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EFFECT OF EARLY FEEDING IN THE HATCHING MACHINE ON THE PRODUCTIVE PERFORMANCE OF BROILERS

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Abstract:
The access of early chicks to food and water is of great importance in enhancing future productive performance, where the current study was conducted to know the effect of early feeding in the hatching machine on the productive traits of broilers. The experiment was designed using completely randomized design (CRD) and 300 broiler chicks of the type Ross 308 were used. The chicks were distributed into 5 treatments, each treatment 3 replicates, and each replicate 20 birds, as follows: T1: The control provided her with the starter diet and water directly upon reaching the breeding hall. T2: the provision of the starter diet and water was delayed for 4 hours after reaching the breeding hall. T3: the provision of the starter diet and water was delayed for 8 hours after reaching the breeding hall. T4: early feeding into the hatching machine with a pre-starter ration. T5: early feeding with the hatcher after the chicks leave the hatching machine directly with the pre-starter ration. The results show Significantly excelled in primary body weight ($p<0.05$) in favor of treatments T4 and T5 compared with the rest of the treatments. Significant superiority in final body weight ($p<0.01$) in favor of treatment T4 compared to treatments T1, T2, and T3, and treatment of T5 was excelled on treatment T2 and T3. Significantly excelled in the overall weight gain rate ($p<0.01$) in favor of treatment T4 with a significant decrease for treatment T3 compared to the rest of the treatments and a significant decrease for treatment T2 compared to treatments T1 and T5. Significant increase in the total feed consumption average, productivity index, and economic index ($p<0.01$) in favor of treatment T4 compared to all other experimental treatments. Significant improvement in the total feed conversion ratio ($p<0.05$) in favor of treatment T4 compared with all treatments.

Keywords: early feeding, hatching machine, productive performance

Introduction

Early feeding, which means early chicks arriving in feed and water, is of great importance in improving production performance and reducing stress on chicks as a result of hatching and other administrative processes, where this requires a long time to reach feed and water and may take more than 24 hours.This causes the muscle protein to be destroyed for energy, where early nutrition during the first period provides carbohydrates, vitamins, and minerals, which in turn reduces the process of protein catabolism (Bello et al., 2013)Therefore, early feeding can be considered at the present time as a criterion for the development of chicks, as it contributes to communicating the basic nutritional needs of newly hatched chicks (Uni et al., 2003; Van Der Pol, 2018) and that early access to food leads to the early development of the digestive system and intestines and the utilization of nutrients greatly to make the chicks achieve the maximum extent of their genetic susceptibility (Ravindran and Abdollahi, 2021). Which in turn leads to higher villi and an increase

in the depth of the crypts, which increases the surface area available for absorption, and this is positively reflected in increasing the absorption of nutrients to achieve the requirements of newly hatched chicks, which in turn enhances growth and future productive performance (Singh et al. 2014).Despite a large number of research and studies that have been concerned with early feeding, they do not agree on the type of food mixture and its concentration diet that can be provided to newly hatched chicks in the hatchery.Accordingly, this study was conducted, which aims to study the effect of early feeding using pre-starter feed with a hatchery on the productive performance of broilers.

Materials and methods:

The study was conducted in Al-Anwar commercial hatchery in Babylon province and then in the poultry field, affiliated to the Department of Animal Production at the College of Agriculture ,University of Kufa for the period from September 2 to October 6, 2021 for a period of 5 weeks. The effect of early feeding after hatching using the pre-starter chick care type and at different periods on the physiological performance of broiler chicks, and the experiment included 300 unsexed broiler chicks from Ross308 crosses of one day age, prepared from the lights hatcher, Feed and water were provided to the chicks of the fourth treatment, by 60 chicks inside the hatching machine, by placing a basket at the bottom of the basket in which the eggs were placed, containing the feed (pre-starter) and water so that the hatched bird would fall directly and find feed and water in front of it to start feeding and the fifth treatment by 60 chicks fed with the same diet inside the hatcher after chicks out of the hatching machine ,The chicks were divided according to the transactions, at an average of 60 chicks for each treatment, and with three replicates (each replicate 20 chicks), the division was made according to the following treatments:

T1: The control provided her with a starter diet and water directly upon reaching the breeding hall.

T2: The introduction of the starter diet and water is delayed for 4 hours after reaching the breeding hall

T3: The introduction of the starter diet and water is delayed for 8 hours after reaching the breeding hall

T4: Early feeding inside the hatching machine with a pre-starter diet (chick care)

T5: Early feeding of the hatcher after the chicks leave the hatching machine directly using the pre-starter diet (chick care).Chicks were weighed upon arrival at the breeding hall. The average chick weight was 40.63, 41.3, 41.04, 44.75, 45.64 for the treatments T4, T3, T2, T1 and T5, respectively.The feeds were raised for 2 hours for the T4 and T5 treatments before being weighed for the purpose of emptying the alimentary canal of the feed.

