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PERFORMANCE AND ECONOMIC IMPACT EVALUATIONS OF BROILER CHICKENS FOR DIFFERENT HOUSING SYSTEMS IN CLOSED FARMS

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ABSTRACT: The current study was conducted in private farms at AL-Khatatpa - the Menoufia Governorate, Egypt. Total number was 1155000 birds which used, all of them from one strain Ross 408 to investigate the effect of different housing systems (cages and floor) on broiler performance and evaluate that economically. By studying its effect on body weights at different ages, growth rates, feed index, feed conversion, European production efficiency (EPE), production number (PN) and livability. Where Body weights were measured at one-day-old chicks, then were weighted weekly till 35 days, and growth rates were estimated intervals at (1-7, 7-14, 14-21, 21-28, and 28-35) days of age, and cumulatively at (1-14, 1-21, 1-28, and 1-35) days of age. The most important results were:

1. Significant ($P \leq 0.05$) statistical differences were found between the two types of housing systems (floor and cages) were for body weight at 7, 21and 28d, of age, and highly significant ($P \leq 0.01$) for body weights at 1, 14, and 35d. of age.
2. Significant ($P \leq 0.05$) statistical differences were found between the two types of housing systems floor and cages) were significant ($P \leq 0.05$) for the cumulative growth rate during the 1-21 period, and highly significant ($P \leq 0.01$) for the cumulative growth rate during the (1-28 and 1-35) periods. But there is no significance ($P \geq 0.05$) for the cumulative growth rates during the1-14 period.
3. Highly significant ($P \leq 0.01$) statistical differences were between the two types of housing systems floor and cages) were for feed/bird, g, and feed conversion. But there is no significance ($P \geq 0.05$) for feed index and feed/bird /m^2.
4. The average economical gain/bird in the floor housing system (16.89 L. E/ bird) was nearly equal to the gain/bird of the cage housing system (16.971 L. E /bird) with differences between the two systems were found due to the capacity of the cages compared to the floor.

In conclusion, the findings of this study confirm that housing type has a massive effect on the productive performance of broiler chickens. The cage housing system is also considered more economical than the floor housing system.

Key words: Broiler, housing systems, performance.

INTRODUCTION

The poultry industry in the Arab Republic of Egypt faces many challenges because the industry is affected by many external factors, which significantly affected by the price of the dollar, due to the poultry industry’s dependence on importing many raw materials from abroad. This factor cannot be controlled unless all the raw materials on which this industry depends are local for production. This we cannot reach at the moment. Therefore, we must move towards reducing the cost of what we have with the capabilities of the industry, which we can control completely. Such as housing systems, management methods, care systems…………… etc.

To reduce the cost of the final product, for example, not limited to breeding using the floor housing system compared to the cage housing system. We find that the floor housing system is commonly used in raising broiler chickens, while the cage housing system is widely used in raising laying hens.

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This works to increase the opportunity for optimal exploitation of the space by increasing the number that can be raised per unit area, in addition to ease of use and application of biosecurity terms. Therefore, recently, the use of cages has been made to raise broiler chickens.

Few studies have been done on the suitability of the broiler housing system in cages compared to the housing system on the floor. Deep-litter floor housing is most common when raising broiler chickens used for white meat production (Aviagen, 2016), in this system, better litter management is crucial for providing good litter quality and for controlling the ammonia level inside the poultry.

The floor is covered with litter up to a depth of 2-3 inches. Birds' density is 5-7 birds per square meter. Easy access to feed, and water, provide good protection. Deep litter disadvantage is its requirement for high-quality litter and litter-borne diseases.

Cages could be defined as the rearing of poultry on raised wire netting floor in smaller compartments. At present, 75% of commercials in the world are kept in cages. Which are suitable for keeping a high density of birds when space is a limitation and scientific managemental practices can be followed. Feeders and waterers are attached to cages from outside, except nipple waterers, for which a pipeline is installed through or above cages.

The main object of this study was to determine the effect of as type of house system as one of important environmental factors on production and European production efficiency of broiler production in closed farms.

MATERIALS AND METHODS

The current study was conducted in private farms at Khatatpa – Menoufia Governorate. The total No. of Ross 408 birds were 1155000 (Cages,675000; and Floor, 480000) were used to investigate the production and economic comparison between cage and floor systems in broiler chickens.

