THE INFLUENCE OF RAW MATERIAL FACTORS AND DEMAND FACTORS ON THE FORMATION OF SUPPLY OF PRODUCTS BY MILK-PROCESSING ENTERPRISES ON THE REGIONAL MARKET: UKRAINIAN EXPERIENCE

Penkova Oksana, Kharenko Andrii, Lementovska Valentyna, Poberezhets Ivan, Nehanov Victor

Penkova Oksana, Doctor of Economics, associate professor, Department of Marketing, Uman National University of Horticulture , Uman, Ukraine, oxana.penkova@meta.ua, ORCID ID: https://orcid.org/0000-0002-7213-9824

Kharenko Andrii, PhD in Economics, associate professor, Department of Marketing, Uman National University of Horticulture, Uman, Ukraine, andrijharenko@gmail.com , ORCID ID: https://orcid.org/0000-0003-1240-0944

Lementovska Valentyna, PhD in Economics, associate professor, Department of Marketing, Uman National University of Horticulture, Uman, Ukraine, v.lementovskij@gmail.com, ORCID ID: https://orcid.org/0000-0003-4086-309X

Poberezhets Ivan, PhD technical science, mathematical and physics, Uman National University of Horticulture, Uman, Ukraine, ivanpoberezhets1@gmail.com ORCID ID : https://orcid.org/0000-0002-9964-5022

Abstract. *Milk-processing enterprises of Ukraine play an important role in ensuring food security of the country and contribute to the saturation of consumer demand. Over the last decade, they have been functioning under market conditions characterized by a sharp change in environmental factors, which in turn put significant pressure on the formation of market situation conditions. This study focuses on the analysis of factors that determine, on the one hand, the supply of dairy products by milk-processing enterprises in Cherkassy region of Ukraine, and, on the other hand, influence the level of demand from potential consumers. In the first case, the influence of the selling price and disposable income per person was studied, and in the second - the availability of quality raw milk and its cost. The study of the level of the influence of these factors was carried out by means of methods of correlation and regression analysis, as well as analysis of the coefficients of elasticity of demand by price and by income. The results of the analysis of consumption of milk and dairy products by residents of Cherkassy region of Ukraine during 2010–2017 showed no clear trend in reducing or increasing the demand per capita, and the impact of the price factor of demand and income effect was insignificant. It makes the number of consumers a limiting factor for increasing the supply. Among the raw material factors, only the lack of raw materials of proper quality has a significant impact on the formation of supply by dairy enterprises.*

Key words: *milk-processing enterprises, milk products supply, factors of demand, milk production, raw milk.*

I. INTRODUCTION

The dairy sub-complex holds an important place in the formation of food provision of the population, as without its products it is impossible to fully develop the human body, especially in case of children. Dairy products are a key part of the food market and are presented in goods as an ultimate product (e.g. milk or yogurt), or as raw material for other products (e.g. confectionery, pizza) [1].

An important factor in the creation and development of the market of milk and dairy products is the formation of demand, which is determined by the level of consumption of this type of product. In recent decades, milk consumption has declined sharply, especially in developed countries, and an anti-trend in promoting the idea of the harm of dairy products to human health, or the need to give up some food because of animal care is gaining momentum. Also, another reason for the decrease in consumption is individual lactose intolerance [2].

An additional problem for the formation of supply by Ukrainian dairy enterprises is the reduction of raw milk production due to the desrease of the number of cattle in all categories of farms. In agricultural enterprises, this phenomenon is explained by their focus on the formation of milk production amount not through the livestock, but through increasing its productivity. Low purchasing prices for dairy products from the milk-processing enterprises and the rapid rate of aging of rural

population, especially of active working age, had a significant impact on the decrease in the number of cows in households.

The above mentioned problems require the concentration of scientific research on determination of the influence of price, demographic and behavioral factors on the activity of small milk-processing enterprises, which can be used by them in order to develop marketing strategies for their further development.

