

EFFICIENCY OF DAIRY CATTLE-BREEDING IN BULGARIA

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Abstract

The proposed report is a part of Bulgarian-Macedonian project “Market oriented farm management”.

The high degree of uncertainty is a feature of modern business environment where firms, especially farms face with new challenges. In that situation farms should improve their management which is a permanent process. The main characteristic of farms at managerial point is: the farmers make their decision according to rational combination of resources (land, labour and capital) and made production. In farm can be implement various activities which concern production of wheat, corn, potatoes, tomatoes, milk, meat and et.c. These activities are called farms productions.

Market of farms products functions nearly to the conditions of perfect competition. This limits farmers’ decisions about production only with type, place, time and amount which have to produce.

Farmer carries out two roles he is both a grower and a manager. In crops farmer is responsible for seeding, cultivating and irrigating and pests control. In livestock farmer breeds animals and keep them health.

The other farmer’s role as manager is important for good health of farm. While agriculture requires agronomic and zootechnical knowledge, management can be defined as a process of making decisions. Farmer makes a choice between different crops and animals, according to available resources and market conditions.

The aim of report is to present Gross margin as a method for management of farms, by discussing its special features and demonstrate applying in certain sector.

The method is simple, in view of the fact that it is not needed specific skills. Nevertheless there are some issues about correct applying of method. In that mean are considered all calculations.

To demonstrate method is used data from eight dairy farms. The farms are different to legal form and production technology. Although the findings are not representative at research area they can be useful in making decision.

Main conclusions are:

- Gross margin can be used as a tool measuring efficiency of production
- Using more resources increased milk productivity what is the main reason these farms to record higher value of gross margin per head and per litre
- High intensive production system is more efficient than extensive one
- Perceived subsidies by farms don’t stimulate them to initiate intensive production system

In conclusion can be generalized the method Gross margin possesses rich analytical ability. Calculating on national and regional level gross margin can provide good support to improve management of farms. It needs to create a data base on production and year, and be available for everyone concerned in agriculture.

Key words: farmer’s roles, farm management, gross margin, efficiency,

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Introduction

Every farm is established on land, which involved in farm activities in purpose of production agricultural products and provides income for farmer's household. On land is built agricultural infrastructure: drillings, irrigation canals, livestock houses, barns and family's house. A farm covers also plants, animals and other resources, which necessary to insure agricultural productions. Some farmers' activities are ploughing, planting, breeding and combination of them. Common feature of farms is object of management. A concept of farm is a core of its management.

The high degree of uncertainty is a typically feature of modern business environment where firms, especially farms face with new challenges. In that situation farms should improve their management which is a permanent process. The main characteristic of farms at managerial point is: the farmers make your decision according to rational combination of resources (land, labour and capital) and made production. In farm can be implement various activities which concern production of wheat, corn, potatoes, tomatoes, milk, meat and et.c. These activities are called farms productions.

Farms usually cover several productions. They need inputs and delivery outputs. Some of the outputs can be used as inputs to other productions. Final products of farms go to market.

This market possesses some important features, which influenced farms. They are expressed in:

- products usually are homogeneous (raw material), in that reason a farmer can't distinguish own products from products of others farmers;
- a great number producers sell products and no one of them can influenced market;
- little relative share of producer is the obstacle to be set own price. The price is result of interaction between aggregate supply and aggregate demand or a farmer takes the price;
- it is easy to enter and leave the sector, because of relative lower capital investment than other sectors.

Market of farms products functions nearly to the conditions of perfect competition. This limits farmers' decisions about production only with type, place, time and amount which have to produce.

Farmer carries out two roles he is both a grower and a manager. In crops farmer is responsible for seeding, cultivating and irrigating and pests control. In livestock farmer breeds animals and keep them health.

The other famer's role as manager is important for good health of farm. While agriculture requires agronomic and zootechnical knowledge, management can be defined as a process of making decisions. Farmer makes a choice between different crops and animals, according to available resources and market conditions. Farmer also decides how to organize production or what technology to be applied.

The aim of report is to present Gross margin as a method for management of farms, by discussing its special features and demonstrate applying in certain sector.

