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INVESTMENT LEVELS IN AGRICULTURAL BUSINESSES SPECIALIZING IN DAIRY CATTLE PRODUCTION IN POLISH FADN REGIONS IN 2004-2016[1]

Key words: investment, milk, FADN

ABSTRACT. Investment levels in agricultural businesses specializing in dairy cattle production in Polish FADN regions were compared based on data for 2004-2016. The analysis included gross and net investments (variables FADN SE516 and SE521) and investment subsidies (variable SE406). The research shows that agricultural holdings specializing in dairy cattle farming in the years 2004-2016 in the FADN Wielkopolska and Śląsk region and in the region of Pomerania and Masuria have reached the level of gross investment per one farm on average annually higher than the average annual level of gross investment in Poland. Farms specializing in dairy cattle farming in the FADN regions of Mazowsze and Podlasie, as well as Małopolska and Pogórze have achieved a lower level of gross investment per farm than on average per year in Poland. The average level of net investment per one agricultural holding specializing in dairy cattle farming in the regions of FADN Wielkopolska and Śląsk, Pomorze and Mazury as well as Mazowsze and Podlasie was of a positive value, whereas in the Małopolska and Pogórze region it was negative. Studies have shown that agricultural farms specializing in dairy cattle farming in the Wielkopolska and Śląsk regions developed the fastest among all farms in Poland, while the fastest growing farms specializing in dairy cattle farming are found in the Małopolska and Pogórze regions.

INTRODUCTION

Agricultural producers have to compete on the market similarly to other businesses. To stay ahead of the competition, they have to expand their productive capacity by investing and identifying opportunities for development. Investment levels and expansion of productive output testify to the growth potential of agribusiness [Józwiak 2004].

Agricultural businesses mainly invest in tangible assets. Spending on modernization increases a farm's value, improves the structure of its assets and increases productive capacity. Investments in modernization aim to increase production in both quantitative and qualitative terms, decrease production costs and change the structure of production to utilize assets more effectively and improve the farm's financial performance [Babuchowska, Marks-Bielska 2012].

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Polish agribusinesses increased their investment spending and improved their productive capacity after Poland had joined the European Union. Investment levels in the agricultural sector increased due to high competition between EU Member States and access to new markets. EU funding programmes have fostered the growth of agricultural business and enabled them to compete effectively on the Single Market and cater to consumer needs [Kisiel et al. 2012, Babuchowska, Marks-Bielska 2011].

There are two types of investments in agricultural businesses [Gołębiewska 2010, Sierpińska, Jachna 2005, Ziółkowska 2006, Zając 2012]:

– replacement investments, namely the purchase of tangible assets to maintain the output capacity that is lost through deterioration,
– investments in new fixed assets to increase a company's productive capacity and its competitiveness.

Investments are a major determinant of growth in the agricultural sector. Investment spending in agriculture is influenced by macroeconomic, microeconomic and organizational factors [Bórawski 2014].

Investment spending in agriculture increased in 2004-2014 after Poland had joined the EU. As an EU Member State, Poland became eligible to non-refundable aid for agricultural producers, which substantially contributed to the restructuring of the Polish agricultural sector [Mikołajczyk 2017]. Poland was also able to increase capital expenditures on fixed assets in environmental protection and water management [Kropsz-Wydra 2017].

Foreign direct investments also contributed to the growth of the Polish agricultural sector in 2005-2014. Exports in agriculture nearly doubled during that period, and Poland has been a leading food exporter in the EU since 2012 [Kłósek, Wojtaszek 2017].

The proportion of investments in agricultural buildings and structures continued to increase between 2010 and 2015, from 35.7% in 2010 to 46.0% in 2015. Poland has a continental climate with very cold winters, and buildings play a very important role in crop and livestock production. The proportion of spending on machines, equipment and tools reached 39.5%, whereas investments in means of transport decreased by 7 percentage points in 2010-2015 [Szafraniec-Siluta, Zawadzka 2017].