II. LITERATURE REVIEW

American scientists C.G. Davis, S.T. Yen, D. Dong, D.P. Blayney [3], having analyzed the demand for 16 categories of dairy products, indicate that price, income and demographic factors significantly affect the volume of demand, as well as it is significantly impacted by the effects of supplementation and substitution. A similar conclusion was obtained based on the results of a case study of consumers in the Guelma region of Algeria [4]. In addition, the choice of food, including dairy products, is influenced by such factors as age, gender, education, profession, religion [5]. Without denying other factors of influence, Sina Ahmadi Kaliji et al. [6], Bhanu et al. [7], Bousbia et al. [4] emphasize the crucial importance of price when choosing dairy products. At the same time, estimates of the degree of influence of these factors for consumers as a whole for dairy products and for their individual varieties differ significantly, due to the regional specifics of demand.

In Ukraine, the level of product prices and population income level also affect the volume of consumption of milk and dairy products. Thus, Gurska I.S. and Lukyanova M.M. claim that volume of milk consumption is determined by the population number (by 75.7%), the price level (by 93.3%), and the income level (by 79.2%) [8]. Another result of the calculations was obtained by Mudrak R.P., Tsymbalyuk Y.A., Korman I.I., who argue that the assumption of the existence of interconnection between the level of consumption of milk and dairy products and the level of income and prices for the products in general was confirmed. However, the expected bond density was not confirmed – a strong bond was assumed ($R > 0.7$), instead it was found out that the bond is average ($R = 0.698$), and the demand for milk and dairy products is inelastic both in terms of income, and of the price [9]. The inconsistency of the conclusions of these researchers may be due to different time periods for which the analysis of relevant indicators was conducted. If we analyze the dependence of dairy consumption on the main factors of demand in the regional context, the results may also differ significantly due to the presence of regional differentiation in terms of income growth and price growth. In addition, price elasticity and elasticity of demand for income are not the same for the entire range of dairy products, due to consumer preferences.

The activity of dairy enterprises is influenced by a number of factors. The first and most significant is the dependence of the industry on suppliers of raw materials, which, in turn, is determined by peculiarities and current state of the livestock industry [10]. In recent years, large enterprises and households in Ukraine have seen a steady decline in the number of cattle and 50 to 120 thousand cows are lost each year [1]. The main volumes of milk and its stockpiling are concentrated in households – 80% of all raw milk, and almost 90% of households keep 1-2 cows, which means a lack of control over milk quality and low level of technology used [11]. The result was a shortage of quality raw milk on the market and increase of the purchase prices for milk. In addition, the opening of new sales channels for Ukrainian dairy products at a favorable price on the international market was crucial [12]. At the same time, the strength of the influence of these factors on the volume of supply needs to be studied.

Another feature of the formation of raw milk supply in Ukraine is the situation when two types of milk producers appear and even compete with each other – high-tech dairy farms with an average stock of 500 cows and more, and households which comprise almost 1 million households with a stock of 1-2 cows, which they keep to provide dairy products for their own families and for the sale of remainder in rural markets, as well as to provide dairy products for relatives and neighbours. Such milk is traded outside the organized market and is practically not documented anywhere. The population sells only 14% of the produced milk for processing [13].

In Ukraine, the supply of milk-processing enterprises also has regional peculiarities, related to nature and climatic conditions that affect the formation of the raw material base. Modern milk-processing enterprises, as a rule, have already formed their raw material zone, which affects regional indicators [13]. The main focus of this article is to study the impact of factors of consumer demand and supply of raw materials on changes of volumes in milk production by processing enterprises of Cherkassy region of Ukraine.

III. METHODOLOGY

The analysis of scientific works presented in the literature review allowed to hypothesize that the formation of supply by milk-processing enterprises is influenced by consumer demand, which in turn has the dependence of the form: consumption = f (economic factors (income, price), subjective factors (level of confidence in quality, advantages in consumption, etc.). The study of the level of influence of these factors on the volumes of consumption of dairy products was carried out by methods of correlation and regression analysis and determination of coefficients of price elasticity of demand and elasticity of demand by income. Analysis of the impact of the raw milk material factor on the activities of milk-processing enterprises was carried out based on the hypothesis that has the dependence of the form: supply of raw milk = f (purchase prices for raw milk, cow productivity, cattle livestock), followed by determination of the influence of these factors by means of correlation and regression analysis.

