDIES ON THE PROFITABILITY OF CORN GROWING

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Abstract: *Cereals are the most important and most influential cultivated plants in the world and also in Hungary. Their importance is highlighted by the fact that 50% of the tillage areas in the world and around 68% in Hungary are occupied by wheat and corn. Competitiveness of the cultivation depends significantly on the up-to-date production technology. Therefore, in this study we aim to explore the economic feasibility of one of the most important cereals, corn, by analyzing the processes of a well-working family farm. First, we describe the modern process technology applied by the farm and outline operational norms. Material, personal and amortization costs are calculated and development of sales, income and the main efficiency indicators are presented with and without subsidies.*

Key words*: corn growing, subsidies, economic analysis*

INTRODUCTION

Maize is one of the world's most important crops, the second most important after wheat. It is of globally significant value, its utilization is very versatile thus it is easily sold [3]. Maize cultivation in our country is of great importance because it is grown on the largest area. The growing area in recent decades was consistently over 1 million hectares which is 25 percent of arable land in Hungary.

It is striking that the global consumption over the past five years has increased by more than 100 million tons. A significant increase was also observed in the reserves. In the 2014/2015 marketing year, the industry realized worldwide 991.29 million tons. China has already built up considerable stocks of maize with 40% of overall reserves while the US only has 24.48%. Residual supplies affect prices in the following years [4]. In recent years a continuous rise in costs related to maize cultivation is observed. The expenditures per hectare in the 2012 marketing year reached 221 thousand forints, which in 2014 rose to HUF 253 thousand. In 2013, the increase in the cost of corn has reached 6 percent, which is approximately the same as the previously indicated input price changes by the Central Statistical Office (KSH).

In 2014, the price index increased by 2 percent, while the cost of production increased by 7 percent. This year, the seed cost rose by 19 percent, fertilizer costs by 5 and pesticide costs by 4 percent compared to the 2013 year [2]. The ever increasing costs of production could be recouped not only through the extra yields but return on investment is greatly influenced also by the change in sales prices. In 2012, the price of corn was 49 thousand forints per ton in 2013 due to low yields because of the drought it was more than 56 thousand forints per marine tons. In 2014, despite the weaker yields, the purchase price fell to 46 thousand HUF per tons [1].

MATERIALS AND METHODS

Corn production technology and work organization. Stubble cultivation at the farm is done in the third-decade of July and the first decade of August with RABA 250 engine and an IH-9.8 dial. The operational norm is 5 ha / hour and the operational time needed is one 12 hour shift. Fall deep plowing is performed from November to December, its labor standard with RABA 250 tractor and a 6 head IH plow to 35 cm depth is 1.2 hectares of land per hour which results in a cultivation shift of 50 hours. Spring plowing

has a three acres per hour norm which requires a 20 hour shift. In April, with an MTZ type tractor, 2 acres of seedbed is prepared per hour resulting in a 30 hour shift consumption. Sowing operations are carried out in the second decade of April, simultaneously dispensing ammonium nitrate fertilizer as well. 68,000 P9494 and DKC4490 hybrid seeds are sawn hectare. An MTZ 82 tractor and an SPC-6 precision seeder is used with a performance of 1.5 ha / hour resulting deployment of the area within 40 hours. In completion, a Cambridge compression cylinder with a performance of 3/ha per hour is used. For weed control a Rau 14GV25 sprayer with a 5 ha / hour norm requires 12 hours. Harvesting 60 hectares of corn takes 50 hours with a Claas Dominator 106 combine at 1.2 ha / hour machine performance.

The harvested crop is transported to the warehouse by trailers connected to ZetorCrystal tractors. With one turn, a shipment of 7.5 tons of maize is possible. In case of a yield of 9.5 tons per hectare a total of 76 rounds is necessary. The delivery is carried out parallel with the harvest, so the use of time for the two operations is the same.

Test methods. We examined the costs incurred during the production and additionally sales and income figures with and without state support. To determine the cost of fuel and volume needed for each operation we used the average oil price of diesel fuel in 2014. Among material costs repair costs, fertilizers, seeds and pesticide costs were included. Personnel costs incurred in the corn production were calculated on the basis of valid work operations per year, and the 2014 minimum wage (2 Euro/ hour). The company also incurred costs for crop drying (2,7 Euro/ ton + VAT) and storage costs (0,27 Euro / ton + VAT). Production efficiency was evaluated with various efficiency indicators for which the production standard costs, cost efficiency, productivity and profitability indicators were calculated.

RESEARCH RESULTS

Changes in the cost of corn production. Out of the total costs of growing corn in the investigated business the most significant is the raw material costs that represents a magnitude of 63%. The maize production cost structure is shown in table 1.

Table 1

The cost structure of corn production

Type of Cost	Cost (Ft/Euro)	Cost ratio (%)
Material	407	63%
Personnel	13	2%
Amortization	0	0%
Other	230	35%
Total cost	650	100%

Compared to other enterprises in the sector, the structure is more or less identical. Our test farm spent slightly more 63% vs. 61% for materials, but slightly less 35% vs. 37% for other costs [1].

Trends in corn growing revenue and income. The development of revenues and income growing evaluated in two aspects, excluding area payments and support (table 2).

Table 2

The evolution of corn growing revenue and income of the investigated business

Yield	**Avg. Sales Price**	**Avg. Sales Price w/o subsidies**
8,56 t/ha	150 Euro/t	1278 Euro/ha
Revenue w/o subsidy	*Subsidy*	*Revenue w/ subsidy*
1278 Euro/ha	230 Euro/ha	1508 Euro/ha
Revenue w/o subsidy	*Total cost*	*Profit w/o subsidy*
1278 Euro/ha	650 Euro/ha	628 Euro/ha
Revenue w/ subsidy	*Total cost*	*Profit w/ subsidy*
1508 Euro/ha	650 Euro/ha	858 Euro/ha

Compared to other similar corn-growing farms our test farm has outperformed sector average in all aspects (figure 1).