MATERIAL AND METHODS

The main aim of the study was to evaluate regional differentiation of investment levels in farms specializing in the production of dairy cattle in Polish FADN regions. Specific objectives were to evaluate gross and net investment in the dairy sector, and subsidies for Polish dairy farmers. The relevant data for 2004-2016 were compared in four Polish FADN regions: Region 785 – Pomorze and Mazury, Region 790 – Wielkopolska and Śląsk, Region 795 Mazowsze and Podlasie, and Region 800 – Małopolska and Pogórze. The following variables in FADN standard results were used in the analysis [Foriańczyk et al. 2017]:

– gross investment (SE516), i.e. the value of purchased and produced fixed assets minus the value of sold and donated fixed assets in the accounting year plus changes in herd value,
– net investment (SE521), i.e. gross investment minus depreciation in the accounting year,

– subsidies on investments (SE406),
– total labor expenditure (SE010), total human labor input in the operational activity of the farm = AWU expressed in work units = full-time employees = 2,+120 hours/year,
– area of agricultural land in ha (SE025) – total area of agricultural land – own land, land leased for one year or more, land shared with the owner on the basis of participation in harvest, as well as fallow land,
– fixed assets (SE441) – cover agricultural land, farm buildings, forest planting as well as machinery and equipment, as well as basic herd animals.

The value of investments was expressed in net prices (without VAT) in Polish zloty (PLN). The analyses were carried out with the use of tabular, graphic and descriptive methods.

RESULTS

In 2017, investments in agriculture reached PLN 5,270.4 million, marking an increase from PLN 3,716 million in 2010. In 2017, Polish agribusinesses mostly invested in buildings and structures (PLN 2,372.8 million), farming machines and tools (PLN 1,473.9 million) and means of transport (PLN 808.2 million). In 2017, investment spending was highest in Wielkopolska (PLN 771 million) and Mazowsze (PLN 713.6 million) and lowest in Świętokrzyskie (PLN 143.8 million) and Podkarpacie (PLN 152.5 million) [GUS 2018]. According to Dariusz Kusz [2018], agricultural investments increased after Poland had joined the EU, which can be attributed to the stimulating effects of EU financial aid, mainly direct payments and funds allocated under the Rural Development Operational Programmes for 2004-2006, 2007-2014 and 2015-2020.

Gross and net investment and subsidies on investments, total labor input, area of agricultural land and fixed assets in dairy farms in four Polish FADN regions in 2004-2016 were analyzed in the first stage of the study.

According to FADN data, in the analyzed period, the average gross investment in Polish agribusinesses specializing in the production of dairy cattle reached PLN 12,778 per annum, average net investment reached PLN 982.92 per annum, and the average value of subsidies on investments – PLN 1,245.69 per annum.

In 2004-2016, total gross investment was determined at PLN 241,308, total net investment – at PLN 12,778, and subsidies on investments – at PLN 16,194 per farm. Gross investment was highest in 2012 at PLN 27,508, whereas net investment was lowest in 2016 at PLN -10,302 (Figure 1).

In the years 2004-1016, the average farm specializing in milk production in Poland had 18.66 ha, while fixed assets per year in the analyzed period were at a level of PLN 542,487.46, with the involvement of total labor expenditure at a level of 1.77 full-time employees.

In FADN region Pomorze and Mazury, average gross investment in 2004-2016 reached PLN 24,701 per annum, average net investment – PLN 3,137.08 per annum, and average subsidies on investments – PLN 1,189.08 per annum per dairy farm.

