

## STRATEGIES FOR THE DEVELOPMENT OF AVERAGE POLISH DAIRY FARMS IN THE CONDITIONS OF A SINGLE EUROPEAN MARKET

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### ABSTRACT

The paper aims to achieve two objectives: 1) To determine the competitive potential of Polish dairy farms and assess the economic results they achieved compared to other European Union entities, 2) To determine and assess the economic effects of possible development directions (strategies) for average Polish dairy farms. The analyses show that the production and economic potential of dairy farms from the European Union countries, characterized by the largest increase in milk production in years 2005–2015, was very diverse. On average, in 2016, the total value of the fixed assets of a Danish agricultural holding was 16 times higher than the value of the fixed assets of a farm in Poland and the average net value added generated by a Polish farm in 2016 was over thirteen times lower compared to Danish farms. However, if we take into account the costs of engaging external factors of production (land, labour and capital), it turns out that Danish farms are losing their advantages. The simulations of three possible variants of development for an average Polish dairy farm showed that good economic results were generated by the variant in which the land was leased and farm holders got employment outside the farm. The variant, which assumed an increase in the number of dairy cows (from 15 to 30) and the resulting growth in milk production could potentially give a slightly higher total net income for the farm family in the first two years, but it was certainly more risky.

**Key words:** dairy farms, economic competitiveness, development strategy

**JEL codes:** Q18

### INTRODUCTION

Ancient philosophers who paved the way for our contemporary thinking already stressed the need to evaluate and define further directions of development for individuals, business entities or sectors of the economy. At the beginning of our era, Roman philosopher and poet Seneca the Younger wrote: “If one does not know to which port one is sailing, no wind is favourable” [Seneca 2017]. This quote has not lost its significance; on the contrary, it has grown in strength [Romanowska 2003]. Naturally, there are also opponents who present arguments undermining the sense of this type of effort [Grant 2011]. In my opinion, it is particularly

important (even necessary) to have visions and draw up development strategies for individual sectors of the economy (e.g. dairy sector), especially if considerable public funds are allocated to improve their functioning. The funds spent by taxpayers should support the right directions of development of entities operating in a given sector of the economy (in this case – the dairy industry). Allocating public funds for activities that serve contradictory purposes is economically unjustified.

The dairy sector in the Polish agri-food industry is of great importance. In 2018, the value of exports of dairy products amounted to EUR 2240.6 million, which was in the milk equivalent 4.62 million tonnes

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(33.6% of production). As compared to 2005, the value of exports in 2018 increased by EUR 1341.0 million. Imports increased from EUR 146.9 to EUR 992.5 million [Smoleński et al. 2007, Szajner 2018]. These data indirectly illustrate the intensification of international competition, which is part of the growing globalization of the economy (including the agri-food sector) [Parzonko 2013]. In the dairy sector, an important element are agricultural farms that keep milk cows and produce milk. The question arises: What is the competitive potential of Polish dairy farms in relation to entities from other countries (especially the European Union) and in what direction they can develop? The works of W. Ziętara and M. Adamski [2018] and E. Kołoszycz and M. Świtłyk [2019] show that the main determinant of the economic efficiency of dairy farms is the scale of production. Farms that maintained more than 30 cows in 2016–2017 generated income allowing for the payment of their own work and development. Unfortunately, farms with a smaller scale of milk production dominate in Poland. Unpublished data from ARIMR show that the number of farms applying for subsidies to cows in 2018 was 151,847, out of which the number of farms applying for subsidies to flocks from 3 to 19 cows was 109,660 (72.2%).

## MATERIAL AND METHODS

The main objectives of the article are: 1) To determine the competitive potential of Polish dairy farms and assess the economic results they achieved compared to other European Union entities, 2) To determine and assess the economic effects of possible development directions (strategies) for average Polish dairy farms. In order to achieve the defined objectives a desk research study has been conducted involving a review of the literature and the European Union legal acts as well as an analysis of a representative sample of farms registered in the European Farm Accountancy Data Network (FADN). The study focused on farms selected from six European Union countries which achieved the highest increase in milk production in 2005–2015 and operate in similar climatic conditions. The studied farms specialised in milk production (the so-called “dairy cows” production type) and the presented measures and indicators show values for an average dairy farm

from a selected European Union country in the years 2005, 2010 and 2016.

