

Improving the competitiveness of dairy products of Ukrainian producers in accordance with European quality requirements

Oksana Pashchenko ^{* 1 A}; Olena Zharikova ^{2 A}; Anna Zharikova ^{3 A}

***Corresponding author:** ¹Candidate of Economic Sciences, Associate Professor of the Department, e-mail: opashchenko26@gmail.com, ORCID: 0000-0002-0603-8072

²Candidate of Economic Sciences, Associate Professor of the Department, e-mail: ele0309@ukr.net, ORCID: 0000-0002-1259-1712

³Student Faculty of Law, e-mail: zharikova0309@gmail.com

^A National University of Life and Environmental Sciences of Ukraine, Kyiv, Ukraine

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Abstract

This article substantiates the trends of increasing the competitiveness of dairy products of Ukrainian producers in accordance with European quality standards. An analysis of compliance of raw milk producers with high standards of safety and quality, which are the norm for the world's leading producers, the quality of raw milk purchased by processing enterprises from agricultural enterprises and the price mechanism of milk processing enterprises. According to the results of research, the most important problems in Ukraine in the dairy market are the lack of supply of milk and mostly its low competitiveness and quality. A comprehensive assessment of dairy production by agro-industrial enterprises of Ukraine (by regions) and found that the presented regions have a high level of competitiveness – this is positive for the country in the representation of dairy products in both domestic and foreign markets. A model of indices of competitiveness of dairy production in agricultural enterprises of Ukraine has been developed. This model is presented graphically in the form of a polygon, the radars of which are 9 indicators (criteria) of competitiveness of milk production. It is investigated and established that the presented model will allow to define and control competitiveness of manufacture of dairy products in the territory of Ukraine, both as a whole and on separate areas.

Key words: competitiveness, dairy products, European quality, competitiveness indices, model.

Introduction

Ukraine used to be considered a European granary, a country where milk and honey flow in rivers. However, this idea needs correcting since though wheat and honey are available in sufficient quantity, we do not produce sufficient amount of milk. The amount of dairy products imported to Ukraine is increasing, and the cost of nationally produced milk has risen by several times. The survey of dairy products market reveals that the store shelves are filled with imported yogurts, sour cream, cream and even milk. Social economic and political processes that are taking place in Ukraine and in other countries all over the world result in adverse conditions for the development of the domestic food industry, which, in the global dimension, is part of the world food market. Ukrainian producers traditionally have high positions in the world market. However, the domestic dairy industry has not yet entered the trajectory of sustainable development despite having unconditional success in milk production technology modernization, its quality improvement and the range expansion. The country is experiencing a decline in milk production level, rising prices for raw milk,

insufficient interaction between producers of raw materials and the final product. Solving these problems will ensure the appropriate level of milk production efficiency, the competitiveness of the enterprises of the dairy subcomplex of the agro-industrial complex of Ukraine in the domestic and foreign markets. [1, 2, 9, 10].

Various aspects of the issue of increasing the producers competitiveness closely related to the current state of the dairy industry in the country were studied by the following Ukrainian scientists: A.E. Alimov, P.S. Berezivsky, T.V. Bozhydarnik, B.B. Bondarets, A.P. Gaidutsky, L.A. Golovchuk, P.S. Zav'yalova, L.S. Ivanov, L.M. Kobrin, D.F. Krysanov, Л.О. Udov, O.M. Varchenko, T.L. Mostenska, A.S. Danylenko, I.A. Kriukov, A.L. Soloshonok, K.M. Kulish, M.K. Parkhomets, P.T. Sabluk, I.P. Teplykh, S.P.Tkachuk, T.I. Myronyuk, S.V. Chuhaevska, C.O. Shevelyova *et al.*

These scientists point out that the market situation in Ukraine is favorable for the dairy industry functioning and the country has the appropriate prerequisites for its development: favorable climate, large areas of agricultural land, soil fertility, historical experience in farming, qualified staff and significant dairy market capacity. However, the authors reveal the presence of significant problems in the development of Ukrainian dairy subcomplex enterprises which requires further research in the industry development in the current conditions. The aim of the paper is to analyze and assess the main factors of raw milk competitiveness in accordance with the European quality requirements on the dairy complex of Ukraine, as well as analyze the problems of its development and ways to solve them. [1-6, 10 12-15, 25].

Material and methods

The method of statistical grouping, graphical, economic-mathematical, computational constructive, correlation-regression methods were the main methods used in the study. The materials of periodicals, scientific papers, Internet sources, statistical information, scientific and methodological literature made up the basis of the research.

