Comparative profitability analysis of milk production companies to milk processing companies in Serbia

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Abstract

In this paper, milk industry in Serbia was analyzed by comparing a profitability of milk production companies to milk processing companies. The research results for period 2010-2013 suggest that milk processing companies had better return on investment, profit margin and assets turnover than milk production companies in observed period, while difference in return on equity was not significant. Research did not show significant changes in level of profitability during the observed period. Overall profitability analysis indicates that in 2010 there were no significant differences in overall profitability between milk production companies and milk processing companies, but in following period 2011-2013, the difference was significant in favor of the milk processing companies.

Keyword: Dairy farming. Dairy processing. Profitability. Return on assets. Assets turnover.

1. Introduction

Traditionally, agricultural production has been an important economic activity in Serbia. This is a consequence of relatively favorable agro-ecological conditions and specific

historical and developmental circumstances. Along with that, the transitional processes which have lasted for two and a half decades, accompanied with effects of global economics crisis, caused further decline in economic activity in Serbia, which increased a relative importance of agriculture in the overall economy.

Actually, a volume of agricultural production was reduced from the maximum level reached in the mid-eighties. This was particularly evident in the last decade of the 20th century, when yields in agricultural production were downsized due to the transitional recession, so that Serbia lagged behind the European Union (EU), but also behind the other former socialist countries of Central and Eastern Europe in relation to productivity of labor and land (Gajić et al. 2003).

During the first decade of the 21st century, the situation has somewhat improved, but production levels have not still reached the same levels from the pre-transition period (Gajić et al. 2007). Livestock production has been significantly behind a crop production, which has been dominated by extensive crops - maize and wheat in dry land farming system. This all leads to a conclusion that the total agricultural production has a low level of intensity. When measured by the number of conditional animal units, animal production is dominated by cattle (> 50%), while milk is the second most important livestock product, and accounts for about 30% of the total value of livestock production. Milk production is carried out in more than 150,000 households, while the total number of dairy cows is around 450,000. Most of the households (about two thirds) are small rural households with up to two dairy cows and a semi-natural production system (Statistical Office of the Republic of Serbia), and they are marginally commercially oriented since they are an element of social security in rural areas.

In the period after 2000, the milk production in Serbia has been constantly declining. When considered regionally, the decline in production came from the territory of central Serbia, while in the north of the country, in Vojvodina region, there was a slight increase in milk production (Statistical Office of the Republic of Serbia). The central Serbia, where about three quarters of the total milk is produced, is characterized by small, semi-natural farms. Such farms are the reason for the decrease in production, since many of them ceased a milk production due to the economic unsustainability. On the other hand, in Vojvodina, which is a region with very favorable agricultural conditions, there is a larger number of commercially oriented farms with a large number of dairy cows, so that 17% of dairy cows gives 25% of milk production and 40% of the total delivered milk (Popović, 2008). Milk yield has been increasing in Serbia in the last years, especially in Vojvodina region where it reached a level

of 4,000 liters per dairy cow, compared to 2,500 liters in Central Serbia (Statistical Office of the Republic of Serbia).

Roughly speaking, the milk producers in Serbia could be divided into: small semi-natural rural households (1-2 dairy cows), more commercially oriented farms (from a few to a several dozen dairy cows) and large production systems with more than 100 dairy cows. In recent years there is a trend of growth of quantities that have been delivered to the dairies in Serbia, while the number of deliverers has been reduced. This suggests the strengthening of commercially oriented producers (Government of Serbia, 2010).

In contrast to the milk production, milk processing facilities are largely concentrated in a few milk processing companies. These companies participate at about 90% in total milk processing, which means that they dominate the market. These facilities are mainly focused on liquid milk products. The production of cheeses, spreads, and similar products is a main activity of medium and small dairies.

The dominance of large dairy processing companies puts smaller farmers to a disadvantage due to the existence of oligopsony or even monopsony. Milk producers cannot negotiate the purchase price, and there is often a problem of reaching the required level of milk quality, which is further reflected in the level of purchase prices. State policy of subsidizing the milk production is not favorable to the small dairy farmers since a condition for subsidies is a delivery of at least 3,000 liters of milk per quarter of a year, which automatically disqualifies small farms from the state support system, and further contributes to the economic unsustainability of their production. Only small dairies are interested in cooperation with these producers, which is very important for their survival. The second group of farms has a slightly better position since they are eligible to the state subsidies. The largest milk producers should be in the best market position, since they have financial capacities for introduction of modern technology and good breeding, so they can produce more quantities of good quality milk which should affect their profitability. However, due to the large milk production, they are predestined to the cooperation with large milk processing companies since they have no alternative channels of delivery. On the other hand, large milk producers are the important segment of supply market for milk processing companies.

