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PRODUCTION POTENTIAL OF HOLDINGS SPECIALIZING IN COW MILK PRODUCTION IN MACROREGIONS OF THE EUROPEAN UNION – A TYPOLOGICAL ANALYSIS

Key words: production potential, macroregions, European Union, synthetic indicator

ABSTRACT. The purpose of this paper was to classify FADN macroregions in the European Union into types by production potential of farms specializing in cow milk production in 2008 and 2017. The production of cow milk is one of the most important branches of animal production both in Poland and other European Union countries, therefore it is the subject of numerous publications. Most often, cow milk production is the subject of research in global terms, European Union countries or regional diversity in Poland. Relatively rarely does the subject of milk production cover a regional approach throughout the European Union. Due to dynamic changes in factors affecting milk production and, in particular, the abolition of the cow milk production quota system in EU countries in 2015, it is important to continue to monitor changes in the milk market, especially on the supply side. Hellwig's method was employed in the calculation of the synthetic indicator of production potential for each macroregion in order to determine types. The study demonstrated that the most advantageous characteristics of the production potential of milk farms, in both years covered, were mostly reported by EU-15 macroregions located in western and northern Europe. Macroregions of new member countries, except Slovakia, were less competitive in terms of their potential. As demonstrated by this analysis, development disparities persist between milk farms located in different EU macroregions.

INTRODUCTION

Cow milk production is one of the key areas of animal production in many European Union countries. As emphasized by Andrzej Parzonko [2013], compared to other types of agricultural production, the distinctive characteristics of milk production are high levels of labor and capital intensity, a clear link with plant production, difficulties in attaining the desired hygienic quality of milk (acceptable somatic cell count and bacteria count in milk) and the need for the producer to cooperate with a milk processor (a dairy). Geographic conditions and location have a strong effect on diverse socioeconomic developments and processes. The theory of location was pioneered by von Thünen, who proposed a model of agricultural production location composed of 5 rings (represented by different types of production) concentrated around a city as a single, centrally organized market. However, as emphasized in relevant literature, von Thünen's assumptions for farming conditions

are too idealistic. In this context, note for instance the assumptions for the existence of a uniform natural space, the same fertility of all soils, and products being transported in straight lines to a central market. Hence, as noted by Piotr Bórawski [2010], the simplistic assumptions used by von Thünen to explain the relationships surrounding the location of agricultural production are not always true in practice. A modified theory of agricultural production location was presented by Robert E. Dickinson [1964]. According to him, the concentric rings around a city exhibit decreasing intensity as they move away from the city. Dickinson's assumption is that horticultural farms are located closest to an urban agglomeration, followed by holdings engaged in intensive farming and milk production, and holdings engaged in extensive cereal production and animal farming, whereas forests are the last ring. In turn, based on von Thünen's model, Alfred Weber specified two groups of location factors, namely regional factors (e.g. transport or labor costs) and local factors (e.g. agglomeration and deagglomeration processes) [Grala 2009]. Paul Krugman [1995] authored what is referred to as new economic geography, placing focus on the key role of agglomerations in the development of economic activity resulting in regional development. However, it may be concluded that, due to the particularities of agriculture as an economic activity, location theories fail to fully explain the location of agricultural production.

In that context, an important topic is production specialization, which is strictly related to comparative costs. Lower unit production costs may result from a greater abundance of essential manufacturing resources or a greater labor efficiency [Zielińska-Głębocka 2006]. When it comes to milk production, the abundance of resources mostly means the availability of high-quality permanent grassland [Zuba-Ciszewska 2014], and a milk yield positively correlated with the numbers of livestock held on holdings [Ziętara, Adamowicz 2018]. As numerous studies indicate, the spatial diversity of the quantity and quality of all three factors of production is a fundamental determinant of the spatial distribution of activities and its efficiency. Moreover, as emphasized by Augustyn Woś [2001], resource competitiveness is the key component of agricultural competitiveness at both national and regional levels.

