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THE USE OF THE TRANSLOGICAL FUNCTION IN MEASURING THE COST EFFICIENCY OF BROILER FARMS IN SALAH AL-DIN IN 2021

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Abstract
This study included the estimation of the trans-logical efficiency function of broiler farms in Salah al-Din governorate for the production season 2021. The main data were obtained by designing a questionnaire form that was prepared for this purpose and distributed to 77 fields in all regions of the governorate. The estimation of translogical function and calculation of some associated economic measures were done according to the FronterV4.1 program. The Translog Cost Function was estimated for four independent variables, and the cost efficiency (1.037) was obtained through the analysis in the Frontier v4.1 program. This indicates the need to go to the best use of the inputs due to the surplus and lack of efficiency they achieve. The study also recommended restoring the role of the state represented by the General Poultry Company by preparing chicks with high convertibility and providing good quality feed or providing raw materials for feed such as grains, proteins, and medicines with high efficiency.

Keywords: Cost efficiency, Translog , Broiler Farms, Frontier 4.1

1. Introduction

The agricultural sector, in terms of both plants and animals, in Iraq is considered one of the most important productive sectors, and the high nutritional importance of poultry is due to the great nutritional value it contains, as it is a rich source of animal protein, salt, calcium and other nutrients of high importance. Livestock constitutes an important national wealth and a vital activity in the field of economic activity in general and the agricultural sector in particular. Poultry farming is an industry of importance in the national economy due to its high nutritional value, and poultry prices are acceptable when compared to the prices of meat and other animal derivatives. Paying attention to this sector and working to increase its production provides the possibility to meet the local demand for its products and not have the need to import them from abroad, and this leads to limiting the depletion of foreign currency and its use in other areas that help to achieve economic development. The production of broiler chickens is usually affected by the level of employment of economic resources and the level of their production efficiency, and because of the scarcity of these resources against multiple uses, and we believe that the level of efficiency in use is low, it has become necessary to study this important activity and to identify the economic efficiency (EE) and its components as the most important measures of economic performance efficiency, and then to recognize the economic efficiency of broiler chicken breeders.

1. Research problem

Productive poultry farms in Iraq, like other livestock breeders, suffer from a lack of optimal use of economic resources, and they are in attempts to achieve economic efficiency and its components (technical and specialized efficiency). There may be a deviation from the optimal level resulting in waste and an increase in some undesirable environmental elements. The high rise in the prices of the inputs used in the production process causes an imbalance in the production process, as the prices of production costs rise significantly compared to the importer, which leads to the reluctance of many poultry breeders to work and the reluctance of many consumers to buy the local product.

2. The importance of research

The importance of the research comes from the economic importance of producing chicken meat, which is considered one of the basic foodstuffs in Iraq, as it is considered one of the basic products in achieving food security. Since the study is concerned with conducting a process of estimating the economic efficiency of broiler production farms in Salah al-Din, and in view of the adoption of development plans to increase the production of broiler chickens, the use of various technologies is one of the most important ways that help agricultural expansion in raising productivity. Some of the inputs are important factors to help the farmer in carrying out agricultural operations in the right manner at the right time. Therefore, it was necessary to study the economic effects of using these inputs on the economics of producing broiler chickens.

3. Research objective

The main objective of the research is to measure economic efficiency using the (ATRANS-LOG cost function) method.

This goal is achieved for broiler farms in Salah al-Din Governorate for the year 2021 through the following:

• Estimating the economic efficiency of broiler production farms in Salah El-Din Governorate.

• Determining the effect of some production factors on the quantity produced from broilers.

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• Studying the most important difficulties and problems that negatively affect the economic efficiency of broiler producers in Salah al-Din.

4. Analysis method:

Several analytical methods were used, including the use of the (ATRANS-LOG Production) (Stochastic frontier analysis) function and the efficiency analysis program (Frontier 4.1).

5. Data sources

The study relied on two main sources of data and information for the purpose of achieving the results. These sources are:

• Primary data sources

In its research data, this study relied on primary sources that were obtained from conducting a field survey by distributing a form representing 25% of meat poultry breeders in Salah al-Din, according to specific questions with data related to economic and environmental efficiency, as well as personal interviews with professors of animal production, poultry sector specialists, and some researchers and scholars.

