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Piotr Sulewski
Adam Wąs

Awareness of Sustainable Agriculture among Polish Farmers – Beneficiaries of the CAP*

Abstract: The main objective of the study was an assessment of the awareness and actions undertaken by farmers in the selected fields of farm activity from the sustainability point of view. The research covered a representative sample of 600 farmers participating in the Polish Farm Accountancy Data Network (FADN). The data from the FADN database were supplied by the information from interviews with farmers. The sustainability indicators were analysed with regard to the amount and type of subsidies received. The sample was divided regarding type and amount of support. The results showed that, on average, the highest sustainability indicators were in farms receiving support under agri-environmental programmes and located in LFAs (less favoured areas), while the lowest were usually in other farms in the LFAs. The analysis of differences between farms categorised according to the total value of subsidies received, found that on average farms with the highest absolute level of support achieved higher sustainability parameters in all dimensions. Based on the results it can be concluded that higher and more varied subsidies to farmers are positively correlated with sustainability of their farms.

Keywords: agricultural policy, sustainability, farmers' awareness, public goods.

1. Introduction

Sustainable development has been a subject of intense debate among politicians, scientists and publicists for over 30 years since the publication of the Brundtland Report *Our Common Future* (WCED 1987). As Spindler (2013) points out, it is rare for a new concept to gain so much popularity in such a short time as the idea

Piotr Sulewski, PhD (dr hab.), Faculty of Economic Sciences, Warsaw University of Life Sciences (SGGW), Nowoursynowska 166, 02-787 Warsaw, piotr_sulewski@sggw.pl; **Adam Wąs**, PhD (dr hab.), Faculty of Economic Sciences, Warsaw University of Life Sciences (SGGW), Nowoursynowska 166, 02-787 Warsaw, adam_was@sggw.pl.

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of sustainable development. The popularity of this concept is probably associated with its significant universality (Anand and Sen 1994; Long 2015; UNEP, UNHR 2015) and the possibility of reference to various problems and spheres of human activity. This universality of the idea is at least partially the result of quite general assumptions (Spindler 2013), which makes it possible for the concept to cover most of the world's current problems. As Pannell and Schilizzi (1998) indicate, sustainability is the paradigm of our time; however, its use as guide to planning or decision-making is clouded by its ambiguity and the multiplicity of definitions. Ciegis, Ramanauskiene and Martinkus (2009) indicate several dozen sustainable development definitions, while Hayati (2017) find not much fewer definitions of sustainable agriculture in the literature. The lack of a precise definition leads to the view that "sustainable development" is really just a phrase for anything (Stanny and Czarnecki 2011). In this situation, it seems most appropriate to reference the simplest and most general definition formulated in the Brundtland Report, according to which *Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs* (WCED 1987).

Despite the many approaches, most studies on sustainable development seem to underline that it is necessary to consider three categories of objective, i.e. environmental, economic and social goals (Dumanski 1998; Emas 2015; Ikerd 1997), which can be identified with three dimensions of sustainable development. Thus the achievement of general goals of sustainable development requires decisions based on economic, social and environmental issues (Emas 2015). Sustainable development in terms of these three basic dimensions includes activities that are economically viable, ecologically sound and socially acceptable. Some authors extend the concept by adding an institutional component in order to emphasise the importance of the policy dimension in the process of integrating sustainable-development goals (Bardy, Rubens and Massaro 2015).

Agriculture occupies a special place in discussions about sustainable development (Pretty 2008; UN 2015). Applying its principles to the agricultural activity leads to the concept of "sustainable agriculture". Similar to the concept of sustainable development, the precise meaning of sustainable agriculture is far from clear (Sadok et al. 2008). However, it is often suggested that sustainable agriculture is based on principles such as ecological soundness (which refers to the preservation and improvement of the natural environment); economic viability (which refers to maintenance of yields and productivity of crops and livestock) and social acceptability, which refers to self-reliance, equality and improved quality of life (Hansen 1996; Majewski 2008; Pretty 1996; Rigby and Caceres 2001; Zhen et al. 2005). Majewski (2002) points out that within the general concept of sustainable

agriculture there may be various production systems with different approaches to the environment (ecocentric: organic farming, regenerative agriculture, biodynamic agriculture; more balanced: integrated farming system, low input sustainable agriculture; or technocentric, like precision farming).

One of the main areas in scientific research on sustainable agriculture is finding ways to assess the compatibility of farmers' activities with the principles of sustainable development. This is usually realised by different types of indicator. Exceptionally, many sustainable-agriculture indicators refer to the environmental dimension, including the evaluation of areas such as soil erosion, soil quality, water quality, general quality of agricultural practices, fertiliser use, crop rotation, pesticide use, climate-change trends, organic matter renewability in soil, index of soil cover vegetation etc. (Hayati 2017; Krasowicz and Kuś 2010; Majewski 2008; van der Werf and Petit 2002). Less frequently the analysis of sustainability in agriculture refers to the social and economic dimensions. In the first of these cases the sustainability assessment for example takes account of the level of education, agricultural skills and experience, the status of the family, ways of supporting decision-making, living conditions, community involvement, security etc. As regards the economic dimension, the most frequently used indicators are based on variables such as general productivity, labour productivity, efficiency, agricultural income or profit, non-farm income, production potential expressed in farm assets or utilized agricultural area etc. (Hayati 2017).