Milk producers and milk processors are inextricably linked and are dependent on each other. However, their interests are conflicted since they have to negotiate the prices, which means that their bargaining position has a strong impact on their profitability. Since the most of the dairy industry in Serbia is concentrated in large capacities, the logical assumption is

that the comparison of the profitability of these companies makes sense only to the large milk producers that are organized as companies. Although they do not have a dominant market share, large milk production companies have organized the most efficient milk production, and may be as much as equal business partners with a large milk processing systems.

In this regard, a comparative analysis of two segments in the chain of milk production (large dairies and large milk producers) should indicate whether there are significant differences in their profitability. Since milk industry is one of the essential sectors of agriculture in Serbia, public interest requires the economic survival of all participants in the milk production chain, and that means a balanced business performance of all participants. In this context, this analysis could set the guidelines for the future agricultural policy of Serbia, which must take into account the sustainability of milk production in all its segments.

2. Theoretical Background

Profitability indicates the earning power and business success of a company (Kimmel et al. 2012). Profitability analysis is based on various ratios calculated from the financial statements data which are then interpreted in order to draw conclusions about the success of operations. Analysis of the results of companies from agricultural sector, as well as companies in the milk production chain is the topic of many researchers, professional organizations and government institutions in many countries (for more details see: Hauser & Lane 2013; Sahin, 2009; Dal Margro et al. 2013; Semerci et al. 2014; Qian et al. 2013; Muminović et al. 2012; Brožova, 2010; Kerbler, 2012; Tekgüç, 2013; Mijić et al. 2014).

The profitability of companies in the milk supply chain is often analyzed from different aspects: as a profitability in a whole milk industry, a profitability in segments of milk industry, a comparison of profitability between different sectors (e.g. dairy farming vs. dairy processing), or a comparison of the profitability of the same group of participants classified according to various criteria (e.g. enterprise size, geographic origin, etc.). For example, analysis of the profitability of a milk production sector in Australia (Hauser & Lane 2013) was conducted by the method of comparative analysis of the profitability ratios (return on assets, return on equity, gross and net profits, etc.) of dairy farms classified by their size into small, medium and large. The results indicate a uniform conclusion that the profitability of the dairy farms increases by increasing the size of farms (companies). Gross margin analysis in dairy cattle in Turkey also shows that large enterprises have produced more milk

and gained more gross margin compared to the small and middle enterprises (Semerci et al. 2014). The analysis of differences in performance between European dairy cooperatives and investor-owned firms were based on the following indicators profitability, debt, operational efficiency, equity growth, size and country dummies (Soboh et al. 2011). The result show that cooperatives are on average less profitable, but operate more efficiently, and have a stronger financial position than investor-owned firms (Soboh et al. 2011).

Painter (2007) compared the profitability of a dairy farms in Canada and New Zealand on the basis of profit, EBITDA and debt ratio indicators. Furthermore, a comparative analysis of the profitability of different sectors in the chain of milk production (dairy farms, dairy processing and supermarkets) was carried out in China (Qian, 2013). The results indicate different levels of profitability among participants, so that supermarkets achieve maximum profitability, followed by dairy farms and dairy processing companies, respectively. Profitability of milk industry in Serbia was analyzed by a comparison of business performance of milk processing companies (financial leverage ratio, ROA, ROE, BEX index) to market average presented by Belex15 and Belexline indices (Muminović et al. 2012). Results suggest that the milk processing companies have above average performance in Serbia.

Given the importance of a milk industry to Serbian economy, as well as the fact that the issue of profitability of various participants in the milk production in Serbia has not been thoroughly studied so far, the paper will further deal with comparative analysis of profitability between dairy farms and milk processors.

3. Materials and Methods

3.1. Materials

There are different indicators of profitability in economic theory and practice. Ratios which are selected to present profitability measures in this paper are as follows:

- Return on Assets (ROA) - measures a company's success in using assets to earn net income.
- Return on Equity (ROE) - measures how much profit (net income) a company generates with the shareholders equity.
- Profit Margin (PM) - indicates net income per unit of sales.

- Assets Turnover (AT) - indicates how efficiently a company is using its assets to generate sales.

The following table (table 1) provides an overview of the indicators and their reference values.