• Secondary data sources

The study relied on secondary data represented by periodic reports, magazines, and correspondences of the two Ministries; Agriculture and Planning, and also included some previous research and studies, web and reference books on the subject of the study, as well as the Food and Agriculture Organization of the United Nations (FAO).

Previous studies

Rahman et al. (2020) studied the food security and technical competence of cucumber growers in Bangladesh. The study used a Stochastic Frontier Analysis (SFA) to assess the profitability and technical efficiency in Bangladesh. They found that cucumber cultivation is a profitable agricultural business, but many cucumber farmers suffer from ineffective technical problems. The study also showed that the average technical efficiency rate for cucumber was about 0.73 %, representing 26% inefficiency in the study area.

Ghorbani, Radmehr and Habibi (2020) focused on technical competence in the agricultural sector in Iran. The study aimed to identify the factors that affect technical efficiency in the agricultural sector. The results of the study revealed that the assumed functional form of the estimate, such as the Translog function, Cobb-Douglas and a Stochastic Frontier Analysis - has a clear positive effect on the estimated standard model.

The study by Ndubueze-Ogaraku and Graves (2020) tested the technical efficiency of the farm in Nigeria using the Stochastic Frontier Approach. The results included

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employment and farm size that positively affected technical efficiency. Moreover, the number of years and the age variable in the study were significant at the 5% level.

The study by Al-Mezeini, Oukil, and Al-Ismaili (2020) discussed estimating the economic and technical efficiency of greenhouse production in the Sultanate of Oman using dual and data envelope analysis methods. The results of the research showed that 79% of greenhouse growers did not achieve technical competence. Furthermore, electricity and water consumption were inefficient, ranging between 46% and 54%, respectively.

A study by Jo, Nasrullah, Jiang and Bao (2021) assessed the current status of farmers' perceptions about animal welfare and technical efficiency in poultry farms using a random border analysis method. Three hundred fifty-five registered farms were surveyed in Heilongjiang Province, China, and 240 of them responded. The results showed that 75% of farmers understand the importance of animal welfare, and 56.3% of them expressed their desire to implement animal welfare in their farms without negative conditions or situations. The technical efficiency of the farmers ranged from 55% to 99%. All variables evaluated in this study have a statistical effect on production. Education, experience, and gender of farmers were important variables and increased efficiency, while the distance from the farm to the main road increased inefficiency.

Hassan (2021) prepared a study entitled Data Envelope Analysis (DEA) approach to estimate the technical and economic efficiency and standards of broiler farms. The technical, economic and volumetric efficiency of broiler farms in Egypt were surveyed and evaluated using DEA technology. To achieve the specified objective, a stratified random sampling technique was used to collect information from 150 broiler farms. The results showed that the average technical efficiency of the broiler farms was 0.915 and 0.985 under constant returns to scale (CRS) and variable returns to scale (VRS), respectively, which means that the farmer, on average, can reduce the use of inputs by 8.5% and 1.5% for production. Therefore, the output level should be technically efficient. Notably, 48.7% of the farms were estimated at full technical efficiency according to the VRS model. The average allocative and economic efficiency of farms was rated at 0.941 and 0.918, respectively, with only 2% of farms being fully dedicated and economically efficient. Furthermore, the average scale efficiency was 0.929 as the majority of the broiler farms (82%) were operating with record-increasing returns. The estimated Tobit regression showed that the age of the farmer, education, experience, access to extension services, and level of training were the most important variables that contributed to the variance in the efficiency of broiler farms.

