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Marcin Żekało

Institute of Agricultural and Food Economics – National Research Institute,
Świętokrzyska 20, 00-002 Warsaw, Poland
zekalo@ierigz.waw.pl

Requirements of organic farming and impact on direct costs of organic production

Abstract: Information and knowledge are now considered the most important factors for the development of the farm, and in the economic aspect they often allow to build competitive advantages. Naturally, the requirements of today's food production sector go beyond the economic effects of the production and also apply to meeting the environmental requirements. Organic farming as a holistic system can be such a proposal for management, but it places high demands on farmers. Restricted legislation in organic farming regulates in detail the manner of production, impacting directly on production character and also economic results achieved in organic farms. Farmers using theoretical and practical knowledge are needed to meet all formal requirements and they want to achieve the best economic results of production. We can point out the strengths of organic production, which by using natural resources, best agricultural techniques and sustainable plant and animal production can lead to a reduction of direct costs of production. The results of studies on the AGROKOSZTY system, relating to the economics of organic production, indicate lower than in conventional farms direct costs of production, as well as good income performance from particular production activities.

Keywords: requirements of organic farming, direct costs of production

As with any sector of the economy, in order to meet increasing demands of the agri-food sector, the producers have to seek information and acquire knowledge. Organic farming is a specific area of operation of agricultural producers, who on the one hand have to demonstrate a wide knowledge of nature, farming and breeding, and on the other hand meet all the legislation requirements. In the case of the agricultural sector we are dealing with very specific legal provisions that govern the management at each stage. There are many formal limitations for this type of farming, which may directly affect the economic results of the production. Therefore, obtaining the relevant information and using it is a very important part of the proper functioning of the farm, also in terms of the economics of agricultural production. Information resource of the economy can be considered in the category of economic resource (Oleński, 2000). It is a collection of various pieces of information potentially useful for the economic activities in the broad sense of the word. As part of this potential we can distinguish: general knowledge, professional skills, information resources of the social and economic entities, information resources of those involved in the information sector of the national economy, infrastructural collections/systems of information, infrastructural information systems of the state and supranational organisations. At the level of an organic farm, the farmer obtains general knowledge needed to operate the farm and professional qualifications allowing him to apply the knowledge in practice. Knowledge needed for agricultural activities is very extensive, especially in organic farming. Economic and production result in organic farming depends, among others, on the use of proper crop rotation, prudent fertiliser management, selection of plant varieties, proper organisation of farm and other factors (Tyburski, 2007). Of course, the value of such information and knowledge comes not from the fact of having it but from using it (Materska, 2005). However, to some extent, the measure of the possible use of the data and building of needed information is the level of education of farmers. Education of farmers is undeniable potential, necessary for the efficient running of the farm. Therefore, the education and expertise is of great importance. Based on a survey of organic farmers participating in the studies of the AGROKOSZTY system in 2006-2008, we can note their high commitment for learning – figure 1.

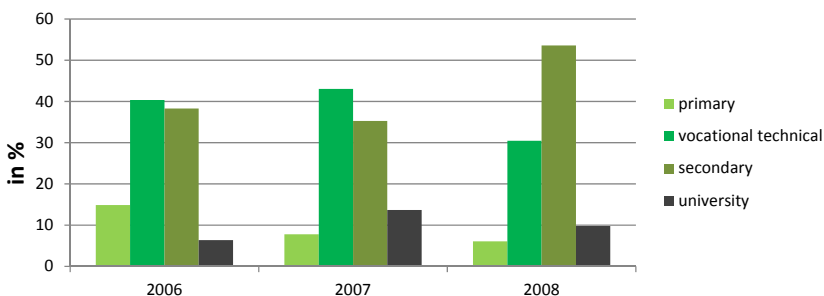


Figure 1. Education of farmers in surveyed organic farms in AGROKOSZTY system in 2006-2008

