



Аграрен университет – Пловдив, Научни трудове, т. LVII, 2013 г.  
Втора българо-полска научнопрактическа конференция  
София–Крапец–Добруджа, 9-14 септември, 2013  
Agricultural University – Plovdiv, Scientific Works, vol. LVII, 2013  
Second Bulgarian-Polish Scientific and Practical Conference  
Sofia–Krapets–Dobrudzha, 9-14 September, 2013

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**РАЦИОНАЛЕН РАЗМЕР НА СТОПАНСТВАТА  
ОТ МЛЕЧНОТО ГОВЕДОВЪДСТВО В БЪЛГАРИЯ  
RATIONAL SIZE OF THE DAIRY FARM IN BULGARIA**

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**INTRODUCTION**

Solving the problem of accelerated introduction of innovative approaches and methods in agriculture requires new solutions in the theory and practice of agricultural management. Dimensions of cattle farms are often determined by purely subjective and intuitive way. Public needs objectively sets the framework for economic efficiency depending on the specific conditions make rational as wholesale and average retail or manufacturing.

Studying the problems of farm size in dairy farming are important and deal with them at this time may become a factor in overcoming the crisis in farming.

Theoretical and practical questions about the size of holdings (rational, optimal, effective, efficient) are a constant focus of research in the context of accelerating the implementation of scientific and technological progress and innovation in the industry. In a market economy, however, these problems should be solved in parallel with other important factors which determine the prosperity of the sector.

American author Wolf (2003) emphasizes the great influence of the factor "economies of scale" and establishes a direct correlation between the increase in the size of farms and reduce production costs in large and very large farms. McDonald at all. (2007) investigated the relationship between production costs and the price of raw milk in different sized farms conclude that large farms achieve a much higher net returns than small farms. Study of USDA (2007) for dairy farms in the U.S. shows that over the period 1970-2006, the average herd size has increased from 19 cows per farm in 1970 to 120 cows in 2006. These changes reflect the trend towards greater specialization and larger size of farms.

According to some Bulgarian economists (Mladenova, 2005) the reasons for the collapse of the animal might be looking in different directions, but one of the most important is related to irrational size of farms. Depending on the territorial differentiation and specific natural and economic conditions in the region that the methods of assessment and justification of the right size of farms is very specific.

Valtchev (1999) in his monographic study of agrarian structures of Bulgarian agriculture advocates the need for the formation of an optimal farm size, " ...it reports as accurately as possible the natural resources, topo-graphy, climatic conditions, traditions, work habits and skills of agricultural population." Ivanov (2007), examining the size of farms in the dairy sector in the country, agrees that " factors that are seen as the main reason for the current level of production in the dairy sector: technology, price, capital and demographic. The various branches of the dairy sector , they play different roles and have different weight but retain their essential function to stop. " Accepted in principle the idea of the author in this study is an attempt to determine the quantitative impact of the factors and their "weight" in determining the size of the farm through their formalize specific indicators.

The aim of this study is based on theoretical and methodological formulations for farm size, to determine the quantitative impact of the factors for their development and specialization, and on this basis to determine rational size group farms in the South Central Region ( SCR ) for planning.

The research is specialized cattle farms with dairy from SCR planning.

#### **MATERIALS AND METHODS**

The size of the holding is determined by a number of external and internal factors. They examined in their interdependence , ie such a system in which all elements are in focal and subordination links. The factors affecting the degree of specialization in the agricultural sector have different weight but retain their function to be an essential stop on it.

In this paper an attempt is made to determine the quantitative impact of the factors and their " burden " on their farm size. Each of these factors' occurs in a formalized manner by a specific metric.

Quantification of the narrowness of the relationship between the studied factors and farm size, gives grounds for those who have the strongest impact on their specialization. The survey results make it possible to determine the rational amount of specialized cattle farms with dairy in SCR.

In this study was used a single linear correlation for measuring the narrowness of the relationship between these factors' and the degree of specialization and resultant indicator. Prebuilt and analyzed a scatter plot of the studied factors which illustrates the linear relationship between variables X and Y.