Methodology and data

Special features of agricultural products assume to put into practice good management methods. They can help farmers to make their decisions. Method of Gross margin is one of them, as an economical method. The method was started using widely in Great Britain during 60th years of last century. It was populated for analyzing and planning in agriculture.

Essence of the method is calculated a gross margin value. It is a difference between total income and variable cost to whole farm or certain crop/animal. Jay Ebben assigns the method as an appropriate tool for determination break even point and management profit beyond this point in small and new enterprises. The author considers gross margin method is suitable when price of product is low, but variable costs are high. Agricultural often faces this situation.

Consulting organization in primary industries South Wales Australia (NSW DPI), assigns calculating gross margin value as a first step of development farm's plan and budget. In this way can be compared profitability of different productions and it is useful to make decision in farming. This organization recommends results of farming to be estimate through gross margin value. This need obtained value to be compared with benchmark.

Chris Firth uses gross margin value to provide comparative economic analysis in organic farming to conventional production. In fact he extends the spread of the method, measuring different technologies.

D. Nikolov assigns gross margin as a good tool in analysis and assessment of agricultural production.

In the European Union classification of holdings is based on their type and economic size, two elements which in turn are based on the gross margins of the various types of agricultural production.

Gross margin is also used under name standard difference by Bulgarian ministry of agriculture and total profit by N. Nikolov, but the mean is the same there is no difference in calculating the values.

The advantages of gross margin analysis include the following:

- The information required is simple and can easily be collected by field personnel.
- The analysis is easy to complete requiring only a calculator although it can be done even more easily on a computer spreadsheet.
- The results are easy for farmers, extension workers, and policy makers to understand.
- The results can be a very useful in helping farmers decide whether or not to adopt the technology or farm enterprise; extension workers decide whether or not to encourage other farmers to adopt the technology or farm enterprise; policy makers and development specialists make more appropriate decisions relating to the design of development projects.

The method is easy to apply it doesn't need specific knowledge or skills. Nevertheless we will discuss some questions about calculating of gross margin value.

Steps in gross margin analysis

There are number of steps involved in setting up a gross margin for a specific technology relating to a farm enterprise. An example of specific steps in setting up the gross margin for each calculation is presented below:

➤ calculate an average yield expected for the crop with the technology to be applied. Where the product has not been produced before this will have to be based on information from other farmers or the advice of national agricultural research or extension services. However, as such services tend to farm in ideal conditions not replicated by small farmers it would be useful to reduce expected yields to take this into account;

➤ calculate the expected gross return, which is the expected production multiplied by the price at the farm gate. Take the information on prices available from the market information service and deduct all marketing costs from the farm gate to the market to which the prices refer;

- calculate seed, fertilizer and pesticide requirements per hectare or for the crop area and work out the total cost of these at the farm gate. It is also necessary to add costs of transport and other costs from the dealer to the farm.
- calculate costs of irrigation water and machinery services required for the relevant area, if these services are obtained commercially;
- estimate costs (other than labour) of irrigation and machinery services if the farmer provides these;
- calculate cost of fixed investments required solely for this crop, e.g. plastic tunnels for horticulture production, dividing the cost of the investment by the number of crops (or years when there is just one crop a year) the investment is expected to be used for;
- on the basis of research/extension service advice or other information, estimate the number of person/days required for land preparation, sowing, weeding and other production activities; harvesting, cleaning, grading and packing. Multiply the number of days by the cost of labour;
- where family labour is used multiply the number of days by the opportunity cost, i.e. the daily wage that members of the family could earn if they weren't working on the farm;
- deduct the rent paid for the area of land used or the bank interest paid if the land is being purchased. Where the land is fully owned by the farmer and there is the possibility of renting it out then the opportunity cost of that land (i.e. the potential rent) should be deducted;
- deduct any taxes on the land (but not on the products) and any interest paid on the land or inputs;
- apportion any other farm costs not included above according to the land area for the crop as a percentage of the total farm land area, divided by the number of crops annually;
- subtract total costs from total revenues to get the gross margin for the crop per hectare or per parcel of land it is intended to use.