Results and discussion

Currently, dairy enterprises production in Ukraine meet the high-quality standards of the EU only partially. Therefore, the main task for Ukrainian producers is to ensure the high quality of both raw milk and the processed products. In addition, antibiotics and palm oil, pesticides, plant substitutes, milk substitution with water, etc. must be excluded from dairy products. According to the statistics, the total consumption fund in Ukraine, including exports and imports, is 9.33 million tons of milk. If we divide this figure by 42 million people of Ukraine, we get 221 kg of milk per capita. But if we divide the real figures – 6.68 million tons – by the real figure for the Ukrainian population – 36 million people – we will see that the consumption level is much lower – 185 kg per capita. Milk production decreased by almost 3.6% in Ukraine during the year. This drop was the most noticeable in cream and butter production, so it is not surprising that this niche was quickly filled by the importers.

But what impedes the Ukrainian milk industry's development in the domestic market and its entering the foreign market? The only reason is low level of milk production. In Ukraine, the volumes in 2019 fell below 10 million tons for the first time. These data are confirmed by the recently published "Forecast of milk production in Ukraine by 2030: methods and calculations" submitted by Olha Kozak, a researcher at the Department of Economics of Agricultural Production and International Integration of the National Research Center "Institute of Agrarian Economics". According to the expert, the internal shortage of the product in 2019 was indicated primarily by the growth of the purchase price for raw milk, which for the last three months of 2019 was almost in line with the world prices or 10-15% higher than in the previous year. In October 2019, the price reached the maximum in hryvnia for the period of Ukraine's independence. Some experts in this field claim that our milk is more expensive than in Belgium, and this is nonsense.

The experts predict a record decline in raw materials for 2020. In 2020, these processes will only intensify, causing structural changes in all components of the dairy food system. The situation will also be complicated by the abolition of the Second-Grade milk since January 1, 2020, which is provided by the new DSTU “3662: 2018 Raw cow’s milk”. Specifications. This implies that processing companies will not receive about 1 million tons of second-grade milk.

Dairy food producers are embarrassed as they cannot compete with the UE plants in terms of prices. Recently, which was attended by Vadym Chagarovsky, the Chairman of the Board of Directors of the Dairy Enterprises Union spoke at the Forum *Dairy Business 2019* held in Kyiv. The expert claimed that it is necessary to work out a special development strategy for the period until 2025 in order to save the industry. The document will provide for a change in marketing strategies and, in particular, the definition of target export markets. Currently, Ukraine has implemented a system of food safety and quality control focused on the ultimate result. That is, individual product samples are selected for analysis by the controller. In case of positive results, the good quality of products is confirmed and the whole batch is subject to sale [1]. However, this approach does not guarantee complete safety and absolute product quality. 19 million tons of milk were produced by Ukrainian enterprises and about 5 tons were produced by the population 20 years ago. According to these indicators, we were among the top ten world milk producers and, despite the problems with its quality, milk was suitable for processing. Therefore, development of dairy farming in Ukraine requires, above all, operating with real numbers. This is the only way the government can see the real state of this sector. And, by the way, the biggest error is in the amount of milk supplied by the population. The identification of cattle kept in small private farms could settle this problem and provide tracking real numbers and exercising effective control.

The situation is different in the EU countries. First of all, milk producers receive subsidies from the state which makes 13-14 eurocents per liter of milk at a cost of 43-44 eurocents. In addition, VAT in the EU countries with the growing milk production is 7%, while in Ukraine it is 20%. In addition, European farmers can get a loan on good terms. Over the past few years, Poland has received 23 billion euros to support the industry, Germany – 64. The figures for Ukraine are simply meager as compared the EU. Secondly, the comparison of the price-quality correlation is not favorable as well. 200 milliliters of regular yogurt in Poland costs 2-3 zlotys, while the Ukrainian producer estimates its product at 25-30 hryvnias. And, of course, the taste of the product is different: Ukrainian dairy products often contain antibiotics or other harmful substances while European consumers are protected. [7, 9].

Currently, milk is produced in insufficient quantities in Ukraine. To ensure a scientifically sound required rate of milk and dairy products consumption per capita (380 kg), it is necessary to increase milk production by 1.9 times. On average, the population of Ukraine consumes only 52.0% of the scientifically grounded norm. At the same time, milk production has been declining in recent years and has decreased by 10.0% over the last 5 years.

The main problems of the milk market in Ukraine are insufficient milk supply and, above all, its low competitiveness and quality. According to some experts, the competitiveness of milk depends on its quality by 80%. At present, raw milk producers are not responsible for the microbiological and hygienic indicators of the EU countries. Since 2004, the quality of milk supplied to processing plants in Ukraine is regulated by the requirements of DSTU 3662-97 “whole cow’s milk”. Procurement requirements. In 2007, this standard was changed and an additional Extra grade was introduced. In the EU, the main document which sets requirements for food quality and safety is the Regulation (EU) № 853/2004 of the European Parliament and of the Council of 29 April 2004 defining specific rules for the hygiene of foodstuffs.