Other determinants of the structure and size of agricultural production in the European Union are instruments and regulations of the Common Agricultural Policy. This is especially important for the milk market, which was among the first ones to be covered by Union regulations. For many years, it was subject to one of the most extensive set of regulatory instruments, especially including milk quotas applicable from 1984 to 2015. Undoubtedly, the EU milk sector is also strongly affected by the conditions for the development of the global dairy industry.

In the context of factors determining the situation in the EU milk market, as outlined above, it seems interesting to carry out research in order to identify their impact and track their ongoing evolution. This topic was addressed in numerous scientific publications, including Dorota Komorowska [2006], Jadwiga Seremak-Bulge [2008, 2011], Agnieszka Baer-Nawrocka et al. [2012], Marzenna Olszewska [2015], Andrzej Parzonko [2013, 2018], Wojciech Ziętara and Marcin Adamski [2018], Jacek Bednarz and Maria Zuba-Ciszewska [2018] and many others. In most cases, focus was placed on a global approach, levels recorded in European Union countries, and regional disparities in Poland. In turn, a regional approach across the entire EU was a relatively rare approach. The determinants of differences

in milk production between macroregions of the European Union were identified by Andrzej Czyżewski and Marta Guth [2016] and Marta Guth and Sebastian Stępień [2016]. Also, the authors performed a cluster analysis in an attempt to specify the macroregions specializing in milk production in 2004 and 2011. Having in mind the rapid changes in factors affecting milk production, especially including the abolition of milk quotas in EU countries in 2015, it is important to continue monitoring the condition of that market.

Therefore, the purpose of this paper is to classify FADN[1] macroregions in the European Union into types by production potential of farms specializing in cow milk production in 2008 and 2017. This will allow to indicate the similarities between regions in milk production, and identify changes in that field.

MATERIAL AND METHODS OF STUDIES

The study covered 137 (excluding Cyprus and Malta) FADN macroregions of European Union countries. Analyses and comparisons relied on the most recent data of the European Commission (2017) and on 2008 data. This allowed to assess regional differences and their evolution over a 10-year period. Hellwig's method of linear ordering, used in the identification of development patterns, was employed in the calculation of the synthetic indicator of production potential of milk holdings for each macroregion in order to determine their types. The first step in building Hellwig's synthetic indicator consisted of choosing sub-characteristics. Following this, values of characteristics were assigned to statistical units and arranged into a matrix:

$$X = \begin{bmatrix} x_{11} & x_{12} & \dots & x_{1K} \\ x_{21} & x_{22} & \dots & x_{2K} \\ \dots & \dots & \dots & \dots \\ x_{N1} & x_{N2} & \dots & x_{NK} \end{bmatrix}$$

where x_{ik} (i = 1, 2, ..., N; k = 1, 2, ..., K) is the value of simple characteristic k in the statistical unit i. Following the elimination of variables proved to be related to other ones, the following sub-characteristics were defined:

- total utilised agricultural area (ha),
- labour input (AWU – Annual Work Unit),
- number of livestock units (LU),
- total assets (EUR).

The next step was the normalization of sub-characteristics. The assumption was made that the labour input is a variable with a stimulating effect to a certain point (nominal value) because both excessive and insufficient labour input do not allow the rational use of other factors of production and negatively affect work efficiency. Other sub-characteristics have a stimulating effect. Equal weights were attributed to each of the selected sub-characteristics. Then, Euclidean distances were calculated between each object under

[1] The Farm Accountancy Data Network is a system of collecting and using farm accountancy data.

