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DEVELOPMENT PATHS OF SPECIALISED DAIRY FARMS IN POLAND

ŚCIEŻKI ROZWOJU POLSKICH GOSPODARSTW WYSPECJALIZOWANYCH W PRODUKCJI MLEKA

Key words: milk production, farm strategies, specialization, diversification
Słowa kluczowe: produkcja mleka, strategie rozwoju, specjalizacja, dywersyfikacja

Abstract. Since accession to the EU, Polish dairy production has experienced dynamic changes in all spheres of its performance. In this dynamic environment, farmers had to adjust their development strategies in order to survive on the competitive market. This paper describes farmers' attitudes towards the future in a context of strategy formulation. Results of the present study suggest that most dairy farmers in Mazovian region continue development towards increased specialisation and production scale. The study indicates that labour and human capital features could hardly explain farmers' strategy choices. However, what seems to play a role is farm and production characteristics. It was more the milk production scale and herd size rather than utilised land that decided the further path of development. Choice of strategy should be strongly facilitated also by investments undertaken on the farm. The investments have been financed mostly from external capital – bank loans and EU investment funds. Thus, access to credit seems to be another important determinant of farm development. It was however remarkable that farmers perceived the availability of these resources as quite easy, especially in case of EU funds. As the most significant barriers to further development, farmers indicated low availability of land and insufficient qualified labour.

Introduction

Since accession to the EU, Polish agricultural production has been introduced to the dynamics and effects of the Common Agricultural Policy (CAP), which shifted from supporting production to more decoupled forms of support [Gorton et al. 2008]. Apart from these policy shifts, farmers also faced changing consumer habits, preferences and demands, and more stringent requirements concerning the environment, animal welfare and product safety. Being competitive and surviving in such a changing environment became the huge challenge for farmers. In the literature, there are few studies or detailed analyses on evaluation of the factors determining the development of dairy farms in Eastern Europe. Especially, studies of attitudes and strategies adopted by farmers, and knowledge of the mechanisms of development of farms, are still unsatisfactory. The pilot study in Slovenia did indicate the demand for support on strategy development amongst Slovenian dairy farmers [Klopčič et al. 2008, Kuipers 2010]. Another study identified different farm strategies which dairy farmers in Slovenia might pursue. The factors which are considered important for entrepreneurial behaviour are associated with larger farms [Bergevoet et al. 2010]. Over one-third of the respondents in Slovenia expressed an intention to keep their farm as it is, and roughly the one half aimed to develop the farm further through specialization and diversification [Klopčič et al. 2009]. Farms which are highly specialized are less likely to diversify [Pascucci, Dries 2010]. In Poland, studies on farm strategies were carried out by Parzonko [2011] and Sulewski [2007].

The development of entrepreneurial skills, innovation and the strategic approach of farmers is the key to improving the effectiveness of management in order to adapt to the rapidly changing market. Long-term strategic plans for dairy farming are complex and need to be a 'living' document', updated on a regular basis to ensure they are current and pertinent [Bell 2009]. In many cases the long-term strategy is related to the person, not the business.

This paper describes farmers' attitudes towards the future in a context of strategy formulation. The paper discusses the results of the survey conducted within the CEE Project[1] in the Mazovia Region. This deals with the identification of past and future strategies adopted and developed by dairy farmers and the factors determining the attitudes and strategies of dairy farmers after accession to the EU. Different farm development paths are shown.

Material and methods

The study was conducted in Mazovian voivodship on the sample of 334 family farms. The surveyed sample represents about 1% of the general population of the dairy farms in the region. The survey objects were selected by stratified random sampling procedure, according to the distribution structure of the milk quota per farm. As of April 1, 2010 (based on the data from Agricultural Market Agency) the structure of farms supplying milk to the market in Mazovian voivodship was as follows: 37.606 wholesale suppliers accounted for 97.6% of all suppliers and supplied 1.906.856.785 kg of milk, while 910 direct suppliers, accounting for 2.4% of all suppliers, supplied 7.492.269 kg of milk. The studied population approximately reflects the territorial and size structure of dairy farmers in the Mazovian region.

The sample consisted of specialised dairy family farms, where a minimum of 50% of gross agricultural income was planned to come from dairy, and their production was being marketed. The data were collected with the use of the direct interview questionnaire by agricultural advisors of the Mazovian Agricultural Advisory Centre.