In discussions on sustainable agriculture, more and more attention is paid to looking for factors providing a favourable environment for farmers to implement practices consistent with sustainable development. This becomes particularly important in the context of agricultural policy, which is increasingly aimed at achieving sustainable-development goals. The European Commission assumptions (2017) on the reform of the Common Agricultural Policy after 2020 point to three general priorities such as:

- fostering a smart and resilient agricultural sector;
- bolstering environmental care and climate action and to contribute to the environmental and climate objectives of the EU;
- strengthening the socio-economic fabric of rural areas.

The priorities presented, as well as specific goals assigned to them, strictly correspond to the principals of sustainable development. In addition, the European Commission indicates that the future CAP accords with 12 of the 17 goals set by the UN in 2015 in its "Agenda for Sustainable Development 2030" (EC 2017; UN 2015).

In the context of these priorities, it seems obvious that only farmers who are aware of them can take appropriate action. Awareness of sustainable development

is becoming more and more important because, as Krasowicz and Kuś (2010) point out, changes in agriculture are increasingly associated with the need to implement the principles of sustainable development in practice. The authors of the report: "OECD Rural Policy Reviews: Poland" (OECD 2018) underline that measures within the CAP include direct payments to support farmers' income, which in turn obliges them to respect standards regarding food safety, environmental protection, animal welfare and the maintenance of land in good environmental and agricultural condition. It would be unreasonable to expect a farmer unaware of the principles of sustainable development to act in accordance with them. It can be assumed that a proper perception of the phenomena increases awareness of the relationships between action and its consequences, which seems necessary for farming in accordance with the rules of sustainable agriculture. Even though the awareness itself does not mean that the farmers will comply with environmental standards, the awareness of the problem plays a role in influencing behaviour (Okumah, Martin-Ortega and Novo 2018). Also Sabiha et al. (2016) emphasise that farmers' activities depend on their environmental awareness. The fact that this is a basic factor leading to the implementation of environmental goals is also indicated by Tatlıdil, Boz and Tatlidil (2009), who emphasise that if farmers are to adopt sustainable agricultural practices they have to believe that they are indeed useful. The issue of farmers' awareness as a factor determining their agricultural practices was also underlined many years ago by Green and Heffernan (1987), who pointed out that awareness is the key element in reduction of the erosion threat. They also pointed out that if an effective soil conservation programme is to be developed, the unique problems, interests and goals of farmers must be taken into account. Similarly, Herzele et al. (2013) emphasised that the improvement of awareness is necessary to improve farmers' motivation to implement environmental goals of sustainable development and thus it is important for achieving agricultural policy goals. Greiner, Patterson and Miller (2009) emphasise that the design of conservation policies and programmes should be guided by a better understanding of farmers' motivations and risk attitudes, so that the incentive system is linked to these factors.

On the other hand, studies conducted by Herzele et al. (2013) showed that the basic motive to participate in an agri-environmental measure was an increase in revenue, which is consistent with previous studies, (e.g. Morris, Mills and Crawford 2000; Wilson and Hart 2000). The study by Herzele et al. (2013) showed that the number of farmers declaring an economic motive was about three times bigger than those indicating a positive impact on the natural environment or a soil-protection motive. Kington and Pannell (2003) indicate that one of the reasons leading to a low level of implementation of practices beneficial to the soil or,

more broadly, to the environment may be a tendency to underrate the seriousness of situation and to overrate the effectiveness of treatments they have implemented (or may implement in the future). These issues were the subject of studies by Majewski (2001, 2008), who constructed an index of agricultural practices' correctness. His research revealed that farmers' awareness of the different agricultural practices was higher than their actions would suggest, although it was still quite far from the theoretically ideal model. Recent research on farmers' perceptions and practices by Kiełbasa et al. (2018) showed that despite an increase in farmers' awareness, many of them still do not have expertise in the field of nutrients management and nutrient balance on their farms. Their knowledge and perception is largely based on general knowledge or results from their own experience.

The problem of farmers' perception of sustainable development and farms management principles consistent with sustainable development seems to be particularly important in the context of the planned 2020+ CAP reforms, which directly refers to a paradigm of sustainable development and to the concept of agriculture based on knowledge.