In the analyzed period in FADN region Pomorze and Mazury, total gross investment was determined at PLN 321,113 per dairy farm, total net investment – at PLN 40,782 per

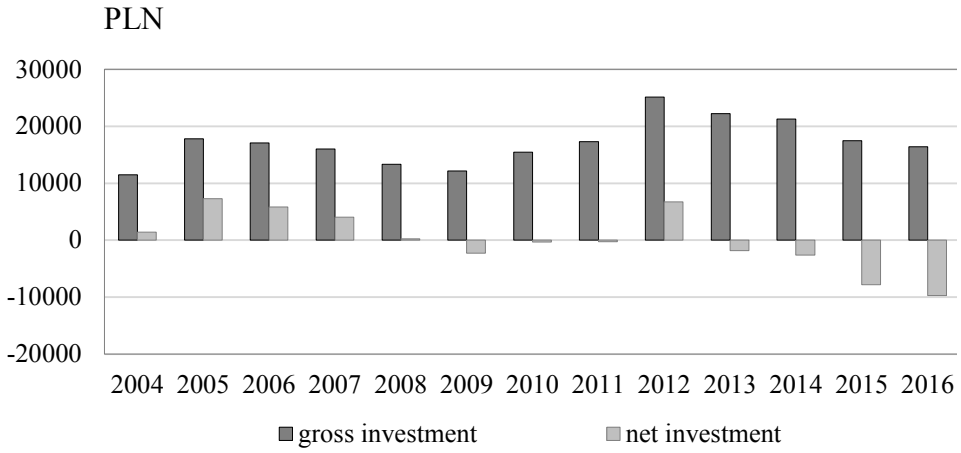

Figure 1. Gross and net investment in FADN regions
Source: own elaboration based on FADN data

farm, and total subsidies per investment – at PLN 47,819 per farm. Net investment was lowest in 2016 at PLN -19,142 (Figure 2).

In the years 2004-1016, the average farm specializing in milk production in the FADN region of Pomorze and Mazury had 27.88 ha, while on average, fixed assets per annum were at a level of PLN 705,957.38 per year, with the involvement of total labor expenditure at a level of 1.87 of full-time employees.

In FADN region Wielkopolska and Śląsk, average gross investment in the analyzed period reached 29,089 per annum, net investment – PLN 6,596.85 per annum, and subsidies on investments – PLN 1,595.08 per annum per dairy farm.

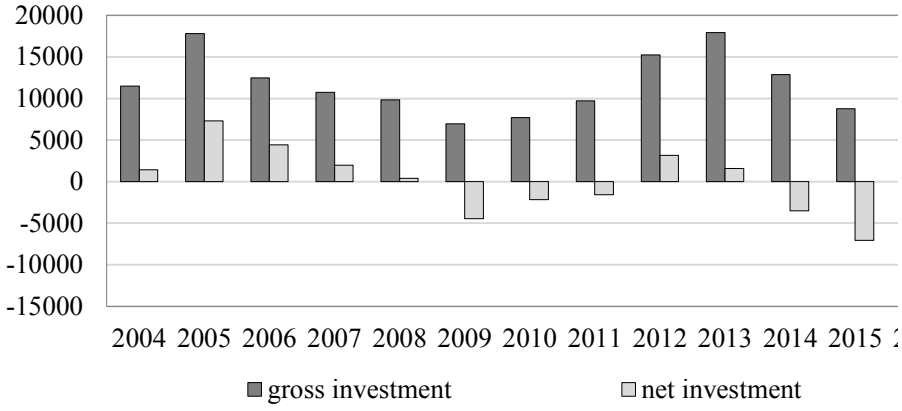

Figure 2. Gross and net investment in FADN region Pomorze and Mazury
Source: own elaboration based on FADN data

In 2004-2016, total gross investment in the analyzed region was determined at PLN 378,157 per farm, total net investment – at PLN 85,759 per farm, and total subsidies on investments – at PLN 20,736 per farm. Gross investment in Wielkopolska and Śląsk was highest in 2010 at PLN 61,696, and net investment was lowest in 2016 at PLN -6,819 (Figure 3). In the years 2004-2016, medium-sized farms specializing in milk production in the FADN Wielkopolska and Śląsk regions had 24.07 ha, while the long-term average assets in the analyzed period were at a level of PLN 717,276.15, with the involvement of total work expenditure at a level of 1.90 full-time employees.

