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DETERMINANTS OF THE DEVELOPMENT OF FAMILY FARMS BREEDING ANIMALS OF CONSERVATIVE BREEDS IN CONDITIONS OF SUSTAINABLE AGRICULTURE¹

Key words: determinants of the development of farms, family farms, breeding animals of conservation breeds, sustainable development of agriculture

ABSTRACT. The aim of the research was to determine the role and significance of natural, economic and social conditions influencing the development of family farms keeping animals of conservative breeds in conditions of sustainable agriculture. Family farms are conducive to the sustainable development of agriculture, particularly in farms which keep animals of conservative breeds. These breeds are well adapted to local, often difficult, environmental and climatic conditions, have a high reproductive capacity and high survival rate, and the products obtained from them have a high nutritional value. Conservation breeds are suitable for traditional breeding on family farms that farm in harmony with the natural and social environment. The research was carried out in family farms in south-eastern Poland. Taking into account the functions performed by family farms, especially those of small scale production, and the influence of various factors on their development, an evaluation of changes from a structural, social and environmental point of view was carried out in this study. In order to achieve the assumed objectives, the following research methods were used: indicator method, descriptive method, vertical and horizontal comparative method, cause and effect analysis. Research has shown that conservation breeds are well adapted to local environmental conditions; they can be maintained on poor fodder resources on the basis of permanent grassland, enabling areas of high landscape value to be managed and protected, and their products are of high quality. Family farms with conservative breeds also influence natural and landscape features as well as social and cultural features of a given region.

INTRODUCTION

The dominant form of farming in Polish agriculture are family farms, which constitute 98.4% of all farms in Poland [GUS 2018]. These farms are regionally differentiated in terms of area, labour force resources, capital or production scale. The weakness of Polish agriculture is its agrarian fragmentation, which affects the scale of production, employment level and profitability of agricultural farms. The smallest family farms (up to 5 ha UAA – Utilized Agricultural Area) are located in south-eastern Poland.

¹ The research was based on empirical data collected during the research project BIOSTRATEG 2/297267/14/NCBR/216 and mass statistics.

In economic and agricultural literature, family farms are defined differently depending on the adopted criteria. The most frequently used criteria defining a family farm include: the use of family labour resources, farm management by a family member, the size of a farm or produced production. Göran Djuefeldt [1996] characterizes a family farm as a combination of an organism: an agricultural farm, a household and a family. In the provisions of Polish law, the concept of a family farm was defined in the Act of 11 April 2003 on the Shaping of the Agricultural System, where, in Article 5, it is assumed that it is an entity run by an individual farmer, whose total area does not exceed 300 hectares of agricultural area [Czechowski 2003]. The importance of family farms is often considered by the functions they perform in relation to the community. The basic functions of these farms are production and economic functions - achieved through agricultural activity. The importance of production and economic functions in family farms is determined by the level and scale of agricultural production and the production and economic efficiency of conducted activities. The economic function of family farms is characterized by the level of income and employment. Family farms often supplement their agricultural production with non-agricultural activities. Family farms are conducive to the sustainable development of agriculture, particularly in farms which rear animals of conservative breeds. These breeds are well adapted to local, often difficult environmental and climatic conditions and are more resistant to disease and stress than other breeds. Moreover, conservation breeds of farm animals have a high reproductive capacity and a high survival rate, and the raw materials obtained from them are qualitatively valuable products, which is particularly important in the context of growing consumer awareness of food safety and quality. Conservative breeds of farm animals are well suited to traditional breeding.

Society's increase in demand for food forces the intensification of agriculture by postponing extensive production, thus marginalising the breeding of animals of conservative breeds. It causes these races to be in danger of extinction. Conservation breeds of farm animals are characterized by lower productivity and profitability of breeding in relation to breeds used in intensive commercial production. Focusing on the quantitative increase of production in agriculture violates the state of balance between an agricultural holding and the natural and social environment. Conservation breeds of farm animals, due to their adaptation to local environmental conditions, are suitable for rearing in small, poorly mechanized family farms, which manage the farm in harmony with the natural and social environment. The small scale production on these farms affects the level of costs and income. Often, production obtained is unprofitable, as the costs of production exceed the income obtained. Small scale production is also exposed to the consequences of fluctuations in purchase prices of agricultural products. This problem is much smaller with regard to large scale production, because larger scale production allows for continuous sale and eliminates fluctuations of purchase prices during the year. Conservation breeds of farm animals, due to their ability to adapt to local conditions and the quality of production, often make it possible to improve the finances of family farms.

