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STATE AND PERSPECTIVES IN COMPETITIVENESS OF ONE FARM TYPE IN SERBIA

RADE POPOVIC

Faculty of Economics Subotica,
Department of Agricultural Economics and Agribusiness,
Subotica, Serbia.
E-mail: popovicr@eccf.su.ac.yu

MARIJA KNEZEVIC

Faculty of Economics Subotica,
Department of Agricultural Economics and Agribusiness,
Subotica, Serbia.

MILOS TOSIN

Faculty of Economics Subotica,
Department of Agricultural Economics and Agribusiness,
Subotica, Serbia.



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Abstract

In the paper is analyzed competitiveness of Serbian family dairy farms in lowland region in 2007, with some aspects of possible perspectives. Globalization process, expected EU integrations and set of free trade agreements will expose Serbian farms in close future to higher level of competition. Identified structural changes, refers on dairy farms concentration and specialization in lowland region in recent years. Estimated model of cost function revealed that family farms with bigger herd size have lower average costs of milk production. Economic efficiency, measured in terms of cost efficiency, shows that larger dairy farms are more efficient. But, not all smaller farms are inefficient. Due to good management some smaller farms are competitive on national market. Milk price volatility in period 2007 to 2009 hurts all farms, but the most farms with higher average costs, which are usually inefficient dairy farms.

Key words: competitiveness, dairy enterprise, dairy farm, milk production, Serbia

Introduction

Cow milk production is one of the most important sectors in Serbian agriculture with 11% share¹ of the agriculture output in 2007. Milk production is traditionally based on family farms that produce over 91% of total milk. About 285.000 farms producing cow milk with small average herd size, just above 2 cows². Cow's population is decreasing with average rate 2.48%, but in last 10 years all decrease comes from central Serbia (highland region). Structural changes are obvious in last decade, especially in lowland region. Number of dairy farms in Province of Vojvodina is decreasing, while cow population is stable, inferring concentration and specialization in milk production (Popovic, 2009). Size and number of commercial family farms increasing, and typically size of those farms varies from 10 to 120 cows in herd. Main causes of this trend are positive effect of dairy policy and stimulating subsidies, as well as vertical coordination with processors.

Globalization process and expected EU integrations will expose Serbian farmers to higher lever of competition. There is also range of free trade agreements with Western Balkan countries, Russia, Ukraine and Turkey. All above mentioned trends refer importance of deeper research of dairy farms competitiveness in Serbia.

¹ Statistical office of the Republic of Serbia and author calculation

² Ministry of agriculture forestry and water management, Statistical office of the Republic of Serbia and author calculation.

Competitiveness is very complex concept. That complexity comes from many dimensions of competitiveness concept. As Zawalinska (2005) stated, citing many authors, there is at list five dimensions of competitiveness. They are: wide range of possible applications (from farm to state level), potential (ex-ante) or revealed (ex-post), originated from diverse theories, temporal approach (short-run, long-run) and relative term of application (internal and external competitiveness). Because of multidimensional approach, there is no single theory and no single measure of competitiveness.

Dohlman, Osborn and Lohmar (2003) define that nation's product competitiveness do not rooted in any single outward measure, but ultimately in the quantity and quality of the country's productive resources. These factors determine the relative efficiency of making different goods and, consequently a countries "comparative advantage" in international trade.

Farm competitiveness can be measured on farm level on one market or on farm sector across nations. In last case should be taken in account influence of subsidies, tax breaks, trade protection and other forms of intervention (Barichelo, 1996) which make competitive advantage (trade advantage) more political than economic concept.

Competitiveness measurement on farm level could be conducted on at least 4 stages:

- competitiveness for production factors with other farm's enterprises,
- with other dairy farms in same production region,
- with different dairy production systems and
- with dairy farms in different countries.

In earlier studies, because of lack of single measure of competitiveness, the most used indicators as determinants of competitiveness until now were: cost of production, profitability, efficiency, factor productivity and market share. Citing other authors Jeffrey and Grant (2001) conclude that producer efficiency and its relationship with production costs is a more appropriate measure of competitiveness than simply comparing average total costs of production.

Investigating an efficiency and competitiveness of the small dairy farms, Tauer (2001) compared small with bigger dairy farms. As conclusion he found out that even small dairy farms can be cost competitive with larger farms.

Empirical studies show importance of quality, representativeness and comparability of farm costs data. Jeffrey and Grant (2001) pointed out that farm level data impediments are unavoidable problem and can be experienced in all areas or times period, with higher probability for that in smaller areas and smaller farms. Beside that, usefulness of cost analysis in bench marking competitiveness of milk production is irrefutable.