IV. RESULTS

Cherkassy region is one of the agrarian areas of Ukraine, which has more than 1.2 million inhabitants, including almost 44% in rural areas. This fact contributes to a significant expansion of livestock production. The share of the region in the all-Ukrainian milk production is relatively constant: from 4.1% in 1990 to 4.9% in 2017 [14].

During 2010-2017, the consumption of milk and dairy products per capita was characterized by unstable dynamics (Table 1). To determine the level of the impact of prices and incomes on it, a correlation was established between them, according to which the correlation coefficient is 0.705, so the density of the relationship is average; the coefficient of determination is 0.498, therefore, the variability of the function by 49.8% is determined by the variability of the selected factors. The obtained regression equation has the form:

$$Y = 240{,}845 - 0{,}007x_1 + 0{,}001x_2.$$

where Y is the consumption of milk and dairy products per capita, kg; x_1 – average sales prices of milk and dairy products, hrn per 1 tone; x_2 – disposable income per capita, hrn.

At the same time, the coefficient of pair correlation between prices and incomes is 0.98, which indicates their multi-collinearity. This is explained by inflationary processes, when the size of nominal remuneration for work increases every year, which means a rapid growth of the consumer price index in Ukraine [15].

Table 1. Consumption, the level of prices for milk and dairy products and disposable income per capita in Cherkassy region of Ukraine

Year	Consumption of milk and dairy products per capita, kg	Average sales prices of milk and dairy products, hrn per 1 tone	Disposable income per capita, hrn
2010	221,2	5395,011	15769,2
2011	218,1	5977,517	18246,3
2012	233,9	5211,057	20717,9
2013	231,8	6686,322	21633,2
2014	237,6	7047,382	21760,5
2015	226,9	8038,942	26969,7
2016	221,1	10520,68	32327,2

2017	206,2	13246,52	41853,5

The analysis of paired linear regressions revealed that the change in prices affects the change in consumption by only 43.7%, and the change in income – by 35.7%. Low and negative values of the coefficient of elasticity of demand by income (Figure 1) indicate both a sufficient level of saturation of consumer demand for dairy products in Cherkasiy region, and the transformation of the structure of expenditures in favour of other products. This contradicts the conclusion of Hrybynyuk O.M., Lysak M.A. and Pugachov V.M. that among the main food products in Ukraine only bread, oil and butter have coefficients of income elasticity less than one, and all the other products, except sugar, are the so-called "luxurious products" and their elasticity exceeds one [16]. This fact does not also correspond with the results of the calculations of Fedulova I.V. and Mostenska T.L., who determined that an increase in average monthly wages by 1% leads to an increase in consumption of milk and dairy products by 1.72% [17]. At the same time, this confirms the results of calculations by Mudrak R.P., Tsymbalyuk Y.A., Korman I.I. [9].

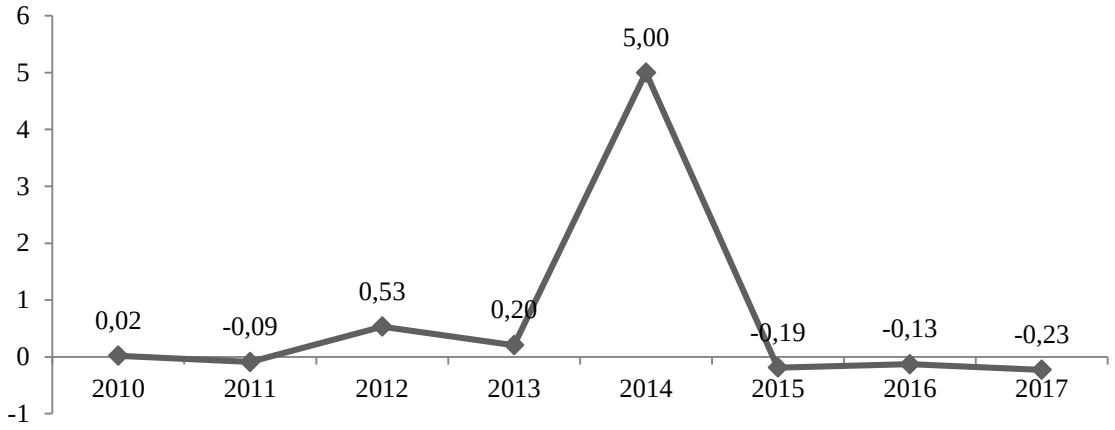

Figure 1. Dynamics of the coefficient of elasticity of demand for milk and dairy products by income