Two densities were applied in the closed system, the first was 17 birds/ m^2 for the floor system and the second was 41 birds/m^2 for the cage system.

At the floor system: birds were reared on the floor, and a bed of sawdust was used for the floor, with a thickness ranging between 8-10cm. Chicks were received at a temperature of 32.5°C and then the temperature was reduced by 1°C every three days. The dormitories were 1215m^2 (93.4m length, L × 13m width, W × 2.9m height, H) and 1700m^2 (130m L × 13.05m W × 2.8m H).

At the cage systems: birds were reared in cages breeding dormitories, while it was 1820m^2 (112m L × 16.25m W × 5.75m H) for cages breeding. The cage units used in broiler breeding consist of three floors, each floor was 3.6m^2 (3m, L × 1.2m, W × 2m, H). The floor is made of thin metal bars.

The lighting program was fixed for both of the floor and cage systems, as it was without darkening in the first three days and starting from the fourth day with an hour of darkness, on the fifth day two hours of darkness, and on the sixth day three hours of darkness, finally, from the seventh day until slaughter, 4 hours of darkness, were used.

All birds feed and water were provided daily and *ad-libitum,* and all birds were fed the basal starter, (1-14 days of age, with 23% crude protein and 3050 kcal/ kg diet) and grower (14-28 days of age, with 21% crude protein and 3100 kcal/kg), according to NRC (1994), as given in Table (1)., water was provided by nibble 360° for all chicks. All procedures and handling of birds were conducted in compliance with the guidelines of the Institutional Laboratory Animal Care and Use Committee, Menoufia University, Egypt.

The studied traits:

Body weights at different ages.

Weekly chicks body weights were measured at one-day-old (10% of the total number of birds) as a sample were weighted weekly till 35 days was taken randomly to estimate the average body weight of the dormitories and these samples were applied in all commercial broiler farms.

Table (1): Composition and calculated of experimental diets.

Ingredients	Diets	
	Starter (1-14 day)	**Grower (14-35 day)**
Ground yellow corn (8.5%).	541	592.0
Soybean meal,44%.	320	260
Full fat soya (38%).	29	29
Gluten, 60%.	71.5	78.0
Mono calcium phosphate.	16.6	17.5
Limestone.	13	13.4
L-lysine.	1	2
DL-methionine.	1.2	1.4
Salt (NaCl).	3.7	3.7
Premix (Minerals and Vitamins).	3	3
Total.	1000	1000
Chemical calculated analysis:		
Crude protein, %.	23.02	21
ME (kcal/kg).	3056	3117
Crude fiber, %.	3.77	3.41
Raw fat is not less than, %.	5.56	5.7

(*) Premix. at 0.30 % of the diet supplies the following/ kg of the diet: Vit. A, 12000 IU;Vit.E, 10 mg; Vit.K_3, 3 mg; Vit B_1, 1 mg; Vit. B_2, 4 mg; Pantothenic acid, 10 mg; Vit. D_3, 2500 IU; Nicotinic acid, 20 mg; Folic acid, 1 mg; Biotin, 0.05 mg; Niacin, 40 mg; Vit.B_6, 3 mg; Vit B_{12}, 0.02 mg; Choline chloride, 400 mg; Mn, 62 mg; Fe, 44 mg; Zn, 56 mg; I, 1 mg; Cu, 5 mg and Se, 0.01 mg. Calculated according to NRC (1994).

Growth rates .

Growth rates were estimated intervals at 1-7, 7-14, 14-21, 21-28, and 28-35 days of age, and cumulatively at 1-14, 1-21, 1-28, and 1-35 days of age according to Brody (1945) formulas, to calculate growth rates.

$$Growth\,rates = \frac{W_2 - W_1}{\frac{1}{2}(W_1 + W_2)} \times 100$$

where:

W_2: the second weight

W_1: the first weight

Feed consumption (FC) (kg per bird).

The mount of feed consumption /bird was calculated by dividing the total feed consumption during the cycle by the actual number of birds at marketing ages.

Feed index (FI).

Feed index was calculated by (dividing the mean of body weight in kg/ feed conversion) according to Meltzer (1980) and Soltan and Kusainova (2012).

$$FI = \frac{Body\ weight\ in\ g\ \times 1000}{Feed\ conversion}$$

Feed conversion ratio (FCR) at marketing age .