Challenges and good practices

There are a number of issues that need to be considered when undertaking gross margin analysis. Some improve the potential validity of the results while others increase its potential use in comparing the results with results elsewhere and help in assessing appropriate plans for the future. Some of the major issues are considered in the following paragraphs – they are not given in any particular order of priority:

Time period to consider

It is very important to use the same time period for all enterprises and technologies if one intends to compare the gross margins of different enterprises or technologies.

What time period should be used for calculating the gross margin? The period usually used is one production cycle. This varies for different enterprises but a compromise commonly used is a year. For example, cereal and legume crops differ somewhat in the length of their production cycles but in many drier parts of the world only one production cycle is possible for each in a year so a year is a convenient period to use.

If in comparing two different enterprises, the production cycle of one enterprise (e.g., enterprise A) is much shorter than another (e.g., enterprise B), it might be better to pick a time period that allows for one production cycle of B to be completed and compare it with, for example, two production cycles of enterprise A.

Prices of products and costs of inputs

Gross margin analysis requires output and inputs to be expressed in terms of a common denominator, that is, a monetary unit. The issue becomes one of deciding whether farm gate (i.e., what it would cost at the farm site itself) or market (i.e., what you actually paid for it) price or cost should be used. The farm gate price or cost involves no marketing cost component. If a product is sold on the market away from the farm, any marketing costs (e.g., the cost of transporting it to the market, the time involved) need to be subtracted from the market price that was received to obtain the farm gate price. If the input was purchased away from the farm, then to get the farm gate cost, any costs involved in getting it to the farm (e.g., transport cost, time involved)⁴ need to be subtracted.

Either farm gate or market prices can be used. However, it is important in reporting the results of gross margin analysis to document what prices were used.

Valuing by-products

Enterprises are usually implemented with the aim of producing a single product. However, there often are by-products that are valued by farmers and their families. An example is wheat where not only the grain is produced for the market but also the straw can be used in the livestock production. If such by-products have a potential market value then their production and value should be estimated and included in the calculation of the gross income.

Variable inputs lasting more than one production cycle

The amounts to use for gross margins analysis must be adjusted when some inputs or outputs last more than one production cycle. Two examples are planting alfalfa, which can be cut for hay for more than production cycle, and the purchase of plastic tunnels to produce vegetables during the off-season which also last more than one production cycle. In both cases it would be incorrect to allocate all the costs to the first production cycle. Instead the costs per year need to be calculated with the help of the following formula:

$$A = \frac{(C - S)}{L}$$

where: A – Annual cost

C – Initial cost

S – Salvage value (an estimate of what you could get for it at the end of its useful life)

L – Estimated useful life (in years)

Imputing variable costs using opportunity costs

Much of the labour and other inputs (e.g. seeds) on small farms come from family sources. To make valid comparisons between different enterprises or different technologies relating to the same farm enterprise, it is necessary to impute, that is estimate, a cost for these family resources. For family labour, this is done through valuing it at what it would cost to hire such labour. Essentially in doing this we are using the opportunity cost of labour. This could vary according to the season or person providing the labour (e.g. male, female, youth). For seeds or other variable inputs, the normal practice is to value them at what it would cost to obtain from the next most likely source of supply (neighbour, local trader, etc.).

⁴ Time involved in transporting products to and from the market, and in identifying buyers and sellers can be considerable. Therefore it may be necessary to put some sort of value on that time.

Interest charges

If in order to adopt a particular enterprise or technology, money is borrowed, the interest to be paid on that loan is a variable cost. In such cases, the interest charge that would be imputed could be approximately calculated as follows:

$$I = \frac{i \times V}{2}$$

where: I – Annual interest charge

i – The relevant annual interest rate, that is, an estimate of what the rate would be if you borrowed the money

V – The actual variable costs paid out

Calculating gross margins per unit of family labour

When comparing technologies or enterprises in terms of gross margin per unit of family labour, the gross margins should be calculated excluding the imputed cost for family labour inputs. The gross margin that is obtained with family labour costs excluded is then divided by the number of units of family labour used in that enterprise or technology.

