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The Assessment of Specific, Economic and Technical, Allocative Efficiency in Calfs Fatting Fields in Nineveh (Gogjali as a model) Using DEA Method

ABSTRACT

Calf fattening fields in Nineveh and particularly in Gogjali village occupy a very significant position in providing the area of the beef meet for the whole community. The present study aims at investigating the technical efficiency utilizing Data Envelopment Analysis method. The study is conducted with the hypothesis of variable return scale taking into consideration the input-oriented method. The study covered filed data of sample consisting of 151 field with a percentage estimated at 47% of the total of the studied fields.

The study divided into two groups. The first includes 100 fields with imported calf class. The second includes 51 fields with local calf. The averages of TE, AE and EE amounted to 87.8% , 71.3% and 62.8% respectively for the first group of sample of TE , AE ,EE As for the second, the averages amounted to 94.6% , 78.6% and 62.8% respectively.

The researcher suggests conducting experiments and studies in order to improve the genetic strains fodder, veterinary treatments and providing loans to breeders without interest.

INTRODUCTION

Among the countries that suffer increasing deficit over time, Iraq comes in the first rank non providing various agricultural commodities, including livestock products, especially red meat, from the fields of breeding and fattening of calves in the private sector, and as one of the main axes in the face of local demand for red meat of which Iraq's local production is only 65% of its actual needs (FAO, 2013: 89). This deficit will increase because of the steady population increase in Iraq. after the production of red meat (137) thousand tons in 1980 (Yassin and others, 2014) decreased to (236.13) tons only in 2015 (League of Arab States, Vol. 36.2016), Therefore, the production of this sector should be increased by 1.9% to meet the expected negative growth (Abdel Majid & Jabbara, 2016). The research aimed at estimating the technical efficiency according to the production function and estimating the specialty efficiency and total economic efficiency according to the cost function. Volume returns change VRs of fattening fields in the Gogjali region of Nineveh governorate for 2018 production year.

The problem of research is the inability of local production to cope with the consumption of local red meat in proportion to the steady increase in population and the rise in income levels.

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The importance of the research is that it is one of the few economic studies that dealt with the economics of meat production and study the economic efficiency of the fields of fattening cattle calves. **This importance** is derived from the fact that it relies on realistic field data for the research sample in the Gogjali region considering it as a region with a comparative advantage in the production of red meat in the province of Nineveh in particular and Iraq in general.

The research proceeded from several hypotheses that state, there is no harmony in the technical efficiency levels between the fattening fields of the foreign (imported) calves and the fattening fields of the local (Iraqi) calves, the difference in the level and amount of use of the economic resources that generate the variation at the levels of competency efficiency, which in turn results in incompatibilities in the levels of macroeconomic efficiency between the calf fattening fields in the research area. The researcher believes that the owners of the imported calves fattening fields exceed their peers in the local calves' fattening fields in achieving technical, specialized and economic efficiency levels but the results showed the opposite. Therefore, **the research aimed at**:

1- Assessment of the technical efficiency levels for each of the imported calves' feedlot fields and the local calves using the DEA method according to the production function.
2- Assessment of the levels of Allocative Efficiency and economic efficiency for each imported and local calves fattening fields by using the method of DEA according to the cost function.
3- Comparison of the results of technical proficiency estimation and the results of the total competency and economic efficiency estimation between the group of imported calves fattening fields with their counterparts of local calves fattening fields after evaluating each group to three age groups according to the primary age of the calves and each age group comprising three time periods, and to the number of days which were spent by the fattening process in each field.

RESEARCH METHODOLOGY AND INFORMATION SOURCES:

In order to achieve the objective of the research, the researcher based on two methods of analysis. First: the method of descriptive analysis based on the concepts of economic theory and previous theoretical studies. Second: method of quantitative analysis depending on the method of data envelope analysis DEAP, and using the production and cost function in case variable volume returns which correspond to the cross-section of field data to views the sample studied in Gogjali region.

The study used two types of sources:

- Basic data sources on the ground and periodic follow-up random sample involved (151) fields, which accounted for about 47% of total research (320) fields.
- Secondary data sources from Arab and foreign periodicals on the International Information Network, official institutions and organizations, Agriculture Directorate of Ninevah, university dissertations and theses, Arab and foreign books and other sources related to the payment.