The feed conversion ratio was calculated as follows:

$$FCR = \frac{The\ feed\ consumption(kg)/bird/cycle}{Body\ weight\ gain/bird/cycle\ (kg)}$$

While body weight gain was measured as the deviation between the body weights (in grams) at marketing ages and compared with one day of age.

European production efficiency (EPE).

The European production efficiency (EPE) was calculated according to the formula from Meltzer (1980) and Soltan and Kusainova (2012) as follows:

$$\boldsymbol{EPE} = \frac{\boldsymbol{Mean\ body\ weight\ (kg) at\ marketing\ age\ \times livability}}{\boldsymbol{Feed\ conversion\ marketing\ age\ (days)}}$$

Production Number (PN) .

Production number was calculated according to the formula of Voeten (1974) and Timmerman *et al.* (2006).

$$(PN) = \frac{(kg\ of\ growth\ per\ day)(100 - mortality\%)}{Feed\ conversion\ ratio} \times 100$$

Livability percentage

Livability was calculated according to formula below:

$$\boldsymbol{Livability},\% = \frac{\boldsymbol{Total\ number\ of\ survival\ birds\ per\ cycle}}{\boldsymbol{Total\ number\ of\ received\ birds\ at\ beging\ of\ each\ cycle}} \times \mathbf{100}$$

Statistical analysis:

Data were computerized and analyzed according to the following model by SPSS Program (2004).

$Y_{ij} = \mu + H_i + e_{ij}$

Where:

Y_{ij} : Observation of i housing system, j cycles;

μ : General mean;

H_i : Fixed effect of housing system;

e_{ij} : Residual effect.

RESULTS AND DISCUSSION

Effects of two housing systems on broiler body weights:

The effect of two housing systems (floor and cages) on broiler body weights at different ages during the fattening period (1,7,14,21,28 and 35 d. of age) are showed in Table (2). Averages of body weights in the floor housing system ($\bar{X} \pm$ S.E) were 42.30 ± 0.33gm., 183.10 ± 3.37gm., 407.07 ± 2.24 gm., 811.61 ± 12.21 gm., 1413.83 ± 3.49 gm. and 1968.51 ± 3.58 at 1, 7, 14, 21, 28, and 35 d. of age, respectively. Where, the averages of body weights in the cages housing system ($\bar{X}$ ± S.E) were 40.11 ± 0.31 gm., 173.17 ± 3.17gm., 403.11 ± 2.10 gm., 797.06 ± 11.47 gm., 1420.67 ± 3.28 gm. and 2008.83 ± 3.37 gm. at 1,7,14,21,28 and 35 d. of age, respectively.

Table (2) showed that the averages of body weight in the floor housing system are higher than cage housing system during the period from one day to twenty-one days old. The matter was reversed after that, so that body weights in the cage housing system were higher than the floor housing system at twenty-eight and thirty-five days of age.

The statistical differences between the two types of housing systems (floor and cages) were significant ($P \leq 0.05$) for body weight at 7, 21 and 28d., of age, and highly significant ($P \leq 0.01$) for body weights at 1, 14 and 35 d. of age (Table 2).

These results agree with that of Garcia *et. al.* (2008) and Guba *et. al*. (2006), who reported that body weight gain was better for broilers raised in cages than that raised on the floor and that of Deaton *et al.* (1974) who found that broiler chicks grown in the cages were heavier than the chicks that were grown in floor pens. Also, a similar trend was obtained by Soltan and Kusainova (2012) and El Shikha (2018). However, our results disagree with Santos *et. al.* (2008), who found that the body weight of broilers in cage system housing was less than that of broilers in litter housing. This difference in results could be the due difference in the broiler breed that is used.

Table (2): Effect of different housing systems (floor and cages) on body weight ($\bar{x}$± S.E) during fattening period (1, 7, 14, 21, 28 and 35 days of age) in broiler chickens.

Housing system	BW1	BW7	BW14	BW21	BW28	BW35	BW gain
floor	42.30±0.37	183.10±3.46	407.07±1.94	811.61±13.76	1413.83±3.00	1968.51±3.51	1926.21±3.39
cages	40.44±0.49	170.33±4.60	394.00±2.58	756.89±18.27	1400.78±3.98	1991.00±4.66	1950.56±4.50
Means of squares	19.779**	936.313*	980.834**	17202.571*	979.167*	2905.373**	2.806N.S.

