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Income of Small Farms in Poland in 2013-2020

Abstract: *Polish farms mostly represent small and very small economic size (60% of the total number of farms). Their economic viability is largely dependent on the help from the EU and the state, in the form of various support instruments. Their economic results are a factor in price changes on the agricultural market. By creating potential scenarios of the farms' working conditions, we can assess their impact on the overall economic situation of the farms. To this end, scenario analysis was applied in the research along with the creation of models of small farms specialising in cattle and pig fattening, milk, cereals, oil seeds, and protein crops. The study has shown that for 2020, the most likely scenario assumes that all of the researched farms will have smaller incomes than in 2013. Entrepreneur's profit for the studied farms will be negative. The most favourable economic situation might occur on dairy farms, which – according to the optimistic scenario – might achieve income parity. This results from changes in the new CAP system of direct payments.*

Keywords: *small farm, models of farms, farm income, scenarios, farm subsidies, income parity*

Introduction

Polish agriculture is characterised by a dispersed farm structure determined by the size of farms. According to Central Statistical Office of Poland (Polish: Główny Urząd Statystyczny, GUS), about 60% of Polish farms belong to the category of small and very small farms, whose economic size is within the range between EUR 2,000 and EUR 25,000. These farms constitute a majority among farms specialising in cattle and pig fattening (more than 70% of farms), cereals, legumes, or potatoes (64%, 75%, and 74%, accordingly) (GUS, 2014). Despite the fact that the owners usually earn low incomes from their agricultural activity, their significance stems from additional functions, such as social and environmental ones (Zegar, 2012). Performance of these functions is especially in the interest of the community, since more and more often consumers search for natural products from an environment which is not destroyed or overexploited in the production process. With a view to meeting these needs, a variety of solutions are being introduced, among them regulations which aim at preserving the existing natural conditions and, at the same time, achieving economic results which will allow the farms to develop. The solutions proposed and implemented by the EU as part of the Common Agricultural Policy are designed to ensure food security, increase in productivity and competitiveness, and environmental protection in Europe. Specifically, more attention was paid to small and medium-sized farms. They have been given preferential support conditions in order to allow them to develop and retain their diversity and multifunctionality. The mechanisms applied in case of these farms may, however, influence their profitability in various ways. The literature on the subject broadly analyses the effects of supporting farms due to implementation of agricultural practices beneficial for the climate and the environment (the so-called greening payments). As the research results demonstrate, the adverse effects of this regulation will not impact small farms, but will affect a relatively small group of the largest farms, mostly those with a highly simplified production structure and lack of Ecological Focus Areas, primarily specialising in livestock and crops (Czekaj et al., 2014; Kołoszycz and Wilczyński, 2014). Subsidizing selected sectors of production could potentially result in increased incomes on cattle farms by 2020 (Kulawik, 2020). The study of the effects of introducing redistributive payment for the first hectares shows that they will have no impact on the incomes of small German farms, which are expected to maintain their current profitability levels (Balmann and Sahrbacher, 2014). Hungarian research shows that redistributive payments will not affect any structural changes on the farms (Potori et al., 2013). In the opinion of experts, the payment – aimed mostly at small farms – will not solve their fundamental problems (Poczta, 2010) and they may still struggle to achieve income parity (Kołoszycz and Świtłyk, 2015). Consequently, the aim of this article is to define the future level of income for Polish small farms with different production profiles by 2020, taking into account the price changes for means of production and for agricultural products as well as the support system for small farms. The additional aim of the study is to attempt to indicate the direction of production on small farms, which could allow to achieve the highest incomes or income parity in 2020.

Material and method

The study was conducted on model farms, created on the basis of technical and economic data concerning farms included in the Polish Farm Accountancy Data Network in 2013 (Goraj et al., 2015). Models were created on the basis of the value of medium-sized highly specialised farms, which due to their economic size could be categorised as very small or small (with standard output between EUR 2,000 and EUR 25,000), selected because of their type of farming (classification TF8 in FADN). As a result, 7 models of farms were created:

- 3 models of very small farms, with the economic size of EUR 2,000--8,000 (FADN size classes 2 and 3), highly specialised in cattle fattening (CF-VS), pig fattening (PF-VS), and production of cereals, oilseeds, and protein crops (COP-VS);
- 4 models of small farms, with the economic size of EUR 8,000-25,000 (FADN size classes 4 and 5), highly specialised in cattle fattening (CF-S), pig fattening (PF-S), production of cereals, oilseeds, and protein crops (COP-S), and milk production (M-S).