2. Objective and method

In the context of expected direction of CAP evolution (increasingly strongly in line with the paradigm of sustainable development), the main objective of the study was to determine the perception and awareness of various issues related to this among Polish farmers. The analysis included selected issues that, in the authors' view, can be assumed as diagnostic variables of the farmers' awareness in the field of sustainable development or their compliance with the requirements of sustainable agriculture. Diagnostic variables used in the study were selected from the list of indicators most often used in assessing the sustainability of agricultural holdings (Hayati 2017; Latruffe et al. 2016; Majewski 2008).

Two sources of data were used in the research: the accountancy data from the FADN (Farm Accountancy Data Network) database, and data from interviews with farmers. The sample analysed includes 600 farms participating in the Polish FADN system. These were selected using a layer/random selection procedure, which covered:

- 4 layers based on the criterion of specialization
- 3 layers based on the criterion of standard production
- 4 layers which corresponded to the regions.

The number of farms surveyed in each layer was determined using the Neyman (1934) method in a manner analogous to that used for determining the sample size for FADN (FADN 2008):

$$n_h = n\frac{N_h\sigma_h}{\sum_{k=1}^{L} N_k\sigma_k},$$

where: n_h – sample size in layer h, n – sample size, N_h – size of population in layer h, σ_h – standard deviation standard h, L – number of layers.

Interviews with the farmers were conducted by advisers from regional extension centres, who coordinated the collection of data within the FADN system. Field surveys were carried out in 2017. The interview questionnaires completed by the advisers were sent to the Institute of Agricultural and Food Economics and added to relevant accounting data available in the FADN database. The FADN data is from 2015. This made it possible to build a database of 600 farms, in which the standard data collected within the FADN system was supplemented by data from interviews with the farmers. The data from the interviews makes it possible to analyse FADN data together with information on the behavioural aspects, in particular on attitudes towards environmental and societal aspects of sustainability. Given that the layer/random sampling method reflects the structure of farms in the population surveyed by the FADN, we can assume that it is representative for the farms within the scope of observation of the Polish FADN (in terms of economic size, type of production and region). The procedures of two-phase sampling are described in detail in statistical literature (Cochran 1977; Kalton 1983). This scope covers the farms with a standard output of more than €4,000, which means that it only applies to commercial farms. The sample consists of farms with an economic size from €4,300 to nearly €750,000. (median €28,200, average €49,400). They had an average area of agricultural land on the level of 36.1 ha (maximum 541 ha).

The basic characteristics of the variables used in the study are presented in Table 1. For each of the three dimensions of sustainability, selected variables were assigned to illustrate farmers' awareness or their compliance with the requirements of sustainable development (sustainable agriculture). The assessment of the level of compliance of farmers' activities with the principles of sustainable agriculture was conducted in groups of farms differing in type and amount of support received from the CAP. The research includes only CAP support granted to operational farm activities (DP – Direct Payments, LFA – Less Favoured Area payments and AEM – Agri-Environmental Measures payments). Due to the relatively incidental nature, support for investment activities was omitted.

The overall level of support was determined using FADN variable SE 605 (Total subsidies – excluding those for investment). As regards the type of support, such categories as environmental subsidies – SE621 (AEM) and Less Favoured Area subsidies – SE622 (LFA) were included (Table 2). The sample was divided into

Table 1. A list of variables used to assess farmers' activities and awareness of the principles of sustainable development

Dimension	Variable	Variable characteristics /measurement scale	Interpretation in the context of sustainability	Source of data*
Environmental	Awareness of soil fertility in P, K, Mg	The dichotomous variable – the farmer knows / does not know soil fertility	stimulant	I
	Awareness of acidity of soils	The dichotomous variable – the farmer knows / does not know soil acidity	stimulant	I
	Performing regular soil fertility tests	The dichotomous variable – the farmer does / does not test soil samples	stimulant	I
	Performing tests for mineral nitrogen content in soil	The dichotomous variable – the farmer does / does not test soil samples	stimulant	I
	The correctness of the premises for the decision on chemical protection of plants	The dichotomous variable – the farmer makes decisions on the protection of plants on the basis of correct premises	stimulant	I
Social	Unused labour resources	Likert scale – self-assessment of the degree of unused labour resources (0-lack of unused resources, 6 – very large amount of unused resources)	destimulant	I
	Degree of work overload	Likert scale – self-assessment of work overload (0 – no sense of overload, 6 – very strong sense of overload)	destimulant	I
	Assessment of the degree of understanding of the business environment	Likert scale – self-esteem of understanding of the economic environment (0 – very big sense of understanding, 6 – lack of understanding)	destimulant	I
	Having a successor (%)	Ratio scale – the probability that a successor will take over the farm	stimulant	I
	Evaluation of cooperation with other people	The dichotomous variable – worth / not worth cooperating with other people	stimulant	I

