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CONDITION AND AREAS OF DEVELOPMENT OF FARMS WITH SLAUGHTER CATTLE*STAN I KIERUNKI ROZWOJU GOSPODARSTW Z CHOWEM BYDŁA RZEŻNEGO***Key words:** farms, slaughter cattle, competitiveness*Słowa kluczowe:* gospodarstwa rolne, chów bydła rzeźnego, konkurencyjność*JEL codes:* O13, Q12, Q16

Abstract: The goal of the study was to assess the effectiveness and competitiveness of farms breeding slaughter cattle in Poland and in other selected countries. The study covered farms from Poland, Austria, Germany, the Netherlands and France. The selection of countries was deliberate. The research materials are based on data from farms covered by the monitoring of the Polish and European FADN. The index and comparative method was used in the assessment of the surveyed farms. An ability to compete was demonstrated by medium-sized Polish farms keeping over 50 livestock units of cattle per one holding and using 55 hectares of utilised agricultural area (UAA) and very large German farms keeping 480 livestock units of cattle and using 417 ha. Payments were the main source of farm income. Their share in the farm income was: 83% (Polish) and 166% (German) respectively.

Introduction

Animal production has been dominant in the structure of commercial agricultural production in the last dozen years or so. Its share in 2015 was 58.5%. Bovine production, which includes the production of beef, plays an important role in animal production. Its share in 2015 was 46.9%. The production of milk is dominant in cattle production (approximately 34%). What should be pointed out is the increase in the share of beef livestock from 9.8% in 2005 to 13.1% in 2015. The share of farms with slaughter cattle in the total number of farms with cattle production of 17.5 p.p., increased from 4.7% in 1996 to 22.2% in 2016. The number of farms with slaughter cattle increased by 11 230 and amounted to 76 220 in 2016 [GUS 2016, 2017a].

It should be pointed out that beef production is undertaken by specialised farms breeding cattle of meat breeds.

Farms that keep cattle are closely tied to the land. They also have organic fertilizers in the form of manure, thanks to which the soil is fed with an organic substance that binds considerable amounts of carbon dioxide. For these reasons, production in these farms is sustainable and environmentally friendly [Harasim 2013]. Another factor contributing to the increase in farmers' interest in breeding of slaughter cattle is the risk associated with ASF (African swine fever). Farmers who keep pigs within areas that are threatened with ASF are forced to abandon this production line. An alternative for them is to take up slaughter cattle breeding, which is less capital intensive than milk production.

Given the growing importance of farms with beef production, there is a need to study their organisation and effectiveness. In the face of limited internal demand for beef and products of its processing, the export of these products is an opportunity to develop farms with slaughter cattle. For this reason, the study of the effectiveness of Polish farms with slaughter cattle should be conducted against the background of similar farms from selected European Union countries.

Materials and research methods

The goal of the study was to evaluate the effectiveness of Polish farms that keep cattle for slaughter compared with similar farms from selected European Union countries and to determine their ability to compete. The research covered farms from the following countries: Poland, Austria, Germany, the Netherlands and France. The selection of countries was deliberate. Austria was chosen because of the similar size and structure of farms and the level of production intensity. On the other hand, Germany and France, as the largest producers, and the Netherlands, as the country with the highest level of production intensity. Detailed research covered Polish farms with slaughter cattle in 2008-2015, and comparative research with the mentioned countries in 2013-2015 including the economic size expressed as SO (Standard Output, calculated as an average over a five-year period) in EUR thousand. The research materials are based on data from farms included in the Polish and European FADN (The network of farms covered by research).

The index method was used in the assessment of the effectiveness of surveyed dairy farms. The following four groups of describing indicators were used: production potential, production organisation, costs, productivity and efficiency (a detailed list of all indicators is given in [Ziętara, Zieliński 2016]).

The competitiveness of farms was determined by the Competitiveness Index (*Wk*) based on Werner Kleinhans [2015]. Competitiveness Index (multiplication factor) was determined as the quotient of farm income and the sum of estimated costs of using own factors of production: labour, land and capital (Equation 1)¹.

$$CI = \frac{FI}{LandOC + LabourOC + CapitalOC}$$

where: *CI* – competitiveness indicator, *FI* – farm income, *LandOC* – the opportunity cost of land, *LabourOC* – the opportunity cost of own labour, *CapitalOC* – the opportunity cost of capital (without land).

