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## **Assessment of the Financial Condition of Selected Dairy Cooperatives during the COVID-19 Pandemic**

**Abstract.** The aim of the article is to present the financial condition of selected dairy cooperatives using ratio analysis and selected discriminant models. The main objective of the paper is to assess the overall financial condition of dairy cooperatives during the COVID-19 pandemic (2020-2021) and earlier years (2017-2019). The author focused, on the one hand, on the assessment of the financial condition of a selected group and, on the other hand, on the link between the financial situation of selected dairy cooperatives and state aid during the changing economic reality caused by the SARS CoV-2 virus. The financial analysis for dairy cooperatives also reveals a broader comparative context in the time span before and during the COVID-19 pandemic. The research shows that the analysed dairy cooperatives, with the exception of OSM Jasienica Rosielna, did not have a negative financial results.

**Key words:** COVID-19 pandemic, finances of dairy cooperatives, financial condition, discriminatory models

**JEL Classification:** F01, G01, Q12

### **Introduction**

There is no universal concept for the development of enterprises and their financial analysis, as each economic entity has its own distinctive characteristics and goals to pursue (Akhmetshin 2017). The market economy is characterised by high volatility of economic and legal conditions, including increasing competition. The functioning of business entities is subject to periodic cyclical influences, causing financial instability, which may end in insolvency and, consequently, in the bankruptcy of the enterprise (Piątek, Konat-Staniek 2017). The prediction of business bankruptcy, as well as business failure itself, is a problem all over the world, both in academic research and in practice. General equilibrium in the economy, its disruptions and the cyclical nature of economic depressions are issues that appear in numerous works by academics, including those honoured with the Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel (Siekierski 2012). These days, companies are faced with many challenges in order to stay afloat, and it is therefore important to keep an ongoing check on a company's financial health (Glen 2012). Predicting future financial health is difficult due to the occurrence of unpredictable phenomena, so-called Black Swan events (Mączyńska 2020). Taleb's theory pointed to the need to develop a strategy to prepare for Black Swan shocks that may occur in the future.

The COVID-19 pandemic caused an unexpected situation in global economies. Majewski (2012) highlighted that intensifying globalisation processes that cause instability in one part of the world or industry quickly spill over to other parts of the world economy,

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thereby amplifying the negative effects. Disruption to supply chains, constraints on the operation of businesses and, consequently, the prospect of illiquidity in business entities has become a sudden problem that business managers and the public have had to face. The outbreak of the COVID-19 pandemic and its consequent aftermath such as lockdowns and the disruption of supply chains caused an accelerated change in national macroeconomic determinants such as price and gross domestic product (Ligaj, Pawlos 2021). In the face of the COVID-19 pandemic, managers of operations in the food industry had an additionally difficult task due to the significant challenges of this industry in the Polish economy as well as globally. The time of the COVID-19 pandemic was a major challenge especially for companies in the agricultural sector (Barichello 2020). Of the entire agricultural sector, the dairy industry was most affected during the COVID-19 pandemic, as dairy products are perishable and vulnerable to the problem of supply chain disruption (Drury 2020). Wang's et al. (2020) indicated that the impact of the COVID-19 pandemic on the dairy industry was a major challenge for dairy farmers around the world, including China and the United States. The biggest problem was logistical issues related to transportation and surplus milk. Yaffe-Bellany and Corkery (2020) pointed out that the pandemic caused significant global milk losses associated with the disrupted supply chain.

Since Poland's accession to the European Union in 2004, the food industry has been one of the most important economic sectors. Firlej (2017) also pointed out that the food industry requires the use of necessary resources to ensure its smooth functioning. The supply of goods to the food market is reflected in the state and financial condition of the companies in the industry. Based on published data from Krajowy Ośrodek Wsparcia Rolnictwa (KOWR) the value of Polish food exports in 2021 was PLN 170.8 billion. The authors of the publication indicate that Polish products manufactured in the food industry, due to the high concentration of sales to foreign markets during the COVID-19 pandemic, will suffer from problems in selling their products, due to difficulties in international trade.