consideration and the development pattern, i.e. the positive ideal solution in terms of the (normalized) simple characteristics considered:

$$q_i = \sqrt{\frac{\sum_{k=1}^{K}(z_{ik}-z_{ok})^2}{K}} \qquad (i = 1, 2, ..., N)$$

where z_{0k} is the normalized value of characteristic k for the ideal solution. The ideal solution can be expressed as a vector $z = (z_{o1}, z_{o2}, ..., z_{ok})^T$. Usually, it is assumed that $z_{0k} = \max_i\{z_{ik}\}$ for simple characteristic k, which has (or was converted to have) a stimulating effect. The resulting values of q_i were used in calculating the value of Hellwig's synthetic development indicator [Wysocki 2010]:

$$S_i = 1 - \frac{q_i}{q_0} \quad \text{where: } q_0 = \bar{q}_0 + 2 \times s_0$$

$$\bar{q}_0 = \frac{\sum_{i=1}^{N} q_i}{N}$$ – arithmetic mean of feature q_i

$$s_0 = \sqrt{\frac{\sum_{i=1}^{N}(q_i - \bar{q}_0)^2}{N}}$$ – standard deviation of feature q_i

Although Hellwig's synthetic development indicator S_i usually falls within the interval (0,1), it may also take other values. The closer it is to 1, the higher the development level of the object considered.

Values of the synthetic indicator calculated above (S_i) were linearly ordered in a non-ascending sequence. The arithmetic mean and standard deviation were used to classify the population.

RESULTS OF THE STUDY

Once calculated, the indicator values allowed to divide regions into four macroregion groups in 2008 and 2017. Findings from the analyses are compiled in Tables 1 and 2 and in Figure 1. In 2008, the first group (with the highest value of Hellwig's synthetic development indicator, $S_i \geq 0.216$) was composed of 26 macroregions, mainly including Benelux, Danish, Irish and British macroregions, 4 northern Italy macroregions and 7 out of 16 German macroregions. In addition to the EU-15 countries listed above, the group also included one new member country, Slovakia. This macroregion group had the highest AWU but also the highest value of assets and the largest average farm area. Milk farms from macroregions of the first group also stood out by the largest animal herd (over LU 112 per farm). In 2017, the first group was mostly composed of the same macroregions, except Ireland (which became part of the second group). Several German macroregions moved to another group, too. In 2017, the first group also included 4 northern German macroregions (which were part of groups 3 and 4 in 2008). One macroregion (Hessen), found in the first group in 2008, was a member of the second group in 2017. Just like in 2008, macroregions included in the first group had a relatively most advantageous (compared to other groups) values of sub-variables representing the production potential of specialized milk farms.

Table 1. Values of the synthetic indicator of production potential of milk farms in the identified groups of European Union macroregions in 2008 and 2017

Group	2008	2017
I	$S_i \geq 0.216$	$S_i \geq 0.260$
II	$0.216 > S_i \geq 0.144$	$0.260 > S_i \geq 0.173$
III	$0.144 > S_i \geq 0.072$	$0.173 > S_i \geq 0.086$
IV	$0.072 > S_i$	$0.086 > S_i$

Source: own compilation based on the FADN database

The composition of the second group changed a little bit more between 2008 and 2017, although the number of macroregions (26) remained the same. In 2008, it included 10 French regions, 4 German regions (including Bayern, the largest one), 4 Italian regions, southern Swedish regions as well as the Czech Republic and Estonia. Changes were mostly caused by French macroregions. In 2017, those located in northwest France enjoyed more advantageous sub-characteristics of production potential. In 2008, it was mostly the case for central French macroregions. In 2017, that group also included Austria, although it was part of the third group in 2008. It was the opposite for Estonia, which reflects a decline in the production potential of Estonian specialized milk farms in relation to farms from all other macroregions. In both years under consideration, the number of AWU per holding was lower in the second group than the first one, but also by around half lower values of other selected sub-characteristics.