Source: Nachtman, Żekato 2009

We need to emphasise that in each year the percentage of farmers with primary education was small. In the last year of the study - 2008 – as much as 63.4% in the group of farmers surveyed had a secondary school or higher (university) education. This reflects to some extent the situation in the whole agriculture where many middle-aged farmers finished agricultural vocational technical schools or ended their education at primary school, while young farmers often graduate from agricultural colleges/universities (Krzyworzeka, 2011). However, the dynamic situation in agriculture makes both, the knowledge that farmers have obtained several dozen years ago at vocational schools, as well as that obtained recently in universities, largely inadequate for current needs after a few years. Therefore, farmers who want to support themselves with their farms must seek knowledge on their own and complete their education. The surveyed farmers often pointed to the participation in various forms of professional training in the field of organic farming such as courses, training courses, seminars. Without the support of the scientific circles and agricultural organisations it is difficult put the acquired knowledge into practice. In this case, in addition to consulting with other organic farmers, the research and education conducted by research centres and institutes and agricultural advisory play an important role (figure 2).

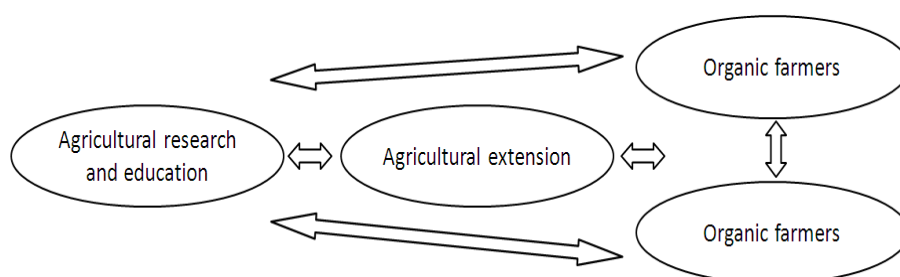


Figure 2. The key parts of transferring the agricultural information and knowledge
Source: Roling, Engel, 1991.

A part of the services and assistance, the farmer can obtain information about organic production technology and also on formal participation in organic farming system, *inter alia*, associated with submitting the application and making agri-environmental commitments in the field of organic agriculture. Access to such information is also an important element in obtaining the financial support, for which farmers pursuing organic production can apply (having an organic farm covered by the control system). Producers can apply for a subsidy per hectare of organic production, joining the agri-environmental programme and selecting a package of Organic Agriculture. Applying for grants is voluntary, however, raising additional funds is economically justified, and the majority of organic farmers tries to take advantage of such opportunity – see figure 3.

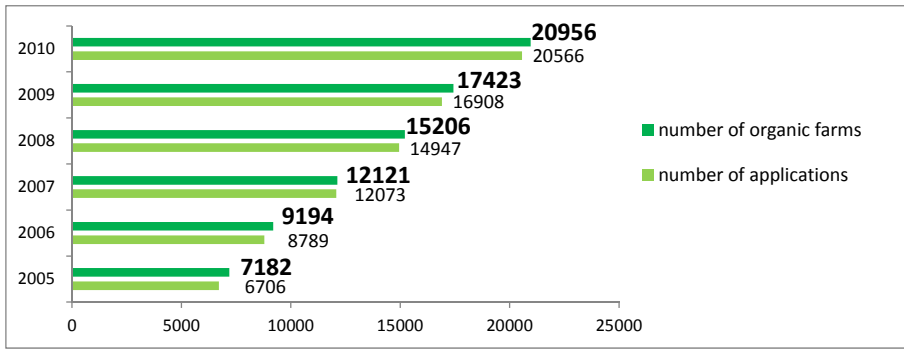


Figure 3. Number of organic farms and applications for support in Poland in 2005 – 2010

Source: www.gjrhars.gov.pl

Of course, the professional qualifications alone are not sufficient to operate the farm in the organic farming system. Information resources at the institutional level in the organic farming mainly include requirements and regulations in this regard. The primary function of organic farming is exercised by the Ministry of Agriculture and Rural Development and the Agricultural and Food Quality Inspection, with which cooperate the Trade Inspectorate, the Veterinary Inspection and the Main Inspectorate of Plant Health and Seed Inspection (figure 4).