Both documents have common requirements for safety indicators (content of heavy metals, mycotoxins, antibiotics, pesticides, nitrates and radionuclides) and quality of raw milk (organoleptic

properties, temperature, purity, acidity, density, milk fat mass percentage, protein) and dry matter). However, there is a significant discrepancy between these standards in terms of total bacterial infection and somatic cell count. European standards are stricter than the national ones. For example, the total number of bacteria in milk according to the EU Regulation 853/2004 is not more than 100,000 / cm³. In Ukraine, this number is normalized from 100 to 3000 000 / cm³, additionally ≤ 100 000, above – ≤ 300 000, the first – ≤ 500 000 and the second – ≤ 3 million types of milk), and the number of somatic cells in milk should be in accordance with the EU standard of is 400,000 / cm³ does not exceed 853/2004 and from ≤ 400 to ≤ 800 thousand / cm³ according to the standard DSTU 3662-97 (for additional and higher qualities – ≤ 400 thousand, the first – ≤ 600 thousand and the second – ≤ 800 thousand Dairy qualities) [3, 4]. Some dairy processing plants in Europe have set even higher standards through their own standards, according to which bacterial contamination is 50,000 or even 30,000 units / cm³, somatic cell count is 200,000 units / cm³, and in some cases 150,000 units / cm³. [5]. For example, in Norway and the United Kingdom the total number of bacteria in milk is not more than 20,000 / cm³, and the number of somatic cells in milk should not exceed 150,000 / cm³, in Denmark – 30,000 / cm³ and 200,000 / cm³, Germany 30,000 / cm³ and 300,000 / cm³, in most other European countries 50-100,000 / cm³ and 400,000 / cm³, in the USA 10,000 / cm³ and 225,000 / cm³.

If we analyze the DSTU 3662-97 standard for milk and the EU document for EU Regulation 853/2004, we can conclude that milk classified as premium class in Ukraine is considered first and second class in the EU according to the EU Standards. Only premium milk meets the requirements of European legislation. And the freezing indicator is not checked in Ukraine. Therefore, the requirements of DSTU 3662-97 are inferior to the EU requirements for milk quality and safety.

The growing demands on dairy products quality has been an important trend in milk production: in July 2018 DSTU 3662: 2015 “Raw cow’s milk”. Specifications was adopted. According to the document, there are three types of milk on the market: “extra”, “higher” and “first”. However, it was decided afterwards to leave the “second” grade until early 2020 to give farmers time to modernize production [6]. Over the next two years, it will be approved for processing into animal feed, casein, etc.

Therefore, Ukraine is trying to introduce high standards of safety and quality of dairy products, which are required for the world’s leading producers. For example, on March 12, 2019, the Order “On approval of requirements for milk and dairy products safety and quality” was adopted. It states that the minimum level of milk suitable for processing must meet the following criteria: bacterial contamination in milk is ≤ 100 thousand / ml; the number of somatic cells is ≤ 400 thousand / ml, freezing point ≤ -0.520 °C (*i.e.* without water pollution), it does not contain inhibitors. The new national standards, which are harmonized with European ones, should be introduced in stages, so the regulation sets up the transition period: from January 1, 2020, the number of microorganisms in milk is ≤ 500,000 / ml, and the number of somatic cells is ≤ 500 thousand / ml; from January 1, 2021, the number of microorganisms is ≤ 300 thousand / ml and the number of somatic cells – ≤ 400 thousand / ml [7].

Therefore, to provide the manufacture of high quality and safe dairy produce we need to improve constantly the mechanisms that contribute to the competitiveness of dairy produce, namely the harmonization of regulations, managing risks during its production, optimal official control services. Therefore, improving the quality of milk is an important factor in competitiveness increasing in the agricultural enterprises of Ukraine. Statistics on agricultural enterprises during 2017-2018 indicate that the share of the first-grade milk decreased significantly – by 5%, in the structure of the output volumes, second grade milk – by 1.6%, while the share of “extra” grade milk increased by 5.2 %, high grade milk – by 1.4%. In 2018 a positive trend was observed in Ukraine in

terms of milk quality improving. Agricultural enterprises sold 21.6 % of “extra” quality milk, 38.1% of high grade and 32.9 % of the first grade of the total (Fig. 1).