2.1.1 Definition of efficiency

There are many definitions given by researchers, thinkers and management specialists to the concept of efficiency, and the most prominent definition is what Peter presented as doing things in the right way, focusing in its definition on the side of activities and inputs. Many thinkers have defined efficiency and economic researchers (Qureshi and Al-Hajj 2012, 12) defined efficiency as working to achieve equality in the thing or work

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to be accomplished. This is achieved either by achieving the maximum outputs from specific inputs or with specific outputs with the lowest inputs. Efficiency also means the ability of the institution to achieve an increase in production and reduce costs, i.e., make good use of the available resources such as money, manpower and production equipment. This includes raising the productivity of the available resources in terms of quantitative and qualitative yields with the least possible expenses (Ibtisam, 2009, 60). Here, efficiency implies a technical process represented by a set of results that can be produced during a certain period, and the rate of output improves when the value increases. The output of a percentage is more than the increase in the inputs, and efficiency is achieved when the cost of the inputs is reduced in relation to the value of production (Saari, 2006, 272). The time of the decisions must be rational and balanced and do not depend on intuition and guesswork but rather on a precise scientific basis. The main reference is the scientific method in research and the basis of using the quantitative method to reach more accurate decisions (Ali, 2015, 603).

2.1.2 Economic Efficiency

Economic efficiency can generally be defined as the combination of resources that maximize returns (Al-Shammari and Al-Bayati, 86, 2009). It is acceptable for its recovery and the production of an optimal variety of goods and services that allow the maximum degree of satisfaction for individual and societal needs (Al-Dari, 2014). From cost, economic efficiency refers to the relationship between inputs and outputs. This means using economic resources to maximize economic returns from that use to reach the greatest production, and some conditions must be met to achieve economic efficiency. The first of which is the full use of economic resources and efficient allocation of economic resources (Nahm, D., & Sutummakid, N,2003,41-47). Moreover, Koopmans was the first to define the concept of efficiency in 1951, when he defined it as the ratio of inputs to outputs. Since under full efficiency, it is impossible to increase any of the products (or decrease any of the inputs) without simultaneously decreasing the second product (or increasing the second product). Based on the definition of Koopmans in 1957, set a measure to measure the value of technical efficiency by dividing the number one in the numerator by the maximum amount of resource that can be reduced without affecting the amount of production or by dividing the maximum production that can be produced within the stability of the resources used (Koopmans (1951,44)(Farrel,1975,253), and the concept of efficiency is a holistic concept in terms of both technical efficiency and allocative efficiency. The credit for its clarification was given to (Farrell, 1957,263). The use-oriented or input-orientated or the efficiency on the input-side (Input-Orientated Measures) and the second on the output-side called the measurement of indicators with output-directed or the economic efficiency on the output-side (Output-Orientated Measures).

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Methods for measuring and estimating economic efficiency

There are several methods for measuring economic efficiency, and they can be classified mainly into the parametric and non-parametric approaches. We will discuss one of each method to estimate the economic efficiency of the research sample.

- Stochastic Frontier Analysis (SAF) method
- Data Envelopment Analysis (DEA) method

2.1.3 Stochastic Frontier Analysis (SAF) method

This model was presented for the first time in two independent papers in 1977 by researchers Meeusen and Broeck, and in the same year, research papers from Ainger, Lovell and Schmidt were published. Basically, this model was applied to cross-section data where this model can be used to obtain the economic efficiency of each institution or farm each one separately. However, this model was also used in analyzing the time series data, as it shows the variation in the economic efficiency of the farm or establishment during the time series. In both cases, this model depends mainly on the traditional regression analysis (Angner et al., Meusen and van den Broeck, 1977, p32). The Cobb-Douglas function is the main function in determining the model of the stochastic boundary production function SFPF and the SFCF stochastic boundary cost function in the SAF method, where the latter differs from the Cobb-Douglas function by the presence of the random error Vi added to the non-negative random variable Ui, as follows:

2.1.3.1 Stochastic Frontier Production Function (SFPF)

Cobb-Douglas Production (CDPF)

$Yi=f(Xi;\beta i)$…………………1

Stochastic Frontier Production function (SFPF)

$Yi=f(Xi;\beta i)+ei$……………2

$ei=Vi-Ui$………………3

2.1.3.2 Stochastic Frontier Cost Function (SFCF)

Depending on the symmetric property between the production function and the cost function and based on equation 2, which is the production function with random limits, the cost function with random limits SFCF can be written algebraically as follows:

$Ci=f(pi;yi;ai)+ei$…….8

$ei=vi+ui$……9

2.1.4 Data Envelopment Analysis (DEA) method

It is a non-parametric method based on linear programming used to measure the efficiency scores of economic institutions (Al-Jubouri, Al-Hadith: 2021). The DEA data envelope method is based on Pareto optimality, which states that any decision-making unit is inefficient if another unit or combination of units can produce the same amount of output with less quantity or input. The production unit will have Pareto efficiency if the opposite is achieved (Helal, 1998,59) as a model for solving the issue of maximizing output or minimizing inputs. This method depends on linear programming to create an envelope or field containing data so that the efficiency can be estimated for the different establishments (farmers) according to the combination of the resource used in this envelope (Al-Hijami). Al-Okaili, 2015, 573).

2.1.5 Translog Cost Function

The logarithmic cost function was brought by the economist (Christensen et al., 1973). It is one of the most widely spread functions because of its superiority over the rest of the productive functions, especially when we have more than two production elements, the other production functions (Cobb-Doglus) and the fixed substitution elasticity production function (CES) and the variable elasticity of production function (VES), become more difficult to use without restrictive assumptions. Hence, the functional formulas become inappropriate and malleable. The limitations of these flexible formulas include the (Translog) function, which is characterized by its accurate estimates and needs fewer restrictions than other formulas (Al-Bajari, 2001). The Translog function is a more general form of substitution variable elasticity, imposing no restrictions on substitution between different input factors. The Translog function can be considered a second-order Taylor approximation of an arbitrary function (Lin, Liu, 2017). The Translog function is widely used to discover the substitution effect of explanatory variables. The interactions between the components of a system concerned with a quadratic response surface can be described as follows:

$$\tilde{y} = a_0 + a_1x_1 + a_2x_2 + a_3x_3 + a_{12}x_1x_2 + a_{13}x_1x_3 + a_{23}x_2x_3 + a_{11}x_1^2 + a_{22}x_2^2 + a_{33}x_3^2 \dots\dots\dots\dots\dots 23$$

2.1.6 General Formula for Translog Cost Function

In this study, the efficiency of broiler farms was calculated using the Translog production function using the maximum probability method. The Translog production function is a type of variable elasticity production function that is easy to estimate and has a strong tolerance (Coelli, 1995). The Translog function can be formulated as follows:

$$LnQt = Bo + \sum_{j=1} BLnxji + 0.5\sum_j \sum_k \beta_{jk} lnX_{ji} lnX_{ki} + (V_i - U_I), \dots\dots 24$$

where i = represents the broiler farm, Xij indicates the input level j used by the broiler farm. $\beta jk = \beta kj$ is assumed to be symmetry due to cross effects, while Qt = Quantity of output for farm i. Vi = random error (measurement errors and errors outside the farmer's control), while Ui = non-negative error component (technical inefficiency). Translog production functions have at least three interpretations: they can be considered accurate representations of real production technology, as a second-order Taylor approximation to the CES function, or as a second-order Taylor approximation

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to an unknown basis production function. When Translog is viewed as linear, it is important to mention that the remainder (i.e. an approximate error) must be attached to equation (24) and that its magnitude increases as we move away from the rounding point (Lagomarsino, 2018).

2.1.7 Estimation of the Translog Production Function

The Translog function can be thought of as a second-order Taylor approximation of an arbitrary function. It is also similar to the coefficients linear regression model, and thus, the Translog production function parameters in equation (24) can be estimated using least squares (OLS). (Omar and Hulya, 2019,10).