The selection of highly specialised farms was supposed to emphasize the significance of the impact of changes in product prices, costs, and the support for farms with different production profiles. The constructed models were based on FADN's information on average resources available on small and very small farms, their production structures, and the prices of goods produced on the farms. Basic information on the analysed model farms are presented in table 1.

Table 1. Basic parameters of model farms

Parameters	Unit of measurement	Model farms						
		Pig fattening		Cattle fattening		Milk	Cereals, oilseeds, protein crops	
		PF-VS	PF-S	CF-VS	CF-S	M-S	COP-VS	COP-S
Agricultural area	ha	6.6	12.8	7.9	17.8	14.3	12.1	26.5
Livestock density	LU/100 ha	71.6	109.0	64.1	74.2	101.4	2.6	2.2
The share of rented area in agricultural land	%	2.9	16.5	7.6	19.1	24.9	10.1	28.9
Total production per 1 ha of agricultural land	PLN thousand/ha	4.9	6.8	3.4	3.5	6.2	3.0	3.2
The share of primary product sales in total sales	%	96	93	73	74	82	92	99
Total workload	AWU	1.3	1.5	1.3	1.6	1.8	1.1	1.3
Share of hired labour in total workload	%	0.8	0.7	1.5	0.6	0.6	0.9	1.6
Farm capital per 1 ha of agricultural land	PLN thousand/ha	31.8	29.4	29.3	28.6	27.3	29.6	29

Source: own study on the basis of: L. Goraj, M. Bocian, D. Osuchm, A. Smolik, 2015, Parametry techniczno-ekonomiczne według grup gospodarstw rolnych uczestniczących w Polskim FADN w 2013 roku. Warszawa: IERiGŻ-PIB.

The calculation of economic results was based on FADN methodology, but it lacked details (e.g. the exclusion of VAT balance in the balance of surcharges to operational and investment activity from the overall income of a farm). The farm income was calculated with the use of the following formula:

$$DR=Pr+Pz+Pp+Do-P-Kb-Ko-A-W-C-O+Di$$

where: DR stands for farm income; Pr – crop production; Pz – livestock production; Pp – other production; Do – subsidies to operational activity; P – taxes; Kb – direct costs; Ko – overhead costs; A – depreciation; W – wages; C – costs of production factors; O – interest; Di – subsidies to investment activity.

The analysis of the economic situation was supplemented with an assessment of production profitability, and establishment of the price of the primary product which would cover the production costs. Production profitability was calculated as the relation of farm income to the farms' total production. Setting a minimal price for the primary product, which would allow to cover the production costs, was done with the use of CVP analysis (cost-volume-profit analysis).

The study also included a calculation of entrepreneur's profit, which was done by subtraction of the estimated costs of engaging own production factors – land, work, and capital, in accordance with the premises of FADN (Goraj et al., 2015), from the overall farm income. For 2014-2020, interest rates on deposits up to 2 years from 2015 were used to estimate the opportunity costs of capital.

The study takes into account the system of direct payments for 2015-2020, with the inclusion of the single area payment scheme, the greening payment, coupled payments, and the redistributive payment. Payments beyond the level of direct subsidies calculated for 2013 on model farms (in comparison with the amount of payments presented in the average FADN results) remained on the same level in the consecutive years of the analysis.

The study was expanded to assess the parity relation of incomes for small farms with non-agricultural population. In the following study, the author uses the relation between the farms' farm income, and the average annual net salary in national economy (minus withdrawals). Since the study is prognostic in nature, it was assumed that the increase in wages would be consistent with its average rate of change in 2006-2014.

Farm models have been verified in terms of their economic results for the base year, which allowed to carry out the next phase of the research related to the analysis of the impact of changes in prices, costs, and subsidies on the economic results of the farms.

The study assumes constant volume and structure of production for 2013-2020. Such an assumption was possible because the farms within the reformed Common Agricultural Policy are exempted from the use of agricultural practices beneficial for the climate and environment. Moreover, such practices are already used with the current structure of production (COP-S farm). The prices of products and means of production in 2014 and 2015 were defined on the basis of the price change index in relation to the previous year. For this purpose, the used data were obtained from the Institute of Agricultural and Food Economics (Seremak-Bulge, 2015; Abramczuk et al., 2014) (for 2015, the authors used the data for the first three quarters of the year).