If there is interest in calculating the gross margin per unit of labour only for a labour bottleneck period (e.g. weeding period), then the gross margin should be calculated including the imputed family labour cost outside of the bottleneck period. The gross margin that is obtained is then divided by the number of units of family labour used during the bottleneck period.

Results and discussion

The method is applied to 8 dairy farms. The farms are divided in two groups according to amount of expenditures – intensive and extensive. They also correspond to no-pasture and pasture animal breeding. Two production systems are compared on data from 2007. Used data was obtained by survey. Data about intensive system (no-pasture) is a part of GTG project “Improvement of Milk Quality in Bulgaria”⁵

Expenditures of farms uses intensive system are two times more than expenditures of extensive. The amount is 1 646 € The higher value is relevant to answer need of animals with fodder. It is represented by high share of feed from variable costs (see table 1). Share of feed from variable costs is 80 % for intensive system, while the share for extensive system is only 63 %. Converting these percentages into value shows that cost of feed of extensive system is greater than total variable cost of extensive system (approximately 50 %). In that reason intensive system reached milk yield 5 883 l/cow or 3 times more than extensive system (1 825 l/cow). Obviously each paid monetary unit has different contribution to milk yield in the two systems. It can be said that extension of expenditures is advisable.

⁵ Nikolov, D. Gross margin calculation in Bulgarian dairy sector (sample from Plovdiv and Pazardzhik regions)

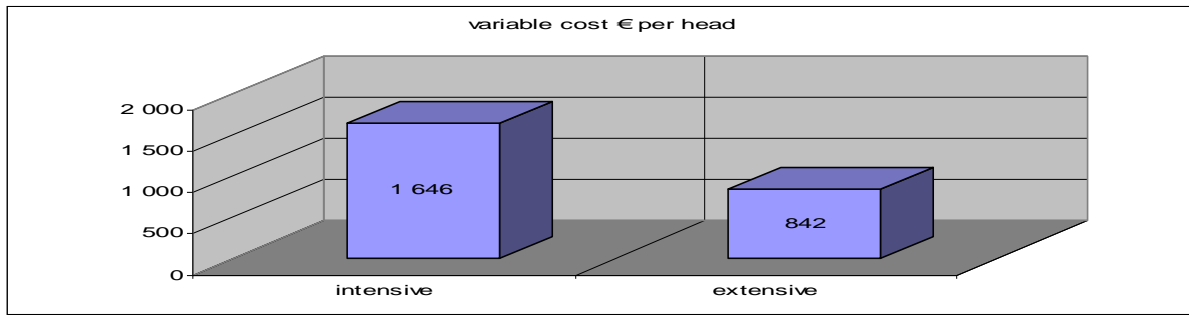


Fig. 1 Variable cost per head (yearly in euro)