** significant differences at P ≤ 0.01, * significant differences at P ≤ 0.05, N.S. non-significant

Continued interest in rearing broilers on different flooring systems apart from a litter may be attributed to one of several major factors: chickens' contact with fecal material and its hazardous effect (Reece *et al.*, 1971; Petek *et al.*, 2014). In addition, Thanga *et. al.* (2001) reported that broiler chickens reared in cages performed better than birds housed on floor system. However, voluntary feed intake is linked to a growth rate.

Superior weight gains in cage-reared chickens may be an indication of more uniform control of environmental conditions in different stages at cage housing. In later periods, the disappearance of differences in body weights was a sign of deterioration in cage conditions. Due to the genetic characteristics of broiler chickens, they tend to be less active with increasing age (Weeks *et al.*, 2000). However, an insignificant difference was noticed between the early period at 1, 7, 14 and 21 days of age.

Effect of two housing systems (floor and cages) on intervals and cumulative growth rates:

The effect of two housing systems (floor and cages) on broiler growth rates at different ages during fattening period (1-7, 7-14, 14-21, 21, 28 and 28-35 d.) ($\bar{X}$ ± S.E) are given in Table (3). Averages of growth rates in the floor housing system ($\bar{X}$± S.E) were 123.38 ± 1.14 gm., 76.91 ± 1.54 gm., 66.40 ± 54.13 gm., 54.13±1.65 and 32.61 ± 0.23 gm., at 1-7, 7-14, 14-21, 21-28- and 28-35-days periods of age, respectively. Where the averages of growth rates in the cages housing system ($\bar{X}$± S.E) were 124.22 ± 0.31 gm., 80.21 ± 1.44 gm., 64.96 ± 1.77 gm., 56.82 ± 1.55 gm. and 34.36 ± 0.21 gm., at 1-7, 7-14, 14-21, 21-28, and 28-35 periods of age, respectively.

These averages in Table (3) showed that the averages of growth rates in the floor housing system is lower than growth rates in the cage housing system during most periods (1-7, 7-14, 21-28 and 28-35) of the fatting period. Only (14-21) period growth rate in the floor housing system was higher than the growth rate in the cage housing system.

The statistical differences between the two types of housing systems floor and cages were significant (P ≤ 0.05) for growth rate (14-21) days period, And highly significant (P ≤ 0.01) for the growth rate (21-28) period. But there is no significance (P ≥ 0.05) for growth rates during (1-7, 7-14, and 28-35) periods. (Table 4).

The effect of two housing systems (floor and cages) on cumulative growth rates at different ages during fattening period (1-14, 1-21, 1-28, and 1-35) days periods ($\bar{X}$± S.E) are given in Table (5). Averages of cumulative growth rates in the floor housing system ($\bar{X}$ ± S.E) were 162.36 ± 0.20, 180.19 ± 0.47 ,188.38 ± 0.09 and 191.58 ±0.07 at 1-14, 1-21, 1-28 and 1- 35 periods of age, respectively. Where the averages of cumulative growth rates in the cages housing system ($\bar{X}$ ± S.E) were 163.73 ± 0.19., 180.51 ± 0.44, 189.01 ± 0.08 and 192.18 ± 0.06 at 1-14, 1-21, 1-28 and 1- 35 periods of age, respectively.

The statistical differences between the two types of housing systems floor and cages) were significant (P ≤ 0.05) for the cumulative growth rate during (1-21) period, And highly significant (P ≤ 0.01) for the cumulative growth rate during (1-28 and 1-35) periods. But there is no significance (P ≥ 0.05) for the cumulative growth rates during (1-14) period. (Table 4).

Table (3): Effect of different housing systems (floor and cages) on average growth rate ($\bar{x}$ ± S.E) during different intervals in fattening period (1-7, 7-14, 14-21, 21-28, and 28-35 days of age) in broiler chickens.

Housing systems	**Intervals**				
	1-7 days	**7-14 days**	**14-21 days**	**21-28 days**	**28-35 days**
Floor	123.38±1.10	76.91±1.57	66.40±2.11	54.13±1.88	32.61±0.21
Cages	122.68±1.47	79.84±2.09	61.97±2.81	60.24±2.49	34.80±0.27
Means of squares	49.580$^{n.s}$.	112.965 $^{n.s}$	214.617*	27.608**	1.095$^{n.s.}$

** significant differences at P ≤ 0.01, * significant differences at P ≤ 0.05, N.S. non-significant

Table (4): Effect of different housing systems (floor and cages) on average cumulative growth rate ($\bar{x}$ ± S.E) during fattening period (1-14, 1-21, 1-28 and 1-35, days of age) in broiler chickens.

