FEATURES OF STATISTICAL METHODS OF FARMS ANALYSING

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Abstract— The article discusses the methods of statistical research of farms. The aim of the study is to develop recommendations and recommendations for improving the analysis of farm activities in the regions and developing econometric models. Criteria for the organization of selective statistical surveys of farms specialized in the production of farm products were improved based on selective representativeness, weights and averages, sampling errors and confidence intervals.

Index Terms— farms, average trend, dispersion trend,econometrics, agricultural crops, trend. .

1 INTRODUCTION

Currently, there are three types of producers in the agri cultural market: agricultural enterprises, dehkan farms and farms. If the first two are traditional, the latter is "new" to the Uzbek economy.

The head of the farm is a farmer. A farmer can be a citizen of the Republic of Uzbekistan who has reached the age of eighteen, having relevant experience or experience in agriculture.

The minimum size of rented land for farms specializing in crop production is at least 30 hectares for cotton and grain production, and at least 5 hectares for horticulture, viticulture, vegetable growing and other crops.

In granting land plots, the farm undertakes to ensure that the productivity of agricultural crops (in average annual yield for three years) is not less than the cadastral assessment of the land. This obligation is enshrined in the land lease agreement.

A peasant farm is a small family farm that is the subject of economic rights for the cultivation and sale of agricultural produce on the personal labor of family members on a household plot granted to the head of the family for the inherited life-long possession. The activity of a peasant economy is regulated by the Law "On Dehkan Farms". A dekhkan farm can be created at the discretion of a member of a dekhkan farm with the formation of a legal entity and without the establishment of a legal entity. A peasant farm shall be created on a voluntary basis and shall be considered as established upon state registration and provision of a land plot in the prescribed manner. An application for allocation of a land plot shall be submitted to the management of the agricultural cooperative or to the management of another agricultural or forestry enterprise, institution and organization with indication of the location, area, composition of the farm and the intended use of the land plot. A peasant farm cannot use hired labor on a permanent basis. A dehkan farm is the head of a family or one of the eligible members of the family, who is entitled to the right of lifelong inheritable possession of the land in the order established by the legislation. State registration of dekhkan economies is carried out within three days from the date of application by the district khokimiyat in the place of permanent residence together with the necessary documents provided by the legislation. A state document certifying the right of permanent possession of a dehkan farm and a certificate of state registration is issued.

Differentiation of a farm from a farm. It is well-known that farms play an invaluable role in supporting the economy of the country and providing the population with agricultural products. Farms in our country are the main subject of agricultural production. Along with private farms, dehkan farms play an important role in agricultural production. In turn, these two agricultural entities have their differences. According to Article 3 of the Law "On farming", the farm is an independent economic entity engaged in agricultural production with the use of leased land.

If the farm operates as a legal entity, the farm can operate both as a legal entity and without a legal entity.

If farming is exclusively specialized in farming, the specialization of the farm is broader and can be established in addition to farming, in livestock, poultry and other areas.

Article 5 of the Law on Farming states that the minimum size of land plots leased to farms specializing in crop production is at least 30 hectares for cotton and grain production, and at least 5 hectares for horticulture, viticulture, vegetable and other crops.

It is worth noting the similarities between the two entities in land use. Land plots allotted for both farming and dehkan farms cannot be objects of privatization, pre-sale, pledge, donation or exchange. Nor can they be leased out for secondary rentals.

Only the farm's right to lease the land and the inherited life tenure of the farm can be pledged to obtain loans from banks.

From the point of view of network development, timely analysis, modeling and forecasting of key indicators of livestock production is important.

Modeling the dynamics of the main indicators of livestock products can be carried out using various models, such as the main trend, trend-season series and linked dynamics. Implementation of each of these methods is possible only if there is a specific database.

Formation of the main trend models is based on the analysis of one-dimensional series of dynamics, namely the

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series of dynamics of specific statistical indicators characterizing the production of a particular product. The modeling of these models is based on the view that any range of dynamics is influenced by a number of factors that can theoretically be distinguished.

2 LITERATURE REVIEW

The issues of social and economic development and prospects of the agricultural sector, including the livestock sector, have been studied by many foreign scientists. In particular, I. Bright [1], R. Jochimsen [2], K.R. McConnell [3], Y. Schumpeter [4], K. Lewis [5] and others conducted theoretical research. In their research, the conceptual approach is mainly based on the socioeconomic development of the agricultural economy, including the livestock sector.

Scientists from the Commonwealth of Independent States: VN Afanasev [6], AP Zinchenko [7], MV Braslavets [8], PK Kundius, IN Chuev, VV Kovalev, Bashkatov [9], AI Gozulov [10], Yu.E Gaabe [11], A. Ivashchenko [12] and others in their research have paid special attention to improving the statistical methodology and database of the livestock sector.