Estimation and analysis of the results of the stochastic boundary cost function TRANSLOG and cost efficiency of broiler farms

Preamble:

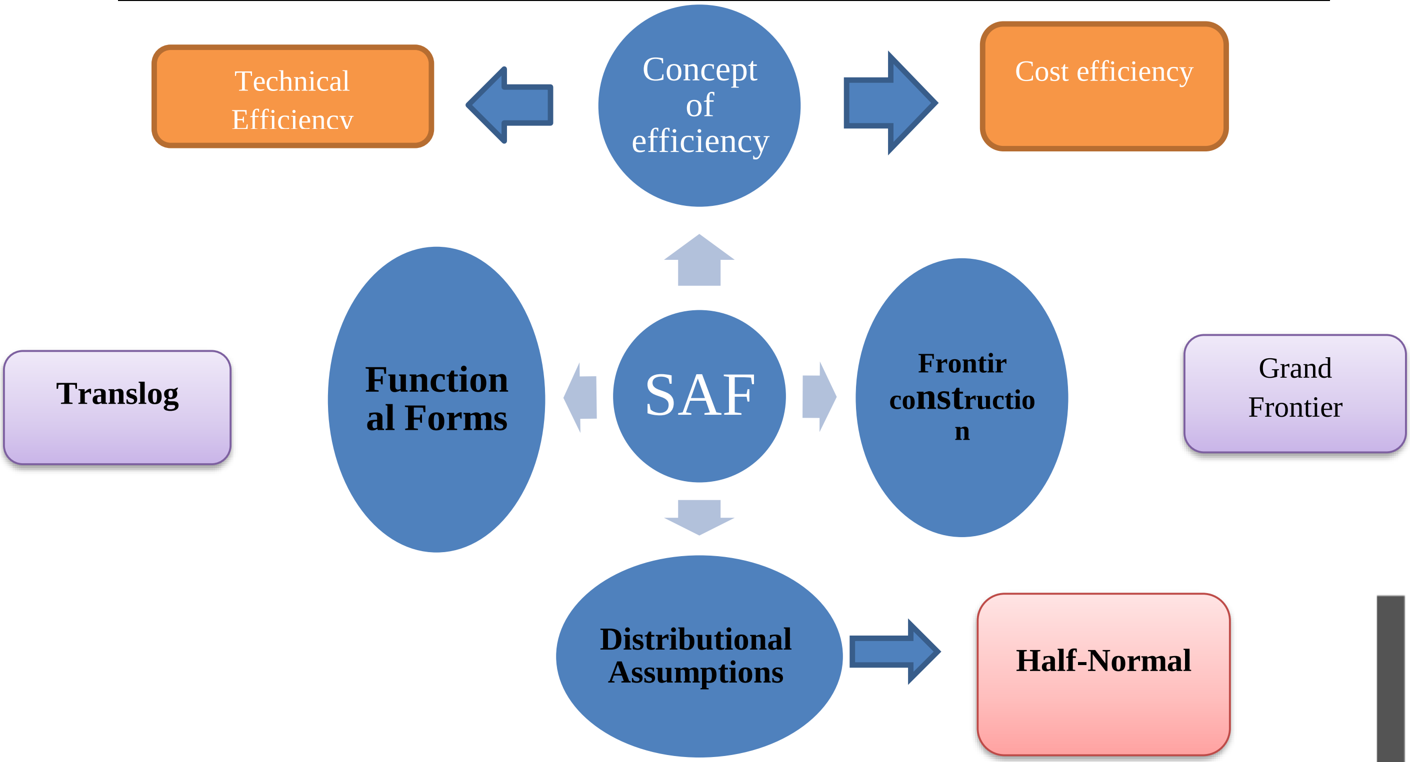
This topic depends on the application of the Translog Cost Function formula to determine the factors affecting the cost efficiency of poultry meat farms in Salah al-Din. It also compares them with the DEA analysis results and knows the impact of technical and social variables and their role in achieving efficiency using the Frontier 4.1 program. We use the transcendental cost function to calculate the cost efficiency (Neupane, H., Paudel, K. P., Adhikari, M., & He, Q. (2022)).

Estimating and analyzing the results of the stochastic boundary cost function and the cost efficiency of broiler farms.

The stochastic frontier cost function was estimated using the Maximum Likelihood method. The numerical values of the parameters of the explanatory variables of the Translog Cost Function and T-test values were obtained, and the cost efficiency was estimated for each observation at the sample level. The variance of coefficients (2δ) (sigma-squared) and gamma were estimated, as well as the economic and social variables of farms that affect the level of cost inefficiency for broiler breeders, where the random border cost function and cost inefficiency were estimated by one step. The results obtained indicate that the negative values of the inefficiency variables indicate the positive relationship between the level of technical efficiency and the variables assumed in the study. The positive trend of these variables indicates a decrease in efficiency with an increase in the influence of these factors.