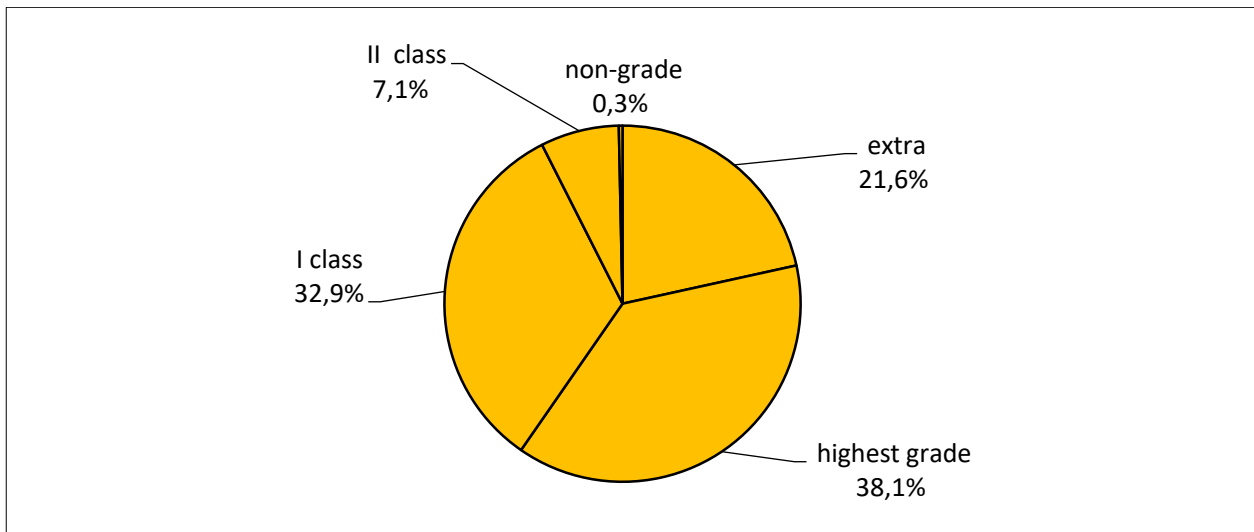


Figure 1 – Quality of cow milk purchased by processing enterprises from agricultural enterprises under the GOST 3662:2015 by regions in 2018, tons

* Source: National Statistics Office [6].

The largest volumes of milk were purchased by processing enterprises from agricultural enterprises of Kyiv (9.4%), Poltava (10.6%), Vinnytsya (16.2%) and Cherkassy (7.4%) regions. The best quality of the milk was provided by Vinnytsya and Poltava regions enterprises. Agricultural enterprises of these regions supplied, respectively, 18,9 % and 16,7 % of “extra” quality grade milk and 50.1 % and 38.3 % of high-quality grade, respectively, of the total supply. Five regions did not produce “extra” quality milk (Donetsk, Zaporizhzhya, Luhansk, Lviv, Mykolaiv). The share of second grade milk in Ivano-Frankivsk did not exceed 66% of the total volume, even the highest quality. Especially poor-quality milk was purchased by processing enterprises in small private farms (Fig. 2).

