ANALYSIS OF THE ECONOMIC EFFICIENCY IN FODDER PRODUCING

Agatha Popescu

University of Agricultural Sciences and Veterinary Medicine Bucharest, Romania
e-mail: agatha_popescu@yahoo.com

Abstract

This paper aimed to present a study case concerning the analysis of the economic efficieny in corn silage producing based on gross margin and profitability threshold methods. Two corn yield levels were taken into account : V1 – 45 t /ha and V2 -55 t/ha, whose total production costs per surface unit were Euro 1,967 and, respectively, Euro 2,096. The V2 variant assures a higher economic efficiency as silage production in terms of net energy is higher per each paid Euro (42,83 MJ NE/Euro). As a conclusion, in fodder producing, despite that it has a negative value, gross margin allows the comparison between various types of forages based on its value per production unit in terms of net energy per unit of cultivated surface. Also, gross margin assures the comparison between various production intensities in the producing of the same fodder.

Key words: effciency, gross margin, profitability threshold

INTRODUCTION

Animal breeders are interested to assure fodder production from a quatitative and qualitative point of view, meeting animal requirements but under economic efficiency, meaning higher productions and lower production costs [4]. In order to evaluate the economic efficiency of various activities in agricultura farms, the UE standards impose the calculation of gross margin [2,7,11]. In fodder producing, gross margin is a negative one because fodder is consumed in the farm and coverted into animal production. For this reason, in order to analyse the comparative efficiency of various fodder crops or among various production intensities for the same fodder crop, one can use the amount of fodder energy produced per surface unit or per every monetary unit production costs [3,5, 10]. Among fodder crops, corn silage is a high quality forage that is used on many dairy farms. Its popularity is due to the high yield of a very digestible, high energy crop and the ease of adapting it to mechanized harvesting and feeding [1]. In this context, the paper concerns to corn silage production, presenting a study case for two variants of production level in order to establish in what measure the increase of production intensity assures a higher economic efficiency.

MATERIAL AND METHOD

The paper aimed to carry out a comparative analysis of corn silage yield and production costs between two experimental variants as follows:V1 control variant, producing 45 t green corn for silage /ha and V2 – achieving 55 t green corn per ha. Fodder yield in terms of energy (MJ NEL/ha) has been determined, taking into account: green corn yield, 15% transportation losses from the field to the storage place, 30% dry matter content in corn silage, 6,400 MJ energy per fodder unit according to the standards in force. For the two variants all the production costs, including both variable and fixed costs, were calculated as follows: seed, fertilizers, plant protection, mechanization, labor but also interest related to working capital, land rent, insurance, assets depreciation, interest related to invested capital. All the calculations were made per surface unit. The comparison concerning the economic efficiency between the two variants was based on the following specific indicators: energy in corn silage per ha, production costs per ha, energy in corn

silage per unit of production cost and production cost per unit of energy in corn silage.

RESULTS AND DISCUSSIONS

Corn Silage Production.

Corn silage production is presented in terms of energy starting from the wet corn yield harvested in the field till the silo cell where the fodder is stored. In case of V1 an amount of 45 t green corn per surface unit was achieved. During the forage transportation from field to the silo cell about 6.75 t has been lost that is about 15% losses. As a result the net green corn yield is in fact only 38.25 t/ha. Taking into consideration that a ton of corn silage has 30% dry matter, the net corn silage yield in terms of D.M. is 11,475 t. Knowing that one ton dry matter corn silage is able to produce 6,400 MJ energy, the corn silage production in terms of energy is considered to be 73,449 MJ/ha.

In case of V2, starting from the 55 t green corn per ha and based on the same judgment, we obtained 89,760 MJ energy in the corn silage yield. Tin this case, the energy production in the corn silage is by 16,320 MJ or 22 % higher than in case of V1 when just 45 t of wet corn has been initially harvested.

The calculation of corn silage yield in terms of energy is presented by experimental variants in Table 1.

Table 1
Calculation of corn silage yield in terms of energy
Calcularea productiei medii de porumb siloz exprimata in energie

Specification	MU	V1	V2	V2-V1
Production of green corn for silage Productia de porumb masa verde pentru siloz	t	45	55	+10
Losses during transportation Pierderi pe timpul transportului (15 %)	t	6.75	8.25	+1.50
Net green corn for silage Productia de porumb masa verde pentru siloz	t	39.25	46.75	+8.50
Net green corn silage in terms of D.M. Productia neta de porumb siloz in SU (1 t green corn = 30 % DM; 1 tona de porumb verde = 30 % SU)	t	11.475	14.025	+2.55
Corn silage yield in terms of energy Productia medie de porumb siloz exprimata in energie (1 t DM corn silage = 6,400 MJ ; 1 tona SU in silozul de porumb = 6.400 MJ)	MJ	73,440	89,760	+16,320

Production Costs.

The calculation of production costs is presented in Table 2.

Seed cost was Euro 128.88 per ha for the both variants, V1 and V2, taking into account the the farmer used to buy selected and certified seeds supplied in packages of 50.000 grains. In the both cases, the farmer used 1.8 package of corn grains for seeding 1 ha. Every corn package was purchased at the price of Euro 71.60.