Table 1: Overview of Profitability Ratios

Profitability Ratio	Calculation	Unit	Reference Value
Return on Assets (ROA)	NI/TAavg	Ratio	≥.1
Return on Equity(ROE)	NI/(C+R)	Ratio	≥.15
Profit Margin (PM)	NI / NS	Ratio	≥.0
Assets Turnover (AT)	NS / TAavg	Ratio	Higher value preferred

Source: Author's illustration (according to Horngren et al. 2012; Hall et al. 2014; Walsh, 2008)
Legend:
NI - Net Income
TAavg - average Total Assets
C - Capital
R - Reserves
NS - Net Sales

In order to analyze the profitability of participants in the milk production chain, the companies were divided into two groups: the first group consists of companies engaged in the breeding of dairy cows, and the second group includes milk processing companies. The study was based on a sample of 20 companies, which were divided into two independent samples of the 10 leading companies in the field of breeding cows and milk processing in Serbia. Profitability analysis was carried out for the period 2010-2013, based on data from financial statements of the companies, retrieved from the website of the Business Registers Agency of the Republic of Serbia (http://www.apr.gov.rs). Descriptive statistics of profitability indicators by sector of milk production is presented in the following table (Table 2).

Table 2: Descriptive Statistics for Profitability Indicators by Milk Industry Segments in Period 2010-2013

Profitability ratio and Year	Group	N	Minimum	Maximum	Mean	Std. Deviation	Variance
ROA 2010	Dairy Farming	10	-.1459	.1770	-.106	.1035	.011
	Dairy Processing	10	.0074	.3863	.055	.1329	.018
ROA 2011	Dairy Farming	10	-.1134	.1916	-.012	.0806	.006
	Dairy Processing	10	-.1162	.2176	.082	.1008	.010

ROA 2012	Dairy Farming	10	-.5567	.1763	-.013	.2111	.045
	Dairy Processing	10	.0032	.2045	.081	.0672	.005
ROA 2013	Dairy Farming	10	-.1855	.1074	.041	.0859	.007
	Dairy Processing	10	.0015	.3458	.099	.1159	.013
ROE 2010	Dairy Farming	10	-1.0418	1.4161	-.232	.6762	.457
	Dairy Processing	10	.0137	8.5107	0.150	3.1240	9.759
ROE 2011	Dairy Farming	10	-.7975	.3782	-.040	.3545	.126
	Dairy Processing	10	.0665	3.5958	.238	1.2530	1.570
ROE 2012	Dairy Farming	10	-1.7891	1.0683	-.046	.7839	.615
	Dairy Processing	10	.0390	4.5720	.302	1.6757	2.808
ROE 2013	Dairy Farming	10	-.4192	2.1645	.145	.7552	.570
	Dairy Processing	10	.0206	4.2801	0.416	1.8360	3.384
PM 2010	Dairy Farming	10	-2.2977	1.4092	-.576	1.0528	1.108
	Dairy Processing	10	.0056	.1190	.047	.0420	.002
PM 2011	Dairy Farming	10	-1.2592	.2283	-.088	.4507	.203
	Dairy Processing	10	.0175	.0584	.066	.0148	.000
PM 2012	Dairy Farming	10	-5.6259	.0628	-.085	1.8600	3.460
	Dairy Processing	10	.0014	.0743	.072	.0236	.001
PM 2013	Dairy Farming	10	-5.8214	.4613	.086	1.9450	3.783
	Dairy Processing	10	.0007	.2324	.094	.0794	.006
AT 2010	Dairy Farming	10	.0126	1.8019	.531	.6168	.380
	Dairy Processing	10	1.1007	3.2460	1.801	.9143	.836
AT 2011	Dairy Farming	10	.0293	1.3694	.492	.5073	.257
	Dairy Processing	10	1.1479	3.7277	1.808	.8900	.792
AT 2012	Dairy Farming	10	.0247	1.7527	.578	.6709	.450
	Dairy Processing	10	1.2545	2.7512	1.758	.5335	.285
AT 2013	Dairy Farming	10	.0002	1.6346	.579	.6866	.471
	Dairy Processing	10	1.2312	2.5541	1.735	.4500	.203

Source: Author's calculation

3.2. Methods

Individual profitability indicators (ROA, ROE, PM, AT) distinguish different aspects of the companies' earning capacities. Suitability of certain indicators depends on the given circumstances and the specific reasons for analyzes. That is why there is not only one indicator which could be used to compare profitability of milk production and milk processing in Serbia. In this regard, consideration of different profitability indicators is highly favorable. Additionally, simultaneous combined observation of different profitability ratios is essential for the final conclusion on differences in levels of profitability. Given that the assessment of individual profitability ratios and overall profitability is needed, the authors constructed two basic hypotheses which were used to compare the profitability of dairy industry sectors:

H_1: There is no statistically significant difference in the individual indicators of profitability (ROA, ROE, PM, AT) between the milk production companies and milk processing companies in Serbia in period 2010-2013.

H_2: There is no statistically significant difference in the overall level of profitability between the milk production companies and milk processing companies in Serbia in period 2010-2013.

In accordance with the defined hypotheses, assessment of profitability of companies in milk industry was conducted in two aspects:

- Comparative analysis of individual profitability indicators of milk production companies and milk processing companies,
- Comparative analysis of the overall profitability of milk production companies and milk processing companies.