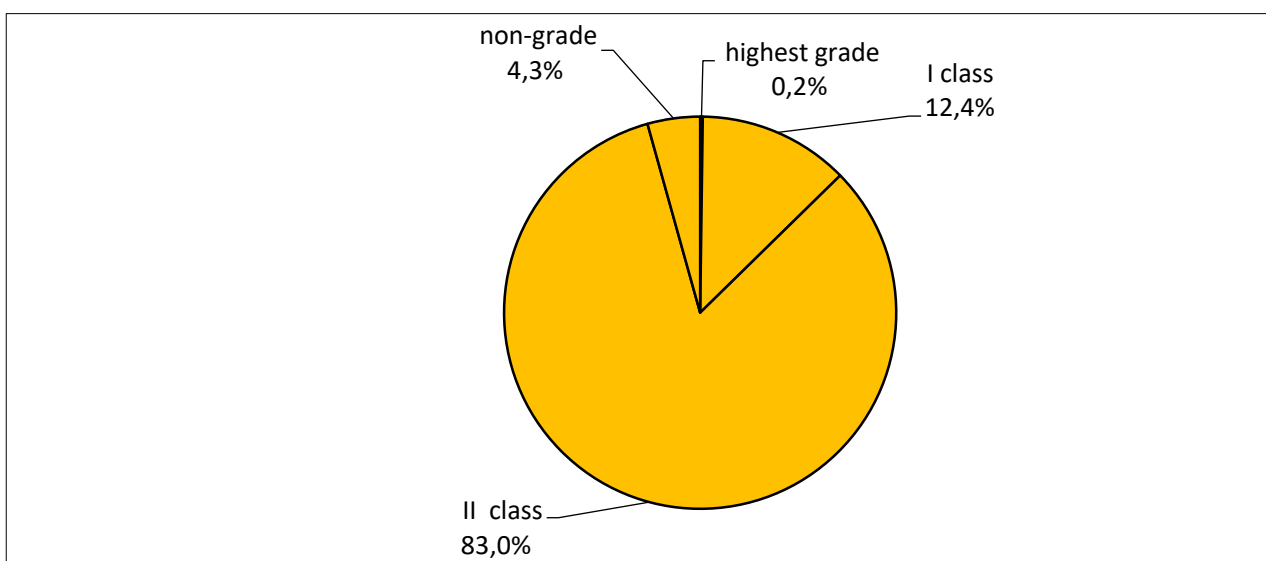


Figure 2 – Quality of cow's milk purchased by processing enterprises in small private farms under GOST 3662:2015 by regions in 2018, tons

* Source: National Statistics Office [6].

Farms sell mainly second grade milk in 2017 – 87.2%, the share of first-class milk is 8.9% [9, 25]. In 2018, 83.0% of all second-grade milk is purchased by processing companies from private households (Fig. 2). The reason for this manual milking has been used to milk cows in private households which violates hygienic and sanitary norms. In addition, falsification can take place at the stage of cooling and it is difficult to control since many small batches of raw milk arrive at the processing enterprises. As a result, raw or unsorted raw milk from processing companies. Premium milk share is only 0.2%. Milk and varieties make up only 12.4%. A significant share of first grade milk is produced in households in Sumy region (88.7%), Dnipropetrovsk (80.4%), Chernihiv (54.1%) and Kherson region (34.8%). These figures are quite low for the EU countries.

Therefore, they will have to decide on the sale of milk after the final abolition of the old standard. And this, in turn, can lead to an increase by about 20-25 percent in the share of the shadow sector in the dairy market. Manual labor, which is mainly used in farms, increases the bacterial contamination of the product, and collecting whole milk from different cows, taking into account the conditions of milking, storage and different quality of raw milk reduces the quality of dairy products. The quality of raw milk is also affected by seasonality. Thus, in summer the quality of raw milk is affected by high temperatures, which complicates the process of raw milk storage during the delivery to dairy farms. In winter, raw milk is of better quality due to cooler weather and the share of milk produced on industrial dairy farms is larger. However, there may be a shortage of raw milk in winter which makes some businesses to shut down. The basic parameters of milk in Ukraine are the lowest among the European countries and the world (Table 2). Kherson, Dnipropetrovsk and Kyiv regions have the highest indices.

Table 2 – Basic indices of milk in the European countries in 2018*

Index	Ukraine	Vinnytsya reg.	Volyn reg.	Dnipropetrovsk reg.	Kyiv reg.	Lviv reg.	Kharkiv reg.	Kherson reg.	Cherkassy reg.	Chernihiv reg.
Fat, %	3.61	3.62	3.62	3.70	3.68	3.59	3.64	3.73	3.66	3.66
Protein, %	3.11	3.12	3.20	3.33	3.14	3.12	3.11	3.26	3.26	3.12

* Source: National Statistics Office [8].

Quality management system based on financial management methods is currently a means of increasing the competitiveness of domestic dairy products. It enables to manage economic indicators of product quality and delivery costs.

Dairy products are essential foodstuffs which are always in demand in the market. This market has recently revived due to rising birth rates, consumer culture and sales quality. To meet market expectations, dairy companies do not always use quality milk or counterfeit due to lack of raw materials and replace animal fats with vegetable ones. This results in deterioration in the quality of final products, deception of consumers and in competitive advantages loss for manufacturers in the market due to the gradual decrease in raw materials supply. Despite the reduction of cows and reduced milk production, the productivity of cows can be increased by improving the feed base, feed quality and ration structure. The price mechanism of milk processing enterprises is an acute problem for raw milk producers. Artificially lowered prices deprive the manufacturers of incentives to increase production and to improve the product quality (Fig. 3). Over the last five years, the price for raw milk has increased by 2.11 times for agricultural enterprises and by 1.96 times for households. Thus, prices are an important incentive to increase milk production and its sales to dairy companies.