Figure 3. Gross and net investment in FADN region Wielkopolska and Śląsk
Source: own elaboration based on FADN data

In FADN region Mazowsze and Podlasie, average gross investment in 2004-2016 reached PLN 17,164.85 per annum, average net investment – PLN 58.31 per annum, and average subsidies on investments at PLN 1,308 per annum.

In the analyzed period, total gross investment per dairy farm in Mazowsze and Podlasie was determined at PLN 223,143, total net investment – at PLN 758, and total subsidies on investments – at PLN 17,004. Gross investment was highest in 2012 at PLN 25,158, and net investment reached the lowest level in 2016 at PLN -9,701 (Figure 4).

In the years 2004-1016, the average farm specializing in milk production in the FADN Mazowsze and Podlasie region had a total area of 173,000 ha, while fixed assets averaged around PLN 52,7356.15 per annum in the analyzed period with the involvement of total labor expenditure at a level of 1.75 full-time employees.In 2004-2016, in FADN region Małopolska and Pogórze, average gross investment per dairy farm reached PLN 11,456.54 per annum, net investment – PLN -678 per annum, and subsidies on investment – PLN 772 per annum.

In Małopolska and Pogórze, total gross investment per dairy farm in the analyzed period was determined at PLN 148,935, and total net investment – at PLN -8,816. Gross investment peaked in 2013 at PLN 17,935, whereas net investment reached the lowest level in 2016 at PLN -10,155 (Figure 5).

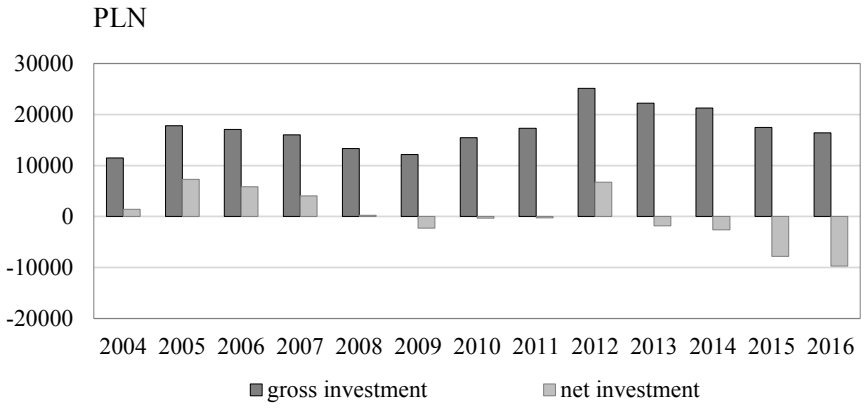

Figure 4. Gross and net investment in FADN region Mazowsze and Podlasie
Source: own elaboration based on FADN data

In the years 2004-1016, the average farm specializing in milk production in the FADN Małopolska and Pogórze regions had 12.36 ha, while the long-term average assets in the analyzed period were at a level of PLN 33,8891.85, with the involvement of total work expenditure at a level of 1.68 full-time employees. The data in Table 1 indicate that gross investment spending in the Polish dairy sector ranged from PLN 11,470 to PLN 27,508 per farm in 2004-2016, and net investment ranged from PLN -10,302 to PLN 7,428, with a positive balance in 2004-2013 and a negative balance in 2014-2016. Subsidies on investments in dairy farms ranged from PLN 0 to PLN 2,269 per farm in 2004-2016.

