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RESEARCH ARTICLE

Technical Efficiency and Total Factor Productivity Analysis of Dairy Cow Breeds in Egyptian Governorates

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Abstract

The current study aimed to estimate the technical and scale efficiency plus total factor productivity of cow (Baladi, Cross and Foreign) breeds in Egyptian Governorates. Records of means for cow breeds were Baladi (92914.3), Foreign (7509) and Cross (137322) in Egyptian Governorates, Also the average quantity of milk produced by tons was 97662.6 during the period 2014-2016 for Egyptian Governorates. The Size and population number of the farms under investigation in 27 Governorates were recorded during the period 2014 and 2016. Then statistical analysis using SPSS and DEAP software was applied. The results revealed that animals from six Governorates showed decreasing return to scale productivity as they were as following, Asyut (0.719), Beni-Suef (0.781), Sharkia (0.781), Dakahlia (0.916), Menia (0.921) and Suhag (0.921) and at the same time they have increased size of the farms to be technical efficient. In addition, eight Governorates had low Malmquist total factor productivity; which were ;North Sinai (0.168), Damietta (0.643), Behaira (0.730), Gharbia (0.893), Kafr-El Sheik (0.951), Fayoum (0.973), Ismailia (0.981) and Asyout (0.986), respectively. Six of them showed constant return to scale productivity. On the other hand, North Sinai had shown increasing return to scale productivity and so should decrease size of farms to increase efficiency and productivity. The breed types had shown technical inefficient and technical changed is recommended to improve breeds to increase efficiency and productivity.

Keywords: Efficiency, Malmquist productivity, Dairy, Egypt.

Introduction

Net Agriculture income reached 256.0 billion Egyptian Pounds (L.E) 2015/2016 versus 224.9 billion L.E 2014/2015, the increase rate was 2673.3 billion L.E (13.8%) which represented about 9.6% of Gross Domestic Product (GDP). While agricultural production value reached 363.9 billion L.E 2015/2016 versus 319.5 billion L.E in 2014/2015, an increase of 13.6%. Animal production value had reached 36.7% of the total value of agricultural production 2015/2016 by 133.9 billion L.E versus 119.3 billion L.E 2014/2015, an increase of 12.3% [1, 2].

Agricultural sector is one of the important sources of national income, livestock represents a major support of agricultural sector in order to achieve integration between plant and animal production, Therefore the state is interested in developing livestock and poultry to reduce the problem of food shortages [1].

Milk is essential to provide nourishment and protection for the young mammals. The major constituents of milk are water, carbohydrates, fat, protein and vitamins and all young mammals are essential for the human foods, so milk represents a fundamental nutrition source [2].

The quantity of milk produced reached 4964 thousand tons in 2016 compared to 5123 thousand tons in 2015 with a drop of 3.1% and 5476 thousand tons for 2014 with a drop of 6.4 % form 2015. Profits are different in dairy farms, and numerous researches have determined parameters for profitability of dairy farm [3]. Gloy *et al*. [4] found that, the parameters for production that included in

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management such as high sized farms, increasing rate of production of milk, and those farms that preferred using of parlors rather than stanchion method of milking, had a significant effect on profitability for dairy milk production farms. Several researches have focused on estimating the relative level of technical and scale efficiency by using the software DEA (Data Envelopment Analysis) techniques. Researches have been conducted by examining the performance of dairy sector in different countries and evaluating the scale and technical efficiency and inefficiencies of the dairy sectors [5].

This research aimed to evaluate various types of efficiency that affect dairy farms such as technical efficiency, scale efficiency and total factor productivity change of dairy cow breeds among different Egyptian Governorates in 2014-2016. Moreover, the current study was applied in order to determine which Governorates have shown the lowest performance adaptations, and to evaluate the technical conditions for each Governorate from the view of returns to scale, technical efficiency under variable to returns assumptions and finally the Malmquist total factor productivity index.