Economic development of agriculture and assessment of structural and structural changes in Uzbekistan have been investigated by economists T.Shodiev [13], BB Berkinov [14], DN Saidova, BT Salimov and others.

However, these studies do not have a comprehensive statistical study on the production of basic livestock products, the development of the livestock sector in the regions, the factors affecting them, the potential and prospects for the regions. These aspects served as the basis for choosing the theme of this dissertation, defining its goals and objectives.

3 METHODOLOGY

In scientific literature these factors are called components of a series of dynamics. From the point of view of separation of dynamics lines into components, it is a theoretical abstraction, as it is a pure mathematical procedure that is based on statistical methods. However, despite the fact that dividing the actual levels of a series of dynamics, this method can be useful in solving various problems of analysis and forecasting. All components of the dynamic range are interconnected and can be expressed as models:

Additive model: Y = T + K + S + E.

Creating seasonal component models is possible only if the initial dynamics of the dynamics includes data presented monthly or quarterly. If the initial series of dynamics is based on the yearly data, the model only covers the trend and the random component. Creation of a trend model of nonlinear components of dynamic dynamics is carried out in several stages:

1. A priori (non-experimental) analysis of dynamic series.

2. To test the hypothesis that there is a major trend in the dynamics of the study.

3. Determine the main trends and parameters of the relevant model.

4. Random component analysis.

5. Creating a generalization model.

We will now analyze the dynamics of production of major livestock products from 2000 to 2018. The selection of 2000 as the starting point for the analysis was due to the fact that by that time the decline in production of the considered types of livestock products would cease and there would be a change in trend.

In the first phase we conduct a priori analysis of the studied series of dynamics and the analysis of the analytical and averaged mean of the dynamics series. The following analytical indicators are used to assess the dynamics and dynamics of socio-economic events:

- growth rate (decrease);
- rates of relative growth (decrease);
- additional growth rate (decrease);
- the absolute value of one percent increase.

Each of these indicators is of three types: chain; Basis; on average. The basis of calculating these indicators of dynamics is the comparison of levels of the periodic series. If the comparison is made with only one level, which is taken as the base of the comparison, these indicators are called baseline indicators. The basis of comparison is either the initial level of the dynamic array, or the level at which a new stage of development begins.

When comparisons are made on a variable basis and each successive level is compared to the previous one, the indicators calculated in this way are called chain indicators.

4 ANALYSIS AND RESULTS

At the next stage of analysis, it is advisable to move to a study of trends. To this end, the hypothesis that the trend is present is forwarded and investigated. Currently, there are many criteria for the existence of a trend, which differ in strength and complexity of mathematical hardware. These methods allow to identify both general trends in the development of basic livestock production indicators, as well as trend by species - average and dispersion trend.

Tabe 1 One-dimensional criteria

	Criterion value = 0					
	t	Ctandart variables	2-D value	Differentiation	The 95% confidence interval for the mean deviation	
					Low	High
Total milk yield (thous. Tons)	13,790	16	,000	504,8941	427,276	582,513
Cultivation of meat	14,903	16	,000	108,4058	92,9854	123,8264

(thousand tons)	9,724	16	,000	157696,29412	123317,7009	192074,8873

One of the ways in which the tendency to reveal trends and how they are expressed is a cumulative T-criterion. This method is based on the calculation and analysis of the statistical characteristics of the series Y1, calculated by the sum of the deviations from the average Y and the correlations between these deviations. The dynamics of the dynamics underlying the hypothesis that there may not be a trend to be tested on the basis of the T-criterion. On the basis of the data on the dynamics of livestock production (Table 1), the hypothesis that a = 0.05 does not have a trend is rejected, which means that there is a trend.

Table 2 Results of the implementation of cumulative T-criteria in the assessment of trends in the volume of livestock production in farmers

Indicators	**Unit of measurement**	**T "criteria account unit**	**The tendency Availability**
Milk production in farmers	Thous.ton	13,790	available
Livestock and poultry slaughtering in farmers	Thous.ton	14,903	available
Egg farming	Bil.piec.	9,724	Available

Since in practice there are three types of trends - mean, dispersion, and autocorrelations, I need to examine the dynamics of each of these types of trends.

Dynamics of the main indicators of animal products can be tested for the presence of the mean and dispersion trends, and the comparison of the mean levels of the range and the Forster-Stewart method.