Housing systems	**Cumulative growth rate**			
	1-14	**1-21**	**1-28**	**1-35**
Floor	162.36±0.22	180.19±0.53	188.38±0.10	191.58±0.07
cages	162.80±0.29	179.29±0.71	188.79±0.13	192.04±0.10
Means of squares	4.630$^{n.s.}$	0.971*	1.251**	3404.596**

** significant differences at P ≤ 0.01, * significant differences at P ≤ 0.05, N.S. non-significant

Deaton *et al*. (1974) found that broiler chicks grown in the cages were heavier than the chicks that were grown in floor pens. Therefore, Setter *et al.* (1999) mentioned that breeding programs under high ambient temperatures could identify heat-tolerant genotypes that would not be selected if tested under temperate conditions. Benyi *et al.*, (2015) found that during the starter period, the birds raised during the summer season were lighter and gained less weight than those reared in winter season. Olawumi (2015) stated the superiority of the cage system over that of deep litter in all the evaluated production traits, where the body weight of cage birds was higher than those of deep litter. Also, Şimşek *et al.* (2014) showed that significantly higher live weight at 7d. (184 g., 172g.) of cage and floor systems respectively, and 14 d. (477g., 459g.) of cage and floor systems respectively. But there was no significant difference between the cage and floor systems at later ages and slaughter weight.

Effect of two housing systems (floor and cages) on intervals and feed consumption, conversion ratio:

The effect of two housing systems (floor and cages) on feed/bird, g., feed conversion, feed index, and feed/bird /m^2 during fattening period ($\bar{x}$ ± S.E) are given in Table (5). Averages of feed/bird, g., feed conversion, feed index, and feed/bird /m2 in the floor housing system ($\bar{x}$ ± S.E) were 3045.09 ± 3.44 g., 1.61 ± 0.005, 1225.62 ± 4.18 and 53.74±0.13, respectively. Where the averages of feed/bird, g., feed conversion, feed index, and feed/bird /m2 in the cage housing system ($\bar{x}$ ± S.E) were 3182.96 ± 3.23g., 1.66± 0.005, 1213.37 ± 3.93 and 131.17±0.12, respectively.

The statistical differences between the two types of housing systems floor and cages) were highly significant (P ≤ 0.01) for feed/bird, g., and feed conversion. But there is no significance (P ≥ 0.05) for feed index and feed/bird /m2. (Table 5).

Table (5): Effect of different housing systems (floor and cages) on average feed consumption, conversion ratio, and index ($\bar{X}$ ± S.E) during fattening period in broiler chickens.

Housing floor	Feed/bird, g.	Feed conversion	Feed index	Feed/bird/m^2
Floor	3045.09±1.85	1.61±0.00	1225.62±4.49	53.74±0.03
Cages	3137.78±2.45	1.64±0.00	1212.65±5.96	129.30±0.04
Means of squares	49349.93**	0.005**	$965.717^{n.s.}$	$0.204^{n.s.}$

** significant differences at P ≤ 0.01 ,* significant differences at P ≤ 0.05,N.S. non-significant

FCR values of reared chickens on the floor were found to be significantly better than reared chickens in the cage. Decreased activity in cage systems was concluded as an effect of the deterioration of FCR value. Skinner *et al.* (2003) reported drowsiness as a parameter that adversely affected the broiler FCR. It was reported that due to the lack of activity reducing the bird's feed consumption and increasing in mortality rates deteriorates the feed efficiency (Mendes *et al*., 2013).

Feed consumption and mortality rates were found to be similar between the groups and this finding suggested another factor affecting feed efficiency; feed waste. The perforated structure of the cage ground leads to spillage of food to the manure belt and spilled food cannot be reached by chickens. However, at the floor system, spilled food can be consumed again and utilized by chickens. At the same time, the rush to food after dark schedule increased food wastage at cage housing and mortality due to sudden death syndrome. In addition, Santos *et al.* (2008) revealed that broilers reared on litter had a better FCR than those raised in cages (1.71 *vs.* 1.81 g/g) due to larger jejunum villus area, mucosal depth, and heavier relative gizzard weights, whereas the small intestine was lighter and shorter.