Description of the economic model used in stochastic parametric analysis.

SAF Modeling Framework (4-5)



Source: Journal of economic cooperation, 27(2), 37-70.

The technical efficiency TE of broiler production farms in Salah al-Din was estimated for the 2021 production season according to the Translog COST Function to know the efficiency achieved. In this method, the focus was on the inputs that the breeders used mainly in the production process in the study sample. The Frontier 4.1 program was used in estimating and calculating the efficiency, which allows estimating random production limits and obtaining estimates for the maximum parameters of the function (Herrero and Pascoe, 2002: 4). The three-step calculation process:

The first step: The method of Ordinary Least Squares (OLS) is used to obtain unbiased linear parameters (Blue) for the Standard Model except for the value of (b0).

The second step: The corrected ordinary least squares (COLS) method is used to obtain unbiased linear parameters, including (b0). In this case, technical efficiency can be defined as the ratio of actual production to expected production, which takes values between zero and one (Kolawole and Ojo, 2007: 125). It is obtained through the following equation:

$$\mathbf{TE} = \frac{\mathbf{Yi}}{\mathbf{Yi^*}} = \frac{\mathbf{e}^{(\mathbf{Xi\beta - ui})}}{\mathbf{e}^{(\mathbf{Xi\beta})}} = \mathbf{e}^{(-\mathbf{ui})}$$

In the third step, the maximum probability estimates for the parameters of the stochastic boundary production function are obtained using the (Maximum likelihood) method according to the Translog cost function.

And that the stochastic boundary production function differs from the production boundary function in the (Translog) formula by adding a random error representing the measurement error (Vi) to the random error (Ui) representing inefficiency.
By taking half (0.5) of the logarithm of the translogical function and adding the limits of the error, we have the following, which estimates the translogical function for the efficiency variables

$$lnTC = \beta_{\circ 1} + \beta_{1\,1} lnX1_{i1} + \beta_{2\,1} lnX2_{i1} + \beta_{3\,1} lnX3_{i1} + \beta_{4\,1} lnX4_{i1} + \beta_{5\,1} lnX5_{i1} + \beta_{61} lnX6_{i1} + 0.5 * \beta_{7\,1} lnX1_{i1} * lnX1_{i1} + 0.5 * \beta_{8\,1} lnX1_{i1} * lnX2_{i1} + 0.5 * \beta_{91} lnX1_{i1} * lnX3_{i1} + 0.5 * \beta_{10.1} lnX1_{i1} * lnX4_{i1} + 0.5 * \beta_{11.1} lnX1_{i1} * lnX5_{i1} + 0.5 * \beta_{12.1} lnX1_{i1} * lnX6_{i1} + 0.5 * \beta_{13.1} lnX2_{i1} * lnX2_{i1} + 0.5 * \beta_{14.1} lnX2_{i1} * lnX3_{i1} + 0.5 * \beta_{15.1} lnX2_{i1} * lnX4_{i1} + 0.5 * \beta_{16.1} lnX2_{i1} * lnX5_{i1} + 0.5 * \beta_{17.1} lnX2_{i1} * lnX6_{i1} + 0.5 * \beta_{18.1} lnX3_{i1} * lnX2_{i1} + 0.5 * \beta_{19.1} lnX3_{i1} * lnX4_{i1} + 0.5 * \beta_{20.1} lnX3_{i1} * lnX5_{i1} + 0.5 * \beta_{21.1} lnX3_{i1} * lnX6_{i1} + 0.5 * \beta_{13.1} lnX3_{i1} * lnX2_{i1} + 0.5 * \beta_{22.1} lnX4_{i1} * lnX4_{i1} + 0.5 * \beta_{23.1} lnX4_{i1} * lnX5_{i1} + 0.5 * \beta_{24.1} lnX4_{i1} * lnX6_{i1} + 0.5 * \beta_{25.1} lnX5_{i1} * lnX5_{i1} + 0.5 * \beta_{26.1} lnX5_{i1} * lnX6_{i1} + 0.5 * \beta_{27.1} lnX6_{i1} * lnX6_{i1} + V_{i1} + U_{i1}$$