The third typological group identified was the largest one in both years, and included 66 and 73 macroregions in 2008 and 2017, respectively. It was mostly composed of French, Spanish, Italian, Finnish, Swedish, Greek and Portuguese macroregions. It also covered all Polish and Croatian macroregions as well as Slovenia and Latvia. In 2017, that group also included all Hungarian regions, even though only one of them (Észak-Magyarország) was part of it in 2008. Four regions located in northern and eastern Bulgaria saw an improvement in their position (considering membership). In the study period, the Hungarian and Bulgarian regions listed above and many other members of that group experienced a clear improvement in the values of variables representing the production potential of special-

Table 2. Mean values of sub-variables representing the production potential of milk farms in the identified groups of European Union macroregions in 2008 and 2017.

Groups	Labour input [AWU]		Number of livestock units [LU]		Total utilised agricultural area [ha]		Total assets [EUR]	
	2008	2017	2008	2017	2008	2017	2008	2017
I	3.3	3.2	112.5	113.1	162.0	163.3	1, 039,216.5	1,056,998.1
II	2.2	2.1	61.1	60.2	71.0	72.6	456,771.8	479,558.2
III	1.7	1.7	30.0	34.1	45.0	51.1	258,149.9	294,539.6
IV	1.9	1.9	8.5	14.3	22.1	24.1	62,111.5	64,235.7
Mean	2.1	2.0	49.9	51.4	70.4	75.1	435,488.9	573,878.4
Standard deviation	1.9	1.9	55.3	56.1	96.1	94.7	441,450.1	596,694.2

Source: own compilation based on the FADN database

ized milk farms. This includes an increase in average farm area, number of livestock units and total assets; at the same time, less labor was used in the macroregions of that group.

In the fourth typological group of macroregions identified, the level of Hellwig's synthetic development indicator of production potential of milk farms reached the lowest levels of $S_i < 0.072$ in 2008 and $S_i < 0.086$ in 2017. This was primarily driven by extremely low capital value and a small average farm area (22-24 ha). In 2017, just like in 2008, it was the smallest group, and was composed of macroregions such as Lithuania, all Romanian macroregions (two of them belonged to the third group in 2008) and two Bulgarian macroregions (in 2008, as many as 5 out of 6 macroregions belonged to that group). Note also the employment figures are comparable to other groups, however, taking into account the much smaller area of agricultural land at their disposal, labor input should be assessed as very high. At the same time, there is a clear increase in the number of livestock units and capital availability. However, as mentioned earlier, the amounts of the mentioned variables continue to be considerably lower than in other groups identified.

In order to identify the differences in production potential between specialized milk farms across all FADN macroregions of the EU, annual means and standard deviations were also calculated for each characteristic. The analysis of these values suggests that the number of labour input was the only variable with a standard deviation not above the mean. As regards other variables, it can be concluded that considerable differences persist between milk farms. At the same time, there is a slight though noticeable increase in the average amount of assets and the area of agricultural land owned by farms. Similar conclusions were drawn by Marta Guth and Andrzej Czyżewski [2016], who used cluster analysis to group macroregions in 2004 and 2011. This indicates that both the abolition