The evolution of costs and prices for products for the subsequent years was considered in three scenarios: most likely, optimistic, and pessimistic scenario.

The most likely scenario took into account the price forecasts developed by the European Commission for 2015-2025 (European Commission, 2015). Taking into consideration the evolution of prices in crop and animal production in the past, both the optimistic and pessimistic scenarios included their highest and lowest levels in 2008-2014. The price change indexes for selected products in respective scenarios are presented in figure 1.

The optimistic scenario assumed:

- in 2016-2017: reaching the level of pig prices from 2014 (an increase of 15% compared to 2015),
- in 2016: return to the level of beef prices from 2014 (an increase of 6% compared to 2015) and an annual increase of 5% by 2018,
- in 2016-2017: increase of milk producer prices to the level from 2013--2014 (an increase of 18% compared to 2015),
- in 2016-2017: increase of cereal prices to the level from 2011-2012 (an increase of about 20% compared to 2015).

The pessimistic scenario assumed:

- in 2016: a decline of pig prices to the level from 2007 (a decrease of 20% compared to 2015),
- in 2016: a decrease of beef prices to the level from 2011 (a decrease of 8% compared to 2015) and remaining at that level in 2016-2017,
- in 2016: the milk producer prices on the level from 2008-2009 (a decrease of 12% compared to 2015),
- in 2016-2017: the cereal prices lower by 24% compared to 2015, and at the level of prices from 2009-2010.

In the following years covered in the analysis, the price changes in the optimistic and pessimistic scenarios were established in accordance with the tendencies adopted in the most likely scenario.

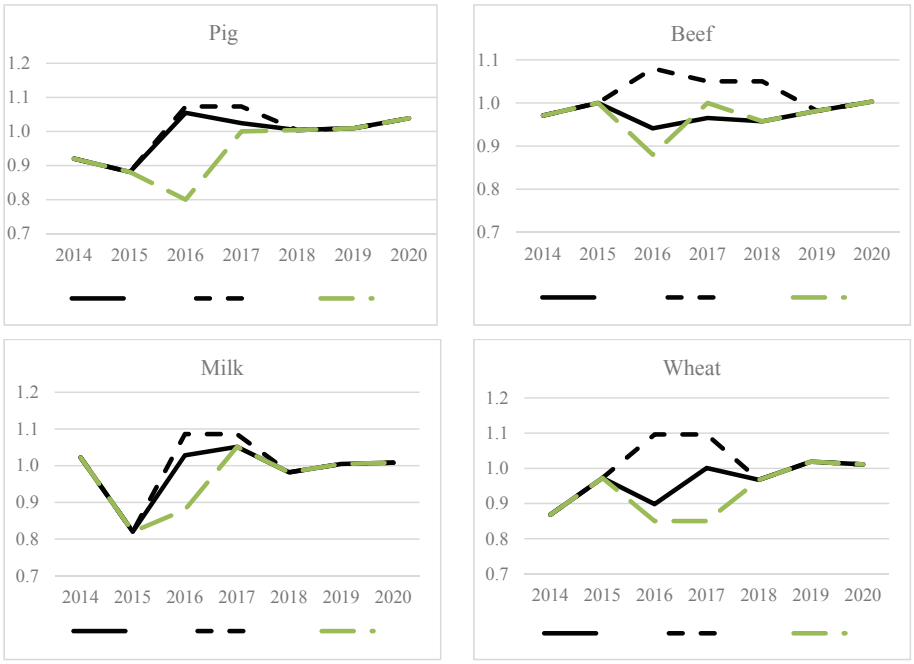

Figure 1. Price change indexes of selected products from farms included in the adopted price scenarios in 2014-2020

Source: own study.

In order to retain the differences between the farms in the base year, chain indexes were used to estimate the prices and costs in individual years of the analysis. The prices for most of the means of production in 2015-2020 were estimated on the basis of the average rate of change in 2006-2014, published by GUS. For diesel fuel prices, projections of the World Bank Group were used (World Bank Group, 2015). Due to a high correlation (Pearson correlation coefficient 0.94) between the prices of feed for cattle, for pigs, and the prices of spring barley, it was assumed that the prices of feed will evolve according to the price changes for spring barley. Similarly, an analysis of correlation between the prices of seed with the prices of wheat demonstrated a strong connection between variables (Pearson correlation coefficient 0.71), which is why also in this case it was assumed that the seed prices would follow the pattern of price change for winter wheat. Figure 2 presents the formation of the prices for selected means and factors of production in 2015-2020.