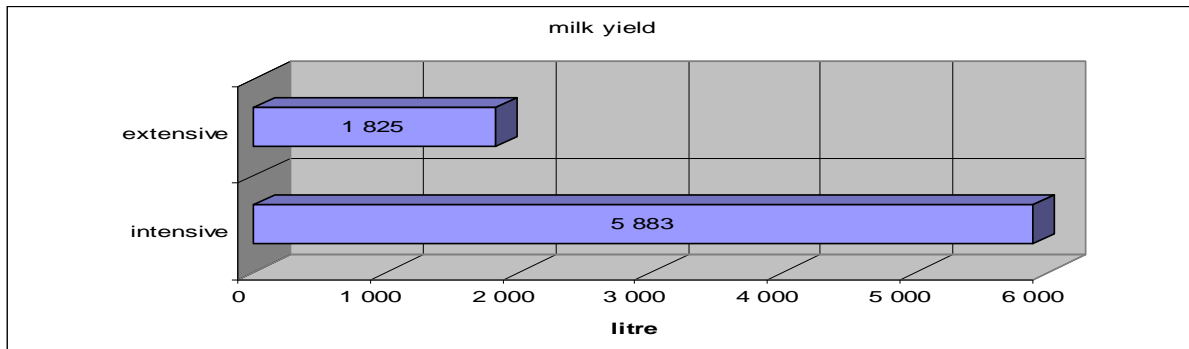


Fig. 2 Milk yield yearly

The results from research are about calculating gross margin (GM) per head and per 1 l milk. GM per head of intensive system is 896 € while extensive system obtained only 131 €. Recognize that big difference it should be pointed that intensive system has the larger extent of fixed cost. Despite all intensive system is more profitable than extensive one. Obtained high level is explained both reached high milk yield and high milk price (see table 1). In that way farms with extensive system not only compensate their high expenditures but realize additional income. High milk yield was yet discussed. But milk price should be considered as an element partly controlled by farmer. The price is fixed as a result of action many factors. In observed farms main factors lead to fix high milk price are large delivery amount and guarantee high and stable quality of milk which are result of high expenditures of intensive system. Obviously there are benefits in different fields. Based on combining these benefits farms applied intensive system obtained much higher gross margin per head than farms applied extensive system.

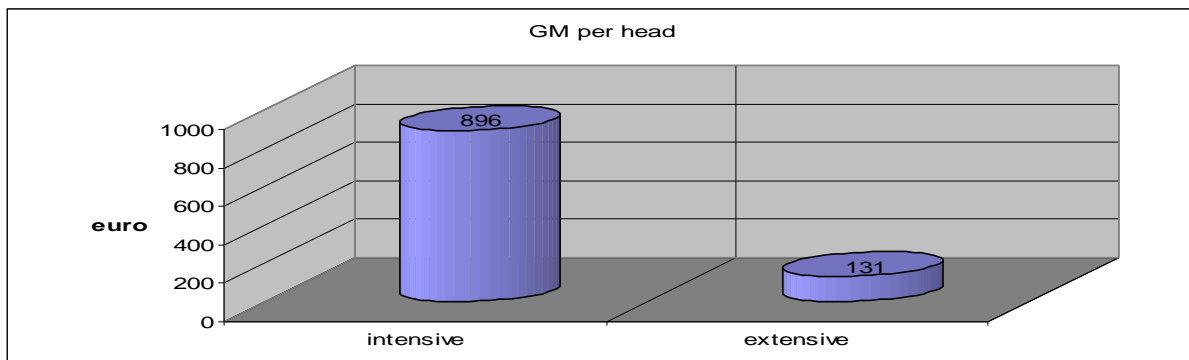


Fig. 3 Gross margin per head

The other important index is gross margin per 1 l milk. Farms with intensive production system obtained value 2 times higher than extensive system. The value is 0,15 €/l.

The main reason for that situation is an achieved better level of expenditures per litre. In intensive system variable cost per litre is 0,26 €, while in extensive system value is greater – 0,40 €. Result shows intensive system achieved better productivity per 1 € expenditure. It is an important premise to be obtained high gross margin per litre milk. Comparing expenditures per litre to milk price shows that there is a positive difference in intensive system, but extensive system has a negative difference. It creates a good opportunity for achievement of high gross margin per litre milk and total gross margin in farms applied intensive system. Obviously farms applied extensive system faces problem on that field, because their expenditures are higher than milk price. On that reason by-products and subsidies are very important factors in farms applied extensive system to eliminate negative difference.