Comparison of individual profitability indicators of milk production companies and milk processing companies has been based on calculation of average values of individual profitability indicators in given years (ROA, ROE, PM, AT). Average profitability ratios are calculated from aggregate balances for each milk industry sector, farms and dairies, which are obtained by summarizing the data from individual financial statements. The main objective of the comparative profitability analysis is to examine the tendency of changes in individual indicators of profitability between milk production and milk processing in period 2010-2013.

In order to assess trends in each profitability indicator in this period, statistical procedure mixed-design repeated measures ANOVA was carried out (see more: Field, 2009). Milk industry sector label was used as an independent variable (milk production or milk processing), and values of each indicator (ROA, ROE, PM, AT) was used respectively as a dependent variable which was repeatedly measured over a period of four years (2010-2013). Results of performed statistic tests should indicate changes in each profitability ratio within milk industry sectors (within-subject effects) and a difference between them (between-subject effects).

In the second part of the research, a multivariate analysis of variance (MANOVA) was carried out in order to compare the overall profitability of milk production sector and milk processing sector by year. Introduction of this test provided the conclusion on the significance of the differences in overall profitability between these sectors.

Statistical package SPSS IBM Statistics Version 20 was used for the execution of selected statistical tests.

4. Results and Discussion

4.1. Comparison of individual profitability ratios of milk production companies to milk processing companies in Serbia

4.1.1. Return on Assets Ratio (ROA)

Return on assets ratio (ROA) indicates that dairies in Serbia have higher net earnings on invested assets compared to milk production companies in the entire period from 2010 to 2013 (Figure 1). ROA improved in both sectors from year to year, but in all observed years ROA of milk processing companies was higher than ROA of milk production companies.

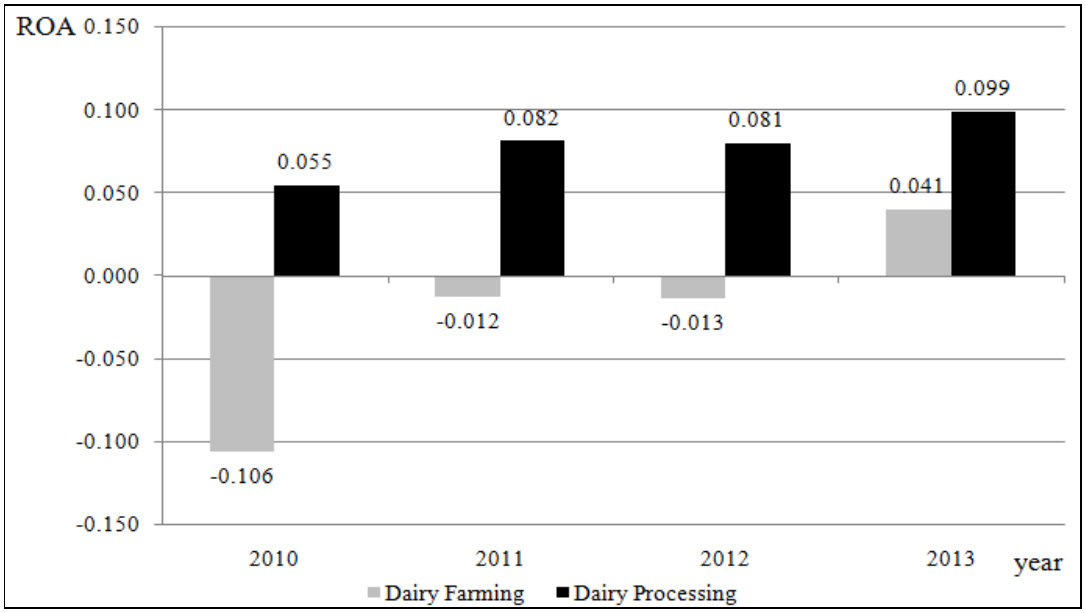

Figure 1: ROA of Dairy Farms and Dairy Processing Companies in Period 2010-2013

Source: Authors' illustration

As defined in the research plan, significance of changes in ROA was tested by mixed design repeated measures ANOVA. Initially, changes in ROA within each milk industry sector in respective years was observed (Table 3), and this analysis was then followed by comparison of ROA between milk industry sectors (Table 4).

Table 3: Test of Within-Subject Effects for ROA

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Year * Dairy Sector	Sphericity Assumed	.016	3	.005	.430	**.732**
	Greenhouse-Geisser	.016	2.637	.006	.430	.708
	Huynh-Feldt	.016	3	.005	.430	.732
	Lower-bound	.016	1	.016	.430	.521

Source: Author's calculation, SPSS Output Table

Assumption of sphericity was tested using Mauchly's test. This test showed that the assumption of sphericity was not violated $\chi 2$ (5) = 3.732, $p > .05$. Taking that in consideration, it can be concluded that within certain dairy sectors, there was no statistically significant difference in ROA over the period ($p > .05$).