TC: represents the total costs of broiler farms
β0: represents the constant term,
βi: represents parameters which are unknown factors that can be estimated.
Xi: They are explanatory (independent) variables and include.
X1: number of chicks (bird)
X2: Feed Quantity (tons)
X3: Number of deaths (bird)
X5: Quantity of medicine (liters)
Vi1: A random variable or measurement error due to variables outside the farm's control, such as weather conditions.
Ui1: Inefficiency variant
The estimation of the production function is as follows, according to the names of the variables:

$$lnTC_{i1} = \beta_{\circ 1} + \beta_{1\,1} lnchicks_{i1} + \beta_{2\,1} lnfodder_{i1} + \beta_{3\,1} lndead_{i1} + +\beta_{41} lnmedicines_{i1} + 0.5 * \beta_{5\,1} lnchicks_{i1} * lnchicks_{i1} + 0.5 * \beta_{6\,1} lnchicks_{i1} * lnfodder_{i1} + 0.5 * \beta_{71} lnchicks_{i1} * lndead_{i1} + +0.5 * \beta_{8.1} lnchicks_{i1} * lnmedicines_{i1} + 0.5 * \beta_{9.1} lnfodder_{i1} * lnfodder_{i1} + 0.5 * \beta_{10.1} lnfodder_{i1} * lndead_{i1} + 0.5 * \beta_{11.1} lnfodder_{i1} * lnmedicines_{i1} + 0.5 * \beta_{12.1} lndead_{i1} * lndead_{i1} + +0.5 * \beta_{13.1} lndead_{i1} * lnmedicines_{i1} + 0.5 * \beta_{14.1} lnmedicines_{i1} * lnmedicines_{i1} + V_{i1} + U_{i1}$$

Table (1) shows the results of estimating the Translog cost function by focusing on the basic inputs used in all the farms of the research sample. Numerical values of the parameters of the independent variables of the Translog function were obtained using the Maximum likelihood method, the values of the t-test and the log ML test. The values of these parameters explain the relationship between the explanatory variables in the function and the value of broiler production. The parameter value of the variable in the function represents the flexibility of the resource (the input).

The results of Table (1) show that there is a positive relationship between TC and the value of the number of chicks. The elasticity of the variable amounted to 0.125 and is consistent with the logic of the economic theory, where the value of t indicated that the variable was not statistically significant. In contrast, the relationship between TC and the value of the feed was positive, which is identical to the economic logic where the value of t was significant at 1%. As for the value of the fatalities, its flexibility was (0.045), and its value was positive, which corresponds to the economic logic, and the value of t was not significant. Finally, the relationship between TC and the value of the necessary medicines was positive according to the economic theory, and t was statistically significant at 10%.

As the results showed, the value of γ was 0.848, which is significant at 1%. This means that about 0.84 of the inefficiency variances were due to the factors under the control of the breeder, and 0.16 was due to random factors outside their control. And the value of the variance 2δ amounted to 0.0025, which is statistically significant at the level of significance of 1% and indicates that the effects of technical inefficiency were the most important component in the total change in TC.

Table (1) estimates the TRANSLOG cost function using the Maximum Likelihood method to measure the cost efficiency of broiler farms in Salah al-Din.