The model-based analysis and assessment of potential economic effects of adopting different development directions (strategies) was carried out on a purposefully selected dairy farm with the production potential (UAA, number of cows, total value of fixed assets) similar to an average Polish farm from 2016 registered in the Polish FADN. The dairy farm selected for this study operates in the vicinity of Ostrołęka and is run by an agricultural family who is considering the formal handover of the farm to a young heir in 2020.

## The production and economic potential of Polish dairy farms compared to other European Union countries

The starting point in designing the development strategy of an enterprise or a group of enterprises from a given sector (including dairy farms) is to determine their production and economic potential.

In the case of an agricultural holding (including a dairy farm), a very important resource affecting the competitive capacity and potential direction of development is the size of utilised agricultural area (UAA) is [Czekaj and Józwiak 2009]. The UAA size per holding depends on various factors. The most important of them include: 1) historical conditions, 2) level of development of the economy, 3) degree of attachment of family members to land resources, i.e. “the patrimony”.

As demonstrated in Table 1, the average size of UAA (owned and rented) managed in 2016 by dairy farms covered by the FADN in the selected European Union countries ranged from 20.96 ha in Poland to 156.05 ha in Denmark. The tendency to increase the average size of UAA of dairy farms over time should be noted. This trend was most dynamic in Denmark. From 2005 to 2016, the average UAA managed by a Danish farm breeding dairy cattle increased by 65.43 ha. In Poland, it was only 3.1 ha. Other very important resources contributing to the production potential are various types of technical means, such as: buildings, machines, equipment and means of transport, which we refer to as fixed assets. Their potential can be measured by total asset value. As can be seen from the data presented in Table 1, the total

**Table 1.** Selected measures and indicators of the economic potential of average dairy farms from selected European Union countries in 2005–2016

Specification	Year	Selected European Union countries					
		DE*	PL	NL	FR	IE	DK
Average number of cows per holding (LSU livestock units)	2005	43.17	11.63	66.35	43.35	51.77	96.64
	2010	53.20	14.29	81.80	51.91	63.75	149.96
	2016	62.80	15.99	92.24	59.78	75.49	165.21
Total Utilised Agricultural Area UAA (ha)	2005	59.41	17.86	43.50	75.61	49.02	90.62
	2010	70.44	20.18	49.23	86.87	59.18	145.13
	2016	72.01	20.96	51.06	92.11	60.15	156.05
Total Asset Value (EUR'000)	2005	570.43	67.69	2 080.01	214.80	950.57	1 631.55
	2010	678.16	164.37	2 519.98	283.94	1 185.06	3 808.88
	2016	794.24	199.10	2 344.75	313.06	1 285.80	3 278.32
Value of buildings (EUR'000)	2005	85.37	29.684	144.73	75.92	75.15	672.02
	2010	100.38	38.317	269.15	109.39	139.94	638.19
	2016	125.50	45.323	283.98	104.82	99.16	568.41
Value of vehicles and machinery (EUR'000)	2005	71.82	17.601	76.12	57.70	32.78	158.67
	2010	98.04	29.068	131.75	73.37	58.06	335.82
	2016	113.83	37.380	115.10	82.91	59.85	275.02
Labour (paid and unpaid) (hr)	2005	4 036	3 838	3 806	2 818	3 673	4 173
	2010	4 365	4 094	4 016	2 960	3 870	5 018
	2016	4 390	4 002	4 151	2 979	3 737	5 690
The degree of financing assets with equity (%)	2005	84.04	90.96	74.49	60.62	95.85	34.72
	2010	82.44	93.87	69.52	56.91	94.34	31.95
	2016	75.94	95.41	64.66	51.25	95.40	21.78

\*DE – Germany, PL – Poland, NL – Netherlands, FR – France, IE – Ireland, GB – Great Britain, DK – Denmark

Source: own study based on [European Commission...].

value of fixed assets on the average farm specialising in dairy cattle production in the studied European Union countries was very diverse. In 2016 the total asset value of an average dairy farm in Denmark was 16 times higher than the asset value of a dairy farm in Poland. It should be noted that this difference has been decreasing over time, because in 2005 the total value of fixed assets of a Danish farm was over 30 times higher than in Poland.

The analysis of fixed assets can go further and focus on the basic pieces of property needed for breeding dairy cattle. The fixed assets which are indispensable in our climatic conditions are livestock buildings. One can evaluate these resources from different perspectives. However, the data available from the FADN only provide their value. The value of livestock buildings in Denmark was over 12 times higher than in Poland (Table 1). The gap was similar with regard to

means of transport, machinery, agricultural tools and devices. Summing up, the presented information on the production and economic potential of the analysed farms specialising in milk production in the studied European Union countries demonstrate the following: 1) there were substantial differences between European Union dairy farms and Polish farms in this respect were the weakest; 2) in the analysed period of 11 years (2005–2016), the differences between the European Union countries were only slightly reduced.