Efficiency concept and measurement methods:

In this field study, efficiency is used as a measure for diagnosis and research objectives. Much of the basis and assessment of economic efficiency is based on the work and theory of an Italian, economist and engineer Vifred Pareto, which states that any decision-making unit is inefficient if it can manage a unit or combination of other administrative units to produce the same quantity of output with quantity and resource than any resource "(Charnes et al., 1994). The productive unit is incompetent according to Pareto's concept" if the opposite is achieved "(al-Hajjami, Farhan, 2017).

Efficiency is a relative term and it is important to understand that there is no absolute efficiency but is always relative to some criteria, and the criterion of economic efficiency is the value (Al hadidi, 2012: 5). Farrell was the first to establish the methodology of analysis and calculation of efficiency in 1957 (Al Muhammad, 2018). Farrell pointed out that the economic efficiency of any farm consists of two main components, technical efficiency and Allocative Efficiency that combined into one scale (Economic Efficiency) (Shatta, et al., 2016). All of the efficiency measures (technical, specialized and economic) value vary between zero and the integer (whole) one and can be measured according to two types of indicators first on the input side which is called input oriented indicators and the second is called output orienting indicators (Coelli et al. 2005, p. 366-374). Output-oriented technical

proficiency (TE) (substantive) is defined as a measure of how well a farmer maximizes production and output within the combination of available inputs or farmer skill in reaching work on the highest equal output curve within the available input mix.(Effiong & Onyenweak, 2006) Input-oriented technical efficiency is defined as the farmer ability to reduce the use of physical inputs to achieve a certain level of production (Chen, et al., 2006).

When the value of technical competence is equal to the right one, the farm works very efficiently and achieves the equivalence between actual production and optimal production (Islam et al., 2011). Output-oriented competency (AE) is defined as the combinations of resources available to maximize production that yields maximum profit (Shatta et al., 2016). The input-oriented competency reflects the farm ability production to achieve a certain level of production at the lowest cost through the optimal use of available inputs (Bank, 2010) taking into account the prices of these inputs (Sengupta, 1995) when specialized efficiency factor is equal to integer one, this means the point of contact of the output curve equal to the equal cost line.

When the farm achieves full technical and specialized efficiency together, then the overall economic efficiency (EE) is achieved, which is defined as the product of both (technical efficiency) TE and multiplied (allocative efficiency)AE and written as the following formula: $EE0 = TE0 \times AE0$

The economic efficiency of the outputs is defined as the ability of the farmer to expand production without changing the quantities used. On the input side, it means how much input can be reduced without changing the quantity of output (Coelli, et al., 1996: 5-24) or it is that farm which has the ability to reduce inputs while achieving a certain level of production (Zhuo, et al., 2006). Hopefully, in this research, we will assess the technical efficiency, allocative efficiency, and economic efficiency of inputs only and by using Data Envelopment Analysis Model (DEA) which essentially relies on Pareto Optimality examples (Shuaibi, 200) 4, 316). It is characterized as a non-parametric model and assumes that all deviations (the difference between the estimated and actual value) of the boundary efficiency curve can be controlled by the farm and that they use linear programming methods (Coelli et al., 2005). And that it does not require a predefined function but efficiency is calculated directly from observations. Also, what recognizes DEA method is that weights are automatically determined by a linear program designed to reduce input or maximize outputs by focusing on the actual quantities of inputs and outputs without having to modify the units of measurement (Batal, 2018). The DEA method uses several models and trends to find efficiency indicators, most notably the CRS model and VRS (Cooper et al., 2002, 137).

Review of references

Many agricultural studies have been carried out to assess technical, specialized and economic efficiency using the DEA method, assuming variable returns to scale VRS, but special studies in animal production are scarce and this study is an extension of (Vedut et al., 2010) study which dealt with the "economic efficiency of calves fattening farms in the Amasya region of Turkey where the technical, specialized and economic efficiency rates amounted respectively to 0.910, 0.9 and 0.822%,. The study recommended helping the breeders to select herds of good breeds. (Mohammad & Showkat, 2014). "Technical Efficiency and Productivity of Small-Scale Farms in Jammu-Kashmir Region", which had a technical efficiency rating of about 48%, indicating a lack of technical efficiency (52%) and (Umar et al., 2015) study. Its determinants for fattening veal projects in Bournoma, Nigeria, which ranged from 0.166 to 100% with an average of about 0.541 which means that the average of the specialized inefficiency of these fields was 46% due to lack of advisory service, and according to (Jafrizal et al., 2017) study, "Analysis of the efficiency and treatment of meat factories in Indonesia" results showed that the average technical efficiency was about (95.7%) indicating a deviation in efficiency (4.3%) ", and finally (Chorbani et al., 2018) studied "Economic Efficiency of Caspian Basin Feeding Field / Iran." This study showed that the results of technical and allocative efficiency assessment amounted respectively about (87,31, 74.87, 65.9%) , and he , Chorbani, concluded that the age and experience of breeders have an impact on efficiency results.