RESEARCH MATERIAL AND METHODS

This study is a contribution to the reflections on the role and significance of natural, economic and social conditions affecting the development of family farms keeping conservation breed animals in conditions of sustainable agriculture.

The research was carried out in south-eastern Poland, i.e. in the Małopolskie, Świętokrzyskie, Podkarpackie and Lubelskie Provinces, in 144 intentionally selected family farms which maintain conservative breeds of farm animals (cattle, pigs, sheep). The criterion for the selection of farms was their specialization according to FADN methodology [Goraj, Olewnik 2015]. The selection of the areas of south-eastern Poland for research stems from the sustainable development of agriculture in this region. The region is characterized by various forms of nature and environmental protection, with a low average farm size and often low yielding native breeds. These features predestine this area for research in the field of sustainability level assessment of farms, as protected areas require vitality maintenance, and thus the carrying out of animal production in the area. The research tool was an interview questionnaire conducted in family farms breeding animals of conservative breeds. The direct interview, concerning natural, economic and social conditions influencing the development of the studied farms, was conducted in 2017. Taking into account the functions performed by family farms of small scale production and the influence of various factors on their development, an assessment of changes regarding the farm's structure, social and environmental character was carried out here. The cause-and-effect relationships between the analysed phenomena were investigated. In order to achieve the assumed objectives, such research methods as: the indicator method, the descriptive method, the vertical and horizontal comparative method and cause-effect analysis were used. The research was based on empirical data collected during the research project BIOSTRATEG 2/297267/14/NCBR/216 and mass statistics.

RESEARCH RESULTS

The development of agriculture, including family farms in Poland, depends on natural, economic and social conditions. While natural conditions are relatively stable, others are variable over time and depend on the level of economic development of the region. In general, it can be stated that natural, economic and social conditions in Poland are favorable to agricultural production, because lowland areas occupy 75.1% and mountain areas only 8.0% [GUS 2018]. This agrarian structure has a great influence on the directions and level of agricultural production. The average agricultural area per family farm in Poland is 10.51 ha UR [GUS 2018]. The largest share of farms up to 5.0 ha of UAA is in the following Provinces: Podkarpackie, Małopolskie, Świętokrzyskie, Lubelskie. Family farms, as the dominant form of farming in agriculture, are diversified in terms of area, labor force resources, equipment with fixed assets, production volume and links with the market. The weakness of Polish agriculture is its agrarian fragmentation, which affects the scale of production, employment level and low profitability of farms. Natural and economic conditions stimulate or limit the directions and level of agricultural production

development, including animal production. The changing market environment of agriculture, technological progress in food economy and emerging models of rational nutrition of the population cause the occurrence of various management systems in agriculture. The introduction of the industrial system in agriculture influenced the intensification of production, which resulted in an increase in the productivity of land and livestock. In the years 2004-2017, i.e. since Poland's accession to the European Union, there has been an increase in agricultural output by 61.4% and agricultural commodity output by 82.4%. In that period, crop production increased by 40.2% (from PLN 38,594.7 million to PLN 54,113.8 million) and commodity production by 62.3% (from PLN 20,316.4 million to PLN 32,979.0 million). The dynamics of growth in the value of animal production, in the years 2004-2017, was also high and amounted to 87.6% in global production (from PLN 31,153.0 million to PLN 58,464.3 million) and 98.2% in commodity production (from PLN 25,910.9 million to PLN 51,369.9 million). In crop production, in the years 2004-2017, changes in the structure of basic crop sowing took place. Area under cereal decreased by 9.3%, potatoes by 55.0% and sugar beet by 21.9%. The area of rape and colza cultivation increased by 69.8% [GUS 2018].

