THE ESTIMATION OF PRODUCTION FUNCTION AND MEASURING THE TECHNICAL EFFICIENCY OF BROILER PROJECTS IN ANBAR PROVINCE

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Abstract

Since Iraq possesses human and material resources required for agricultural development, if it is properly invested, to achieve self-sufficiency. The Research depended on the analysis of Cobb-Douglas production function for broiler chickens in Anbar province, a functional analysis, Bladavh to assess the technical competence and capacity efficiency by using the model Aledjala for a group of broiler breeders in Anbar province. The estimated coefficient signals here consistent with what is expected, according to the logic of economic theory, and was significant at the level (1%), as well as the function as a whole were significant at the level of (1%). A value of the coefficient of determination (R^2) was that (92%) of the variation in the production of broiler chickens is due to variation in the independent variables (labor and capital). Elasticity of production for variable work amounted to (0.2%), a positive value and this means that the increase in the work item by (1 %) leads to increased production by 20% and unit, assuming the stability of other factors. As for the capital it is noted that the value of the elasticity of this resource was (0.88%) unprecedented positive signal which indicates the increase in capital by (1%) leads to an increase in total output by (088%). Total elastic ties which are the sum of productivity elastic ties was (1.08) which means they show Constant returns to scale. The results of the technical efficiency indicators, showed that the average technical efficiency of the study sample was 0.88 for the constant to scale, size, and 0.98 for the variable capacity of size, while the average size efficiency reached 0.90. These results showed the misuse of economic resources by 12%, that is the possibility to reduce the use of resources to achieve the same output current level, on the other hand the capacity result showed that four farms have achieved economic size optimization 7%, while 93% of the broilers farmers work on increasing to scale stage which means there is a possibility to increase production in light of the existing means and without increasing the use of scarce economic resources.

Keywords: Data Envelopment Analysis (Computer) Program, Constant Returns to Scale.

تقدير الإنتاج وقياس الكفاءة الفنية لمشاريع فروج اللحم في محافظة الانبار

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المستخلص

العراق يمتلك الموارد البشرية والمادية المطلوبة بالتنمية الزراعية إذا ما أحسن استثمار موارده الاقتصادية بحيث يكون قادر على تحقيق الاكتفاء الذاتي ،وقد اعتمد البحث على تحليل دالة إنتاج كوب-دوجلاس لفروج اللحم في محافظة الانبار، اضافة الى تقدير الكفاءة الفنية وكفاءة السعة باستخدام نموذج التوجيه الادخالي لمجموعة من مربي فروج اللحم في محافظة الانبار، وجاءت إشارات المعاملات المقدرة منسجمة مع ما هو متوقع طبقا لمنطق النظرية الاقتصادية، وكانت جميعها معنوية عند مستوى 1%، كذلك الدالة معنوية ككل عند مستوى 1%. تشير قيمة معامل التحديد R^2 الى أن 92% من التباين في إنتاج فروج اللحم يعزى الى التباين في المتغيرات المستقلة (العمل ورأس المال) المرونة الانتاجية لمتغير العمل بلغت 0.2 وهي قيمة موجبة وهذا يعني ان زيادة عنصر العمل بنسبة 1% يؤدي الى زيادة الانتاج بنسبة 20% وحدة، بافتراض ثبات العوامل الاخرى. اما بالنسبة لعنصر رأس المال فيلاحظ ان قيمة مرونة هذا المورد بلغت 0.88 مسبوقة بإشارة موجبة مما يدل على زيادة المورد بنسبة 1 % يؤدي إلى زيادة الناتج الكلي بنسبة 088%. بلغ إجمالي المرونات الذي هو مجموع المرونات الانتاجية 1.08 مما يعني انها تظهر ثبات عائد السعة Constant Returns to Scale، واظهرت نتائج مؤشرات الكفاءة الفنية، ان متوسط الكفاءة الفنية لعينة الدراسة بلغت 0.88 لسعة الحجم الثابت، و0.98 لسعة الحجم المتغير، في حين بلغت متوسط الكفاءة الحجمية 0.90. هذه النتائج تظهر هنالك سوء استخدام للموارد الاقتصادية بمقدار 12%، اي انه امكانية لتقليل استخدام موارد الانتاج لتحقيق نفس مستوى الانتاج الحالي، من ناحية اخرى اظهرت نتائج السعة ان اربعة مزارع حققت الحجم الاقتصادي الامثل وبنسبة 7%، في حين 93% من مربي الدواجن يعملون في مرحلة تزايد السعة، مما يعني هناك امكانية لزيادة الانتاج في ضوء الامكانات المتاحة وبدون زيادة استخدام الموارد الاقتصادية النادرة.