MATERIALS AND METHODS OF WORK

The researcher relied mainly on the primary data obtained from a special questionnaire, sources on the ground, personal interviews and a periodic follow-up of a random sample of (151) fields which accounted for nearly 47% of the total calves fattening production in the region of Gogjali - Nineveh province in 2018.

In order to obtain a realistic estimate of the technical efficiency, competence and allocative efficiency of the calves fattening fields owners in the research sample, the total sample was divided into two groups of fields according to calves classes.

The first class consisted of (100) fields of imported calves fattening which included (5610) imported calves, and the second class consisted of (51) fields of local calves fattening which included (2523) local calves and each group was divided into three categories according to primary age for a calf (6-12 months, 12-24 months, 24-36 months), and, also, each age group was divided into three time periods depending on the length of the fattening process (150-180, 181-210, 211-250) day of fattening.

Thus the main production variables in this study are as follows:

Y = The dependent variable represents the total gross weight increase of the life Kg/ field/ fattening period

X1 = Number of family workers employed in calf fattening process worker /field/ fattening period

X2 = Primary weight of live calf kg / field / fattening period

X3 = Amount of consumption of concentrated feed kg / field / fattening period

X4 = Amount of dry feed consumption (straw) kg / field / fattening period

X5 = Amount of green feed consumption (alfalfa) kg / field / fattening period

X6 = Quantity of veterinary treatments and vaccines unit / field / fattening period

Characterization and formulation of models used in the analysis:

Formulation of the model is intended to express real relations with a supposed mathematical relationship based on the study and analysis of reality (Fahad & Ali, 2016) and (Javadnmard & Kianeh Kandi, 2011).

The description of the DEA envelope model is based on the parameters of the output function and on the input side assuming the VRS returns to estimate and calculate technical efficiency in the research sample is as the following formula:

minθ, λθ VRS

subject to

$-qi + q\lambda \geq 0$

$\theta xi - x\lambda \geq 0$

$I1\ \lambda = 1$ and $\lambda \geq 0$

(Xi): represents the input vector, yi: represents the output vector λ: the vector sum and IXl: represent the constants or weights associated with all the efficient fields and (θ): represents the value of the efficiency index located between zero and the integer one.

While the specification of the DEA model according to the cost function variables and on the input side variables assuming the VRS to estimate and calculate the economic efficiency and its sections in the research sample is as the defend as : (Colli, 1996 : 24).

Min xi, $wi^{l}\ xl^{*}$

Subject to:

$-qi + q\lambda \geq 0$

$\theta\ xi^{*} - x\lambda \geq 0$

$I,\lambda=1$ and $\lambda \geq 0$

Where: (xi) : represents the vector of the used quantities of inputs in the field and (wi): represents the prices of inputs used in the field, and the economic efficiency of the field is calculated as the following equation: $EE_i = w_i^1 x_i^* / w_i x_I$

The Allocative efficiency (AE) of the field is calculated as: AEi = EEi / TEi
After calculating and knowing the technical competence and competence, the total economic efficiency can be calculated and evaluated as : EEi = TEi * Aei

RESULTS AND DISCUSSION

1. Technical Efficiency Assessment Results TE:

The results of the Technical Efficiency Assessment TE were confirmed with the results of the professional and economic efficiency assessment in Table (1, 2).

Table (1) shows the results as Total Economic Efficiency assessment (EE), Technical Efficiency (TE) and Allocative Efficiency (AE) of Gogjali imported calves fattening production fields in 2018 by using the method of data envelope analysis and according to the variables of production functions and costs.

