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Original Article

The Effect of Early Feeding and Transporting Time from Hatcher to Farm On the Productive Performance and Carcass Traits of Broiler Chickens

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Abstract

New researches suggest that an early feeding approach has a long-term influence on chick growth performance and nutrient metabolism. The present study was designed to determine the effect of early feeding and the time of chickens transferring from the hatchery to the field on broiler chickens' productive performance and carcass traits. Two hundred twenty-five chickens, one-day-old of broiler chickens Ross 308 with a mean live body weight of 45 g, were used and were randomly distributed to five treatments by 45 chickens per treatment with three replicates (15 chickens per replicate). The experimental treatments were as follows: T1 (control treatment) – the chickens were transferred 24 hours after hatching to the field without feeding, and in groups T2 to T5, the chickens were fed immediately and transferred to the field 24, 6,12,18 hours after hatching, respectively. The current results showed no significant (P>0.05) effects of the experimental treatments on final body live weight, weight gain, feed intake, and feed conversion ratio. In addition, the treatments' insignificant (P>0.05) effects on the weights of the carcass, abdominal fat, breast, thigh, back, wing, neck, heart, liver, and gizzard were found. It can be concluded that there was no evidence of a positive effect of early feeding and transporting duration after hatching on productive performance and carcass characteristics of broilers.

Keywords: early feeding, productive performance, carcass characteristics, Broiler chickens

1. Introduction

The commercial broiler industry frequently has delayed feed access due to hatchery spread, processing, and transport from the hatchery to a grow-out facility. Management and regulatory processes such as sex determination, vaccination, and packaging are other factors in delayed feeding. Delay in feeding has been shown to have a detrimental impact on early body weight loss, growth performance, and early musculoskeletal and gastrointestinal development (1). Research has shown that increasing the post-hatching period and lack of access to food and water has detrimental effects on chickens due to dehydration and reduced energy. Food deprivation in the first 36 hours of hatching significantly reduces villi height, thus affecting the enterocyte population and subsequent intestinal lymphatic tissue and the immune system (2, 3). The thymus is very sensitive to food deprivation, during which there is a rapid depletion of CD4 + T and IgG cells. The study of haematological parameters during food and water deprivation showed higher levels of PCV and Hb than in fed birds, likely due to the lower plasma volume caused by fasting in water (4). In addition, it can lead to premature depletion of energy stores and increase hepatic lipogenesis, as well as

decreased glycogen levels in the liver and muscle (5, 6). In response to the detrimental impacts of delayed feeding, early feeding strategies such as egg feeding, hatchery feeding, and pre-starter diets have been devised, all of which have both short- and long-term effects on growth and development (7). However, more information is needed about the impact of delayed feeding or early feeding practices, transporting the transfer of diet from hatcher to farm on broiler chickens' production performance and carcass traits. This study aimed to investigate the effect of early feeding and transport time on productive performance and carcass traits.

2. Materials and Methods

2.1. Study Site

The field experiment was conducted in the Agricultural Research Department/Livestock Research Department, Poultry Research Station, Hall 14, Abu Ghraib, for a period from 28/11/2021 to 3/1/2022 for 35 days to find out the effect of early feeding and the date of transferring from the hatchery on productive performance and carcass characteristics of broilers.

2.2. Experimental Design

The experiment involving 225 one-day Ross 308 chickens used, with an average weight of 45 g, was purchased from the hatchery of Al-Shakr Al-Ahlia Company to produce broilers in the Abu Ghraib district. The chickens were randomly distributed among five treatments, 45 chickens, and three replicates for each treatment, at a rate of 15 chickens/repeat. The replicates were randomly distributed to the pens since the first day of the age, and the area of each pen was 5.1 × 2 m.

2.3. Experimental Procedure

The chickens were raised by ground rearing in a hall divided into 21 pens. The lighting system was followed in 23h of light and 1h of darkness. Feed and water were provided *ad-libitum* freely during the period of rearing. An appropriate environment was provided for breeding in the different stages of growth, and the birds were fed during the experiment on two types of rations. The starter ration was provided for a period of 1-14 days, and a growth ration was provided for 14-35 days of age. The feed materials were prepared from the agricultural research station's feed lab, and the feed materials were prepared (Table 1). As for health care, the preventive and health program was applied to the experimental chickens. The chickens were raised to the age of 35d, and at the end of the breeding period, 3 birds from each replicate group were randomly weighed and slaughtered early in the morning, and the chickens fasted 10 hours before the slaughter process. The carcasses were cleaned, scalded and weighed; the internal organs were removed and weighed, and carcass segments (breast, back, neck, thigh and wings) were weighed.