In animal production, the level of production factors, their structure and direction of use of animals and the quality of manufactured products changed. There was an increase (by 46.4%) in cow milk yield from 3884 kg (2004) to 5687 kg (2017). In the analysed years 2004-2017, the cattle stock increased by 16.1%, from 5,200,173 to 6,035,742, and the number of dairy cows decreased by 21.8%, from 2,754,810 to 2,152,887. The largest decrease in the number of dairy cows took place in the following Provinces: Podkarpackie (by 66.0%), Małopolskie (by 55.1%), Świętokrzyskie (by 52.3%) [GUS 2018]. The decrease in the number of dairy cows in Poland is a result of the elimination of small herds and the breeding selection of cows. Analysing the stock of basic farm animal species in Poland, it can be stated that, since Poland's accession to the European Union, there has been a clear decrease in pig stock (by 31.5%), especially sows (by 44.9%). This is a result of high costs incurred in sow breeding, including piglet breeding and pork production. This is particularly true for small farms. The pig population decreased in almost all Provinces except for Wielkopolskie (increase by 1.8%). The largest decrease in this stock was recorded in Podlaskie (by 64.4%) and Małopolskie (by 63.6%). A decrease in stock can also be observed in horses (by 42.2%) and sheep (by 13.9%) [GUS 2018]. In the sheep population there was a downward trend until 2015, however in recent years it has been increasing. The sheep population in 2004 amounted to 311 834 sheep and in 2017 to 268 541 sheep. The largest number of sheep is found in the Małopolskie Province, as sheep constitute 31.9% of the population. A slight increase in the number of sheep in recent years indicates an attempt to revive sheep production. The quality of products and the sheepherding culture widely promoted among the population contribute to this. Out of the poultry kept in Poland, chicken poultry, focused on the production of meat and eggs, is of the greatest economic importance. In the years 2004-2017, there was dynamic growth (by 47.5%) in the number of chicken poultry in Poland. Profitability of production has a clear impact on trends in animal production. The intensification of agricultural production, despite considerable economic and production successes, contributed to serious threats to the natural environment. It has affected the balance between agricultural production

and the natural environment. One of the ways of limiting the existing threats to the farm environment is to adopt and implement the principle of sustainable development of agriculture [Adamowicz 2005, Wilkin 2011]. Sustainable agriculture is a concept that links farm production targets to environmental protection requirements. Sustainable agriculture should meet such requirements as [Baum 2005]:

- produce food raw materials of appropriate quality,
- use environmentally friendly production technologies,
- maintain and develop the landscape and recreational values of rural areas,
- ensure the safety of human and animal health.

An important role in the sustainable development of agriculture is fulfilled by the influence of family farms on the vitality of rural areas, including the natural and cultural environment. Family farms breeding animals of conservative breeds are more friendly to the natural and social environment than other forms of farming.

The Common Agricultural Policy conducted by the European Union has a significant impact on the efficiency of livestock farming of conservative breeds [Żmija 2016]. Farms keeping animals of conservative breeds obtain financial subsidies under this policy for breeding and rearing animals of these breeds. Currently, in our country, the programmes for the protection of genetic resources of farm animals include the following conservative breeds:

- cattle: Polish Red and White, Polish Red, Polish Black and White, Polish White-backed;
- sheep: Black-Headed, Polish Olkuszka, Polish Swiniarka, Polish Uhruska, Carpathian Cakiel of Podhale, Polish Wrzosowka, Polish Merino, Polish Kamieniecka, Polish Korbiel, Polish Pogorze, Polish Pomeranian, Polish Wielkopolska, Zelezińska, Polish Mountain breeds;
- pigs: Polish Pulawska, Polish Złotnicka White, Polish Złotnicka Spotted breeds;
- horses: Polish Pony, Hucul pony, Polish Małopolski, Polish Wielkopolski, Polish Silesian, Cold-blooded Sztumski type horse, Cold-blooded Sokolski type horse breeds;
- chickens: Leghorn, Polbar, Rohde Island Red, Rohde Island White, Sussex, Polish Zielononozka hen breeds;
- geese: Polish Zielononozka, Polish Garbonosa, Polish Kielecka, Landes, Polish Lubelska, Polish Podkarpacka, Polish Pomeranian, Polish Rypinska, Slovak White, Polish Suwalska, Polish Zatorska goose breeds;
- ducks: reduced K2 ducks, khaki, Campbell orpington, Polish Pekin p33, Polish Pekin LsA, Polish Pekin p8, Polish Pekin p9.

The progressive intensification of animal production resulted in the gradual displacement of conservative breeds of farm animals from family farms. Many local breeds have lost economic justification for further breeding. The number of native breeds of animals decreased in Poland, therefore it was necessary to undertake programmes to protect animals of conservative breeds. The number of herds and animals of conservation breeds of basic farm animal species in Poland is presented in Table 1.