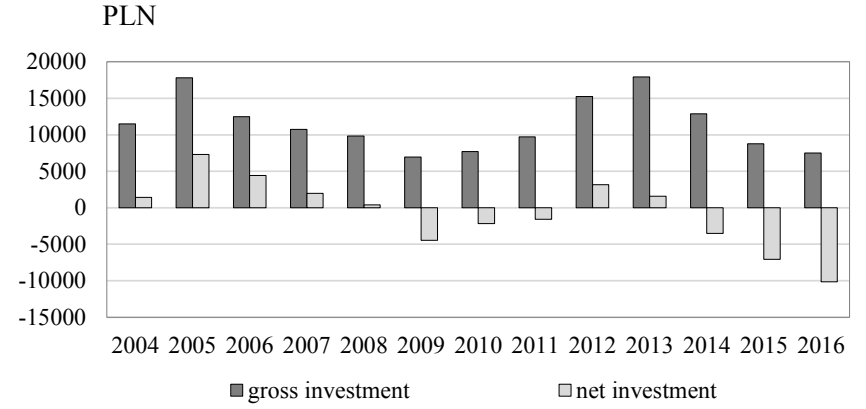

Figure 5. Gross and net investment in FADN region Małopolska and Pogórze
Source: own elaboration based on FADN data

Table 1. Average gross and net investment per dairy farm in Polish FADN regions

Item	Average gross and net investment per farm [PLN]											
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Gross investments (SE516)	11,470	17,795	17,562	17,274	13,616	12,241	19,803	21,121	27,508	25,708	23,039	18,254	15,917
Net investments (SE521)	1,401	7,292	6,819	5,120	336	-2,798	1,687	2,151	7,428	1,701	-1,126	-6,931	-10,302
Subsidies on investments (SE406)	2	2	60	985	1,313	1,045	1,604	1,642	1,658	2,258	2,269	1,664	1,694
Total labor expenditure (SE010)	16,920	16,960	17,260	17,370	17,300	17,630	18,190	18,540	17,970	18,010	18,010	17,950	17,850
Area of agricultural land [ha] (SE025)	12.90	15.70	15.70	16.70	16.70	17.40	21.00	20.90	20.40	21.00	21.30	21.40	21.50
Value of fixed assets (SE441)	227,650	244,659	255,300	293,415	300,212	536,062	60,522	641,928	668,288	799,613	819,037	819,548	845,103

Source: own elaboration based on FADN data

Total labor expenditure in 2004-2016 in Poland on farms specializing in dairy cattle farming ranged from 16,920 AWU to 18,010 AWU per farm. The area of agricultural land in 2004-2016, in Poland, on farms specializing in dairy cattle farming, increased from 12.90 ha to 21.50 ha. The value of fixed assets in 2004-2016, in Poland, on farms specializing in dairy cattle farming, increased from PLN 227,650 up to PLN 845,103 per farm.

Agribusinesses specializing in the production of dairy cattle in FADN Region Wielkopolska and Śląsk were characterized by the highest investment spending in 2004-2016. In the analyzed region, gross investment per farm was determined at PLN 29,089 on average, which is more than 56% higher than the national average (PLN 18,562.15).

Gross investment also exceeded the national average in FADN region Pomorze and Mazury. In that region, average gross investment per dairy farm was determined at PLN 24,701, and was 33% higher than the national average. In FADN region Mazowsze and Podlasie and FADN region Małopolska and Pogórze, average gross investment in the dairy sector was below the national average. In these regions, gross investment was determined at PLN 17,164.85 in Mazowsze and Podlasie (around 92% of the national average) and PLN 11,456.54 in Małopolska and Pogórze (around 62% of the national average).

CONCLUSIONS

In 2004-2016, net investment in the Polish dairy farming sector was positive in FADN regions Wielkopolska and Śląsk, Pomorze and Mazury, and Mazowsze and Podlasie, and it was negative in FADN region Małopolska and Pogórze. Average net investment in FADN region Wielkopolska and Śląsk and in FADN region Pomorze and Mazury exceeded the national average.

Positive net investment levels in FADN regions Wielkopolska and Śląsk, Pomorze and Mazury, and Mazowsze and Podlasie indicate that dairy firms in those regions not only replaced worn out machinery and equipment, but also invested in new purchases and projects to expand their productive capacity in the analyzed period.

