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DEPENDENCE OF MEAT PRODUCTION ON THE POTENTIAL OF FODDER PRODUCTION IN UZBEKISTAN

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ABSTRACT
In the article, the dependence of meat production in the Republic of Uzbekistan on the volume of fodder production was proved by the regression equation using long-term statistics.
KEYWORDS: *agriculture, livestock, meat cultivation, horticulture, fodder, regression equation, correlation index.*

INTRODUCTION

The main purpose of the reforms carried out in agriculture in the Republic of Uzbekistan is aimed at providing the population of the country with raw materials of food products, industrial sectors, effective use of feedings and increasing the export potential of agricultural sector products. The rapid development of the livestock network in the country plays an important role in providing the population with cheap and high-quality meat and other food products, especially in increasing employment and increasing incomes of citizens living in rural areas.

At the same time, the current state of affairs in the regions dictates the implementation of specific measures to support these Network Enterprises, increase the feed base. Special attention is paid to scientific approaches to the development of livestock in the Republic of Uzbekistan and the wide introduction of advanced modern technologies, saturation of the domestic market with meat products, further stimulation of production and processing of imported substitute and export-oriented meat products, ultimately improving the well-being of the population and increasing incomes [1, 2019].

THE MAIN FINDINGS AND RESULTS

I. Proposed Methodology

The theoretical and methodological foundations of the economic and geographical study of agriculture are presented in the works of foreign scientists I.G. Tyunen, K.I. Ivanov, V.G. Kryuchkov, A.M. Nosonov, A.N. Rakitnikov. The first monographs on agricultural geography in the republic were carried out in the middle of the last century by professors Z.M. Akramov and A.N. Rakitnikov [5, 2001]. They led a comprehensive economic and geographical expedition organized in the Zarafshan River Basin, and published the monograph “Agricultural Geography of Samarkand and Bukhara Regions in 1961” [3, 2020]. The economic and geographical aspects of the development of the agricultural sector are illustrated by different regions: M.Yusupov, R.Khodiev, A.Valikhanov, E.Umarov, S.Saidkarimov, T.Egamberdiev, Yu. Akhmadmadiev A. Kholmirzaeva [4, 2014].

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II. Result Analysis

Meat production depends on several factors. However, in the conditions of meat production in Uzbekistan, fodder base is of primary importance [2, 2015]. Therefore, in this study, it was proved by the regression equation that the increase in meat (live weight) production depends primarily on the volume of fodder production. For this purpose, long-term data of the Statistics Committee of the Republic of Uzbekistan were used [6, stat.uz].

Table 1
Fodder and meat products (live weight) grown in the Republic of Uzbekistan

Years	Fodder, Thousand ton	Meat (live weight), Thousand ton
2013	5353,5	1787,8
2014	6084,6	1906,3
2015	6390,5	2033,4
2016	6684,2	2172,5
2017	6895,1	2286,8

The table is based on the data of the statistics section of the Republic of Uzbekistan.

According to the information presented in this table, we find the function of linear $\hat{y}(x) = a + bx$, which expresses the correlation between the size of fodder and the amount of meat grown in a living weight, that is, the amount of demand (*y*) for the product, we draw up the regression equation for the size of fodder (*x*).

The double regression equation represents the relationship between two variables based on the law of change of the average value of the data obtained from the observation results. If the dependence of demand on (*y*) forage (x) is expressed, for example, by the equation $y = a + b \cdot x$, then this equation states that when the amount of forage increases, the demand increases by an average of b(b>0) represents.

In practice, in each individual case, the magnitude y consists of two additions as follows.

$$y_j = y_{x_j} + \varepsilon_j$$

where: y_j - is the actual value of the resultant indicator;

y_{x_j} - theoretical values of the result obtained from the regression equation;

ε_j - is random variables that represent the deviation of the actual value of the resultant indicator from the theoretical value determined in the regression equation.

In this regard, we use the method of small squares.

$$S = \sum (y_i - y_{xi})^2 = \sum (y - a - b \cdot x)^2;$$

We find the minimum of this function. To do this, we derive *a* and *b* from this function on the variables.

$$\begin{cases} \dfrac{dS}{da} = -2\sum_{i=1}^{n} y_i + 2 \cdot n \cdot a + 2 \cdot b \sum_{i=1}^{n} x_i = 0 \\ \dfrac{dS}{db} = -2\sum_{i=1}^{n} x_i \cdot y_i + 2 \cdot a \sum_{i=1}^{n} x_i + 2 \cdot b \sum_{i=1}^{n} x_i^2 = 0 \end{cases}$$

$$\begin{cases} n \cdot a + b \sum_{i=1}^{n} x_i = \sum_{i=1}^{n} y_i \\ a \sum_{i=1}^{n} x_i + b \sum_{i=1}^{n} x_i^2 = \sum_{i=1}^{n} x_i \cdot y_i \end{cases}$$

Divide the equations in the system by n, and using

$$\overline{x} = \frac{1}{n}\sum_{i=1}^{n} x_i, \ \overline{y} = \frac{1}{n}\sum_{i=1}^{n} y_i, \ \overline{xy} = \frac{1}{n}\sum_{i=1}^{n} x_i y_i, \ \overline{x^2} = \frac{1}{n}\sum_{i=1}^{n} x_i^2, \ \overline{y^2} = \frac{1}{n}\sum_{i=1}^{n} y_i^2$$

equations, we obtain the following equation. $\begin{cases} a + b \cdot \overline{x} = \overline{y}, \\ a \cdot \overline{x} + b \cdot \overline{x^2} = \overline{y \cdot x} \end{cases}$

