Original scientific paper

Financial aspects of potato production on farms in the Republic of Serbia

Mladen Petrović[1], Nikola Ljiljanić[1], Vojin Cvijanović[1], Vedran Tomić[1], Robert Radišić[1]

[1]*Institute for Science Application in Agriculture, Belgrade*

Corresponding author: Mladen Petrović, mpetrovic@ipn.bg.ac.rs

Abstract

Vegetable production in the Republic of Serbia is performed on about 130,000 hectares that is about 3.5% of total plant production. The most common vegetable in Serbia is potato, which is grown on about 30,000 hectares. The goal of the paper is to show the financial aspects of potato production on farms in Republic of Serbia in the 2015-2019 period by utilization of calculation based on variable costs. The data for analysis have been collected on 323 farms (survey done on selected farms conducted by the Institute for Science Application in Agriculture - IPN). By utilization of sensitivity analysis it has been also shown in the paper the impact of prices and yields on amount of gross margin in potato production. The obtained results indicate a constant increase of the gross margin amount in the potato production in the analyzed period, as well as that changes in prices and yields have a significant impact on the gross margin in potato production.

Key words: gross margin, potato, farms, Serbia

Introduction

Vegetable production is present in almost all regions of the Republic of Serbia, with numerous vegetable crops that are grown. Production is performed both in the field and in the green houses, depending on the conditions of production, with the field production being more prevalent (Ljiljanić and Rajić, 2018). Vegetable production is a highly intensive and profitable branch of agricultural production, so it can have a significant impact on development of agricultural sector, but this production also significantly depends on the degree of overall economic development (Paunović, 2016). Potato is a vegetable crop that is traditionally used in the Republic of Serbia in the preparation of national dishes, and therefore it is significantly

used in the nutrition (Ilin et al., 2014). This is confirmed by the fact that potatoes are vegetables that are grown on the largest areas in Serbia. Potatoes are grown on 30,000 hectares, with average yields of about 17 t/ha (Statistical Office of the Republic of Serbia). Significant part of the total potato production in Serbia is realized in the regions of Šumadija and Western Serbia, as well as in the region of Southern and Eastern Serbia, since those regions have the most favourable conditions for the potato growing. However, it has to be noted that the highest average yields have been achieved in the territory of Vojvodina, where mainly industrial potatoes are produced (Vlahović, 2015). The total yields of potatoes varied in the analyzed 2015–2019 period and amounted to maximum 700,000 tons (Statistical Office of the Republic of Serbia).

Matherial and Method

The methods used in the analysis presented in the paper are the following: survey, the direct costing calculation, desk research and descriptive method. Financial performance indicators are universal measures of the profitability in any production. In agricultural production, financial performance indicators are most often calculated by using the data from the analytical calculation of the full cost price or by direct costing calculation. For the family farms, which are the subject of the present analysis, the direct costing calculations based on variable costs are most often used to determine the optimal volume and structure of production, while indicators obtained from this calculation can be used as a good financial instrument for business decisions (Gogić, 2014). The direct costing calculation determines the following basic financial indicators of production: production value, variable costs and gross margin. The general formula for calculating gross margin is as follows:

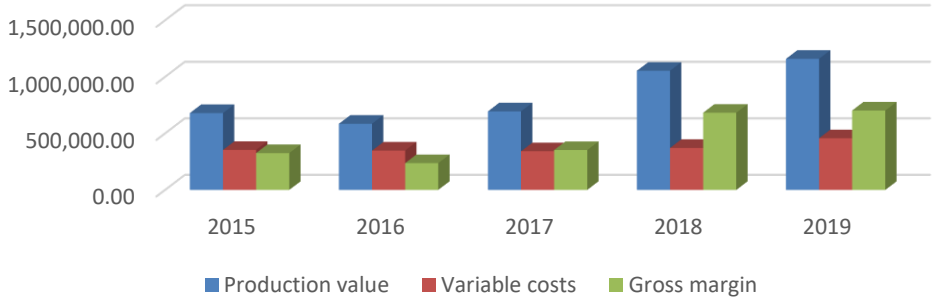
$$PV - VC = GM$$

PV - production value VC – variable costs GM – gross margin

Operating performance is expressed through gross margin, which represents the difference between the production value and variable costs (Savić et al., 2020). Calculation of gross margin represents the fast and efficient way of calculating an indicator used for comparing different production lines on a family farm and for selection of the most profitable one (Andrić, 1998; Tomić et al., 2013). The aim of this paper is to present financial indicators in potato production in Serbia by using the method of direct cost calculation.