Field No.	TE%	AE%	EE%	Field No.	TE%	AE%	EE%	Field No.	TE%	AE%	EE%
1.	795	925	735	34.	932	808	753	67.	941	773	727
2.	805	816	656	35.	100	100	100	68.	919	769	707
3.	753	773	582	36.	904	698	631	69.	893	722	645
4.	774	728	563	37.	100	573	573	70.	768	721	554
5.	731	678	495	38.	876	769	674	71.	727	720	524
6.	920	920	846	39.	100	754	754	72.	723	669	484
7.	768	975	749	40.	100	594	594	73.	820	597	489
8.	775	727	563	41.	100	756	756	74.	100	536	536
9.	698	852	595	42.	100	820	820	75.	100	822	822
10.	661	858	567	43.	917	573	525	76.	805	689	554
11.	100	538	538	44.	943	543	512	77.	741	726	538
12.	100	619	619	45.	925	532	492	78.	668	722	482
13.	100	882	882	46.	100	636	636	79.	745	670	499
14.	990	778	770	47.	977	573	559	80.	665	614	408
15.	100	100	100	48.	899	590	530	81.	100	100	100
16.	951	529	503	49.	762	572	436	82.	813	585	476
17.	864	962	831	50.	745	666	496	83.	100	600	600
18.	843	878	740	51.	871	571	498	84.	887	642	570
19.	100	925	925	52.	100	100	100	85.	819	580	475
20.	877	939	823	53.	100	864	864	86.	100	407	407
21.	901	961	866	54.	100	862	862	87.	674	547	369
22.	701	951	667	55.	917	857	786	88.	100	666	666
23.	947	604	572	56.	959	711	682	89.	887	502	445
24.	705	843	594	57.	914	657	601	90.	754	638	480
25.	878	658	578	58.	909	611	555	91.	655	574	376
26.	100	856	856	59.	996	597	534	92.	645	544	351
27.	923	677	625	60.	100	632	632	93.	636	560	356
28.	100	913	913	61.	879	511	449	94.	100	350	350
29.	100	918	918	62.	909	462	420	95.	925	700	648
30.	890	852	758	63.	935	427	399	96.	896	689	617
31.	836	906	757	64.	798	483	386	97.	724	716	518
32.	949	680	645	65.	100	100	100	98.	100	750	750
33.	815	828	674	66.	886	846	749	99.	827	588	486
								100.	780	535	417
							average		87.80	71.30	62.6

The source is prepared by the researcher based on questionnaire format data and statistical program Deap.

Where the technical efficiency TE for the imported fattening fields as a maximum was (100%) for a group of (28) fields and accounted for 28% of the total fields of the group, and as a minimum TE reached an average of (63.6%) of the field in sequence (93). While TE reached an average of 87.8%, which shows that the owners of these fields can increase their meat production by 12.2% without any increase in the amount of used resources and the hey can achieve the same level of actual production by reducing the level of economic resources use by 12.2% to reach the optimum level of production and the technical efficiency (TE) for the sample of local calves fattening fields reached (100%) as a maximum. As for a group of (23) fields and accounted (45%) of the total fields group, and as a minimum TE reached an average of (72.9%) for the field as in sequence (49).While TE-averaged amounted about 94.6% which indicates that the technical efficiency levels of the local calves fattening fields are higher than those of the imported calves fattening fields.

2. Results of the allocative efficiency, and total economic efficiency assessment by using the method of DEA analysis of the calves fattening production in the region of Gogjali - Nineveh province in 2018:

A - The data of Table (1) shows that the average level of allocative efficiency (AE) for the imported calves fattening fields category amounted to integer 1 (100%) as maximum, and for a group of only (5) fields, and the allocative efficiency amounted (AE) the lowest level (35%) in field sequence (94).While the average total of allocative efficiency of imported calves fattening fields amounted (71.3%) showing that the imported- calves –fattening- fields owner's ability to achieve the same level of actual production by lowering the level of costs to 28.7% or achieving a production level higher than the current level using the same level of current costs (71.3%). Since the technical efficiency (EE) is a product for the two measurements, TE multiplied by AE (Coelli, 2008). Thus the results of the analysis show that the average economic efficiency EE for the same sample amounted (100%) as maximum.

Concerning a group of fields about (5) fields only, amounted about 35% as a minimum in field sequence (94). While the average of imported calves fattening fields amounted (62.8%) which shows a deviation of the total economic efficiency from its optimal level as an average (37.2%. Thus, according to the previous analysis results,

we conclude that not all the 28 fields that achieved complete technical efficiency also

achieved full economic efficiency at the same time. The field may achieve full technical efficiency but it is below the level of achieving full allocative and economic efficiency.

