ASSESSMENT OF ECONOMIC PERFORMANCE OF AGRICULTURAL FARMS IN POLAND WITH SPECIAL EMPHASIS ON SPECIALIZED DAIRY FARMS

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Abstract: This study attempts to assess the results of resource management in specialized dairy farms compared to the overall sample of agricultural farms in Poland, which participated in agricultural accounting within the FADN system in 2020. The study focuses on analyzing economic and production results as well as the profitability and productivity of land, labor, and capital. The analysis indicates a similar level of land productivity in both groups of farms. Farms specializing in milk production showed higher labor productivity with lower capital involvement. Additionally, the studied dairy farms achieved significantly higher economic results compared to the overall sample of farms, resulting in higher income from production resources.

Keywords: economic performance of agricultural farms; dairy farms; Poland

1 Introduction

Dairy cattle farming is one of the fundamental branches of agricultural production in Poland, with over 70% of animal product purchases being cow milk. The specialization and concentration of production, increased herd sizes, and higher milk yields make milk production a stable and reliable source of income for farmers (Olszewska, 2015; Kilar, 2022). Poland's moderate climate and relatively favorable natural conditions for cattle farming and milk production contribute to its position as one of the largest milk producers in Europe in 2020, ranking twelfth in the global milk production (FAO Stat 2022). The main factor contributing to the growth of milk production in Poland is the improved profitability after joining the European Union. Moreover, Polish dairy farms have lower production costs compared to Western European countries, enhancing the profitability of this sector (Malaga-Toboła and Kocira, 2013, Kilar 2022).

The basic concepts related to the goals of economic activities are profit and income. Achieving profit or income means that the value of production or service provided in each period exceeds the production costs (Koutouzidou et al. 2022). Profit is a characteristic category for economic activities of enterprises, while individual farms calculate income. Farming labor and family members' work are not paid regularly, and it does not represent a wage category for all family members (Zegar 2008). The earned agricultural income serves as payment for labor and is comparable to wages for hired labor. Income represents the newly created value in the production process on the farm. One of the fundamental indicators of farming, essential from the farmers' perspective, is achieving production-economic goals, which involves producing an adequate amount of agricultural products and ensuring satisfactory income. Such an assessment allows identifying farms that operate at an appropriate level and provide the farmer's family with remuneration comparable to average wages earned in other sectors of the national economy. The economic result of farmers' decisions is the income obtained from the agricultural farm, which is a measurable effect of agricultural activity. It is also used to assess the profitability of agricultural production factors, including labor efficiency on the farm, both in terms of the ability to achieve extended reproduction and the ability to support the family associated with the farm.

Economic assessments of farms can be made using various indicators, such as basic financial indicators like gross agricultural income, personal income, income parity, and personal income structure. Kilar (2022) defines efficiency in agriculture as one of the ways to assess farm performance, representing the relation of effects to resources used. This approach allows measuring efficiency using partial synthetic indicators of resource utilization. Farms engaged in extensive production, characterized by low unit production and low costs, and farms engaged in intensive agricultural production, characterized by high unit production and high costs, can achieve favorable efficiency indicators. However, due to profitability, high fixed costs, and necessary technological progress, developmental family farms in Poland, with limited agricultural land, should strive to maximize production and minimize costs (Kilar, 2022; Kusz, 2018).

2 Objective and research methods

The aim of this study is to assess the economic results of individual agricultural farms specializing in milk production in Poland, compared to the overall results of farms that participated in agricultural accounting within the FADN system in 2020. According to the methodology of FADN, the study focused only on farms exceeding the minimum threshold of economic size, known as commercial farms. The comparative analysis examined the potential of production resources in the studied farms, the level of achieved production and economic results, as well as the productivity and profitability of factors of production in these farm groups. According to the FADN methodology, the production results of agricultural farms are represented by the category of "total production," which includes total agricultural production of crops and animals, as well as non-agricultural production and income from land leasing, building rental, machinery, and services. Meanwhile, the income category, according to this methodology, corresponds to net agricultural income considering payments for production and investment activities in agricultural farms. To determine the importance of subsidies in shaping the level of farm income, the study calculated net agricultural income both with and without subsidies (Zegar, 2008).

3 Results of the study

The factors of production in agriculture include land, labor, and capital, which are fundamental elements. Changes in the resources of these factors and their mutual relationships influence the organization of production processes on the farm, its size, and ultimately the income obtained. Table 1 presents data on the production resources of the analyzed farm groups in 2020.