Table 1. Feed ingredients of the research

Feed ingredients	Starter diet 1-14 d	Grower diet 14-35 d
Crushed yellow corn	٤٣,٨	٤٤.6
local crushed wheat	14	15.4
soybean meal 48%	32.7	29.1
protein concentrate	5	5
sunflower oil	2.2	3.5
limestone	1.1	1.5
Dicalcium Phosphate DCP	٠.7	0.4
salt	0.3	0.3
The mixture of vitamins and minerals	0.2	0.2
Total	١٠٠	١٠٠

2.4. Data Collection

Average live weight, feed intake, weight gain, and feed conversion ratio for each pen were calculated weekly. Carcass traits were also measured in this study which involved the measurement of dressing percentage and the relative weights of breast, thigh, leg, neck and wings, as well as the relative weights of heart, gizzard, liver and abdominal fat. Furthermore, the production index (PI) and Growth rate (GR) for each treatment were calculated according to the equation indicated in the previous research (8).

2.5. Statistical Analysis

The complete randomized design (CRD) was used to study the effect of different treatments on the studied

traits. The significant differences between the means were compared with Duncan (9)'s polynomial test. The ready-made program (SAS 1996) was used in the statistical analysis according to the following mathematical model: ($Y_{ij} = \mu + t_i + e_{ij}$). The difference in mean values was considered significant at ($P \leq 0.05$).

3. Results and Discussion

3.1. Effect of Early Feeding and Transferring Time on Average Body Weight

The current study showed a significant difference in the average body weight between treatments for the first day as well as for the first, second and third weeks, while no significant differences ($P>0.05$) in the fourth and fifth weeks of age were observed (Table 2). These results agree with Sklan and Noy (10), who demonstrated that early feeding led to a short-term increase in body weight. Previous studies also confirmed that early access to feed led to a similar pattern of body weight gain (10). Kidd, Taylor (11) showed that early feeding did not affect body weight. Moreover, there are no significant ($P>0.05$) differences between the treatments regarding production index and growth rate. As for the effect of transferring chickens on the average body weight, the results of this study were consistent with Hollemans, de Vries (2) that holding chickens for a short period (3 h) and then transferring them to the field did not affect the early and late performance of broilers while transferring chickens from the hatchery under controlled climatic conditions (0, 4, 10 h in transfer time) led to a decrease in body weight compared to chickens that were not transferred until 21 days after hatching (4, 12). In this study, the lack of transferring time effect on productive performance may be due to meeting the nutritional needs of chickens.

3.2. Effect of Early Feeding and Transferring Time on Weight Gain

Regarding weight gain, the effect of early feeding on productive performance was revealed (Table 3). There was no significant effect ($P>0.05$) of the experimental treatments on body weight gain and no significant difference between treatments during the experiment. At the same time, Batal and Parsons (7) stated that early feeding after hatching leads to higher weight gain. Bigot, Mignon-Grasteau (13) demonstrated that chickens had a more significant weight gain (15 g) in the first 24 hours after early feeding than chickens that did not receive immediate feeding after hatching. Several studies showed that early feeding after hatching increases the rate of subsequent body weight gain (4, 14). For the effect of chicken transfer on the rate of weight gain, the present study agreed with the findings of different studies, which showed no significant effect of transferring time on the weight gain of broilers (2, 15).

3.3. Effect of Early Feeding and Transferring Time on Feed Consumption

The effect of early feeding on the weekly feed consumption rate for broilers was detected (Table 4). This study's findings showed no significant effect ($P>0.05$) of the experimental treatments on feed consumption was found. Hooshmand (16) revealed that early feeding did not affect feed consumption. While there was a significant effect of early feeding on feed consumption was observed (17). Additionally, these results differed with Kang, Bang (3), who stated that feed consumption at the age of 7 days was higher ($P<0.01$) for chickens that received early feeding within 3 and 12 hours, compared with those that were fed at 24, 36, and 48 hours. Regarding the effect of chickens transferring on the feed consumption rate, the results of this experiment agreed with several studies which indicated that there was no significant effect of transferring time on feed consumption for broilers (4, 15).