Materials and Methods

Data sample

DEA was applied to data related to 27 Egyptian Governorates from 2014 to 2016. Year 2014 was considered the staring year for the observations and the collected data from Central Agency for public mobilization and statistics (CAPMAS) [2, 6, 7]. The records were collected for input for the modal assumptions, the number of different dairy cow breeds (Baladi, Cross and Foreign Breeds) in thousands and the size of each Governorate (km^2) as well as the total population of each Governorate. Output assumptions are the quantity of milk (tons) for cows among different years.

Data envelopment analysis (DEA)

Two methods were presented for estimating Milk efficiency and productivity: Data Envelopment Analysis (DEA) and Stochastic Frontier Analysis (SFA) [8]. The aim to be examined is the principle for determined the method for application to the data [9]. The application of DEA for agriculture has studied by numerous papers where these studies have investigated differences between technical efficiency scores and the distribution of these scores in the sample data [10-14]. DEA was performed in this study in order to investigate changes in technical efficiency under both constant and variable return to scales and scale efficiency and finally productivity index by using Malmquist method in Egyptian governorate dairy farms breeds.

The DEA model

For a single output, the following linear programming model is used for determining the technical efficiency under constant return to scale assumptions [15]:

$$\begin{aligned} &\max_{\theta,\lambda}\theta_i \\ &\text{subject to} \sum_{j=1}^{n}\lambda_j\, y_j - \theta_i\, y_i - s = 0 \\ &\sum_{j=1}^{n}\lambda_j\, x_{kj} + e_k = x_{ki} \\ &\lambda_j \geq 0;\ \ s \geq 0;\ \ e_k \geq 0 \end{aligned} \qquad (1)$$

Where θ_i is referred to the increase in output that used for input (ith) and λ_j indicates N × 1 vector of weights related to inputs that is efficient, s is the slack of output, and e_k is the kth slack of input. Banker *et al*. [16] suggested that DEA model that is used for the constant return to scale (CRT) could be adapted for a variable returns to scale (VRS). So should adding constraint N1'λ = 1 for convexity of the model, so modified into VRS DEA (variable return to scale Data Envelopment Analysis). A decision making unit (governorate) has efficient results for output when the values of λi and θ are equal to 1, and λj = 0. On the other hand, an observation is inefficient when λi = 0, θ > 1, and λj ≠ 0 for the output result. Solving (1), we can get a measure of technical efficiency.

$$TE_i = \frac{Y_i}{Y_i^*} = \frac{1}{\theta_i} \qquad 0 \leq TE_i \leq 1 \qquad (2)$$

Where Yi is the observed output and Y i is the maximum possible output. When comparing the technical efficiency constant to return (TECRS) scores to the technical efficiency variable to return efficiency (TEVRS) scores can obtain the measure of scale. When there are differences between the two scores, this investigate that there is scale inefficiency that showed limits for the

achievement of an optimal (constant) scale, and the scale efficiency can be calculated by the following equation [17].

$$SE_i = \frac{TE_i^{CRS}}{TE_i^{VRS}} \qquad 0 \le SE_i \le 1 \tag{3}$$

When SEi = 1 this refers to scale efficiency is full and SEi < 1 investigate that there is a non-increasing return of scale (NIRS) for the model of DEA.

When panel data are present, DEA can be used for calculate the Malmquist Total Factor Productivity (TFP) Index, which estimate productivity change over a period [18]. The TFP can be decomposed into more components: changes into technological changes in the technical efficiency; changes in the pure efficiency; and finally changes in scale efficiency [19]. Where change in technological described by shit in the productivity and changes in efficiency showed by reaching the production. Fare *et al.* [20] described TFP for the output as follows:

$$M_0\left(y_{t+1}, x_{t+1} y_t, x_t\right) = \left[\frac{d_0^t\left(x_{t+1},\ y_{t+1}\right)}{d_0^t\left(x_t, y_t\right)} * \frac{d_0^{t+1}\left(x_{t+1},\ y_{t+1}\right)}{d_0^{t+1}\left(x_t, y_t\right)}\right]^{1/2} \tag{4}$$

Where xt + 1 represents the production point for x1 and yt + 1 represent the production point for y1. The M0 refers to the mean (geometric) of the two output-based on Malmquist TFP that described by the period t and period t + 1 technology. When M0 > 1 will refers to growth from the period t to the period t + 1 is positive for the productivity and when M0 < 1 will refers to growth from the period t to the period t + 1 is negative for the productivity. When M0 = 1 will refers to constant growth from the period t to the period t + 1 for the productivity [19].

