Mansoura Veterinary Medical Journal

ECONOMIC EFFICIENCY OF CHICKEN BREEDS ON BROILER PRODUCTION

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ABSTRACT

This study aimed to investigate the difference in productivity between different broiler breeds and their effect on productive and economic efficiency of broiler farms through studying, the effect of most important factors that may affect broiler farm production (season of production, broiler breed and system of housing) and the effect of breed among different seasons and housing systems on total return, total costs and net profit. Also, the effect of veterinary management (Drugs, vaccines, disinfectant, and veterinary supervision), mortality rate, marketing age, marketing weight and marketing price of Kg meat on farm production were evaluated. This study was carried out during the period from 2012 – 2015 on random cycles of broiler farms in four different Provinces including Dakahlia, Kafr Elsheikh, Gharbiya and Sharqia.

Our study concluded that, in order to gain high profits from broiler farming, it is important to achieve productive and economic efficiency. Also, It was found that the best economical broiler breeds in the study were Sasso, Ross and Hubbard breeds where the high total return and net profit were obtained. On the other hand, winter season was better than summer season for broiler production, where the farm gave higher total return and net profit. In broiler production the veterinary management inputs (vaccines, drugs, veterinary supervision and disinfectants) were very important and represented about 13% from the total variable cost.

INTRODUCTION

Duration and area of the study:- This study was carried out during the period from 2012 – 2015 on random cycles of broiler farms in four different Provinces including Dakahlia, Kafr Elsheikh, Gharbiya and Sharqia.

Methods of data collection:- The data were collected from a cross-section survey from a random sample of broiler farms. The data were collected from broiler farms by two methods, according to **Atallah, (2000) and Ahmed, (2007),** either from accurate records available in poultry farms in the study areas or from face to face research questionnaire methods that were established for this purpose in case of farms that have no records.

The data were collected about:- Seven different breeds (Hubbard, Arbor acres, Avian48, Ross, Cobb, Sasso and Dokki4), two different seasons (winter and summer), four different localities (Dakahliah, Kafr Elsheikh, Gharbia, and Sharkia) and two different housing systems (Closed and open system).

These data were classified according to the methods implied by Omar, (2003) and Osman et al., (2008):

1) Production parameters and production resources:- that included breed type, number of brooded day old chicks, season of production cycle, housing system, feed amount per bird, mortality percentage and its causes from most important diseases spread during production cycle, marketing age, average body weight of bird at marketing and marketing price per kg meat.

2) Production costs: which included:-

A-Fixed costs: It included the rent of the buildings and equipments depreciation. The depreciation rates were calculated for the equipments on five year periods and for the buildings on twenty five year periods according to **(Muhammad, 2002)**, while the value of rent was used directly during the calculation without depreciation in case of the farms not owned by farmers **(Atallah, 2000).**

B-Variable costs: such as the values of vaccines, drugs, disinfectants, veterinary supervision, feed cost, day old chick cost, labour cost, electricity, litter costs and the transportation and miscellaneous costs **(Atallah, 2000 and Bano et al., 2011)**.

3) Production returns:-It included the returns from total live body weight sales, litter sales; according to the market prices during the years of the study.

Analytical Technique::-The data were collected, arranged, and analyzed statistically using the computer program **SPSS/PC (SPSS, 2007)** and the used analytical design was multifactorial (nested) design.

All the production parameters affecting the broiler production as well as their costs and returns within different breeds were calculated for each 100 broiler birds to overcome the variation in the numbers of broilers of the different farms.

Duncan's multiple range test (DMRT)(Duncan, 1955): It was done to test the significant differences between the breeds within the different seasons **M. stat, (1984).**

Measures of the economic and productive efficiency: The following measures were calculated over the period extended from (2012 – 2015) for about 197 cycles from Egyptian broiler farms**. The measures were:**

1. Average broiler meat production per kilogram = Number of live birds X Average body weight at the marketing age.
2. Average total costs per Egyptian pound **(New, 1991)**: = Average fixed costs + Average variable costs.
3. Average total variable costs per Egyptian pound **(Atallah, 1997)** = Feed cost + Day old chicks cost + Litter cost + Medicaments cost + Miscellaneous costs (labor, fuel, water and electricity).
4. Average fixed costs per Egyptian pound **(Atallah, 2004 and Omar, 2009)** = Building costs or rent + Equipment costs.
5. Average total returns per Egyptian pound = Broiler sales + litter sales.
6. Average net income **(Rosegrant et al., 2008)** = Average total returns – Average total costs.