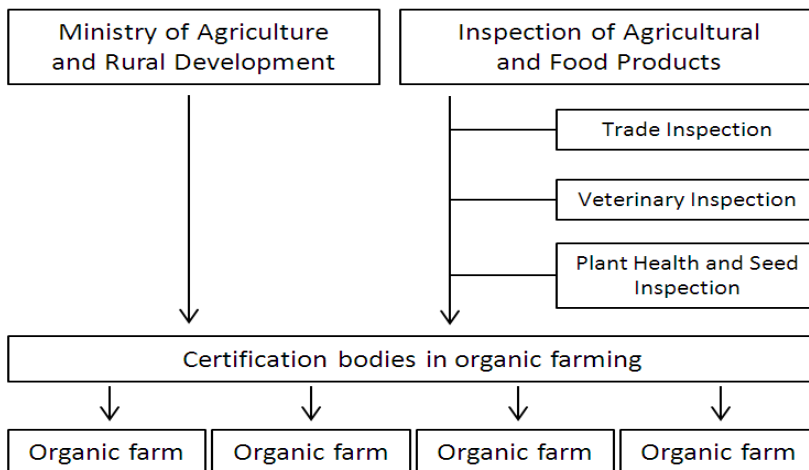


Figure 4. The structure of the control and certification system for organic farming in Poland

Source: www.minrol.gov.pl

These state authorities comprise the control and certification system for organic farming in Poland. The system of control and certification of organic farming is the primary guarantor for the consumer that the products on the market are manufactured in accordance with the applicable rules on organic

farming and are free of contaminants, such as: residues of pesticides and hormones, and that fertilisers and genetically modified organisms were not used during production. The legislation clearly determines the manner of organic farming management, which is reflected in the economic results of organic production.

The purpose of this article is to attempt to determine the effect of restrictive regulations in organic farming related to agricultural production on the economic aspects, mainly the direct costs of organic production. The first part of the paper presents the basic legal requirements for organic production, both plant and animal, in organic farms in the light of the applicable law. The second part attempts to determine strengths and weaknesses and the opportunities and threats of organic production, which may affect the direct costs of production. Economic aspects (direct costs) of production in organic farms are presented on the basis of accounting data collected in the AGROKOSZTY system, using the methodology of gross margin. The study also applies methods of descriptive statistics with elements of SWOT analysis, including tabular descriptions and graphical presentation of results from AGROKOSZTY system.

Conducting agricultural production in organic farm in the light of current legislation

Management of organic farming is strictly defined by the Law on organic agriculture. In order to identify the strengths and weaknesses of organic farming it is worth to know these basic principles. All the more so as the organic method of farming has a direct impact not only on aspects related to the protection of the environment but also on economic and production performance on the farm. In addition, farmers are required to adhere to the principles of good agricultural practice. Therefore, the amount of information and knowledge resources needed to run an organic farm can be challenging, especially for farmers who begin to apply organic methods. EU legislation designated the framework of organic production on the farm, and all the detailed requirements of organic production are included in the Council Regulations (EC). It should be further noted that the detailed rules for the implementation of Council Regulation (EC) No 834/2007 with regard to organic production, labelling and control are set in Commission Regulation (EC) No 889/2008 of 5 September 2008. The national document establishing the status of organic farming in Poland is the *Act of 25 June 2009 on organic farming* (Dz. U. 09 No. 116, item 975). List of amending regulations and corrections is quite large, which indicates continuous adjustment of legislation in the field of organic agriculture. Often it can be a problem for farmers running organic farms who need to fulfil the agri-environmental commitments.

Under current Council Regulation (EC) No 834/2007 of 28 June 2007 on organic production and labelling of organic products and repealing Re-

gulation (EEC) No 2092/91 (OJ L 189, 20.7.2007, as amended.) organic production is defined as *"overall system of farm management and food production that combines best environmental practices, a high level of biodiversity, the preservation of natural resources, the application of high animal welfare standards and a production method in line with the preference of certain consumers for products produced using natural substances and processes"*.