3.4. Effect of Early Feeding and Transferring Time on the Feed Conversion Ratio

A significant difference in the weekly feed conversion ratio among the treatments did not appear (Table 5). Following these results, Kidd, Taylor (11) reported that early feeding after hatching did not affect feed

conversion efficiency. The present study also agreed with several studies that confirmed no significant effect of early feeding on feed conversion ratio (3, 14). On the other hand, this result differed from the findings of de Jong, van Riel (17) who pointed out that the number of fasting hours after hatching significantly affects the feed conversion rate. Relating to the effect of transporting time on the feed conversion efficiency, the results of this experiment agreed with the finding of several researchers, which indicated that there is no significant effect of transferring time on the feed conversion efficiency (4, 15, 17). This result can be explained by the fact that the measurement of feed absorption needed to be more accurate because the amount of scattered feed could not be measured.

3.5. Effect of Early Feeding and Transferring Time on the Relative Weight of Carcass Parts

The effect of early feeding on the relative weight of the main and secondary carcass parts is shown in table 6. The results demonstrated no significant (P>0.05) differences in the relative weight of the main and secondary carcass cuts between the experimental treatments. The result of the current study agreed with Mahapatra, Srinivasan (18) that there was no significant difference between the treatments in the weight of the eviscerated carcass and the weight of the breast, back, thigh, neck, and wings. In contrast, an increase in breast size (10%) was revealed in birds that were provided with early feeding (10). No significant effect was detected regarding the effect of transporting time on carcass parts. This finding agreed with Hollemans, de Vries (2) and indicated no significant effect of transferring time on productive performance.

3.6. Effect of Early Feeding and Transferring Time on the Relative Weight of Edible Internal Organs and Abdominal Fat

The effect of early feeding on the relative weight of edible internal organs was revealed (Table 7). The present results indicated no significant differences (P>0.05) between treatments for the relative weight of the heart, liver, gizzard and abdominal fat. Similarly, Kang, Bang (3) showed that no significant effect was observed in the weight of the gizzard and the weight and length of the small intestine from the age of 7-35d. Furthermore, El-Husseiny, Abou El-Wafa (19) reported no significant differences between the experimental treatments concerning the percentage of purification and abdominal fat. On the other hand, the same study showed that early feeding led to an increase in the weight of the heart and gizzard and the length of the small intestine compared with chickens that got late feeding. The results of this study agreed with that of Sklan and Noy (10), who showed no significant differences in liver weight at 14, 21 and 35d of age.

Table 2. Effect of early feeding and transferring time on the average live body weight of broilers

Treatments	Day 1	Average weight (g/b)						Performance evaluation
		Weeks					PI	GR
		Week 1	Week 2	Week 3	Week 4	Week 5	116649.86±7642.63	190.16±0.14
T1	45.19±0.01^{b}	139.02±1.49^{c}	379.99±5.08^{c}	704.17±5.55^{b}	1168.883±9.68	1795.11±26.57	121884.66±5870.74	190.30±0.09
T2	45.19±0.02^{b}	147.64±2.03^{ab}	398.88±6.18^{ab}	728.17±3.96^{a}	1177.77±11.75	1821.10±16.59	114058.86±5854.38	190.1±0.12
T3	45.25±0.03^{b}	148.17±1.46^{ab}	404.88±4.23^{a}	739.82±9.26^{a}	1177.77±25.62	1784.44±23.51	129312.96±7610.70	190.14±0.04
T4	46.40±0.06^{a}	160.15±7.64^{a}	405.55±6.18^{a}	737.57±3.39^{a}	1171.10±29.14	1837.55±5.84	127451.23±5357.29	189.83±0.28
T5	46.35±0.086^{a}	144.79±4.64^{c}	379.77±10.79^{c}	691.13±7.47^{b}	1153.33±10.18	1781.33±49.15	116649.86±7642.63	190.16±0.14
Significance	*	*	*	*	N.s	N.s	N.s	N.s