   Depreciation rate for building **(Lotfollahian and Hosseini, 2007; Muhammad, 2002 and Rahimi and Behmanesh, 2012). =** (Building costs / No. of years to be depreciated (25 years))
7. Percentage of the total returns to the total costs (Total returns/Total costs)*100
8. Percentage of the net profit to the total costs (Net profit (income)/ Total costs)*100
9. Percentage of total returns to the variable costs (Total returns/Variable costs)*100
10. Percentage of the net profit to the variable costs (Net profit (income)/Variable costs)/100
11. Total veterinary inputs / total variable costs.
12. Total veterinary inputs / total costs.

Table (1): Effect of different seasons among different breeds on feed costs, total veterinary management costs and day old costs /100 broilers.

Breed	Season	N	Feed costs (LE)	Total veterinary management costs (LE)	Total variable costs (LE)	Total fixed costs (LE)	Total costs (LE)
			Mean±S.E	Mean±S.E	Mean±S.E	Mean±S.E	Mean±S.E
Hubbard	Summer	11	1280.46±3.42e	245.18±4.66d	2048.29±11.84e	83.36±5.80b	2131.64±12.91f
	Winter	14	1232.29±4.67f	228.34±4.00f	1785.23±15.88i	72.40±3.82c	1857.62±13.73h
	Total	25	1253.48±8.06C	235.75±4.78C	1900.97±12.38E	77.22±4.63A	1978.19±17.46E
Arbor acres	Summer	15	1291.96±3.15d	273.65±4.69b	2118.00±12.45d	51.50±4.28e	2169.50±13.41d
	Winter	11	1289.50±7.43e	237.12±3.00e	1854.89±14.06g	47.49±4.05f	1902.38±14.30f
	Total	26	1290.92±6.63B	258.20±4.62A	2006.68±10.88C	49.80±3.01D	2056.49±12.64C
Avian	Summer	12	1247.62±2.99f	244.74±4.70d	2007.17±17.83e	82.79±4.98b	2089.96±15.95d
	Winter	13	1256.00±4.92f	250.38±4.51cd	1803.95±12.89h	75.85±5.94c	1879.80±11.78g
	Total	25	1251.98±5.03C	247.67±4.78AB	1901.50±14.31D	79.18±5.65A	1980.68±14.73D
Ross	Summer	18	1259.14±4.22f	229.02±4.19f	2023.32±14.69e	48.16±3.45ef	2071.48±12.46b
	Winter	8	1191.86±4.99g	235.04±4.01e	1868.00±20.95f	46.79±4.33ef	1914.79±11.91g
	Total	26	1238.44±8.84C	230.87±4.41C	1975.53±12.73D	47.74±3.41D	2023.27±12.79D
Cobb	Summer	24	1289.32±5.09e	232.47±4.63e	2052.22±16.94e	62.53±3.92c	2114.74±16.28d
	Winter	19	1899.40±5.49a	281.33±9.69a	2621.86±14.05a	101.79±4.85a	2723.64±13.15a
	Total	43	1558.89±4.96A	254.06±10.47A	2303.92±16.83A	79.87±4.16A	2383.79±12.81A
Sasso	Summer	27	1513.43±8.54c	253.77±6.19c	2205.05±19.81b	50.78±3.38e	2255.83±16.26c
	Winter	14	1617.56±7.59b	245.79±6.86d	2186.58±13.94c	61.58±3.20d	2248.16±15.72c
	Total	41	1548.99±9.95A	251.04±6.09D	2198.74±16.45B	54.47±5.59C	2253.21±10.07B
Dokki4	Summer	6	1296.18±8.54c	221.49±7.02c	1882.91±14.81a	65.29±3.48e	1947.13±16.71c
	Winter	5	1294.22±7.59b	226.23±6.90d	1884.68±17.89g	62.45±4.47d	1945.93±12.99f
	Total	11	1295.20±9.51B	223.89±7.09D	1883.57±11.89F	63.28±4.47B	1946.85±12.99E

-Small litters: Indicated that: Means within the same column of different small litters are significantly different at ($P < 0.05$).

-Capital litters: Indicated that: Means within the same column of different capital litters are significantly different at ($P < 0.05$).

Table (2): Effect of different seasons among different breeds on mortality rate, livability percent /100 broilers and marketing age and marketing weight / bird.