Table 4: Test of Between-Subject Effects for ROA

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	.055	1	.055	3.348	.086
Dairy Sector	.180	1	.180	10.898	**.005**
Error	.264	16	.017		

Source: Author's calculation, SPSS Output Table

The results of between-subject tests indicate a statistically significant difference between the ROA in milk production sector and milk processing sector in the period, F (1,16) = 10.898, $p < .05$.

4.1.2. Return on Equity Ratio (ROE)

Analysis of ROE from aggregated financial statements indicated that dairies achieved higher return of capital invested by owners in the entire period (Figure 2Figure 2). The rate of return on capital in this period had a constant tendency of improvement in both sectors of milk industry.

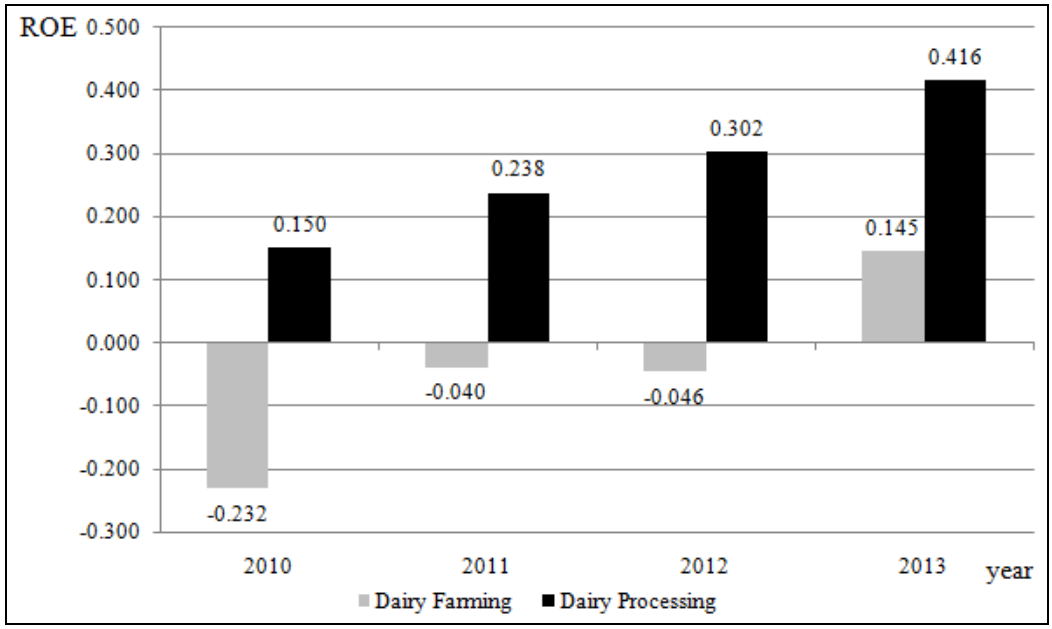

Figure 2: ROE of Dairy Farms and Dairy Processing Companies in Period 2010-2013

Source: Authors' illustration

Observation of changes in ROE provided the following results (table 5):

Table 5: Test of Within-Subject Effects for ROE

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Year * Dairy Sector	Sphericity Assumed	.442	3	.147	.250	**.861**
	Greenhouse-Geisser	.442	2.300	.192	.250	.810
	Huynh-Feldt	.442	2.876	.154	.250	.853
	Lower-bound	.442	1.000	.442	.250	.624

Source: Author's calculation, SPSS Output Table

Assumption of sphericity was tested using Mauchly's test. The test showed that the assumption of sphericity was not violated $\chi 2(5) = 8.605$, $p > .05$. Taking that in consideration, it can be concluded that within certain dairy sectors, there was no statistically significant difference in ROE over the period ($p > .05$).

Figure 2 shows that milk processing companies had higher ROE than milk production companies, but in order to test whether the difference in ROE is a coincidence or it has a systemic character, it is necessary to perform a statistical test. The results of this study are shown in the following table 6:

Table 6: Test of Between-Subject Effects for ROE

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	15.570	1	15.570	2.563	.129
Dairy Sector	17.400	1	17.400	2.864	**.110**
Error	97.212	16	6.076		

Source: Author's calculation, SPSS Output Table

The results indicate that the difference in ROE between milk industry sectors was not statistically significant, $F(1,16) = 2.864$, $p > .05$.

4.1.3. Profit Margin Ratio (PM)

Analysis of profit margin based on aggregated financial statements indicates that dairies generate more earnings for each monetary unit of sales compared to the dairy farms. Rate of return on the monetary unit sales had a constant tendency to increase in the period with a noticeable reduction in the difference in the level of profit margins so that they are in 2013 almost equalized (Figure 3).