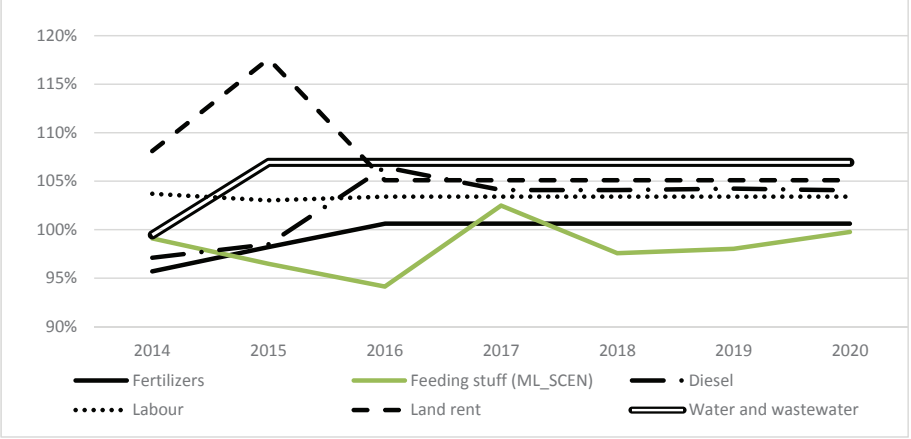

Figure 2. Price change indexes for means and factors of production in 2014-2020
Source: own study.

Results

To assess the economic situation of model farms, two types of profit were used: the farm income, and the entrepreneur's profit. Since the farms represent different agricultural types in accordance with FADN's TF8 grouping, it was essential to ensure comparability of the achieved results. Therefore, it was decided that the adopted unit of measurement would be the income from total workload for operational activity of the farm, expressed in hours.

Incomes of the studied farms are presented in tables 2 and 3, divided according to the three scenarios analysed. Studying the data from table 2 it can be noted that in 2013-2015 farm income per one hour of labour decreased in all types of farms. The most unfavourable situation occurred on farms highly specialised in pig fattening. On a very small farm, the decrease in farm income was over 80%, while on a small farm (economic size between EUR 8,000 and EUR 25,000) it exceeded 50%. This situation was connected with an economic downturn on the pork market. Pig prices in 2015 were lower by almost 20% compared to 2013, along with growing production costs and a lower level of direct payments for this type of farms in 2015. The model farm which was characterised by the lowest decrease of farm income in 2013-2015 was a farm specialising in milk production. The decline in profitability between 2013 and 2015 was only 4%. Maintaining the income at almost the exact same level in the first three years covered by the analysis was possible owing to new CAP direct payments, namely payments for production including payments for cows and cattle. The above-mentioned payments allowed to diminish the adverse effects of the drop in milk producer prices (2015) on the profitability level of the analysed farm. The analysis shows that between 2013 and 2015 the return on milk sales decreased by almost 15%.

Table 2. Farm income per working hour on model farms

Scenario/ year	Model farms						
	Pig fattening		Cattle fattening		Milk	Cereals, oilseeds, protein crops	
	PF-VS	PF-S	CF-VS	CF-S	M-S	COP-VS	COP-S
2013	1.67	7.22	1.22	6.18	10.65	5.82	11.98
2014	1.12	5.70	0.95	5.72	10.99	4.04	7.97
2015	0.29	3.29	0.78	5.47	10.19	3.57	7.08
The most likely scenario (ML_SCEN)							
2016	0.58	3.85	0.25	4.52	10.25	2.19	4.11
2018	0.51	4.28	-0.28	3.58	10.34	1.42	2.48
2020	0.32	4.53	-0.80	2.63	9.55	0.69	1.06
Pessimistic scenario (PES_SCEN)							
2016	-0.89	0.02	-0.09	3.88	8.31	1.65	2.93
2018	-1.10	0.05	-0.43	3.30	8.33	-0.50	-1.70
2020	-1.37	0.10	-0.95	2.35	7.52	-1.29	-3.25
Optimistic scenario (OPT_SCEN)							
2016	0.68	4.12	1.01	5.97	11.01	4.42	8.95
2018	0.93	5.35	1.49	6.94	11.60	4.71	9.63
2020	0.75	5.65	0.94	5.94	10.83	4.08	8.42

Source: own study.