Material and Methods

To represent cost function, between many functional forms a relatively simple quadratic has been selected as it is analytically tractable. A quadratic cost function can be estimated for average costs of milk production from original data. Total cost of milk production divided by output (number of cows multiplied with average yield) gives equation for average cost:

$$AC = ax^2 - bx + c$$

Equation for marginal cost is first derivative of total cost function and it is represented as:

$$MC = 3ax^2 - 2bx + c$$

As determinants of average estimated costs, in practice usually are used: number of cows, milk yield, used agriculture land, prices of concentrate and bulk feed, wage rates, etc. Here all those determinants are examined and cost function estimation is based on those variables who the best explain cost variation.

Economic efficiency is: “the ability to choose the technically efficient output/input combination that optimizes a decision-maker’s goals(s), given relative output and input prices” (Jeffrey S., 1992). Achieving higher level of efficiency is desirable goal for farms tending to become and stay profitable and sustainable. Economic efficiency is examined in terms of cost efficiency, with total cost control ratio. Each ratio is expressed in terms of cost per 1 Dinar (RSD) of dairy enterprise revenue. Farms with lower cost control ratio are more efficient.

Material for research is based on two sources. First are databases from earlier conducted researches for Serbian dairy farms in lowland production region in 2003 and 2007, which are source for farm competitiveness on national level. Second source is available data from International farm comparison network Dairy (IFCN), through project of cooperation Serbia with IFCN network. Database of this institution was built in 2000 and rapidly grow up to 2008. Now it represents 80 countries that produce 95% of world milk production. Because IFCN use slightly different methodology, data are not comparable with first source. Farm gate prices from this database are used in further analysis.

In this paper, measuring of competitiveness is focused on dairy farms in lowland production region in Serbia. As dairy farm, here is treated farm with at least 50% revenue originated from dairy enterprise. Farms were grouped by herd size in 6 groups: 5 to 9; 10 to 19; 20 to 29; 30 to 39; 40 to 49 and 50 and more cows. In each group at least 3 farms were sampled and in total sample size were 24 farms (Figure 1).

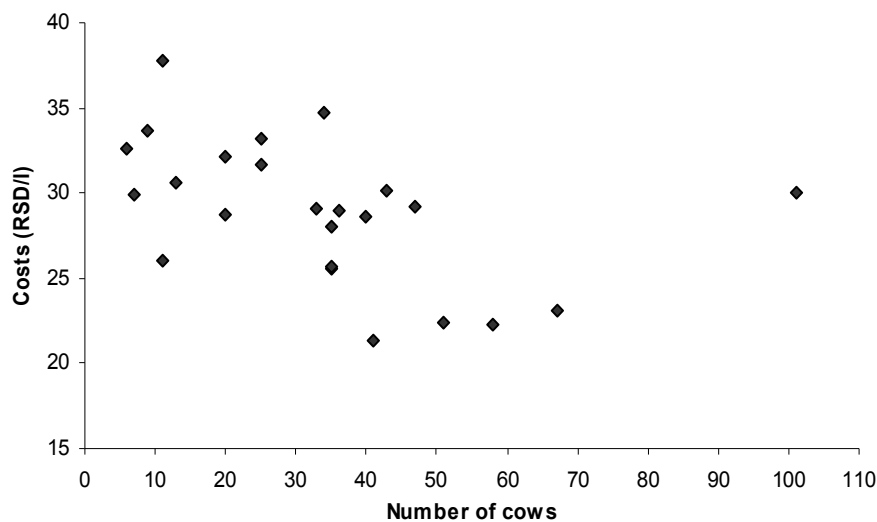


Figure 1 - Costs of milk production per liter for 24 sampled lowland farms in 2007.

In total revenues were included all cash and non cash revenues. Rearing herd replacement and calves were treated as separate enterprises and data about revenues and costs were collected only for cow's milk enterprise. Economics cost concept was applied and for each farm were calculated entrepreneur profit and net farm income.

Results and discussion

Using E-views software numerous of independent variables were examined in estimation of milk production cost function. Finally the model with four independent variables showed the best results and function of average cost in 2007 was estimated as:

$$AC = 35.72586651 - 0.2190378845 \cdot COWS + 0.001650302384 \cdot COWS^2 - 0.00297647414 \cdot MY + 0.6007004142 \cdot CONC + 0.06894880067 \cdot WR$$

$$R^2 = 81.88$$

$$F_0 = 16.26 > F_{(0.01;5;19)} = 4.17$$

Where:

- COWS = average cow numbers
- MY = average milk yields (liter/cow/year)
- CONC = concentrate costs (din/kg)
- WR = wage rates (din/working hour)

Statistical properties of the model are good. The R^2 value of 81.88 indicating that above 80% of inter-farm variance in costs is explained and that is emphasized by F-

statistics which indicate that model is significant at 99% level. Since the main control variable for the farmer is the number of cows, there was made an assumption that milk yield is fixed for all farms (weighted average yield in sample). That enables to represent cost function as simple quadratic function which is much easier for analytics. Average weighted milk yield in sample was 5,844 liter/cow/year.