The opportunity cost of land was assumed at a level of rent in appropriate economic size classes. The costs of the farmer's own labour and members of their family were adopted on the basis of the average level of salaries in the national economy as the basis for calculating the income parity (a reference of farm income per Family Work Unit (FWU) to the average level of salaries in the national economy).

Competitiveness was defined in this study as the ability of the farm to develop. Such an ability is obtained by a farm when the farm income covers the costs of its own factors of production. This approach is different from the competitiveness traditionally defined as gaining an advantage (based on cost, price, quality etc.) in relation to competitors. The authors previously determined the competitive abilities of farms using the category of „entrepreneur's profit”, parity income and the net investment rate [Ziętara, Zieliński 2016].

¹ The value of competitiveness index $CI \geq 1$ indicates full coverage of own costs of factors of production with the income farm. Based on Kleinhans, a further classification was adopted and the following classes were identified: $CI (-)$ – in the case of a negative FI ($CI1$), $0 < CI < 1$ – partial coverage of own cost of factors of production ($CI2$), $1 = CI < 2$ – full coverage of own cost of factors of production ($CI3$), $CI \geq 2$ – double and higher own cost of factors of production ($CI4$). The competitiveness index $CI3$ indicates a competitive ability, while $CI4$ indicates the full competitiveness of a farm. This statement coincides with the view of Biswanger [2011], who states that an enterprise capable of development should achieve a profit rate twice as high as the interest rate on loans.

Competitiveness of Polish farms with slaughter cattle in 2008-2015

Table 1 shows the figures describing the minimum sizes of farms with slaughter cattle, which show development capabilities determined by means of the competitiveness index. These data come from farms covered by the Polish FADN monitoring in 2008-2015, broken down by cattle stock expressed in livestock units (LSUs) per farm. Due to the insufficient number (less than 15), in 2012 no farms in the following categories were covered: 50-60 and 60-80 LSU, and in 2014 in the class 50-60 LSU/farm. In 2008 and 2010, the farms keeping 38.70 and 38.85 LSU of cattle respectively and an area of about 37 ha of UAA demonstrated the ability to compete. The value of their competition index (CI3) was 1.01 and 1.06 respectively. They used leased land as well. Their share was about 30%. The share of permanent grasslands (TUZ) was slightly higher, and amounted to 32.32 and 35.36% respectively. The fodder share in the cropped area was at a similar level. These farms made little use of hired labour, which amounted to approximately 5%. The stocking density of cattle amounted to ca. 105 LSU/100 ha of UAA, and should be regarded as average. The fodder area per 1 LSU of cattle in these farms was 0.54 ha, which should be regarded positively. The obtained farm income per Family Work Unit (FWU) ensured that an income parity of 187% and 163% could be achieved. These farms used all kinds of payments to a large extent. Their share in the farm income was 38 and 56% respectively.

Table 1. Minimum sizes and characteristics of Polish farms that keep slaughter cattle and were able to compete in 2008-2015

Tabela 1. Minimalne rozmiary i cechy polskich gospodarstw z chowem bydła rzeźnego zdolnych do konkurencji w latach 2008- 2015