B - The results of Table (2) show that the average level of allocative competence (AE) for the group of local calves fattening fields amounted integer one (100%) as a maximum

for a number of (5) fields only, and the allocative efficiency (AE) amounted about (61,2%) for the production field sequence (37). While the average allocative efficiency (AE) for the total fields of the local category amounted (78.6%) which refers to that the owners of these fields can achieve the same level of actual production by lowering the level of costs by (21.4%) , or achieve a production level higher than the current level using the same level of costs (78.6%) Since EE is the result of two measures (AE, TE) (Coelli et al., 2005: 366). The results of (economic efficiency) EE were in a match with the results of the full economic efficiency assessment, and it amounted integer 1 (100%) for the total group of (5) fields only. While the average economic efficiency EE for local calves fattening fields amounted (78.6%) which refers to the deviation of the level of economic efficiency from the optimal level about (21.4%). Thus, this is an indication of the possibility of the owners of local calves fattening fields to achieve the same level of real production by reducing the resources used or costs by (21.4%) or to achieve a production level higher than the actual level with the same amount of resources and without reducing costs.

From the foregoing. It can be seen that (23) fields achieved full technical efficiency, but only (5) fields of local calves fattening fields achieved full allocative and economic efficiency in the as shown below in Table (2).

Table (2) shows the results as Total Economic Efficiency assessment (EE), Technical Efficiency (TE) and Allocative Efficiency (AE) of Gogjali local calves fattening production fields in 2018 by using the method of data envelope analysis and according to the variables of production functions and costs.

Field No.	%TE	AE %	EE %	Field No.	%TE	AE %	EE %	Field No.	TE%	AE %	EE %
.1	100	840	840	.18	100	983	983	.35	931	723	673
.2	931	825	768	.19	100	910	910	.36	845	803	679
.3	911	803	732	.20	100	825	825	.37	100	612	612
.4	100	689	689	.21	100	100	100	.38	844	739	624
.5	881	724	638	.22	945	837	791	.39	100	635	635
.6	100	100	100	.23	986	731	720	.40	100	627	627
.7	100	940	940	.24	879	725	637	.41	963	642	618
.8	100	845	845	.25	973	777	756	.42	978	575	562
.9	981	783	768	.26	832	781	650	.43	925	543	502
.10	100	765	765	.27	100	906	906	.44	888	676	600
.11	933	791	738	.28	100	803	803	.45	100	692	692
.12	849	831	706	.29	933	888	829	.46	862	662	571
.13	928	767	712	.30	962	811	780	.47	100	100	100
.14	899	746	671	.31	100	915	915	.48	920	729	671
.15	100	992	992	.32	806	844	680	.49	729	717	523
.16	100	100	100	.33	100	670	670	.50	100	635	635
.17	100	100	100	.34	996	666	663	.51	752	722	543
							average		94.6	78.6	74.4

The source is prepared by the researcher based on questionnaire format data and statistical program Deap.

3- Comparison of the results of technical efficiency (TE), the allocative efficiency (AE) and economic efficiency (EE) OF Gogjali **calves fattening production fields** in 2018.

In order to achieve the objectives of this research and to find out whether the research hypotheses match the results of the estimation of the field data and to determine the best category of the primary age of the calves and the best period of fattening economically, See table 3 below:

Table (3) shows the percentages of the average technical efficiency levels (TE) and the allocative efficiency (AE) and the economic efficiency (EE) imported and local calves fattening production fields according to age group and the period of fattening in the study sample for the production year 2018.

Details		Field numbers				imported			Local		
Class		imported		local							
Age Group	/ fattening day Period	field	calf	field	calf	TE%	AE%	EE%	TE%	AE%	EE%
the first 6-12 month	180−150	16	789	5	297	85.13	78.73	66.66	94.46	77.62	73.34
	210−181	11	651	9	458	87.62	84.12	73.43	95.80	82.70	79.40
	250−211	11	583	7	355	92.74	81.31	75.41	100	95.85	95.85
Sum and average						88.49	81.38	71.83	96.75	85.39	82.86
Second 12-24 month	180−150	7	419	5	212	96.92	65.31	63.62	92.58	76.72	71.08
	210−181	29	1596	8	455	89.82	67.36	60.92	96.21	81.28	78.08
	250−211	7	544	5	278	80.34	74.90	61.48	92.46	70.18	64.46
Sum and average						89.02	69.19	62	93.75	76.06	71.20
The third 24-36 month	180−150	6	340	4	181	86.55	56	48.28	97.17	59.37	57.75
	210−181	7	446	4	134	79.67	54.77	43.21	93.82	75.15	71.02
	250−211	6	233	4	153	85.86	66.3	57.3	82.75	70.22	57.57
Sum and average						84.02	59.02	49.59	91.24	68.24	62.11
Sum and total average		100	5610	51	2523	87.8	71.3	62.8	94.6	78.6	74.5

Source: Collected and calculated by the researcher based on the results of table data (1, 2)

Table (3), above, shows that the levels of TE, AE, and EE of the imported calves fattening fields which their average amounted (87.8, 71.3, 62.8%) respectively, are not superior to levels of TE, AE, and EE of local calves fattening fields, which their average amounted (94.6, 78.6, 74.5%) respectively.