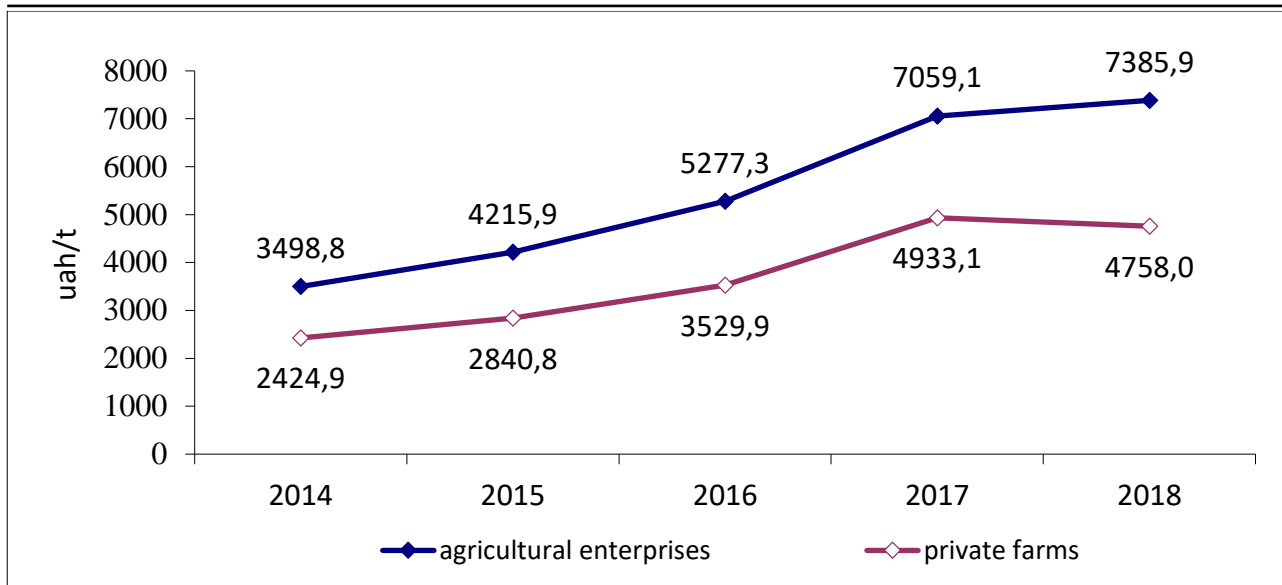


Figure 2 – Purchasing prices of milk in Ukrainian milk processing enterprises, UAH / t

Milk price has not only to reimburse the costs of its production, but to stimulate the growth of its production and contribute to increasing the profitability of its production as well. In addition, raw milk prices include the costs of milk processing enterprises, which cannot increase the price for milk and dairy products due to low solvency of consumers. More than that, the price increase may lead to a reduction in consumption. The efficiency of milk producers depends on the competitiveness of the products offered to consumers. Evaluation of the raw milk competitiveness level is necessary for making grounded decisions on the production and sale of dairy produce on both domestic and external markets, for reducing purchases of similar imported products and improving the products quality and competitiveness. High level of milk production competitiveness is observed in the companies that have achieved the highest competitiveness index that ranges from 1.012 to 1.089 (Khmelnysk, Chernihiv, Rivne, Cherkassy, Volyn, and Poltava regions) (Fig. 4).

A significant direction of development of enterprises of dairy branch of Ukraine is to increase the competitiveness of producers of milk-raw material. To do this: to develop a set of measures that will be aimed at increasing the productivity of cows and a gradual increase of animals, particularly in agricultural enterprises, increase the production of milk-raw materials and improving its quality characteristics, through high-efficiency technologies on an innovative basis, taking into account world experience. And to do this: to restore and reconstruct the existing large livestock farms and complexes; to increase the efficiency of breeding work; to improve conditions for the animals, milking and cooling of milk-raw materials; to create a modern large dairy complexes with the presence of highly productive animals and an established quality assurance system of milk-raw materials; to integrate the milk producers of raw milk processing enterprises, which will contribute to the regulation of pricing policy; to ensure effective state support of commodity producers; implement in production resource-saving technologies that will reduce resource costs and improve the quality of milk; to create a new technological base which will meet the modern requirements of milk production and to learn from the experience of other countries; to improve milk quality on the basis of the fight against the falsification of products. Therefore, the problems of increase of competitiveness of producers of milk-raw materials currently are challenging and relevant, and measures of the state towards the highest standards of safety and quality of dairy products are the norm for leading manufacturers in the world.