Table 1 – continued

Dimension	Variable	Variable characteristics /measurement scale	Interpretation in the context of sustainability	Source of data*
Eeconomic	Agricultural land area	Ratio scale – hectares	stimulant	F
	Economic size	Ratio scale – thousand PLN	stimulant	F
	Self-assessment of wealth	Likert scale (0 – poor, 6 – wealthy)	stimulant	I
	Share of farm income in total income	Ratio scale – (%) of total income	stimulant	I
	Disposable income	Ratio scale – farm income + depreciation (PLN)	stimulant	F
	Income per unit of own labour.	Ratio scale (PLN/FWU – family work unit)	stimulant	F
	Amount of payments	Ratio scale (PLN/farm)	stimulant	F

* I – interview with farmers from sample of FADN farms, F – FADN database

Source: Own study.

four groups of farms using quartiles according to payments received (according to SE 605). Farms with a total support below the first quartile formed the first quartile group, farms with the amount of support above the first quartile and below the median formed the second, farms above the median and below the third quartile formed the third group, and farms with the total payment above the third quartile formed the fourth.

3. Results

Almost all of the farms surveyed received direct payments, of which over a third received additional support for management of the LFA, and over 15% of the farms received support for the implementation of agri-environmental programmes, while less than 8% were granted LFA payments and agri-environmental subsidies simultaneously. Table 2 shows the structure of farms by type of subsidy received for operational activities.

Table 2. Percentage of farms receiving specific types of support

Type of support		% of farms
Direct payments (DP direct payments)		99.2
including:		
DP with connection of other payments		43.3
including:		
LFA (less favourites area) payments		34.3
	including:	
	LFA + AEM	7.7
	LFA without AEM	26.7
AEM (agri-environmental measures) payments		15.8
	including:	
	AEM +LFA	7.7
	AEM without LFA	8.2

Source: Own study.

3.1. The environmental dimension of sustainability

Soil is the basic and irreplaceable factor of production in agricultural activity, hence the assumption that farmers' attitudes in this field can well illustrate the environmental sustainability of a farm. As indicators of sustainability at

the environmental level, following variables were selected: farmers' awareness of soil fertility in P, K, Mg (phosphorus, potassium, magnesium); farmers' awareness of soil acidity, regular soil fertility tests, analysis of the mineral nitrogen content of the soil, correctness of the basis for the decision on chemical protection of plants. The correctness of answers provided by farmers was verified on the basis of the guidelines contained in the literature (Duer, Fotyma and Madej 2002; Majewski 2001; Majewski et. al 1997).

Table 3 provides a summary of the responses obtained by groups according to the type of subsidy (DP, AEM and LFA payments) and the amount of support received (division into quartiles groups based on value of SE605). The figures in table 3 illustrate the percentage of farmers who were characterised by a correct approach to the issues analysed, e.g. were aware of the condition of the soil or showed correct practices in soil testing and behaves rationally when deciding on the chemical protection of plants (make a decision on the basis of exceeding the economic threshold or on the advice of an adviser). All variables in this combination are therefore stimulants, the higher the value, the better from the point of view of realising the paradigm of sustainable development.

Taking into account the type of subsidy received, it can be noticed that the highest level of compliance of the responses with assumption of sustainability can be observed in the group of farmers who received support under agri-environmental programmes as a supplement to direct payments. The only exception here was the issue of the premises underlying the decision on the chemical plant-protection procedures, where the percentage of farmers giving correct answers was lower than the average in the total sample. One may explain this by the fact that farmers in LFA and implementing AEM programmes had slightly less intensive production and, in view of the generally smaller number of treatments, they therefore pay less attention to careful planning of their schedules. The worst in this comparison was the group of farms benefiting only from LFA as supplement to direct payments. In each of the categories included (except for the decision on chemical protection of plants), the percentage of farmers giving correct answers was lower than in the group benefiting from agri-environmental programmes (and lower than in the group receiving only direct payments). This seems particularly worrying, as farms in LFAs are assumed to have more difficult production conditions and additional ignorance may worsen the unfavourable situation (in this group only 44% of farmers declared regular soil testing while in the group receiving agri-environmental support such farmers was almost 20 percentage points higher). On this basis it may be speculated that at least some of the farmers in this group are not trying to make optimal use of the available resources; however, they continue farming, but in a way that limits the use of inputs.

Taking account of the criterion of the subsidy received, it can be generally noticed that, on average, farms receiving the highest total payments have clearly higher compliance with the sustainable development paradigm (in the majority of indicators analysed) than those receiving lower payments. On this basis, as the amount of subsidy per holding correlates very closely with its area, it can be assumed that farmers managing larger farms have a higher level of environmental awareness.

