Increasing the competitiveness of Ukrainian dairy products in line with European standards

Olena.B. Zharikova
Candidate of Economics Science,
National University of Life and Environmental Science of Ukraine
E-mail: ele0309@ukr.net

Oksana. V. Pashchenko,
Candidate of Economics Science,
National University of Life and Environmental Science of Ukraine

Abstract
In this article the main factors of the competitiveness of dairy products on the markets of Ukraine according to European standards are analyzed. Calculations are made on the basis of analysis of the main factors of competitiveness of milk and raw materials of commodity producers on the basis of European quality. The methods used in calculations are; the method of statistical groupings, calculation-constructive, correlation-regressive and economic-mathematical methods. The ways of increasing the competitiveness of milk and their commodity producers are grounded.
In order to increase the competitiveness of milk production in agricultural enterprises, it is necessary to implement complex and systemic measures that will ensure increase of productivity of cows, high efficiency of the industry and improvement of the quality of dairy products. In order to increase the competitiveness of milk producers, it is necessary to develop and implement measures to harmonize Ukrainian legislation.

Keywords*:* milk and dairy production, milk, consumption fund, quality, competitiveness, milk producers

Background. Competitive goods production is an important factor of ensuring the sustainable development of commodity production. Products market competitiveness is an important issue in the strategy and tactics of producers, because it is one of the indicators of their efficient activity, it affects their successful operation and financial position, the possibility of getting efficient market position, and thus, the recognition of quality characteristics by the consumers. This aspect of the problem is inherent in all products, including milk and dairy produce. Milk is a significant component of the human diet since it contains essential for the human body elements and is consumed by different groups of people, from children to the elderly. Our national policy considers food safety to be the basic way of ensuring the public health.
High quality raw milk supply to milk and dairy producers is an important element of the production. This problem has become even more complicated recently due to lower production of raw milk. These circumstances make milk processing enterprises buy raw materials of poor quality in order to prevent disruptions in the production process.
Analysis of recent research and publications. The papers of many national and foreign scholars like P.S. Berezivskyi, A.P. Haidutskyi, M.I. Helvanovskyi, P.S. Zav'yalov, M.I. Malik, T.L. Mostenska, M.K. Parhomets, P.T. Sabluk, S.O. Shevelev, A.Yu. Yudanov and others highlight the research results on various aspects of products competitiveness. Dairy produce competitiveness was highlighted in the papers of the following economists: V. Boyko, S.V. Vasylchak, M.N. Ilchuk, O. Kozak and others. However, some aspects of this issue need further studying. Particular attention should be paid to the factors of milk producers competitiveness increase, which will provide cows increased productivity, the high efficiency of the industry and dairy produce quality improvement.
The paper aims to analyze the main factors increasing the competitiveness of raw milk producers in accordance with European quality and to prove the ways of milk producer's competitiveness increase.

Methods. Scientific papers, periodicals, the Internet resources and statistical information make methodological and information basis of the article. The study used statistical groupings methods, calculation and constructive, graphic, correlation and regression, economic-mathematical methods.
Results. Signing the economic part of the Ukraine–European Union Association Agreement, namely the agreement on free trade zone (FTZ) opens a new sales market for Ukrainian producers – a competitive market.

According to the Ukraine–European Union Association Agreement, all food products intended for sale should be produced in Ukraine according to the EU requirements and standards, which will enable them to export the produce to the EU Member States without additional certification. Currently dairy products manufactured in Ukraine only partly meet the high quality standards of the EU. Therefore, the main task for Ukrainian producers is to ensure a high quality of raw milk and processed products. In addition, disappear antibiotics and palm oil should be removed from Ukrainian dairy produce.
Analysis of the opinions of scientists and experts engaged in studying the issue of providing milk processing plants with high-quality raw milk enables us to identify the main factors reducing the quality of raw milk: violations of sanitary conditions of milk production, failure to meet the requirements on cleaning and milk cooling after the milking, inappropriate primary quality control, the use of outdated technologies and equipment, violation of transportation requirements, poor staff training. As a result, the raw milk provided for processing does not meet the standards for microbiological indices and the requirements on the levels of antibiotics, pesticides, plant substitutes or milk substitution with water (falsification) etc. The system of food safety and quality checks focused on the ultimate result is typical for Ukraine. That is, individual samples of the products are selected by a controller are the subject to the analysis. In case of getting positive results, the entire consignment of the products is confirmed to be of appropriate quality and it can be realized [1]. However, this approach does not ensure complete products safety and absolute quality.
The amount of milk produced in Ukraine is insufficient. To provide scientifically grounded required intake of milk and dairy produce per capita (380 kg), milk production should be increased by 1.8 times. Ukrainian people consume in average only 55.2% of scientifically based standards for dairy produce intake. Also, milk production has been decreasing in recent years and in the last 5 years it decreased by 4.3%. Accordingly, the consumption fund decreased by 4%, though in the manufactured milk use structure the consumption fund increased by 1.2% and by the end of 2015 it amounted to 8995 thousand tons (Table 1).