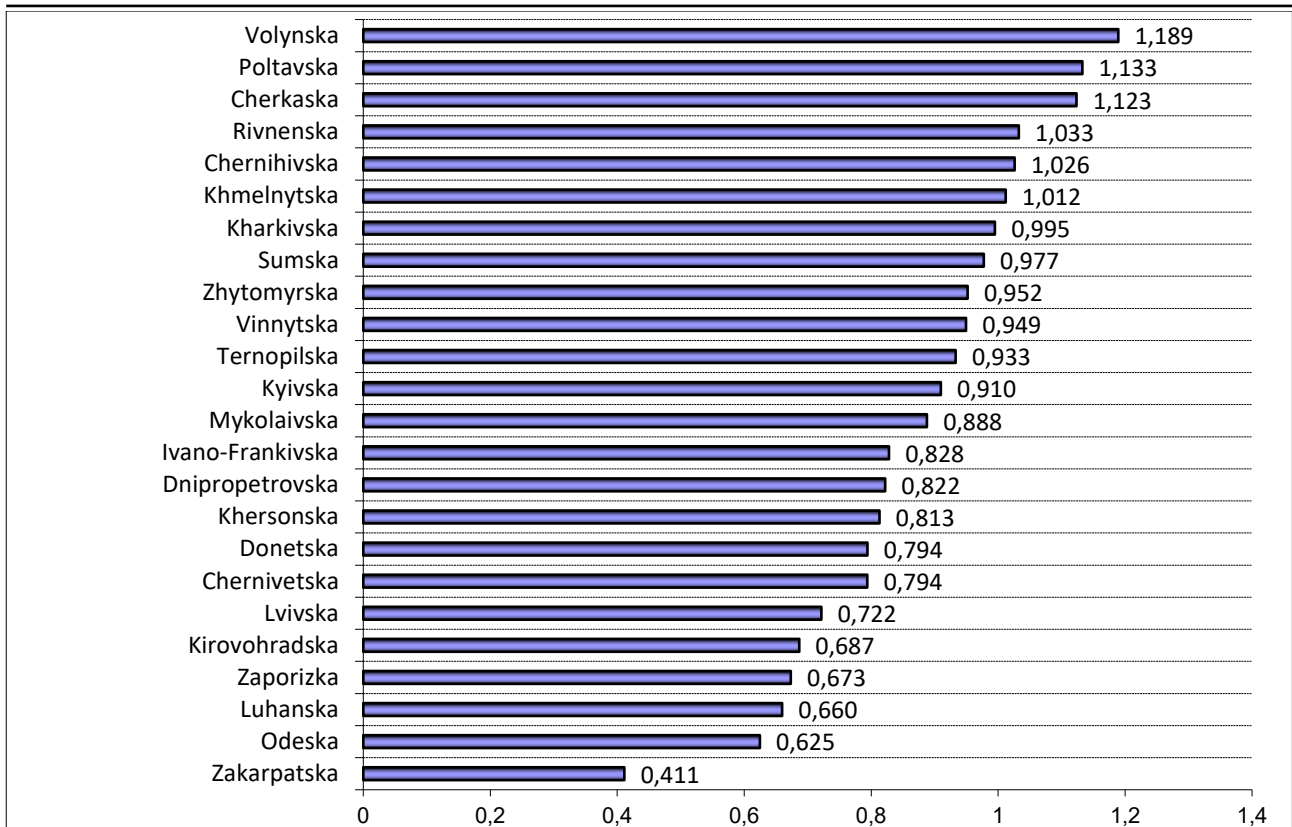


Figure 4 – Rating of regions on the results of comprehensive assessment of milk production by agricultural enterprises in Ukraine

For comparison of the criteria of competitiveness of production of milk-raw material producers have used polygon of competitiveness. To construct a polygon have used the coordinate plane where the points on the axes postponed the indices of competitiveness of milk production. Connect the dots has got a polygon of competitiveness of production of milk-raw materials. The value of competitiveness indices graphically represents the area of the polygon, radars which are 9 indicators (criteria) the competitiveness of milk production (Fig. 5).