Breed	Season	N	Mortality rate (%)	Livability (%)	Marketing age (Day)	Average marketing weight / bird (Kg)	Value of broiler sale (LE)	Total return (LE)	Net profit (LE)
			Mean±S.E	Mean±S.E	Mean±S.E	Mean±S.E	Mean±S.E	Mean±S.E	Mean±S.E
Hubbard	Summer	11	12.87±1.42c	87.13±10.42c	39.18±1.52c	1.98±0.01b	2297.45±13.11g	2350.35±14.01g	218.71±17.49lG
	Winter	14	6.64±3.27e	93.08±3.34b	38.79±0.37cd	2.11±0.07a	2538.96±13.15d	2585.94±14.35d	728.32±18.23a
	Total	25	9.38±2.81D	90.46±7.77B	38.96±0.93C	2.05±0.06A	2432.69±16.72D	2482.08±14.33D	503.89±12.55C
Arbor acres	Summer	15	19.67±1.54b	80.33±6.54d	39.20±1.62c	1.99±0.05b	2321.55±18.85f	2423.46±16.21f	253.96±13.64e
	Winter	11	8.10±3.37d	91.90±9.37b	37.45±1.21d	1.95±0.01b	2381.57±19.61f	2427.98±16.22f	525.60±13.51f
	Total	26	14.77±4.91B	85.23±4.91D	38.46±1.96C	1.97±0.03b	2346.94±14.38E	2425.37±12.91D	368.88±16.44F
Avian	Summer	12	12.30±2.11c	87.70±3.11c	38.58±1.23cd	1.94±0.03b	2526.24±15.44d	2575.65±13.37d	485.69±13.58g
	Winter	13	10.18±3.14c	89.82±9.14b	39.00±1.16c	2.02±0.02A	2269.88±14.35g	2318.20±14.69g	438.40±14.09i
	Total	25	11.20±4.50	88.80±5.50C	38.80±1.16C	1.98±0.02b	2392.93±15.51E	2441.77±15.48E	461.09±15.28D
Ross	Summer	18	11.79±3.51c	88.21±5.51b	39.72±1.05c	2.00±0.07a	2608.48±16.46c	2656.4±15.82c	584.92±16.80d
	Winter	8	13.64±3.89c	86.36±8.89b	41.75±1.25c	2.01±0.04a	2494.65±14.40e	2538.59±14.63e	623.80±16.67c
	Total	26	12.36±3.18C	87.64±9.18C	40.35±1.28C	2.00±0.06A	2573.46±16.48C	2620.15±15.21C	596.88±15.46B
Cobb	Summer	24	12.25±4.51c	87.75±10.51b	38.92±0.61cd	1.97±0.08b	2474.48±16.43e	2527.79±16.53e	413.05±16.66j
	Winter	19	22.88±2.62a	77.12±7.86a	38.74±1.18cd	1.98±0.04b	3043.01±19.97a	3121.81±14.30a	398.17±10.08k
	Total	43	16.95±2.27A	83.05±4.63A	38.84±1.40C	1.98±0.06B	2725.69±12.40B	2790.26±12.87B	406.47±17.73E
Sasso	Summer	27	8.57±3.52d	91.43±7.52b	65.07±1.41b	1.82±0.01c	2944.85±16.82b	2989.32±16.37b	733.49±16.33a
	Winter	14	8.75±3.44d	91.25±7.44b	64.64±2.09b	1.91±0.03b	2909.48±14.30b	2950.14±13.62b	701.98±19.80b
	Total	41	8.63±3.40C	91.37±7.40B	64.93±1.61B	1.85±0.02C	2932.77±13.94A	2975.95±15.46A	722.74±15.63A
Dokki4	Summer	6	8.78±3.64d	91.22±4.22b	69.86±1.33b	1.43±0.02c	2385.43±16.65b	2421.81±16.85b	474.86±15.33a
	Winter	5	8.37±3.79d	91.63±3.15b	68.78±1.02a	1.48±0.04c	2388.12±14.90f	2423.79±13.82f	476.92±14.28h
	Total	11	8.65±3.89D	91.35±3.89B	69.40±0.95A	1.45±0.05D	2386.31±14.90E	2422.78±14.80D	475.93±14.04D

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Table (3) Effect of different seasons among different breeds on value of collective efficiency measures (total return/total costs, total return/total variable costs, net return/total costs, net return/total variable costs total_veterinary management costs to (variable and to total costs):and /100 broilers.