In order to carry out the analysis of the development paths chosen by the farmers, the procedure of cluster analysis was used [Verhees 2012]. Farmers were asked to indicate three of 10

Table 1. Farmers' segments identified, based on most important strategies mentioned by the farmers[*]
Tabela 1. Segmenty określone na podstawie najważniejszych strategii deklarowanych przez rolników

Strategy components/ *Komponenty strategii*	Farmers' segments/*Rolnicze segmenty*						
	independent diversifiers/ *różnicujący działalność*	specializing growers/ *wyspecjali- zowani*	new starters/ *nowo zaczy- nający*	cooperate among farmers/ *współpraca pomiędzy rolnikami*	down- scalers/ *zmniej- szający skalę*	cooperate in the chain/ *współpraca w łańcuchu*	cooperating diversifiers/ *współpracu- jący różni- cujący*
Downscaling/ *Zmniejszanie skali*	-0.18	<u>-0.53</u>	0.09	-0.15	<u>2.11</u>	-0.14	-0.17
Start a new location/ *Zacząć w nowej lokalizacji*	-0.25	-0.25	<u>3.65</u>	-0.23	-0.23	-0.25	-0.06
Diversify/ *Różnicować*	<u>1.05</u>	<u>-0.66</u>	0.18	-0.31	0.42	-0.14	<u>2.55</u>
Cooperate/ *Współpracować*	-0.66	-0.32	0.00	<u>1.88</u>	-0.56	-0.14	0.84
Chain integration/ *Integracja w ramach łańcucha*	-0.65	-0.31	0.17	-0.11	-0.60	<u>2.01</u>	0.59
n (%)	113 (11%)	413 (40%)	62 (6%)	134 (13%)	134 (13%)	125 (12%)	58 (6%)

[*] The cluster analysis was performed on the whole database of Poland, Slovenia and Lithuania by Frans Verhees [2012], underlined numbers are significantly different/*Analiza skupień przeprowadzono na całej bazy danych dla Polski, Słowenii i na Litwy przez Fransa Verhees [2012], podkreślone liczby są istotnie różne*
Source: own study
Źródło: opracowanie własne

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development paths they would consider for their farm in the next five years, where 1st means the most and 3rd the least important. Then a Principal Component Analysis (PCA) was conducted to see whether these answers could be summarized, prior to the cluster analyses. Five components explain 66% of the variance in the answers (tab. 1). The sixth component has an Eigen value below one, indicating that 5 components might be an appropriate solution. The first component is named "Downscaling" because it is positively correlated with downscaling as an important strategy and negatively correlated with expanding dairy production. Interestingly a "Wait & see" strategy was also positively correlated with this component. Thus waiting resembles downscaling. The second component is named "*Start anew*" because it is positively correlated with starting a new farm and relocating as important strategies. The third component is named "Diversify" because it is positively correlated with diversifying into agricultural or non-agricultural activities as important strategies, and negatively correlated with specialization in dairy farming. The fourth component is named *Cooperate* because it is positively correlated with cooperating with other dairy farmers. The fifth component is named *Chain integration* because it is positively correlated with chain integration [Verhees 2012].

Factor scores of the PCA were used in a clustering procedure. First a hierarchical cluster analysis was performed to determine the number of clusters. A sharp increase in the agglomeration coefficient indicates that groups are merged together that are really different in factor scores and thus that they should not be merged. This procedure indicated that 7 clusters might be an appropriate solution. Then a non-hierarchical clustering procedure used the starting values (i.e. averages per cluster) of the hierarchical cluster analysis to determine the final clusters. The results for the surveyed farmers in the Mazovian voivodship in Poland are presented in table 2.

Table 2. Different sizes of the farmers' segments in Poland indicating seven development paths (strategies)
Tabela 2. Wyniki grupowania w Polsce – ścieżki rozwoju gospodarstw

	Independent diversifiers/ *Różnicujący działalność*	Specializing growers/ *Wyspecjali-zowani*	New starters/ *Nowo zaczynający*	Cooperate among farmers/*Współpraca pomiędzy rolnikami*	Downscalers/ *Zmniejszający skalę*	Cooperate in the chain/ *Współpraca w łańcuchu*	Cooperating diversifiers/ *Współpracujący różnicujący*
%	3.9	46.3	5.1	14.9	10.1	18.5	1.2
n	13	154	17	50	34	62	4

