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FARMER’S LABOUR COST AND THE PRICE CALCULATION MODEL FOR THE AGRICULTURAL PRODUCTS

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Farmer’s labour cost and the price calculation model for the agricultural products

Working Paper

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Agriculture constitutes a specific sector of the national economy. It does not contribute significantly to the increase in the gross domestic product, however, it is expected to fulfil three important functions: economic, social and environmental. The agriculture sector is based at present on the family farm model, which differs from other forms of agricultural by a joint, family-based form of farming, as well as by the existence of a strict connection between the family farm capital and the farmers’ individual property. Family farms constitute at the same time a basic source of income for farmers and their families, hence, the long-lasting discussion about means of estimating the level of fair incomes payable to the farmers. This research paper presented the concept of the price calculation model for agriculture products which is based on the internal rate of return. The research presented herein takes also into consideration the work input made by the farmers. The farmer’s labour costs are estimated based on the minimum fair income model developed from the human capital model. The paper described also the formal variables which determine both the model for cost calculation of agricultural products, and the fair income model. Furthermore, the paper also presented a calculation of one agricultural product (wheat) produced by a typical family farm. The conclusions presented herein may influence further discussions with reference to the minimum prices of agricultural products and on the farmers’ minimum fair income.
INTRODUCTION

Agriculture at present plays three major functions: economic, social and spatial. The economic function refers mainly to the farmers’ obligation to produce agricultural products in order to meet the requirement of feeding the farmers themselves, as well as other members of the society. At the same time, however, the products produced shall be of appropriate dietary valour and quality. Furthermore, these products shall be delivered to the market at prices affordable to the consumers. Farms shall also create work places and provide the farmers and their families with fair incomes generated by their farming business. Additionally, the farmers are required to apply certain agricultural methods which would guarantee that the farmed land preserves its natural and environmental valour.

In the contemporary Poland and Europe, agriculture is based mainly on the so-called family farm model which differs from other forms of agriculture by a number of specific features. At the same time, however, the methods applied by this family farm model generates a certain range of problems; in this respect, the basic issue for the family farms at present is the problem of fair income generation. Outside the agriculture sector, this problem is regulated by the motion of minimal income level by which all employees are guaranteed an income meeting all their basic social and life needs. Although this solution has been widely accepted by various societies, it does not exist within the agriculture sector despite the facts that the farmers deserve, as any other employees or producer of goods, a fair income for their work. The farmers’ incomes are generated from the sale of agricultural products produced; hence, it would seem quite appropriate to accept an assumption according to which determining the minimum prices for agricultural products shall be tantamount to the introduction of the minimum income levels obtained by the farmers. The acceptance of such a solution remains self-explanatory with regard to the definition of income [Morehart, Kuhn, Offut, 2000] generated by farms. According to this definition, income is regarded as fair if it covers all overheads resulting from managing a farm. This research paper presents some assumptions related to the model of agricultural products pricing policy, with the reference to the introduction of a minimum income system for the farmers which, as a fair income, shall guarantee the farmers and their families an economic situation in which all their social and life needs are fulfilled. The
fair income system for the farmers was
developed and presented for the purpose of
this research paper based on the minium
fair income model. If the model of price
calculation is to provide information on the
acceptable prices which can cover the
overheads resulting from the production
process of a particular produce, it has to
take into consideration the cost of the
farmer’s labour. A price of agricultural
product which includes the farmer’s labour
cost allows for the calculation of a fair
price; this approach emphasises also the
requirement of covering the labour cost of
the farmer; namely, the farmer’s work shall
be paid for. Every worker or producer of
goods shall be paid a fair wage.
Considering the aspect of human capital in
the perspective of any accountancy system
means first of all taking into consideration
the labour theory of value according to
which the value of human-produced goods
is defined by the input of labour required
for their production. If the final product
consists of a number of integral
components, one of them is definitely the
labour input required for the production of
this final product. Therefore, the
calculation of product value consists of
both, the detailed evidence of the
production process aggregating the labour
input in the final stage of this production
process, as well as the labour input
evidence included in the materials used
during this production; this estimation
takes place during the cost calculation
process. As underlined by Y. Ijiri [1999,
p. 185]: ... contrary to the theory of value
based on the work and which concentrates
on work inputs, the theory of value based
on utility, focuses on the effects, and
therefore, the production process is not
regarded as the subject matter of this
approach... Therefore, the value
understood as the historic cost of
production is regarded as a widely present
approach adopted for the theory of
accountancy, and as such, is not present in
the theory of utility. A similar concept of
income, measured by the accountancy
system, remains in compliance with the
concept of the labour theory of value. The
socially-accepted labour input defining the
product value is included in the
accountancy system based upon the
accomplishment principle which
emphasises the fact that the gross receipts
determine the level of income obtained
from a particular enterprise. Hence, the
income creation process consists of
a confrontation between the real labour
input (cost balance) and the socially-
acceptable labour input (market price)
[Dobija (M.), 2002].
MODEL OF COSTS CALCULATION FOR AGRICULTURAL PRODUCTS