Statistical analysis

The collected data were analyzed using SPSS (Statistical Package for Social Science (version 21), the SPSS program [21-24] was used for analysis of variance. Duncan multiple range tests and homogeneity of variance were done according to Snedecor and Cochran [25]. The efficiency measures for technical, scale and total factor productivity were estimated by using the DEAP 2.1 program created by Coelli [17].

Results and Discussion

The Table (1) that shows the statistics of the different variable inputs and outputs that are used in the DEAP program where the first inputs were the total numbers of Baladi breeds that were used in different Governorates where the mean number in thousands was 92914.3 and the minimum number was 50.6 for Port-Said governorate and maximum at 259397 for Menoufia Governorate during the period 2014-2016. The total number of Cross breed was 137322 where the Red Sea governorate had the minimum number that was 83.3 and the largest Governorate, Behera that was 2041378. The Foreign breed was an average of 7509 and the lowest Governorate was South Sinai that had no Foreign breed (Zero) and the largest Governorate was 78077 for Behera. These results agree with [2, 6, 7] that indicated the largest Governorate for breeding Cross breed was the Behera while Red Sea had no Baladi breeds.

The quantity of milk produced by tons was average 97662.6 during the period 2014-2016 for Egyptian Governorates. Where these quantities are decreased in 2016 and 2015 than 2014 although the total number of the breeds of cows are increased during 2016 and 2015 than 2014 so the technical efficiency, scale efficiency and total factor productivity should evaluated to disclose the problem with the breed number or the size of the farms in each governorates [2, 6, 7].

Table 1: Means of quantity of milk produced (ton) per each breed with Egyptian governorates 2014-2016.

Governorate	Baladi number (Thousand)	Cross number (Thousand)	Foreign number (Thousand)	Quantity milk (Ton)
Cairo	6410± 215.5***	1567± 334.3**	1656.6± 198***	4289± 369***
Alexandra	16217± 2518***	54565± 2709.6**	3941± 1055***	44831± 2533***
Port- Said	50.6± 50.6***	34653± 15082**	2.33± 2.33***	25309± 11523***
Suez	4681± 0.05 ***	5370± 2651**	1524.6± 1522***	11677± 9037***
Damietta	6970± 0.05 ***	42056± 2073**	7179± 1422***	57522± 3324***
Dakahlia	78316± 0.05 ***	94675± 13351**	15965± 1413***	121735± 11367***
Sharkia	189804±34649 ***	194512± 5166**	10263± 3626***	248760± 53332***
Kalyoubia	84011.6± 8948***	28792± 5267**	6024± 524.4***	52387± 12792***
Kafr_ El Sheikh	91940.6± 9507***	135235± 4539**	2721± 292.7***	137292± 1540***
Gharbia	62298.3± 19352***	171125± 8438**	9912± 1049.7***	179670± 11460***
Menoufia	259397± 34242***	75572± 11921**	5183± 2076***	148276± 2609***
Behera	177396± 43149***	2041378± 1521**	78077± 18314***	595457± 91607***
Ismailia	23421± 1858.5***	18579± 9648.6**	12998± 3113***	35670± 8535***
Giza	125700± 2380***	22243± 13561**	7535± 1946***	67568± 9594***
Beni- Suef	220452± 51089***	121325± 29815**	2966.6± 569.1***	126890± 7948***
Fayoum	191102± 3637***	93717± 5453**	1107± 175.4***	117969± 3532***
Menia	238622± 21268***	72076± 1887**	2582± 821***	119851± 5307***
Asyout	151210± 10294***	201048± 45088**	15399± 5088***	174613± 23561***
Suhag	194950± 8027***	87330± 14133**	8123± 1025***	131329± 10530***
Qena	177680± 10273***	33608± 10405**	2378± 788***	76240± 15232***
Aswan	48339± 5220***	16221± 1411**	264± 34.03***	23461± 2936***
Luxor	111960± 19541***	22727± 10063**	1542± 270***	60562± 5743***
Red Sea	220.0± 38.15***	83.3± 45.84**	4807± 2470***	98.3± 62.8***
El Wadi- El Gidid	45388± 792.1***	132128± 33889**	377.6± 194.1***	4579± 1159***
Matrouh	1937.0± 416.1***	4982± 1095**	192.6± 98.5***	69602± 9175***
NorthSini	102.3± 4.91***	2009± 659**	24.6± 22.2***	1023± 91.2***
South Sinai	108.00± 108***	125.3± 76.3**	0	133.6± 123.1***