Item/Wyszczególnienie	Unit/Jedn.	Years/Lata				
		2008	2010	2012	2014	2015
Stocking density/Obsada bydła	LSU/farm SD/gosp.	38.70	38.85	37.41	68.57	69.84
Utilised agricultural area/ Powierzchnia UR	ha/farm/ha/gosp.	36.16	37.80	41.03	83.49	82.79
Share of leased land/Udział dzierżawionych gruntów	%	31.40	27.27	32.00	34.20	41.37
Share of permanent grassland in UAA/Udział TUZ w UR		32.39	35.36	33.66	58.09	52.57
Share of hired labour/ Udział pracy najemnej		4.80	5.80	4.94	11.01	11.92
Fodder share in cropped area/ Udział pastwnych w zasiewach		38.15	32.00	23.96	34.43	34.05
Cattle stock/Obsada bydła	LSU/100 ha of UAA/ SD/100 ha UR	107.34	102.80	91.18	82.14	84.37
Fodder area per LSU/ Powierzchnia paszowa na SD	ha/LSU/ha/SD	0.54	0.54	0.54	0.88	0.81
Beef livestock production]/ Produkcja żywca wołowego	t/farm/t/gosp.	4.90	8.07	13.90	25.14	30.05
Farm income/Dochód z gospodarstwa	thous. PLN/FWU/ tys. zł/FWU	44.24	42.06	37.37	38.06	67.24
Income parity/Parytet dochodowy	%	187.20	163.00	132.51	125.65	215.30
Share of payments in income/ Udział płatności w dochodzie		37.97	55.86	68.14	131.84	64.57
Competitiveness index/ Wskaźnik konkurencyjności	-	1.01	1.06	0.76	0.77	1.34

Source/Źródło: [Goraj i in. 2009-2016]

In 2012 and 2014, the researched farms did not show any ability to develop and compete. The competitiveness index was 0.76 and 0.77 respectively, with the stocking density at 37.4 and 68.6 LSU/farm and with the UAA amounting to 41 and 83.5 ha. In 2014, the use of fodder area was worse, as it amounted to 0.88 ha per 1 LSU of cattle, i.e. 63% higher than the average in previous years. The scale of cattle production in these farms was 13.9 and 25.14 tons of beef livestock/farm respectively and was significantly higher than the production of beef livestock in 2010 by 72% and 211%, respectively. These farms have achieved income parity, but the costs of utilising their own land and capital have not been covered. For this reason, farms in these years did not have the ability to develop, although they benefited from payments to a large extent. Their share in the income was 68% and 132% respectively. The ability to compete in 2015 was demonstrated by farms keeping approximately 70 cattle and having 82.8 ha of UAA. They utilised leased land to a large extent. Their share was 41.4%. The share of permanent grassland was high in such farms and amounted to 52.6%. The stocking density of cattle amounted to ca. 84.4 LSU/100 ha of UAA, and should be regarded as average. The competitiveness index in these farms was 1.34, and the income parity was 215%. The share of payments in the farms' income amounted to ca. 65%. This means that farms with this production scale and without payments would not be able to develop.

Polish farms with slaughter cattle compared with similar farms in selected countries

There were only two groups of farms among the surveyed farms that showed an ability to compete (tab. 2). These were medium-large Polish farms and very large German farms².

They obtained values of the competition index of above 1. The value of the competition index in both types of farms was 1.12. The value of the index in other farms was within the range from 0.21 (medium small German farms) to 0.79 (very large Dutch farms).

It is important to know the characteristic features of these farms. Relevant figures are provided in table 3. The examined farms with similar competitive ability differ in the production potential determined by the economic size and UAA. Polish farms are average-large ones with the SO value of EUR 70000, whereas German ones in the very large class with the SO value of EUR 899000. They were about 13 times larger than the Polish ones.

The area of Polish farms was 55 ha, and the German farms were 7.5 times larger. The total labour input in German farms amounted to 5.6 AWU/farm and was 2.8 times higher than in

Table 2. Competitive abilities of Polish farms with slaughter cattle compared with farms from the surveyed countries (average in 2013-2015)

Tabela 2. Zdolności konkurencyjne polskich gospodarstw z chowem bydła rzeźnego na tle gospodarstw z badanych krajów (średnia z lat 2013-2015)

SO [thous. EUR]/ SO [tys. euro]	Poland/ Polska	Austria/ Austria	Germany/ Niemcy	Netherlands/ Holandia	France/ Francja
Competitiveness index/CI (multiplication factor)/Wskaźnik konkurencyjności Wk (krotność)					
(3) 25-50	0.78	0.42	0.21	-	0.46
(4) 50-100	1.12	0.51	0.39	-	0.45
(5) 100-500	-	-	0.62	0.49	0.54
(6) ≥500	-	-	1.12	0.79	-

