

From Theory to Practical Calculation of the Gross Margin for Agricultural Crops in Different Countries

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ABSTRACT

Universities from Germany, the United Kingdom, Poland and Romania cooperate with partner universities in Armenia, Ukraine and Uzbekistan in adapting agrarian studies. The ERASMUS+ funded project TOPAS aims to fill up the gap between the theoretical, formal higher education in agricultural sciences and practical training. The project's concept focuses on concerted improvements in the interaction between teaching approaches, student placements and the collection of local empirical data for teaching and research. Teaching content in the partner countries relies predominantly on information and data from agricultural research stations and do not reflect the situation of existing farming enterprises sufficiently. Improved student placements offer the opportunity for the collection of local empirical data on agriculture and allow for the continuous improvement of teaching content. Preconditions are the definition of relevant data and the establishment of appropriate data management systems at the partner universities. This paper aims to determine the differences between gross margin calculations for wheat crop in two European countries. The output of a marketable crops production includes marketable output evaluated with farm gate prices and also, where it is available, direct payments. In the profitability calculations all output, costs and factor requirements are determined for one specific time or area unit. Usually the indicators are determined per 1 ha or per 1 year. The quality differences of some crops affect the use and the price of the product. A positive profit represents the amount of money remaining for the return of own production factors (family labour, own capital, own land) after the costs of the used supplies, machinery, buildings, equipment as well as wages, interest and rent payments are covered. A positive net profit shows that all production factors have a rate of return. The gross margin obtained for 1 ha wheat in one country is lower in comparison with the other country because both the total yield and the direct payments are lower even if the costs are almost the same.

INTRODUCTION

The gross margin is defined as a difference between the marginal output and marginal costs when the scale of production is increased by one unit. It depends on the specific farm situation which costs positions change (variable) and which ones remain the same (fixed):

- materials (seeds, chemicals and fertilizers, etc.) and services can usually be directly allotted to the variable costs.
- considering such factors as capital used in form of current assets, working time, utilized area (land), production/supply rights, etc., it depends on the farm situation, and to what extent:
 - they can be allocated to the variable or to the fixed costs;
 - their appearance incurs expenditures (for borrowed factors).

METHODOLOGY

Since it is not reasonable to sum up the costs of use of the mentioned production factors, they are usually not taken into account in gross margin calculations and are calculated separately. If gross margin calculations are used for farm planning and for determination of efficiency, measures containing the return of the used capital and/or labour on the basis of total gross margin, a calculation of imputed costs and wages/imputed costs for labour in gross margin would cause difficulties: these costs must be added back to the total gross margin in order to e.g. be able to measure the value added appropriately. The gross margin shows, how much money per ha is available for covering the costs of all still remaining factors. If it is assumed that all factors, are sufficiently available, the gross margin is the first important measure for evaluation of the relative economic viability of alternative farm enterprises.

RESULTS AND CONCLUSIONS

The gross margin calculations for wheat in two European countries are presented in the following tables. The gross margin for 1 ha wheat in Romania is lower than the half of the German wheat gross margin due to multiple causes. First of all, the cereal prices are a little lower. Second, the direct payments are three times higher in Germany than in Romania and the fertilizer and chemical costs are the same. Even if Romanian farmers have their own machinery for the harvest and the cost are a little lower for this service, the gross margin still remains low. Another important thing that counts is the yield which is also higher in Germany due to the used technology. Other facts which are also taken into account are the insurance and the drying process of grain which are not done in Romania.