In another research, Santos *et al.* (2012) reported that although broilers reared on litter floors showed greater 14-day Salmonella colonization than cage-reared broilers, their digestion capacity appeared superior to cage-reared broiler, and they had fewer undigested feed particles in their distal small intestine which correlates with *enhanced* growth performance and breast meat yield. Şimşek *et al.* (2014) indicated that feed intake was similar (P≤0.05) between the two housing systems (cage and deep litter) while, a better feed conversion rate was obtained in floor system (P≤0.01)

Fouad *et al.* (2008) mentioned that floor-reared broilers had significantly heavier final body weight, body weight gain, better FCR, and lower mortalities throughout the whole rearing period (0-6 weeks). Lacin *et al.* (2013) found higher body weight in the floor group than cage without any effect on FCR and carcass traits. Aslam Athar *et al.* (1990) emphasized a significant increase in the performance of broilers at cage housing systems. However, Bahreiny *et al.* (2013) found no significant difference between the cage and floor systems in terms of live weight, feed intake and FCR.

Effect of two housing systems (floor and cages) on livability, production number (PN), feed index, feed/birdm^2 and European production efficiency (EPE) :

The effect of two housing systems (floor and cages) on livability, production number (PN), and European production efficiency (EPN) ($\bar{X}$ ± S.E) are given in Table (6). Feed index and feed/bird /m^2 for the floor housing system ($\bar{X}$ ± S.E) were 3045.09 ± 3.44 g., 1.61 ± 0.005, 1225.62 ± 4.18 and 53.74 ± 0.13, respectively. Where, the averages of feed/bird, g., feed conversion, feed index and feed/bird /m2in the cage housing system ($\bar{X}$ ± S.E) were 3182.96 ± 3.23g., 1.66± 0.005, 1213.37 ± 3.93 and 131.17g / kg±0.12, respectively.

The statistical differences between the two types of housing systems floor and cages) were highly significant (P ≤ 0.01) for feed/bird, g. and feed conversion. But there is no significance ($P \geq 0.05$) for feed index and feed/bird /m^2. (Table 6).

Table (6) illustrate the analysis of variance of meat production traits (European production efficiency (EPE), production number (PN), and livability as affected by rearing system and time. All factors have highly significant effects. In addition, all factors and interactions have a significant effect on studied traits. Livability and European production efficiency significantly ($P \leq 0.05$) differed between both systems, where birds housed in cages have higher values than birds housed on the floor (Table 6).

Economic evaluation of broiler production:

Table (7) illustrated the economic evaluation of broiler production in housing systems (floor and cages, respectively) and the price of marketing / 1 kg. Data and costs are collected for each element from feed mills, hatching, and markets each year.

These results indicated that marketing prices at farms were suitable for both producers and consumers but the cycles between farms and markets are very expensive and responsible people must think about other methods to solve such problem.

Table (7) showed that the average gain / bird in the floor housing system (16.89 pounds/ bird) was I nearly equal with gain / bird of the cage housing system (16.971 pounds /bird). Differences between two systems were found by breeding numbers / m^2. So, cage housing system have most gain compared with the floor housing system.

Table (6): Effect of different housing systems (floor and cages) on average livability and production traits ($\bar{X}$ ± S.E) during fattening period in broiler chickens.

Housing system	Livability	Production No.	European Efficiency
Floor	96.17±0.08	115.28±0.46	342.54±1.41
Cages	95.98±0.11	114.02±0.62	342.88±1.87
Means of squares	32804.39**	9.091$^{n.s.}$	0.650$^{n.s.}$

** significant differences at $P \leq 0.01$,* significant differences at $P \leq 0.05$,n.s. non-significant.

Table (7): Economic evaluation of broiler production for floor and cage housing systems in closed farms during tree different cycles (I, II and III).