The model presented below for the costs calculation of agricultural products [Dobija, Dobija, 1999] is based on the capital retain principle expressed by the concept of the internal rate of return (IRR), and allows for the calculation of the required value, i.e. the price of agricultural products (p). According to the capital retain method, the capital shall increase with time. The capital located at the initial stage of a calculation period in the allocation units (C₀) and managed effectively shall be increased at the end of this period by the internal rate of return. This assumption have been presented by the following formula:

\[ C_1 = C_0 \cdot (1+r) \]  
1.

where: \( C_1 \) – the capital at the end of calculation period

Taking into consideration the specific nature of the family farming, the capital located in the assets of these farms shall equal, at the end of the calculation period, the total of non-cash or cash incomes (CF) generated by the farms and the assets from the initial stage of the calculation period (A₀) decreased by their lost value (d), which is presented by the following formula:

\[ C_1 = CF + A_0 \cdot (1-d) \]  
2.

Additionally to the lost value of the owned assets, the incomes constitute the basic value determining the increased volume of the capital invested in the farm. The incomes are used to cover the depreciation of assets and to achieve a positive value of the internal rate of return (r):

\[ C_0 \cdot (1+r) = CF + A_0 \cdot (1-d) \]  
3.

\[ CF = C_0 \cdot (r + d) \]  
4.

The above formula (4) indicates that the capital retain depends on the incomes (CF) and the internal rate of return (r).

The internal rate of return, in compliance with the CAPM model (capital asset price model), consists of the total rate of return at the zero risk level (r_f) plus the assets risk factor for the assets into which the capital was invested (β_A) multiplied by the risk premium (r_p).
\[ r = r_f + \beta_A r_p \]

The risk factor for the assets into which the capital was invested is used to measure each type of assets involved in a particular business activity. In the case of the family farms, the risk results mainly from the nature of agricultural processes and the assets remaining the main subject of these processes. J. Zegar defines the production process in the agriculture sector as … a process of reproducing various types of matter into agricultural products by means of biological methods taking place in plants and animals (i.e. in the converters) with an active participation of various elements of the natural environment (i.e. the biosphere. (…) These processes are initiated, powered and maintained (as well as regulated) by the people who performer a sequence of appropriately organized actions and with the use of appropriate means of action… [Encyklopedia…, 1984, p. 570]. A similar definition of the production process was also presented by D. Niezgoda [1996, p. 12] who defined the farming production process as … a conscious human activity undertaken with the use of production means and natural resources with the aim to transform the features (i.e. physical, chemical, and / or biological) and status of the work objects, allowing to obtain agricultural utilities which fulfil the social needs by direct or indirect means …; and furthermore, according to T. Rychlik and M. Kosieradzki [1981, p.185], the production process in agriculture …means a set of actions, undertaken consciously and intentionally over the land, production animals, and other work subjects …. The definition of the farming activity which assumes that functioning of farms is based on the concept of biological transfer of plants and animals, has been enclosed in IAS 41 – Agriculture [IAS 41, § 5]. Such defined agricultural activities form the foundation for the functioning of family farms. Simultaneously, the analysis of the production processes (their complexity, multitude, inter-connectivity, and dispersion), taking place in the family farms, indicates at the fact that the activities undertaken by the farmers and their farms are burdened with a significant investment risk; therefore, it is possible to assume that the value of this factor (\( \beta_A \)) can amount to 1.0.