Table 3. Selected variables characterising the environmental awareness of farmers according to type and value of subsidies received

Grouping variable		Selected variables representing environmental dimension				
		Farmer awareness of soil fertility in P, K, Mg	Farmer awareness of soil acidity	Performing regular soil fertility tests	Performing tests on mineral nitrogen content in soil	Correctness of the premises for the decision on chemical protection of plants
		% of farmers with correct indications				
Type of received support	only DP*	81.7	88.7	53.8	14.4	67,1
	DP + LFA**	74.8	84.3	44.4	13.8	67,4
	DP + AEM***	86.6	90.3	63.3	16.3	64,2
	DP + LFA + AEM	87.4	89.2	56.5	15.2	62
Amount of received payments	1st quartile group (<15,900 PLN)	83.7	88.6	42.0	10.0	68,3
	2nd quartile group (15,900-31,500 PLN)	71.7	84.8	41.3	16.7	64,3
	3rd quartile group (31,500 – 56,900 PLN)	79.9	85.4	55.3	10.7	65,0
	4th quartile group (>56,900 PLN)	87.4	91.5	68.7	20	67.0
Average		80,7	87.6	51.8	14.3	66.2

* DP – direct payments, ** LFA – Less Favoured Area payment, *** AEM – Agri-Environmental Measures payments.

Source: Own study.

Table 4 presents data on the relationship between selected parameters representing the social dimension of sustainability of agriculture and the type and amount of subsidy received by farmers. The layout of the table is analogous to table 3, however, the indicators shown do not reflect the frequency of correct indications but the mean values from the Likert scale or percentages.

Table 4. Selected variables characterising the social dimension of sustainability regarding the type and value of subsidies received

Grouping variable		Variables analysed				
		Unused labour resources (Likert scale 0 low – 6 high)	Degree of work overload (Likert scale 0 low – 6 high)	Assessment of the degree of understanding of the business environment (Likert scale 0 high – 6 low)	Probability of having a successor (%)	Evaluation of cooperation with other people (% supporting cooperation)
		Destimulant		stimulant		
Type of received support	only DP	1.91	3.22	2.44	23.0	68.7
	DP + LFA	1.65	3.56	2.46	19.7	61.9
	DP + AEM	2.10	3.61	2.31	26.1	63.3
	DP + LFA + AEM	1.24	3.20	2.37	32.4	67.4
Amount of payments received	1st quartile group (<15,900 PLN)	1.95	3.03	2.49	17.4	66.0
	2nd quartile group (15,900–31,500 PLN)	2.05	3.37	2.51	19.1	66.7
	3rd quartile group (31,500–56,900 PLN)	1.59	3.59	2.42	18.2	61.3
	4th quartile group (>56,900 PLN)	1.60	3.39	2.29	38.1	70.5
Average		1.80	3.35	2.43	23.2	66.1

Source: Own study.

Similarly to previously, it can be observed that farms that participated in agri-environmental programmes in some respects stand out from the rest of the survey, although the relationships are less explicit than in the variables used to assess

the environmental dimension of sustainable development. On average, farmers from farms that simultaneously received both LFA and AEM subsidies indicated the least problem with unused labour resources, and also felt the least discomfort from work overload. It is worth emphasising, however, that this observation does not concern farms which receive only agri-environmental support (as a supplement to direct payments).

Farmers receiving both LFA and AEM (but also AEM itself) also declared a higher degree of understanding of the processes taking place in the economic environment. At the same time, farms receiving AEM or AEM and LFA subsidies indicated a clearly higher probability of the holding being taken over by a successor than in case of farms not receiving agro-environmental payments. Farmers participating in agri-environmental programme and collecting LFA payments at the same time more often positively assessed cooperation with other people than farmers receiving only one of these payments, although the highest approval for cooperation was observed among farmers receiving only direct payments.

When comparing the issues concerning the social dimension of sustainability in groups according to support value, it can be observed that the farms entitled to receive highest subsidies have the highest of almost all social indicators (except for the "work overload" indicator). At the same time, in this group there were relatively few unused labour resources and farmers indicated a relatively high understanding of the economic environment. In addition, this group had the highest the average probability that a successor would take over the farm as well as the highest percentage of farmers positively assessing the merits of cooperation with other people.

Table 5 presents the variables used to assess the economic dimension of sustainability regarding the type and amount of subsidies received. Analysing selected data by the type of subsidy received, it can be quite unequivocally stated that in the economic dimension the lowest level of sustainability is among farms receiving only LFA payments in addition to direct payments. These are characterised by the weakest production potential (the lowest area) as well as the lowest income and the lowest combined amount of subsidy for operational activity. The result of the above-mentioned conditions is probably the lowest self-assessment of farmers' wealth. This observation suggests that difficult farming conditions are associated with lower production and economic potential (as a consequence it has a negative impact on sustainability) and LFA payments cannot compensate for this handicap.

However, this situation does not relate to farms that receive both LFA and AEM payments at the same time. This group is characterised, on average, by the largest area and economic size as well as the highest incomes (both on the farm scale and per unit of own labour, although at the same time they have the lowest share of farm

income in total income). Farmers in this group feel wealthier than others. It is also worth noting that regarding parameters characterising economic sustainability, farms receiving only direct payments are clearly better than farms receiving direct payments and LFA payments.