The simulations showed that in the most likely scenario (2016-2020), for most of the analysed model farms, the farm income will be lower than in 2015, with the exception of farms highly specialised in pig fattening and dairy farms (in the early years of the projection). It is envisaged that by 2020, the farm income of a very small farm specialising in pig fattening will increase by over 10% compared to 2015. On a small farm specialising in the same type of production, the income will be higher by almost 35%. Calculations show that starting with 2018, a very small farm (CF-VS) specialising in cattle fattening will operate at a loss. The expected developments for farms highly specialised in cereal, oilseeds, and protein crops production should also be mentioned. Simulations indicate that the profitability of production on these farms will be decreasing systematically. As demonstrated in the data from table 2, in 2020 the farm income on these farms will be lower by about 90% compared to 2015.

From the analysis of the pessimistic scenario it can be inferred that in 2020 only small farms focused on livestock production will actually gain income from their activity. The remaining farms will incur losses. Situation will be the best for dairy farms, where the farm income in 2020 will be at about PLN 7.5 per working hour. This income will be over three times higher than on a farm specialising in cattle fattening, which is in the second place in terms of the highest profitability demonstrated by the analysed farms in the pessimistic scenario.

If, in accordance with the projections of the optimistic scenario, the producer prices for farm products change, it can be expected that in 2020 the farm income will increase compared to 2015. The most beneficial effects of such

developments will be visible in the case of farms specialising in pig fattening. On a very small farm, the farm income will increase more than threefold, and on a small farm – almost twofold. Nonetheless, it will be the small (in terms of its economic size) dairy farm and the small farm highly specialised in cereals, oilseeds and protein crops production that will report the highest income per working hour. In the case of the former, the farm income in 2010 will be close to PLN 11 per working hour, while in the case of the latter, it will be at about PLN 8.5 per working hour.

In numerous scientific studies it has been postulated that only a complete account of production costs (taking into account the valuation of own factors of production) shows the actual capability of a farm to generate income and develop. In consequence, the entrepreneur's income is analysed. Data from table 3 show that all of the analysed model farms, both in 2013-2015 as well as in the forecast period, will incur losses connected with agricultural activity. Such a situation takes place regardless of the adopted scenario, the economic size of the farm, or its type of farming. The obtained results demonstrate that by 2020 this unfavourable tendency will only become more pronounced.

Table 3. Entrepreneur's income per working hour on model farms

Scenario/ year	Model farms						
	Pig fattening		Cattle fattening		Milk	Cereals, oilseeds, protein crops	
	PF-VS	PF-S	CF-VS	CF-S	M-S	COP-VS	COP-S
2013	-14.84	-10.76	-15.74	-12.41	-7.21	-12.02	-7.86
2014	-15.41	-12.16	-15.91	-12.84	-6.77	-13.87	-11.92
2015	-16.59	-14.83	-16.42	-13.35	-7.79	-14.71	-13.13
The most likely scenario (ML_SCEN)							
2016	-16.86	-14.86	-17.52	-14.90	-8.31	-16.69	-16.76
2018	-18.10	-15.66	-19.24	-17.12	-9.44	-18.74	-19.79
2020	-19.55	-16.75	-21.05	-19.46	-11.54	-20.85	-22.72
Pessimistic scenario (PES_SCEN)							
2016	-18.32	-18.69	-16.42	-15.54	-10.25	-17.24	-17.94
2018	-19.72	-19.89	-19.39	-17.41	-11.45	-20.66	-23.97
2020	-21.25	-21.18	-19.31	-19.74	-13.57	-22.83	-27.03
Optimistic scenario (OPT_SCEN)							
2016	-16.75	-14.58	-16.75	-13.45	-7.55	-14.47	-11.93
2018	-17.69	-14.59	-17.47	-13.76	-8.18	-15.46	-12.64
2020	-19.12	-15.62	-19.31	-16.15	-10.26	-17.47	-15.36

Source: own study.