كلمات مفتاحية: نظام مغلف البيانات، ثبات العائد للسعة.

Introduction

Iraq is currently, facing food problems lies in the failure of agricultural products designed in general to meet the growing demand needs of the citizen which forced Iraq to import large quantities of agricultural products to face the growing demand. Iraq's dependence on food importes is a threat to food security, as well as its impact on the resources of foreign currency on the one hand (9). So the state should be concerned with the agricultural sector and development to achieve high growth rates in the agricultural sector exceed population growth rates, which led to the development of agricultural sector, which is the foundation pillar in the economic structure of many countries of the world (10), Iraq has the human and material resources required to agricultural development, if properly invested, so that it is able to achieve food self-sufficiency as well as the possibility of exporting the surplus. The importance of research comes from the economic importance of the poultry sector in general and broiler meat in particular, where it is considered an important source of farm income sources(1).

Materials and Methods

The research aims to analyze the Cobb–Douglas production function of broilers in Anbar province, and the creation of economic derivatives of the function, and assess the technical competence and capacity efficiency by using the routing model Aledjala to capacity variable Size for agroup of broiler chickens, as the local poultry meat production declined to meet the growing demand for poultry meat despite the availability of all basic components to increase and the development of agricultural production in general and livestock in particular. The data were collected from the field sources in light of the form of a questionnaire prepared for this purpose where the study of 60 poultry field for 2012, which represent almost 25% of the working fields in Anbar province, Cobb-Douglas Production Function was estimated using the least squares method and to identify the first degree tests and the second using Eviews statistical program, and make sure to pass the statistical standard tests function and make sure that the model pass the problems

of econometrics, as well as to do estimation for efficiency and size efficiency and using input model to capacity variable-sized Sample uses DEAP system (Data Envelopment Analysis Program). The following simplified explanation of the concept of technical efficiency and size efficiency that DEAP system represents is one of the Non-Parametric Methods (14). It is based on linear programming methods [5] and the technical efficiency refers to the economic unit's ability to achieve the greatest result of using available resources (6) which reflect a ability of the production unit for the maximum production capacity using input available it refers to the lack (resources), and its value is between zero and one, and when the technical competence equal to one, the production unit achieves full technical competence, but if technical efficiency is less than one meaning that the production unit can reduce the proportion of input for the amount of production itself or get a higher production of the same amount of input (12). According to the concept of the DEA can efficiency calculation of n of economic units that have one input and one output (4,15) according to the following formula

Efficiency = actual economic output of the unit j/The actual input economic unit j

The scale efficiency specifies the nature of returns to scale for any economic unit, and the reason for this is that economies of scale can determine efficient and inefficient economic unit, and efficiency can be measured dividing the technical competence under constant returns to scale CRS by technical efficiency under variable returns to scale VRS(2,13) and then the degree of technical efficiency , which is obtained from the CRS & VRS DEA is divided into two parts, one of them can be traced back to inefficient capacity and the other for the lack of technical efficiency, if there difference between the degree of technical efficiency in CRS & VRS DEA of economic unit, this unit suffers from inefficient capacity and we can determine any capacity efficiency from the following form:

$$Se_i = \frac{TE_i^{CRS}}{TE_i^{VRS}}$$

Se_i: capacity efficiency.
TE_i^{CRS}: Technical efficiency under CRS.
TE_i^{VRS}: Technical efficiency under VRS.
If the value of capacity efficiency equal to 1 means that the economic unit with the efficiency of capacity and if the value of capacity efficiency less than one mean there is a shortage of capacity efficiency, which means that this efficiency measure the amount of the degree to which can be expanded by the economic unit in accordance with the size of its activity, or amount of change in production due to changes in the factors of production at the same time, the economic unit was operating at yield declining capacity or increasing or fixed, if the use of input factors of production increased by a certain percentage and increased production for itself, We have here the case of return on fixed capacity, but if the rate of increase in the use of factors of production is greater than the rate of increase in production in this case we hav a decreasing return to scale, but if the rate of increase in the use of production factors made the largest percentage increase in production, we have here the case of increasing return to scale.

Results and discussion

Production function of broilers was estimated by (OLS) total output is the depended variable, labor and capital are independent factors, The results of the study showed that double logarithmic function is the suitable function based on the evaluation of estimated coefficients and according to the logic of economic theory and statistical tests illustrated by the table (1), The estimated coefficients signals consistent with what is expected , according to the logic of economic theory, and were all significant at the level of (1%) as test (t), as well as the significance of function as a whole at the level (1%) as test (F). According to the value of the coefficients of determination (R^2) is (92%) of the variation in the production of broiler chickens is due to variation in the independent variables (labor and capital) and (8%) of these changes are attributable to other factors not included in the function, which absorbed the impact random variable. Each of the independent factor parameters indicated in double of logarithmic

function are partial elastic ties values, which show that the elasticity of production of labor amounted to (0.2), a positive value and this means that the increase in the labor item by (1%) leads to an increase production by (0.20%) unit, assuming the stability of other factors. As for the capital factor, it is noted that the value of the elasticity of this resource was (0.88) unprecedented positive signal which indicates the increase in capital by (1%) leads to an increase in total output by (0.88%). With a total elasticities which is the sum of productivity elasticities (1.08) which means they show the stability of yield capacity (Constant Returns to Scale) (7).

Table 1. the estimated parameters of the production function broiler chickens by double logarithmic formula

Independent variables	The estimated parameters	(R^2)=0.92
(lnA) constant	-8** (-16.3)	$R^{2\backslash}$= 0.92
(lnL) Labor hour	0.2 * (2.2)	F= 347.2**
Capital(lnK)th ousand dinars	0.88** (12.9)	D-w= 1.43

Source: Calculated by the researcher based on a questionnaire and using the statistical program reviews.

In order to be an accepted model and supported in the interpretation of the phenomenon studied, it is required to detect the standard problems (second-order problems), namely-Autocorrelation (instability of variation) (Heteroscedasticity) and (Multicollinearity). To detect the problem Heteroscedasticity as the implications of this problem that the estimated parameters lose recipe efficiency and therefore the tests do not become accurate or appropriate, existing forecasts be less credible than other forecasts that rely on others be free from this problem (3). Breusch-P-Godfrey test shows there is no heteroscedasticity problem because the value of F is not significant as shows in table (2). The autocorrelation problem (Autocorrelation) was detected by using Durbin-Watson (8) test which shows that the value of d parameter Calculated 1.43 located in the area is the crucial decision, suggesting the existence of a positive correlation has been detected and the

seriousness of the problem by using the value (Ro) (p) law Next d = 2 (1-p) It turns out that the value of row between 0.3 and 0.2 there is no fear of autocorrelation problem. The problem of (Multicollinearity) was detected by using the test (Klein-Test), which it is used as an indicator of the existence of this problem, where it is the square root of the coefficient of determination compared with the simple correlation matrix (Table 3) shows that (the root of $R^2 = 0.92$), the highest values of the correlation matrix which points to the lack of correlation between the independent variables.

Table 2. results of the analysis using Breusch-P-Godfrey test for the detection of the heteroscedasticity problem

Source: Calculated by the researcher based on a questionnaire and using the statistical program reviews.

Table 3. Matrixlinks

Source: Calculated by the researcher based on a questionnaire and using the statistical program reviews.