Breed	Season	N	Total return/ total costs (%)	Total return / total variable costs (%)	Net profit/Total costs (%)	Net profit /total variable costs (%)	Total veterinary management costs to	
							Total costs (%)	Total variable Costs (%)
			Mean±S.E	Mean±S.E	Mean±S.E	Mean±S.E	Mean±S.E	Mean±S.E
Hubbard	Summer	11	110.26±10.66e	114.76±7.61d	10.26±2.61e	10.68±1.16e	11.50±1.50ab	11.97±1.97ab
	Winter	14	139.21±12.21a	144.85±5.81a	39.21±2.11a	40.80±3.11a	12.29±2.12a	12.79±1.98a
	Total	25	125.47±5.11B	130.57±7.12A	25.47±2.14B	26.51±2.51B	11.92±2.13AB	12.40±1.40A
Arbor acres	Summer	15	111.71±11.71d	114.42±8.21d	11.71±1.17e	11.99±2.19e	12.61±2.13a	12.92±1.91a
	Winter	11	127.63±11.27c	130.90±7.11bc	27.63±3.11b	28.34±2.14c	12.46±2.14a	12.78±1.88a
	Total	26	117.94±9.41C	120.86±11.12 C	17.94±4.19C	18.38±3.16C	12.55±2.12A	12.87±1.88A
Avian	Summer	12	123.24±12.31d	128.29±10.11c	23.24±3.14c	24.19±2.19c	11.71±2.14ab	12.19±1.19 a
	Winter	13	123.32±12.31c	128.51±10.12c	23.32±3.21c	24.30±2.41c	13.32±2.15a	13.88±1.87a
	Total	25	123.28±11.70C	128.41±10.11BC	23.28±2.81B	24.25±2.44B	12.50±2.11A	13.02±1.88A
Ross	Summer	18	128.24±11.70c	131.29±10.12b	28.24±2.41b	28.91±2.77c	11.06±2.15ab	11.32±1.34ab
	Winter	8	132.58±11.44bc	135.90±9.10b	32.58±5.11ab	33.39±3.31b	12.27±2.16a	12.58±1.58a
	Total	26	129.50±10.19B	132.63±6.31A	29.50±3.11AB	30.21±3.16A	11.41±2.17AB	11.69±1.16A
Cobb	Summer	24	119.53±10.11d	123.17±7.11d	19.53±3.12d	20.13±2.17d	10.99±2.18b	11.33±1.13ab
	Winter	19	114.62±11.12d	119.07±7.18cd	14.62±2.16d	15.19±2.19d	10.33±2.11b	10.73±1.17b
	Total	43	117.05±11.12C	121.11±10.12BC	17.05±2.05B	17.64±2.13C	10.66±2.10B	11.03±1.11A
Sasso	Summer	27	132.83±10.11bc	135.12±8.11b	32.52±2.15bc	33.26±2.13b	11.25±2.11ab	11.51±1.51ab
	Winter	14	131.22±11.31bc	134.92±9.12b	31.22±2.13ab	32.10±2.14b	10.93±2.11b	11.24±1.24ab
	Total	41	132.08±10.12A	135.35±5.16A	32.07±2.17A	32.87±2.17A	11.14±2.13AB	11.42±1.42A
Dokki4	Summer	6	123.64±10.92d	127.11±7.13b	25.52±2.11c	24.97±2.18b	10.95±2.15ab	11.53±1.71ab
	Winter	5	125.52±11.30d	129.52±6.17c	26.48±2.13c	26.32±2.15b	11.41±2.13ab	11.98±1.38ab
	Total	11	124.45±11.21B	128.63±6.17.B	24.45±2.13B	25.27±2.17B	11.50±2.11AB	11.89±1.88A

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-Capital litters: Indicated that: Means within the same column of different capital litters are significantly different at ($P < 0.05$).

RESULTS AND DISCUSSION

A-Effect of different seasons among different breeds on feed costs, total veterinary management costs and day old chicks costs /100 broilers:

The results observed in table (1) indicated that, there was a significant differences ($P < 0.05$) of the different seasons among different breeds as well as the broiler breeds on the values of feed costs, total veterinary management costs and chicken costs /100 broilers.

The total feed costs revealed a higher levels in summer and winter season of Sasso and winter season of cobb as their values were 1513.43, 1617.56 and 1899.40 LE/100 broilers and the lower feed costs observed in winter season of Ross and Hubbard, summer and winter season of Avian as their values were 1191.86, 1232.29, 1247.62 and 1256 LE/100 broilers respectively. The results also indicated that the higher feed costs among breeds observed in Cobb and Sasso as their values were 1558.89 and 1548.99 LE/100 broilers respectively, while the lower feed costs observed in Ross, Avian and Hubbard breeds as their values were 1238.44, 1251.98 and 1253.48 LE/100 broilers, respectively. The results showed the higher total veterinary management costs at different seasons in winter season of Cobb, summer seasons of Arbor acres and Sasso as their values were 281.33, 273.65 and 253.77 LE/100 broilers respectively, while the lower value observed in summer and winter seasons of Dokki4 and winter season of Hubbard as their values were 221.49, 226.23 and 228.34 LE/100 broilers respectively. The higher value of total veterinary management costs among breeds observed in Arbor acres and Cobb as their values were 258.20 and 254.06 LE/100 broilers respectively, while the lower value of total veterinary management costs observed in Dokki4 and Ross as their values were 223.89 and 230.87 LE/100 broilers respectively. The results also concluded that Cobb and Arbor acres showed the higher value for feed costs, total veterinary management costs, while Ross breed showed lower value for feed costs with Avian, and with Dokki4 for total veterinary management costs, while the lower breeds for chicken costs but higher feed costs were Sasso and Dokki4. By comparing the previous results we found that feed costs contribute the higher part of total variable costs followed by day old chicks costs then total veterinary management costs , and this agreed with **Dziwornu, (2014)** who stated that feed costs and day old chick costs represent about three-quarters of the average variable cost of broiler production.

