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ECONOMIC EFFECTS IN THE PRODUCTION OF SUGAR BEET AND SUGAR

Jovan Babović¹, Veselinović Branislav²

Abstract

The objective of the study is the labor productivity in the production of sugar beet and sugar in three agricultural enterprises on 4.624 ha. The areas under sugar beet comprised in this study participate with 64.7% in the overall areas under this crop in the region of Srem. The annual production of sugar beet provides for the needs of sugar refineries in total. The basic factors affecting the productivity are: the level of technical equipment, natural factors, the selection of sugar varieties, applied modern technology, the organization of work, the qualification and motivation of the employees. The results can be used for the promotion of business, agro-economic analyses, planning, agro-marketing needs and for the comparison of one's own productivity with the presented results .

Key words: *productivity, economic production, profitability, labor input and machinery input per hectare, production per hour*

Achieved results and labour productivity in the production of sugar beet and sugar

Taking into account the fact that the labor productivity is a criterion for the success in business, the objective of our paper is to give an answer to the following questions: how to produce more and how to meet higher standards and produce more economically. The enterprises N, M, and A comprised in this research produced sugar beet on the area of 4.438 ha in 2008 and on 4.624 ha in 2009. The areas under sugar beet comprised in this study participate with 64.7% in the overall areas under this crop in Srem. On the other hand the selected enterprises are the most significant sugar beet

1 Phd. Jovan Babović, FIMEK, University Business Academy, Cvečarska 2, Novi Sad
babovic@fimek.edu.rs 021/400-484

2 Phd. Branislav Veselinović, FIMEK, University Business Academy, Cvečarska 2,
Novi Sad, brane1952@yahoo.com

producers in the region. In the sowing structure, on average for all the enterprises, sugar beet participates with 14.24% i.e. in N with 8.14%, in A with 13.93% and in M with 18.67%. (Tab.1)

Production and economic effects in the sugar beet production

One of the essential factors on which the level of productivity depends is the obtained yield per area unit. By the analysis of the obtained yields we have established that in N, on the area of 666 ha, the yield was 61 tons per ha with the tendency of 17.8% increase compared to 2008. In M on the area of 2,252 ha, the yield was 62 tons per ha i.e. 12.1% more compared to the same period while in A, on the area of 1,706 ha, the yield was 55.8 tons per ha. On average for all the enterprises on the area of 4,624 ha the yield was 59.6 tons/ha which is 10 % more in comparison with the production per area unit in 2008.(Tab.4). The obtained yields in the production of sugar beet are the result of the achieved agro-technical measures, favorable plant spacing, favorable assortment, climatic and soil factors. The emphasis is on the fact that besides the obtained yield per area unit of approximately 60.0 tons/ha on the area of 4,624 ha at the mentioned enterprises, the content of sugar in beets was high. Thus, on average at M the sugar content in beets was 16.58% and at A it was 16.78%. On average, in the region of Srem, on the area of 7,174 ha, the mean digestion was 16.6 %. Comparing the obtained yields in tons/ha in enterprises on average with the producers in the AP of Vojvodina, it can be concluded that the yield in the enterprises was 10.1 tons/ha higher in 2008 while in 2009 it was 12.5 tons per ha. The achieved yields in the production of sugar beet in enterprises are far higher than the average yields on holdings in Vojvodina. (Tab.2). In the structure of the average costs of the studied enterprises in the production of sugar beet (169,827 dinars) the seed participates with 10%, mineral fertilizers with 16.6%, pesticides with 16%, labor input with 12%, machinery costs with 25% and other costs with 20.4%. It is evident that the workforce and machinery costs participate in this intensive production with 37%. The comparative analysis shows certain differences in the cost structure which, in most cases, depends on the sowing density, natural conditions, input costs, number of operations from the technological schedule, wages, machinery equipment, interest rate and running or indirect costs. The economical side in the production of sugar beet of 1.35 shows that all the available recourses were used rationally. A economized better than the average. On average there was 1.35 dinars of returns on each dinar invested.(Tab.3)

The profitability of the production of sugar beet presented through the ratio of average profit and yield is:

$$\mathbf{Rp(2008) \ 34,569/162,600 \times 100 = 21.260\%}$$

$$\mathbf{Rp(2009) \ 59,439/229,266 \times 100 = 25.926\%}$$

The profitability rate shows that there was a high profitability rate with the tendency of increase in relation to the previous period on each 100 dinars invested.

A high profitability rate is present in all the enterprises, the highest being in A. The comparative analysis of indices of economy and productivity (Kanisek, 2008) shows the objectivity and reality in presenting the indicators of the economy quality in the sugar beet production.