Fertilizers cost depended on the amount of fertilizers which has to be applied and in its turn on the soil test concerning its content in N, P_2 O and K_2O. This cost item was Euro 342.97 in case of V1 and Euro 419.18 in case of V2. The V2 variant registered higher costs because the requirements in N, P_2 O and K_2O were 236 kg, 115.5 kg and 280.5 kg compared to V1 where the requirements in N, P_2 O and K_2O were 193.1 kg, 94.5 kg and, respectively 229.5 kg per surface unit.

Plant protection cost depended on the amount of herbicides used and the number of treatments applied. This cost item registered Euro 50.75 in case of V1 and Euro 65.98 in case of V2, because for a higher corn production was necessary a higher amount of herbicide (1.3 kg compared to 1 kg per ha in case of V1).

Table 2
Calculation of Production Costs
Calcularea cheltuielilor de productie (Euro/ha)

Specification Specificare	V1	V2	V2-V1
Seeds Saminta	128.88	128.88	-
Fertilizers Ingrasamintele	342.97	419.18	+76.21
Herbicides Erbicidele	50.75	65.98	+15.23
Materials ***Materiale***	***522.60***	***614.02***	***91.44***
Own mechanized agricultural works Lucrari cu mijloacele proprii mecanizate	184.49	199.23	+14.74
Thirds services Servicii terti	204.51	214.73	+10.22
Other proportional variable costs Alte cheltuieli proportional variabile	20.00	20.00	-
Proportional variable Costs ***Cheltuieli proportional variabile***	***931.60***	***1,048.00***	***+116.40***
Interest related to working capital Dobanda aferenta capitalului circulant	24.30	27.30	+3,00
Labor Forta de munca	90.20	99,60	+9.40
Land rent Arenda terenului	240,00	240.00	-
Other variable costs Alte cheltuieli variabile	354.50	366.90	+12.40
VARIABLE COSTS **CHELTUIELI VARIABILE**	**1,286.10**	**1,414.90**	**+128.80**
GROSS MARGIN **MARJA BRUTA**	**-1,286.10**	**-1,414.90**	**+128.80**
Fixed Assets depreciation, maintenance and insurance Amortizarea, intretinerea si asigurarea activelor fixe	412.34	412.34	-
Interest related to fixed capital Dobanda aferenta capitalului fix	196.46	196.46	-
General Labor Forta de munca generala	34.20	34.20	-
Other fixed and general costs Alte cheltuieli fixe si generale	38	38	-
FIXED AND GENERAL COSTS **CHELTUIELI FIXE SI GENERALE**	**681**	**681**	**-**
TOTAL PRODUCTION COSTS **CHELTUIELI TOTALE DE PRODUCTIE**	**1,967.10**	**2,095.90**	**+128.80**
EU Subsidies Subventii de la UE	100	100	-
FINAL PRODUCTION COSTS **CHELTUIELI FINALE DE PRODUCTIE**	**1,867,10**	**1,995.90**	**+128.80**

Costs of own mechanized agricultural works counted for Euro 184.49 in case of V1 and Euro 199.23 in case of V2. This cost item depended on the list of agricultural works for corn crop according to the technological sheet, the machinery used and related labor in terms of hours per ha and year from soil preparation till harvesting.

Other proportional variable costs counted for Euro 20 for the both variants.

The proportional variable costs registered Euro 931.60 in case of V1 and Euro 1,048 in case of V2. These costs were 12.49 % higher in case of V2, taking into account the higher corn silage production intensity.

Interest cost related to working capital recorded Euro 24.3 in case of V1 and Euro 27.30 in case of V2.

Labor cost was Euro 99.60 in case of V2 (of which Euro 76.7 family work and Euro 23 employed labor) higher than in case of V1 – Euro 90.20 (of which Euro 69.4 family work and Euro 20.8 employed labor).

Land rent cost counted for Euro 240 for the both variants, taking into account that the farmer owns 40% of arable surface and 60% is rented .Land rent cost depended both on the land surface owned by farmer and rented from other owners, but also on rent level in the area.

Variable costs related to the corn silage yield per ha were Euro 1,286.10 in case of V1 and Euro 1,414.90 in case of V2. The variable costs are by Euro 128.88, meaning 10 % higher in case of V2 compared to the level registered by the variant V1.

Fixed and general costs totalized Euro 681 both for V1 and V2. they included depreciation, maintenance and insurance cost for fixed assets (machinery and buildings) .

Fixed Assets depreciation, maintenance and insurance costs were Euro 412.34 per ha for the both variants.

Interest related to fixed capital counted for Euro 196.46 for the both variants, taking into account the fact that the farmer capital consisted of 40 % borrowed capital and 60% own capital and the interest rate was 7% for the borrowings and 5% for owner' s equity.

General Labor cost was Euro 34.20 for the both variants, taking into account the length of administration works and tariff per work hours.

Other fixed and general costs counted for Euro 38 in the both cases.