Source: Polish and European FADN

Źródło: Polski i Europejski FADN

² In the European FADN there are the following economic size classes of farms: very small (1) 2,000≤€<8,000, Small (2) 8,000≤€<25,000, Medium-small (3) 25,000≤€<50,000, medium-large (4) 50,000≤€<100,000, large (5) 100,000≤€<500,000, very large (6) €≥500,000

Table 3. Characteristic features of farms that keep slaughter cattle and are able to compete
 Tabela 3. Charakterystyczne cechy gospodarstw z chowem bydła rzeźnego zdolnych do konkurencji

Item /Wyszczególnienie	Poland <i>Polska</i>	Germany <i>Niemcy</i>
Economic size of farm [SO in thous. EUR]/ <i>Wielkość ekonomiczna gospodarstwa [tys. euro SO]</i>	70.0	899
Area of farms [ha of UAA]/share of leased land [%]/ <i>Powierzchnia gospodarstw [ha UR]/udział gruntów dzierżawionych [%]</i>	55.6/25.6	417.4/54.5
Total labour input [AWU]/share of own labour/ <i>Nakłady pracy ogółem [AWU]/udział pracy własnej</i>	2.0/71.2	5.6/21.2
Value of assets [thous. EUR /ha]/share of own capital in liabilities [%]/ <i>Wartość aktywów [tys. euro/ha]/udział kapitału własnego w pasywach [%]</i>	7.53/88.97	6.02/66.45
Share of cereals in UAA [%]/fodder share in UAA [%]/ <i>Udział zbóż w UR [%]/udział pastewnych w UR [%]</i>	26.3/68.6	24.2/69.9
Total cattle stock/including dairy cows [LSU/100 ha]/ <i>Obsada bydła ogółem/w tym krów mlecznych [SD/100 ha]</i>	93.5/74.5	115.1/89.1
Cattle stock/ha of fodder area [LSU]/share of animal production [%]/ <i>Obsada bydła/ha pow. paszowej [SD]/udział produkcji zwierzęcej [%]</i>	1.37/76.9	1.65/75
Total costs/direct costs [EUR/ha of UAA]/ <i>Koszty ogółem/koszty bezpośrednie [euro/ha UR]</i>	895.6/417.7	2410.4/956.7
Feed costs [EUR/LSU]/share of purchased feed [%]/ <i>Koszty pasz [euro/SD]/udział pasz z zakupu [%]</i>	350.5/65	496.1/84
Hired labour costs [EUR/ha]/lease fee cost [EUR/ha]/ <i>Koszty pracy najemnej [euro/ha]/koszt czynszu dzierżawy [euro/ha]</i>	8.2/50.8	316.8/191.1
Cost of factors of the production/including own labour [thous. EUR per farm]/ <i>Koszt własny czynników produkcji/w tym pracy własnej [tys. euro/gospodarstwo]</i>	19.9/9.7	83.2/45
Animal production EUR/LSU/land productivity [thous. EUR/ha of UAA]/ <i>Produkcja zwierzęca euro/SD/produktywność ziemi [tys. euro/ha UR]</i>	549/0.70	1019/1.52
Labour productivity [EUR thousand/AWU]/land profitability [thous. EUR/ha of UAA]/ <i>Wydajność pracy [tys. euro/AWU]/dochodowość ziemi [tys. euro/ha UR]</i>	19.67/0.40	112.76/0.22

Source: Polish and European FADN

Źródło: Polski i Europejski FADN

Poland. They also differed in the share of their own labour, which was 71.2% in Polish farms and 21.2% in German ones. The value of assets per 1 ha of UAA in German farms was EUR 6000 and was 20% lower than in Polish farms.