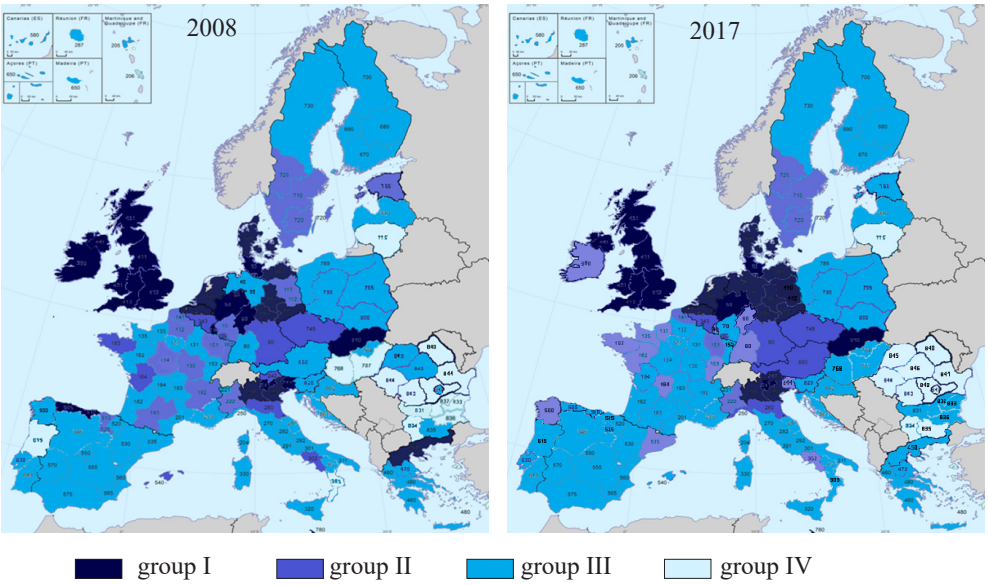

Figure 1. Typology of macroregions according to the production potential of specialized milk farms in 2008 and 2017

Source: own compilation based on the FADN database

of milk quotas[2] as well as the implemented measures under the cohesion policy aimed at leveling out the development differences of regions (also in rural areas) do not contribute to significant changes in the diversity of farms involved in milk production in macro-regions of the European Union.

SUMMARY AND CONCLUSIONS

This paper attempted to indicate the similarities between the European Union's FADN macroregions in terms of production potential of specialized milk farms, and identify the changes taking place in that area. The study demonstrated that the most advantageous characteristics of the production potential of milk farms in both years covered (2008 and 2017) were mostly reported by EU-15 macroregions located in western and northern Europe. It follows from Eurostat data that this very part of the EU is a milk production hub: in 2017, the total milk production volume in Germany, France and the UK accounted for more than 45% of total milk production in the EU. These countries are dominated by intensive production patterns, with large milk farms at high levels of cow productivity. The EU's highest cow productivity (determined by factors which include resources owned and production structures) is recorded in the Netherlands and Denmark (over 8,500 kg/cow/year) [Eurostat 2019]. In turn, macroregions with a low synthetic indicator of the production potential of specialized milk farms include EU-13 macroregions, especially those located in the least wealthy countries, such as Romania and Bulgaria. At the same time, note that Bulgarian macroregions were found to have relatively improved their sub-characteristics covered by this analysis between the years covered. Similar developments were experienced in Hungarian macroregions. Nevertheless, it can be concluded that, after the ten-year period covered by this study, a large development gap persists between milk farms based in different EU macroregions (especially between old and new Member States) as evidenced by a high standard deviation of most variables covered. Macroregions of new member countries, except Slovakia, were less competitive in terms of their potential. The persistent differences are largely determined by various historical factors. In Western European countries, concentration processes were accelerated by the market situation, on the one hand, and by these transformations being financially supported under the Common Agricultural Policy, on the other. As a consequence, agriculture in these countries is based on large, specialized production units which, however, continue to be family-run. In turn, in most EU-13 countries, the collectivization process followed by privatization resulted in the emergence of fragmented, less competitive agrarian structures (except for the Czech Republic and Slovakia). This is also true for the milk production sector. Based on the above, it may be concluded that CAP instruments extended to cover the agriculture of these countries have so far failed to narrow the development gap between milk farms located in different EU macroregions. Hence, the identification of prevailing disparities enables verification, where possible, of existing agricultural policy instruments or new ones designed to improve the situation of macroregions with a smaller potential of milk production.

[2] However, it should be emphasized that due to a short period (less than two years), the effect of the abolition of milk quotas may not yet be visible.

BIBLIOGRAPHY

Baer-Nawrocka Agnieszka, Renata Grochowska, Ewa Kiryluk-Dryjska, Jadwiga Seremak-Bulge, Piotr Szajner. 2012. *Światowy rynek mleka i jego wpływ na polskie mleczarstwo po zniesieniu kwot mlecznych* (The global milk market and its impact on Polish dairy after the abolition of milk quoats). Warszawa: IERiGŻ-PIB.

