

PARITY FAMILY INCOME IN FAMILY FARMS OF DIVERSE AREAS

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Abstract. The area of a production family farm which may generate parity income of a farmer's family using mechanized production systems, implemented according to the rules of the sustainable agriculture has been determined. The assumption that the target income of a farmer's family (parity income) should be comparable to disposable income obtained by those employed in other sectors of national economy has been made. The result of the above assumption follows the statement that farms using from 20 to 50 ha of AL are more likely to meet the requirements of a parity farm generating target income in certain production conditions than other types of farms. The research uses the data of a development project implemented in the years 2009-2012 by NCBiR (*The National Centre of Research and Development*) no NO 120043 06/2009 entitled "Technological and ecological modernization of the selected family farms" accomplished by ITP (*Institute of Technology and Life Sciences*) in Falenty O/Warszawa (Wójcicki, 2009).

Key words: family income, farm area, parity income, sustainability, degree of mechanization, intensity of organization.

Introduction

The scope of EU activities allows for programmes aiming at harmonious, balanced and lasting development of the Community. The achievement of these objectives requires goal-oriented actions accompanied by research on given problems as it is worth remembering that the achievement of balance in one area may imply differences in the other one. It is assumed that the reason for this phenomenon depends on both typical features of an individual and external factors, as well as on the development of economic processes irrelative to an individual (Leszczyńska, 2008).

The whole range of these conditions, which remain difficult to describe, limits the possibilities of effective and efficient farm management which affects diversification of economic effects. The issue concerning research on household income diversification in the sectors of national economy is particularly difficult. In terms of agriculture the said issue is

tackled occasionally mainly due to great diversification of systems and conditions of production.

The problem of parity incomes in agriculture is referred to an attempt to equalize income of agricultural population with the income of other social groups (Woś, 1998). Moreover, it is observed that this problem is tackled unwillingly due to belief that the objective criteria to define proper level of income or its scope do not exist (Leszczyński, 2002).

Some authors believe that the parity of income is connected with exogenous (external) and endogenous (internal) causes (Wiśniewska, 2008; Tabor, 2006). The fact that these types of parity are pointed out becomes important in the conditions of market economy, especially currently when the attempts to implement the rules of “sustainable agriculture” are made. In the EU these rules are included in a programme called “cohesion policy” and constitute an important part of global activities on the so called “sustainable development”. All these activities aim at closing the gaps in development and life standards of particular social groups including agriculture. In this case equal living conditions depend on sustainable and lasting development in economic, social and ecological scopes which might be difficult taking into account actual possibilities of increasing agricultural production intensity and equipment of work process. It is worth pointing out that the equipment of work process affects work efficiency and the substitution of production factors.

Objective and scope

The objective of the paper is an attempt to determine parity income of farm families obtained in farms with different scale of agricultural production process. It has been assumed that parity income of farm families is comparable with the income obtained by households of those employed in other sectors of national economy (employee’s disposable income). The problem of obtaining parity income is of significant importance in small- area but mechanized production farms as it provides the purpose for management in agriculture where the intensity of production and the objectified work input (improvement of efficiency and work comfort) should be increased due to economic and social reasons respectively. To meet environmental demands and to reduce ecological threats these activities should be taken up in the limited scope. The analysis refers to 26 development- oriented farms grouped by AL area (up to 20; 20-50; 50-80 and more than 80 ha AL), presuming that the farmers increase production scale first and then take up activities aiming at achieving sustainability in the production process on the used field areas.

The research uses the data of the development project implemented in the years 2009-2012 by NCBiR (*The National Centre of Research and Development*) no NR 120043 06/2009 entitled “Technological and ecological modernization of the selected family farms” accomplished by ITP (*Institute of Technology and Life Sciences*) in Falenty O/Warszawa (Kurek and Wójcicki, 2011). Out of 53 farms (located within the territory of Poland) subject to this project, 26 farms, where the process of agricultural production underwent four evaluations within the last twenty years, were selected for analysis.

Research methodology and analyses

The basic economic parameter which defines standard of living in agricultural farms is the income a family obtains and which constitutes remuneration for the work of people employed there. The possibilities to obtain the income depend on the system of production organization including the following: the scale of production and its intensity, equalization level of agricultural production process, etc. As a rule, the scale of agricultural production is connected with the AL area remaining at the farmer's disposal as it determines production capacity of both plant production and animal production sectors (availability of fodder or manure management). In the thesis it has been assumed that the parity income of a family is determined by the farm AL area (a parity farm) and on the obtained production effects which should provide the farmer's family with adequate income comparable to the income obtained in other sectors of the national economy. The level of the income with reference to the year of research amounted to 1794 PLN a month per a working person (GUS [Central Statistical Office of Poland], 2011).