### Economic efficiency of Polish dairy farms compared to selected EU countries

Running a business in a free-market economy involves pursuing the most effective use of the existing resources, which partly translates into a constant struggle to improve work efficiency. Adam Smith in his magnum opus “An Inquiry into the Nature and Causes of the

Wealth of Nations” observed that “the wealth of every nation is regulated by two different circumstances; first by the skill, dexterity, and judgment with which its labour is generally applied; and, secondly, by the proportion between the number of those who are employed in useful labour, and that of those who are not so employed” [Smith 1954]. This regularity is still valid.

The measure presenting the economic effects of the used resources, without taking into account whether they are owned by the farm family or only in their use, is the Farm Net Value Added. As the data presented in Table 2 demonstrate, the highest average net value added was achieved by Danish farms. In 2016, it amounted to EUR 186,062 and was 65% higher than in 2005. At the other extreme there were Polish farms specialising in milk production. The average net value added in 2016, generated by a Polish farm was over

**Table 2.** Selected measures and indicators of economic effectiveness of an average dairy farm from selected European Union countries in 2005–2016

Specification	Year	Selected European Union countries					
		DE*	PL	NL	FR	IE	DK
Farm net value added (EUR)	2005	53 735	8 851	84 110	43 132	51 750	112 745
	2010	72 747	14 073	109 629	58 612	61 203	192 451
	2016	74 931	13 744	71 569	43 192	70 879	186 062
Farm net income (EUR)	2005	32 513	7 967	51 033	30 600	41 103	29 237
	2010	44 302	13 354	58 309	41 740	47 798	-14 453
	2016	40 640	12 891	26 730	23 175	60 192	9 802
Profitability of farm family labour (EUR/hr) (PL <sub>0</sub> )**	2005	9.95	2.15	14.15	11.63	12.69	10.12
	2010	13.69	3.36	15.88	15.39	14.17	-5.45
	2016	11.88	3.29	7.38	8.87	18.40	3.71
Profitability of farm family labour (Euro/hr) (PL <sub>1</sub> )***	2005	1.65	1.57	-6.98	8.67	-8.33	-14.20
	2010	4.49	1.80	-10.18	12.07	-6.30	-52.38
	2016	4.21	1.00	-11.29	6.05	-7.09	-28.84

\* De – Germany, PL – Poland, NL – Netherlands, FR – France, IE – Ireland, GB – Great Britain, DK – Denmark

\*\* Profitability of farm family labour (PL<sub>0</sub>) = Farm net income (EUR) / Farm familylabour input (man-hour)

\*\*\* Profitability of farm family labour (PL<sub>1</sub>) = (Farm net income – Costs of equity capital and own land) (EUR) / Farm family labour input (man-hour)

Source: own study based on [European Commission...].

thirteen times lower than on Danish farms. However, if we take into account the cost of total external factors of production (land, labour and capital), it turns out that Danish farms lose their advantages. In 2016, the average farm net income in Denmark was only EUR 9,802 and was the lowest among the compared countries. The highest farm net income in 2016 was, on average, generated by farms from Ireland (EUR 60,192) and Germany (EUR 40,640). The average farm focused on milk production in Poland, according to data from the FADN, achieved farm net income of EUR 12,891.

Another indicator, crucial for the assessment of the economic effectiveness of farms from the selected EU countries, is the economic productivity of labour and the profitability of the farm family labour input. The profitability of farm family labour has a greater informational value (especially in international comparisons) when it comes to proper assessment of the competitive potential and, at a later stage, designing a dairy farm development strategy. The profitability of farm family labour can be determined in two slightly different manners. The first involves the relationship between the farm net income and the farm family labour input. The second approach takes the farm net income less the costs of holder's own fac-

tors of production (capital and land) and refers the result to the farm family labour input. The indicated costs of holder's own factors of production have the character of calculated costs (they are not actually incurred), however, they play an important role in the analysis of the potential directions of changes (Table 3). The conducted calculations showed that in the studied countries the average profitability of labour on farms specialising in milk production was quite diverse. Relatively low average farm net income in Poland and Denmark resulted in a very low labour profitability ratio ( $PL_0$ ). Taking into account the calculated costs of holder's own land and the equity capital input in the farm net income, it turned out that in some countries it had a negative value (Netherlands, Ireland and Denmark). This resulted in a negative indicator of labour profitability ( $PL_1$ ).