Bednarz Jacek, Maria Zuba-Ciszewska. 2018. Produkcja mleka ekologicznego w Polsce. Koncentracja czy rozproszenie? (Organic milk production in Poland. Concentration or distraction?). *Zeszyty Naukowe SGGW w Warszawie. Problemy Rolnictwa Światowego* 18 (4): 112-121. DOI: 10.22630/PRS.2018.18.4.102.

Bórawski Piotr. 2010. Wykorzystywanie teorii lokalizacji Johanna Heinricha Von Thünenna do oceny efektywności gospodarstw z alternatywnymi dochodami (Using the location theory of Johann Heinrich Von Thünenn to assess the efficiency of farms with alternative incomes). *Roczniki Nauk Rolniczych, Seria G* 97 (2): 176-183.

Czyżewski Andrzej, Marta Guth. 2016. *Zróżnicowanie produkcji mleka w makroregionach Unii Europejskiej z wyróżnieniem Polski* (Diversification of milk production in European Union macro-regions with the distinction of Poland). Warszawa: PWN.

Dickinson Robert E. 1964. *City and region. A geographical interpretation.* London: Ruthledge and Paul Ltd.

EUROSTAT. 2019. Database, https://ec.europa.eu/eurostat/web/agriculture/data/database, access: 16.08.2019.

Grala Dorota. 2009. *Przemiany własnościowe i przestrzenne budownictwa mieszkaniowego w okresie transformacji w Polsce* (Ownership and spatial changes in housing construction during the transformation period in Poland). Poznań: Uniwersytet Ekomnomiczny.

Guth Marta, Sebastian Stępień. 2016. Zróżnicowanie gospodarstw mlecznych FADN w makroregionach Unii Europejskiej względem determinantów produkcji mleka (Diversification of FADN dairy farms in the macro-regions of the European Union relative to milk production determinants). *Roczniki Naukowe Stowarzyszenia Ekonomistów Rolnictwa i Agrobiznesu* XVIII (4): 86-91.

Komorowska Dorota. 2006. *Koncentracja produkcji mleka w Polsce* (Concentration of milk production in Poland), http://www.wne.sggw.pl/czasopisma/pdf/EIOGZ_2006_nr61_s159.pdf, access: 8.05.2019.

Krugman Paul. 1991. *Geography and trade.* Leuven University Press, Cambridge, Massachusetts: The MIT Press.

Olszewska Marzenna. 2015. Produkcja mleka w Polsce na tle świata i krajów Unii Europejskiej (Milk production in Poland against the background of the world and European Union countries). *Wiadomości Zootechniczne* L III (3): 150-157.

Parzonko Andrzej. 2013. *Globalne i lokalne uwarunkowania rozwoju produkcji mleka* (Global and local conditions for the development of milk production). Warszawa: Wydawnictwo SGGW.

Parzonko Andrzej. 2018. *Koszty produkcji mleka w gospodarstwach mlecznych w Polsce i innych krajach UE - ocena w latach 2009-2015.* [W] Międzynarodowa konferencja pt. *Nauka gospodarcza dla rozwoju obszarów wiejskich* (Milk production costs in diary farms in Poland and other EU countries – assessment in 2009-2015. [In] International Conference Economic science for rural development),154-161, Jelgava.

Seremak-Bulge Jadwiga. 2008. Wpływ kwotowania na funkcjonowanie rynku mleka. [W] *Rozwój sektora rolno-spożywczego w Polsce na tle tendencji światowych* (Impact of auota on the functioning of the milk market. [In] The development of the agri-food sector in Poland against the background of global trends), eds. A. Kowalski, M. Wigier, 35-53. Warszawa: IERiGŻ-PIB.

Seremak-Bulge Jadwiga. 2011. *Rynek mleka na progu 2011 r*. (Milk market at the beginning of 2011). Białystok: Polska Izba Mleka.