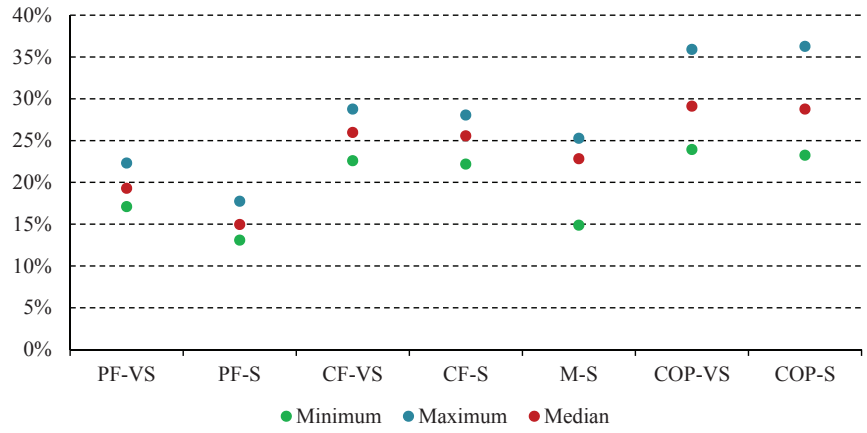

Figure 3. The share of subsidies in the total returns of model farms
Source: own study.

Very important factors for the income of the analysed farms are the subsidies (direct payments included) which shape the level of profitability. Their share in the total returns is varied and dependent on the type of farming (fig. 3). The conducted research showed that over the analysed period, the share of subsidies in the total returns on most farms does not undergo major changes. Depending on the assumed scenario, the difference does not exceed 3%. The only farm where an increase in the share of subsidies in the total returns went from 15% in 2013 and 2014 to 25% in 2020 was a dairy farm. The above conclusions allowed to present the research results in the form of basic parameters of descriptive statistics (fig. 3). Farms specialising in pig fattening are characterised by the lowest share of subsidies in the total returns. As can be observed, the median for this share on a very small farm is 19% and it decreases with the increase in the scale of production (on a farm of small economic size it amounts to 15%). In the case of farms specialising in cattle fattening, the maximum share of subsidies in the total returns is as much as up to 30% and it is similar for both analysed farms specialising in this particular type of production. The highest share of subsidies can be observed on farms producing cereals, oilseeds, and protein crops. For these farms, the maximum share of subsidies in the structure of total returns takes on values above 35%, while the median is close to 30%. The analysis also shows that the strongest impact of the adopted scenario on the size of subsidy share in the total returns can be observed for farms producing cereals, oilseeds, and protein crops. In the pessimistic scenario, this share amounts to 36%, while in the optimistic scenario it does not exceed 25%.

The profitability of production calculated as the ratio of farm income to total returns is presented in table 4. Simulations showed that on most farms only in the optimistic scenario the profitability of production in 2020 will be similar or higher than in 2015. On farms specialising in pig fattening, it can be ex-

pected that in 2015-2020 profitability will be stable or higher. On a small-size farm, the profitability of production will increase by about 30%. However, comparing the profitability between the first and the last year of the analysed period (2013-2020), it will decrease by over 30%. Analysing the results obtained for the most likely scenario it should be noted that high yield declines will be experienced on farms highly specialised in the production of cereals, oilseeds, and protein crops. Comparing the results for 2015 with the production profitability in 2020, the decrease will amount to about 80%, regardless of whether it is a small or a very small farm.

Table 4. Production profitability (taking into account internal consumption and gratuitous transfer of a farm) on the analysed farms

Scenario	PF-VS				PF-S			
	2013	2015	2018	2020	2013	2015	2018	2020
ML_SCEN	0.15	0.03	0.05	0.03	0.26	0.14	0.17	0.18
PES_SCEN	0.15	0.03	-0.13	-0.16	0.26	0.14	0.00	0.00
OPT_SCEN	0.15	0.03	0.09	0.07	0.26	0.14	0.21	0.21
Scenario	CF-VS				CF-S			
	2013	2015	2018	2020	2013	2015	2018	2020
ML_SCEN	0.12	0.08	-0.03	-0.09	0.33	0.31	0.22	0.16
PES_SCEN	0.12	0.08	-0.05	-0.11	0.33	0.31	0.21	0.15
OPT_SCEN	0.12	0.08	0.14	0.09	0.33	0.31	0.36	0.31
Scenario	COP-VS				COP-S			
	2013	2015	2018	2020	2013	2015	2018	2020
ML_SCEN	0.37	0.28	0.13	0.06	0.37	0.26	0.10	0.04
PES_SCEN	0.37	0.28	-0.06	-0.14	0.37	0.26	-0.09	-0.16
OPT_SCEN	0.37	0.28	0.32	0.27	0.37	0.26	0.31	0.26
Scenario	M-S							
	2013		2015		2018		2020	
ML_SCEN	0.48		0.53		0.53		0.49	
PES_SCEN	0.48		0.53		0.48		0.43	
OPT_SCEN	0.48		0.53		0.56		0.52	

Source: own study.