The higher value of total variable costs was observed in winter season of Cobb, summer season of Sasso, winter season of Sasso and summer season of Arbor acres as their values were 2621.86, 2205.05, 2186.58 and 2118 LE/100 broilers respectively, while the lower value of total variable costs observed in winter season of Hubbard, winter season of Avian, winter season of Arbor Acres and winter season of Ross as their values were 1785.23, 1803.95, 1854.89 and 1868 LE/100 broilers respectively. The results also showed that the higher value of total variable costs among breeds observed in Cobb, Sasso and Arbor acres as their values were 2303.92, 2198.74 and 2006.68 LE/100 broilers respectively, while the lower value observed in Dokki4, Hubbard and Avian as their values were 1883.57, 1900.97 and 1901.50 LE/100 broilers respectively.

The changes of total variable cost attributed to the changes in feed cost, one day old chick cost, medicament cost, and quality of farm management. This agreed with

Atallah, (1994) who reported a significant effect of the different broiler breeds on the total variable cost.

The higher value of total fixed costs observed in winter season of Cobb, summer season of Hubbard, summer and winter seasons of Avian as their values were 101.79, 83.36, 82.79 and 75.85 LE/100 broilers respectively, while the lower value of total fixed costs observed in winter and summer seasons of Ross, winter season of Arbor acres and summer season of Sasso as their values were 46.79, 48.16, 47.49 and 50.78 LE/100 broilers respectively. The total fixed costs showed the higher value among breeds in Cobb and Avian as their values were 79.87 and 79.18 LE/100 broilers respectively, while the lower value observed in Ross and Arbor acres as their values were 47.74 and 49.80 LE/100 broilers respectively. These differences in total fixed costs may be attributed to price changes of rent or building cost and equipment from year to year, and also the type of house either closed or open, and also among breeds due to differences in length of fattening period. These results agreed with **Zatter, (1998) and Ahmed, (2007),** who reported that there is a significant effect broiler breed on fixed costs.

The results showed that the higher value of total costs observed in winter season of Cobb, summer and winter seasons of Sasso and summer season of Arbor acres as their values were 2723.64, 2255.83, 2248.16 and 2169.50 LE/100 broilers respectively, while the lower value of total costs observed in winter seasons of Hubbard, Avian, Arbor acres and Ross as their values were 1857.62, 1879.80, 1902.38 and 1914.79 LE/100 broilers respectively. The higher value of total costs among breeds observed in Cobb and Sasso as their values were 2383.79 and 2253.21 LE/100 broilers respectively, while the lower value observed in Dokki4 and Hubbard breeds as their values were 1946.85 and 1978.19 LE/100 broilers respectively.

The results also concluded that Cobb breed showed the higher value with Avian for equipment costs and total fixed costs, with Dokki4 for rent and building costs and with Sasso for total costs, while Ross showed lower value with Arbor acres for equipment costs and total fixed costs and with Sasso for rent and building costs, while the lower breeds for total costs were Dokki4 and Hubbard breeds.

B- Effect of different seasons among different breeds on mortality rate, livability percent /100 broilers and marketing age and marketing weight / bird:

The results observed in table (2) indicated that, there is a significant differences ($P < 0.05$) of the different seasons among different breeds as well as the broiler breeds on the levels of mortality rate, livability, marketing age and average marketing weight /bird. The higher level of mortality rate observed in winter season of Cobb, summer season of Arbor acres, winter season of Ross and summer season of Hubbard as their values were 22.88, 19.67, 13.64 and 12.87 % /100 broilers respectively, while the lower level observed in winter season of Hubbard, winter season of Arbor acres, summer season of Sasso, summer and winter seasons of Dokki4 as their values were 6.64, 8.10, 8.57, 8.78 and 8.37 %/100 broilers respectively.

The results clarified that the higher level of mortality rate among breeds observed in Cobb and Sasso as their levels were 16.95 and 14.77 % /100 broilers respectively, Sasso and Dokki4 showed lower values were 8.63 and 8.65 % /100 broilers respectively.