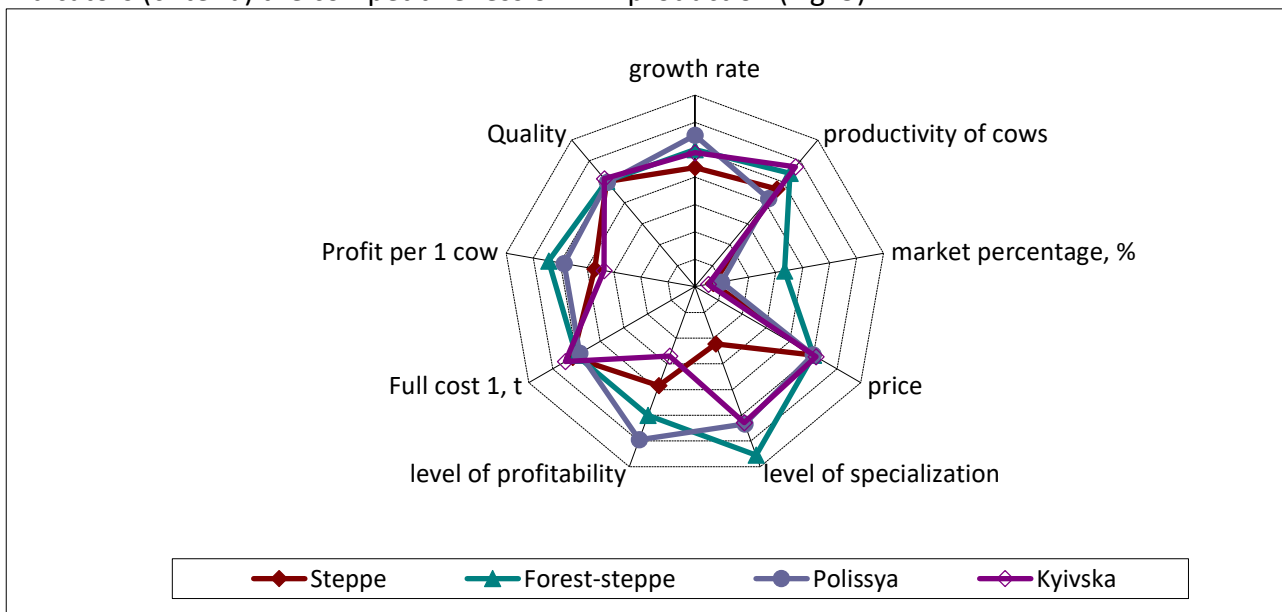


Figure 5 – Model for milk production competitiveness of agricultural enterprises in some regions of Ukraine

* Source: developed by the authors

Milk production competitiveness model was structured as follows: a circle was divided by radial evaluative scales into 9 sectors by the number of the criteria; the criterion value improved as the distance from the circle center grew; the scales on radial lines were calibrated in such a way that that all important evaluative criteria laid inside a circle; all the criteria for milk competitiveness assessment is determined by a 100-point scale; milk competitiveness indicator value is below the standard, its absence is pointed zero which coincided with the center of the circle. This model of the polygon of competitiveness of milk production in agricultural enterprises of some regions of Ukraine shows that the greatest advantages of competitiveness of milk production have the areas of the Forest-Steppe zone, because they are furthest from other zones and have better criteria for assessing competitiveness. This model of competitiveness polygon will provide information for informed decisions on the efficiency of milk production, as well as the ability to obtain accurate and adequate information and take into account many criteria for assessing competitiveness, which will provide more accurate information on the competitiveness of raw milk producers.

Conclusions

A significant direction of development of enterprises of dairy branch of Ukraine is to increase the competitiveness of producers of milk-raw material. To do this:

- develop a set of measures that will be aimed at increasing the productivity of cows and a gradual increase of animals, especially in agricultural enterprises, increase the production of milk-raw materials and improving its quality characteristics, through high-efficiency technologies on an innovative basis, taking into account world experience.
- restore and reconstruct the existing large livestock farms and complexes;
- to increase the efficiency of selection work;
- to improve the conditions of animal maintenance, milking and cooling of milk-raw materials;
- to create a modern large dairy complexes with the presence of highly productive animals and an established quality assurance system of milk-raw materials;
- to integrate the milk producers of raw milk processing enterprises, which will contribute to the regulation of pricing policy;
- to provide efficient state support of commodity producers; implement in production resource-saving technologies that will reduce resource costs and improve the quality of milk;
- create a new technological base corresponding to modern requirements of milk production and to learn from the experience of other countries; to improve milk quality on the basis of the fight against the falsification of products.
- develop and implement measures to harmonize legislation in the sphere of food hygiene and approximation to EU legislation in the field of tracking the food chain “from field to table”;
- implement the system of Hazard Analysis Critical Control Point for enterprises and control bodies, as well as checking the network of public laboratories and preparation for their accreditation in compliance with ISO standards [10]: move to the modern technologies of keeping cows, milking and timely cooling of milk raw materials; to promote the construction and reconstruction of large modern dairy complexes;
- improve fodder production and fodder base; implement production, marketing, and organizational strategies that will significantly accelerate the process of adaptation to a competitive environment; contribute to the development of integration processes in milk products building complex of the country; to facilitate the staffing of milk producers, raw milk and dairy products and to improve the professional level of their specialists; to improve customs-tariff protection of domestic producers of milk and dairy products, and others.
- bring the legislation of our country to European standards in conditions of Ukraine’s

membership in the WTO, which will contribute to improving the efficiency of milk producers, with the assistance of cooperatives.

Therefore, the problems of increase of competitiveness of producers of milk-raw materials currently are challenging and relevant, and measures of the state towards the highest standards of safety and quality of dairy products are the norm for leading manufacturers in the world.

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