Table 5. Selected variables characterising the economic dimension of sustainability regarding type and amount of payments received

Grouping variable		Analysed variables						
		Agricultural land area (ha)	Economic size (in thousand PLN)	Self-assessment of wealth (Likert scale 0 poor – 6 wealthy)	Share of farm income in total income (%)	Disposable income (in thousands.PLN/farm)	Income per unit of own labour (in thousands PLN/FWU)	Amount of payments received (in thousands PLN/farm)
Type of support received	only DP	38.9	51.7	2.60	82.0	119.5	72.5	46.5
	DP + LFA	26.6	38.4	2.75	79.3	79.0	50.3	36.8
	DP + AEM	42.4	44.7	2.63	79.4	120.1	76.2	65.2
	DP + LFA + AEM	46.1	58.3	2.83	72.7	128.0	85.8	75.1
Amount of payments received	1st quartile group (<15,900 PLN)	8.8	23.1	2.47	65.3	42.0	30.0	9.7
	2nd quartile group (15,900-31,500 PLN)	18.0	28.7	2.55	78.2	57.9	36.6	23.4
	3rd quartile group (31,500 – 56,900 PLN)	31.3	52.1	2.59	88.2	114.9	68.8	42.1
	4th quartile group (>56,900 PLN)	86.3	93.8	2.83	90.3	228.7	128.6	113.7
Average		36,1	49.4	2.61	80.5	110.9	69.0	47.2

Source: Own study.

Considering the division into quartile groups by the amount of subsidy received, it should be noted that virtually all parameters increase as they move to groups with higher subsidies. This seems quite obvious, because subsidies are quite closely

connected with the farm's agricultural area, which at the same time determines the potential for production and, consequently, the possibility of generating income. However, the large disproportions in production potential between the designated groups should be underlined. The average area of farms in the 4th quartile group was almost 10 times higher than in the first (86.3 ha. vs 8.8 ha. of agricultural area). As a result, the average level of subsidy in the last of the designated groups was over 11 times higher than in the first.

As pointed out in the introduction, reforms to the Common Agricultural Policy in recent years, as well as those planned for the future, emphasise the issue of increasing the role of agriculture as a "nature conservator" and the "provider" of various public goods. This direction is related to the pressure of EU society, which, financing agricultural support, expects that farmers will also pursue non-productive objectives to a greater extent than previously, thus contributing to the implementation of the EU's Sustainable Development Strategy. Such expectations are well illustrated by the effects of consultations by the European Commission in preparation for the reform of the CAP after 2020. From these consultations, it appears that only 53% of non-farmer EU citizens agree with the statement that "farmers need direct support", although at the same time 92% of the "non-farmers" support the view that "agricultural policy should provide more benefits for the environment and climate" (Ecorys 2017). The Commission's consultations also show that as many as 80% of farmers endorse "direct support" in the form of subsidies; however, only 64% are in favour of providing "environmental and climate benefits". In view of the conflict of interest revealed here, we have attempted to define the attitude of the farmers surveyed towards to the issue of increasing support for public goods (assuming that this will be one of the most important manifestations of the implementation of the paradigm of sustainable development in future agricultural policy). At the same time, it can be assumed that this issue combines the issues of environmental and social awareness.

Figure 1 shows farmers' opinions regarding the issue of transferring support under the CAP from direct payments to "public goods". The graph shows that, on average, only 46.2% of respondents are in favour of increasing the financing of support of public goods generation. The highest percentage of respondents supporting this idea was observed among farmers receiving both LFA and AEM support, which suggests a greater than average environmental sensitivity in this group. However, it is somewhat surprising that the fewest advocates of greater support for generating public goods were in the group of farmers in AEM programmes outside the LFA.

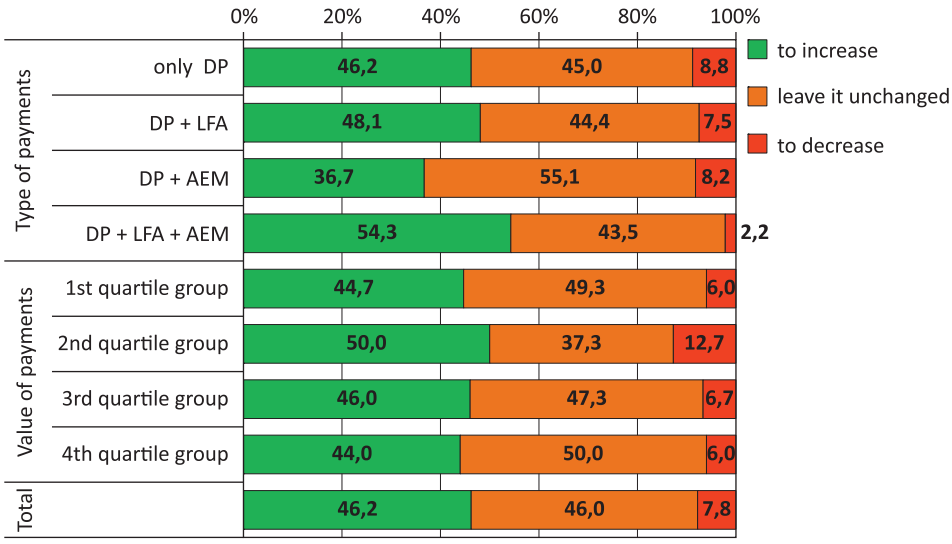

Figure 1. Farmers' attitudes to shifting CAP funds to support the generation of public goods (in %)

Source: Own study.