The data presented in Table 1 show that, in the last years, i.e. 2015-2018, the decrease in the number of conservative breeds of farm animals in Poland halted. This is a result of the co-financing of animals of conservative breeds on family farms. This financing is provided through the Common Agricultural Policy and the state budget.

Table 1. Conservation breeds (indigenous) of basic farm animal species in Poland

Species – breed	2015		2018	
	number of herds	number of animals	number of herds	number of animals
Cattle – cows				
Polish Red and White	334	3,125	330	3,395
Polish Red	256	2,388	259	2,419
Polish Black and White	131	1,489	115	1,640
Polish White-backed	40	424	58	610
Pigs – sows				
Polish Pulawska	27	551	59	1,423
Polish Zlotnicka White	28	836	34	1,277
Polish Zlotnicka Spotted	27	517	31	811
Sheep				
Black-Headed	36	1,546	53	2,757
Polish Olkuska	54	1,123	54	1,291
Polish Swiniarka	21	1,390	39	2,161
Polish Uhruska	107	6,612	126	7,458
Carpathian Cakiel of Podhale	118	7,128	112	7,874
Polish Wrzosowka	115	8,467	107	8,264
Polish Merino	59	6,841	56	7,595
Polish Kamieniecka	51	4,464	59	5,574
Polish Korbiel	24	1,543	29	1,941
Polish Pogorze	15	786	17	1,254
Polish Pomeranian	108	7,994	102	8,092
Polish Wielkopolska	59	7,272	62	7,850
Zeleznienska	23	1,496	25	1,916
Polish Mountain	27	1,476	34	1,970
Horses – mares				
Polish Pony	215	1,238	230	1,616
Hucul pony	264	1,225	280	1,289
Polish Malopolski	138	449	134	471
Polish Silesian	249	843	270	932
Polish Wielkopolski	32	165	27	125
Cold-blooded Sztumski type	226	1,078	264	1,305
Cold-blooded Sokolski type	263	1,112	254	1,229

Source: own elaboration based on [Krupiński 2019]

In Poland, the following breeds of cattle were classified as conservative: Polish Red and White, Polish Red, Polish Black and White, Polish White-backed. These breeds are well adapted to local, often difficult, environmental conditions. The rearing of these breeds may be based on permanent grassland and poor arable forage. In some regions, e.g. mountainous regions, Polish Red breed cows are the only ones able to make full use of the available poor feed resources. This makes it possible to develop and protect areas of high landscape and ecological value. Conservative cows are characterized by high health and immunity, longevity and good fertility. They also have the capacity to reduce milk yield under feed shortages. Although the obtained milk yield of these cows is not too high, high quality products often sought after by customers on the market are obtained from them. Their natural, landscape and socio-cultural functions make them a testimony to the tradition and culture of local communities.

Pig conservation breeds include the Polish Pulawska pig, the Polish Zlotnicka White pig and Polish Zlotnicka Spotted pig. These breeds were created on the basis of local breeds occurring in Poland. Pigs of these breeds represent a genetic reserve that could be used in future for breeding. The animals of these breeds are characterised by an unevenness in relation to farm feed and pigs for fattening grow well using cheaper farm feed. Although these breeds are characterized by worse fattening and slaughter performance than other breeds in Poland, their meat is characterized by very good quality. Due to their utility values, they can be kept in organic farms. The role of these conservative breeds is not only as a genetic reserve for pig breeding, but also a market niche for higher quality products.

The breeds of sheep included in the biodiversity programme are shown in Table 1. The sheep included in the programme represent a very valuable element of the genetic diversity of the species. Sheep play an important role in the ecosystem in order to preserve the natural environment. They are also an important part of folklore and rural culture, as well as agro-tourism, which is developing better and better. Sheep farming is part of landscape architecture and the shepherding culture. With a view to preserving conservative breeds for breeding and future generations, the Ministry of Agriculture and Rural Development under the Common Agricultural Policy under the Rural Development Programme financially supports the breeding of conservative breeds. In the period 2007-2013, financial support was provided to preserve endangered genetic resources of animals: for cattle – PLN 1,140 per animal; for sheep – PLN 320 per animal; pigs – PLN 570 per animal; horses – PLN 1,500 per animal [PROW 2007-2013]. In the period 2014-2020, financial support for the preservation of native breeds within the Rural Development Programme amounted to: cattle – 1,600 PLN/unit; pigs – 1,140 PLN/unit; sheep – 360 PLN/unit; goats – 580 PLN/unit; Małopolskie, Wielkopolskie horses – 1,900 PLN/unit; horses of other breeds covered by support – 1,700 PLN/unit [PROW 2014-2020]. Financial support is aimed at the protection of selected, valuable (family) conservative breeds that are in danger of extinction. Conservation breeds of farm animals are best adapted to local conditions by providing products of the highest quality. The breeding of these breeds contributes to the preservation of biodiversity and the preservation of traditions and culture of local communities.