Means within the same column and carrying ** are significant at ($P \leq 0.05$).
Means within the same column and carrying *** are significant at ($P \leq 0.001$).

Results for technical efficiency for all Governorates under constant to return assumption was 0.815 revealing that loss of milk production by about 18.5 % due to either total number of breeds in each of them or those governorates can increase milk production with about 18.5% without increasing the fixed resources. The results indicated that 13 Governorates showed inefficient milk production under constant return assumption those were Cairo (0.789), Alexandria (0.707), Dakahlia (0.842), Sharkia (0.875) , kalyoubia (0.810), Beni-Suef (0.781), Menia (0.984), Asyout (0.719), Suhag (0.921), Aswan (0.831), El Wadi- El Gidid (0.150), North Sinai (0.360) and South Sinai (0.281) that means that the loss of milk production may be due to technical inefficiency. The results of technical inefficiency in 13 Governorates mean that their increased output with average of 34 % without increasing their resources for the total number of cow breeds.

Three of these Governorates had technical inefficiency less than 50% (El Wadi- El Gidid, North Sinai and South Sinai),while the worst governorate for milk production was El Wadi-El Gidid that work for milk production with loss of 85% of their resources under constant to return assumptions. Also results indicated that 14 governorates work full efficiency under constant to return assumptions (that means constant resources for production of milk).

When variable return assumption taken into account for measuring technical efficiency the mean average was 0.972 revealing that loss of milk production by about 2.8 % when changing the fixed resources that included total number of breeds in each governorates or those

governorates can increase milk production with about 2.8% with increasing the fixed resources

Also these results revealed that only five governorates were inefficient those were Alexandria (0.736), Dakahlia (0.900), kalyoubia (0.818), Menia (0.960) and El Wadi- El Gidid were (0.831).

These results are comparable with Lahmar *et al*. [26] findings, who reported that 47% of the farms are found to produce below 80 % of their potential due to technical inefficiency. Efficiency measure suggests that state-owned farms in Tunisia could increase milk production by as much as 32% through a more efficient use of their production inputs. This result seems to confirm that the increase in milk production over the last decade in Tunisia is the result of an increase in the number of imported dairy cows rather than of an improvement in dairy production efficiency. Also, Theodoridis and Ragkos [27] had estimated the mean level of technical efficiency and it was 0.748, indicating that there is substantial inefficiency in farming operations for the sampled dairy farms and suggesting that a 25.2% increase of the production value is possible. Kaneva [28] found that the average technical efficiency is 44% for producers' co-operatives and 31% for family owned farms. This means that co-operatives could produce their output with 56% less inputs and family owned farms with 69% less. The results provide evidence that farm's production orientation plays a significant role in terms of its efficiency.