Agribusinesses specializing in the production of dairy cattle in FADN region Wielkopolska and Śląsk grew most rapidly, whereas dairy farms in FADN region Małopolska and Pogórze developed at the slowest pace. Subsidies on investments in the dairy farming sector were highest in Wielkopolska and Śląsk, and lowest in Małopolska and Pogórze.

Data analysis showed that the average value of fixed assets, average labor input in total and the average area of agricultural land specializing in dairy cattle in the FADN region of Pomorze and Mazury and in the FADN region Wielkopolska and Śląsk were the highest, while in the FADN region Mazowsze and Podlasie and in the FADN region of Małopolska and Pogórze average values were lower.

BIBLIOGRAPHY

Babuchowska Karolina, Renata Marks-Bielska. 2011. Realizacja działania PROW 2007-2013 „Modernizacja gospodarstw rolnych" w województwie lubelskim (Implementation of the PROW 2007-2013 activity 'Modernisation of farms' in the Lubelskie Voivodeship). *Zeszyty Naukowe SGGW. Problemy Rolnictwa Światowego* 11 (14): 7-16.

Babuchowska Karolina, Renata Marks-Bielska. 2012. Unowocześnianie gospodarstw rolnych z województwa warmińsko-mazurskiego w ramach PROW 2007-2013 (Modernization of farms from the warmińsko-mazurski region under the RDP 2007-2013). *Zeszyty Naukowe SGGW. Polityki Europejskie, Finansowanie i Marketing* 8 (57): 36-46.

Bórawski Piotr. 2014. Zróżnicowanie inwestycji w gospodarstwach mlecznych (Differentiation of inve- stment in dairy farms). *Roczniki Naukowe SERiA* XVII (2): 27-32.

Floriańczyk Zbigniew, Dariusz Osuch, Renata Płonka. 2017. *Polski FADN. Wyniki standardowe uzyskane przez gospodarstwa. rolne uczestniczące w polskim FADN w 2016 roku* (Polish FADN. Standard results obtained by farms. farms participating in the Polish FADN in 2016). Warszawa: IERiGŻ-PIB.

Gołębiewska Barbara. 2010. Kierunki podejmowanych działań inwestycyjnych w gospodarstwach rolnych o zróżnicowanych powiązaniach z otoczeniem (The directions of investment in the farms depend on the strength of their markets relations). *Roczniki Nauk Rolniczych. Seria G* 97 (4): 6-68.

GUS (CSO). 2018. *Rocznik statystyczny rolnictwa* (Statistical Yearbook of agriculture). Warszawa: GUS.

Józwiak Wojciech. Strategia postępowania posiadaczy gospodarstw rolnych i ich pozarolnicze formy aktywności gospodarczej w latach 1996-2002 (Behaviour of farm holders and their non-agricultural activity in the years 1996-2002). *Roczniki Naukowe SERiA* VI (3): 94-100.

Kisiel Roman, Dorota Dołęgowska, Jolanta Marozas, 2012. Kierunki wykorzystania płatności bezpośrednich w woj. podkarpackim. [W] *Nierówności społeczne a wzrost gospodarczy. Wpływ funduszy unijnych na działalność gospodarczą* (Directions of using direct payments in the province Podkarpackie. [In] Social inequalities and economic growth. The impact of EU funds on economic activity), ed. M.G. Woźniak, R. Fedan, 252-267. Rzeszów: Uniwersytet Rzeszowski.

Kłósek Kamil, Michał Wojtaszek. 2017. Napływ i dynamika bezpośrednich inwestycji zagranicznych w sektorze rolniczym w Polsce w latach 2005-2014 (Inflows and synamics of foreign direct investments in the agricultural sector in Poland in the years 2005-2014). *Roczniki Naukowe SERiA* XIX (1): 74-79.

Kropsz-Wydra Irena. 2017. Zróżnicowanie poziomu nakładów na środki trwałe służące ochronie środowiska i gospodarce wodnej w Polsce (Diversification of the level of expenditures on fixed assets for environmental protection and water management in Poland). *Roczniki Naukowe SERiA* XIX (3): 161-167.