Results and Discussion

On the basis of direct cost calculations there have been calculated the average annual amounts of production value, variable costs and gross margin in the potato production on family farms in the Republic of Serbia for the analyzed period (2015-2019).



Source: Authors' calculation based on IPN survey data

Figure 1. Financial indicators of potato production on family farms in Serbia for the 2015-2019 period (RSD[1]/ha)

Figure 1 presents the dynamics of potato production financial indicators in the 2015-2019 period, based on direct costing calculation and calculated for 1 ha area. It can be concluded that the highest values of all financial indicators were recorded in 2019. The lowest production value and gross margin were recorded in 2016, while variable costs were the lowest in 2017.

Table 1: Financial indicators, base and chain indices in the potato production for the 2015-2019 period (calculated for 1 ha)

Indicator	2015	2016	2017	2018	2019
Production value (RSD)	679,536.42	584,904.26	694,720.93	1,053,519.23	1,159,060.56
BI* (%)	-	86.07	102.23	155.03	170.57
CI** (%)	-	86.07	118.78	151.65	110.02
Variable costs (RSD)	353,757.43	347,986.69	342,122.91	371,163.02	456,943.02
BI* (%)	-	98.37	96.71	104.92	129.17
CI** (%)	-	98.37	98.31	108.49	123.11
Gross margin (RSD)	325,778.99	236,917.57	352,598.02	682,356.21	702,117.54
BI* (%)	-	72.72	108.23	209.45	215.52
CI** (%)	-	72.72	148.83	193.52	102.90
Share of the gross margin in the production value (%)	47.94	40.51	50.75	64.77	60.58

[1] RSD - Republic of Serbia Dinar
*BI – base indices
**CI – chain indices
Source: Authors' calculation based on IPN survey data

In Table 1 there are shown the most significant financial indicators in potato production for the 2015-2019. period, obtained from the direct costing calculation (calculated for 1 ha area). The

oscillations in the value of production by individual analyzed years occured due to changes in the average yield and price of potatoes. The value of potato production varied significantly in the analyzed period. The lowest production value was recorded in 2016, when it amounted to 584,904.26 RSD/ha, while it was the highest in 2019 (1,159,060.56 RSD/ha). Observing the base indices, it can be concluded that in 2018 production value increased by 55.03% compared to the 2015 base year. In 2019 production value increased by 70.57% compared to the base year and this was the highest production value achieved in the analysed period. Indicators obtained on the basis of chain indices show that in 2016, compared to 2015, there was a decrease in the production value by 13.93%, while in other analyzed years a continuous increase was recorded. The largest increase between the analyzed years was in 2018, when the value of potato production was by 51.65% higher compared to 2017.

In contrast to the amount of production value, variable costs did not have significant changes, except in 2019, when they were slightly higher as compared to previous years. In 2019, the variable costs of potato production were 456,943.02 RSD/ha. In other analyzed years, the variable costs amounted to about 350,000 RSD/ha, as also indicated by the base and chain indices.

Taken into account that the amounts of variable costs had smaller changes in analyzed years, it can be concluded that the gross margin was mostly influenced by the value of production, more precisely by the yields and prices of potatoes. The obtained results confirm this fact, so in 2019 the largest amount of gross margin was recorded (702,117.54 RSD/ha). The base indices show that the gross margin in 2019 was by 115.52% higher compared to the indices in the base year (2015). The chain indices show that the largest changes in analyzed period were recorded in 2017 and 2018. In 2017 the gross margin was by 48.83% higher compared to 2016, while in 2018 an increase was 93.52% compared to 2017.