Also, Table (2) showed that average scale efficiency score was 0.837 that means loss of milk production by about 16.3 % for all governorates due to the size of the farms by decreasing or increasing the size. The most scale inefficient governorates (14) were estimated to be operating under increasing and decreasing returns to scale conditions. Eight governorates were scaled inefficient due to increasing the size of the farms and those governorates should increase the size of the farms to be efficient where those farms work for production of milk under sub-optimal scale those governorates were Cairo (0.789), Alexandra (0.960), kalyoubia (0.990), Aswan (0.831), Red Sea (0.069), El Wadi- El Gidid (0.180), North Sinai (0.360) and South Sinai (0.281). Four governorates from scale inefficiency were less than 50% means that these 4 governorates exhibit a sub-optimal scale, implying that the milk farms need to be expanded in order to achieve full scale efficiency. They ranked, the Red Sea (0.069) (94% loss of milk) due to decreased size of the farms or the size should increase by about 94 % to be scale efficient in production). The second governorate was El Wadi- El Gidid (0.180) (that revealed loss of milk for about 80%) because of decreased size of the farms or the size should increase by about 80% to be scale efficient). South Sinai (0.281) (70% milk loss) as a result of decrease in size of the farms or the size should increase by about 70% to be scale efficient). North Sinai (0.360) (that revealed loss of milk for about 60%) due to decrease size of the farms or the size should increase by about 60% to be scale efficient).

Table 2: Estimation of technical and scale efficiency for Egyptian Governorates 2014-2016.

Governorate	TE (CRS)	TE (VRS)	Scale efficiency	Return to scale
Cairo	0.789	1.000	0.789	Increasing
Alexandra	0.707	0.736	0.960	Increasing
Port- Said	1.000	1.000	1.000	constant
Suez	1.000	1.000	1.000	constant
Damietta	1.000	1.000	1.000	constant
Dakahlia	0.842	0.900	0.916	decreasing
Sharkia	0.875	1.000	0.875	decreasing
Kalyoubia	0.810	0.818	0.990	Increasing
Kafr_ El Sheikh	1.000	1.000	1.000	constant
Gharbia	1.000	1.000	1.000	constant
Menoufia	1.000	1.000	1.000	constant
Behera	1.000	1.000	1.000	constant
Ismailia	1.000	1.000	1.000	constant
Giza	1.000	1.000	1.000	constant
Beni- Suef	0.781	1.000	0.781	decreasing
Fayoum	1.000	1.000	1.000	constant
Menia	0.894	0.962	0.921	decreasing
Asyout	0.719	1.000	0.719	decreasing
Suhag	0.921	1.000	0.921	decreasing
Qena	1.000	1.000	1.000	constant
Aswan	0.831	1.000	0.831	Increasing
Luxor	1.000	1.000	1.000	constant
Red Sea	1.000	1.000	0.069	Increasing
El Wadi- El Gidid	0.150	0.831	0.180	Increasing
Matrouh	1.000	1.000	1.000	constant
NorthSini	0.360	1.000	0.360	Increasing
South Sinai	0.281	1.000	0.281	Increasing
Total	0.815	0.972	0.837	

CRS TE (Technical Efficiency) under constant returns to scale hypothesis, VRS TE under variable returns to scale hypothesis.

By contrast, 6 governorates were exhibiting supra optimal scale inefficiency. They ranked Suhage (0.921), Menia (0.921), Dakahlia (0.916), Sharkia (0.875), Asyout (0.719), Beni-Suef (0.781), and showed decreasing returns to scale efficiency. These findings suggest that the size of the farms are on average, supra optimal and should be decreased to reach the optimal scale. Madau *et al*. [29] found that the scale efficiency on average (0.987), indicating that production could increase by 1–2% for reaching efficient production. While Aldeseit [30] had estimated scores for scale efficiency by using DEA models for both constant and variable return to scale. Their investigated that the farms in the sample data were not operating at an optimal size. The average estimated was 0.66 for scale efficiency, indicating that there is scale-inefficiency for sampled dairy producers also concluded the dairy producer were overusing inputs to produce their level of output or their about 0.34 of the farms were operating inefficiency for the size of the farms. Also to increase scale of efficiency, all degrees of technical efficiency for dairy farmers in Jordan should be increased.

