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Magdalena Śmiglak-Krajewska

Poznań University of Life Sciences, Poland

THE DETERMINANTS OF PULSES PRODUCTION ON FARMS IN WIELKOPOLSKA PROVINCE

DETERMINANTY PRODUKCJI ROŚLIN STRĄCZKOWYCH W GOSPODARSTWACH ROLNYCH Z WOJEWÓDZTWA WIELKOPOLSKIEGO

Key words: pulses, feed industry, farms

Słowa kluczowe: rośliny strączkowe, przemysł paszowy, gospodarstwa rolne

Abstracts. The aim of this study was to determine the factors affecting the development of production of pulses to be used as commodities or feeds on farms in Wielskopolska. The survey was conducted on 184 farms in 2012, where farmers were interviewed with a questionnaire. There was a minimal share of pulses in the crop structure on the farms under study. Low cost-effectiveness of production and yield instability were some of the reasons why the respondents did not start the production of pulses. Another important reason was the absence of the market to sell such products.

Introduction

Pulses should play an important role in plant production due to their natural and economic values. Their share in the crop structure and the selection of species providing a specific raw material for feeds chiefly result from the demands of animal production [Kopiński, Matyka 2012]. The better use and greater range of pulse production may reduce the deficit of feed protein in feeding farm animals and improve the cost-effectiveness of animal production. It is also ecologically and agritechnically justified, because nitrogen fertilisation can be limited and a good position for the follow-up crop can be provided. According to Prusiński et al. [2008], the introduction of pulses into crop rotation gives a possibility to reduce mineral fertilisers even by 20-25%. Apart from that, the post-harvest remains of pulses left in the field enrich the soil with humus and potassium by about 35 kg/ha and with phosphorus by 25 kg/ha [Jasińska, Kotecki 1997]. All of that results in an outlay-free increase in the yield of follow-up crops even by as much as 5-15% [Dubis, Budzyński 1998, Duer 1994, Dzienia i in. 1989, Gawęda, Kwiatkowski 2013].

There is minimal percentage of pulses in the crop structure of arable land in Poland. In 2013 the share of pulses amounted to about 1.6%, where the share of fodder cultivars amounted to 1.2% [*Mały rocznik…* 2014]. The cultivation of pulses is regionally diversified in Poland. Fodder pulse plantations occupy the largest area in West Pomeranian Province (13,153 ha), Masovian Province (12,690 ha) and Wielkopolska Province (11,511 ha), whereas edible varieties are predominant in eastern regions of Poland (18 420 ha, i.e. 0.8% of the total area of edible pulses in Poland) [*Użytkowanie gruntów*… 2014].

This situation chiefly results from the fact that the feed industry shows little interest in using domestic pulses for the production of mixtures. This situation is caused by numerous factors, the most important of which are easy access to large amounts of soybean meal with homogenous qualitative parameters and timely delivery of the meal. For several years Poland has been importing about 1.8-1.9 million tonnes of soybean meal a year, where about 60% is used to produce feeds for poultry, 20% – for feeds for pigs and 10% – for feeds for cattle. The imports could be considerably limited by using domestic sources of protein, including pulses, which have sufficient amounts of protein. In order to achieve this goal the production of pulse should be organised so that farmers will be economically encouraged to produce larger and homogenous batches

of seeds. According to Polish regulations, GMOs cannot be used to feed animals. However, in practice there is a moratorium on this ban (until 1 January 2017). In order to encourage farmers to increase pulse production in 2010 special subsidies were introduced, which depended on the area of pulses grown. The payment was introduced due to the positive influence of the plants on the environment and agricultural economy, because they limited the use of mineral nitrogen fertilisers, improved the soil quality and provided domestic protein, which was necessary for feed production. However, it turned out that it is difficult to considerably increase the cultivation of high-protein crops in Poland in a short time.

In view of this fact, the aim of this study was to determine the factors affecting the development of production of pulses to be used as commodities or feeds on farms in Greater Poland.