At the same time, it could be concluded from the dynamics of the elasticity of demand for milk and dairy products, that consumers consider these goods low-value, but in fact negative values since 2015 have been determined by the reconsideration of household spendings, in particular a significant increase in housing spendings – from 9.2% in 2010 to 17% in 2017, and reduction in the share of food expenditures – from 51.6% in 2010 to 47.9% in 2017 [18]. The rapid increase in the value of the coefficient in 2014 is caused by a slight increase in the nominal disposable income of Cherkassy inhabitants that year in comparison with other years of the analyzed period and decrease in real income.

It is important in the analysis of price elasticity of demand to take into account the product structure of dairy products, because the price per 1 kg of cheese is much higher than the price of 1 liter of milk, which should theoretically increase the value of price elasticity of cheese in comparison with milk. However, the results of calculations show that during the analyzed period the constant dependence between the change in the prices level and the volume of purchases of certain types of dairy products was not detected (Table 2).

Table 2. Dynamics of the coefficient of price elasticity of demand for milk and dairy products

Product	2010	2011	2012	2013	2014	2015	2016	2017
Processed liquid milk	0,29	2,22	1,65	0,84	-0,35	-0,18	0,22	-0,16
Butter	0,32	1,97	2,12	0,70	0,33	-0,24	-0,05	-0,64
Fresh unfermented cheese (unripe, including whey cheese and cottage cheese)	1,50	3,22	4,76	2,80	-0,29	-0,16	0,16	0,11
Rennet and processed cheese	1,22	1,43	1,32	0,36	-0,67	-0,05	0,10	0,05
Fermented milk products	1,33	1,72	3,98	1,33	-2,44	-0,17	-0,12	-0,35

During 2010-2013, the highest values of price elasticity coefficients were in the categories "fresh unfermented cheese" and "fermented milk products". But demand for other categories was

highly elastic. Since 2014, there has been a decrease in the coefficients of price elasticity for all types of dairy products. This is partly due to the revival of the shadow sector of dairy products market, which is estimated at 20-25% level, where the prices for consumers are lower by 15-30%. In addition, a large amount of dairy products on the Ukrainian market are counterfeited, particularly in case of butter, cheese and other products [19]. Media coverage of the results of consumer expertise, which resulted in detection of discrepancies in product quality, has reduced the level of consumer confidence that they are willing to provide to the sellers. Therefore, for some buyers, lower prices for products are raising doubts as for their quality.

The availability of high-quality raw milk and its cost have a significant impact on the formation of supply by milk-processing enterprises. In turn, the volume of raw milk production is determined by the livestock and their productivity, as well as purchase prices for milk. In 2010-2017, the reduction in the cattle livestock in Cherkassy region reached 17.3 thousand heads (18.1%), while their productivity increased by 1275 kg (26.7%) (Table 3).

Table 3. Supply of raw milk by all categories of farms in Cherkassy region of Ukraine and the factors that determine it

Year	Milk production, thous. tones	Purchase prices for raw milk, hrn per 1 tone	Productivity of cows, kg	Cattle livestock, thous. heads
2010	478,9	2900,9	4779	95,4
2011	463,9	3097,7	5257	93,5
2012	498,5	2705,3	5357	94,1
2013	511,7	3429,9	5494	95,0
2014	529,8	3645,0	5724	91,2
2015	530,1	4442,3	5780	88,4
2016	519,0	5591,6	6012	83,1
2017	507,9	7461,9	6054	78,1

A significant amount of milk is produced in households, but their share in the total volume is constantly decreasing – from 54.9% in 2010 to 40.8% in 2017. The decrease in the livestock is primarily caused by reduction of the number of private farms in general, which in turn is entailed by active urbanization of population and its low interest in milk production, as well as by the construction of European-level farms [20]. In contemporary conditions, households are not able to ensure high quality milk production for a number of reasons: non-compliance with the requirements for keeping cows, violation of sanitary and hygienic standards and, as a consequence, high level of bacterial contamination of milk; violation of milking technology; high share of human labour in the production process, which negatively affects the quality of products; there is almost no primary processing of milk and the lack of conditions for its cooling (this requires special attention, because cooling is an effective means of preventing the reproduction of bacteria in milk) [21]. Milk-processing enterprises will continue to reduce the level of cooperation with population due to the insufficient level of milk quality, as well as the lack of desire of the milk producer (population) to work for improvement of this quality [22]. The consequence of these reasons is the situation in which only 60-70% of the total milk production goes to industrial processing (Figure 2).