*Table 1.*M**ilk production volume and consumption fund in Ukraine in 2011-2015**

Indices	**Year**					**2015 to 2011**	
	2011	**2012**	**2013**	**2014**	**2015**	**+/-**	**%**
Production, ths. tons	11086	11378	11488	11133	10615	-471	95.7
Consumption fund, ths. tons	9363	9797	10050	9581	8995	-368	96.1
% of consumption fund in regard to total output	84	86	87	86	85	1	101.2
Per capita, kg	204.9	214.9	220.9	222.8	209.9	5	102.4
% of the recommended dairy product intake standard	54	57	58	59	55	1	101.9

*Source: calculated according to the National Statistics Office data [2]

Thus, the most important problems of the milk market in Ukraine is the lack of milk supply and its mainly low competitiveness and quality. Some experts in milk competitiveness argue that milk competitiveness depends by 80% on its quality. Currently, the raw milk of the producers does not meet the requirements on microbiological and hygiene indicators standards for the EU countries. In Ukraine the quality of milk

supplied to processing plants for dairy produce manufacture has been governed by the requirements of GOST 3662-97 «Cow whole milk. Procurement requirements » since 2004. In 2007 this standard was amended - a new grade of raw – «Extra » - milk was introduced . In the EU the main document that states the requirements for food quality and safety is Regulation (EC) No 853/2004 of 29 April 2004 laying down specific hygiene rules for food of animal origin for food business operators.

Common to both documents is the availability of safety indicators requirements (on heavy metals, mycotoxins, antibiotics, pesticides, nitrates and radionuclides) and raw milk quality (organoleptic properties, temperature, clarity, acidity, density, fat mass fraction, protein and dry matter). However, these standards contain a significant discrepancy in relation to the total bacterial contamination and the number of somatic cells. European standards are stricter than the national ones, for example, the total number of bacteria in milk under EU Regulation 853/2004 is not more than 100 thousand / cm^3, while in Ukraine this index rates from 100 to 3000 thousand / cm^3 (for extra quality grade ≤100 thousand , higher - ≤ 300 thousand, first - ≤ 500 thousand and the second grade - ≤ 3 million species). The number of somatic cells in milk should not exceed 400 thousand / cm^3 under EU Regulation 853/2004 and, according to the GOST 3662-97 (Ukrainian standard), this index ranges from ≤400 to ≤800 thousand / cm^3 (for the extra and highest quality grade - ≤ 400 thousand, first - ≤ 600 thousand and the second grade - ≤ 800 thousand) [3; 4]. Some dairies in Europe's set up their own standards with even higher requirements on bacterial contamination ranging from 50 000 up to 30 000 units /cm^3, the number of somatic cells is 200,000 units / cm^3, and in some cases 150 000 units / cm^3 [5]. Having analyzed the milk Standard GOST 3662-97 and document of the EU Regulation EC 853/2004, we can conclude that the former requirements are much inferior to the latter in terms of milk quality and safety. Raw milk referred to first and second grade in Ukraine does not meet the EU requirement standards. Only “extra” grade meets the EU requirement standards. As for the freezing point index, is not controlled in Ukraine. Thus, the requirements of the GOST 3662-97 are inferior to the EU requirements for milk quality and safety.

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. The largest volumes of milk were purchased by processing enterprises from agricultural enterprises of Kyiv (12.4%), Poltava (17.6%), Vinnytsa (11.6%), Kharkiv (8.8%) regions. The best quality of the milk was provided by Kiev and Kherson regions enterprises. Agricultural enterprises of these regions supplied 26.3% and 81.0% of "extra" quality grade milk and 35.6 % and 8.3% higher quality grade respectively of the total supply. 14 regions did not produce "extra" quality milk in 2015. And in 6 regions (Volyn, Ivano-Frankivsk, Luhansk, Poltava and Kharkiv) they did not supply even the highest quality grade milk. Especially poor quality milk was purchased by processing enterprises in small private farms, 86.4% of the total milk output sold by small private farms was of second grade quality. The reason for this is that the milk supplied to the processing enterprises was obtained through manual milking which violates sanitary rules. Also, refrigeration is not applied there, falsification of raw milk can take place, which is difficult to control because the procurement stations purchase a large number of small parties of raw milk. As a result, substandard or low-quality raw milk is supplied to processing enterprises. The share of higher grade milk quality is only 0.1%. A significant share of first grade milk quality is supplied by farms of Dnipropetrovsk region (47.4%), Kherson (39.0%), Lviv (29.8%) and Zaporizhya (24.7%) regions. These figures are very low for EU countries.