Research material and methods

The research was conducted in 2012 on a sample of 184 farms from Greater Poland Province. The farms were purposefully selected for the research, which means that the entities were deliberately chosen for the sample. The following selection criteria were assumed: the farm area – at least 9 ha of farmland and commodity production on the farm. The method of personal interviews based on a specially prepared questionnaire was used for the survey. The information collected in the survey was analysed and described with the methods of descriptive statistics.

Characterisation of population under study

The farms were grouped according to the total farm area, which encompassed the area of the farm and the area of land leased (Tab. 1).

Three types of production were distinguished: crops, animals and mixed production. Mixed production was predominant on the farms which were not larger than 100 ha, whereas mixed production or crop production prevailed in the group of farms with the area of at least 100 ha. Cereals were predominant in the crop production, i.e. 134 farms grew wheat, 102 farms grew rye, 132 farms grew barley, 41 farms grew oats and 122 farms grew triticale. Few farmers grew pulses. 51 farms grew yellow lupine, 23 farms grew narrow-leafed lupine, 22

Table 1. A characterisation of the farms under study (n = 184)
Tabela 1. Charakterystyka badanych gospodarstw (n = 184)

Area/ *Powierzchnia [ha]*	Number of farms/ *Liczba gospodarstw*	Production/*Produkcja*		
		crops/ *roślinna*	animals/ *zwierzęca*	mixed/ *mieszana*
		number of farms/ *liczba gospodarstw*		
9-20	40	7	6	26
20-50	63	6	8	49
50-100	49	15	2	33
100 or more/*100 lub więcej*	32	12	6	14
Total/*Razem*	184	40	22	122

Source: own study based on the questionnaire survey
Źródło: opracowanie własne na podstawie badań ankietowych

Table 2. General characterisation of the respondents (n = 184)
Tabela 2. Ogólna charakterystyka respondentów (n = 184)

Specification/ *Wyszczególnienie*	Number of responses/ *Liczba odpowiedzi*	%
Owner's sex/*Płeć właściciela:*		
Female/*Kobieta*	21	11.41
Male/*Mężczyzna*	163	88.59
Education/*Wykształcenie*:		
Vocational/ *Zawodowe*	23	12.5
Secondary/Średnie	130	70.65
Higher/*Wyższe*	23	12.5
No answer/*Brak odpowiedzi*	8	4.36
Age [years]/*Wiek [lata]:*		
20-35	30	16.30
35-45	58	31.52
45-55	62	33.70
55-66	33	17.93

Source: own study based on the questionnaire survey
Źródło: opracowanie własne na podstawie badań ankietowych

farms grew fodder peas, 12 farms grew edible peas and only 1 farm grew tick beans. As far as animal production is concerned, cattle (78 farms) and pig breeding (72 farms) predominated.

The farm managers were also characterised according to their age, education and sex (Tab. 2).

Men were the owners of most of the farms under study (88.59%). Most of the surveyed farm owners were aged 45-55 years (33.70%), followed by the group aged 35-45 years (31.52%). The farm owners usually had secondary education (70.65%); there were 12.5% of the farm owners with higher education and 12.5% of the owners with vocational education.

Research findings

Among the entities surveyed 58% of the farms had pulses in their crop structure: 51 farms grew yellow lupine (the average sown area: 3.2 ha), 23 farms grew narrow-leafed lupine (the average sown area: 3.6 ha), 22 farms grew fodder peas (the average sown area: 5.4 ha), 12 farms grew edible peas (the average sown area: 14 ha) and only 1 farm grew tick beans yellow lupine or fodder peas (Fig. 1).