Table 3 The results of the implementation of the method of comparing the average levels of livestock production

Indicators	**The average trend**		**The dispersion trend**	
	tp	Results	Fp	Results
Milk production	2,66	available	2,33	Not available
Breeding of cattle and poultry for live slaughter	5,13	available	10,83	Not available
Egg farming	5,27	available	1,43	Not available

The average comparison method is based on the determination of the range and the mean levels of the dispersions. The time series (time-dependent row) is divided into two parts, approximately equal to the number of members. Each is treated as an independent selection set with a normal distribution. If time series has a tendency, the mean and dispersions calculated for each set should differ significantly. Thus, checking for the presence of a trend in the line under study leads to the verification of the hypothesis that the two normally distributed sets are equal.

Testing the hypothesis of the dispersion equation is carried out using the F-criterion, whose calculation value is calculated as the ratio of the dispersions calculated for the two parts of the dynamic range.

If the computational value of F at this level of probability is greater than the table, the hypothesis that the equations of the two normally distributed sets are equal is rejected.

Examination of the moderate trend in all considered rows of livestock production in the Republic of Uzbekistan for the period 2000-2018 (Table 3) shows that the hypothesis of equality of average is rejected for all indicators under review, since >tp= 0.05. ; 10), which means that the averages differ significantly, and the average trend is in these rows.

After proving that there is a trend in the dynamics of the main indicators of livestock products, the trend is calculated using the mathematical function. Dynamics of the studied indicators Analytical equation using the curve between the empirical levels of the initial series is the most common method. The Trend equation is chosen so that it best approximates the real trends and trends in the development of animal events and processes. To do this, many different mathematical functions are used:

$\bar{y}_1 = a_0 + a_1 \cdot t$ - first class;

$\bar{y}_1 = a_0 + a_1 \cdot t + a_2 \cdot t^2$ - secondary;

$\bar{y}_1 = a_0 + a_1 \cdot t + a_2 \cdot t^2 + a_3 \cdot t^3$ - tertiary;

$\bar{y}_1 = a_0 + a_1 \cdot t + ... + a_k \cdot t^k$ *k-level*,

$a_0, a_1, ..., a_k$ – Parameters of the polynomials; The conditional definition of t-time.

To characterize trends in livestock production, the trend models presented in Table 4, using different levels of multidimensionalities using analytical smoothing techniques, have been developed.

Table 4

Equality trend for livestock production in the Republic of Uzbekistan for 2000-2018

Indicators	**Unit of measurement**	Model
Milk production in farmers	Thous.ton	$\overline{Y_t}$ = 28.863- 57452.975t
Livestock and poultry slaughtering in farmers	Thous.ton	$\overline{Y_t}$ = 0.007 t2-28481.987
Egg farming	Bil.piec.	$\overline{Y_t}$ = exp (-107.0399+0,0564 • t)
Indicators	Unit of measurement	$\overline{Y_t}$ = 5.776471*t-11490.747
Milk production in farmers	Thous.ton	$\overline{Y_t}$ = 0.001* t2-5692.683
Livestock and poultry slaughter-	Thous.ton	$\overline{Y_t}$ = exp (4.1786+0.0525376*t)

ing in farmers		
Egg farming	Bil.piec.	$\overline{Y_t}$ =12352.142-24645405.2*t
		$\overline{Y_t}$= 0.001*t3-8116644.655
		$\overline{Y_t}$ = exp (-139.45584+0.075373*t)

An important problem in the next stage of the analysis and modeling of trends in livestock production in the country through the method of analytical alignment is the selection of a mathematical function that best describes the actual patterns of change in indicators. The conclusions regarding the regularity of livestock production indicators depend on the correct solution of the problem.

The selection of the curve form can be based on the criterion taken as the sum of squares of deviations of actual values from the values calculated by the trend equation. From the set of curves, the minimum criterion value is chosen.

Table 5

Key features of adequacy of the trend equations of the main indicators of livestock production in the Surkhandarya region for the period 2000-2018

Index	Model name	Model	R2	Mean square error	F
Milk production	Linear	$\overline{Y_t}$ = 28.863-57452.975t	0.932	40.609	206.118
	Square	$\overline{Y_t}$ = 0.007 t2-28481.987	0.933	40.459	207.764
	Growth	$\overline{Y_t}$ = exp (-107.0399+0,0564 • t)	0.963	0.057	392.447
Breeding for slaughtered cattle and poultry	Linear	$\overline{Y_t}$ = 5.776471*t-11490.747	0.946	7.204	262.324
	Square	$\overline{Y_t}$ = 0.001* t2-5692.683	0.946	7.172	264.824
	Growth	$\overline{Y_t}$ = exp (4.1786+0.0525376*t)	0.982	0.037	808.744
Egg farming	Linear	$\overline{Y_t}$ =12352.142-24645405.2* t	0.871	24877.268	100.586
	Cubic	$\overline{Y_t}$= 0.001*t3-8116644.655	0.871	24744.87	101.204
	Growth	$\overline{Y_t}$ = exp (-139.45584+0.075373*t)	0.958	0.082	342.333

As Lewis points out, the proximity of the level to the empirical range alone does not constitute a fundamental criterion of suitability. A line near the starting line can be taken as much as it needs, but that does not mean that the curve is the level of the line. The concept of a level is a straight, smooth curve that deviates from it, but determines the tendency for a continuous movement of a line. This means that the curve that satisfies the concept of the level must be as simple as possible. However, this does not mean that the complex level can be thought of as a simple curve that does not correspond to the baseline data.

