ECONOMETRIC ANALYSIS OF LIVESTOCK PRODUCTION IN REGIONS USING A PANEL MODEL (ON THE EXAMPLE OF SURKHANDARYA REGION)

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Abstract: In this thesis, the process of growing the main types of livestock products is deeply analyzed on a scientific basis using a panel data model. Also, a random effect model aimed at increasing the efficiency of livestock production in the region was studied, and proposals and recommendations for its practical application were developed.

Keywords: economic-statistical methods, linear multifactorial regression model, constant-effect model, random-effect model.

One of the strategic directions of state policy in the Republic of Uzbekistan is the development of agriculture, in particular, the livestock sector, strengthening the food security of the population, and diversifying sources of income. Animal husbandry has become not only a part of the industrial sector, but also a rapidly developing socio-economic sphere, and when its effectiveness is increased, it provides a great impetus not only for an insured food supply, but also for economic growth in a wide range, from small farms to large enterprises.

In the livestock sector, the Surkhandarya region is distinguished by unique natural and climatic conditions, rich pasture potential, and extensive crop reserves. In a short period of time, there are opportunities for the effective use of available resources, optimization of production costs, and modernization of the region's livestock industry through the widespread introduction of modern technologies.

Therefore, the analysis of the effectiveness of livestock production in the Surkhandarya region, the identification of existing problems, and their substantiated assessment using a panel data model are relevant from a scientific and practical point

of view. This approach is an important tool in ensuring the rapid development of livestock farming in the region and clearly defining future development strategies.

Using available statistical data, models of linear multifactorial regression, constant effects, and random effects were constructed in the Gretl program for the volumes of milk and egg production in the districts of Surkhandarya region, and final conclusions were developed based on their results. They are:

Table 1.

Summary of the results of the Gretl program for the production of milk and egg products by districts of Surkhandarya region.[1]

Model conclusions for dairy products					
№			**R^2**		
		$y = e^{6,62501} \cdot x_5^{0,839245}$	530882	326752	0,009098
		$y = \frac{e^{5,20108+0,13i_3+0,13i_4+0,09i_7}}{e^{0,92i_1+0,22i_2+0,14i_6+0,20i_8}} \cdot \frac{e^{0,06i_{12}} \cdot x_1^{0,0235228} \cdot x_5^{1,13066}}{e^{0,35i_9+0,89i_{10}+0,09i_{11}+0,69i_{13}}}$	97813	024500	0,961987
		$y = e^{4,95778} \cdot x_1^{0,0235228} \cdot x_5^{1,13066}$	0,997813	024500	0,961987
Model summaries for egg products					
		$y = \frac{x_6^{1,40801}}{e^{6,30581} \cdot x_1^{0,201370}}$	0,838188	0,412538	0,906999

[1] Author's calculation results based on data from the National Statistics Committee of the Republic of Uzbekistan

		$y = \frac{x_1^{0,274965} \cdot x_6^{1,17524} \cdot e^{0,03i_6+0,12i_{10}}}{e^{6,00382+0,67i_1+0,20i_2+0,79i_3+0,44i_4+0,4}} \cdot \frac{1}{e^{0,15i_7+0,33i_8+0,87i_9+0,61i_{11}+0,26i_{12}+2,12i}}$	0,920182	0,316226	1,413008
		$y = \frac{x_1^{0,274965} \cdot x_6^{1,17524}}{e^{6,49187}}$	0,920182	0,316226	1,413008

According to the conclusions of the above model, the sum of squared residues for dairy products is very small and is equal to 0.040816, and low values of the Akaike (AIC) and Schwartz (BIC) criteria indicate the compactness and optimality of the model. There is a positive autocorrelation DW<2 (i.e., the previous residue has a positive effect on the subsequent residue). This time panel corresponds to the nature of the data and is expected and does not affect the main results of the model.

Analysis of the model results shows that the expansion of the land area allocated for food production and the increase in the population have a significant positive impact on the volume of dairy production. The expansion of land resources increases production capacity, which expands the fodder base for livestock and ensures an increase in milk production. At the same time, population growth leads to an increase in domestic consumer demand, which stimulates producers to grow more dairy products. As a result, these factors play an important economic and social role in increasing the volume of dairy production.

According to Table 1, the factors influencing the volume of egg production were assessed based on logarithmic panel data. According to calculations, the sum of the residual squares (RSS) of the model is 6.79, which indicates a low level of error of the model.

The results of the information evaluation criteria as a model are as follows: Akiake (AIC) -59.21, Henna-Kuina (HQ) -74.84, Schwarz (BIC) -98.10. The relatively low value of these values indicates the compactness of the model, its optimality, and the absence of redundant parameters. A smaller output of AIC than HQ and BIC indicates better data compatibility of the model.

According to the analysis results, it was established that the main factors positively influencing egg production volumes are the area of land allocated for fodder cultivation

and the number of heads. This means that with sufficient feed and a large number of heads, production volumes increase, which means that the model results are statistically reliable and economically logical.

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