The farmers indicated the main reasons why they grew pulses, i.e. improvement of the soil structure, especially soil fertility and productivity (Fig. 2). Another important reason was the influence of pulses on the increase in the yield of follow-up crops, because pulses leave a good position to grow many other crops. Forty respondents used pulses as feeds for animals on their

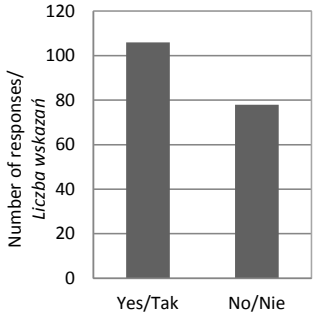

Figure 1. Do you have pulses to be used as commodities and/ or feed in your crop structure? (n = 184)
Rysunek 1. Czy w strukturze zasiewów znajdują się rośliny strączkowe przeznaczone na cele towarowe i/lub paszowe? (n = 184)
Source: own study based on the questionnaire survey
Źródło: opracowanie własne na podstawie badań ankietowych

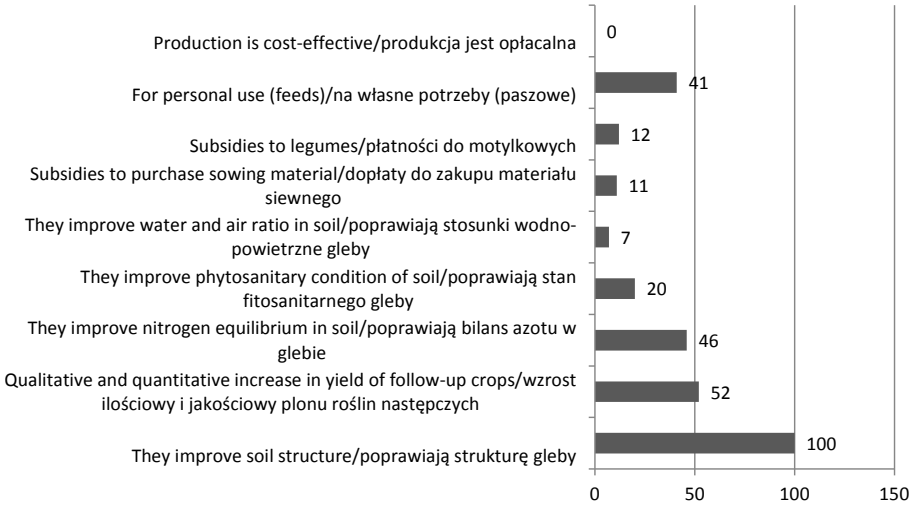

Figure 2. The reasons why pulses were included in the crop structure on the farms under study (n = 184)
Rysunek 2. Powody wprowadzenia do struktury zasiewów roślin strączkowych w badanych gospodarstwach rolnych (n = 184)
Source: own study based on the questionnaire survey
Źródło: opracowanie własne na podstawie badań ankietowych

farms. None of the respondents said that the production of pulses was cost-effective. Twenty respondents also noted an important phytosanitary role of this group of plants, as they can be used as green manure. Pulses are also capable of fixing free atmospheric nitrogen, which enriches the soil with this component. Twelve respondents indicated that they produced such crops because of the subsidies they could receive. At present farmers in Poland may receive special territorial subsidies, which depend on the area of pulses and small-seed legumes grown. The subsidies were increased and as a result, farmers became more interested in growing those plants. This fact was also proved in earlier studies, where the correlation coefficient between the increase in the plantation area and the amount of subsidies was 0.9 [Florek 2013]. This means that about 90% of farmers growing native pulses were motivated by the subsidies. This points to the fact that economic factors are the main barriers to the development of production of pulses. The most important limitation is the low demand from recipients (feed plants), because they chiefly use imported soy meal as a basic raw material for the production of feeds.

Economic and agritechnical factors were the most typical reasons why the farmers did not include pulses into their crop structure (Fig. 3). As far as the agritechnical factors are concerned, the farmers usually listed high sensitivity to unfavourable weather conditions, yield instability, which resulted in low and changeable cost-effectiveness, and low competitiveness with other crops. As far as the economic conditions are concerned, the most responses concerned the low cost-effectiveness of pulses and the absence of the market to sell the products. This situation indicates that feed plants have low demand for these raw materials.