A particular form of enterprise in the food economy is the cooperative, which has a dual character (Zuba, Zuba 2009). The dairy industry has become the fastest growing sector in the food industry since Poland joined the European Union on 1 May 2004. The dairy industry has met the quality and technological requirements of the European Union (Suchoń 2012). Dairy cooperatives are an opportunity for small agricultural producers, as this type of enterprise combines the material means of capital and the mutual cooperation of people cooperativism. As Suchoń (2013) emphasised, dairy cooperatives are important against the background of the food industry and the market economy and therefore cannot be discriminated against. Small dairy cooperatives should strive for more efficient and effective management in order to be competitive and offer quality products.

The production of milk and dairy products in Poland is of vital economic importance, as it is the most important branch of the agricultural economy. The further development of dairy co-operatives is dependent on their accumulated own funds, which also include profit. The global value of agricultural production in 2020 was PLN 121.7 billion compared to PLN 69.7 billion in 2004, when Poland joined the European Union. The market economy requires an enterprise to constantly monitor and evaluate its financial performance. Access to analytical information and assessment of an enterprise's current operations enables an efficient evaluation of its financial condition and possible correction of its actions in the event of unsatisfactory results. In order to ensure economic stability, a common quantitative tool used in enterprises is the use of ratio analysis (Jachna, Sierpińska 2007).

Wojnar (2014) indicated that financial analysis should be supported by an additional tool in assessing the financial condition of companies. This is because a situation may arise in which it is unclear which financial indicators show the good or bad condition of a company. Whether high profitability or low liquidity, for example, should be decisive. It is therefore necessary to use additional tools with which to identify a company's financial situation. One such tool, which is used due to their universality and ease of use, are discriminant models (Hamrol, Czajka, Piechocki 2004).

Managing an enterprise by comparing the financial performance of a given company to that of another in the same industry is called 'benchmarking'. This is a frequent activity in business practice, as it allows an assessment of where a company's financial position is compared to others with a similar business profile (Wędzki 2006).

## Methodology

The main objective of the study is to assess the overall financial condition of dairy cooperatives during the COVID-19 pandemic period (2020-2021) and earlier years (2017-2019). The selection of the sample for the study was purposeful, dictated by the fact that the dairy industry is the fastest growing branch of the food industry, and the production of milk and dairy products is the largest branch of Poland's agricultural economy, so the financial condition of these enterprises should be analysed on an ongoing basis. Ratio analysis and two selected Polish discriminant models were used to achieve the objectives: Model A. Hołda and the Poznański model. A number of early warning tools can be found in the literature, e.g. artificial neural network, the indicator method, unidimensional and multidimensional discriminant models (Czerwińska-Kayzer, Florek 2012). In this study, discriminant models are used. The selection of models was dictated by their frequency of occurrence in the literature and selected models adapted to Polish conditions.

The construction of Artur Hołda's discriminant model is based on a constant size and takes into account five indicators: current liquidity, total debt, asset turnover, return on assets and the current liabilities turnover ratio in days (Hołda 2001). The Hołda's discriminant model captures universal characteristics and can serve a large group of so-called sector-wide companies (Noga, Adamowicz, Jakubowski 2014).

The Poznański discriminant model was developed by M. Hamrol, B. Czajka and M. Piechocki based on a study of the financial statements of 100 Polish commercial law companies. The construction of the model is based on a constant size and four financial ratios: return on assets, quick liquidity, fixed-asset-to-equity-capital ratio and gross margin on sales (Hamrol, Czajka, Piechocki 2004). The efficiency of the Poznański discriminant model was determined to be 92.98% reliable (Bombiak 2010).

The financial indicator that combines the Hołda model and the Poznański model is the return on assets. The return on assets indicator shows the relationship between a company's financial performance and its assets and is considered one of the best individual indicators of management competence (Kusuma 2021).

Eight dairy cooperatives located in Poland with public access to financial data were analysed. The dairies to be surveyed were located in the following voivodships in Poland: two each in małopolskie and podlaskie, and one each in mazowieckie, łódzkie, warmińsko-mazurskie and podkarpackie. The selected dairy cooperatives have organic production certificates for selected products.