For determination of the parity farm size the indicator suggested by Nietupski (Nietupski and Szelwicki, 1981) has been modified:

$$Q_{\text{ha AL}} = (13 \text{ Dgb} \cdot N)^{-1} \cdot Dp$$

where:

- $Q_{\text{ha AL}}$ – parity farm area (ha AL),
- Dgb – disposable income in other sectors of national economy (PLN),
- Dp – farmer's family income,
- N – number of farm employees.

The required area of a parity farm for the obtained indicator is determined by the following calculation :

$$Q_{\text{ha AL}} \leq \text{current farm area (ha AL)}$$

Existing rules of agricultural production management require that its sustainability be taken into consideration, which is related to the three of the following criteria: agricultural production organization system, working conditions and the obtained economic effects (equalization in ecological, economic and social aspects).

In order to determine whether ecological quality requirements are met, a SOM indicator -reproduction or degradation of soil organic matter (acceptable indicator 0.3-1.5 tonnes·ha⁻¹ OS) (Kuś and Karasowicz, 2001) has been calculated.

Livestock (LSU·100 ha⁻¹ AL) has been assumed as additional evaluation indicator. This indicator enables to maintain the level of SOM in the soil, but affects the increase in work inputs.

Workforce productivity was determined as a relation between the level of family income (Fi) and work inputs in four groups of researched farms and the renewability of SOM at the level of $0.5 \leq 1.0$ tonnes·ha⁻¹ AL considered as balanced was maintained.

The level of work inputs for each farm determined for yearly workload of family members and the level of mechanization of work process according to Zaremba (work comfort) provided the basis for evaluation of social sustainability (Zaremba, 1985).

Results

The level of family income was evaluated in the groups of farms (table 1), which were listed by agricultural land area (ha AL) assuming that the adopted class range of AL area size influence both technology of the production processes implemented there and family income.

Table 1
Characteristic of the researched farms

Specification	Measurement units	Groups of farms by ha AL				Total
		< 20	20 ≤ 50	50 ≤ 80	≥ 80	
Number of farms in the research	(number)	5	7	9	5	26
Farm size area	(ha AL)	14.3	31.1	65.5	115.1	55.9
Cereals in the structure of crops	(%)	34	54	55	74	61
Intensity of production organization	(points according to Kopec)	373	383	338	201	310
Livestock LSU	(LSU · 100 ha ⁻¹ AL)	86	93	87	28	65
Number of own employees (in the farm)	(Employee · 100 ha ⁻¹ AL)	18 (2.52)	8 (2.53)	4 (2.45)	2 (1.77)	4 (2.36)
Work inputs in total	(Man-hour·ha ⁻¹ AL)	371	170	78	32	88
Replacement value of mechanization means	(PLN·ha ⁻¹ AL) (PLN·man-hour ⁻¹)	34.8 94	32.3 190	22.0 282	11.4 356	19.9 226
Mechanization level according to Zaremba	(%)	57	65	88	79	81
Energy inputs	(kWh·ha ⁻¹ AL)	2426	1548	2888	627	1899
Energy equipment of work process	(kWh·man-hour ⁻¹)	6.5	9.1	36.7	18.4	21.5
The level of renewability or degradation of soil organic matter- SOM	(t·ha ⁻¹ OS)	0.73	0.33	0.27	- 0.26	0.271
Agrochemical inputs	(PLN·ha ⁻¹ AL)	0.51	0.66	0.88	0.91	0.84

Source: own study based on Kurek and Wójcicki (2011)

The researched community of farm groups is highly diversified as far as AL area is concerned (from 14.3 ha AL to 115.1 ha AL) and it is observed that the bigger the farm

area the more extensive production system is followed. This process involves decline of production organization intensity index according to Kopeć (from 373 to 201 points), the proof of which is gradual increase of cereals plants in the structure of crops (from 34% to over 74%) and decrease of livestock from 86 to 28 LSU·100 ha⁻¹ AL, for farm groups respectively. Positive phenomenon in these farm groups is the decrease of the employment level per 100 ha AL and the decrease of manpower input (man-hour·ha⁻¹ AL) which is compensated by the increase of work process mechanization level (according to Zaremba) from 57% to 79% expressing participation of the objectified work in total work inputs. The indicators show that along with the increase of AL farm area the work comfort improves. Gradual increase of energetic equipment of work process index which is, e.g. 6.5 kWh·man-hour⁻¹ for the group of farms up to 20 ha AL and 18.4 kWh·man-hour⁻¹ for the group of farms over 80 ha AL.