### Potential strategies for the development of average dairy farms in Poland – case study

In Poland and other European Union countries farmers running a business, such as e.g. dairy cattle breeding and milk production, are still facing the problem of the most effective use of resources (own labour and equity) and the accumulation of the generated financial surplus. As it was stated in the previous part of the arti-

**Table 3.** Average prices of external factors (land, labour and capital) on dairy farms from selected European Union countries in 2005–2016

Total external factors	Year	Selected European Union countries					
		DE*	PL	NL	FR	IE	DK
Rent paid for UAA (EUR/hour)	2005	221.90	30.07	561.72	124.20	328.36	592.78
	2010	204.74	53.00	703.37	130.60	306.14	600.33
	2016	286.25	87.87	675.51	147.36	388.18	590.19
Wages paid (EUR/man-hour)	2005	9.03	1.64	11.50	9.76	9.09	17.68
	2010	10.04	2.59	13.35	11.02	10.47	22.26
	2016	13.87	2.75	15.12	12.23	12.19	22.95
Interest paid (%)	2005	4.18	2.46	3.67	3.59	5.72	4.26
	2010	3.90	3.17	3.87	3.46	4.62	4.58
	2016	2.76	3.63	2.76	2.44	4.59	2.70

Source: own study based on [European Commission...].

cle (Tables 1 and 2), the production and economic potential of Polish farms focused on milk production was on average much smaller compared to other European Union countries. Its use was relatively good, however, the generated financial surplus only allows for very low accumulation (investments). In addition, it should be noted that farms specialising in milk production in Poland vary considerably. Therefore the development strategy should be designed separately for average dairy farms and separately for farms showing above the average production potential. Due to the complexity of the problem the model-based considerations will demand its simplification.

Because of the deep regulation of the agricultural market in the European Union, executed through a series of agricultural policy instruments, the farm development strategies cannot be designed without taking into account both the existing solutions and planned changes. In 2015, the “quota milk production in the European Union”<sup>1</sup> was finally liquidated and the customs restrictions on the inflow of dairy products from outside the European Union were reduced. Due to these decisions the competition in the European Union milk market increased. Milk purchase prices paid in European dairies followed prices in New Zealand and the USA [Szajner 2017, Parzonko 2019].

The current European Union agricultural policy is a fact and its effects are noticeable. However, for farmers who are planning changes in agricultural production in their holdings (dairy farms, dairies) it is crucial to know what will be the priorities of Common Agricultural Policy of the European Union after the end of the current programming period, i.e. in years 2021–2027. The final guidelines are not known yet. The Regulation of the European Parliament and of the Council establishing rules on support for strategic plans to be drawn up by Member States under the Common agricultural policy (CAP Strategic Plans) and financed by the European Agricultural Guarantee Fund (EAGF) and by the European Agricultural Fund for Rural Development (EAFRD), published on June

6, 2018, shows that the planned changes will be relatively small compared to the current programming period [Rozporządzenie... 2018/0216/COD]. A very important proposed change in the Common Agricultural Policy of the European Union after 2021 is even stronger emphasis on positive impact of farms on the environment and climate [Wąs et al. 2018].

The first and naturally considered option (strategy) for the development of a farm focusing on breeding dairy cattle is to increase the scale of milk production and thus generate additional economic benefits. These decisions are quite difficult and entail a real risk, so they are mainly taken by young people. One of the basic conditions determining the considerations of this variant of farm development is the readiness (willingness) of the farm family to work with animals (dairy cattle) and take up the challenges assigned to this type of work. The second factor determining pursuing this path of change (development) is the farm production potential and its dedication to a particular type of production. Farms deeply specialized in milk production and well equipped with machinery and suitable buildings (e.g. a modern cowshed well equipped with devices improving milking and feeding) may find it very difficult to shift the direction of production. The situation is different in less specialised holdings which are less equipped with means of production dedicated to dairy business.