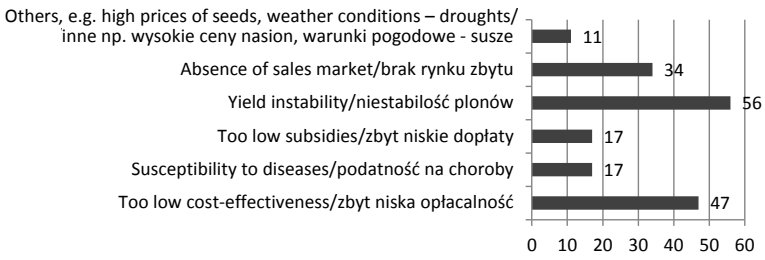

Figure 3. The reasons why pulses were not included into the crop structure on the farms
Rysunek 3. Powody braku roślin strączkowych w zasiewach w badanych gospodarstwach
Source: own study based on the questionnaire survey
Źródło: opracowanie własne na podstawie badań ankietowych

Among the factors which might be decisive for the farmers to include pulses into their crop structure the most respondents (69) listed higher production subsidies (Fig. 4). 44 farmers thought that subsidies to purchase the sowing material were also significant and 38 farmers would expect the state to facilitate the sales of pulses. The following factors were also important: increasing the cost-effectiveness of production by reducing the costs of production (30 responses), greater usefulness of pulses as feeds (41 responses) and genetic improvement of the available cultivars of those plants.

Figure 5 shows the respondents' answers to the question about increasing the area of pulse plantation if the cost-effectiveness of production improved. 76 respondents (41%) said that if the production of pulses guaranteed similar cost-effectiveness to the production of wheat or rye, the area of plantation of those crops on their farms would increase at most to 20%. 67 farmers (36%) indicated that they could increase the plantation area by 21-40%, but 32 respondents (14%) said they would not increase their plantation area. The farms would be ready to increase the production, but these possibilities are limited due to the current market conditions. In view of the fact that there

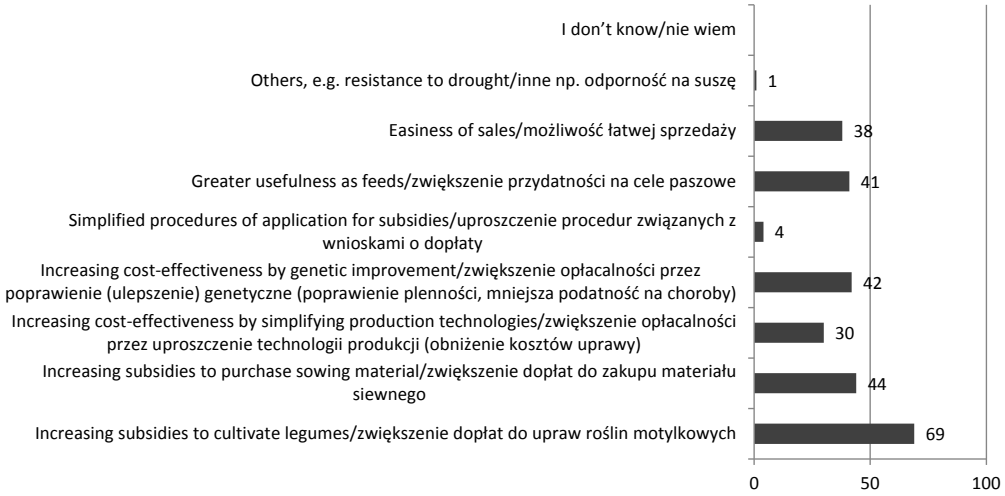

Figure 4. Which factors would you find decisive to start the production of pulses or increase their plantation area?
Rysunek 4. Jakie czynniki mogłyby zdecydować o wprowadzeniu lub zwiększeniu areału uprawy roślin strączkowych?
Source: own study based on the questionnaire survey
Źródło: opracowanie własne na podstawie badań ankietowych