Kusz Dariusz. 2018. Pomoc publiczna a proces modernizacji rolnictwa (Public help versus agriculture modernization process). Rzeszów: Wydawnictwo Politechniki Rzeszowskiej.

Mikołajczyk Jarosław. 2017. Inwestycje w rolnictwie Polskim w latach 2004-2014 w ujęciu makroekonomicznym (Investments in polish agriculture in the years 2004-2014 from the macroeconomic perspective). *Roczniki Naukowe SERiA* XIX (1):116-121.

Sierpińska Maria, Tomasz Jachna. 2005. *Ocena przedsiębiorstwa według standardów światowych* (Evaluation of the company according to world standards). Warszawa: PWN.

Szafraniec-Siluta Ewa, Danuta Zawadzka. 2017. Struktura nakładów inwestycyjnych na środki trwałe przedsiębiorstw rolniczych – ujęcie porównawcze (Structure of investment outlays on fixed assets of agriculure enterprises in Poland – a comparative approach). *Roczniki Naukowe SERiA* XIX (3):282-288.

Zając Dariusz. 2012. Inwestycje jako czynnik modernizacji gospodarstw rolnych z działalnością pozarolniczą. [W] *Nierówności społeczne a wzrost gospodarczy*. *Modernizacja dla spójności społeczno-ekonomicznej w czasach kryzysu* (Investments as a factor of modernization of farms with non-agricultural activities. [In] Social inequalities and economic growth. Modernization for socio-economic cohesion in times of crisis), ed. M.G, Woźniak, 284-294. Rzeszów: Uniwersytet Rzeszowski.

Ziółkowska Justyna. 2006. *Metody oceny efektywności projektów inwestycyjnych w agrobiznesie. Studia i Monografie* (Methods for assessing the effectiveness of investment projects in agribusiness. Studies and Monographs). Warszawa: IERiGŻ-PIB.

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POZIOM INWESTYCJI W GOSPODARSTWACH ROLNYCH SPECJALIZUJĄCYCH SIĘ W CHOWIE BYDŁA MLECZNEGO W REGIONACH FADN W POLSCE W LATACH 2004-2016

Słowa kluczowe: inwestycje, mleko, FADN

ABSTRAKT

Przedstawiono porównanie poziomu inwestycji w gospodarstwach rolnych specjalizujących się w chowie bydła mlecznego w regionach FADN Polski w latach 2004-2016. Analizie poddano inwestycje brutto i netto (zmienne FADN SE516 i SE521) oraz dopłaty do inwestycji (zmienna SE406). Z badań wynika, że gospodarstwa rolne specjalizujące się w chowie bydła mlecznego w latach 2004-2016 w regionie FADN Wielkopolska i Śląsk oraz w regionie Pomorze i Mazury osiągnęły poziom inwestycji brutto na jedno gospodarstwo średnio rocznie wyższy niż średni roczny poziom inwestycji brutto w Polsce. Gospodarstwa rolne specjalizujące się w chowie bydła mlecznego w regionach FADN Mazowsze i Podlasie oraz Małopolska i Pogórze osiągnęły niższy poziom inwestycji brutto na gospodarstwo niż średnio rocznie w Polsce. Średni poziom inwestycji netto na jedno gospodarstwo rolne specjalizujące się w chowie bydła mlecznego w regionach FADN Wielkopolska i Śląsk, Pomorze i Mazury oraz Mazowsze i Podlasie stanowi wartość dodatnią, natomiast w regionie Małopolska i Pogórze wartość ujemną. Badania wykazały, że gospodarstwa rolne specjalizujące się w chowie bydła mlecznego w regionie Wielkopolska i Śląsk rozwijały się najszybciej spośród wszystkich gospodarstw w Polsce, natomiast najwolniej rozwijały się gospodarstwa rolne specjalizujące się w chowie bydła mlecznego regionu Małopolska i Pogórze.

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