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## RESEARCH ON THE USE OF GROSS MARGIN IN THE PROFITABILITY ANALYSIS OF VARIOUS CROPS - A CASE STUDY: WHEAT AND MAIZE IN ROMANIA

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**Abstract.** Lucrarea a avut ca scop efectuarea unei comparatii privind profitabilitatea la cultura de grau si porumb, folosind drept termeni de referinta marja bruta si profitul. In acest scop, datele au fost colectate pentru anul 2010 din 2 ferme vegetale care dispun de dotari tehnice similare, practica aceleasi tehnologii de cultura in sistem neirigat in conditiile pedoclimatice din zona de Sud a Romaniei. Ferma 1 a realizat o productie medie la unitatea de suprafata de 4.000 kg la grau si 5.500 kg la porumb, iar Ferma 2: 4.000 kg la grau si 4.200 kg la porumb. Pentru ambele ferme s-au determinat: produsul brut, cheltuielile variabile per total si pe elemente de cost, cheltuielile fixe per total si pe elemente de cost, cheltuielile totale de productie la hectar. Marja bruta, profitul brut si net s-au determinat in doua variante: Varianta A – cu subventii si Varianta B-fara subventii. Ferma care a realizat rezultate superioare a fost Ferma 2, unde rata profitului net a fost 45,61% la grau si 92,49% la porumb, fata de 17,72% pentru grau si 75,97% la porumb in cazul Fermei 1. Rezultatele au aratat ca cea mai profitabila cultura este porumbul, care asigura o marja bruta si profit mai mare la unitatea de suprafata. In perspectiva, fermierii trebuie sa optimizeze structura culturilor cerealiere pentru a mari eficienta economica in productia vegetala.

**Key words:** Analysis, Gross Margin, Maize, Profitability, Romania, Wheat.

### INTRODUCTION

Cereal farming is an important sector of the Romanian agriculture, as cereals represent the basic food both human beings and animals (A.Ursu et al., 2008). Romania's entry into the EU in January 2007 imposed the acceptance of Gross Margin (GM) as a barometer of economic efficiency for various production directions adopted within a farm (D. Serban, 2010).

The advantage of GM is the fact that it allows the comparison, in terms of profitability, between various activities running in a farm and decides which one produces the highest gross margin and profit (M.Draghici et al., 2004; A. Popescu et al., 2000; A. Popescu, 2002; A. Popescu, 2005; A. Popescu, 2006; A. Popescu, 2009). Therefore, the higher gross margin per ha, the more profitable crop (A. Popescu, 2009; D. Serban, 2010; A. Ursu et al., 2008). Also, it could be successfully used as a standard criterion to classify the farms according to their profile and contribution to the overall profit (M. Draghici et al., 2004).

In the vegetal sector, Gross Margin is calculated in LEI per surface unit and its level depends on the output per surface unit but also on variable costs. The practice has proved that the higher production performance and the lower variable costs, the higher gross margin. Subtracting the fixed costs from gross margin, we can get gross profit per ha (D. Serban, 2010).

In this context, this study aimed to make a comparison between the profitability of two basic crops for the Romanian agriculture: wheat and maize. For this purpose, the data were collected from two farms situated in the Southern part of the country. They were processed according to the specific methodology for calculating the gross margin and profit.

### MATERIAL AND METHOD

The research work aimed to make a comparison between wheat and maize crops from the point of view of their profitability. For this purpose, the gross margin and profit were used as comparison criteria.

These indicators were calculated according to the EU regulations, using the formulae:

$$GM = GP - VC,$$

where GM=Gross Margin, GP= Gross Product and VC=Variable Costs.

$$GP = GM - FC,$$

where GP=Gross Profit, GM=Gross Margin and FC=Fixed Costs.

$$NP = GP - PT$$

where NP= Net Profit, GP=Gross Profit and PT= Profit Tax.

All the data were collected for the year 2010 from two farms situated in the plain area of the Southern Romania: Farm 1 – CS “Casa Pepenilor Verzi” and Farm 2- CS “Agriprod Beiu” Ltd.

The calculations were made in two variants: Variant A- Taking into consideration the subsidies and Variant B – No subsidies.

The two farms are practicing cereal farming in a non irrigated cropping system, have similar technical endowment and implement similar agriculture technologies.

Profit tax in Romania is 16 %.

Subsidies represent 131 Euro (of which 81 Euro from the EU and 50 Euro from the Romanian Government), calculated at the exchange rate of 1 Euro = 4.3 lei.

All the data were expressed in the national currency – Lei per ha.

### RESULTS AND DISCUSSIONS

Farm 1.

**Gross Product** was 2,965 Lei /ha for wheat and 3,867 Lei/ha for maize, ensuring a difference of 30 % in favour of maize crops (Variant A). This was due to the obtained yield: 4,000 kg/ha of wheat grains sold for 0.6 Lei/kg market price and, respectively, 5,500 kg/ha of maize, also sold for 0.6 Lei/kg (Table 1).