Accordinging model, in 2007 only farmers with 30 and above cows in herd could earn entrepreneur profit. Results for 2003 production year shows that only farms with 10 and more cows could earn entrepreneur profit (Popovic R, 2006). It's indicates that bottom line of profitability in milk production is moving to the bigger herd size. If farmers are profit maximizing, as model assumes, they should expand herd size to cost minimization level of 69 cows and beyond this to profit maximizing level of 87 cows.

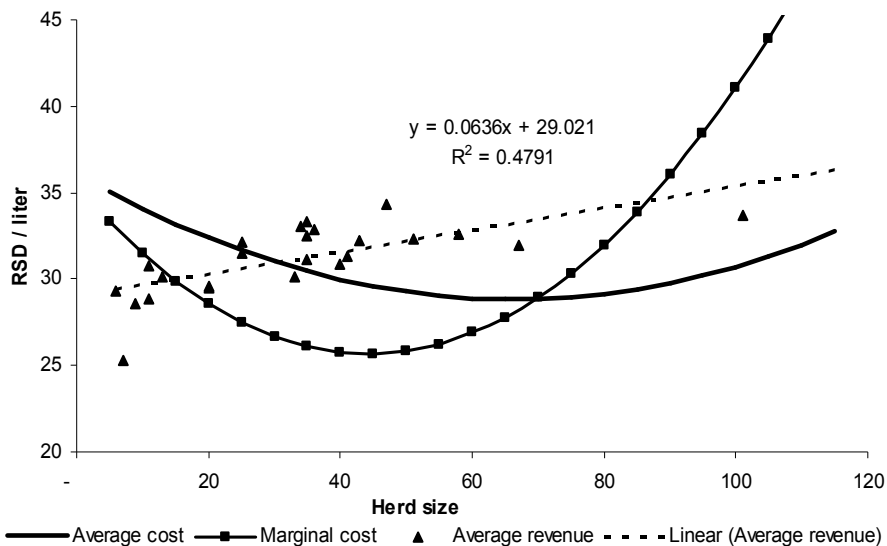


Figure 2 - Estimated cost function of milk production in lowland region in 2007.

From quartile analysis by entrepreneur profit can be inferred that entrepreneur profit was achieved by bigger farms. Top 25% of sampled farms (6 of 24) are not the biggest farms by land area and don't have significantly bigger herds. Source of their profitability could be found basically on revenue side and partially on cost side. Those farms earn highest revenue due to high average milk yield and the highest average milk prices.

Table 1 - Quartile analysis by entrepreneur profit in 2007.

	Highest Quartile	Up/Mid Quartile	Mid/Low Quartile	Lowest Quartile
Average land used (ha)	72	108	33	41
Own land (ha)	23	33	19	17
Average cows number	48	46	26	15
Average milk yield (l/cow)	6,645	5,282	5,776	5,660
Revenue (€/cow)	2,627	2,065	2,166	2,023
Revenue from milk sale (€/cow)	2,106	1,591	1,692	1,512
Milk price (€/100l)	32	31	30	27
Variable cost (€/cow)	1,241	1,226	1,434	1,317
Fixed cost (€/cow)	871	793	896	1,076
Occupier's income (€/cow)	860	427	326	360
Entrepreneur profit (€/cow)	514	46	-164	-369

In Figure 3, it is shown that farms with bigger herds have smaller ratios. That means they are more cost efficient. Bigger farms are more efficient, with lower average labor costs and higher labor productivity. It is a result of applied different technologies in milk production. Technologies in milking and feeding identified in research are ranging from low mechanized (only milking) at small sized herds to completely mechanize at herds in group 50 and more cows.

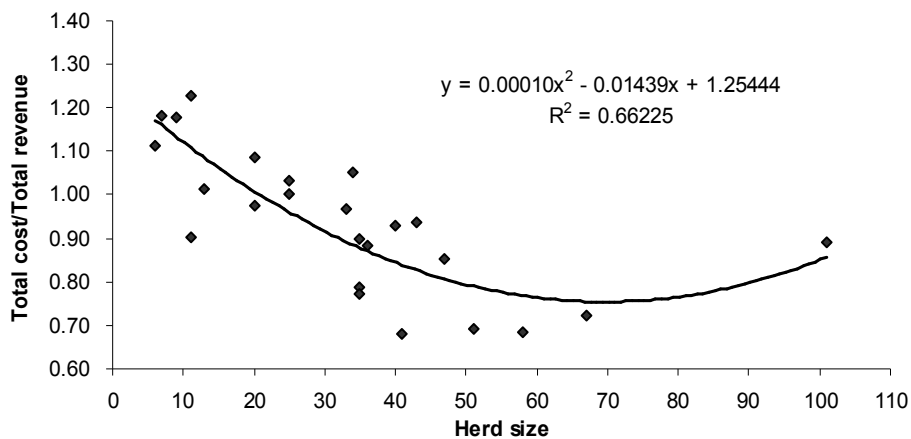


Figure 3 - Economic efficiency measured with total cost control.