Tab. 1: Production resources of comparable farm groups in 2020

Specification	Farm	
	Total	Dairy
Average agricultural area [ha]	21.6	21.1
- of which leased [ha];	6.7	5.4
Total workload [AWU]	1,535	1.739
- including wage labour [AWU]	0,196	0.027
Total assets [PLN]	860467.0	1072991.0
Total assets [PLN/ha]	39836.4	50852.7

Source: own study based on (FADN 2022).

In the compared farm groups, the average area of arable land did not differ significantly. Farms specializing in milk production managed an average area of 21.1 hectares of Utilized Agricultural Area (UAA), while the overall average for all farms was 21.6 hectares. The analyzed farm groups managed land resources that were partially leased - dairy farms leased 5.4 hectares, while all farms leased 6.7 hectares. Based on the agricultural accounting data from the FADN (Farm Accountancy Data Network) concerning the labor resources of agricultural holdings, it is possible to indicate only the contribution of labor resources to the production processes of farms, i.e., labor inputs. The accounting data shows that the total annual labor inputs per annual work unit (AWU) were higher in dairy farms (1.739 AWU) compared to all farms (1.535 AWU).

The potential of capital resources in agricultural holdings consists of fixed and working production assets, represented by total assets. In farms specializing in milk production, their value amounted to 1,072,991.0 PLN, while in all farms, it was 860,467.0 PLN. However, the capital intensity of production, i.e., total assets per 1 hectare of UAA, was lower in the overall farm group and amounted to 39,836.4 PLN/ha (see Tab. 1).

Tab. 2 presents data on the value of production and productivity of the compared farm groups. In 2020, the analyzed farm groups achieved diverse total production values. In the overall farm group, the average value of total production was 148,044 PLN, while in dairy farms, the average value of total production amounted to 184,610 PLN. Milk production dominated the total production value in the examined dairy farms, accounting for over 73% of the total production value (in the overall farm group, it was 17.73%). Significant shares in the results of the analyzed dairy farms were also held by cattle production (13.39%) and cereal production (10.15%). In contrast, in the production results of all farms, the most significant and largest share was held by cereal production (nearly 30%), followed by milk production (17.73%), pig production (over 8.81%), and vegetables (7.18%).

Farms specializing in milk production achieved a higher level of production results compared to the overall farm group by nearly 20%.

Tab. 2: Production value and productivity of compared farm groups in 2020.

Specification	Farm			
	Total		Dairy	
	production value [PLN]	production structure [%]	production value [PLN]	production structure [%]
Total production	148 044	100.00	184 610	100.00
Crop production, including:	85 243	57.58	22 567	12.22
- cereals	43 731	29.54	18 737	10.15
- potatoes	3 979	2.69	1 638	0.89
- vegetables and flowers	10 630	7.18	194	0.10
- fruit	7 029	4.75	303	0.16
Livestock production, including:	61 551	41.58	161 550	87.51
- milk and processed products from cow's milk	26 255	17.73	136 116	73.73
- beef resin	10 530	7.11	24 712	13.39
- pork resin	13 048	8.81	316	0.17

Source: own study based on (FADN 2022).

Comparing the production results of the analyzed groups of farms with the input of production factors involved in their achievement (Table 3) allowed to calculate the resource productivity of these farms. On farms specializing in milk production, the productivity of land resources was significantly higher compared to the land productivity of all farms and reached the value of PLN 8749.29/ha (group of farms in total 6853.89). Similar trends were observed in terms of economic labor productivity and amounted to PLN 96,445.60/AWU (total group of farms) and PLN 106,158.70/AWU (dairy farms), respectively. On the other hand, the productivity of capital involved was clearly lower in the group of dairy farms, which resulted from the higher capital intensity of production in this category of farms.

Tab. 3: Resource productivity in analyzed farms in 2020.

Specification	Farm	
	Total	Dairy
Land productivity [PLN/ha] [ha]	6 853.89	8 749.29
Economic work efficiency [PLN/AWU]	96 445.60	106 158.70
Productivity per PLN 100 of total assets [PLN]	17.20	15.10
Total assets [PLN/ha]	39 836.40	50 852.70

Source: own study based on (FADN 2022).