• The coefficient of correlation between the variables x and y data of a sample is determined by the formula:

$$R_{Y/X} = \frac{\sum (Y_i - \bar{Y}) \cdot (X_i - \bar{X})}{\sqrt{\sum (Y_i - \bar{Y})^2 \cdot \sum (X_i - \bar{X})^2}}$$

• To determine the rational amount of specialized cattle farms with dairy is using the " distance to the standard " using pre- selected indicators with the greatest burden (labor productivity, financial performance of a dairy cow and an average milk yield per cow).

• In assessing the effects of specialization in different size cattle farms (small, medium and large) is defined rational dimension in which the utmost use of available resources and the level of economic efficiency and maximizes cost recovery.

The various objects of interest (groups of cattle farms) determine the distance to the relevant benchmark index by the formula:

$$R_i = \sum_{j=1}^n K_j \left( 1 - \frac{P_j}{P_e} \right)^2$$

wherein:

$R_i$  – distance to the reference of the i-ture;

$K_j$  – significant coefficient of j-th indicator;

$P_e$  – the appraised value of the j-th indicator;

$P_j$  – reference value of that indicator.

After determining the distance to the most important standard to rank the various options for assessment, respectively. minimally different groups of cattle farms - small, medium and large. For farms with distance to the standard place rank unit. It is rational in terms of the effectiveness of specialization option.

## RESULTS AND DISCUSSION

**Table 1** presents data on average for the period of major industrial and economic indicators characterizing the activity of specialized cattle farms with dairy in SCR planning.

**Table 1**

### Main economic indicators

NUTS 3	IEc (%)	PT (x. lv./3)	Co (%)	P/R (%)	FRst (x. lv.)	FR/cr. (x. lv.)	CL (n)
Plovdiv	79,9	31,3	19,0	126,8	0,878	110,7	4064
Smolyan	4,0	12,4	-5,6	91,4	-0,228	-4,1	3052
Stara Zagora	4,5	7,4	20,3	148,2	0,523	11,3	2915
Kardzhali	2,2	9,0	23,3	128,2	0,324	5,5	2839
Haskovo	6,3	11,5	8,7	118,8	0,271	6,9	3180
Pazardzik	3,1	9,6	10,9	149,6	0,511	8,4	3308
UCR	100	21,3	16,1	125,7	0,649	25,8	3647

**Note:** IES - an index of the effect of specialization by regions (%), PT (thousand Levs/h) - labor productivity; Co. (%) – liberating capital based on tangible fi-

xed assets, P/R (%) - performance based costs; FRst (thousand Levs – financial result of the holding; Fr / cr (thousand Levs ) - financial result of a dairy cow, CI ( l) - average milk yield per cow.

In **table 2** The coefficient of correlation between the degree of specialization and main economic indicators.

Correlations between the degree of specialization and main economic indicators characterizing the activity of cattle farms

**Table 2**

<b>№</b>	<b>Formula</b>	<b>R</b>	<b><math>K_{det.}</math></b>
1	$IEc = f(Fr/cm)$	0,992219	0,984498
2	$IEc = f(WT)$	0,981768	0,963868
3	$IEc = f(cm)$	0,927811	0,860833
4	$IEc = f(Fr/k)$	0,662602	0,439041
5	$IEc = f(Co)$	0,273446	0,074773
6	$IEc = f(P/P)$	-0,017640	0,000311

**Note:** R - correlation coefficient ,**Kdetermined. ( $R^2$ )** ( in %) - coefficient of determination, respectively. coefficient of determination.