Labor and machinery input in the sugar beet production

The essential factor on which the labor productivity depends in the sugar beet production is direct labor input. The results show that the labor input per area unit varies considerably in the three studied enterprises. On average, for all the three enterprises the labor input in the sugar beet production was 51.1 hour/ha with the tendency of decrease of 6.1% in relation to the labor input from the previous year.

Pr (2008) $Q(t/ha)/T(hour/ha) = 54.2/73.4 = 0.734 t/hour$

Pr (2009) $59.6/68.9 = 0.865t/hour$

In the same period in the sugar beet production the machinery input was 17.2 hour/ha with the trend of decrease of 6.3%. The level of mechanized farming in the sugar beet production is illustrated by the data that the machinery participates with 25.3% and workforce with 74.7%. In the sugar beet production the total input (labor and machinery) was 68.9 hours/ha in 2009 and in 2008 it was 73.4 hours/ha. The total input was reduced by 7.1% in 2009 in comparison to the previous period. The analysis of the input shows that M had the lowest labor input of 47 hours/ha per area unit and that N and A approximately had 53 hours/ha (Tab.4).

Labor productivity per production unit (hour/ton)

In the sugar beet production all the enterprises had the labor input of 0.861 hours per ton in 2009 and in 2008 it was 1.018 hours/ton. It is evident that the labor productivity in the sugar beet production, on average, in the studied enterprises presented through the labor input per production unit is permanently increasing. The increase of labor productivity resulted from the permanent yield increase and the decrease of labor input per area unit. In the enterprises the yields per ha are increased by 10% and the labor input per ha is decreased by 6.1% in comparison to the previous year. In 2008 in the mentioned enterprises the labor input was 1.018 hours/ton and in 2009 it was 0.861 hours per ton. The result is that the sugar beet producers achieved higher productivity of 16.3% in 2009. To be more precise, the production per hour was 996.3kg of sugar beet in 2008 while in 2009 it was 1168 kg or 17.1% more. The labor productivity presented on the basis of the total labor input (current and past) in the enterprises was increased by 6.1%. Thus, in 2008 the total input was 1.35 hours/ton and in 2009 it was 1.15 hours/ton. The achieved labor productivity in sugar beet production and its effects on the operating results is illustrated by the data that in 2009 on average the production

value per labor per hour was 4253.3 dinars or 43.8% more compared to the previous year i.e. 3146.4 dinars of production value of total labor per hour (current and past) or 40% more compared to the previous period. (Tab.4).

The development conception of the enterprises is based on the need for direct vertical economic ties of producers and manufacturers of sugar beet and sugar. Considering this conception it is interesting to present the achieved productivity for the whole production process based on labor and total input. In the production process sugar beet-sugar in 2008 in the sugar refinery SM the labor input per ton of sugar beet and sugar was 31.4 hours i.e. 1.018 hours/ton of sugar beet and 30.40 hours/ton of sugar. In 2009 in the process of production and manufacturing 26.0 hours/ton were spent, i.e. in the sugar beet production 0.861 and in sugar production 25.18 hours/ton. It shows that in the process production-manufacturing the labor productivity was increased by 17.2% in relation to the previous year.(Tab.5).

Conclusion

Based on the data on the achieved results and labor productivity in the production of sugar beet and sugar in the enterprises in the region of Srem the following facts can be emphasized. In the three studied enterprises in Srem on the area of 4,624 ha the average yield of 59.6 tons/ha was obtained and was increased by 10.0%. The natural conditions, the introduction of rich sugar varieties, modern equipment with the application of the appropriate agro-technical measures result in high yields in this production. On average, 51.1 hours/ha of labor input was needed in all the studied enterprises with the trend of decrease by 6.1% in relation to the labor input from the previous year. In the production of sugar beet there was 17.8 hours/ha of machinery input. In the production of sugar beet the total input was 73.4 hours/ha in 2008, and it was 68.9 hours/ha in 2009, which means that the total input was reduced by 6.1% in comparison to the previous period. In the structure of total input the labor input participates with 74.2% and machinery input with 25.8%. In the production of sugar beet the labor input was 1.018 hours/ton in 2008. and 0.861 hours/ton in 2009. It means that the labor productivity in sugar beet production in the enterprises was increased by 15.5% a year. The increase in labor productivity resulted from yield increase of 10% and decrease in labor input per area unit. The economy in the sugar beet production shows that the recourses were used rationally and that there was 1.35 dinars of returns on each dinar invested. On average, a high profitability rate of 25.9% was achieved in the studied enterprises. The productivity measured through production per hour of total work shows that in 2009 the production was 0.869 tons/hour or 17.8% more compared with the previous year. The labor productivity measured on the basis of the total current and past labor input was increased by 15.6% since in 2008 the input was 1.374 hours/ton and in 2009 it was 1.160 hours/ton. The productivity expressed in value shows an increase of 43.8% per hour of labor input i.e. 40.0% per hour of total input. The production of one ton of sugar required 25.18 hours of labor input with a trend of decrease of 17.2% compared with the previous year. The production of sugar