Source/*Źródło: Verhees 2012*

A majority of the farmers indicated further development towards specialisation and increase of production scale (growth). These two strategies were selected in $1^{st,}$ 2nd or 3rd place by 85.7% (specialisation) and 80% (growth) of all respondents. The segment "S*pecialising growers*" contained 46% of the sample. The other dominating strategy was *Cooperation*, both vertical (in the chain) and horizontal (with other farmers). Cooperation between farmers and cooperation in the chain were, respectively, selected in $1^{st,}$ 2nd or 3rd place by 43.7% and 34 % of the farmers. Farmers classified into this cluster *Cooperation* represented 33% of the sample but they represent two different clusters. The least important group of farms choose the strategy of downscaling/wait &see or diversifying into other agricultural or non-agricultural activities. These development paths were considered by 15% of the farms.

The statistical analysis on the preliminary results was performed using non-parametric tests: the Analysis of Variance (ANOVA) Kruskal-Wallis Test and Median Test, to see whether the chosen features were really significantly different for each of the strategy clusters. Additionally, the differences were calculated for two groups of strategies, in case of which, the draft results seemed to be different. The first group combined *Specialising-growers*, *Cooperating among farmers*, *Cooperating within Chain* (n = 282) and the second group included *Downscaling* and *Diversifying* (n = 51). It was checked if the differences really were significant between these two groups. The parametric (in case of normally distributed variables) and non-parametric tests were used.

Results

This section presents the results from the general analysis of the main farm characteristics which differentiate the farms, by seven different choices of development paths.

Human capital

There are no large (and statistically significant) differences between the identified strategy types in terms of human capital variables like age and level of education of the household manager. The average age of the farm owner varied from 38.5 years in case of *Diversifiers* to 43.5 years in case of *Downscalers.* Most of the farmers had secondary education in all the selected groups. However, households that planned to decrease (*Downscalers*) or diversify production, had somewhat smaller families working on the farm than in the other strategies. This put them at a relative disadvantage as far as the farm labour endowments were concerned.

Farm features and production characteristics

There were differences between types of milk producers in terms of several production characteristics. Average farm size of *Specialising-growers* and *Cooperating* farms is higher than in case of *downscaling* and *diversifying* farms. The difference between the first (Specialising-growers and
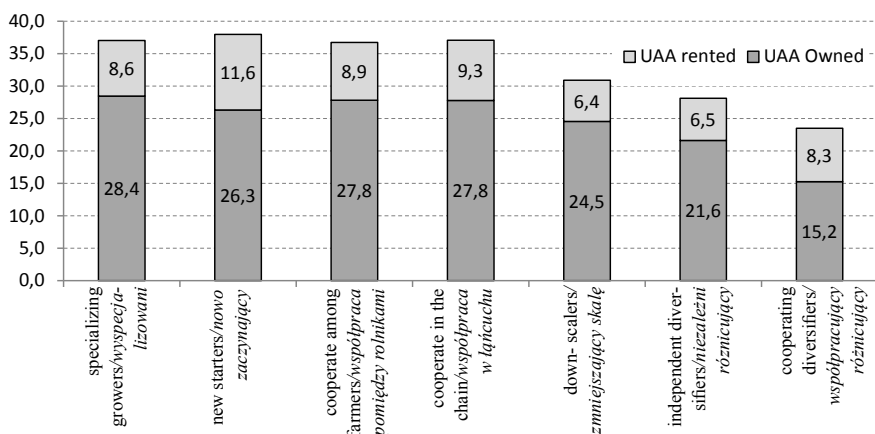

Figure 1. Average number of ha UAA owned and rented by strategy in 2010 (n = 334)
Rysunek 1. Średnia wielkość gruntów rolnych własnych i dzierżawionych w 2010 r. (n = 334)
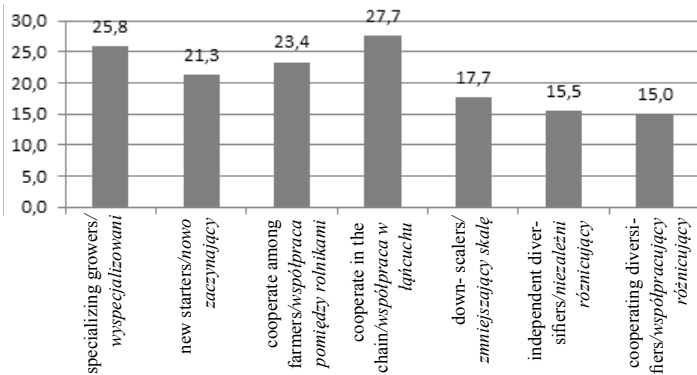Source: own study
Źródło: opracowanie własne