The data presented in table 4 also show that a dairy farm is characterised by the highest production profitability. It was similar within the entire analysed period and in all scenarios. There was usually between PLN 0.48 and PLN 0.55 of farm income per every unit of returns from the farm's operational activity.

Specifying the producer price for the primary product, which could cover the production costs, is an especially valuable piece of information. For this purpose, the CVP analysis, which allows to determine the BEP (Break Even Point), can be employed. Since the BEP in value terms is expressed in the value of production, in order to determine the producer price necessary calculations were made. The results are presented in table 5. Moreover, for cognitive purposes, calculations were made for both situations in which subsidies are included in the operational activity of a farm, and those in which subsidies are ignored in the economic balance.

Data from table 5 show that achieving the BEP on farms highly specialised in animal production requires a similar producer price for the primary product in both 2015 and 2020. Only on farms whose main product are cereals it is foreseen that in order to cover the production costs, the average producer price of four cereals should increase by about 10%.

Table 5. The producer price for the primary product in the analysed model farms, allowing to reach the BEP

Model farm (primary product)	Unit	2013	2015	2016	2018	2020
The producer price for the primary product allowing to reach the BEP (excluding subsidies for operational activity)						
PF-VS (pig fattening)	PLN/kg	4.93	4.86	4.73	4.84	4.90
PF-S (pig fattening)	PLN/kg	4.45	4.44	4.37	4.38	4.37
CF-VS (cattle fattening)	PLN/kg	7.98	8.04	8.07	8.24	8.36
CF-S (cattle fattening)	PLN/kg	6.80	6.84	6.85	6.99	7.10
M-S (raw milk)	PLN/kg	0.75	0.75	0.75	0.76	0.78
COP-VS (cereals with the exception of maize)	PLN/dt	72.34	70.84	71.08	73.97	77.23
COP-S (cereals with the exception of maize)	PLN/dt	72.74	71.48	71.67	74.88	78.60
The producer price for the primary product allowing to reach the BEP (including subsidies for operational activity)						
PF-VS (pig fattening)	PLN/kg	3.71	3.73	3.63	3.72	3.89
PF-S (pig fattening)	PLN/kg	3.57	3.58	3.61	3.56	3.47
CF-VS (cattle fattening)	PLN/kg	5.62	5.66	5.75	5.90	6.24
CF-S (cattle fattening)	PLN/kg	4.21	4.18	4.25	4.37	4.71
M-S (raw milk)	PLN/kg	0.49	0.35	0.35	0.37	0.42
COP-VS (cereals with the exception of maize)	PLN/dt	37.43	37.99	39.01	41.63	47.77
COP-S (cereals with the exception of maize)	PLN/dt	34.72	33.51	33.69	36.77	40.34

Source: own study.

Once the subsidies for operational activities (with direct payments) are included in the CVP analysis, it is clear how significant those subsidies are for the profitability of agricultural production on the studied farms. When they are included in the calculation of BEP, the producer price for the primary product which allows to cover the production costs can be 20% or even up to 50% lower. It is especially visible on the example of the studied farms highly specialised in the production of cereals, oilseeds, and protein crops. Considering a farm of a small economic size, covering the production costs in 2020 is possible with an average producer price for four cereals amounting to PLN 40 per decitonne. If the farm is not subsidised, the price should be almost twice as high. Making similar comparisons in the case of farms specialising in pig fattening, the price should be higher by 25-30%, for cattle fattening – 35-60%, for dairy farms – twice as high.

The income parity, calculated as the relation of farm income to the average net wages in the national economy, is presented in figure 4. In 2015, the lowest income parity (only 8%) was typical of a very small farm specialised in cattle fattening (CF-VS). The highest parity was observed for small farms, producing dairy, and cereals, oilseeds, and protein crops; it oscillated around 65-75%. If the

forecasts of the most likely scenario are to come true, on each of the model farms the income parity will be decreasing in the coming years. In 2020, for most farms it will not exceed 10%. The best situation will be on a dairy farm, with the income parity exceeding 50%.