Total production costs recorded Euro 1,967,01 in case of V1 and Euro 2,095.90 in case of V2 . Production costs were by Euro 128.80 higher in case of V2 compared to V1. But we have to consider also the fact that the variant V2 has a higher production intensity and produced an additional amount of energy counting for 16,320 MJ per ha (22 % more than V1).

Gross Margin has negatives values, being equal to variable costs, that is Euro - 1,286.10 in case of V1 and Euro – 1,414.90 in case of V2.Taking into account the EU subsidies of Euro 100/ha, production costs become lower, that is Euro 1,867.10 in case of V1 and Euro 1,995.90 in case of V2 and Gross Margin increase to Euro - 1,186.10 in case of V1 and, respectively Euro - 1,314.90 in case of V2 (Table 2).

Economic efficiency is presented in Table 3.The V2 variant assures an increased economic efficiency in the producing of corn silage because : the energy content of corn silage yield is by 16,320 MJ /ha, respectively by 22% higher than in case of V1; production costs are by Euro 129 higher per ha or by 6.90 % higher than in case of V1; energy of corn silage yield is by 5.63 MJ (14.31%) higher per every Euro paid; production costs are by Euro 0.003 (12 %) per MJ energy of corn silage yield compared to the case of V1. Therefore, the variant V2 having a higher production intensity is able to produce more corn silage in term of energy but under the condition of lower cost per energy unit (Table 3).

Table 3
Comparison concerning the Economic Efficiency between the experimental variants
Comparatie privind eficienta economica intre variantele experimentale

Specification Specificare	MU	V1	V2	V2-V1
Net energy in corn silage yield Energia neta in productia medie de porumb siloz	MJ/ha	73,440	89,760	+16,320
Production Costs Cheltuieli de productie	Euro/ha	1,867	1,996	+129
Net energy in corn silage per paid Euro Energia neta in porumbul siloz per euro platit	MJ/Euro	39.33	44.96	+5.63
Production Costs per energy unit produced of corn silage Cheltuieli de productie per unitate de energie din silozul de porumb	Euro/MJ	0.025	0.022	-0.003

CONCLUSIONS

1. In fodder producing , Gross Margin has a negative value, but it could be diminished by subsidies which are able to reduce variable costs.

2. Energy in corn silage yield per surface unit, production costs per surface unit, energy per every monetary unit paid and costs invested for obtaining 1 MJ energy in fodder production are high importance indicators for assessing the economic efficiency for the same fodder crop, but for various production intensities.

3. The variant V2 , harvesting 55 t green corn per ha, assures 89.760 MJ energy per ha and respectively 44.96 MJ per paid Euro, therefore higher performances compared to the case when an amount of 45 t green corn was produced per surface unit.

4. Farmers have to pay more attention to the increase of fodder production per surface unit in order to grow up economic efficiency in the field and get higher performances in animal production.

5. In this purpose, the management decisions that influence the quality and quantity of the crop that is harvested when corn silage is grown are referring to: the use of selected and certified high value corn hybrids, the assurance of plant population per surface unit, the use of a corresponding fertilization according to the soil content in N, P_2 O and K_2O and corn needs, the achievement of the agricultural works according to the crop technology, the choice of the right moment for the crop harvesting in close relationship to the plant maturity at the harvest moment, the harvest and storage management. All these aspects, if they are respected, have to contribute to the achievement of a high quality corn silage, in the expected amount in the benefit of animal production under reasonable production costs and to farmer's satisfaction.

REFERENCES

Journal articles

[2] Draghici Manea, Oancea Margareta, Plesoianu Gh., Zahiu Letitia, Scrieciu Fl.,: Farm Management Textbook, Atlas Press S.R.L. Calarasi, p.31-35, 2004

[8] Popescu Agatha,: Gross margin – a barometer of profitability in agriculture, International Symposium "Durable Agriculture – the agriculture of the future", Craiova, 23-24 November, 2006.

[9] Popescu Agatha,: Researches concerning Gross Margin in Dairy Farms of various size and milk producion, UASVM Bucharest, Scientific Papers , D Series, Vol. LI, Animal Production, p. 259-263, 2008.

[11] Ursu Ana, Nicolescu M., Dinu T.,: Technical and economical practical Guides and of Management. Vegetal Production, Cartea Universitara Publishing House, Bucharest, p.30-35, 2008.

Books

[1] Bates Garry,: Corn silage .University of Tennessee. Agricultural Extension Service. Plant and Soil Science, 1998

[3] Kuhlmann, F.,: Betriebslehre des Agrar und Emahrungswirtschaft, Sttutgart, 2002

[4] Oancea Margareta,: Modern management in agricultural units, Ceres Publishing House, Chapter 10, 2003.

[5] Odening M., Bokelmann W.,: Agrarmanagement, Ulmer, Stuttgart, 2000

[6] Popescu Agatha,: Financial and business Management in Dairy Farms, AGRIS Publishing House, Bucharest, 2003

[7] Popescu Agatha,: Financial Management in Dairy Farms, Do-minor Publishing House, Bucharest, 2006

[10] Reisch E., Zeddies J.,: Ein fuhrung in die Landwirtschaftliche Betriebslehre speizieller Teil, Ulmer, Sttutgart, 1992