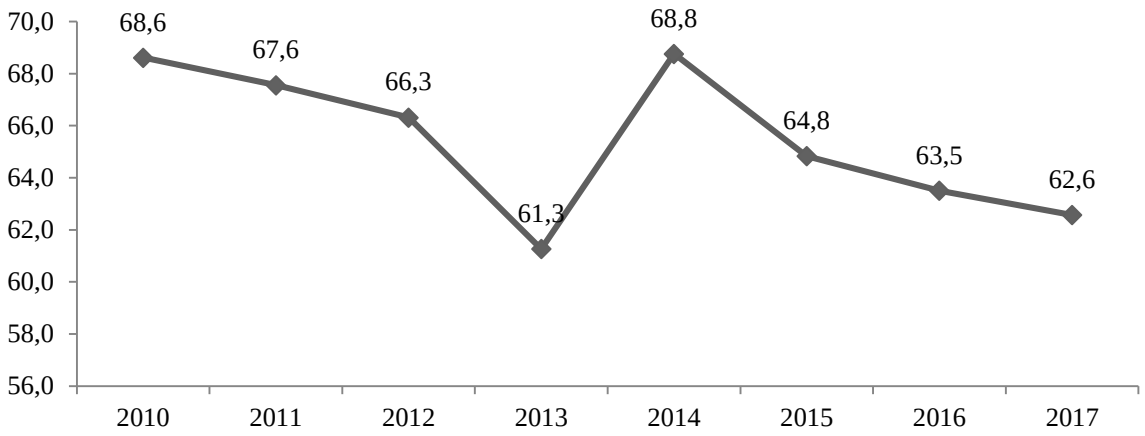

Figure 2. The share of milk produced by all categories of farms in Cherkassy region, received by milk-processing enterprises

Purchase prices of milk-processing enterprises depend on a number of factors: the quality of milk, the market situation in a particular region, etc [23]. Over the past five years, the purchase price of milk from agricultural enterprises in Ukraine has almost equaled the average price of milk in the European Union. The main reason for the rise in the price of milk was the increase in the cost of dairy products, as well as the decrease in its supply in the Ukrainian market [8], but private households produce first and second grade milk and non-grade milk in contrast to large farms. Agricultural enterprises provide mechanical milking, cooling of milk, and as a result, they supply raw materials of higher quality, receiving on average twice the price than private households [24].

The use of linear paired regressions revealed that the increase in the productivity of cows had the greatest influence on the formation of the supply of raw milk among the analyzed factors (Table 4). But purchase prices and livestock for the analyzed period did not become determinants of production, which can be explained by two factors: households sell a significant part of their products not to milk-processing enterprises, but in the shadow market, receiving higher prices, or use products for their own needs; reduction of livestock was compensated by increased productivity of cows.

Table 4. Assessment of the influence of factors on the formation of the supply of raw milk by all categories of farms in Cherkassy region of Ukraine

Factor	Correlation coefficient	Determination coefficient	Regression equation
Purchase prices for raw milk	0,39	0,15	Y= 481,566 + 0,005x
Productivity of cows	0,72	0,52	Y= 281,694 + 0,040x
Livestock	0,40	0,16	Y= 641,405 - 1,518x

In general, it can be stated that during the analyzed period for the milk-processing enterprises of Cherkassy region of Ukraine problems did not exist in raw milk material as it is, but in high-quality raw milk material.