These results were contrary to the expectations according to the hypotheses the research included which show the superiority of the owners of imported fattening production fields to local calves fattening production fields in achieving high levels of technical efficiency, allocative and economic efficiency as it is shown in the summary of the results of the table above which make it very clear that the first fattening period (150 – 180) within second age group is the best in achieving the highest levels of technical efficiency (TE) according to (96.92%), But the third fattening period in the first age group is the best in achieving the best levels of allocative efficiency (AE) and economic efficiency (EE), which their average amounted about (81,31, 75.41%) respectively

According to the researcher, the third fattening period ((211-250) day within the first age (6-12) month in the sample of imported calves fattening fields, is likely to be the best

as the results of the assessment in Table (3) show that the third fattening period within the first age group is the best in achieving the highest levels of TE, AE and EE in the sample of local calves fattening fields in the way as imported calves fattening fields in the research sample.
From the above, the researcher comes to the following important **conclusions**:

1. The owners of local calves fattening fields are superior to their peers of imported calves fattening fields in achieving higher levels of technical, economic and allocative efficiency.
2. The third fattening period of (211-250) days within the second and third age group of (6-12) months is the best in achieving the best levels of technical, economic and allocative efficiency concerning both groups used in the research sample.
3. Not all fields that have achieved full technical proficiency have achieved full allocative and economic efficiency.

The researcher recommends conducting the following:

1. The necessity to encourage people who want to run calf fattening fields by providing or funding them free-interest loans.
2. Encouraging researchers, higher education students and specialized research stations and institutions to perform further experiments and researches in the field of genetic improvement on Iraqi claves which will help to provide Iraq with hard currency.
3. Providing the breeders alternative food and fodder instead of wheat and barley and veterinary treatments and vaccines.

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تقدير الكفاءة التقنية والتخصصية والاقتصادية لحقول تسمين عجول اللحم في محافظة نينوى (منطقة كوكجلي أنموذجاً) باستخدام اسلوب DEA

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المستخلص

تعد حقول تسمين العجول في منطقة كوكجلي انموذجا لمحافظة نينوى لما لها من إسهام كبير في تلبية نسبة عالية من احتياجات افراد المجتمع من اللحوم الحمراء، وعليه استهدف البحث تقدير الكفاءة التقنية TE والكفاءة التخصصية AE والكفاءة الاقتصادية EE في هذه المنطقة للعام 2018 وباستخدام اسلوب تحليل مغلف البيانات DEA وبافتراض تغير عوائد الحجم VRs ووفق دالتي الانتاج والتكاليف ومن جهة المدخلات input-oriented وذلك بالاعتماد على البيانات الميدانية لعينة عشوائية بلغت (151) حقل، شكلت نسبة 47% من اجمالي حقول المنطقة المدروسة، وقسمت إلى مجموعتين الأولى (100) حقل احتوت على عجول الصنف المستورد والثانية (51) حقل لعجول الصنف المحلي، وبلغت متوسطات قيم الكفاءة التقنية لحقول تسمين عجول الصنف المستورد والمحلي نحو (87,8%، 94,6%) على التوالي .فيما بلغت متوسطات مستوياتها بنحو (87,8 ، 71,3 ، 62,8)% على التوالي لحقول تسمين عجول الصنف المستورد وبلغت مستوياتها بنحو (94,6 ، 78,6 ،74,5)% على التوالي لحقول تسمين عجول الصنف المحلي ونظرا لتفوق حقول الصنف المحلي على حقول تسمين عجول الصنف المستورد في مستويات الكفاءة لذا توصي الدراسة بأجراء المزيد من الدراسات والتجارب الخاصة بالتحسين الوراثي بهدف تطوير اصناف العجول المحلية وتوصي بتقديم القروض الخالية من الفوائد للمربين .

الكلمات المفتاحية: تقييم الكفاءة، التقنية، الاقتصادية، حقول التسمين، عجول اللحم، أسلوب DEA .