Based on data from the annual financial statements of the analysed dairy cooperatives, the following indicators were calculated for the index analysis:

1. gross profitability of sales =  $\frac{\text{gross financial result}}{\text{sales revenue}}$ ,
2. net return on sales =  $\frac{\text{net financial result}}{\text{sales revenue}}$ ,
3. net return on equity =  $\frac{\text{net financial result}}{\text{total equity}} \cdot 100\%$ ,
4. current ratio =  $\frac{\text{current assets}}{\text{current liabilities}}$ ,
5. quick liquidity ratio =  $\frac{\text{current assets} - \text{stocks} - \text{short-term prepayments}}{\text{current liability}}$ ,
6. cash solvency =  $\frac{\text{cash and cash equivalents}}{\text{current liabilities}}$ ,
7. inventory turnover =  $\frac{\text{average inventory}}{\text{cost of goods sold}} \cdot 365$  (in days),
8. settlement of short-term receivables =  $\frac{\text{short-term receivables}}{\text{net sales revenue}} \cdot 365$  (in days),
9. liabilities turnover ratio =  $\frac{\text{current liability}}{\text{net sales revenue}} \cdot 365$  (in days),
10. total debt =  $\frac{\text{external capital}}{\text{total assets}} \cdot 100\%$ .

## Results

Table 1 presents data resulting from calculations using ratio analysis for selected dairy cooperatives that show no clear signs of good or bad financial condition. There is a noticeable trend of increasing total debt for the selected dairy cooperatives since the pandemic (2020). Also noticeable is a decrease in the following financial indicators since 2020: gross profitability, net profitability, net return on equity.

Based on the indicator analysis, a trend of increasing total debt can be observed for the selected dairy cooperatives at the turn of the analysed years. Negative profitability indices for OSM in Jasienica Rosielna in 2021, EkoŁukta 2020 and 2018 indicate deteriorating profitability and losses occurring. The inventory turnover ratio has an increasing trend in the surveyed dairy cooperatives. The high inventory turnover rate should be interpreted in a way that threatens liquidity, as there are delays in the renewal of stocks.

Table 1. Calculated selected financial indicators for the analysed dairy cooperatives in 2017-2021