Polish farms used foreign capital to a lesser extent. Their share in liabilities amounted to 11%, and in German ones it was about 36%. The organisation of plant production was similar in both types of farms. The share of cereals in the UAA was 26% and 24%, and for fodder 69% and 70% respectively. The total cattle stock in LSU/100 ha of UAA of Polish farms was 93.5 and in German 115.1 LSU. It should be regarded as average in both cases. There were differences in the use of the forage area. The cattle stock in LSU/ha of forage area in Polish farms was 1.35 and was 17% lower than in German farms. The surveyed farms differed significantly in terms of the intensity of production. The total costs in German farms amounted to 2,410 EUR/ha and were 169% higher than in Poland. The difference in direct costs was smaller – 129%. There were also differences in the structure of costs. The share of direct costs in total costs in Polish farms was 47% and in German ones 39%. The cost structure in Polish farms should be assessed as more favourable. Feed costs per 1 LSU in Polish farms amounted to 350,5 EUR and

were 29% lower than in German ones. The share of purchased feed was also lower in Polish farms, and amounted to 65% in the Polish and 84% in the German farms. The analysed farms differed in the level of hired labour costs and lease fee costs. The hired labour costs in Polish farms amounted to 8.2 EUR/ha 317 EUR/ha in German farms. Differences in the cost of lease fee were lower. The cost of lease fee in German farms was 191 EUR/ha UAA and was 4.8 times higher than in Poland. The cost of using own factors of production in Polish farms was around EUR 20/ha and was four times lower than in German farms. Differences in the cost of own labour were greater. The cost of own labour in Polish farms amounted to EUR 9.7/ha and was five times lower than in German ones. Animal productivity in German farms determined by the value of animal production per 1 LSU amounted to 1.019 EUR and was about twice as high as in Polish ones. Land productivity in German farms was twice as high, and labour productivity was almost six times higher. However, the profitability of land was lower. The main source of income in Polish and German farms with an ability to compete included all kinds of payments. Their share in the income was 83 and 166% respectively.

Conclusions

1. Among the analysed farms with slaughter cattle, only medium-sized farms with an economic size of EUR 50000-100000 SO and very large German farms with an economic size of EUR 500000 SO and higher demonstrated an ability to compete. Other Polish, Austrian, German and French farms did not show such an ability. The competitiveness index in these farms was within the range from 0.21 (medium small German farms) to 0.79 (very large Dutch farms).
2. The area of farms that kept cattle for slaughter and were able to compete was strongly diversified. Polish farms used about 56 ha of UAA, whereas German farms used about 417 ha of UAA. The organisation of production in Polish and German farms capable of competition was similar. Productivity of animal production measured by the value of animal production per LSU in Polish farms capable of competition amounted to EUR 549 and was about 50% lower than the productivity in German farms.
3. The basic source of income in the analysed farms with slaughter cattle included all kinds of payments. In medium-large Polish farms capable of competition it was 83%, whereas in other farms of the analysed countries it exceeded 100%. It was the highest in medium-sized German and French farms, in which it amounted to 316%. In German very large farms capable of competition amounted to 166%. This means that farms with slaughter cattle and without state support in the form of payments were not able to function.
4. Effective breeding of cattle for slaughter can be achieved in two types of farms. The first would be competitive farms, meaning the ones capable of development and with a minimum area of about 60 ha of UAA. The second one could be farms with a smaller area (2-15 ha) where cattle for slaughter would be a side activity providing additional income, next to the main external activity.

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Streszczenie

Celem badań była ocena efektywności i konkurencyjności gospodarstw z chowem bydła rzeźnego w Polsce i w wybranych krajach Unii Europejskiej. Badaniami objęto gospodarstwa z Polski, Austrii, Niemiec, Holandii i Francji. Dobór krajów był celowy. Źródłem materiałów badawczych były dane z gospodarstw objętych monitoringiem Polskiego i Europejskiego FADN. W ocenie badanych gospodarstw posłużono się metodą wskaźnikową i porównawczą. Zdolnościami do konkurencji wykazały się średnio duże gospodarstwa polskie utrzymujące ponad 50 sztuk dużych bydła w przeliczeniu na jedno gospodarstwo i użytkujące około 55 ha użytków rolnych oraz bardzo duże gospodarstwa niemieckie utrzymujące 480 sztuk dużych bydła i użytkujące 417 ha. Głównym źródłem dochodu w gospodarstwach były płatności. Ich udział w dochodzie z gospodarstwa wynosił odpowiednio: 83% (polskie) i 166% (niemieckie).

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