The elements of the management of organic plant production highlighted in Council Regulation (EC) No 834/2007 are: soil fertility management, choice of plant species and varieties, long-term crop rotation, recycling of organic materials and proper cultivation techniques. According to these guidelines (and in accordance with the Code of Good Agricultural Practice) farming should be done in accordance with proper agricultural technology principles and crop rotation must be as varied as possible and should include (in addition to commercial and feed plants) legumes or alternating pasture with small-seeded legume crops undersown, plants for green manure and deep rooted plants. The guidelines also point to the limited share of cereals that should not exceed 60% of the agricultural crops on the farm. Additional fertilisers, products improving soil fertility and plant protection products should be used only when their use is consistent with the objectives and principles of organic production. An important restriction is the prohibition of the use of mineral nitrogen fertilisers, which are widely used in conventional agriculture. Given the restrictions associated with little opportunity for the use of other mineral fertilisers (mainly natural minerals are available), the manure derived from animals - besides compost and green manure - is the most desirable mean of plant production. The main principle used in plant protection is preventive action implemented by appropriate choice of species and varieties, crop rotation, protection of natural enemies of pests. Only in the case of threat to a crop it is allowed to use plant protection products approved for use in organic production.

A very important element of plant production is the origin of seed and seedlings. It is possible to obtain such material from one's own organic farm or to purchase certified seed. Council Regulation (EC) No 834/2007 specifies the manner of obtaining seed and vegetative propagation material. To this end, the mother plant, in the case of seeds, and the parent plant, in the case of vegetative propagating material, is grown in accordance with organic farming principles for at least one generation, and in the case of perennial crops, for at least two growing seasons. The manufacture of organic products (other than seed and vegetative propagation material) should use eco-friendly material, though in derogation conventional seeds are also approved (in the absence of appropriate seed produced organically).

Council Regulation (EC) No 834/2007 indicates the role of livestock production in organic farming: *"Livestock production is fundamental to the organisation of agricultural production on organic holdings in so far as it provides the*

necessary organic matter and nutrients for cultivated land and accordingly contributes towards soil improvement and the development of sustainable agriculture". Farmed animals play an important role in the circulation of organic matter. The manure enriches the soil especially in nitrogen compounds, and has a positive effect on its structure. On the other hand, environmental requirements limit the maximum number of animals per 1 ha of agricultural land in order to minimise over-grazing, soil degradation and excessive accumulation of manure applied to the land. Pollution of the environment, particularly the soil and water, is thus limited, which is associated with the limit of the amount of nitrogen introduced with organic fertilisers; applies only to the use of farmyard manure, dried manure and dehydrated poultry manure, composted manure, including poultry manure, composted farmyard manure and liquid manure. The stocking density should therefore take the maximum allowed number of animals per hectare of arable land. Permitted livestock units (species or group) corresponding to this limit have been established and described in Annex IV to the Ordinance of the Minister of Agriculture and Rural Development of 14 May 2002 on the detailed conditions for the production of organic products.

Eco-friendly way to keep the animals on the farm puts high demands for farmers. The most important from the point of view of livestock production restrictions in organic farming is to provide animals with organic feed. Securing a sufficient own forage area in the farm is thus very important for economic reasons. Therefore, farmers in organic farms ensure diverse crop rotation. With regard to the type of breeding of herbivorous animals (ruminants) one should use pastures, and at least 60% of the dry matter in daily rations is to consist of roughage (green fodder, silage or hay). Purchased organic feeds are relatively expensive and their availability in the market is still very limited. It has been increasingly noted that breeding animals based on permanent pasture is good for the environment as well as for economics of production [Radkowska 2009]. Pasture forage is one of the best and most valuable roughage, and at the same time is cheap. The sources of protein in animal nutrition in organic farms include legumes: beans, peas, lupins. The primary concentrate feeds should be cereal grain and legume seed (crushed or as meal). Also by-products of the food industry are used, such as bran, dried beet pulp and oil-cake from oilseeds (e.g. rapeseed, sunflower). An important component of animal feed is the prohibition of industrial concentrates and complete mixes and feed manufactured with GMO crops. Since it is forbidden to use growth promoters, synthetic amino acids and antibiotics, animals grow slowly, retaining the natural resistance and durability. In addition, all young mammals must be fed with natural, preferably maternal milk, for a reasonable period of time specified in the Council Regulation (EC) No 834/2007. Maximising the use of animals (longer production lifetime), such as dairy cows, is an advantage of organic breeding. This is associated with low culling rate, which reduces the cost of herd replacement (Żukowski, 2009). An important determinant of animal welfare is to ensu-