Figure 2. Average number of dairy cows by strategy in 2010 (n = 330)
Rysunek 2. Średnia liczba krów mlecznych według Strategii w 2010 r. (n =330)
Source: own study
Źródło: opracowanie własne

Cooperating, n = 282) and the second group (Downscaling and Diversifying n = 51) was however not statistically significant. The average area of leased land was slightly larger for the first group (fig. 1).

Specialising-growers and cooperating farmers had, on average, about 50% more dairy cows (fig. 2) than those representing the downscaling and diversification strategy (25.5 vs. 16.9 head). The differences between the two groups, as well as between the 7 strategies, were statistically significant (p < 0,001). However, there was no difference observed in the case of average milk yield per cow, which in the first group was 5.200 kg and the second was 4.990 kg. Since there was no difference in milk yield, but there was in number of dairy cows, it follows that milk production had a similar distribution to the dairy herd. In the case of the first group, the average milk quota owned was 50% larger than in case of the second group. This difference was significant.

Focus on development

Over 70% of farmers invested in milk production during last 10 years. The most common investments were in new feeding and milking technology, which increased milk yield, an increase in the dairy herd, increase of land area and more sustainable production measures (tab. 3). All interviewed farmers had in 2011 a cooling tank and a manure storage facility. This basic equipment did not differentiate the sample.

It was observed that the first group of farmers (*Specialising growers and Cooperating*) were investing in milk related assets more often and earlier than the other group (*Downscallers and*

Table 3. Changes before and after accession to the EU (percentage of farmers mentioning this change; n = 334)
Table 3. Zmiany w gospodarstwach przed i po akcesji do UE (% rolników wymieniających taką zmianę)

Specification/*Wyszczególnienie*	Percentage of farmers mentioning change/ *% rolników wymieniających zmianę*				
	5 years before accession/ *5 lat przed akcesją* – 1999-2004	after accession EU/ *po akcesji do UE* – 2004-2010	within coming 5 years/*w najbliższych 5 latach* – 2011+	no/ *nie*	don't know/ *nie wiem*
Increase milk production per cow/ *Zwiększenie produkcji mleka na krowę*	23.88	50.75	50.45	3.88	6.87
Increase number of dairy cows/ *Zwiększenie liczby krów mlecznych*	16.42	27.46	49.25	15.22	14.93
Improve sustainable production traits of cows/ *Poprawa cech produkcyjnych krów*	17.91	43.28	59.70	2.39	6.87
Take commercial loan for investment/ *Kredyt na inwestycje*	17.02	20.30	30.75	23.88	27.16
Invest in modern technology (feeding technology, milking equipment)/*Inwestowanie w nowoczesne technologie (karmienie technologii, sprzętu dojenie)*	16.72	29.55	40.00	15.82	18.51
Buy additional land/*Zakup dodatkowych gruntów*	13.73	14.33	40.00	23.28	26.27
Rent additional land/*Dzierżawa dodatkowych gruntów*	9.25	14.03	37.31	24.18	27.46
Invest in larger barn/*Inwestycja w większa stodole*	7.46	9.55	23.58	36.12	29.25
Invest in manure storage/*Inwestycja w składowanie obornika*	6.87	25.67	13.43	37.31	18.81
Start with other agricultural activities/ *Rozpoczęcie innych rodzajów działalności rolniczej*	0.60	1.79	4.18	69.55	24.18

Source: own study
Źródło: opracowanie własne

D*iversifiers*) of producers. In the first group also, 50% of dairy farmers increased the number of cows, whereas in the second group only 30% did so. The second group more often declared diversification of agricultural income in last 10 years or plan this in the near future.

With regard to investment plans it was found that about 55% of farmers from the first group and only 13% of second group, planned to increase the number of dairy cows and milk production during the subsequent five years. It is interesting that, on average, 42% of farms from the total sample (except the *Downscaling* group of 17%) planned to increase the size of their farms. It is worth mentioning that almost no farms were planning to start processing and direct selling of dairy products from the farm and none were planning organic production. The reasons might be the low profitability of such activities compared to conventional production, the strict legal requirements, no tradition of producing farm dairy products and also marginal demand (dairy factories often do not have separate lines for organic milk).