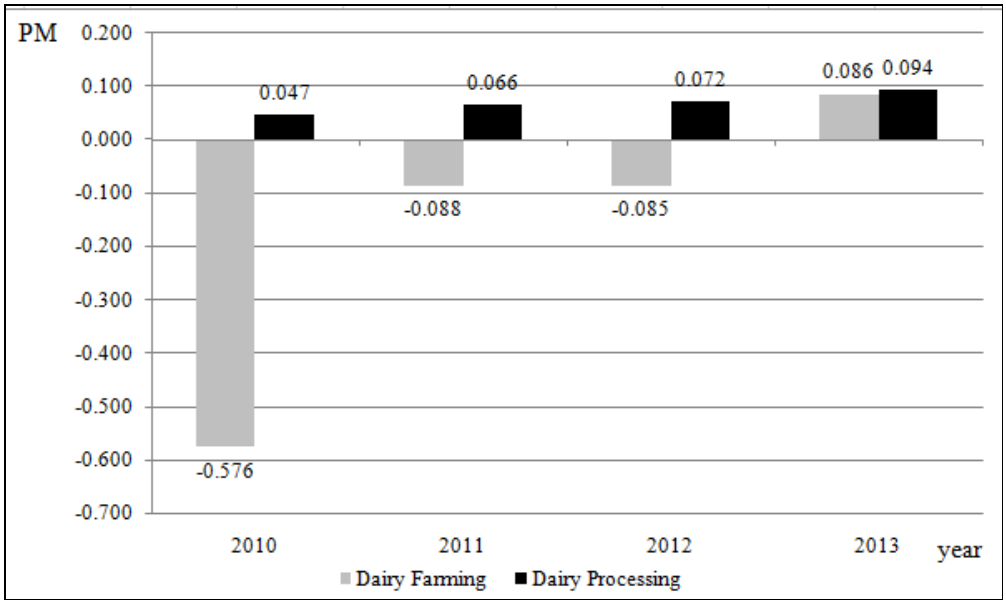

Figure 3: PM of Dairy Farms and Dairy Processing Companies in Period 2010-2013
Source: Authors' illustration

Observation of changes in PM provided the following results (see table 7):

Table 7: Test of Within-Subject Effects for PM

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Year * Dairy Sector	Sphericity Assumed	1.605	3	.535	.617	.608
	Greenhouse-Geisser	1.605	1.102	1.457	.617	**.458**
	Huynh-Feldt	1.605	1.197	1.341	.617	.470
	Lower-bound	1.605	1.000	1.605	.617	.444

Source: Author's calculation, SPSS Output Table

Since Mauchly's test indicated that assumption of sphericity was violated with PM $\chi 2$ (5) = 70,045, $p < .05$, degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ($\varepsilon = .367$). Repeated measurements of PM in the reported period indicate that no statistically significant change was demonstrated in the level of realized profit margins within certain sectors ($p > .05$).

Comparison of PM between milk industry sectors is shown in the following table 8.

Table 8: Test of Between-Subject Effects for PM

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	4.860	1	4.860	3.422	.083
Dairy Sector	6.922	1	6.922	4.873	**.042**
Error	22.727	16	1.420		

Source: Author's calculation, SPSS Output Table

Even though the profit margins of milk industry sectors that were calculated from aggregate balances were significantly closer in 2013, looking at individual companies in the entire four-year period, however, we may conclude that there is a statistically significant difference in PM between milk industry sectors, F (1,16) = 4.873, $p < .05$.

4.1.4. Assets Turnover Ratio (AT)

Analysis of assets turnover (AT) shows that milk processing companies used their property more efficiently (Figure 4).