T1: Control diet, and the chickens were transferred 24 hours after hatching to the field without feeding; T2: the chickens were fed immediately and transferred to the field 24 hours after hatching; T3: the chickens were fed immediately and transferred to the field 6 hours after hatching; T4: the chickens were fed immediately and transferred to the field 12 hours after hatching; T5: the chickens were fed immediately and transferred to the field 18 hours after hatching; abc Means with different superscripts within the same column differ significantly (*P<0.05), ns P>0.05; SEM: Standard error of means; PI: production index; GR: growth rate

Table 3. Effect of early feeding and transferring time on the weight gain of broilers

Weight gain (g)					
Treatments	**Weeks**				
	Week 1	**Week 2**	**Week 3**	**Week 4**	**Week 5**
T1	93.86±1.49	240.97±4.16	324.17±1.11	464.70±6.18	626.22±33.05
T2	102.40±2.03	251.24±7.50	329.28±2.25	449.59±15.47	643.32±21.85
T3	102.55±1.46	256.70±3.00	334.93±8.99	437.95±18.75	606.66±25.24
T4	113.31±7.06	245.39±3.39	332.02±7.17	433.53±26.22	666.44±34.27
T5	98.63±4.64	233.86±7.21	312.48±4.08	462.17±8.50	628±46.61
SEM	N.s	N.s	N.s	N.s	N.s

T1: Control diet, and the chickens were transferred 24 hours after hatching to the field without feeding; T2: the chickens were fed immediately and transferred to the field 24 hours after hatching; T3: the chickens were fed immediately and transferred to the field 6 hours after hatching; T4: the chickens were fed immediately and transferred to the field 12 hours after hatching; T5: the chickens were fed immediately and transferred to the field 18 hours after hatching; abc Means with different superscripts within the same column differ significantly (**P*<0.05), ns *P*>0.05; SEM: Standard error of means

Table 4. Effect of early feeding and transferring time on the feed consumption of broilers

Feed consumption (g)					
Treatments	**Weeks**				
	Week 1	**Week 2**	**Week 3**	**Week 4**	**Week 5**
T1	170.48±11.80	317.15±11.80	418.44±2.29	642.22±13.51	968.88±8.67
T2	171.99±14.73	318.66±14.73	457.01±23.44	689.99±0.38	965.77±23.80
T3	154.71±27.44	301.37±27.43	432.39±29.77	641.55±16.44	953.33±33.55
T4	167.06±13.65	313.73±13.65	430.75±10.65	682.21±5.22	951.11±5.40
T5	157.10±3.51	303.77±3.51	403.55±8.32	644.44±21.88	880.66±57.87
SEM	N.s	N.s	N.s	N.s	N.s

T1: Control diet, and the chickens were transferred 24 hours after hatching to the field without feeding; T2: the chickens were fed immediately and transferred to the field 24 hours after hatching; T3: the chickens were fed immediately and transferred to the field 6 hours after hatching; T4: the chickens were fed immediately and transferred to the field 12 hours after hatching; T5: the chickens were fed immediately and transferred to the field 18 hours after hatching; abc Means with different superscripts within the same column differ significantly (**P*<0.05), ns *P*>0.05; SEM: Standard error of means

Table 5. Effect of early feeding and transferring time on the feed converting ratio of broilers

Feed conversion ratio (g)					
	Weeks				
Treatments	**Week 1**	**Week 2**	**Week 3**	**Week 4**	**Week 5**
T1	1.81±0.11	1.313±0.06	1.287±0.003	1.377±0.03	1.55±0.08
T2	1.67±0.11	1.27±0.09	1.38±0.06	1.53±0.05	1.5±0.06
T3	1.50±0.27	1.17±0.12	1.287±0.06	1.46±0.05	1.57±0.08
T4	1.47±0.10	1.27±0.04	1.29±0.05	1.58±0.09	1.43±0.07
T5	1.59±0.05	1.29±0.02	1.28±0.04	1.39±0.06	1.4±0.03
SEM	N.s	N.s	N.s	N.s	N.s