The risk premium (\( r_p \)) is the value which is directly connected to the risk factor for the assets into which some capital was invested (\( \beta_A \)); according to many researches, the value of this risk factor amounts to 8% [Brealey, Myers,
The income \((CF)\) is made of the total net profit and depreciation. Therefore, it can be assumed that the net profit \((PN)\) generated by an entity represents the value of the initial capital invested into the assets increased by the rate of return on this capital. This means that the income can be presented according to the following formula:

\[
PN = C_0 \cdot r_f + C_0 \cdot \beta \cdot r_p
\]  \hspace{1cm} 6.

At the same time, according to the formula accepted by the accountancy system, the net profit constitutes the difference between income \((I)\), costs \((C)\) and income tax \((T)\), which has been expressed in the following formula:

\[
PN = I - C - T
\]  \hspace{1cm} 7.

Taking into consideration the fact that the family farms do not pay any income tax, but only a agricultural tax the amount of which depends on the amount and quality of land owned\(^1\), the amount of the income tax can constitute a fixed value to be included in the total cost; hence, the total income value can be calculated with the use of the formula No 7.

\[
PN = P - C
\]  \hspace{1cm} 8.

---

\(^1\) In Poland the income tax issues are regulated by the agricultural tax act, dated on 15. November 1984, a complete text published in the Law gazette No 136, item 969, according to which the agricultural tax is calculated according to the following assumptions:

1) for the agricultural lands – the number of calculation hectares based on the surface area, type and class of arable lands resulting from the land and building register, and according to a tax district assignment;

2) for other lands – the number of hectares resulting from land and building register.
The costs are made of fixed and variable costs which depend on the production capacity; whereas, the incomes, which take into consideration the existence of an effective market, can be presented according to the following formula:

\[ P = C_0 \cdot r_f + C_0 \cdot \beta_A \cdot r_p + C \]  \hspace{1cm} 9.

Since the incomes are calculated as the agricultural product prices multiplied by the production volume, and the costs are made of the fixed and variable costs, the price of agricultural products can be calculated according to the following formula:

\[ p = \frac{C_0 \cdot r_f}{V} + \frac{C_0 \cdot \beta_A \cdot r_p}{V} + \frac{C_f}{V} + c_v \]  \hspace{1cm} 10.

**ESTIMATING MINIMUM INCOMES**

The fundamental problem affecting the family farms is the issue related to the estimation of a normative, fair farmer’s income; its calculation is required and necessary in order to estimate diligently the costs incurred for the production of agricultural products inside a farm.

The measurement of human capital has been a research subject for many years. The significant role which human capital plays in the social and economic life has also been recently appreciated. However, the discussion is still conducted regarding the function of human capital and the methods of their measuring. From the very beginning, the studies on the nature of human capital, with respect to its creation and maintenance, were linked to the general theory of capital. Theoretically speaking, however, two fundamental aspects of human capital measurement were created:

- **the aspect of organizational units** which treats a human being as a capital creating a rent, i.e. an income equalling the wage, which then becomes a basis for calculating the human being value;
- **the individual aspect** according to which the capital means skills, abilities, knowledge, energy and health - accumulated in a human being as a result of particular inputs [Dobija (M.), 2002].
For the purpose of this research paper, the individual aspect of human capital has been accepted. In this approach, human capital has to be treated as an economic factor located inside the human nature. The human capital model, formulated on the basis of the general capital model, takes into consideration the fact that the capital is owned by a specific person, and that during the capital formation stage, i.e. between one’s birth and the day of the first employment, no loss of this capital ever occurs; this can be expressed by the following formula [Dobija (M.), 2006]:

\[ H_t = H_0 e^{rt} \]

where: \( H_0 \) – denotes an input stream from which the capital is created  
\( H_t \) – the capital assigned to a person at the age of \( t \)

The model of human capital, however, has to take into consideration some specific assumptions with reference to the theory of existence. The human capital analysis within the context of an individual indicates the need to perceive a human being as a three-fold entity (triad) consisting of body - mind - soul. While analysing human capital from this perspective, it has to be emphasised that any measurement shall focus on three basic elements: the costs of living which allow a human being to maintain the body in an appropriate physical form; the costs of education which provide for mental development, and the experience factor which is indispensably connected with creativity, or ingenuity etc. [Dobija (M.), 2002, 2006].