Thus the selected function of the trend must satisfy the following conditions:

- Theoretically justified;
- to have as few parameters as possible;
- that its parameters have a specific economic value;
-the estimated values of the set should be as little as different from the corresponding true observations of the periodic series.

There are a variety of methods that are well-supported by the socio-economic phenomena studied, allowing for the selection of the curve shape.

In practice, as a rule, the methods of mathematical and statistical comparative analysis, based on which the estimation and analysis of the accuracy of the trend models are used. The model serves as an empirical measure of the adequacy of the model and the magnitude of its errors, which can be identified in various ways.

The average absolute error of the Trend equation is a generalized characteristic of the deviation of the empirical and theoretical values of the sign, and the size of the studied character is the same size.

Therefore, in estimation of regularities of change of characteristics in practice the average error of approximity, which is determined by the following formula is used as an indicator of adequacy of trend models

This indicator is a relative indicator of trend model adequacy and does not reflect the dimensions of the studied features. The average error of the approximation shows how close the analytical function of the smoothing is bypassing the values of the initial row.

Thus, the task is to select one of the best possible approaches to the complex trends and regularities in the operation of the complex from the many possible levels of trend that characterize the tendency to change the main indicators of livestock production.

In order to evaluate the adequacy of the Trend equation with the actual trends of the index under consideration, the practice uses the quadratic error of the prognosis.

The disadvantages of mean absolute and mean square errors are their significant dependence on the scale of the phenomena and processes under study.

The results of calculations of the values of accuracy and adequacy criteria for the average residual modulus, average error of approvals, Darbin-Watson criteria, Dynamics of the main indicators of livestock production in Surkhandarya region are presented in Table 5.

An analysis of the adequacy and accuracy characteristics of the trend models presented in the table best describes the dynamics of milk yield in Uzbekistan through a straight

line equation. The value of the average error of the approximation is within the limit of 15% for all the given equations of the trend, but the minimum value corresponds to the linear equation.

Analyzing the key indicators of the accuracy and adequacy of the statistical equations, we can conclude that the trend of variation can be best described by the GROWTH model (Figure 3), which corresponds to the minimum residual modulus and all the criteria of accuracy in the table. will allow.

The projected values of egg production indicate that these trends will remain positive in 2017-2019: according to projections, by 2021, the region will annually produce 389.7 million. more than one egg is produced.

It should be noted that the projected values allow for the prediction of changes in the volume of production of major livestock products by only four years. This is due to the fact that the increase in the number of observers in the statistical collection allows for a more accurate description of this set, whereas the dynamics extension does not always produce the same results, especially when the dynamics series is used to predict key performance indicators for livestock production.

The fact is that information levels are lost as the values move away from the avoidance period, meaning that the values of the dynamic range levels are not uniform in the forecasting. Therefore, the parameters of the equations that encode the growth curves are free from defects and may change their values by subtracting some of the existing members of the array, which may reflect the accuracy of the computational values of the dynamic range equations.

5 Conclusion

In summary, the main objectives of statistical study of the livestock industry in the conditions of economic modernization are: Development of a program for statistical monitoring of the sector's activities; determination of the system of statistical indicators characterizing the results of livestock activity; analysis of the absolute intensity and intensity of changes in the scale of production of major livestock products; modeling and forecasting one-dimensional series of dynamics describing the results of livestock activities; Statistical analysis of various factors influencing the results of animal husbandry, modeling and forecasting of multi-dimensional series of dynamics, etc.

A comprehensive assessment of the state and development of livestock sector in farms is based on a system of statistical indicators. Statistical indicators are the categories summarizing the volume and quantitative ratio of specific events and processes. These indicators reflect the status, development and sustainability of livestock production at various levels of time and space. They allow you to get a description of the individual events and processes, their group status, and the description of the whole set of individual units.

Compilation and analysis of farm statistics is performed at regional, social and sectoral levels. The completeness and scope of the objective system of indicators depends on the level of management of the material and other possibilities of its study, information and analysis tasks.

In order to ensure compliance with statistical laws and requirements of the system of statistical indicators in farms, it is necessary to include the following: compliance of the system of indicators with the goals and objectives of economic and statistical research; to ensure comparability of system indicators; Availability of a uniform methodology for their calculation; logical interrelation of system indicators; the completeness and completeness of representing the object of the research.

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