But, it should be noticed that there are also few dairy farms, smaller than 50 cows in herd, with economically efficient production. It could be explained only with good management on those farms.

Using “Typical farm” methodology with applied economic cost concept on whole dairy enterprise IFCN – Dairy research center took in account two dairy farms from Serbia RS-10 and RS-84 with 10 and 84 cows in 2007. Comparison of production cost those two with farms in other 43 countries from all continents revealed that Serbian dairy farms in 2007 were cost competitive if compare with dairy farms in Western Europe countries³. But, not cost competitive with farms in Oceania, South America, and Asia and ex Soviet Union countries. Competitiveness of larger dairy farms, as well as dairy supply chain in Serbia was also indicated by Berkum S. (2009).

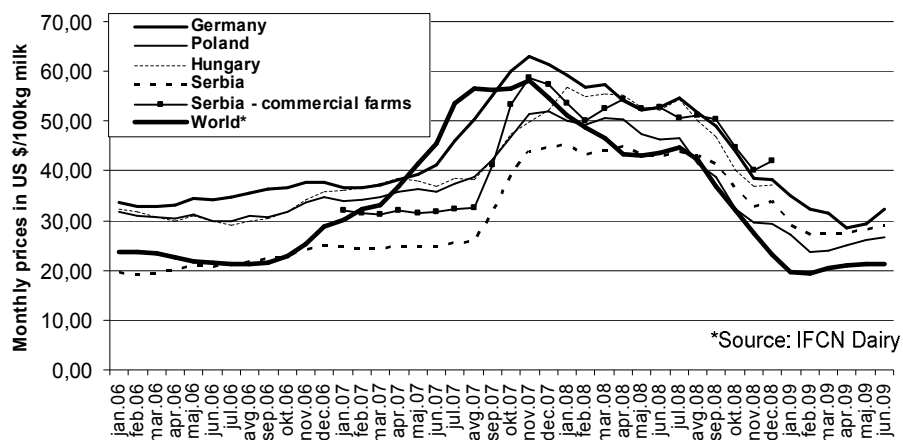


Figure 4 - Average monthly farm gate milk prices for: Germany, Poland, Hungary, Serbia and estimate for the World.

Simple milk price comparison doesn't give conclusion about competitiveness of milk production. From other side dynamics of milk prices on different markets can give some inference about market integration and farms position on market. No one national market is entirely isolated from world market trends in long term. The milk price transmission on Serbian market (Figure 4) in period 2006 to 2009 shows, it is asymmetric and time lagged.

In 2007 when world market experienced extremely milk price increase, wave of that increase came with 9 months delay on Serbian market. In same year milk price transmission on German and Poland market, was faster and less asymmetric. The reasons for this might be linked to two major facts. Firstly, the Serbian market is not well integrated in to the world market, what is emphasized with fact that either smaller farms or commercial farms didn't get higher prices until September 1. Because of the rapid increase of input prices in the period June-August farmers suffered a loss in dairy

³ Hemme et al. (2008), page 23.

enterprise during this three months period. Secondly, slow milk price transmission could be a sign that farmer's position on market wasn't favorable in relation with milk processors. Additional analysis of milk prices for commercial dairy farms shows that when eventually milk processors decide to increase the price for raw milk, they pay much higher prices to commercial farms. Those farms produce high quality of raw milk. Only over three months milk prices, achieved by commercial family farms, reached the level of world prices and since April 2008 were close to average prices those dairy farmers got in Germany.

Conclusions

Competitiveness of dairy farms in Serbia was examined using empirical evidence of farms in lowland production region. Dairy farms are the most important type of farms in Serbia with 11 % share of agriculture output just with milk production. Competitiveness was measured with cost of production, profitability and efficiency. Estimated cost function revealed that farms with 30 and less cows were unprofitable, and only farms with herd size above this level could make profit. Original data shows that not all farms under 30 cows were unprofitable, what infers importance of good management practice. Bigger farms are more efficient with low average labor costs and high labor productivity. It is result of applied completely mechanized technology in milk production. Average costs of production are decreasing and average revenue per liter is increasing with increasing herd size. Some farms with less than 50 cows in herd, due to good management are cost efficient, and competitive with larger farms. While Serbian dairy farms with larger herd size are cost competitive with EU farms, higher milk prices, as result of higher milk quality and bigger subsidies gives "competitive advantage" to EU dairy producers. Additional analysis of farm gate milk prices shows that transmission of milk prices in Serbia is time lagged and asymmetric.

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