An indicator that can represent the change in profitability of the family farm is the share of gross margin in the production value. Depending on how the value of gross margin moves, and thus the value of production and variable costs, this indicator also changes. The higher this indicator, the lower the share of production costs, which should be the goal of every family farm. Based on the obtained financial indicators of potato production on the family farms in the Republic of Serbia for the 2015-2019 period, it can be concluded that this indicator was the highest in 2018, when the gross margin was 64.77% of the value of production. In 2018, this indicator was higher than in 2019, although in 2019 the highest amount of gross margin and production value was achieved, but the variable costs were also higher and they had a larger

share in the production value. The smallest share of gross margin in the production value was recorded in 2016, i.e. it amounted to 40.51% of production value.

One of the elements that affect the value of production, and thus the gross margin of potatoes as well, is the selling price of potatoes. In the analyzed period, the selling price of potatoes realized by the surveyed farms, ranged from 22.44 RSD/kg to 33.93 RSD/kg. The lowest price was in 2016, while the highest one was in 2019. In 2018, the price was close to the price in 2019 (33.24 RSD/ kg), in 2015 it was 27.32 RSD/kg, and in 2017 it was 26.26 RSD/kg. Comparing the average annual prices of potato with the average amount of gross margins, it can be concluded that the highest gross margins were recorded in the years when the price of potatoes was the highest.

Since it was determined that the yields and prices have the significant impact on the value of the gross margin in potato production, the sensitivity analysis has been done. The sensitivity analysis shows how the gross margin of potato production varies due to changes in the factors that influence the value of production. It was analyzed how changes in prices and yields affect the changes of the gross margin. The sensitivity analysis took into account the absolute changes in prices and yields, when the specified parameters change by 10% and 20% respectively.

Table 2 shows the sensitivity analysis of the gross margin in potato production for the 2015-2019 period, due to the changes in prices and yields, based on the five-year average prices, yields and gross margins achieved on the surveyed farms.

Table 2. Sensitivity analysis of the potato production gross margin to the price and yield changes

Yield (kg/ha)		Price (RSD/kg)				
		-20%	-10%	Average	+10%	+20%
		22.91	**25.78**	**28.64**	**31.50**	**34.37**
-20%	**23,083.28**	162,456.36	228,566.87	294,677.39	360,787.90	426,898.41
-10%	**25,968.69**	228,566.87	302,941.20	377,315.53	451,689.86	526,064.18
Average	**28,854.10**	294,677.39	377,315.53	**459,953.67**	542,591.81	625,229.95
+10%	**31,739.51**	360,787.90	451,689.86	542,591.81	633,493.77	724,395.73
+20%	**34,624.92**	426,898.41	526,064.18	625,229.95	724,395.73	823,561.50

Source: Analysis performed by the authors, based on IPN survey data

Based on the collected data of gross margins on the farms where potatoes was the dominant crop in the 2015-2019 period, the average price, average yield and average gross margin of the potato production were calculated. The average price of potatoes for this five-year period was

28.64 RSD/kg, the average yield was 28,854.10 kg/ha, while the average gross margin was 459,953.67 RSD/ha. As it could be expected, 20% reduction in the price and yield of potatoes would drastically reduce the gross margin of the potato production (by more than 60%), while 20% increase in price and yield would lead to an increase in gross margin by almost 80%. Based on the realized analysis, it can be concluded that changes in prices and yields significantly affect the gross margin value of the potato production.

Potato is grown in the Republic of Serbia on the largest areas compared to other vegetable crops. However, areas under potatoes show a declining trend. In 2015, potatoes were grown on 42,000 ha, while in 2019 that area was reduced to 34,000 ha. Since the areas were decreasing, the total annual production was lower. In 2019 the average yield of potetoe was significantly increased, it reached 20.60 t/ha, so the total production exceeded the level of production from 2015, when the largest areas under potato were recorded. Analysis of realized gross margins in potato production on family farms in the Republic of Serbia in the 2015-2019 period shows that the amount of gross margin in 2019 was twice as high as in 2015 and amounted to 702,117.54 RSD/ha. Prices and yields had a significant influence on the gross margin in potatoe production, which can be concluded from the analysis of the gross margin sensitivity to changes in prices and yields in potato production. Sensitivity analysis indicates that an increase in the price and yield of potatoes by 20% led to an increase in gross margin in potato production by 80%, while a decrease in price and yield by 20% led to a decrease in gross margin by 60%.

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