The livability was higher level in winter seasons of Hubbard, Arbor acres and Dokki4 with summer seasons of Sasso and Dokki4 as

their values were 93.08, 91.90, 91.63, 91.43 and 91.22 %/100 broilers respectively, while the lower livability level observed in summer season of Arbor acres, winter season of Ross, summer season of Avian and summer season of Cobb as their values were 80.33, 86.36, 87.70 and 87.75 %/100 broilers respectively. The higher level of livability among breeds observed in Sasso and Dokki4 as their values were 91.37 and 91.35 %/100 broilers respectively, while the lower level of livability among breeds observed in Arbor Acres and Ross as their values were 85.23 and 87.64 % /100 broilers respectively.

The higher level of marketing age observed in summer and winter seasons of Dokki4, summer and winter seasons of Sasso as their levels were 69.86, 68.78, 65.07 and 64.64 day/100 broilers respectively, while the lower level of marketing age observed in winter season of Arbor Acres, summer season of Avian, winter season of Cobb and winter season of Hubbard as their levels were 37.45, 38.58, 38.74 and 38.79 day/100 broilers respectively. The results cleared that the higher level of marketing age among breeds observed in Dokki4 and Sasso as their levels were 69.40 and 64.93 day/100 broilers respectively, while Arbor acres and Avian showed lower levels 38.46 and 38.80 day/100 broilers respectively.

The higher level of average marketing weight observed in winter season of Hubbard, winter season of Avian, winter and summer seasons of Ross as their values were 2.11, 2.02, 2.01 and 2 Kg/100 broilers respectively, while the lower level of average marketing weight observed in summer and winter seasons of Dokki4, summer and winter seasons of Sasso as their values were 1.43, 1.48, 1.82 and 1.91 Kg/100 broilers respectively.

The results cleared that the higher level of average marketing weight among breeds observed in Hubbard and Ross as their values were 2.05 and 2 Kg/100 broilers respectively, while the lower level of average marketing weight among breeds observed in Dokki4 and Sasso as their values were 1.45 and 1.85 Kg/100 broilers respectively. The results concluded that the mortality rate was higher in summer season than winter season, while livability was higher in winter season than summer season. This may be due to high temperature in summer that may result in heat stress that causing death this agreed with **Daghir, (1995b)** that stated that heat represents a threat on broiler chickens that they suffer from heat stress and die, and agreed with those of **Yalcin et al., (1997) and Zahir-ud-Din et al., (2001)** as they mentioned the negative effect of high ambient temperature on bird performance.

These results also agreed with researches of **Imaeda, (2000),** who reported higher mortality in summer than in winter season, but disagreed with **Dawkins et al., (2004)** who reported lower mortality percent in summer season than in winter.

The results also concluded that average marketing weight/bird were higher in winter season than summer season, as birds tends to eat more in winter season this agreed with results by **El-Husseiny et al., (1992)** that divided commercial broiler chicks randomly into two equal groups. The first group was kept at 32°C while the second group kept at 22°C for 6 weeks of age. They found that there was 11% decrease in body weight gain in the higher temperature (32°C) compared to that of the lower temperature (22°C). The results also agreed with a study of **Al-Batshan and Hussein(1999)**on the effect o f hot cycling temperature on broilers during gr owing period and found that hot cyclic temper ature decreased body weight and weight gain.

On the other hand marketing age was higher in summer season than winter season and this may be due to high temperatures in summer season that result in reduction of feed intake as birds need to limit heat production by their body, and as a result showing slower growth rate, consequently need more time to reach marketing weight and increasing marketing age.

The results also concluded that breeds Sasso and Dokki4 showed lower mortality rate and higher livability indicating that they can withstand Egyptian climatic conditions and different management levels, however, both breeds showing lower average marketing weight and higher marketing age.

Arbor acres breed showed higher mortality rate with Cobb, lower livability with Ross that may indicating that these breeds less resistant to diseases and Egyptian climatic condition. These results may be due to difference in the disease susceptibility among breeds. These results agreed with those of **Ahmed, (2007); Atallah, (1994) and Atallah, (2000)** who stated broiler breeds differ in mortality percent.

Arbor acres with Avian are lower breeds for marketing age, while the higher breeds for average marketing weight/bird were Hubbard and Ross. These results agreed with **Fernandes et al., (2013) and Taha et al., (2010)** who concluded that chicken breed affects body weight gains at different ages, and also agreed with These results agreed with **Kalamah, (2002) and Hermiz et al., (2014)** who found that the broiler genetic lines were significantly differ in total and daily body weight gains.

The higher value of broiler sale observed in winter season of Cobb, summer and winter seasons of Sasso and summer season of Ross as their values were 3043.01, 2944.85, 2909.48 and 2608.48 LE/100 broilers respectively, while the lower value of broiler sale observed in winter season of Avian, summer season of Hubbard, summer and winter seasons of Arbor acres as their values were 2269.88, 2297.45, 2321.55 and 2381.57 LE/100 broilers respectively.