The results showed technical efficiency indicators table (4), that the average technical efficiency in light of constant to scal depending on the production function for projects production of poultry meat amounted to 88% and Trouht between upper limit stood at 100% efficiency and a minimum stood at 73% and show that with the technical efficiency of poultry projects between 80% to 89% came in first place and represented 43% of the size of the sample, followed by projects with the efficiency of 90% to 99% to 41.6%,

followed by projects that technical efficiency between 0.70% to 79% to 10%, while its efficiency projects that a full 100 % accounted for 6.6%, while the average technical efficiency under variable return to scale on production function for projects production of poultry meat amounted to 98% and through between upper limit at 100% efficiency and a minimum at 96% and came first prize with the efficiency of 90% to 99% of projects with 75%, followed by projects that its efficiency a full 100% accounted for 15%.

Table 4. represents the results of the technical efficiency analysis of the model using data envelope DEAP

FIRM	CRSTE	VRSTE	SCALE	RE.TO.SC
1	0.8	0.979	0.817	irs
2	0.84	0.979	0.858	irs
3	0.863	0.991	0.871	irs
4	0.897	0.978	0.917	irs
5	0.893	0.978	0.913	irs
6	0.984	0.985	0.999	irs
7	0.872	0.99	0.882	irs
8	0.785	0.981	0.8	irs
9	0.974	1	0.974	irs
10	0.951	0.988	0.962	irs
11	1	1	1	-
12	0.947	0.989	0.958	irs
13	0.852	0.985	0.865	irs
14	0.954	0.992	0.962	irs
15	0.957	0.996	0.961	irs
16	0.93	1	0.93	irs
17	0.9	1	0.9	irs
18	0.757	1	0.757	irs
19	1	1	1	-
20	0.894	0.976	0.917	irs
21	1	1	1	-
22	0.746	1	0.746	irs
23	0.911	0.975	0.934	irs
24	0.801	0.975	0.821	irs
25	0.782	0.991	0.789	irs
26	0.975	0.978	0.997	irs
27	0.953	0.988	0.965	irs
28	0.911	0.977	0.932	irs
29	0.729	1	0.729	irs
30	0.751	0.994	0.756	irs
31	0.8	0.98	0.817	irs
32	0.809	0.991	0.817	irs
33	0.805	0.995	0.809	irs
34	0.832	0.998	0.834	irs
35	0.855	0.975	0.877	irs
36	0.846	0.98	0.863	irs
37	0.877	0.979	0.895	irs
38	0.838	0.979	0.857	irs
39	0.882	0.98	0.9	irs
40	0.83	0.958	0.867	irs

Source: Calculated by the researcher based on a questionnaire and using the statistical program deap.

while the average capacity efficiency was based on the production function of the projects breeding poultry meat 90% and through between upper limit stood at 100% efficiency and a minimum stood at 0.73 and came first place of poultry projects technical

competence between 0.90% to 0.99% to 46.6% and then projects that capacity efficiency have between 80% to 0.89% with 31.6% of the size of the sample, followed by projects that its efficiency a full 100% accounted for 13.3% of the total sample came in ranked last projects that technical efficiency between 0.70% to 0.79% to 8.3%, these results show that most of the projects operate under acceptable efficiency in view of what Iraq is going through exceptional circumstances at present where it was found the presence of waste in the use of economic resources were increased by 12% in light of constant to scale, The possibility of reducing the use of production resources to achieve the same output current level, on the other hand showed the results that four farms have achieved economic size optimization and 7% while 93% of the poultry farmers working in the increasing return to scale, which means there is a possibility to increase the light output in the means available and without increasing the use of scarce economic resources. Of the results of the analysis show that most of the breeding poultry projects work in the first stage of production is the stage of increasing returns and operate under acceptable efficiency economically, which means that directed the state to support the breeding of poultry meat and expansion projects in all parts of Iraq to try to fill the demand for poultry meat increasing thus reducing the import and provide hard currency for the country and reduce dependence on outside in the provision of community requirements of food.

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