re appropriate livestock buildings, including appropriate stocking density and providing access to outdoor runs. Living conditions of animals should take into account their needs and natural behaviour. Organic livestock production should pay attention to proper selection of animal breeds their adaptability, vitality and resistance to disease. First, preference is given to native breeds. In accordance with the provisions of Council Regulation (EC) No 834/2007: *The organic livestock production system should aim at completing the production cycles of the different livestock species with organically reared animals. It should therefore encourage the increase of the gene pool of organic animals, improve self reliance and thus ensure the development of the sector.*

Requirements of organic agricultural production and direct costs of production - SWOT analysis

SWOT analysis is a widely used and recognised method of analysis which allows us to easily identify the inside of the enterprise (farm) and its surroundings. This method is also used to identify key problems and their solutions in the agricultural sector. Through the SWOT analysis, the farmer can make a description of the actual state of agricultural production sectors in which he specialises, as well as determine its position against the background environment. This facilitates accurate assessment of the situation, as well as allows taking appropriate steps towards effective action (Starzyk, 2007).

Strengths and weaknesses of the management in a single organic farm are associated to some extent with the possibilities and limitations posed by legal requirements. However, it should be noted that the functioning of an organic farm on the market is subject to environmental opportunities and threats, which mainly depend on the development of the market for organic products and the development of entrepreneurship and cooperation between farmers. In this section, an attempt is made to analyse the organic production conditions in the aspect of direct costs in terms of strengths and weaknesses (internal factors – at the farm level) as well as opportunities and threats (external factors – concerns the surrounding) – see table 1.

Taking into account the factors (strengths and weaknesses) of organic farm production as well as the current state (opportunities and threats) of organic farming in Poland, we can point out the relation with the economics of production, especially the direct costs incurred in organic farming. The big advantage of organic farms is the ability to reduce production costs through the pursuit of self-sufficiency on one's own farm. However, the development of the organic production sector is dependent on the development of market and interests of consumers.

Table 1. Agricultural production in organic farming in terms of direct costs incurred - SWOT analysis

Strengths	Weaknesses
<ul style="list-style-type: none"> + possibility of reproduction of seeds on own farm - lower cost of own seed in comparison to certified seed + possible use of available farm manure and appropriate cultivation technology - lower costs compared to expensive means of production + limited use of plant protection products - prevention methods based on natural resources proper agriculture technique and selection of varieties - low cost + longer production lifetime of farm animals - lower cost + production of feed mainly on own farm - lower costs + properly chosen and properly maintained animals do not require treatment 	<ul style="list-style-type: none"> - often insufficient amount of seed and lower quality of own seed - in case of need to use approved fertilisers e.g. lime fertilisers - high cost of transportation and purchase - in case of need to use approved protection products - high cost of purchase - limited capacity and difficulty in obtaining organic breeding animals - insufficient forage area on the farm in case of increasing production - exclusion (waiting period) from production in case of the need for treatment of animals
Opportunities	Threats
<ul style="list-style-type: none"> + reduction in prices of means of production in response to development of organic market and increased consumer demand + development of organic seed market for producers + development of producer groups will lower the cost of purchase of inputs + development of organic market will affect development of organic livestock breeding + development of market in organic feed and feed additives 	<ul style="list-style-type: none"> - small interest of seed companies in organic sector causes low availability of organic seed on market - dispersion of organic farms makes it difficult to take up broader cooperation - difficulties in obtaining organic animals - higher cost of purchasing and transporting - low availability of organic feed in the market resulting in high costs of purchase