Items	Floor				Cages			
	I	**II**	**III**	**Mean**	**I**	**II**	**III**	**Mean**
Price of a baby chick, L.E.	6.5	8	8		6.5	12	8	
Feed, L.E.	19.98	20.47	20.81		21.01	21.99	21.22	
Rent, L.E.	1	1.1	1.05		0.35	0.37	0.38	
Labor, L.E.	1.135	1.195	1.3		0.34	0.49	0.48	
Medicine, L.E.	1.4	3.83	3.6		2.65	2.77	2.6	
Farm running, L.E.	0.76	1.23	1.12		0.87	1.08	1.01	
Adjust for mortality, L.E.	0.255	0.235	0.255		0.21	0.32	0.51	
Marketing transport distance L.E.	0.2	0.1	0.2		0.23	0.21	0.22	
Total, L.E.	31.23	36.16	36.34		32.16	39.23	34.42	
Profit, L.E.	10%	10%	10%		10%	10%	10%	
Marketing price, L.E.	34.35	39.78	39.97		35.38	43.15	37.86	
Price/kg, L.E.	25	30	29		25	30	29	
Average weight, kg	1.795	2.05	2.045		1.995	2.01	1.97	
Total Marketing No.	174410	115110	143536	144352	217202	215207	215469	215959,33
Gain/bird	10.525	20.82	19.335	16.89	14.495	17.15	19.27	16.971

Conclusion

The findings of this study confirm that housing type has a massive effect on the productive performance of broiler chickens. The cage housing system is also considered more economical than the floor housing system.

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تقييم الأداء لدجاج اللحم والأثر الإقتصادى لأنظمة الإسكان المختلفة فى المزارع المغلقة

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الملخص العربي

أجريت الدراسة الحالية بإحدي المزارع الخاصة بالخطاطبة - محافظة المنوفية - مصر. وكان إجمالي عدد الطيور المستخدمة ١١٥٥٠٠طائر من سلالة الروص (٤٠٨)وتم تسكينها فى نظامى الأرضي والبطاريات وذلك لدراسة تأثيرها على أداء دجاج اللحم وتقييم ذلك اقتصادياً بالمزارع المغلقة . من خلال دراسة تأثيرها علي أوزان الجسم في مختلف الأعمار ومعدلات النمو ومعدلات استهلاك العليقة ومعدل تحويل الغذاء، وكفاءة الإنتاج الأوروبية (EPE) . حيث تم قياس أوزان الجسم للكتاكيت عند عمر يوم واحد ووزنها أسبوعياً حتى ٣٥ يومًا، وتم تقدير معدلات النمو خلال الفترات زمنية (١-٧ ، ٧-١٤ ، ١٤-٢١ ، ٢١-٢٨ ، ٢٨-٣٥) يومًا من العمر ، وبشكل تراكمي في عمر(١-١٤ و١-٢١ و١-٢٨ و١-٣٥ يومًا) وكانت أهم النتائج على النحو التالى:

١. كانت الفروق الإحصائية بين نوعي أنظمة الإسكان (الأرضية والأقفاص) ذات دلالة إحصائية (P ≤ ٠,٠٥) لوزن الجسم عند عمر ٧ و ٢١ و ٢٨ يوم وكبيرة للغاية (P ≤ ٠,٠١) لأوزان الجسم عند أعمار ١ و ١٤ و ٣٥ يوم.
٢. كانت الفروق الإحصائية بين نوعي أنظمة الإسكان الأرضية والأقفاص) معنوية (P ≤ ٠,٠٥) لمعدل النمو التراكمي خلال الفترة ١-٢١، وذات دلالة إحصائية معنوية جدا (P ≤ ٠,٠١) لمعدل النمو التراكمي خلال الفترات (١-٢٨ و ١-٣٥) ولكن لا توجد فروق (P ≤ ٠,٠٥) لمعدلات النمو التراكمية خلال الفترة ١-١٤يوم.
٣. كانت الفروق الإحصائية بين النوعين من أنظمة الإسكان (الأرضية والأقفاص) ذات دلالة إحصائية عالية المعنوية (P ≤ ٠,٠١) لمعدل التحويل الغذائي .feed conversion،feed/bird, g ، ولكن لا توجد فروق معنوية (P ≤ ٠,٠٥) لمؤشر الغذاء feed index.
٤. كان متوسط الربح / الطائر في نظام الإسكان الأرضي (L. E / bird ١٦,٨٩) مساويا تقريبا للربح/ الطائر لنظام الإسكان في الأقفاص (١٦,٩٧١جنية). ووجد أن الاختلافات بين النظامين تعود بصفة أساسية إلي السعة الإستيعابية للأقفاص بالمقارنه بالأرضية.

وهنا تؤكد نتائج هذه الدراسة أن نوع المسكن له تأثير كبير على الأداء الإنتاجي لدجاج اللحم و يعتبر نظام الإسكان فى أقفاص أكثر اقتصادياً من نظام الإسكان الأرضي.