In order to pursue the objectives defined for this study, the consideration of potential directions of development (strategy) will be focused on a dairy farm with production potential and economic results characteristic for an average farm from the population of farms focused on milk production registered in the Polish FADN (input parameters from 2016). Three variants (strategies) of development will be considered: a) Increase the number of dairy cows, which will result in increased milk production; b) Lease land and get employment outside the holding; c) Replace breeding dairy cows with beef cattle. Variant A requires changes to the production potential i.e. a number of new invest-

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<sup>1</sup> It should be noted that the milk production quotas began to phase out gradually from 2007. It was a rather sophisticated mechanism, involving increasing national milk quotas for individual European Union countries. The result was that in many European Union countries dairy quotas ceased to actually limit the production of milk.

ments. The first important problem will be providing an increased number of animals with an appropriate feed base and proper management of organic fertilizers. There is a real need for additional UAA. This is a very difficult problem because land is a special production factor, which is a limited resource and cannot be moved to another location. Another problem and investment challenge related to this farm development strategy is the need for new (more functional) livestock buildings. In addition, more efficient agricultural machinery and equipment are needed to manage more livestock and UAA. The farm family faces the need to tie up more capital in the expanded economic activity. This brings up the question about potential sources of the necessary capital and efficiency of its use. Another natural problem to tackle is to determine the degree of increasing milk production and the scope of necessary investments. The presented variant, assumes the most realistic increase in the number of dairy cows from 15 to 30 through the purchase of in-calf heifers (11 units), enlargement of UAA resources by 15 ha through lease, modernization of existing livestock buildings and purchase of a tractor with a set of haylage machines (Table 4).

The total investment expenditure (rather conservatively estimated) including rent paid on UAA would amount to PLN 362,900. At this point, one of the most

challenging questions about financing the planned investments arises. Usually the holder's own savings are insufficient and in order to fully finance the investment ideas it is necessary to use external sources of funding (usually loans). In the presented case, the holder's own funds amount to PLN 45,000 and to maintain financial liquidity, a loan of PLN 303,000 will be required at the beginning of the year, of which PLN 228,000 will be a long-term loan and 75,000 will be a short-term loan with a maturity date at the end of the year. The use of external financing sources increases the risk of losing financial liquidity, especially in the situation of a volatile market (unstable milk purchase prices). In this situation, the question arises – is it worth taking this type of risk?

In order to address this question, we will make an economic calculation presenting the potential financial results of this variant, compared to economic benefits from alternative solutions. Having assumed the average prices from 2018 (e.g. the net price of milk of PLN 1.2 per litre) and the average level of productivity of plants and animals (e.g. annual milk yield at the level of 6,500 litres) with the intensity of production adjusted to this level, we calculated the annual net income in the year of modernization at PLN 65,520. This relatively low amount results from the increased feed costs (increased number of livestock requires purchase

**Table 4.** Investment expenditures and costs of rent in separate strategies for the development of a farm with average production potential (PLN)

Specification	Strategies for development of a farm with „average” production potential		
	variant – „A”	variant – „B”	variant – „C”
Annual rent for UAA	17 435		–
Purchase of heifers of the milk breed	60 500		–
Purchase of beef cattle	–		99 000
Purchase of a tractor	120 000	no investment needed	–
Purchase of machines for preparing silage	60 000		–
Extension and modernization of the existing cowshed (including installation of a second-hand milking machine)	105 000		10 000
<b>Total</b>	<b>362 935</b>		<b>109 000</b>

Source: own study.

of feeds, because the holding's own resources will be insufficient) and also the annual milk production is lower. In the following year, agricultural net income should reach PLN 139,000. Additionally, it should be noted that the increased number of dairy cows on the farm will require full farm family labour resources; hence the total net income of the farm family will be their income from agricultural activity.

In variant "B", (involving resignation from agricultural activity and getting a job outside the holding), it was assumed that the farmer and his wife would get employment outside the farm and their net income from this form of employment would amount to PLN 72,000 (net pay PLN 3,000 per month). In addition, the lease of 17 ha of UAA will generate net income in the form of rent in the amount of PLN 21,100 (the rate of direct payments to the area of 17 hectares plus additional payment in the amount of PLN 300 per hectare of UAA). Additionally, the sale of movable tangible assets (such as tractors, machines, agricultural devices) will unlock capital, which will earn interest on a deposit generating annual net income of PLN 1,700. The annual total net income of the family in this development option would be PLN 94,800.

The third considered development strategy – variant "C" – is to focus on breeding beef cattle. This variant would involve the sale of owned dairy cattle and purchase of 18 in-calf heifers of meat breed. This option would not require far-reaching investments and related capital needs. The purchase of heifers of meat breeds would be financed from the sale of the owned dairy cows and the necessary modernization of buildings would be financed from the holder's savings. Rearing of beef suckler herd is not very labour-intensive, therefore in this variant (strategy) the holder can be employed on a part-time contract (30 hours a week) and his wife can get a full time employment outside the farm. The calculations show that in the transition year the agricultural activity will generate a loss of PLN 20,100, but taking into account earnings from outside employment, the total net income of the farm family would amount to PLN 42,900. In the second year, agricultural net income would be PLN 20,340 and earnings from outside employment – PLN 63,000.