The increase of farm surface areas and the same the increase of production scale is expressed not only by the change of the management system into more extensive one improving efficiency and farmer's work comfort but may have a negative impact on the condition of natural environment. Environmental threats may result from the fact that the level of soil organic matter decreases from 0.73-0.26 t·ha⁻¹ OS along with the increase of AL area in the researched groups of farms. The process of SOM content decrease in the farms' soils is compensated by the increase of costs of agrochemicals, mineral fertilizers and pesticides. The increase of usage costs of these yield current assets is by 78% higher in farms using over 80 ha AL in comparison to the first group of farms (using up to 20 ha AL).

The level of material and energetic inputs in the researched farms (table 1) allows determination of the nature of sustainability of the production process implemented there and assessment of the possibility to meet the requirements in terms of ecological and social sustainability by these farms.

The level of work inputs and the equipping workplaces with mechanization measures (which guarantee work comfort) and the level of production organization that facilitates the maintenance of the acceptable SOM content in the soils show that the researched farms using on average 31 to 65 ha AL can be treated as the farms which meet the requirements in terms of ecological and social sustainability.

The purpose of management in agriculture is not only the implementation of production process but the implementation of this process in the way that guarantees commodity production that ensures appropriate level of family income. The level of this income is not meaningless as it should guarantee the standard of living comparable to other households (the so called parity income). Therefore, the comparison involved the income of a farmer's family which, according to the research methodology of the said project, is not encumbered with depreciation allowances and corresponds to disposable income of working families. Obtaining target family income (table 2) is possible while obtaining high net commodity production (cereal unit – GU)

and its efficient management. In the researched group of farms only farms in the second group, using on average 31.1 ha AL obtain high net commodity production (112.3 GU·ha⁻¹ AL). This group of farms shows the highest index of production organization intensity (383 points according to Kopeć), high livestock (93 LSU·100 ha⁻¹ AL) and satisfactory level of other indicators subject to evaluation. The said group of farms obtains also the highest economic effects expressed by the level of family income related to AL area

unit and thus it can be assumed that it meets economic, ecological and social requirements that sustainable agricultural production processes have to follow. The evaluation of income sources shows that different forms of subsidies and support of EU assistance funds are of significant importance.

Table 2
Parity farm size area in relation to the researched group of farms and disposable income

Specification	Measurement units	Groups of farms by ha AL				Total
		< 20	20 ≤ 50	50 ≤ 80	≥ 80	
Number of researched farms	(number)	5	7	9	5	26
Farm size area	(ha AL)	14.3	31.1	65.5	115.1	55.9
Net commodity production	(GU·ha ⁻¹ AL)	50.0	112.3	69.2	52.7	69.1
Income of a farmer's family (with EU subsidies)	(PLN·ha ⁻¹ AL)	2637	3208	1853	2237	2480
Income of a farmer's family (without EU subsidies)	(PLN·employee ⁻¹ month)	1246	3285	4130	12118	4557
Parity size of the farm (with subsidies)	(PLN·ha ⁻¹ AL)	1611	1934	808	1193	1380
Parity size of the farm (without subsidies)	(PLN·employee ⁻¹ month)	761	1980	1801	6464	2413
Replacement and development investments of the farm in the year of research	(ha AL)	22.3	18.4	30.8	18.4	22.2
	(ha AL)	36.3	30.5	70.7	34.6	39.9
	(thousands PLN)	7.3	39.0	160.8	152.5	96.9

Source: own study based on Kurek and Wójcicki [2011]

The level of family income and obtained payments affect parity size of a family farm (table 2) which should guarantee family income comparable with the income of the households of employees. Such possibilities occur in groups of farms using over 20 ha AL. These possibilities disappear when family income is decreased by subsidies from EU Funds System because in this case only the group of farms using over 80 ha AL is able to obtain parity family income. It is worth pointing out that detailed evaluation of the degree of sustainability of production processes implemented in the researched farms does not meet ecological requirements typical of sustainable processes of agricultural production.