The results showed that the higher value of broiler sales among breeds observed in Sasso and Cobb as their values were 2932.77 and 2725.69 LE/100 broilers respectively, while the lower value observed in Arbor acres and Dokki4 as their values were 2346.94 and 2386.31 LE/100 broilers respectively. The higher value of total return observed in winter season of Cobb, summer and winter seasons of Sasso with summer season of Ross as their values were 3121.81, 2989.32, 2950.14 and 2656.4 LE/100 broilers respectively, while the lower value of total return observed in winter season of Avian, summer season of Hubbard, summer seasons of Dokki4 and Arbor acres as their values were 2318.20, 2350.35, 2421.81 and 2423.46 LE/100 broilers respectively.

The results cleared that the higher value of total return among breeds observed in Sasso and Cobb as their values were 2975.95 and 2790.26 LE/100 broilers respectively, while the lower value of total return among breeds observed in Dokki4 and Arbor acres as their values were 2422.78 and 2425.37 LE/100 broilers respectively.

The changes in total returns differed among seasons as a result of changes in price of poultry meat at marketing. These results agreed with **Ahmad et al., (2008),** who stated that sale prices varied among the different seasons resulting in changes in total return obtained.

The results clarified that the higher value of net profit observed in summer and winter seasons of Sasso, winter season of Hubbard and winter season of Ross as their values were 733.49, 701.98, 728.32 and 623.80 LE/100 broilers respectively, while the lower value of net profit observed in summer season of

Hubbard, summer season of Arbor acres, winter and summer seasons of Cobb as their values were 218.71, 253.96, 398.17 and 413.05 LE/100 broilers respectively.

The higher value of net profit among breeds observed in Sasso and Ross as their values were 722.74 and 596.88 LE/100 broilers respectively, while the lower value of net profit observed in Arbor acres and Cobb as their values were 368.88 and 406.47 LE/100 broilers respectively.

These results agreed with those of **Atallah, (2000) and Zahir-ud-Din et al., (2001),** as they concluded that, the breed has a significant effect on net profit according to mortalities, feed conversion rate and live body weight of the bird. The results concluded that values of total return and net profit were higher in winter season than summer season, while total costs was higher in summer season than winter season. The high total return in winter season may be attributed to higher livability, average marketing weight and value of broiler sale in winter season than summer.

The results also concluded that Cobb and Sasso were higher breeds for total cost and total return, while for net return higher breeds were Sasso and Ross, but the lower breeds for net return were Cobb and Arbor acres, while Dokki4 with Arbor Acres showed lower value of total return and with Hubbard showed lower value of total cost.

C-Efficiency measures of different seasons among different breeds:

The results cleared that the season of broiler production among different breeds have a great effect on efficiency measures either collective efficiency measures (total return/total costs, total return/total variable costs, net return/total costs and net return/total variable costs) or partial efficiency measures (value of vaccines, drugs, veterinary supervision costs, disinfectant costs, and veterinary supervision costs to total costs and total variable costs, and costs of each Kg broiler sale from vaccines, drugs, veterinary supervision, disinfectant and total veterinary management costs).

The results observed in table (3) indicated that, there is a significant differences ($P < 0.05$) of the different seasons among different breeds as well as the broiler breeds on value of collective efficiency measures (total return/total costs, total return/total variable costs, net return/total costs and net return/total variable costs /100 broilers.

The higher value of total return/total costs percent at different seasons observed in winter seasons of Hubbard and Ross, summer and winter seasons of Sasso as their values were 139.21, 132.58, 132.83 and 131.22 %/100 broilers respectively, while the lower value observed in summer seasons of Hubbard and Arbor acres, winter and summer seasons of Cobb as their values were 110.26, 111.71, 114.62 and 119.53%/100 broilers respectively. The results cleared that the higher value of total return/total costs percent among breeds observed in Sasso and Ross as their values were 132.08 and 129.50 %/100 broilers respectively, while Cobb and Arbor acres showed lower values 117.05 and 117.94%/100 broilers respectively. The results also cleared that the higher value of total return/total variable costs percent at different seasons observed in winter seasons of Hubbard and Ross, summer and winter seasons of Sasso as their values were 144.85, 135.90, 135.12 and 134.92 %/100 broilers respectively, while the lower value observed in summer seasons of Hubbard and Arbor acres, winter and summer seasons of Cobb as their values were 114.76, 114.42, 119.07 and 123.17%/100 broilers respectively. The higher value of total return/total variable costs percent among breeds observed in Sasso and Ross as their

values were 135.35 and 132.63 %/100 broilers respectively, while Arbor acres and Cobb showed lower values 120.86 and 121.11%/100 broilers respectively.