Specification		Financial ratio*									
		1	2	3	4	5	6	7	8	9	10
2017	OSM Nowy Sącz	3.57	2.87	10.50	2.11	1.57	0.65	21	36	39	26.70
	Nutrica Zakłady Produkcyjne	3.22	2.60	37.06	0.68	0.39	0.01	21	31	79	75.17
	OSM Piątnica	1.16	0.92	2.81	1.94	1.74	0.66	16	47	43	24.52
	OSM Radomsko	1.97	1.59	7.17	1.76	1.17	0.42	220	35	47	41.52
	Mleczarnia EkoŁukta	0.21	0.21	-7.38	0.74	0.35	0.01	38	51	151	107.18
	ZPM DOMINIK	22.00	16.33	1.71	0.83	0.53	0.10	1101	854	2009	39.14
	OSM Jasienica	32.45	26.10	4.23	4.67	4.36	1.55	27	292	533	18.36
	Rosielna										
	SM Mlekovita	2.99	2.32	10.63	1.70	1.27	0.31	16	47	52	45.01
2018	OSM Nowy Sącz	2.82	2.26	8.11	2.74	2.19	1.03	21	39	34	19.72
	Nutrica Zakłady Produkcyjne	2.54	2.01	29.42	0.57	0.35	0.01	23	36	104	77.87
	OSM Piątnica	0.62	0.40	1.26	2.01	1.75	0.67	19	50	45	26.63
	OSM Radomsko	-0.80	-0.79	-3.77	1.71	1.06	0.31	238	31	41	38.34
	Mleczarnia EkoŁukta	-3.79	-3.79	65.81	0.60	0.25	0.01	40	27	107	122.15
	ZPM DOMINIK	47.46	39.76	5.06	1.03	0.73	0.17	626	714	1288	33.79
	OSM Jasienica	22.90	18.47	2.84	4.32	3.96	1.21	27	297	591	19.10
	Rosielna										
	SM Mlekovita	0.16	0.29	1.39	1.65	1.22	0.12	25	53	51	47.00
2019	OSM Nowy Sącz	2.73	0.92	0.75	2.89	2.35	1.31	19	34	33	35.71
	Nutrica Zakłady Produkcyjne	4.20	3.34	32.36	0.62	0.33	0.01	28	33	106	70.84
	OSM Piątnica	1.63	1.25	3.38	2.07	1.85	0.67	11	57	48	25.28
	OSM Radomsko	-3.97	-4.03	21.41	1.41	0.92	0.18	205	34	45	42.77
	Mleczarnia EkoŁukta	1.60	1.60	17.86	0.62	0.21	0.01	70	37	176	120.95
	ZPM DOMINIK	15.66	9.90	1.18	1.08	0.70	0.21	677	664	1339	31.86
	OSM Jasienica	16.64	13.43	1.84	4.69	4.40	1.29	27	301	612	17.97
	Rosielna										
	SM Mlekovita	1.08	0.87	4.37	1.82	1.35	0.28	42	48	44	44.94
2020	OSM Nowy Sącz	0.004	0.003	1.31	2.55	2.01	1.08	21	32	34	40.00
	Nutrica Zakłady Produkcyjne	0.03	0.03	17.35	0.69	0.34	0.005	-	32	106	67.00
	OSM Piątnica	0.01	0.01	2.87	1.85	1.66	0.51	52	52	45	50.74
	OSM Radomsko	0.002	0.001	0.63	1.82	1.28	0.58	151	27	38	83.72
	Mleczarnia EkoŁukta	-0.12	-0.12	0.66	0.52	0.18	0.006	-	38	215	442.09
	ZPM DOMINIK										
	OSM Jasienica	0.02	0.014	0.19	4.78	4.52	1.49	24	274	606	497.00
	Rosielna										
	SM Mlekovita	0.02	0.17	8.78	1.94	1.47	0.58	1212	37	37	120.07
2021	OSM Nowy Sącz	0.01	0.01	3.53	2.28	2.20	1.10	21	31	41	44.80
	Nutrica Zakłady Produkcyjne	0.05	0.042	4.25	0.66	0.37	0.007	-	46	132	150.00
	OSM Piątnica	0.006	0.004	1.43	1.73	1.50	0.42	12	50	47	53.47
	OSM Radomsko	0.081	0.07	22.25	2.94	2.47	1.68	161	30	38	85.77
	Mleczarnia EkoŁukta	-	-	-	0.46	0.16	0.013	-	-	-	540.00
	ZPM DOMINIK										
	OSM Jasienica	-0.26	-0.26	-3.91	4.02	3.75	1.18	264	264	65	427.15
	Rosielna										
	SM Mlekovita	0.02	0.016	8.15	1.89	1.39	0.33	2343	45	45	121.76

Source: Author's own calculations based on financial statements of selected dairy cooperatives.

The ratio analysis carried out did not indicate unequivocally whether the cooperatives were financially sound or at risk of bankruptcy. For this purpose, an assessment of the

probability of bankruptcy of cooperatives was carried out using two Polish discriminant models: Hołda and Poznański. For all the analyses of the discriminant models, the following cell colours were adopted for a better graphical presentation:

- green - enterprise is in good financial condition,
- red - threat of bankruptcy,
- grey – data is not available.

Table 2. Indicators of model A. Hołda of the analysed dairy cooperatives in 2017-2021

Dairy cooperatives	2017	2018	2019	2020	2021
OSM Nowy Sącz	1.95	2.49	2.26	1.16	1.77
Nutrica Zakłady Produkcyjne	15.38	8.52	0.18	2.34	0.48
OSM Piątnica	2.38	2.40	1.86	1.57	1.44
OSM Radomsko	1.47	1.53	1.28	1.34	2.08
ZPM DOMINIK	0.45	0.70	0.75	-	-
Mleczarnia EkoŁukta	-	-	-	-	-
OSM Jasienica Rosielna	3.50	3.25	6.99	-4.50	-4.85
SM Mlekovita	1.45	1.79	1.82	0.90	1.00

Source: Author's own calculations based on financial statements of selected dairy cooperatives.