V. CONCLUSIONS

The results of the analysis of the peculiarities of consumer demand formation in Cherkassy region of Ukraine during 2010-2017 revealed that the consumption of milk and dairy products per capita was characterized by unstable dynamics, but the value of the coefficient of variation was only 0.045, i.e. 4.5%, and the oscillation coefficient - 0.14, which does not indicate a clear tendency in demand reducing or increasing. The main economic demand factors such as price of dairy products and disposable income per capita during the analyzed period showed a synchronized upward trend, and the correlation coefficient between them was 0.98. Regression analysis revealed that the change in prices affects the change in consumption volume by only 43.7%, and the change in income - by 35.7%. Calculations of the elasticity of demand for milk and dairy products by income showed that in 2010-2013 demand was inelastic, as these products are an integral part of the consumer basket of many

Ukrainians. In the crisis year of 2014, with a reduction in real incomes, demand became highly elastic and in 2015-2017 the coefficient became negative due to factors of both economic nature (increasing share of expenditures for housing services, etc.) and psychological nature (anti-advertising impact, trust in quality, change of preferences, medical contraindications, etc.).

Calculations of price elasticity of demand for certain categories of dairy products showed that for all assortment groups in 2010-2013 the values of coefficients were positive, i.e. the increases in price did not reduce consumption, but rather expanded it, especially for fresh unfermented cheese and fermented milk products. Since 2014, the tendency has changed - for all products, except for fresh unfermented cheese, the increase in prices caused a slight reduction in consumption, i.e. demand for them was characterized by low elasticity. At the same time, these tendencies do not fully reflect the reaction of consumers in Cherkassy region to price changes, as they do not take into account the growth of purchases amounts of dairy products in the shadow market, caused by declining confidence in quality.

A study of the impact of the main factors determining the processing enterprises' of Cherkassy region procurement of raw milk found out that the total milk production by all categories of farms in 2010-2017 increased, except in 2017, due to increased productivity of cows, which compensated for the reduction of their livestock. At the same time, the level of purchase prices for milk did not have a significant impact on the supply of raw milk, which is explained by the focus of small producers on the shadow sales channels, as well as the use of milk for their own needs. Taking into account the fact that milk-processing enterprises receive around 65% of the produced raw milk materials, the limiting role of this factor in the formation of supply in the short term perspective is not mentioned. However, there may be a shortage of raw materials of the required quality due to the existence of a significant share of households in total milk production, whose products do not meet the standards.

To maintain their market positions, milk-processing enterprises of Cherkassy region need to take measures to increase consumer confidence in the quality of their products, as well as to try and make long-term direct contracts with producers of quality raw milk materials.

REFERENCES

1. Skopenko N.S., Evseeva-Severina I.V., Bovkun A.O. Contemporary state and prospects of development of the market of milk and dairy products of Ukraine. *Food resources*. 2019. № 13. P. 279–290.

2. Zingone F., Bucci C., Iovino P., Ciacci C. 2017. Consumption of milk and dairy products: Facts and figures. *Nutrition*. Vol. 33, no. 1, p. 322-325. URL: https://doi.org/10.1016/j.nut.2016.07.019

3. Davis C. G., Yen S. T., Dong D., Blayney D. P.. Assessing economic and demographic factors that influence United States dairy demand. *Journal of Dairy Science*. Vol. *94*, Issue *7*, July 2011, Pages 3715-3723. URL: https://www.journalofdairyscience.org/action/showPdf?pii=S0022-0302%2811%2900370-5

4. Bousbia, A., Boudalia, S., Chelia, S., Oudaifia, K., Amari, H., Benidir, M., Belkheir, B., Hamzaoui, S. 2017. Analysis of factors affecting consumer behavior of dairy products in Algeria: A case study from the region of Guelma. *Internastional Journal of Agriculture Research*. Vol. 12, no. 2, p. 93-101. URL: https://doi.org/10.3923/ijar.2017.93.101

5. Bus, A. E. M. and Worsley, Anthony. 2003. Consumers` sensory and nutritional perceptions of *t*hree types of milk, *Public health nutrition*. Vol. 6, no. 2, pp. 201-208.

6. Ahmadi Kaliji, S., Mojaverian, S. M., Amirnejad, H. and Canavari, M. 2019. Factors Affecting Consumers' Dairy Products Preferences. *AGRIS on-line Papers in Economics and Informatics*, Vol. 11, No. 2, pp. 3-11. URL: https://www.researchgate.net/publication/332266908_Factors_Affecting_Consumers'_Dairy_Products_Preferences

7. Bhanu, B., Serma Saravana Pandian, P. V., Vinothini, P. and Mathanghi, S. K. 2017. Analysing the Consumer Preference for Dairy Products in Trivandrum City, India. *International Journal of Science, Environment and Technology*, Vol. 6, No. 1, pp. 650-654.