	Wheat I (60 dt)				Wheat II (70 dt)			
Gross output	Unit	Quantity	€/Unit	€	Quantity	€/Unit	€	€
Total yield	dt	60			70			
Wheat (baking)	dt	53	11,50	609,50	62	11,50	713,00	
Wheat (feeding)	dt	7	10,80	75,60	8	10,80	86,40	
Direct paym.: cereal area	ha	1	348,00	348,00	1	348,00	348,00	
Total gross output				1.033,10			1.147,40	
Proportional variable special costs								
Seed	Unit	Quantity	€/Unit	€	Quantity	€/Unit	€	€
Wheat - certified	dt	0,6	43,00	25,80	1,8	43,00	77,40	
Wheat - owned	dt	1,2	13,80	16,56				
Total seed costs				42,36			77,40	
Fertilizer	kg / 1 dt	Requ. Utiliz.	grain : straw = 1 : 1,1	€	grain : straw = 1 : 1,1	€	€	€
N	2,20 0,40	1,1 40%		163,7 0,63	191,0 0,63	120,30		
P ₂ O ₅	0,80 0,50	1 100%		48,0 0,58	56,0 0,58	32,48		
K ₂ O	0,60 1,10	1 100%		36,0 0,31	42,0 0,31	13,02		
Total fert. costs	(1 dt = 1 dt)			142,12		165,80		
Chemicals	Unit/ha	Quantity	€/Unit	€	Quantity	€/Unit	€	€
Seed dressing (own seed)	0,2 l/dt	1,2	43,00	10,32	0	43,00		
Herbicide	0,2 g	1	205,00	41,00	1	205,00	41,00	
Growth control	1,0 l	0,5	5,50	2,75	1	5,50	5,50	
Fungicide 1 (powdery mild)	0,5 l	0,33	51,00	8,42	0,5	51,00	12,75	
Fungicide 2 (ear protection)	2,0 l		31,00		0,5	31,00	31,00	
Total chemicals costs				62,49			90,25	
Services	Einh.	Quantity	€/Unit	€	Quantity	€/Unit	€	€
Combine harvester	ha	1	112,00	112,00	1	112,00	112,00	
Total services costs				112,00			112,00	
Variable costs for owned machinery				89,45			93,24	
Other costs	Quantity	€/Unit	€	Quantity	€/Unit	€	€	€
Drying	25% of yield (dt)	15,0	1,70	25,50	17,5	1,70	29,75	
Insurance	% of output (excl.Pr.)	685,10	1,88%	12,88	799,40	1,88%	15,03	
Fee for using own seed		67%	5,05	3,37	100%	-0,92	-0,92	
Total variable costs				490,16			582,55	
Gross Margin				542,94			564,85	
Requirements of working capital		60% of VarCo	294,10		60% of VarCo	349,53		

Fig.1 Gross margin calculation for wheat in southern Germany

	Wheat I (45 dt)				Wheat II (55 dt)			
Gross output	Unit	Quantity	€/Unit	€	Quantity	€/Unit	€	€
Total yield	dt	45			55			
Wheat (baking)	dt	41	10,50	430,50	50	10,50	525,00	
Wheat (feeding)	dt	4	9,50	38,00	5	9,50	47,50	
Direct paym.: cereal area	ha	1	120,00	120,00	1	120,00	120,00	
Total gross output				588,50			692,50	
Proportional variable special costs								
Seed	Unit	Quantity	€/Unit	€	Quantity	€/Unit	€	€
Wheat - certified	dt	0,6	40,00	24,00	1,8	40,00	72,00	
Wheat - owned	dt	1,2	12,00	14,40				
Total seed costs				38,40			72,00	
Fertilizer	kg / 1 dt	Requ. Utiliz.	grain : straw = 1 : 1,1	€	grain : straw = 1 : 1,1	€	€	€
N	2,20 0,40	1,1 40%		122,8 0,63	77,34	150,0 0,63	94,53	
P ₂ O ₅	0,80 0,50	1 100%		36,0 0,58	20,88	44,0 0,58	25,52	
K ₂ O	0,60 1,10	1 100%		27,0 0,31	8,37	33,0 0,31	10,23	
Total fert. costs	(1 dt = 1 dt)			106,59		130,28		
Chemicals	Unit/ha	Quantity	€/Unit	€	Quantity	€/Unit	€	€
Seed dressing (own seed)	0,2 l/dt	1,2	43,00	10,32	0	43,00		
Herbicide	0,2 g	1	205,00	41,00	1	205,00	41,00	
Growth control	1,0 l	0,5	5,50	2,75	1	5,50	5,50	
Fungicide 1 (powdery mild)	0,5 l	0,33	51,00	8,42	0,5	51,00	12,75	
Fungicide 2 (ear protection)	2,0 l		31,00		0,5	31,00	31,00	
Total chemicals costs				62,49			90,25	
Services	Einh.	Quantity	€/Unit	€	Quantity	€/Unit	€	€
Combine harvester	ha	1	112,00	112,00	1	112,00	112,00	
Total services costs				112,00			112,00	
Variable costs for owned machinery				118,61			122,40	
Other costs	Quantity	€/Unit	€	Quantity	€/Unit	€	€	€
Drying	0% of yield (dt)	17,5	1,70	29,75	17,5	1,70	29,75	
Insurance	% of output (excl.Pr.)	468,50	1,88%	8,81	572,50	1,88%	10,77	
Fee for using own seed		67%	5,05	3,37	100%	-0,92	-0,92	
Total variable costs				329,45			414,00	
Gross Margin				259,05			278,50	
Requirements of working capital		60% of VarCo	197,67		60% of VarCo	248,40		

Fig.2 Gross margin calculation for wheat in northern Romania

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