Summary and conclusions

The analysis carried out serves as an attempt to determine the level of workforce productivity in the groups of farms of varied areas where systems of agricultural production ensure the renewability of soil organic matter (SOM) to varying degrees. Work effectiveness was measured by the level of parity family income assuming that the target income of a farmer's family (parity income) should be comparable with disposable income obtained by employees of different sectors of national economy. Such possibilities in the researched farms occur in the group using 20 to 50 ha AL because these farms obtain satisfactory level

of income in conditions where the rules of sustainable agriculture are implemented. As a rule, farms with bigger surface area do not meet ecological requirements. The most unfavorable situation is observed in a group of farms using less than 20 ha AL because they do not meet economic requirements and their parity farm size area is bigger than the AL area currently used by about 56%. The complexity of the problem results from the fact that this group constitutes over 80% of total number of the farms in Poland while the only uses about 50% of AL area. Moreover, this group of farms, as a rule, does not carry out investment activity, and the subsidies obtained from EU Funds System serve as supplement to disposable income. The level and conditions of obtaining parity income by farming families, determined in the thesis for the researched group of farms may indicate the absence of rational agricultural as well as economic policies under conditions of general absence of work places and high rate of unemployment.

References

- GUS, (2011). *Rocznik statystyczny*. Główny Urząd Statystyczny, Warszawa.
- Kurek, J.; Wójcicki, Z. (2011). *Technologiczna i ekologiczna modernizacja wybranych gospodarstw rodzinnych*. Wydane przez ITP w Falentach O/ Warszawa, część IV, 67-128.
- Kopeć, B. (1987). Intensywność organizacji w rolnictwie polskim w latach 1960-1980. *Roczniki Nauk Rolniczych, seria GT. 84, z. 1*, 8-25p.
- Kuś, J.; Krasowicz, S. (2001). Przyrodniczo-organizacyjne uwarunkowania zrównoważonego rozwoju gospodarstw rolnych. *Pamiętnik Puławski 124*, 273-288p.
- Leszczyńska, M. (2008). *Nierówności dochodów barierą osiągania spójności społeczno-ekonomicznej, [w:] Nierówności społeczne a wzrost gospodarczy*, pod red. M.G. Woźniaka, zeszyt nr 12, Uniwersytet Rzeszowski, Katedra Teorii Ekonomii i Stosunków Międzynarodowych, Rzeszów, 269-278.
- Nietupski, T.; Szelwicki, B. (1981). Minimalna wielkość gospodarstwa rolnego w Polsce. *Post. Nauk Rol.*, R.28(4), 5-20.
- Tabor, S. (2006). Postęp techniczny a efektywność substytucji pracy żywej pracą uprzedmiotowioną w rolnictwie. *Inżynieria Rolnicz.* 10(85). ISSN 1429-7264.
- Wiśniewska, J. (2008). Pojęcie parytetu dochodowego w naukach rolniczych. *Stowarzyszenie ekonomistów rolnictwa i agrobiznesu, Tom X, zeszyt 1*, s. 8.
- Woś, A. (1998). *Encyklopedia Ekonomiczno-Rolnicza*. PWRiL Warszawa, s. 539.
- Wójcicki, Z. (2009). *Technologiczna i ekologiczna modernizacja wybranych gospodarstw rodzinnych*. Wydane przez ITP w Falentach O/Warszawa. ISBN 978-83-89806-32-1.
- Zaremba, W. (1985). *Ekonomika i organizacja mechanizacji rolnictwa*. PWRiL Warszawa.

PARYTETOWY DOCHÓD RODZINY W ZRÓŻNICOWANYCH OBSZAROWO GOSPODARSTWACH RODZINNYCH

Streszczenie. Określono wielkość towarowego gospodarstwa rodzinnego, które może uzyskać parytetowy dochód rodziny rolnika, zachowując zmechanizowane systemy produkcji, realizowane zgodnie z zasadami rolnictwa zrównoważonego. Założono, że oczekiwany dochód rodziny rolnika (dochód parytetowy) powinien być porównywalny z pracowniczym dochodem rozporządzalnym, uzyskiwanym przez zatrudnionych w innych działach gospodarki narodowej. Wynik tej oceny wyrażono poprzez stwierdzenie, że gospodarstwa użytkujące 20 do 50 ha UR mogą łatwiej niż inne spełniać wymagania parytetowego gospodarstwa, umożliwiające uzyskanie oczekiwanej wysokości dochodu, w danych uwarunkowaniach produkcyjnych. W badaniach wykorzystano dane z realizowanego w latach 2009-2012 projektu rozwojowego NCBiR nr NR 120043 06/2009 „Technologiczna i ekologiczna modernizacja wybranych gospodarstw rodzinnych” realizowanego przez ITP w Falentach O/ Warszawa (Wójcicki, 2009).

Słowa kluczowe: parytetowy dochód rodziny, parytetowa wielkość gospodarstwa, odnawialność substancji organicznej, stopień mechanizacji, koszt uzbrojenia technicznego, intensywność organizacji

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