Manual labor, which is mainly used in small private farms cause increase in bacterial contamination of the product. The milk is taken from different cows and put together and, taking into account the manual milking, storage conditions and different quality of raw milk, all these contribute to reduced quality of dairy produce. The quality of raw milk is also affected by seasonality. In the summer the quality of raw milk is affected by high temperatures, which makes it difficult to store raw milk in the course of its delivery to the dairy business. In winter raw milk quality is better due to cool weather and a higher share of the milk produced in big enterprises. But winter is also a season of the lack of raw milk, which makes some companies to suspend their work. The basic parameters of milk in Ukraine are the lowest among the European countries and the world (Table 2).

*Table 2.***Basic indices of milk in the European countries in 2015***

Index	**Ukraine**	**Belarus**	**Poland**	**Estonia**	**Lithuania**	**Latvia**	**Germany**	**Netherlands**	**Finland**	**New Zealand**
Fat, %	3.4	3.6	3.7	3.7	3.7	3.7	4.0	4.2	4.2	4.2
Protein, %	3	3	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4

* Source: Faostat3.fao.org [7].

Currently, the means of domestic dairy companies competitiveness increase are provided by a quality management system ruled by economic management, which implies control of economic indicators of the product quality and its maintenance cost. An important factor of improving the competitiveness of milk in the agricultural enterprises is to increase the milk yield per cow (Table 3).

*Table 3.***Ukrainian agricultural enterprises grouping (including small farms) in terms of milk yield per cow, 2015 ***

Index	**Groups of enterprises in terms of milk yield per cow, kg**					**Total**
	below 3500	3500-5000	5001-6500	6501-8000	over 8000	
Enterprises number	623	420	316	183	87	1629
Cows number, ths.	108	107	122	97	55	489
Cows number per cow, heads	174	254	386	532	629	300
Milk output, ths. tons	269.7	461.0	693.4	691.8	499.4	2615.2
Realized milk, ths. tons	240.0	423.8	646.9	651.3	475.2	2437.3
Annual yield per cow, kg	2494	4316	5681	7112	9130	5348
Cost of 1 t of milk, UAH	3060	3751	3541	3533	3553	3528
Working expenses, UAH	7631	16190	20116	25125	32436	18871
Production cost of 1 t milk, UAH	3429	4140	3825	4085	4017	3948
Realization price for 1 t milk, UAH	4075	4230	4398	4596	4689	4447
Profit for 1 t milk, UAH	645	90	573	512	673	499
Profit total, million UAH	154.9	38.1	370.8	333.2	319.6	1216.7
Profitability level, %	18.8	2.2	15.0	12.5	16.7	12.6

*Source: calculated by the authors on the basis of № 50 (agriculture) the statistic form

The data in Table 3 indicate that the increase of milk yield per cow in agricultural enterprises in Ukraine in 2015 contributed to improving the economic efficiency of milk production. Gradual cost reduction and increase in selling price of 1 ton of milk took place in enterprise groups I-V with increased levels of milk yield per cow, which ensured the profit growth for 1 ton of realized milk. This trend contributed to improving the profitability of milk production in farms. In the I-V enterprise groups milk production was profitable. The highest profitability was observed in the first group (annual rate of yield under 3,500 kg) and made 18.8%; in the enterprises of II-V groups the profitability increased gradually from 2.2 to 16.7 percent. An important factor in improving milk competitiveness in farms is increasing the concentration of cows number in farms (Table 4).

*Table 4.***Ukrainian agricultural enterprises grouping (including small farms) in terms of cows number, 2015 ***

Index	Groups of enterprises in terms of cows number					Total
	under 200	201-500	201-1000	1001-1500	over 1500	
Enterprises number	934	472	154	33	36	1629
Cows number, ths.	84	150	104	39	112	489
Cows number per cow, heads	90	318	673	1192	3097	300
Milk output, ths. tons	323.7	755.5	657.4	257.6	621.0	2615.2
Realized milk, ths. tons	288.6	695.3	612.5	244.1	596.7	2437.3
Annual yield per cow, kg	3835	5035	6340	6551	5570	5348
Cost of 1 t of milk, UAH	3571	3498	3617	3606	3418	3528
Working expenses, UAH	13695	17609	22934	23624	19034	18871
Production cost of 1 t milk, UAH	3914	3840	3989	3898	4067	3948
Realization price for 1 t milk, UAH	4009	4339	4510	4661	4631	4447
Profit for 1 t milk, UAH	95	500	521	763	564	499
Profit total, million UAH	27.5	347.5	318.9	186.3	336.5	1216.7
Profitability level, %	2.4	13.0	13.0	19.6	13.9	12.6