8. Gurska I.S., Lukyanova M.M. Functioning of the domestic market of milk and dairy products. *Innovative Economics*. 2019. № 3–4. P. 30–39. URL: http://nbuv.gov.ua/UJRN/inek_2019_3-4_6

9. Mudrak R.P., Tsymbalyuk Y.A., Korman I.I. Marketing analysis of the national market of milk and dairy products. *Actual problems of economy*. 2016. № 8. P. 69–84.

10. Drozdova V.A., Vekshina A.P. Development of the dairy industry: contemporary state and prospects. *Scientific Bulletin of Uzhgorod National University*. Series: International Economic Relations and the World Economy, 2018. Issue. 22 (1). P. 101–105.

11. Shiyan D.V., Chumak G.M. The level of development of dairy farming as a factor of the formation of the dairy subcomplex in the regions. *Bulletin of KhNAU*. Series: Economic Sciences, 2019. № 1. P. 82–90.

12. Vasylchenko O.M. Economic efficiency of milk production in agricultural enterprises. *Economic analysis*. 2018. T. 28 (2). P. 110–118.

13. Kozak O. Trends in dairy consumption in Ukraine. Impact of the pandemic. URL: https://infagro.com.ua/olga-kozak-predstavitel-ifcn-v-ukraine-vedushhiy-nauchnyiy-sotrudnik-nnts-iae-tendentsii-potrebleniya-molochnyih-produktov-v-ukraine-vliyanie-pandemii/

14. Agriculture of Cherkassy region in 2018: Statistical Yearbook / Head Department of Statistics in Cherkassy region; [resp. for the release L.Ye. Boyko]. Cherkassy, 2019. 106 p.

15. Kyfyak V.I., Babchuk A.M., Rudko K.I. Inflation as a determining factor influencing the welfare of the population of Ukraine. *Economy and state*. 2018. № 1. P. 86–90.

16. Hrybyniuk O.M., Lysak M.A., Pugachov V.M. Elasticity of demand for food products. *Economics of agro-industrial complex*. 2017. № 6. P. 59–64.

17. Fedulova I.V., Mostenska T.L.. Using demand functions to balance the development of food markets. *Bulletin of the National University "Lviv Polytechnic". Management and entrepreneurship in Ukraine: stages of formation and problems of development*. 2015. № 819. P. 189–197.

18. Incomes and expenditures of the population in 2017: Statistical Yearbook / State Statistics Service; [resp. for the issue N.M. Smyshlyaeva, L.O. Gvozdik]. Kyiv: State Enterprise "Information and Analytical Agency", 2017. 106 p. URL: https://ukrstat.org/uk/druk/publicat/kat_u/2019/zb/02/zb_dvn2017.pdf

19. Loshakova N. The results of the year in the milk market: manufacturers are increasingly oriented to China and the EU. 2019. URL: https://delo.ua/business/itogi-goda-moloko-349186/.

20. Moshkovska O. Analysis of the modern state of the dairy sub-complex of Ukraine, problems of its development and ways of their solution. *Agrosvit.* 2019. № 18. P. 16–23.

21. Shevchenko A.V., Tabachuk N.O. The contemporary state of the dairy market and ensuring its quality in the context of Ukraine's European integration. *Scientific Bulletin of Uzhgorod National University*. Series: International economic relations and the world economy. 2019. Issue 27 (2). P. 101–107.

22. Fasteyev M. The dairy industry of Ukraine continues to transform. 2019. URL:: https://infagro.com.ua/maksim-fasteev-vedushhiy-analitik-infagro-molochnaya-otrasl-ukrainyi-prodolzhaet-transformirovatsya/.

23. Volyak L.R., Halytska A.S. Analysis of milk and dairy production in Ukraine. *Economics and society*. 2018. Issue 19. P. 1393–1399.

24. Chmut A.V., Antosh N.V. State and development trends of the milk and dairy products market in Ukraine. *Economics and society*. 2018. Issue 17. P. 174-181.