SUMMARY

The economic situation of family farms is affected by costs, the direction and scale of production as well as the prices obtained from the sale of products. The economic situation of farms is also influenced by the Common Agricultural Policy of the European Union and relations between factors of agricultural production. Intensification of livestock farming caused conservative breeds to lose economic justification for further breeding and some herds of these breeds to be eliminated. Therefore, the European Union, within the framework of the Common Agricultural Policy, started to financially support family farms which maintain farm animals of conservative breeds. In order to adapt conservative breeds to local, natural and climatic conditions and maintain their economic and breeding value, it is necessary to support further breeding.

Conservation breeds of farm animals have, among other things, advantages, namely:

- they are perfectly adapted to local, often difficult, environmental conditions,
- they can be maintained on poor forage resources on the basis of permanent pasture, which makes it possible to manage and protect areas of high landscape value,
- they can be used to obtain products of unique quality, with a centuries-old tradition of production.

The preservation for future generations of family farms with conservative breeds is supported not only by the breeding value of these animals but also their natural, landscape, ethnographic and socio-cultural functions..

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UWARUNKOWANIA ROZWOJU GOSPODARSTW RODZINNYCH Z CHOWEM ZWIERZĄT RAS ZACHOWAWCZYCH W WARUNKACH ROLNICTWA ZRÓWNOWAŻONEGO

Słowa kluczowe: uwarunkowania rozwoju gospodarstw, gospodarstwa rodzinne, chów zwierząt ras zachowawczych, zrównoważony rozwój rolnictwa

ABSTRAKT

Celem badań było określenie roli i znaczenia uwarunkowań przyrodniczych oraz ekonomiczno-społecznych, wpływających na rozwój gospodarstw rodzinnych utrzymujących zwierzęta ras zachowawczych w warunkach rolnictwa zrównoważonego. Gospodarstwa rodzinne sprzyjają zrównoważonemu rozwojowi rolnictwa, a szczególnie te prowadzące chów zwierząt z rasami zachowawczymi. Rasy te są dobrze przystosowane do lokalnych często trudnych warunków środowiskowych i klimatycznych, mają wysoką zdolność reprodukcyjną i dużą przeżywalność, a pozyskiwane od nich produkty mają wysoką wartość odżywczą. Rasy zachowawcze nadają się do chowu tradycyjnego w rodzinnych gospodarstwach, które gospodarują w harmonii z otoczeniem przyrodniczo-społecznym. Badania przeprowadzono w gospodarstwach rodzinnych na terenie Polski południowo-wschodniej. Biorąc pod uwagę funkcje pełnione przez gospodarstwa rodzinne, szczególnie o małej skali produkcji, oraz wpływ różnych czynników na ich rozwój przeprowadzono ocenę zaistniałych zmian w ujęciu strukturalnym społeczno-środowiskowym. Do zrealizowania założonych celów zastosowano takie metody badawcze, jak: metoda wskaźnikowa, metoda opisowa, metoda porównawcza pionowa i pozioma, analiza przyczynowo-skutkowa. Badania wykazały, że rasy zachowawcze są doskonale przystosowane do lokalnych trudnych warunków środowiskowych, mogą być utrzymywane przy ubogich zasobach paszowych w oparciu o trwałe użytki zielone, co umożliwia zagospodarowanie i ochronę obszarów o dużych walorach krajobrazowych, a uzyskiwane od nich produkty są wysokiej jakości. Gospodarstwa rodzinne z chowem ras zachowawczych wpływają również na cechy przyrodniczo-krajobrazowe i społeczno-kulturowe danego regionu.

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