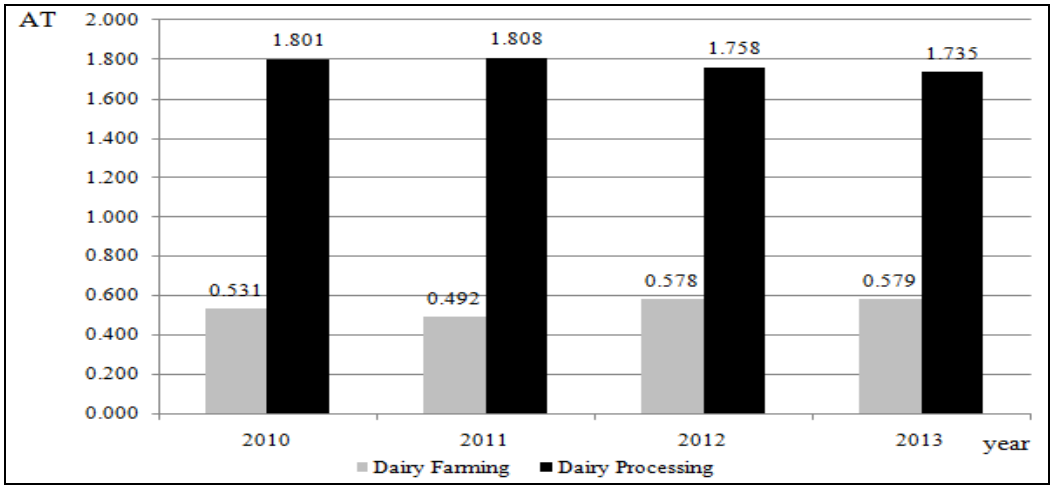

Figure 4: AT of Dairy Farms and Dairy Processing Companies in Period 2010-2013

Source: Authors' illustration

Observation of changes in AT in period provided the following results (see table 9):

Table 9: Test of Within-Subject Effects for AT

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Year * Dairy Sector	Sphericity Assumed	.080	3	.027	.518	.672
	Greenhouse-Geisser	.080	2.233	.036	.518	**.620**
	Huynh-Feldt	.080	2.774	.029	.518	.658
	Lower-bound	.080	1.000	.080	.518	.482

Source: Author's calculation, SPSS Output Table

Since Mauchly's test indicated that assumption of sphericity was violated with AT $\chi 2(5) = 15.314$, $p < .05$, degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ($\varepsilon = .744$). Implemented testing procedures indicate that the rates of AT did not significantly vary in the sectors of milk production and milk industry within observed years ($p > .05$).

Comparison of AT between milk industry sectors is shown in the following table (table 10).

Table 10: Test of Between-Subject Effects for AT

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	82.575	1	82.575	49.269	.000
Dairy Sector	19.928	1	19.928	11.890	**.003**
Error	26.816	16	1.676		

Source: Author's calculation, SPSS Output Table

When comparing AT of milk production companies and milk processing companies in Serbia, it can be observed that there is a statistically significant difference between them, which means that milk processing companies have significantly better AT, $F(1,16) = 11.890$, $p < .05$.

4.2. Comparison of Overall Profitability of Milk Production Companies to Milk Processing Companies in Serbia

Comparison of overall profitability should provide a key answer to the question of the relationship between milk production companies and milk processing companies in Serbia. Overall profitability takes into account the cumulative impact of all individual profitability indicators (ROA, ROE, PM, AT). Since individual financial indicators are different dependent variables that were measured simultaneously to evaluate the overall profitability in milk

industry, statistical test of multivariate analysis of variance (MANOVA) was used. MANOVA was carried out for each year in period 2010-2013.

Test of the assumption of homogeneity of covariance matrices was carried out before application of MANOVA. This test was performed by applying the Box test in accordance with the SPSS procedure. It was observed that the data did not pass the test of homogeneity of covariance matrices in each year. In these circumstances, we accepted the view that the Hotelling's trace was robust when comparing the two groups using the samples of the same size (Field, 2009).

4.2.1. Comparison of overall profitability of milk production companies to milk processing companies (2010)

Results of MANOVA test for 2010 are shown in the following table 11:

Table 11: Comparative analysis of overall profitability of milk production companies to milk processing companies in 2010 in Serbia

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared	Noncent. Parameter
Intercept	Pillai's Trace	.780	11.498	4	13	.000	.780	45.992
	Wilks' Lambda	.220	11.498	4	13	.000	.780	45.992
	Hotelling's Trace	3.538	11.498	4	13	.000	.780	45.992
	Roy's Largest Root	3.538	11.498	4	13	.000	.780	45.992
Dairy Sector	Pillai's Trace	.412	2.279	4	13	.116	.412	9.116
	Wilks' Lambda	.588	2.279	4	13	.116	.412	9.116
	Hotelling's Trace	.701	2.279	4	13	**.116**	.412	9.116
	Roy's Largest Root	.701	2.279	4	13	.116	.412	9.116

Source: Author's calculation, SPSS Output Table

Since the Box test showed that assumption of homogeneity of covariance was violated, M = 103 862, F (10,1223.91) = 7.510, p <.001, Hotelling trace statistic was applied. Using Hotelling trace showed no significant difference in the level of profitability between milk production companies and milk processing companies in 2010, T = .701, F (4,13) = 2.279, p > .05.