*Source: calculated by the authors on the basis of № 50-cr (agriculture) the statistic form

Concentration of production gives an opportunity to apply scientifically developed technologies of animals farming and feeding as well as to implement efficient rational technical means of complex mechanization of all the production processes ana to apply high-yielding breeds of animals. The data in Table 4 show that increased concentration of the number of cows in farms in the agricultural enterprises of Ukraine in 2015 provided improvement of the economic efficiency of milk production. In business groups I-IV increase in the number of cows in farms resulted in gradual cost reduction and increased realization prices of 1 kg of milk. In the Group V enterprises, which had a herd of over 1500 cows, annual production costs per cow were lower compared with the Group IV enterprises, which caused lower productivity of cows and increased total cost of 1 ton of milk.To investigate the influence of climatic conditions on production of competitive produce in Ukraine we suggested farms grouping in terms of milk production profitability (Table 5).

*Table 5.***Grouping Ukraine agricultural enterprises (including farms) in terms of the profitability of milk production in 2015,% ***

Index	Groups of enterprises in terms milk production profitability, %					Total
	below 0	0.1-15	15.1-30	30.1-45	over 45	
Steppe						
Cows number, ths.	35	26	12	3	5	80
Production cost of 1 t milk, UAH	4325	3767	3392	2877	3136	3822
Profitability level, %	-21.0	5.1	20.9	38.6	71.3	0.0
Forest steppe						
Cows number, ths.	71	89	60	37	54	312
Production cost of 1 t milk, UAH	4183	3745	3418	3184	2355	3474
Profitability level, %	-15.3	7.2	20.3	34.9	89.7	15.2
Polissya						
Cows number, ths.	23	25	18	17	13	96
Production cost of 1 t milk, UAH	4119	3866	3273	3179	2559	3485
Profitability level, %	-12.9	4.8	23.7	37.5	64.5	14.8
Ukraine						
Cows number, ths.	129	141	90	56	72	488
Production cost of 1 t milk, UAH	4208	3767	3390	3170	2461	3529
Profitability level, %	-16.4	6.5	20.9	35.7	83.4	12.6

*Source: calculated by the authors on the basis of № 50-cr (agriculture) the statistic form

The data in Table 5 indicate that almost 35% of the total number of enterprises engaged in milk production were unprofitable in 2015 and they produced 22.3% of the total volume of milk. The main reason for milk production unprofitability in these enterprises was low productivity of cows (average 4520 kg) while production costs per cow were very high. The level of milk profitability of more than 45% of enterprises had 170, or 10.8% of the total number of enterprises engaged in milk production. Analysis of the Table 5 data prove that the climatic conditions, the livestock concentration on farms and extending specialization in milk production in some geographical economic zones of Ukraine affect the increase in economic efficiency of raw milk.

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. A high level of milk production competitiveness is observed in the companies that achieved the highest competitiveness index ranged from 1.086 to 1.120 (Kharkiv, Rivne, Volyn, Poltava and Cherkassy regions).

Conclusions. To increase the competitiveness of milk production in the agricultural enterprises it is necessary to implement comprehensive and systematic

measures that will ensure cows productivity, high efficiency of the industry and the dairy produce quality improvement. To increase the competitiveness of Ukrainian milk producers the following activities should be carried out: to develop and implement measures for legal harmonization in the area of food hygiene and approximation of the EU legislation in the field of tracking the food chain "from farm to table"; to implement the Hazard Analysis Critical Control Point in enterprises and in the control bodies and check the national laboratory network and prepare for their accreditation according to the ISO standards [8]; transfer to the advanced technology of cows farming, milking and raw milk timely cooling; promote the construction and reconstruction of large modern dairy complexes; to perfect fodder production and forage reserve; to implement manufacturing, marketing and organizational strategies that will significantly accelerate the adaptation of the enterprises to the competitive environment; to promote the development of integration processes in the national milk subcomplex; to facilitate milk producers, raw milk and dairy produce staffing and to improve the professional level of the specialists; to improve customs tariff protection of domestic milk and dairy products producers of etc. Also, it is important to harmonize the national legislation with the European standards in terms of Ukraine's membership in the WTO, which will improve the efficiency of milk producers under cooperatives contribution.

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