Table 1. *Gross Margin and Profit for Wheat and Maize Crops - FARM 1 - Lei/ha*

Specification	Wheat		Maize	
	Variant A Subsidies included	Variant B No subsidi es	Variant A Subsidies included	Variant B No subsidi es
Gross Product	2,965.00	2,400	3,867.00	3,300
Variable Costs	1,460.20	1,460.20	1,018.18	1,018.18
Gross Mar gin = 1-2	1,504.80	939.80	2,848.82	2,848.82
Fixed Costs	988.19	988.19	1,012.28	1,012.28
Gross Profit = 3-4	516.61	48.39	1,836.54	1,269.54
Total Production Costs = 2+4	2,448.39	2,448.39	2,030.46	2,030.46
Gross Profit Rate (%) = 5/6x100	21.09	1.97	90.44	62.52
Profit Tax (16 % x 5)	82.65	7.74	293.84	203.13
Net Profit = 5-8	433.96	40.65	1,542.70	1,066.41
<b>Net Profit Rate (%)= 9/6x100</b>	<b>17.72</b>	<b>1.66</b>	<b>75.97</b>	<b>52.52</b>

**Variable Costs** counted about 1,460.20 Lei/ha for wheat and 1,018.18 Lei/ha for maize. Therefore, in order to produce maize, the expenses were lower by 30% in case of corn compared to wheat. Variable cost depends on production performance, but also on each variable cost item.

About 1.25% of variable costs represented the wheat seeds and 50% the maize seeds used for sowing. Seeds cost depended on the used cultivars, the dose per surface unit and seeds' market price.

The fertilization represented 850 Lei/ha for wheat (34.71% of production cost) and 402 Lei/ha for corn (19.79% of production expense). Therefore, maize required by 50% a lower cost for fertilization compared to wheat.

Herbicides cost was 220 Lei/ha in the case of maize (10.83% of production cost) and only 25 Lei/ha for wheat crops. In the case of corn, more expenses for plant protection against weeds was needed compared to wheat.

For both crops, the farmer managing Farm 1 did not apply any fungicides, insecticides and did not use water for irrigation, third-party services or crop insurance.

Table 2. Structure of Production Cost per ha for Wheat and Maize Crops - FARM 1

Specification	Wheat		Maize		Difference Maize-Wheat
	Lei	%	Lei	%	Lei
<b>Variable Costs :</b>	<b>1,460.20</b>	<b>59.63</b>	<b>1,018.18</b>	<b>50.14</b>	<b>-442.02</b>
-Seeds	300	12.25	126	6.20	-174
-Fertilizers	850	34.71	402	19.79	-448
-Herbicides	25	1.03	220	10.83	+195
-Fungicides	-	-	-	-	-
-Insecticides	-	-	-	-	-
-Irrigation Water	-	-	-	-	-
- Third Party Services	-	-	-	-	-
-Insurance	-	-	-	-	-
-Own Mechanical Works	285	11.64	270	13.29	-15
-Seasonal Labour	-	-	-	-	-
-Supply Cost	0.2	-	0.18	-	-0.02
Fixed Costs:	988.19	40.27	1,012.28	49.86	+24.09
-Full time Labour	190	7.76	0.09	-	-189.91
-General Costs	57	2.32	45	2,21	-12
-Interest	-	-	-	-	-
-Depreciation	0.19	0	0,19	-	-
-Rent	741	30.19	967	47.65	+226
Total Production Cost	2,448.39	100.00	2,030.46	100.00	-417.93

The supply cost was very low, only 0.2 Lei/ha for wheat and 0.18 Lei/ha for maize (Table 2).

**Fixed costs** counted 988.19 Lei/ha in the case of wheat and 1,012.28 Lei/ha for maize. Therefore, the fixed costs were by 2.43 % higher for corn.

The rental cost represented 741Le /ha (74.98% of fixed costs) for wheat and 967 Lei/ha (95.52% of fixed costs) for maize (Table 2).

**Production cost** was 3,448.39 Lei/ha for wheat and 2,030.46 Lei/ha for maize.

In the case of wheat, Variant A, including subsidies, the net profit rate was 17.72% and for Variant B, no subsidies, the net profit rate was only 1.66%.

In the case of maize, Variant A, subsidies included, the net profit rate was of 75.97% while in Variant B, no subsidies, the net profit rate was 52.52% (Table 2).

Farm 2

**Gross Product** counted 3,202.6 Lei/ha for wheat and 3,962.06 Lei/ha for maize. Therefore, in this farm, maize also ensured a higher income (Table 3).