Materials, method and survey results

To show the economic situation and direct costs of organic production the accounting data on agricultural activities were taken according to the rules of the Agricultural Products Data Collection System (AGROKOSZTY). The surveyed farms were located across Poland and were selected from a representative sample of Polish FADN (Farm Accountancy Data Network). They rank among the economically strongest agricultural individual holdings with output for family farms above the national average. For this reason, the

results obtained should not be directly translated into national average results. However, multiannual surveys indicated that the calculations correctly reflected direct cost trends of production. As an attempt to reference the results of conventional farms surveyed in AGROKOSZTY system in the same year were taken into consideration.

Under the AGROKOSZTY system, the methodology used for calculating the gross margin was consistent with the EU rules (Augustynska, Goraj, Tarka, Pokrzywa, Skarzynska, 2000). It is the first income category, calculated by deducting from the value of production the corresponding direct costs. In crop and animal production, the production value depends on the yield and the selling price for products (annual average transaction prices or 'at the farm gate' prices). Among direct costs of crop production we can distinguish: costs of seeds, mineral fertilizers, organic fertilizers, crop protection products, growth regulators and other direct costs (insurance, special expenditure, special services). For livestock production, direct costs are as the following: livestock replacement, feeding stuffs (purchased and produced on the farm), other direct costs (livestock insurance, rent for the use of forage area, medicines and veterinary services, special expenditure and services). Additionally, corresponding subsidies were taken into account. The item of subsidies only comprised those which directly concerned particular activities, mostly supplementary payments. In case of organic production also agri-environmental payments were taken into account.

For this study two agricultural activities were selected – winter wheat and dairy cows, which are very common in both conventional and organic farms. The basic data of selected activities were presented in table 2.

Table 2. The basic production data of agricultural activities in conventional and organic farms surveyed in Agrokoszty system

Specification	Average results by group of surveyed farms			
	Winter wheat		Dairy cows	
	conventional	organic	conventional	organic
Number of surveyed farms	152	19	167	20
Area under cultivation	20,7	2,9	-	-
Annual average number of dairy cows	-	-	23	9
Yield [dt/ha] [liter/cow]	61,2	28,4	5506	3346
Selling price [EUR/dt] [EUR/liter]	15	22	0,22	0,19

Source: AGROKOSZTY database.

The scale of production (in the meaning of area under cultivation or number of dairy cows) in organic farms was significantly smaller, the same as the yield (see table 2). The selling price for winter wheat was about 46,6% higher than conventional, but the price for milk was 13,6% lower in surveyed group of farms. The level of direct costs of production in surveyed farms and economic results of particular activities on gross margin level were shown on graphs (see figure 5 and figure 6).

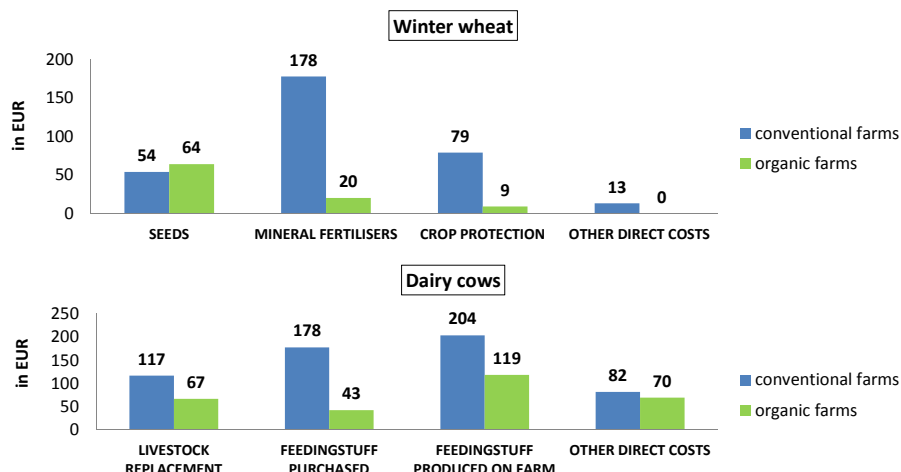


Figure 5. The level of direct costs of winter wheat cultivation (per ha) and milk production (per dairy cow) on organic and conventional farms surveyed in AGROKOSZTY system