was 6,587 kg/ha. In the process of sugar beet and sugar production the labor input was 26.0 hours/ton. The labor input of current and past labor in this process in the sugar refinery in SM was 26.34 hours/ton for both products. The presented results point out that there is an increase of labor productivity in the production of sugar beet and sugar. The increase in productivity can be achieved by further increase in the yield of both beet and sugar per hectare, by decrease of labor input per production unit, by better organization of work, by introduction of incentive payment system, by improvement of labor and technological discipline in the production and by enhancement of the quality of work as well as of the products.

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Appendix

Table 1. Participation of sugar beet in sowing structure in %

Enterprise	2008	2009
N	6,64	8,14
A	14,0	13,93
M	18,58	18,67
Average	13,99	14,24

Source: Data from enterprises

Table 2. Comparative review of obtained yields (tons/ha)

Production	2008	2009	Index
AP Vojvodina	44,1	47,1	106,8
Enterprises in Srem	54,2	59,6	109,9
Difference	10,1	12,5	123,8

Source: The Executive Council of AP Vojvodina and original data organization

Table 3. Economic effects in the production of sugar beet (din/ha, Ke and %)

Enterprises	Period	Revenue	Costs	Profit	Econom. (Ke)	Profitability %
N	2008	155.400	117.727	37.673	1,320	24,2
	2009	219.140	162.326	56.814	1,350	25,9
	Index	141,0	137,9	150,8	102,3	107,0
A	2008	160.500	124.419	36.081	1,290	22,5
	2009	195.000	139.286	55.714	1,400	28,6
	Index	121,49	111,9	154,4	108,5	127,1
M	2008	165.900	138.250	27.650	1,200	16,7
	2009	233.856	181.284	52.572	1,290	22,5
	Index	140,9	131,1	190,1	107,5	134,7
Average	2008	162.600	128.031	34.569	1,270	21,3
	2009	229.266	169.827	59.439	1,350	25,9
	Index	141,0	132,6	171,9	106,3	121,6

Source: Estimate based on standard calculations in sugar beet production

Table 4. Labor productivity in sugar beet production

Enterprises	Period	Areas, yields and labor productivity in sugar beet production								
		Area	Yield tons per ha	Value per ha in dinars	Production Input				Productivity per hour of direct input in dinars	
					Per ha hour		Per tons hour		Labor	Total
					Workers	Machines	Workers	Tractors		
1	2	3		5	6	7	8	9	10	11
N	2008	495	51,8	155.400	55,0	18,6	1,061	0,359	2.818,2	2.105,9
	2009	666	61,0	219.140	53,0	17,0	0,869	0,278	4.134,7	3.130,6
	Index	134,5	117,8	141,0	96,3	91,3	81,9	77,4	146,7	148,6
A	2008	1.735	53,5	160.500	57,3	19,1	1,071	0,357	2.801,1	2.100,8
	2009	1.706	55,8	195.000	53,4	18,2	0,957	0,326	3.651,7	2.723,5
	Index	98,3	104,3	121,49	93,2	95,3	89,3	91,3	130,3	129,6
M	2008	2.208	55,3	165.900	51,0	19,5	0,922	0,352	3.252,9	2.533,2
	2009	2.252	62,0	233.753	47,0	18,2	0,758	0,293	4.973,5	3.585,2
	Index	102,0	112,1	140,9	92,1	93,3	82,2	83,2	152,8	141,5
Leverage	2008	4.438	54,2	162.600	54,4	19,0	1,018	0,356	2.957,4	2.246,6
	2009	4.624	59,6	229.266	51,1	17,8	0,861	0,299	4.253,3	3.146,4
	Index	104,2	110,0	141,0	93,9	93,7	83,7	83,9	143,8	140,0

Source: Authors` calculations

Table 5. Labor productivity in sugar production in certain sugar refineries (hours/ton of sugar)

Period	SM	C	V	Z
2008	30,40	25,76	32,84	25,45
2009	25,18	22,90	32,84	25,45
Index	82,80	88,90	100,00	100,00

Source: Data from sugar refineries and the authors` calculations