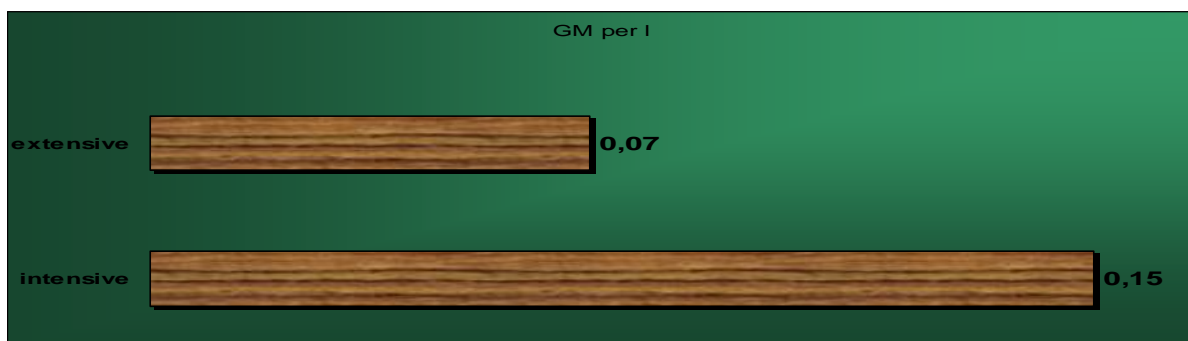


Fig. 4 Gross margin per 1 litre milk

Based on data from the exploration an effectiveness of the production system is accounted, as regard between the value of the gross margin for entire farms and their overall income. The relation is calculated with and without subsidies. The results show that the intensive production system is more efficiently in comparison with the extensive in the two cases. Like it is showed so that the subsidies are with relatively larger degree of significance of achieving higher potency in the extensive systems of the economy activity. A main factor is the short milk yield with the extensive production that makes high spending of a 1 liter of milk. Everything that gives a foundation for the role of subsidies in those farms to be decided as dual. In one hand they give opportunity of farms to continue their activity, but in other hand they have as well deterrent effect. The had subsidies do not make farmers pass to new production systems, because their production is efficiency in low degree of risk. Intensive production is high efficiency, but risk is much higher due to that require considerably more resources.

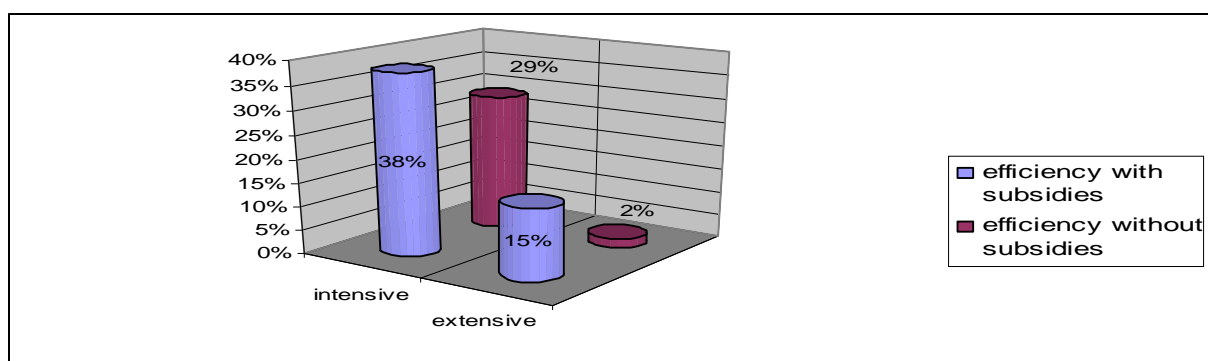


Fig. 5 Efficiency of production

Conclusions

Main conclusions of the research are:

- Gross margin can be used as a tool measuring efficiency of production
- Using more resources increased milk productivity what is the main reason these farms to record higher value of gross margin per head and per litre
- High intensive production system is more efficient than extensive one
- Perceived subsidies by farms don't stimulate them to initiate intensive production system

In conclusion can be generalized the method Gross margin possesses rich analytical ability. Calculating on national and regional level gross margin can provide good support to improve management of farms. It needs to create a data base on production and year, and be available for everyone concerned in agriculture.

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Tabl ЕФИКАСНОСТ ГАЈЕЊА МЛЕЧНИХ ГОВЕДА У БУГАРСКОЈ
е 1. Production cost and GM analysys