Source: AGROKOSZTY database.

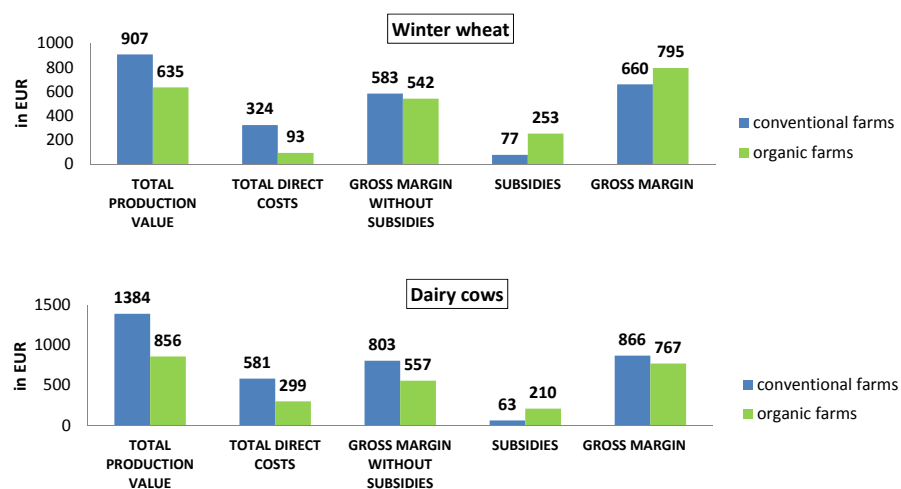


Figure 6. The level of direct costs of winter wheat cultivation on organic and conventional farms surveyed in AGROKOSZTY system

Source: AGROKOSZTY database.

As showed by the result of research in the AGROKOSZTY system, organic farms are associated with low level (compared to conventional farms) of direct costs of given agricultural activities. Largely because this organic farms are able to get well results at the level of gross margin despite significantly weaker production results. In that situation the support of the payments is very important and it has bigger impact on gross margin account in organic production than in conventional.

On the basis of considerations and the results of research presented, a few conclusions about the requirements in organic farming and its impact on agricultural production in organic farm can be formulated.

1. Knowledge and information for farmers are becoming increasingly important among the many factors affecting the operation of the organic farm. With regard to the organic method of farm management directly involves a knowledge of the restrictive legal requirements and how to use them in practice. This is not only related to the necessity of fulfilling environmental commitments, but it also determines the nature of agricultural production and the production and economic results achieved in organic production.
2. The use of farmer's knowledge and the own farm potential become a strong side of organic farm. This allows to lead an extensive production as largely independent of external means of production (from purchase). In this case, lower direct costs of production may be a strong side of organic farm management. However, the yielding remains at a relatively low level compared to conventional production. While increasing the productivity of the unit (crops or animals) or increasing the scale of production (number of hectares or animals) may require the purchase and high costs that organic farmers cannot afford. This may be the weaker part of organic production, which at the present stage of development of the organic market is a major barrier for producers of organic products.
3. The study of direct costs in agricultural production on organic farms in the Agrokoszty system showed much lower level of these costs than in conventional farms. Incurred direct costs are often a reflection of the restricted legislation requirements in organic agriculture. From other hand, the reduction or low level of direct costs may be the only one chance to achieve a quite good economic results from organic production. In this case, targeted subsidies to compensate losses (low yielding) associated with extensification of production are justified .

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