The above approach applied while trying to understand the human capital nature leads to the formulation of a human capital model [Dobija (M.), 1998, 2000, 2001, 2002] defined according to the following formula:

\[ H(T) = (K + E) \cdot [1 + Q(T)] \]

where: \( H(T) \) – the capital value assigned to a person  
\( K \) – capitalized costs of living  
\( E \) - capitalized costs of education  
\( Q(T) \) – experience factor which is measured based on a modified learning curve
The model for estimation of human capital which is accumulated inside a particular human being assumes that the value of this human capital is defined as the total of capitalized costs of living and education, and increased by the experience factor. The variables \( K \) and \( E \) are regarded as capitalized values, for the calculation of which an appropriate capitalization rate was applied. Along the development process of one’s professional career, the experience factor occurs.

According to the general capital theory, human capital does not incur any loss, however, it decreases as a result of the work performed. Within the work process, the worker’s capital is being transferred into the products produced by him/her. Simultaneously, human capital demonstrates a tendency towards retaining its initial value. Accepting the concept of capital retain, incomes shall be regarded as values resulting from the application of fair rate of return from the capital accumulated inside a worker. By applying the concept of the internal rate of return and assigning it to human capital for the period of one year, the following formula can be formulated:

\[
H(T)(1+r) = W + H(T+1) \tag{13}
\]

where: \( W \) – an annual cost of work  
\( r \) – a capital increase rate

The following formula indicates that the capital \( H(T) \) which was accumulated inside a particular person performing work shall increase its value within a particular period of time by the following factor \( (1+r) \). Within the period under examination, the working person receives a particular wage \( W \), as well as increases its capital along with experience \( H(T+1) \). The above formula allows for the calculation of an annual wage \( W \) which amounts to:

\[
W = H(T) \cdot r - H \cdot \Delta Q(T) \tag{14}
\]

It can be concluded from the wage model that the wage shall be expressed as a percentage value \( (r) \) of the capital. The experience increase factor has a strong impact on the level of wage obtained during the initial period of employment, however, this impact decrease with time [Sunder, 1997, p. 35 (acc.) Dobija (M.), 2006]. Therefore, the general model can be presented as follows:

\[
W = H(T) \cdot r \tag{15}
\]
The $H(T)\cdot r$ component indicates the essence of the wage theories based on the human capital value. The wage is a derivative of the capital value accumulated inside a worker. The basic wage, assigned in compliance with the presented model, balances the cost of risk. By doing so, the depreciation of the worker capital is prevented. The wage calculated in compliance with the above model allows for the retention of capital; it constitutes a fair income, since, as it was assumed theoretically, a fair income cannot cause any loss to human capital [Dobija (M.), 2006a]. As practical experiments prove, the lack of compensation for the expended human capital, by not providing a fair income, leads to dissatisfaction, and in the long term, to social unrests [Cieślak, Kucharczyk, 2004]. According to the results of the research conducted by I. Cieślak [2006, s. 176] ... a fair income shall result from a precise connection between the wage, and work input provided by a worker.... Therefore, if the works undertaken by a farmer constitute works performed for the farm, he / she can expect that this farm will compensate for the energy input provided.

**APPLICATION OF THE PRICE CALCULATION MODEL FOR AGRICULTURAL PRODUCTS AND THE FAIR INCOME MODEL**

The example presented below refers to the method of estimating a fair price of wheat. The calculation was based on the price calculation model for agricultural products and the fair income model. The calculations were performed for a family farm specializing in the production of an analysed agricultural product. The farm is managed by a married couple who grow wheat on the total arable surface of 30 hectares\(^2\). The accepted productivity per one hectare amounts from 40 to 50 quintals. For Poland, an average wheat productivity amounts to approximately 35 quintals/ha. The is a smaller value than the European average productivity factor which for 2002 amounted to 65 quintals/ha [Szot, 2002]. Therefore, it was accepted that a minimum crop capacity shall amount to 35 quintals/ha. At the same time, the farmers are expected to make all possible efforts to increase their productivity.