Table 3. *Gross Margin and Profit for Wheat and Maize Crops - FARM 2*

Specification	Wheat		Maize	
	Variant A Subsidies included	Variant B No subsidies	Variant A Subsidies included	Variant B No subsidies
Gross Product	3,202.60	2,600	3,962.60	3,360
Variable Costs	1,466.60	1,466.60	1,144	1,144
Gross Margin = 1-2	1,736.00	1,133.40	2,818.60	2,216
Fixed Costs	608.97	608.97	741.97	741.97
Gross Profit = 3-4	1,127.03	524.43	2,076.63	1,474.03
Total Production Costs = 2+4	2,075.57	2,075.57	1,885.97	1,885.97
Gross Profit Rate (%) = 5/6x100	54.29	25.26	110.10	78.15
Profit Tax (16 % x 5)	180.32	83.91	235.84	235.84
Net Profit = 5-8	946.71	440.52	1,238.19	1,238.19
<b>Net Profit Rate (%)= 9/6x100</b>	<b>45.61</b>	<b>21.22</b>	<b>65.65</b>	<b>65.65</b>

**Variable Costs** were higher in the case of wheat, 1,466.60 Lei/ha compared to maize: 1,144 Lei/ha. Seeds cost for maize represented 0% (120 Lei/ha) from wheat seeds cost.

Fertilization required 954 Lei/ha in the case of wheat and by 25% less in the case of maize (722 Lei/ha).

Wheat crops required 25 Lei/ha to destroy the weeds while maize did not require any plant protection preparations.

In the case of Farm 2, the farmer did not spend any money for fungicides, insecticides, irrigation water, thirds services and crop insurance as in the case of Farm 1. But own mechanical works including equipment repairs, diesel and lubricants consumption and other materials required about 301.40 Lei/ha for maize and 246.60 Lei/ha in wheat farming (Table 4).

Table 4. *Structure of Production Cost per hectare for Wheat and Maize Crops - FARM 2*

Specification	Wheat		Maize		Difference Maize-Wheat Lei
	Lei	%	Lei	%	
Variable Costs:	1,466.60	70.66	1,144.00	60.65	-322.60
-Seeds	240	11.56	120	6.36	-120
-Fertilizers	954	45.96	722	38.28	-232
-Herbicides	25	1.20	-	-	-
-Fungicides	-	-	-	-	-
-Insecticides	-	-	-	-	-
-Irrigation Water	-	-	-	-	-
- Third-Party Services	-	-	-	-	-
-Insurance	-	-	-	-	-
-Own Mechanical Works	246.60	11.88	301.40	15.98	-54.8
-Seasonal Labour	-	-	-	-	-
-Supply Cost	0.8	0.06	0.60	0.03	-0.20
Fixed Costs:	608.97	29.34	741.97	39.34	+133
-Full time Labour	146	7.03	190	10.07	+44
-General Costs	43.97	2.11	43.97	2.33	-
-Interest	-	-	-	-	-
-Depreciation	29	1.40	28	1.48	-1
-Rent	390	18.80	480	25.46	+90
<b>Total Production Cost</b>	<b>2,075.57</b>	<b>100.00</b>	<b>1,885.97</b>	100.00	-189.60

**Fixed Cost** reached 741.97 Lei/ha for maize and by 18% less, i.e. 608.97 Lei/ha for wheat.

Rental cost represented about 64% of fixed cost both for wheat and maize.

The farmer dealing with Farm 2 paid 2,075.57 Lei/ha in order to produce 4,000 kg of wheat grains and 1,885.97 Lei/ha to produce 4,200 kg of maize grains.

Taking into consideration the subsidies coming from the EU and the Romanian Government, the net profit rate counted 45.61% for wheat and 92.49% for maize.

Comparing the two farms, we can mention that the financial results are better in the case of Farm 2, where the net profit was higher both for wheat and maize farming compared to Farm 1.

As in the case of Farm 1, maize proved to be a more profitable crop compared to wheat under the conditions of Southern Plain of Romania.

## CONCLUSIONS

Production is a factor with a positive influence on the gross margin and profit. Maize could ensure a higher gross product compared to wheat yield.

Variable cost is lower in the case of maize farming in comparison with wheat farming.

As a result, the gross margin for maize is higher compared to wheat.

Also, the gross margin is higher if farmers get subsidies. If subsidies are not available or provided only maize seems to be a profitable crop.

Therefore, maize farming is the most efficient direction of production in the South part of Romania.

But, as long as wheat continues to be used to produce bread and other food products it is still an important crop in the Romanian agriculture.

Also, crop rotation have to take into account not only wheat and maize, but also barley, sun flower, rape etc. This obliges farmers to pay more attention to the optimization of the cultivated area with various crops.

Gross margin could be successfully used to compare other agricultural crops in order to optimize the production and income per ha and increase farm profitability and competitiveness.

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