The results clarified that the higher value of net return/total costs percent at different seasons observed in winter seasons of Hubbard and Ross, summer and winter seasons of Sasso as their values were 39.21, 32.58, 32.52 and 31.22 %/100 broilers respectively, while the lower value observed in summer seasons of Hubbard and Arbor acres, winter and summer seasons of Cobb as their values were 10.26, 11.71, 14.62 and 19.53%/100 broilers respectively. The higher value of net profit/total costs percent among breeds observed in Sasso and Ross as their values were 32.07 and 29.50%/100 broilers respectively, while Arbor acres and Cobb showed lower values 17.94 and 17.05%/100 broilers respectively. The results cleared that the higher value of net profit/total variable costs percent at different seasons observed in winter seasons of Hubbard and Ross, summer and winter seasons of Sasso, as their values were 40.80, 33.39, 33.26 and 32.10%/100 broilers respectively, while the lower value observed in summer seasons of Hubbard and Arbor acres, winter and summer seasons of Cobb as their values were 10.68, 11.99, 15.19 and 20.13%/100 broilers respectively. The higher value of net profit/total variable costs percent among breeds observed in Sasso and Ross as their values were 32.87 and 30.21%/100 broilers respectively, while Arbor acres and Cobb showed lower values 18.38 and 17.64 LE/100 broilers respectively.

The results showed the higher total veterinary management costs/total variable costs at different seasons in winter seasons of Avian and Hubbard, summer and winter seasons of Arbor acres as their values were 13.88, 12.79, 12.92 and 12.78 %/100 broilers respectively, while the lower value observed in winter and summer seasons of Cobb, winter season of Sasso and summer season of Ross as their values were 10.73, 11.33, 11.24 and 11.32% /100 broilers respectively. The higher value of total veterinary management costs/total variable costs among breeds observed in Arbor acres and Avian as their values were 12.87 and 13.02%/100 broilers respectively, while Cobb and Sasso showed lower values 11.03 and 11.42%/100 broilers respectively.

These results concluded that, the higher season for total veterinary management costs to total costs and total variable costs was winter season than summer season. The results also concluded that Arbor acres and Avian showed costs showed higher value for total veterinary management costs to total costs and total variable costs while Sasso and Cobb showed the lower value. These results concluded that collective efficiency measures were higher in winter season than summer season, and among breeds Sasso and Ross were higher breeds, while the lower breeds were Cobb and Arbor acres. These results agreed with those of **Omar, (2003)**, who concluded that, the season of the year and broilers breeds significantly affect the efficiency measures of production.

CONCLUSION

This study concluded that, for obtaining good profits from broiler farming, it is important to reach to efficient production and it was found that, the best economical broiler breeds that gave high total returns and net profits were Sasso, Ross and Hubbard breeds. Also, winter season is better than summer season for broiler production, where the farm gave higher total return and net profit. The veterinary management inputs (vaccines,

drugs, veterinary supervision and disinfectants) were very important in broiler production and represented about (13%) from the total variable cost.

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الملخص العربى

الكفاءة الإقتصاديه لسلالات الدواجن على إنتاج بدارى التسمين

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أجريت هذه الدراسة لمعرفة مدى تاثير سلالة دجاج التسمين على الكفاءة الاقتصادية والانتاجية لمزارع دجاج التسمين وعلاقتها بالعوامل الاخرى المؤثرة على انتاجية و ربحية مزارع دجاج التسمين. حيث تم تجميع بيانات 197 دوره دجاج تسمين خلال الفتره من 2012 - 2015 من مزارع فى محافظات الدقهلية ، كفر الشيخ ، الغربية ، الشرقية ، وقد شملت المتغيرات التى تم دراستها سلالة الدواجن ، وموسم الانتاج ، ونظام المسكن ، وكمية الاعلاف تكلفتها و تكلفة الرعاية البيطرية (الادوية والتحصينات والمطهرات والاشراف البيطرى) و عمر التسويق ووزن الطيور عند التسويق و قيم التكاليف المتغيرة و الثابتة والايرادات التى شملت العائد من بيع الدواجن والسبلة .

أوضحت نتائج هذه الدراسة أن افضل سلالات الدواجن التى تحقق أعلى ربح تحت الظروف المصرية هى الساسو و الروس و الهبرد حيث انها تحقق أعلى عائد و أعلى صافى ربح، كما أوضحت أيضا أن أفضل المواسم لتحقيق ربح مرتفع هو الشتاء عن الصيف، بالإضافة إلي ذلك أظهرت الدراسة ان الرعاية البيطرية تمثل 13 % من إجمالى التكاليف المتغيرة ومع ذلك فهي تؤدي إلي تحقق عائد مرتفع عن طريق منع الامراض وزيادة وزن الطيور وربحية الطيور كما انها تحسن من كفائتها الاقتصادية والانتاجية.