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Dairy farm cost efficiency in leading milk-producing regions in Poland

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ABSTRACT

This paper examines the cost efficiency of dairy farms in 2 important regions of commercial milk production in Poland (i.e., Wielkopolskie and Podlaskie). Both regions gained importance following the market-driven resource allocation mechanism adopted after Poland's transition to the market economy in 1989 and accession to the European Union (EU) in 2004. The elimination of the dairy quota system in the EU in 2015 offers new expansion opportunities. The analysis of trends in cow numbers, milk production, and yield per cow shows different patterns of expansion of the dairy sector in the 2 regions. We selected dairy farm data from the Farm Accounts Data Network database for both regions and applied the cost frontier estimation model to calculate the relative cost-efficiency index for the period 2004 to 2009. The indexes compare each farm in the sample to the most efficient dairy farm in each region separately. Additionally, the top 5% of dairy farms with the highest relative cost efficiency index from each region were compared in terms of production costs with published results from a study using the representative farm approach. The comparison of results from 2 different studies permits a conclusion that Wielkopolskie and Podlaskie dairy farms are able to compete with farms from the 4 largest milk-producing countries in the EU. Although both regions can improve yields per cow, especially Podlaskie, both regions are likely to take advantage of the expansion opportunities offered by the 2015 termination of the milk quota system.
Key words: cost frontier estimation, milk yield trend, cow herd trend, milk production trend, cost efficiency index

INTRODUCTION

This paper examines the cost efficiency of dairy farms in 2 regions (known as voivodeships) essential to commercial milk production in Poland (i.e., Wielkopolskie and Podlaskie; Figure 1). Both regions compete in cost efficiency because they do not enjoy large concentrations of consumers like Mazowieckie voivodeship, with the largest urban population in Poland, the capital Warsaw. Both Wielkopolskie and Podlaskie regions gained importance in response to the adoption of the market-driven resource allocation mechanism after Poland's transition to the market economy in 1989. Later, each achieved substantial gains in dairy sector performance after the country's accession to the European Union (**EU**) on May 1, 2004. For example, milk production in Wielkopolskie voivodeship increased by 24% and in Podlaskie voivodeship by 40.4% between 2004 and 2012 (Roman, 2014). The shares of the country's milk production in Wielkopolskie and Podlaskie voivodeships increased from 11.4 and 14.1% in 2004 to 14.2 and 19.1% in 2013, respectively (GUS, 2015).

Dairy sector developments in both regions illustrate the tendency toward increasing regional concentration of production driven by the natural resource base that was distorted before 1989 by the centrally planned economic system based on artificial pricing. The geography in the 2 regions includes wide river valleys suitable for pasture and hay production, although the climate is milder in Wielkopolskie than Podlaskie voivodeship. In some areas of both regions, land quality is relatively low and field crop farming generates lower returns.

This paper briefly describes major changes in the dairy sector since the transition to the market economy in Poland and stresses the importance of cost-efficiency analysis at the regional level rather than the aggregate level of macro-regions formed under the Farm Accounts Data Network (**FADN**) accounting system. Although a similar quantitative cost efficiency analysis of dairy farms was almost impossible before Poland joined the FADN data system, the rapid restructuring and spatial concentration of milk production confounds the true trends underlying the observed changes in Poland's dairy sector at the macro region level. Despite its limitations, the cost frontier estimation applied in the current study and estimated using disaggregated FADN data provides previously unavailable insights about the

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Figure 1. Location of Wielkopolskie and Podlaskie voivodeships in Poland. Color version available online.

current regional situation of dairy farms by allowing for comparison of relative cost efficiency in 2 leading dairy-producing regions. Specifically, descriptive statistical analysis demonstrates the growth of the dairy sector in 2 regions, Wielkopolskie and Podlaskie voivodeships, whereas the estimated and graphically shown trends in the number of cows, yield per cow, and milk production in each region reveal that although each region expands dairy production, the pattern of expansion varies. The calculation of the cost efficiency index allows, in relative terms, assessment of each farm in the sample against the most efficient farm within the region. The individual cost efficiency indexes identify the top performing farms in each region and allow their characterization by selected relevant farm indicators. Additionally, the latter are compared with results of published studies using the representative farm approach. The outcome provides insights into the potential competitiveness of dairy farms in 2 selected regions of Poland in anticipation of the termination of the milk quota system in the European Union. The use of results of the 2 methods (i.e., cost frontier function and the representative farm approach) provides a richer picture of the current situation and facilitates forecasting undertaken by users of these results.

The quota system has been limiting EU milk production. Between 2004 and 2013, EU milk production barely changed from 148.7 to 152.4 Mt. During the same period, milk production in the United States increased from 77.5 to 91.3 Mt (17.7%), and the production in New Zealand rose from 15 to 18.9 Mt (25.6%). Poland produced 11.8 Mt in 2004 and 12.7 Mt (7.6%) in 2013, using almost all its quota every year and the 1% annual quota increase permitted by the EU. Poland is the fourth largest milk producer in the EU following Germany, France, and the United Kingdom, and ahead of the Netherlands and Italy between 2004 and 2013.

The impending termination of the dairy quota system within the EU in April 2015 will remove any limits on milk production, allowing farmers in either region to expand production and compete with higher-cost producers. Poland has been leading in utilization of