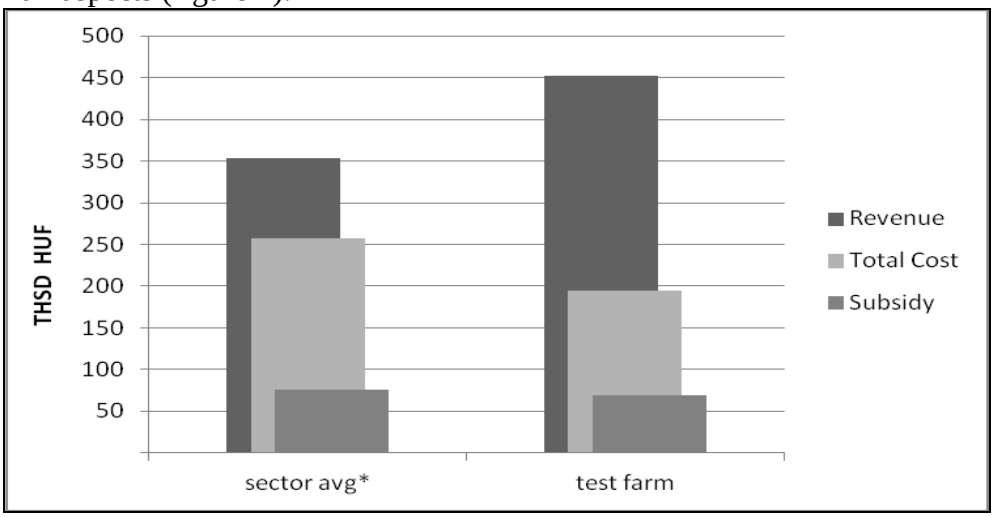

Figure 1 Test farm and sector comparison

**Sector average is for 2013, calculated +/- 10% off center cluster* [1].

Efficiency indicators of the corn production. From the efficiency indicators of corn production the following measures provide key information: cost efficiency, productivity and profitability :

$$\text{Standard Cost} = \frac{\text{Total Cost}}{\text{Yield}} = \frac{650 \text{ Euro/ha}}{8.,6 \text{ t/ha}} = 76 \text{ Euro/ton}$$

$$\text{Cost efficiency} = \frac{\text{Yield}}{\text{Total Cost}} \times 1000 = \frac{8{,}56 \text{ t/ha}}{650 \text{ Euro/ha}} \times 1000 = 43 \text{ kg/ Euro}$$

Productivity without subsidy:

$$\text{Productivity}_1 = \frac{\text{Revenue}}{\text{Total Assets}} = \frac{1278 \text{ Euro/ha}}{450 \text{ Euro/ha}} = 2{,}84 \text{ Euro}$$

$$\text{Productivity}_2 = \frac{\text{TotalAssets}}{\text{Revenue}} \text{ x } 1000 = \frac{450 \text{ Euro/ha}}{1278 \text{ Euro/ha}} \text{ x } 1000 = 352 \text{ Euro}$$

Productivity with subsidy:

$$\text{Productivity}_3 = \frac{\text{Revenue}}{\text{Total Assets}} = \frac{1508 \text{ Euro/ha}}{650 \text{ Euro/ha}} = 2{,}32 \text{ Euro}$$

$$\text{Productivity}_4 = \frac{\text{Total Assets}}{\text{Revenue}} \text{ x } 1000 = \frac{650 \text{ Euro/ha}}{1508 \text{ Euro/ha}} \text{ x } 1000 = 430{,}9 \text{ Euro}$$

Profitability without subsidy:

$$\text{Profitability}_1 = \frac{\text{Income}_1}{\text{Production Area}} = \frac{37704 \text{ Ft}}{60 \text{ ha}} = 628{,}4 \text{ Euro/ha}$$

$$\text{Profitability}_2 = \frac{\text{Income}_1}{\text{Yield}} = \frac{37704 \text{ Euro}}{514 \text{ t}} = 37 \text{ Euro/ton}$$

$$\text{Profitability}_3 = \frac{\text{Income}_1}{\text{Total Cost}} = \frac{628 \text{ Euro/ha}}{650 \text{ Euro/ha}} = 0{,}966$$

Profitability with subsidy:

$$\text{Profitability}_4 = \frac{\text{Income}_2}{\text{Production Area}} = \frac{51496 \text{ Euro}}{60 \text{ ha}} = 858 \text{ Euro/ha}$$

$$\text{Profitability}_5 = \frac{\text{Income}_2}{\text{Yield}} = \frac{51496 \text{ Euro}}{514 \text{ t}} = 100{,}2 \text{ Euro/ton}$$

$$\text{Profitability}_6 = \frac{\text{Income}_2}{\text{Total Cost}} = \frac{858{,}3 \text{ Euro/ha}}{650 \text{ Euro/ha}} = 1{,}32$$

CONCLUSIONS

In 2014 the corn growing test farm has achieved 858,3 Euro per hectare income to which a very favorable, wet weather also contributed. The other important factor was that the company has been producing at a low cost of 650 Euro per hectare. Due to the compliance with appropriate crop rotation technique they have avoided the appearance of pests, thus the high costs associated with plant protection did not arise. These interactions have led to the fact that results of the investigated business were outstanding with or without the area based support. Their production success, however, is closely related with compliance to technological discipline and professional commitment.

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