4.2.2. Comparison of overall profitability of milk production companies to milk processing companies (2011)

Results of MANOVA test for 2011 are shown in the following table (table 12):

Table 12: Comparative analysis of overall profitability of milk production companies to milk processing companies in 2011 in Serbia

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared	Noncent. Parameter
Intercept	Pillai's Trace	.885	28.802	4	15	.000	.885	115.209
	Wilks' Lambda	.115	28.802	4	15	.000	.885	115.209
	Hotelling's Trace	7.681	28.802	4	15	.000	.885	115.209
	Roy's Largest Root	7.681	28.802	4	15	.000	.885	115.209
Dairy Sector	Pillai's Trace	.596	5.533	4	15	.006	.596	22.133
	Wilks' Lambda	.404	5.533	4	15	.006	.596	22.133
	Hotelling's Trace	1.476	5.533	4	15	**.006**	.596	22.133
	Roy's Largest Root	1.476	5.533	4	15	.006	.596	22.133

Source: Author's calculation, SPSS Output Table

Since the Box test showed that assumption of homogeneity of covariance was violated, $M = 64.967$, $F(10,1549) = 4.903$, $p < .001$, Hotelling trace statistic was applied. Using Hotelling trace showed a significant difference in the level of profitability between milk production companies and milk processing companies in 2010, $T = 1.476$, $F(4,15) = 5.533$, $p < .05$.

4.2.3. Comparison of overall profitability of milk production companies to milk processing companies (2012)

Results of MANOVA test for 2012 are shown in the table 13:

Table 13: Comparative analysis of overall profitability of milk production companies to milk processing companies in 2012 in Serbia

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared	Noncent. Parameter
Intercept	Pillai's Trace	.838	19.328	4	15	.000	.838	77.313
	Wilks' Lambda	.162	19.328	4	15	.000	.838	77.313
	Hotelling's Trace	5.154	19.328	4	15	.000	.838	77.313
	Roy's Largest Root	5.154	19.328	4	15	.000	.838	77.313
Dairy Sector	Pillai's Trace	.484	3.524	4	15	.032	.484	14.097
	Wilks' Lambda	.516	3.524	4	15	.032	.484	14.097
	Hotelling's Trace	.940	3.524	4	15	**.032**	.484	14.097
	Roy's Largest Root	.940	3.524	4	15	.032	.484	14.097

Source: Author's calculation, SPSS Output Table

Since the Box test showed that assumption of homogeneity of covariance was violated, M = 103.879, $F(10,1549)$ = 7.839, $p < .001$, Hotelling trace statistic was applied. Using Hotelling trace showed a significant difference in the level of profitability between milk production companies and milk processing companies in 2010, T = .940, $F(4,15)$ = 3.524, $p < .05$.

4.2.4. Comparison of overall profitability of milk production companies to milk processing companies (2013)

Results of MANOVA test for 2013 are shown in the following table (table 14):

Table 14: Comparative analysis of overall profitability of milk production companies to milk processing companies in 2013 in Serbia

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared	Noncent. Parameter
Intercept	Pillai's Trace	.855	19.214	4	13	.000	.855	76.855
	Wilks' Lambda	.145	19.214	4	13	.000	.855	76.855
	Hotelling's Trace	5.912	19.214	4	13	.000	.855	76.855
	Roy's Largest Root	5.912	19.214	4	13	.000	.855	76.855
Dairy Sector	Pillai's Trace	.537	3.776	4	13	.030	.537	15.105
	Wilks' Lambda	.463	3.776	4	13	.030	.537	15.105
	Hotelling's Trace	1.162	3.776	4	13	**.030**	.537	15.105
	Roy's Largest Root	1.162	3.776	4	13	.030	.537	15.105

Source: Author's calculation, SPSS Output Table

Since the Box test showed that assumption of homogeneity of covariance was violated, M = 68.344, $F(10,1223.904)$ = 4.982, $p < .001$, Hotelling trace statistic was applied. Using Hotelling trace showed a significant difference in the level of profitability between milk production companies and milk processing companies in 2010, T = 1.162, $F(4,13)$ = 3.776, $p < .05$.

5. Conclusion

A comparative analysis of the profitability of companies involved in the milk production and milk processing in Serbia was done on the basis of individual financial profitability indicators and the level of overall profitability. Research results indicate the

significant differences in the level of profitability of companies in different milk industry sectors in the period 2010- 2013 in favor of milk processing companies.

When considering individual profitability indicators, research has shown that in the given period there were significant differences in the level of ROA, PM and MT between milk production companies and milk processing companies, while the difference in ROE was not statistically proven. In all these indicators, the dairies had better profitability indicators. When observing the changes in profitability indicators within each milk industry sector, it can be concluded that there are no significant variations in profitability, although analysis of summary financial report shows improvements, which means that these improvements are not evenly distributed within the sector.

Analysis of overall profitability by taking into account all individual profitability indicators, showed that in 2010 there was no significant difference in the level of profitability between milk production companies and milk processing companies, and in the following years (2011-2013) dairies had significantly higher levels of profitability which suggests dipper disturbances in milk industry chain.

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