The calculations show that in the conditions when net earnings from employment outside agricultural

holding are on the rise and easier to obtain, the development of agricultural activity, especially breeding dairy cows and beef cattle, is economically unattractive. The situation may be different if there was a possibility to subsidize the necessary investments from public funds (e.g. Rural Development Program). Careful construction of support can stimulate quick changes. Assuming that public funds for farmers are made available, the priority should be programs supporting the construction or modernization of livestock buildings. Under RDP 2014–2020 (the measure "Modernization of agricultural holdings"), there are funds dedicated to construction of livestock buildings. However, the proposed administrative (bureaucratic) procedures are quite complicated and imprecise, which discourages potential beneficiaries. The administrative risk outweighs the potential benefits from more complex investments financed from public funds.

## SUMMARY AND CONCLUSIONS

1. The analysis of the production and economic potential of dairy farms from European Union countries, who are leaders in this sector, shows the following: 1) there are big disparities and Polish farms in this respect were the weakest; 2) in the analysed period of 11 years (2005–2016), the differences between countries were reduced to a limited extent.
2. The efficiency of using the production potential by dairy farms in the six European Union countries was very diverse. Due to the relatively low profitability of farm family own labour (compared to net earnings available on the labour market), all analysed countries will have to further improve their economic efficiency. Polish average farms focused on milk production are characterized by low profitability of holders' own labour (and the increasing net earnings available on the labour market will force further improvement of economic efficiency).
3. The simulation of the three variants of Polish average dairy farm development showed that good results were obtained by the variant involving the lease of the holder's own land and getting employment outside the farm. The variant, which assumed an increase in the number of dairy cows (from



15 to 30 pieces) and the resulting increase in milk production could potentially give a slightly higher total net income for the farm family in the first two years, but it entails considerably bigger risk.

4. The simplification of bureaucratic (administrative) procedures required to obtain funds for co-financing the construction or modernization of livestock buildings could encourage the farm holders to increase milk production.

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## **STRATEGIE ROZWOJU PRZECIĘTNYCH POLSKICH GOSPODARSTW MLECZNYCH W WARUNKACH JEDNOLITEGO EUROPEJSKIEGO RYNKU**

### **STRESZCZENIE**

Cele główne artykułu to: 1) Określenie potencjału konkurencyjnego polskich gospodarstw mlecznych i ocena uzyskiwanych wyników ekonomicznych na tle podmiotów z Unii Europejskiej; 2) Ocena ekonomiczna skutków określonych kierunków (strategii) rozwoju dla przeciętnych polskich gospodarstw mlecznych. Z przeprowadzonych analiz wynika, że potencjał produkcyjny i ekonomiczny gospodarstw mlecznych z krajów Unii Europejskiej, charakteryzujących się największym przyrostem produkcji mleka w latach 2005–2015, był bardzo zróżnicowany. Przeciętnie, w 2016 roku gospodarstwo duńskie posiadało 16-krotnie większy majątek trwały niż gospodarstwo w Polsce, a przeciętna wartość dodana netto w 2016 roku, generowana przez polskie gospodarstwo była ponad 13-krotnie mniejsza niż w gospodarstwach duńskich. Uwzględniając koszty zaangażowania zewnętrznych czynników produkcji (ziemi, pracy i kapitału), okazuje się, że gospodarstwa duńskie tracą swoje przewagi. Z przeprowadzonych symulacji trzech wariantów rozwoju polskiego przeciętnego gospodarstwa mlecznego dobre rezultaty ekonomiczne dawał wariant, w którym założono oddanie w dzierżawę posiadanej ziemi i podjęcie pracy poza gospodarstwem. Wariant, w którym założono zwiększenie pogłowia krów mlecznych (z 15 do 30 sztuk), co skutkowało zwiększeniem produkcji mleka, potencjalnie mogłoby dawać nieco wyższy dochód ogólny rodziny rolniczej w okresie dwóch pierwszych lat, jednak był on zdecydowanie bardziej ryzykowny.

**Słowa kluczowe:** gospodarstwa mleczne, konkurencyjność ekonomiczna, strategia rozwoju