The discriminant analysis based on the Hołda model showed that only for the OSM in Jasienica Rosielna there is a threat of bankruptcy since the COVID-19 pandemic. For the remaining dairies, the value of the discriminant model function is greater than zero, indicating good financial condition of the company. The higher the value of the calculated function, the better the situation of the enterprise and the lower the risk of bankruptcy. An increase in the value of the function over time signifying the financial improvement of the enterprise was noted only in the Okręgowa Spółdzielnia Mleczarska in Radomsko. In the other cases, the indicator decreased between the pre-pandemic time (2017-2019) and the pandemic time (2020-2021).

Table 3. Indicators of the Poznański model of the analysed dairy cooperatives in 2017-2021

Dairy cooperatives	2017	2018	2019	2020	2021
OSM Nowy Sącz	1.57	4.86	5.00	10.53	17.66
Nutrica Zakłady Produkcyjne	7.14	5.90	6.25	7.65	4.31
OSM Piątnica	10.15	10.05	3.67	16.69	9.95
OSM Radomsko	8.55	8.32	7.32	4.51	6.23
ZPM DOMINIK	4.62	2.86	-	-	-
Mleczarnia EkoŁukta	4.79	3.44	4.30	-	-
OSM Jasienica Rosielna	-24.60	-25.34	-20.23	7.43	10.34
SM Mlekovita	8.42	8.93	9.24	11.03	26.28

Source: Author's own calculations based on financial statements of selected dairy cooperatives.

The performed study of the probability of bankruptcy on the same sample of dairy cooperatives showed that, based on the Poznański discriminant model, all analysed dairy cooperatives during the COVID-19 pandemic are profitable. It is noteworthy that the OSM in Jasienica Rosielna, on the basis of the analysis carried out in the discriminant Poznański

model at the time before the COVID-19 pandemic had negative values of the function, while during the COVID-19 pandemic it showed profitability. The opposite situation occurred for this dairy cooperative in the model of Hołda. In the time before the pandemic, it showed good financial condition, while during the COVID-19 pandemic it had negative function values of the discriminant model.

Table 4. Nominal value of aid for the dairies analysed in 2017-2021

Dairy cooperatives	Nominal value of the aid [PLN]
OSM Nowy Sącz	30,774.59
Nutrica Zakłady Produkcyjne	418,290.60
OSM Piątnica	43,789,998.07
OSM Radomsko	120,205.91
ZPM DOMINIK	605,664.00
Mleczarnia EkoŁukta	483,196.19
OSM Jasienica Rosielna	548,513.00
SM Mlekovita	12,493,687.61

Source: Author's own calculations based on SUDOP UOKIK reports - search for aid received by beneficiary.

In addition, an analysis was carried out on the aid received in the analysed years 2017-2021. State aid allocated to the studied dairy cooperatives was not classified as aid compensating for the negative financial consequences related to the COVID-19 pandemic. In most cases, it was *de minimis* aid. OSM in Jasienica Rosielna, which showed the highest probability of bankruptcy in the discriminatory analysis, received the highest nominal value of aid among enterprises that operate regionally.

## Conclusions

The research showed that according to both the Hołda model and the Poznański model, the threat of bankruptcy is posed by the Okręgowa Spółdzielnia Mleczarska in Jasienica Rosielna located in the podkarpackie voivodship at different times. Undoubtedly, this is a cooperative among all of those analysed, for which it would be necessary to deepen the assessment of financial condition due to ambiguous results.

On the basis of the conducted analyses, it can be concluded that during the COVID-19 pandemic the financial results of the studied dairy cooperatives were reduced. However, the values they present are classified as profitable enterprises. It is also worth noting that each of the analysed dairy cooperatives received public aid in the form of financial assistance between 2017 and 2021. This confirms that dairies are an important link of economic entities in Poland and maintaining their profitability is important for the functioning of the food industry in Poland, which is dynamically developing and competing with foreign dairy giants.

In conclusion to the research, it can be confirmed that the discriminant analysis presents synthetic results, thus enabling more precise and unambiguous conclusions to be drawn about the threat of bankruptcy than basing knowledge solely on indicator analysis.



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