Weber Alfred. 1909. Über *den Standort der Industrien Tübingen* (Alfred Weber's theory of the location of industries). Chicago: The University if Chicago Press.

Woś Augustyn. 2001. *Konkurencyjność wewnętrzna rolnictw*a (International competitiveness of agriculture). Warszawa: IERiGŻ-PIB.

Wysocki Feliks. 2010. *Metody taksonomiczne w rozpoznawaniu typów ekonomicznych rolnictwa i obszarów wiejskich* (Taxonomic methods in recognizing the economic types of agriculture and rural areas). Poznań: Wydawnictwo Uniwersytetu Przyrodniczego w Poznaniu.

Zielińska-Głębocka A. 2006. Standardowy model handlu międzynarodowego. [W] *Międzynarodowe stosunki gospodarcze* (Standard international trade model. [In] International Economic Relations), eds. T. Rynarzewski i A. Zielińska-Głębocka, 56-96. Warszawa: PWN.

Ziętara Wojciech, Marcin Adamski. 2018. Competitiveness of the Polish dairy farms at the background of farms from selected European Union countries. *Problems of Agricultural Economics/ Zagadnienia Ekonomiki Rolnej* 354 (1): 56-79. DOI: 10.30858/zer/89615.

Zuba-Ciszewska Maria. 2014. Wpływ zmian niektórych uwarunkowań na poziom wykorzystania potencjalnej powierzchni paszowej w chowie krów mlecznych w Polsce i w Niemczech w latach 1996-2011 (Impact of changes in some conditions on the level of utilization of the potential forage area in dairy cow farming in Poland and Germany in 1996-2011. *Roczniki Ekonomii i Zarządzania* 6: 217-228.

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POTENCJAŁ PRODUKCYJNY GOSPODARSTW SPECJALIZUJĄCYCH SIĘ W PRODUKCJI MLEKA KROWIEGO W MAKROREGIONACH UNII EUROPEJSKIEJ – ANALIZA TYPOLOGICZNA

Słowa kluczowe: potencjał produkcyjny, makroregiony, Unia Europejska, miernik syntetyczny

ABSTRAKT

Celem artykułu jest dokonanie typologii makroregionów FADN w Unii Europejskiej, według potencjału produkcyjnego gospodarstw specjalizujących się w produkcji mleka krowiego, w latach 2008 i 2017. Produkcja mleka krowiego stanowi jedną z najważniejszych gałęzi produkcji zwierzęcej zarówno w Polsce, jak i pozostałych krajach UE, dlatego jest przedmiotem licznych publikacji. Najczęściej produkcja mleka krowiego stanowi przedmiot badań w ujęciu globalnym, państw UE lub zróżnicowania regionalnego w Polsce. Stosunkowo rzadziej tematyka produkcji mleka obejmuje ujęcie regionalne w całej UE. Przez wzgląd na dynamiczne zmiany czynników oddziałujących na produkcję mleka, a zwłaszcza zniesienie w 2015 roku systemu kwotowania produkcji mleka krowiego w państwach UE, istotna jest dalsza obserwacja zmian zachodzących na rynku mleka, zwłaszcza od strony podażowej. W celu wyznaczenia typów makroregionów, dla każdego z nich obliczono miernik syntetyczny potencjału produkcyjnego metodą Hellwiga. Jak wykazały badania, najkorzystniejszymi cechami opisującymi potencjał produkcyjny gospodarstw mleczarskich w obu analizowanych latach cechowały się przede wszystkim makroregiony w krajach UE-15, które są położone w zachodniej i północnej Europie. Makroregiony z nowych państw członkowskich, z wyjątkiem Słowacji, cechowały się mniejszą konkurencyjnością w zakresie posiadanego potencjału. Podjęta analiza dowiodła utrzymującą się polaryzację w zakresie rozwoju gospodarstw mleczarskich z makroregionów UE.

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