As part of the research, an attempt was made to assess farmers attitudes to value of public goods generated by agriculture. During the interview, respondents were informed that on average in the EU the equivalent of about PLN 300 of each household's taxes are spent on supporting public goods in the agricultural sector. Respondents were asked to categorise this as "too much", "appropriate" or "not enough". A comparison of the results obtained by groups according to the type and amounts of subsidies collected by the farm is provided in Figure 2. As in the previous list, the highest environmental sensitivity (farmers indicating that the support is too low) was characteristic for farms receiving both LFA and AEM subsidies (almost 35% of respondents). On the other hand, the lowest percentage of farmers indicating it is not enough were those receiving only AEM subsidies (alongside direct payments). Taking into account as differentiating criterion the amount of farm with subsidies, it can be seen that the percentage of farmers who regard the appropriate level of support as too low was highest in the group of the greatest beneficiaries. This may be explained in two ways. On the one hand, the relative burden on the average EU household may seem small for farmers receiving support in tens of thousands PLN a year. On the other hand, one may assume that they are aware that their economic existence depends to a large extent on the willingness of EU taxpayers to continue supporting agriculture.

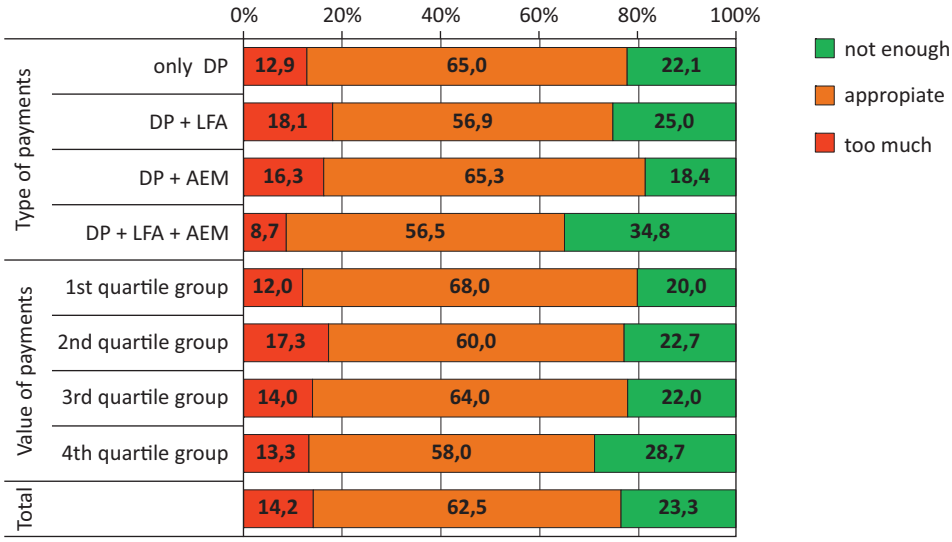

Figure 2. Assessment of the level of support for generating public goods by agriculture in the EU

Source: Own study.

4. Discussion and conclusions

According to Wilson and Hart (2002) the possible shift towards conservation-oriented attitudes of farmers through participation in agri-environmental schemes is a key indicator for the assessment the effectiveness of agri-environmental policy. Some evidence suggests that the voluntary nature of agri-environmental schemes may determine their rather low effectiveness in inducing permanent changes in farmers' attitudes towards sustainable environmental management (Burton and Paragahawewa 2011; Lastro-Bravo et al. 2015).

However, McCracken et al. (2015) suggest that working with farmers and involving them in developing skills in environmental management through advice and training may improve the success of AES.

A systematic literature review of factors determining EU farmers' participation in agri-environmental schemes conducted by Lastro-Bravo et al. (2015) indicates that there is a rich set of sociological and economic factors influencing farmers' participation in AES (farm income, labour resources, soil quality, social capital, the presence of a successor, access to technical advice or extension services etc.). Some research demonstrated that participation in AES was associated with farmers' positive attitudes towards the environment or to the adoption of environmentally

friendly practices (e.g. Barreiro-Hurle, Espinosa-Goded and Dupraz 2010; Defrancesco et al. 2008). An important aspect of participation in agri-environmental programmes is also the level of payments (Defrancesco et al. 2008). Analysis by Ruto and Garrod (2009) has revealed that the method of payment calculation may favour larger farms compared to small ones, which can lead to the situation that farmers' willingness to adopt an AES contract may increase with farm size. Lastro-Bravo et al. 2015 underline that larger farms find it easier to adopt less intensive measures and may therefore find it easier to participate in an AES. The study by Fleury et al. (2015) indicate the importance of supporting farmer's environmental learning for the success of AES.