However, defining an optimum farm size is not a simple and straightforward

\(^2\) The price of land: PLN 15 000 per ha
agricultural products is the farmer’s work. In the presented example, it constitutes 37% of the total costs. The costs were calculated according to the fair income model. The farm under analysis employed two farmers with secondary education which allowed for the effective farm management. Their work experience amounted to 22 and 20 years respectively. To calculate their minimum fair income, the following values were accepted for each component constituting this income:

- monthly wage cost – PLN 490
- monthly costs of education – PLN 250
- education factor – 6%
- capitalization rate – 8%.

While calculating a minimum fair income for a farmer, it is necessary to take also into consideration the economical size of the managed farm. By doing so, the calculation will include the work input factor connected to the wheat production.

Table 1  Human capital value of the family farm owners

<table>
<thead>
<tr>
<th>Item</th>
<th>Person</th>
<th>Farmer (1)</th>
<th>Farmer (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capitalized living costs</td>
<td></td>
<td>269 080.35</td>
<td>269 080.35</td>
</tr>
<tr>
<td>Capitalized education costs</td>
<td></td>
<td>17 599.80</td>
<td>17 599.80</td>
</tr>
<tr>
<td>Total of capitalized living and education costs</td>
<td></td>
<td>286 680.15</td>
<td>286 680.15</td>
</tr>
<tr>
<td>Experience increase factor dependable on the learning factor</td>
<td></td>
<td>0.24</td>
<td>0.23</td>
</tr>
<tr>
<td><strong>Total human capital value</strong></td>
<td></td>
<td><strong>355 483.39</strong></td>
<td><strong>352 616.58</strong></td>
</tr>
</tbody>
</table>

Table 2  Normative income of the farm owners

For the farm under analysis, the normative fair income shall amount to PLN 17 916 and 17 772 respectively. Further detail data on the value of human capital and farmer’s labour costs is presented in Tables 1 and 2.

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3 This is a monthly cost of living established upon an average annual social allowance for 2007 defined by the Labour and Social Care Institute, for a family of four (see: [www.ipiss.com.pl](http://www.ipiss.com.pl)).

4 Since the farm under analysis is farmer by two person working full time, and the farm size amounts to 30 ha, it means that each person was assigned 15 ha instead of an assumed 24 ha which would allow to accommodate complete the available economic assets.
The income constitutes one of the most important cost items taken into consideration while calculating the wheat price; however, this is not the only factor. Namely, there are the costs of machines and equipment, pesticides, fertilizers etc.

The farm under analysis, which produces wheat as its main product, uses certain specific machinery, tools, as well as buildings and structures for this production purpose; their types, value and usage period are presented in Table 3.

**Table 3** Fixed assets used for the production of wheat$^5$

<table>
<thead>
<tr>
<th>Item</th>
<th>Value</th>
<th>Usage period, in years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tractor</td>
<td>65 000</td>
<td>10</td>
</tr>
<tr>
<td>Trailer</td>
<td>12 800</td>
<td>20</td>
</tr>
<tr>
<td>Plough</td>
<td>2 000</td>
<td>20</td>
</tr>
<tr>
<td>Grain drill</td>
<td>11 500</td>
<td>20</td>
</tr>
<tr>
<td>Cultivator</td>
<td>2 500</td>
<td>20</td>
</tr>
<tr>
<td>Harrow</td>
<td>1 500</td>
<td>20</td>
</tr>
<tr>
<td>Soil miller</td>
<td>3 800</td>
<td>15</td>
</tr>
<tr>
<td>Fertilizer spreader</td>
<td>7 200</td>
<td>15</td>
</tr>
<tr>
<td>Suspended spraying machine</td>
<td>2 100</td>
<td>15</td>
</tr>
<tr>
<td>Grain silo (BIN)</td>
<td>15 100</td>
<td>50</td>
</tr>
<tr>
<td>Warehouse for machines and equipment</td>
<td>50 000</td>
<td>50</td>
</tr>
</tbody>
</table>

$^5$ The prices for machines and equipment were obtained from an Internet site (see: www.agrofoto.pl, www.tabor24.pl) and from the Agricultural Advisor newspaper.
Additional costs incurred in the farm:

- Artificial fertilizers: 450 kg/ha - polyphosphorus, price: PLN 1.1 per kg
- Pesticides: 4 l/ha – chwastogoks, price: PLN 65 per 5l
- Diesel: 8 litres daily, price: PLN 3.90 per litre
- Machine hire services (combine): 1.5 h work per ha, price PLN 250 per hour
- Obligatory farm insurance: PLN 650
- Agricultural tax, the rates for 2008
- Grain for sowing: 230 kg/ha of wheat, price: PLN 410 per ton
- Social security: PLN 2 128

The above assumptions allowed for the calculation of the wheat production costs which are presented in Table 4 below.