Table 2

y	x	x^ 2	y ^2	x • y
1787,8	5353,5	28659962,25	3196229	9570987,3
1906,3	6084,6	37022357,16	3633980	11599072,98
2033,4	6390,5	40838490,25	4134716	12994442,7
2172,5	6684,2	44678529,64	4719756	14521424,5
2286,8	6895,1	47542404,01	5229454	15767714,68
2037,36	6281,58	39458247,3	4150836	12797839,83

$$\begin{cases} a + 6281{,}58 \cdot b = 2037{,}36, \\ 6281{,}58 \cdot a + 39458247{,}3 \cdot b = 12797840{,}83 \end{cases}$$

$$b = 0{,}32,$$

$$a = 26$$

Putting the values of the parameters *a* and *b* in the given linear regression equation, we write the following regression equation.

$$y = 0{,}32x + 26$$

$y(x+1) - y(x) = 0{,}32$ means that when fodder increases by 1 ton, meat (live weight) increases by 0.32 tons.

1.1. Correlation coefficient

Let's calculate the dependency index. Such an indicator is the sample correlation coefficient calculated according to formula $r_{xy} = \dfrac{\overline{xy} - \overline{x} \cdot \overline{y}}{\sigma_x \cdot \sigma_y}$:

$$\sigma_x^2 = \overline{x^2} - \overline{x}^2 = 39458247{,}3 - 4159560{,}25 = 35298687{,}05$$

$$\sigma_y^2 = \overline{y^2} - \overline{y}^2 = 4150836 - 4150835{,}8 = 0{,}2$$

r_{xy} The linear correlation coefficient takes values from -1 to +1 $r_{xy} = \dfrac{\overline{xy} - \overline{x} \cdot \overline{y}}{\sigma_x \cdot \sigma_y} = 0{,}964$.

The correlation between factors can be weak or strong. Their criteria are evaluated on the Cheddock scale:

$0.1 < r_{xy} < 0.3$: weak;
$0.3 < r_{xy} < 0.5$: average;
$0.5 < r_{xy} < 0.7$: sensible;
$0.7 < r_{xy} < 0.9$: high;
$0.9 < r_{xy} < 1$: max
The correlation between the factors r_{xy} =0.96 is very high.

1.2. Elasticity coefficient.

For this purpose, the coefficients of elasticity and beta coefficients are calculated.
The coefficient of elasticity is found from the following formula: **Error!**

$$E = 0{,}32 \frac{6281{,}58}{2037{,}36} = 0{,}98$$

This indicates the percentage change in the y of the resulting factor y when the mean factor changes to x 1%. It does not take into account the degree of variability of the factors.

Therefore, when it changes to x 1%, it changes to y 98%. In other words, the effect of x on y is significant.

1.3. Correlation index (empirical correlation ratio).

$$\eta = \sqrt{\frac{\sigma_{ycp}}{\sigma_{y_0}}} = \sqrt{\frac{62280,19}{3556038,5}} = \sqrt{0,017514} = 0,130384$$

Here $\sigma_{y_0} = 3556037 + 1,573519 = 3556038,5$

$$\eta = 0,130384$$

The value obtained indicates that the factor x has a weak effect on y.

The set of relations for any relationship is determined using the correlation coefficient:

$$R = \sqrt{1 - \frac{\sum (y_i - y_x)^2}{\sum (y_i - \bar{y})^2}} = 0,964212248$$

1.4. Approximation error.

We evaluate the quality of the regression equation using an absolute approximation error.

$$\bar{A} = \frac{\sum |y_i - y_x|}{n} = 0,000616 \cdot 100\% = 0,0616$$

Since the error is less than 15%, it is advisable to use this equation as a regression.

1.5. Determination coefficient.

(Square) The square of the correlation coefficient is called the detection coefficient, which represents the rate of change of the resulting property explained by the change in the factor property.

Often in the interpretation of the detection coefficient it is expressed as a percentage.

In $R^2 = 0,92970526$ i.e. 0.92 % cases the change of x leads to the change of y, in other words, the choice accuracy of the regression equation is higher.

2.1. Significance of the correlation coefficient.

2. Determine the true value of Fisher's F-criterion:

$$F = \frac{R^2}{1 - R^2} \cdot \frac{(n - m - 1)}{m} = \frac{0,92970526}{1 - 0,92970526} \cdot \frac{(5 - 1 - 1)}{1} = 39,6774465$$

Table value of the criterion with $k_1 = 1$ ва $k_2 = 9$, $F_{kp} = 34,12$ degrees of freedom $F > F_{kp.}$

Since the actual value is $F > F_{kp}$, the detection coefficient is statistically significant, and the found value of the regression equation is statistically reliable.

CONCLUSION

Thus, it has been proved that the volume of meat production (live weight) in Uzbekistan depends on the volume of fodder production. We can conclude that in order to increase the production of meat products, the main focus should be on fodder production, only through this can meat production be managed and price controlled.

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