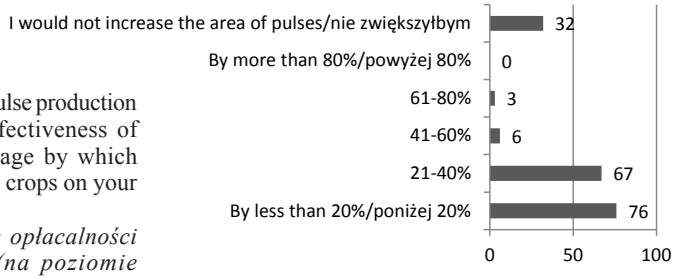

Figure 5. If the cost-effectiveness of pulse production improved (similarly to the cost-effectiveness of wheat or rye), what is the percentage by which you would increase the area of those crops on your farm? (n = 184)
Rysunek 5. W przypadku poprawy opłacalności produkcji roślin strączkowych (na poziomie opłacalności pszenicy lub żyta) o ile % zwiększyłby się areał uprawy tych roślin w gospodarstwie? (n = 184)
Source: own study based on the questionnaire survey
Źródło: opracowanie własne na podstawie badań ankietowych

is considerable predominance of cereals in the crop structure on farms, pulses could become an important element of crop rotation. According to the data of the Central Statistical Office (2014) in 2013 the share of cereals amounted to 72.6% of the total area of crops.

At present apart from cereals industrial crops, especially rapeseeds and sugar beets, are predominant in the crop production structure on the farms under analysis. In order to make a stable increase in the production of pulses for feeds in Poland it is necessary to guarantee suitable conditions for the development of this production. Appropriate economic conditions are particularly significant. It is very important to take demand-oriented actions, i.e. to promote native sources of vegetable protein among feed producers. Increasing subsidies to pulse production will increase farmers' interest in such crops. However, the absence of a stable sales market will still be a problem.

Summary

As results from the study, there was a minimal share of pulses in the crop structure on the farms under study. 51 farms grew yellow lupine, 23 farms grew narrow-leafed lupine, 22 farms grew fodder peas, 12 farms grew edible peas and only 1 farm grew tick beans (the average sown area of pulses on the farms under analysis was 5.7 ha). The respondents indicated that the main reasons why they introduced pulses into their crop structure were improvement of the soil structure and the influence of pulses on the qualitative and quantitative increase in the yield of follow-up crops. As far as the reasons for not growing pulses are concerned, the respondents said that those plants were characterised by low cost-effectiveness of production and yield instability. Another important reason was the absence of a sales market. The respondents expressed their opinion that subsidies to the production of legumes might be the main factors why the farmers would make a decision to start the production of those crops or increase the plantation area.

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Streszczenie

Celem opracowania było określenie czynników wpływających na rozwój produkcji roślin strączkowych przeznaczanych na cele towarowe lub paszowe w gospodarstwach rolnych w województwie wielkopolskim. Badania przeprowadzono w 2012 roku w 184 gospodarstwach, wykorzystując metodę wywiadu osobistego przy użyciu opracowanego kwestionariusza ankiety. Udział roślin strączkowych w strukturze zasiewów analizowanych gospodarstw był niewielki, średnia powierzchnia zasiewów wynosiła 5,7 ha. Wśród powodów niepodejmowania tego rodzaju produkcji ankietowani wymienili niską opłacalność produkcji oraz niestabilność plonów. Ważnym powodem był także brak rynku zbytu.

Correspondence address
dr inż. Magdalena Śmiglak-Krajewska
Poznań University of Life Sciences
Finance and Accounting Department
Wojska Polskiego St. 28
60-637 Poznań
phone: (61) 846 61 01
e-mail: smiglak-krajewska@up.poznan.pl