Table 4 Balance sweet for annual crop production costs

<table>
<thead>
<tr>
<th>Item</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labour costs</td>
<td>35 688</td>
</tr>
<tr>
<td>Artificial fertilizers</td>
<td>14 850</td>
</tr>
<tr>
<td>Pesticides</td>
<td>1 560</td>
</tr>
<tr>
<td>Diesel</td>
<td>624</td>
</tr>
<tr>
<td>Machine hire services</td>
<td>15 000</td>
</tr>
<tr>
<td>Depreciation</td>
<td>10 190</td>
</tr>
<tr>
<td>Obligatory farm insurance</td>
<td>650</td>
</tr>
<tr>
<td>Tax</td>
<td>4 372</td>
</tr>
<tr>
<td>Grain for sowing</td>
<td>8 280</td>
</tr>
<tr>
<td>Current renovations</td>
<td>5 205</td>
</tr>
<tr>
<td>Social security</td>
<td>2 128</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>96 419</strong></td>
</tr>
</tbody>
</table>

At the cost framework presented above, in compliance with the formula (9) and (10), it is possible to establish a fair income for the farm under analysis, as well as to calculate a unit wheat price taking into consideration various levels of productivity.

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6 [www.krus.gov.pl](http://www.krus.gov.pl)
Table 5  Farm fair income and unit wheat price

<table>
<thead>
<tr>
<th>Item</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farm fair income</td>
<td>149 417</td>
</tr>
<tr>
<td>Unit wheat price(^7), with the productivity of:</td>
<td></td>
</tr>
<tr>
<td>40 quintal / ha</td>
<td>93</td>
</tr>
<tr>
<td>45 quintal / ha</td>
<td>83</td>
</tr>
<tr>
<td>50 quintal / ha</td>
<td>75</td>
</tr>
</tbody>
</table>

**CONCLUSION**

Securing fair incomes for the farmers is at present a very important issue, widely discussed both in our country and across Europe. Any such discussion shall be supported, however, with some tools which will effectively support any further steps aimed at resolving this issue. This research paper presented an attempt to calculate the wheat price as an example of agricultural product. The method of calculating this price was based on the price calculation model applicable for agricultural products. The proposed model of minimum prices is based on the concept of the internal rate of return, with the consideration given also to such factors as risk, and the income of farmers who by providing their products to the market make an attempt to participate in the product exchange process governed by the free-market regulations. A significant part of this calculation model was the cost of the farmer’s labour, since it contributes greatly to the increase in the cost of production; however, the cost of labour remains one of the many basic factors which are necessary if the product is to be produced. Estimating the farmer’s income remains at the same time still an important issue, not only with the reference to the price of agricultural products. It influences the income generated by the farmer and his/her family, but also remains important within the perspective of the social problems encountered by the family farms. These problems refer mainly to the issue of estimating the work effectiveness of particular family members participating in the farm management, and to the issue of mutual financial settlements (both, between particular family members, and between the farm and the household)\(^8\).

The presented models for agricultural products price calculation and fair income

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\(^7\) At the moment of the above calculation, the average unit price of wheat amounted to PLN 48 per quintal (source: [www.ceny.rolnicy.com](http://www.ceny.rolnicy.com))

\(^8\) These issues were discussed in other papers written by both authors
estimation, as well as the practical examples of their application, indicate how complex the issue of farmers’ fair income is and how much research input it still requires. Further analysis is required e.g. on such elements as an optimum family farm size, means of utilizing the assets in compliance with its designation and the level of contribution towards the increase in effectiveness and productivity, as well as the problem of assessing the risk connected with the management of biological transfer of plants and animals. Therefore, we would like to express our hopes that the research material presented herein will stimulate further discussions with reference to the minimum prices of agricultural products and the fair incomes payable to the farmers.

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