The results of Jaforullah and Whiteman [31] for estimating efficiency of scale for dairy industry in the New Zealand and to investigate the relationship between technical efficiency and farm size (scale efficiency). The numbers of dairy farms in the sample data had shown 264 and they applied DEA for the sample data. Their results indicated that the percent of these farms that operating at optimal scales was 19% and those above optimal scale was 28 %, while those below optimal scale were representing 53%. Also, average technical efficiency under variable return to scale was estimated at 89 per cent.

In addition, Weersin *et al*. [32] had estimated efficiency parameters for dairy farms in Ontario and decomposed it into

technical (purely) and efficiency of scale using approach for non-parametric (DEA). The percent of technical efficient dairy farms in the sample data was 42%, while the inefficiency for farms of dairy in Ontario was 58% that are due to non-optimal scale of production. The different in scales between herd sizes indicate a range of farm sizes exist and not operating at efficiency. They concluded that scale efficiency measures had a significant effect on the profitability of the dairy farms.

On the other hand, Hambrusch *et al.* [33] study which aimed to estimate different efficiency scores either for technical and scales for dairy farms in Austria and also to examine the relationship between efficiency and farm size. The number of dairy farms that is highly specialized for milk production was 222. Using the approach for non-parametric (Data Envelopment Analysis), the results showed 79 % of the farms were technical efficiency and 94% of the farms were scale efficiency. This indicated that management practices of these highly specialized dairy farms that is used for milk production had a stronger impact on technical efficiency than farm size. An analysis of returns to scale revealed that 18 % of the sample farms were operating at constant returns to scale, 9 % above scale efficiency and 73 % below efficient scale so these farms should increase their size by about 27% to be constant return to scale.

The results of Table (3) showed the total factor productivity for all governorates by applying the Malmquist productivity index that has become the standard approach in productivity measurement over time especially when non parametric specification are applied to micro data. Where, it was decomposed into changes in efficiency, (catching up), changes in frontiers (technical changes).

Table 3: Malmquist Index (geometric means) for total factor productivity changes and its components 2014-2016.

Governorate	Efficiency change	Technological change	Pure Efficiency change	Scale Efficiency change	Total Factor Productivity change
Cairo	1.070	1.310	1.000	1.070	1.401
Alexandra	1.095	0.957	1.000	0.939	1.048
Port- Said	1.000	1.079	1.000	1.000	1.079
Suez	1.000	1.269	1.000	1.000	1.269
Damietta	1.000	0.643	1.000	1.000	0.643
Dakahlia	0.994	1.007	0.998	1.005	1.001
Sharkia	1.069	1.069	1.000	1.069	1.143
Kalyoubia	0.966	1.239	0.963	1.003	1.197
Kafr_ El Sheikh	1.000	0.951	1.000	1.000	0.951
Gharbia	0.998	0.895	1.000	0.998	0.893
Menoufia	0.881	1.184	1.000	0.881	1.043
Behera	1.000	0.730	1.000	1.000	0.730
Ismailia	1.000	0.981	1.000	1.000	0.981
Giza	0.991	1.277	0.791	1.000	1.010
Beni- Suef	1.131	1.012	1.000	1.131	1.144
Fayoum	1.000	0.973	1.000	1.000	0.973
Menia	1.058	1.142	1.000	1.038	1.208
Asyout	1.095	0.900	0.930	1.177	0.986
Suhag	0.955	1.150	0.978	0.977	1.098
Qena	0.850	1.246	0.920	0.924	1.059
Aswan	1.097	1.207	1.000	1.097	1.324
Luxor	1.000	1.663	1.000	1.000	1.663
Red Sea	1.003	1.830	1.000	1.003	1.836
El Wadi- El Gidid	2.583	0.592	1.000	2.354	1.530
Matrouh	1.000	2.046	1.000	1.000	2.046
NorthSini	0.807	0.579	1.000	0.807	0.468
South Sinai	1.887	1.129	1.000	1.887	1.028
Total	1.051	1.051	0.993	1.059	1.131