Many of studies on AES focus on searching for factors determining farmers' participation in them, while we have attempted to answer the of question whether farmers who participate in such schemes are more aware of the sustainability challenges than others. Our analyses indicate that both the type and the amount of support for farming may be a factor differentiating farmers' attitudes and awareness in the context of the sustainability.

The premise that makes it possible to positively verify the effect of support in the form of agri-environmental programmes is the higher environmental sustainability of farms using this type of support. Farmers receiving only agri-environmental payments (as a supplement to direct payments) are characterised by higher than average indicators used in the assessment of the environmental dimension (they perform soil tests more often than others and are aware of its fertility); however, they show lower compliance with the paradigm of sustainable development in other dimensions and to a small extent support increasing support for generating public goods by agriculture. To some extent, this deficit is compensated by farmers who receive direct LFA and AEM payments simultaneously. These have a similar awareness of soil fertility even though they analyse it less frequently. At the same time, this group has the highest indicators in the social and economic dimension as well as being characterised by the greatest tendency to support an increase in generating public goods by agriculture. It can therefore be concluded that farmers receiving AEM payments are the most sustainable, in particular, if they also receive LFA payments.

Farmers who receive only LFA payments (alongside direct payments) are the worst in most variables analysed, which may indicate their low level of sustainability. It can be assumed that due to poorer soil and climate conditions some of these farms are run in the most extensive way possible. Farmers on these farms do not maximise income from farming, while compensating for their lower farm incomes with higher subsidies.

Regarding the level of subsidy it was noticeable that farms with the highest subsidies represent the highest level of sustainability among all CAP beneficiaries. Only in the social dimension do they "lose" against smaller units in terms of "work overload". At the same time, owners of large farms would be more inclined to increase the subsidy level allocated to the support public goods, although slightly less often than others endorse this idea. From the point of view of the large production potential of these farms it seems understandable and consistent with the opinions of farmers from other countries (Ecorys 2017).

Finally, based on the indicators analysed, it could be concluded that the highest level of awareness and the most correct attitudes from the point of view of sustainable development occur among farmers who are most actively seeking support from CAP. This applies both to farmers receiving both LFA and AEM payments as well as to farmers receiving the highest subsidies. In both groups, the level of sustainability indicators selected is higher than in other groups in almost all cases. This dependence does not seem to be entirely accidental, because the average area of farms receiving both AEM and LFA subsidies is slightly larger than in the other groups categorised according to the type of support. It allows us to assume that in farms with sufficiently large land resources, farmers seek to use the land rationally and respond positively to support offered under agricultural policy (e.g. through the application of appropriate practices). In addition, they are characterised by stronger links with the environment and a greater chance of future generations continuing farming. Taking account of their obvious greater economic potential, it can be concluded that the support received by these farms under the CAP has a positive impact on the behaviour and attitude of farmers in the context of the sustainable development.

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Świadomość trwałego rolnictwa wśród polskich rolników – beneficjentów Wspólnej Polityki Rolnej

Streszczenie: Głównym celem badań była ocena świadomości zagadnień związanych z „trwałym rolnictwem" wśród polskich rolników korzystających ze wsparcia w ramach WPR na podstawie stosowanych przez nich wybranych praktyk rolniczych. Badaniami objęto reprezentatywną próbę 600 rolników uczestniczących w polskim FADN. Dane dostępne w bazie FADN zostały uzupełnione danymi uzyskanymi w trakcie bezpośrednich wywiadów z rolnikami. Wartość parametrów wskazujących na stopień trwałości gospodarstw przeanalizowano w zależności od typu i wartości otrzymywanego wsparcia finansowego z UE. Wyniki przeprowadzonych analiz wskazują, że przeciętnie najwyższymi parametrami trwałości charakteryzowały się gospodarstwa korzystające z programów rolno-środowiskowych i jednocześnie położone na obszarach ONW, podczas gdy najniższy poziom tych parametrów obserwowano w pozostałych jednostkach położonych na ONW. Analiza różnic między grupami gospodarstw wyodrębnionymi na podstawie łącznej wartości dopłat wykazała, że jednostki, które otrzymywały bezwzględnie wyższe wsparcie charakteryzowały się wyższym poziomem wskaźników trwałości. Na podstawie przeprowadzonych analiz stwierdzono, że pobieranie większego i bardziej zróżnicowanego wsparcia pozytywnie wpływa na poziom trwałości gospodarstw.

Słowa kluczowe: polityka rolna, trwałość, świadomość rolników, dobra publiczne.