**Table 3**

Shows the final results of the application of the method "distance to the standard"

**Application of the method "distance to the standard"**

<b>№</b>	<b>Indicators</b>	<b>Plovdiv</b>	<b>Smolyan</b>	<b>Stara Zagora</b>	<b>Kardzhali</b>	<b>Haskovo</b>	<b>Pazrdzik</b>
1	Labour Productivity - lv/busy ( $P_j$ )	31,3	12,4	7,4	9,0	11,6	9,6
2	FR of 1 farm - tousand. lv. ( $P_j$ )	110,7	-4,1	11,3	5,4	6,9	8,4
3	3 Wed milk yield for the area - l ( $P_j$ )	4064	3052	2915	2839	3180	3308
4	Distance to standard ( $\sum K_j(1-P_j/Pe)^2$ )	0,0	1,501	1,468	1,504	1,326	1,370
5	Ranks of options by regions	1	5	4	6	2	3

**Note:**  $j = 1$  to  $n$ , where  $n = 1,2,3$ ; P1 - Annual labor productivity; P2 - annual financial results on a farm; P3 - average milk yield; Pe - benchmarks where  $Pe_1 = 31324$ ,  $Pe_2 = 110,7$ ,  $Pe_3 = 4064$ , Distance to standard -  $R_i = \sum K_j (1-P_j/Pe)^2$  for all  $j$  from 1 to  $n$

In **Table 4** are summarized the data for rational farm size using the "distance to the standard" of different typology by regions.

**Table 4**

**Application of the "distance to the standard" for determining the optimal size of farms in the SCR with different typology**

Application of the method "distance to the standard" for determining the optimal size of dairy farms with different typology in the SCR

№	Indicators	Small	Medium	Large	$R_1$	$R_2$	$R_3$
1	Labor Productivity- lev/busy	1736	7953	34687	0,90	0,59	0,00
2	FR of 1 Economy - thousand levs	0,8	8,7	110,7	0,99	0,85	0,00
3	Wed milk yield for the area - l	2070	3195	3861	0,21	0,03	0,00
4	Разстояние до еталона - $R_i$				2,10	1,47	0,00
5	<b>Distance to standard</b>				<b>3</b>	<b>2</b>	<b>1</b>

**Note: R1, R2, R3** - Distance to the standard for small, medium and large farms

**Table 5** is a computational algorithm to determine the optimal size of cattle farms with dairy in areas SCR according to their typology.

**Table 5**

Using the method "distance to the standard" for determining the optimal size of dairy farms with different typology in areas

№	Indicators	Small	Medium	Large	$R_1$	$R_2$	$R_3$
<b>Area Plovdiv</b>							
1	Labour productivity - lev / busy	1338	7700	39672	0,93	0,65	0,00
2	FR 1 Economy - thousand Levs	-4,0	-0,8	272,7	1,03	1,00	0,00
3	Wed milk yield for the area - l	1943	3125	4129	0,28	0,06	0,00
4	Distance to standard - $R_i$				2,24	1,71	0,00
5	<b>Ranks of options</b>				<b>3</b>	<b>2</b>	<b>1</b>

Summarized data for the different grades of economic size farms in areas in the SCR are attached in **Table 6**.

**Table 6**

**Ranking of different economic size farms based method "distance to the standard" by fields in SCR**

They were of Using the method "distance to the standard" for ranking of different economic size dairy farms in areas

Field	Size cattle farms		
	Small	Medium	Large
Plovdiv	3	2	1
Smolyan	2	1	3
Stara Zagora	3	2	1
Kardzhali	3	2	1
Haskovo	3	2	1
Pazardzhik	2	1	-
SCR	3	2	1

**CONCLUSIONS**

1. Conditions for development of cattle breeding farms with dairy in SCR are - beneficial in Plovdiv. This is determined by the high values of the indicators examined for this area ( index of economic efficiency - IES is 79.9%).

2. The values of the studied economic indicators in all areas of the SCR (excl. of Smolyan District) is highest in the large -sized farms (over 16 IU), ie they are rational and somewhat optimal size for small and medium-sized farms and are - suitable for development of dairy cattle.

3. Large farms in Smolyan recorded negative financial result and occupy last place in the ranks scheme (rank 3). Better performance in small and medium-sized farms set their priority place for mountain conditions.

4. In Pazardzhik region due to lack of data for large farms, medium-sized farms receive the highest - ranking (rank 1), but this is not yet evidence that large farms there are ultimately futile.

**LITERATURE**

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