Income from a family farm is a payment for the involvement of farms' production factors in their production processes. A synthetic account of the economic results of the analyzed groups of farms is presented in Tab. 4.

Tab. 4: Income statement and profitability of resources in comparable farms groups in 2020.

Specification	Farm			
	Total		Dairy	
	[PLN]	[PLN/ha]	[PLN]	[PLN/ha]
Total production	148 044	6 853.9	184 610	8 749.3
- Intermediate wear	91 960	4 257.4	102 896	4 876.6
+ Balance of subsidies and taxes related to operating activities	28 680	1 327.8	37 157	1 761.0
(+) operating subsidies	30 772	1 424.6	38 041	1 802.9
(-) taxes	1 952	30.4	1 130	53.6
(+) VAT balance from operating activities	- 140	- 6.5	247	11.7
Gross value added	84 763	3 924.2	118 872	5 633.7
- Depreciation	22 898	1 060.1	28 671	1 358.8
Net added value	61 865	2 864.1	90 201	4 274.9
- The cost of external factors	13 752	636.7	4 878	231.2
+ Balance of subsidies and taxes related to investment activities	515	23.8	- 57	-2.7
(+) investment subsidies	1 827	84.6	1 584	75.1
(+/-) VAT balance on investment activities	1 312	60.7	1 641	77.8
Farm income with subsidies	48 628	2 251.3	85 266	4 041.0

Source: own study based on (FADN 2022).

Total costs of production activity of the compared farms were at a similar level, including material costs. In farms focused on milk production, the material costs resulted primarily from the costs of feed (approx. 60%), and then from the costs of fertilization and plant protection, and energy costs. The material costs of all farms were to a large extent also shaped by the costs related to animal production, including mainly the costs of animal feed. Both in dairy farms and farms in general, material costs accounted for over 70% of total costs. The costs of depreciation of fixed assets were higher in farms specializing in milk production, while the costs of external factors of production, taxes and other charges on land, buildings and the negative VAT balance were higher in farms in general. Due to the fact that farms specializing in milk production obtained a higher level of production results than all farms (at a similar level of production costs of both groups of farms), the economic results of dairy farms were at a much higher level (almost three times). The income of an average dairy farm (without subsidies) was PLN 22,935, while the average income of all farms was PLN 7,991.

Both in the case of farms focused on milk production and in the case of all farms, the level of final results was determined to a large extent by the level of subsidies for production and investment activities obtained by farms. The share of subsidies in the income of farms focused on milk production amounted to approx. 60%, while in farms in general - approx. 80%, which indicates the dominant role of subsidies in shaping the level of income of these groups of farms, especially of all farms (Jongeneel, Gonzalez-Martinez, 2022). Subsidies to the activity of farms have a significant share in the income of both farms in Poland and other European Union (EU) countries. In the EU-15 countries, since 1995, the share of subsidies in the total income of farms has been predominant and increasing, and in 2009 it even exceeded 100% of income (Runowski 2014). In Poland, a very high level of income support was recorded in multidirectional farms and farms focused on field crops (Goraj, Mańko 2013), and in horticultural farms subsidies did not have a large impact on the level of income obtained by these farms (Ziętara, Sobierajewska 2013). On the other hand, the share of subsidies in the income of Polish dairy farms was lower than in farms in other EU countries (Ziętara, Adamski 2014).

Due to the fact that the level of income obtained was higher in farms focused on milk production, the profitability of production resources in these farms was also higher. The profitability of land resources in dairy farms was higher by over 50% of own labor by over 40%, and of capital employed by over 30% than in farms in general (Niewęgłowski et al. 2017).

4 Conclusion

The researched farms focused on milk production compared to the total farms used a slightly larger area of land resources,

involved more labor and much more capital, and achieved a higher level of production results. As a result, the productivity of land resources was similar in both groups of farms, and the labor expenditure was higher in farms specializing in milk production, which resulted from the lower labor intensity of production of these farms. On the other hand, the capital productivity of dairy farms was clearly lower than that of all farms, because milk production is a capital-intensive activity and in the compared groups of farms the capital intensity of production significantly prevailed on dairy farms. Farms specializing in milk production obtained economic results at a much higher level than farms in general, because with similar production costs in both groups of farms, they achieved a higher level of production results. As a result, the profitability of production factors was clearly higher on dairy farms. Thus, in terms of economic efficiency of resource management, dairy farms clearly outperformed all farms.

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