Indicators	Farm code										
	Pazarjik 1 Intensive	Pazarjik 2 Intensive	Pazarjik 4 Intensive	Pazarjik 3 Intensive	Sitovo1 Extensive	Sitovo 2 Extensive	Bolyarovo 5 Extensive	Yambol 6 Extensive	Average Intensive	Average Extensive	Average Total
cow number	32	110	30	64	40	40	20	120	59	55	57
milk yield l/cow	4 531	8 500	5 000	5 500	1 800	2 100	1 500	1 900	5 883	1825	3 854
produced milk l	145 000	935 000	150 000	352 000	72 000	84 000	30 000	228 000	395 500	103 500	249 500
milk price €/l	0,33	0,36	0,35	0,35	0,25	0,25	0,25	0,28	0,35	0,26	0,30
total income €	59 170	384 375	61 375	142 100	32 000	45 500	10 000	131 616	161 755	54 779	108 267
income from milk %	80	89	87	87	56	46	75	74	86	63	74
subsidies %	17	10	13	13	19	16	no subsidies	8	13	14	13,5
share of feed from V. cost	79 %	79 %	81 %	81 %	69 %	79 %	40 %	64 %	80 %	63 %	72 %
variable cost €	29 763	233 099	46 844	90 589	27 370	40 070	8 200	109 542	100 073	46 296	73 184
variable cost €/per l	0,41	0,5	0,62	0,51	0,76	0,95	0,55	0,96	0,51	0,81	0,66
GM €	29 407	151 285	14 531	51 511	4 630	5 430	1 800	22 074	61 682	8 483	35 083
GM €/per head	919	1 375	484	805	116	136	90	184	896	131	514
GM €/per l	0,20	0,16	0,10	0,15	0,07	0,07	0,06	0,10	0,15	0,07	0,11
efficiency with subsidies	50 %	39 %	24 %	36 %	14 %	12 %	-	17 %	38 %	15 %	32 %
efficiency without subsidies	39 %	33 %	12 %	27 %	- 6 %	- 5 %	18 %	10 %	29 %	2 %	28 %

ЕФИКАСНОСТ ГАЈЕЊА МЛЕЧНИХ ГОВЕДА У БУГАРСКОЈ

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Резиме

Овај рад је део је бугарско-македонског пројекта „Тржишно управљање пољопривредним газдинствима“.

Висок степен несигурности део је модерног пословног окружења где фирме, посебно фарме, долазе у сусрет с новим изазовима. У тој ситуацији фарме би требале унапредити свој менаџмент, што представља перманентан процес. Главна карактеристика фарме из менаџерске тачке гледишта је: фармери своје одлуке темеље на рационалној комбинацији ресурса (земљиште, рад и капитал) и производње. На фарми се могу имплементирати различите активности које су у вези са производњом пшенице, кукуруза, кромпира, парадајза, млека, меса итд. Такве активности зову се пољопривредни производи.

Пијац пољопривредних производа функционира у условима готово савршеног такмичења. Ово ограничава фармерове одлуке у вези производње, па се он брине само о типу, месту, времену и количини онога што мисли производити.

Фармер заузима двојну улогу: он је и произвођач и менаџер. Код житарица, фармер је одговоран за сетву, култивацију, иригацију и контролу пестицида. У сточарству фармер храни животиње и одржава их здравима.

Друга улога фармера као менаџера важна је за здравље фарме. Док пољопривреда захтева агрономско и зоотехничко знање, менаџмент може бити дефиниран као процес доношења одлука. Фармер одабира између различитих житарица и животиња, у координацији са доступним ресурсима и тржишним условима.

Циљ овог рада је да презентира бруто маржу као методу за менаџмент фарми, објашњавајући њене посебне карактеристике и демонстрацију апликације у одређеном сектору.

Метода је једноставна, ако се узме у обзир да за њену примену нису потребне посебне вештине. Ипак, постоје неки проблеми код правилног аплицирања методе. Све калкулације су израђене према томе.

Да би се демонстрирала метода, кориштени су податци осам млечних фарми. Фарме се разликују по правној форми и технологији производње. Иако открића нису репрезентативна на подручју истраживања, ипак могу бити корисна у доношењу одлука.

Главни закључци су:

- Бруто маржа се може користити у сврху мерења продукције
- Кориштење више ресурса повећало је производњу млека, што је и главни разлог зашто су ове фарме забиљежиле већу вредност бруто марже по глави и по литри
- Систем интензивне продукције ефикаснији је од екстензивног
- Субвенције за фарме не су стимулативне да би покренуле систем интензивне продукције.

Као закључак се може генерално рећи да метода бруто марже поседује богату аналитичку способност. Утврђивање бруто марже на националном и регионалном нивоу може пружити добру основу за унапређивање менаџмента фарми. Треба креирати базу података о продукцији и години, која би била доступна свима који се баве пољопривредом.