t- value	Standard Error	Parameters value	Parameters	Variables
*70.35	0.218	15.388	$\beta_{\circ}$	Fixed limit
0.719	0.174	0.125	β_1	Ln chicks
*2.485	0.157	0.391	β_2	Ln fodder
0.900	0.05	0.045	β_3	Ln dead
***1.282	0.145	0.186	β_4	Ln medicines
**1.696	0.110	0.187	β_5	$lnchicks_{i1} * lnchicks_{i1}$
**-1.966	0.123	-0.242	β_6	$lnchicks_{i1} * lnfodder_{i1}$
0.667	0.052	0.034	β_7	$lnchicks_{i1} * lndead_{i1}$
-0.386	0.182	-0.007	β_8	$lnchicks_{i1} * lnmedicines_{i1}$
*2.967	0.066	0.197	β_9	$lnfodder_{i1} * lnfodder_{i1}$
**-1.800	0.056	-0.102	β_{10}	$lnfodder_{i1} * lndead_{i1}$
-0.268	0.159	-0.042	β_{11}	$lnfodder_{i1} * lnmedicines_{i1}$
*3.903	0.0089	0.034	β_{12}	Ln dead * Ln dead
0.970	0.035	0.034	β_{13}	Ln dead * Ln medicines
-0.569	0.078	-0.0044	β_{14}	Ln medicines * Ln medicines
*6.732	0.126	0.848	γ	Gama
*3.490	0.007	0.0025	²δ	Sigma-squared
		3.261	LR test	LR test
		153.33	Log likelihood function	Log likelihood function

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The source was prepared by the researcher based on the data of the questionnaire and the analysis program (Frontier V.4.1)

* indicates a level of significance at 1%, while ** indicates a level of significance at 5% and *** indicates a level of significance at 10%.

Estimation of cost efficiency for broiler farms in Salah al-Din

Table (2) Results of cost-efficiency estimation of sample farms for broiler broilers in Salah al-Din for the season 2021

CE	Farm	CE	Farm
1.038	39	1.064	1
1.057	40	1.054	2
1.08	41	1.025	3
1.019	42	1.066	4
1.011	43	1.071	5
1.079	44	1.006	6
1.064	45	1.016	7
1.018	46	1.034	8
1.075	47	1.009	9
1.035	48	1.010	10
1.03	49	1.013	11
1.077	50	1.027	12
1.042	51	1.030	13
1.059	52	1.013	14
1.064	53	1.015	15
1.098	54	1.035	16
1.075	55	1.027	17
1.037	56	1.038	18
1.055	57	1.043	19
1.04	58	1.069	20
1.025	59	1.040	21
1.021	60	1.014	22
1.025	61	1.016	23
1.027	62	1.026	24
1.024	63	1.079	25
1.025	64	1.031	26
1.019	65	1.011	27
1.019	66	1.027	28
1.028	67	1.018	29
1.021	68	1.027	30
1.026	69	1.028	31
1.022	70	1.012	32
1.066	71	1.036	33
1.033	72	1.020	34
1.029	73	1.158	35
1.026	74	1.020	36
1.016	75	1.028	37
1.023	76	1.047	38
1.016	77		
	1.016		Average

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The source was prepared by the researcher based on the data of the questionnaire and the analysis program (Frontier V.4.1)

Conclusions

1. The high costs of production used (inputs) put the cost line above the equal output curve, and we are guided that some of the projects were technically efficient but not specialized and economically efficient at the level of the study sample in Salah al-Din Governorate.
2. Through the results of the economic efficiency estimates that resulted in the convergence of averages, we conclude that breeders use resources convergently and work in a production environment with almost identical conditions and costs.
3. From the results of estimating the translog cost function, it was found that the cost efficiency of the sample projects ranged between a lower level of 1.006 and a higher level of 1.158.
4. Translog's cost-efficiency results show that the amount in excess of the correct one is the amount of additional cost borne by the product.

Recommendations

1. Establishing a strategic development policy for the agricultural sector in general and poultry production in particular, considering that the two complement each other in the agricultural economy.
2. The necessity of conducting economic and scientific research and studies on chicken meat production projects to guide breeders and guide them in using the variety, diet, effective medicines and vaccines and creating profitable production conditions for them.
3. To give economic importance to the cultivation of the liquor components used in the fodder and encourage farmers to grow them (yellow corn and soybeans) to contribute to reducing imported fodder and work to reduce the cost of feed, considering that its cost is high.
4. The necessity of directing the optimal use of the inputs from the surplus achieved in most of the sample farms.
5. With the high-cost efficiency obtained from Translog, 3.7% of the costs incurred can be avoided without any loss in total production.
6. The need to work on introducing technology into the poultry industry to control costs and increase the level of planning for the production process inputs.

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