The results showed that eight governorates had low Malmquist total factor productivity they were North Sinai (0.168), Damietta (0.643), Behaira (0.730), Gharbia (0.893), Kafr-El Sheik (0.951), Fayoum (0.973), Ismailia (0.981) and Asyout (0.986), respectively. North Sinai showed increasing return to scale productivity and so should decrease size of farms to increase efficiency and productivity whereas Asyut governorate showed decreasing return to scale productivity and should increase size of farms to increase efficiency and productivity.

The other governorates (n=6) showed constant to return productivity and the breed types showed technical inefficient and recommended technical change to increase efficiency and productivity for breeds. Also the results showed that total factor productivity (TFP) on average equal to 1.131 implying that during the period of 2014-2016 there were generalized technological of progress. These results disagreed with Madau *et al*. [29] that found mean TFP on average was equal to 0.979, implying that during the period of the observations, there has been a generalized "technological" regression and that TFP has grown by a decreasing amount.

Conclusion

In conclusion, six governorates showed decreasing return to scale productivity (0.719-0.921) including Asyut, Beni-Suef, Sharkia, Dakahlia, Menia and Suhag those which is a must to increase size of their farms to be technically efficient. However, eight governorates had low Malmquist TFP (0.168-0.986) involving North Sinai, Damietta, Behaira, Gharbia, Kafr-El Sheik, Fayoum, Ismailia and Asyut. North Sinai governorate showed increasing return to scale productivity and so should decrease size of farms to increase efficiency and productivity whereas Asyut Governorate showed decreasing return to scale productivity and should increase size of farms to increase efficiency and productivity. The other Governorates (6) showed constant to return productivity and the breed types showed technical inefficient and recommended technical change to increase efficiency and productivity for breeds.

Conflict of interest

The authors have no conflict of interest to declare.

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الملخص العربي

تحليل الكفاءة التكنولوجية والانتاجية الكلية في سلالات الأبقار في محافظات مصر.

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يهدف هذا البحث إلى تحليل الكفاءه التكنولوجية وكفاءة السعة والإنتاجية الكلية في سلالات الأبقار (البلدي والخليط والاجنبي) في محافظات مصر. تم تجميع سجلات عن اعداد سلالات الأبقار البلدي والخليط والاجنبي وكذلك كمية انتاج اللبن وحجم المحافظات وعدد السكان اثناء الفتره من 2014-2016 وتم عمل التحليل الاحصائي باستخدام برنامج SPSS، وبرنامج DEAP لعمل التحليلات الازمة. أظهرت النتائج ان هناك ست محافظات تعمل تحت مستوي منخفض من السعة وهي على الترتيب اسيوط (0.719)، بني سويف (0.781)، الشرقية (0.785). الدقهلية (0.916)، المنيا (0.921)، وسوهاج(0.921) ويجب زيادة الحجم لزيادة الكفاءة التكنولوجية. كما اظهرت النتائج من ناحية الإنتاجية الكلية ان هناك ثمان محافظات منخفضة وهي علي الترتيب شمال سيناء (0.468), دمياط (0.643), البحيرة (0.730), الغربية (0.893), كفرالشيخ (0.951), الفيوم (0.973), الاسماعيلية (0.981), أسيوط (0.986) ست من هذه المحافظات تعمل تحت مستوي ثابت من السعة ولذلك يجب العمل علي تحسين السلالات لكي تصل الى الكفاءة الإنتاجية بينما محافظة شمال سيناء تعمل تحت مستوي سعه متزايد فيجب تقليل الحجم لكي تصل الى الكفاءة الإنتاجية بينما محافظه اسيوط تعمل تحت مستوي سعة متناقص فيجب تقليل الحجم لكي تصل الى الكفاءة الانتاجية.