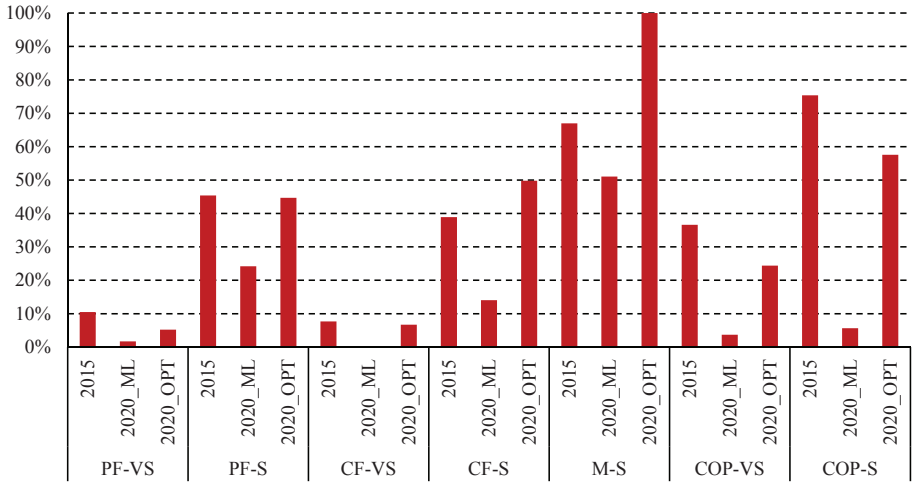

Figure 4. Income parity in the most likely scenario (ML) and the optimistic scenario (OPT)

Source: own study.

Simulations conducted for the purposes of the optimistic scenario showed that in 2015-2020 the value of income parity might be similar or higher. Such a situation will occur on small farms in terms of their economic size, and farms specialising in animal production. Just like in the case of the most likely scenario, the parity level for dairy farms should be noted. It has been estimated that in 2020, it will be almost 102%, which means that a monthly farm income will be higher than the projected net wage in the national economy. The obtained study results demonstrate that even in the optimistic scenario the income parity for farms specialising in the production of cereals, oilseeds, and protein crops will be decreasing. In 2020, it will be lower by about 12-18% compared to 2015. This is the highest decline among all the analysed farms in which a decrease of income parity is forecast for 2015-2020.

Conclusions

The conducted study on the profitability of small agricultural farms in Poland clearly indicates their low profitability (economic size not exceeding EUR 25,000). For the majority of researched farms, the farm income does not guarantee development or even a minimum subsistence level. If we take the entrepreneur's profit to be the foundation of an agricultural farm's activity, then the study shows that none of the analysed farms meet this criterion. During the entire research period (2013-2020), the entrepreneur's profit was a negative value regardless of the type of farm (in accordance with FADN's TF8 grouping). This means that the model farms, having taken into account the costs of alternative use of production factors, incurred losses related to their agricultural activity.

Comparisons made between the farms showed that by 2020, the situation will be the most favourable for small dairy farms. On those farms, regardless of the assumed scenario for the agricultural market, the farm income throughout the entire projection period will be similar or higher than the one achieved in 2013. However, this situation is not determined by the increase in production value, but rather results from the direct payments introduced into the system. The introduction of payments for production – and especially payments for cattle and cows – significantly influenced the size of direct payments. The conducted research has shown that the new solutions in the area of granting direct payments will not improve the economic situation of small farms. With the exception of dairy farms, it can be concluded that the effect will be neutral or negative. Especially in the case of farms highly specialised in the production of cereals, oilseeds, and protein crops, where a decrease in the amounts of direct payments is forecast, the situation can be unfavourable.

The calculation of income parity demonstrated the disadvantage of farms with economic size not exceeding EUR 8,000. Farms specialising in pig and cattle fattening can achieve parity not exceeding 10% according to the optimistic scenario. The only farm with actual income parity in this scenario will be a dairy farm.

The presented research results may contribute to the debate on the direction that should be taken with regard to small agricultural farms in Poland. Many researchers have advocated the preservation of these farms due to their social, cultural, or environmental function. On the other hand, the level of profitability of their agricultural production suggests they must have diversified sources of returns. Hence, questions arise: With which model of a small farm we will be dealing? Will we still talk of an agricultural farm?

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