Availability of resources

About 72% of farmers in the group S*pecialising growers and Cooperating farmers* versus 50% of those in the group D*ownscalers and Diversifiers* were financing investments by bank credit. The difference was significant at $p < 0,01$. Another important source of investment capital for dairy farmers was EU investment subsidies from the Rural Development Plan. About 59% of farmers in the first group and 45% of second declared that they used this source for investment. It is however interesting that the most active in obtaining external sources of investments (regardless the source) were farmers developing towards *Cooperation in chain* and D*iversifying. Cooperating-in-chain* farmers were usually characterised by larger UAA and higher production which could facilitate credit availability for this group. The *Diversifying* group more often made use of investment subsidies than credit, which can be explained by their smaller scale (and therefore probable poorer availability of credit), but their activity in investments seems to be remarkable, compared to the other farms. It is also worth mentioning that after EU accession CAP direct payments became an additional source of capital for these farmers. Almost all producers perceived this source as easily accessible.

Regarding availability of resources, farmers indicated that the most difficult and problematic resources to obtain are land (both to purchase or lease) and qualified labour. The land availability is perceived as the most limited resource, especially in typical agricultural regions. There are many reasons of this, firstly the direct-payment system assigned to the land keeps land prices high, secondly some personal relations like traditional connections to the land and reluctance of farmers to sell it to the neighbours, and thirdly land speculation.

The other resource with low accessibility is qualified labour. The reasons of this are also complex. First of all, traditionally, Polish farms are based on family labour, which is more trustful, safe and cheaper than external workers, and secondly, there is a real lack of qualified labour in the rural areas. Farmers, who abandon farming usually move to the off-farm sector or migrate to the cities. Besides, work in agriculture is usually less well paid and more difficult, especially in the physical context.

Conclusions

The presented study on farm srategies indicate that most dairy farmers continue development towards increased specialisation and production scale. Results of the present study suggest that labour and human capital features could hardly explain farmers' strategy choices. However, what seems to play a role is farm and production characteristics. It was more the milk production scale and herd size rather than utilised land (owned and leased-in) that decided the further path of development. Farms with an already large milk production enterprise were more likely to further specialise and increase production scale. It is interesting that those who had achieved a higher level of production were looking for more opportunities for their farm, in cooperation with other farmers or (less often) within the chain.

The results allows one to assume also that choice of strategy should be strongly facilitated by investments undertaken on the farm. It was observed that dairy specialising and cooperating farmers were investing in milk related assets more often and earlier than the group of farmers who indicated a diversification strategy or downscaling/wait& see attitude.

Investments have been financed mostly from external capital – bank loans and EU investment funds. Thus, access to credit seems to be another important determinant of farm development. It was however remarkable that farmers perceived the availability of these resources as quite easy, especially in case of EU funds. As the most significant barriers to further development, farmers indicated low availability of land (both for purchase or lease) and insufficient qualified labour.

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Streszczenie

Od momentu przystąpienia Polski do UE polski rynek mleka doświadczył dynamicznych zmian we wszystkich sferach działalności. Aby przetrwać na konkurencyjnym rynku w dynamicznie zmieniającym się otoczeniu, rolnicy musieli dostosować strategie rozwoju swoich gospodarstw. Przedstawiono postawy producentów mleka wobec przyszłości w kontekście formułowania strategii. Wyniki badania wskazują, że większość producentów mleka na Mazowszu będzie kontynuować rozwój w kierunku zwiększenia specjalizacji i skali produkcji. Badania wykazały, że to nie cechy kapitału ludzkiego (wiek, doświadcznie) różnicują rolników pod względem wyboru ścieżki rozwoju, a gospodarstwo i jego charakterystyka (wielkość stada, produkcji, powierzchnia). Wybór strategii związany był także z inwestycjami realizowanymi i planowanymi przez rolników. Inwestycje te były finansowane głównie z kapitału zewnętrznego, tj. kredytów bankowych i funduszy inwestycyjnych UE. Tak więc dostęp do kredytu może być kolejnym ważnym wyznacznikiem rozwoju gospodarstwa. Do największych barier dla dalszego rozwoju gospodarstw rolnicy zaliczyli niską dostępność gruntów (zarówno dzierżawy jak i zakupu) oraz brak wykwalifikowanych pracowników.

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