T1: Control diet, and the chickens were transferred 24 hours after hatching to the field without feeding; T2: the chickens were fed immediately and transferred to the field 24 hours after hatching; T3: the chickens were fed immediately and transferred to the field 6 hours after hatching; T4: the chickens were fed immediately and transferred to the field 12 hours after hatching; T5: the chickens were fed immediately and transferred to the field 18 hours after hatching; abc Means with different superscripts within the same column differ significantly (**P*<0.05), ns *P*>0.05; SEM: Standard error of means

Table 6. Effect of early feeding and transferring time on the relative weight of carcass parts of broilers

	The relative weight of carcass parts					
Treatments	**Back**	**Breast**	**Thigh**	**Wings**	**Neck**	**Total**
T1	14.85±0.40	31.47±0.77	22.22±0.27	8.8±0.10	4.88±0.26	82.23±0.60
T2	14.93±0.68	31.65±0.31	22.43±0.38	8.53±0.10	5.35±0.10	82.90±0.47
T3	14.19±0.76	31.68±0.88	22.71±0.81	8.83±0.30	5.69±0.16	83.11±0.81
T4	14.02±0.5	31.86±0.41	20.91±0.51	8.90±0.41	5.60±0.09	81.30±1.74
T5	14.19±0.71	30.52±0.93	22.90±1.29	8.82±0.25	5.58±0.30	82.02±1.69
SEM	N.s	N.s	N.s	N.s	N.s	N.s

T1: Control diet, and the chickens were transferred 24 hours after hatching to the field without feeding; T2: the chickens were fed immediately and transferred to the field 24 hours after hatching; T3: the chickens were fed immediately and transferred to the field 6 hours after hatching; T4: the chickens were fed immediately and transferred to the field 12 hours after hatching; T5: the chickens were fed immediately and transferred to the field 18 hours after hatching; abc Means with different superscripts within the same column differ significantly (*P<0.05), ns P>0.05; SEM: Standard error of means

Table 7. Effect of early feeding and transferring time on the relative weight of edible internal organs and abdominal fat of broilers

	The relative weight of edible internal organs					
Treatments	**fat Abdominal**	**Gizzard**	**Liver**	**Heart**	**Dressing 1**	**Dressing 2**
T1	0.38±0.06	1.11±0.01	2.04±0.05	0.42±0.01	58.40±0.84	61.99±0.89
T2	0.48±0.11	1.09±0.08	1.89±0.11	0.39±0.01	60.41±1.01	63.84±1.21
T3	0.66±0.14	1.19±0.01	1.74±0.14	0.38±0.01	60.37±0.42	63.70±0.38
T4	0.65±0.08	1.17±0.17	1.87±0.07	0.36±0.008	60.25±0.93	63.67±1.15
T5	0.59±0.05	1.05±0.03	1.75±0.22	0.38±0.02	59.5±2.02	62.73±2.11
SEM	N.s	N.s	N.s	N.s	N.s	N.s

T1: Control diet, and the chickens were transferred 24 hours after hatching to the field without feeding; T2: the chickens were fed immediately and transferred to the field 24 hours after hatching; T3: the chickens were fed immediately and transferred to the field 6 hours after hatching; T4: the chickens were fed immediately and transferred to the field 12 hours after hatching; T5: the chickens were fed immediately and transferred to the field 18 hours after hatching; abc Means with different superscripts within the same column differ significantly (*P<0.05), ns P>0.05; SEM: Standard error of means; Dr1: dressing percentage without viscera; Dr2: dressing percentage with viscera

4. Conclusion

In conclusion, the beneficial effect of early feeding on the productive performance and carcass traits of broiler chickens was not evident in this study. Moreover, the effect of transferring time did not differ significantly between the experimental treatments.

Authors' Contribution

Study concept and design: M. A. Y. H.
Acquisition of data: H. S. A. J.
Analysis and interpretation of data: M. A. Y. H.
Drafting of the manuscript: H. S. A. J.
Critical revision of the manuscript for important intellectual content: M. A. Y. H.
Statistical analysis: H. S. A. J.
Administrative, technical, and material support: H. S. A. J.

Ethics

The study procedures were approved by the ethics committee of the University of Baghdad, Baghdad, Iraq.

Conflict of Interest

The authors declare that they have no conflict of interest.

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