Table (1) the percentage of protein and energy in the diets used in the experiment

Feed material	starter diet% days 10-1	growth diet% 24-11 days	% final diet days 35-25
Energy represented Kcol/Kg	3015	3081	3210
crude protein %	23.11	21.51	19.58
Energy/crude protein ratio	130.4	143.2	163.9

Results

The effect of early feeding in the hatching machine on the productive performance of broilers

Average live body weight and weight gain: The results of Tables 2 and 3 indicate the effect of early feeding in the hatching machine on the average live body weight and weight gain of broilers, respectively.The primary weight at 1 day age showed a significant increase for treatments T4 and T5 at the level of probability ($p<0.05$) compared with treatments T1, T2 and T3.As for the final body weight at the age of 5 weeks, Table (2), and the cumulative weight gain 1-5 weeks, Table (3), the T4 treatment excelled on the rest of the treatments and there was no significant difference between it and the T5 treatment in live body weight.

Table (2) The effect of early feeding in the hatching machine on the average live body weight of broilers at the age of 5-1 weeks.

Treatments	Average live body weight (g/bird) for weeks					
	1 day	1	2	3	4	5
T1	b 0.49 (^{2}) ±40.63	a 3.2 ±192.5	b 4.50 ±477.53	b 7.90 ±933.23	b 9.66 ±1420.90	b 20.16 ±1971.15
T2	b 0.55 ±41.30	b 2.15 ±184.33	b 4.33 ±466.5	b 6.84 ±910.49	b 8.17 ±1408.41	c 15.10 ±1937.87
T3	b 0.75 ±41.04	a 3.12 ±186.5	b 5.08 ±470	b 8.88 ±920.83	c 7.75 ±1370.69	c 12.37 ±1920.60
T4	a 1.75 ±44.75	a 4.3 ±198.166	a 6.11 ±486	a 9.34 ±959.61	a 10.16 ±1557.36	a 23.11 ±2118.65
T5	a 1.90 ±45.64	a 4.4 ±189.25	b4.17±471.66	c 9.90 ±893.73	b 12.13 ±1401.05	ab 14.80 ±1984.73
significant level	*	*	*	**	**	**

*Different letters vertically indicate a significant difference ($P<0.05$) between the treatments.

** The vertically different letters indicate a significant difference ($p<0.01$) between the treatments.

(1) Treatments T1 - control group T2 and T3 - delaying the provision of feed and water for 4 and 8 hours, respectively T4 - early feeding using a pre-starter inside the hatching machine - T5 early feeding using a pre-starter outside the hatching machine.(2) (mean standard error).

Table (3) The effect of early feeding in the hatching machine on the average of weekly and total weight gain for broilers at the age of 5-1 weeks.

Treatments	Average weekly and total weight gain (gm/bird) for weeks					
	1	2	3	4	5	total weight gain

T1	**6.33±151.87** ([2])	**8.81±285.03**	**b 7.11 ±455.69**	**b 5.19 ±487.67**	**b 7.15 ±550.26**	**b 13.20 ±1930.52**
T2	**5.88±143.03**	**7.92±282.16**	**b 5.55 ±443.99**	**b 6.32 ±497.92**	**c 4.76 ±529.47**	**c 6.22 ±1896.57**
T3	**6.43±145.45**	**6.81±283.50**	**b 6.12 ±450.84**	**c 4.82±449.86**	**b 7.55 ±549.91**	**d 4.17 ±1879.56**
T4	**7.17±153.41**	**5.39±287.83**	**a 10.10 ±473.61**	**a 8.03 ±597.75**	**b 8.22 ±561.30**	**a 13.29 ±2073.90**
T5	**6.62±143.61**	**9.11±282.41**	**c 4.48 ±422.07**	**a 8.10 ±507.32**	**a 7.19 ±583.68**	**b 12.18 ±1939.09**
significant level	N.S	N.S	**	**	**	*

N.S - There are no significant differences between the treatments.
** The vertically different letters indicate a significant difference ($p<0.01$) between the treatments. (1) Treatments T1 - control group T2 and T3 delaying the provision of feed and water for 4 and 8 hours, respectively T4 - early feeding using a pre-starter inside the hatching machine - T5 early feeding using a pre-starter outside the hatching machine.(2) (mean □ standard error).

Average weekly and total feed consumption

Table 4 The effect of early feeding in the hatching machine on the rate of weekly and total feed consumption for broilers ,A significant increase in the rate of total feed consumption in favor of treatment T4 is observed at the level of probability ($p<0.01$) on all treatments of the experiment, while the rest of the treatments did not record any significant differences from the control treatment T1.

Table (4) The effect of early feeding in the hatching machine on the average weekly and total feed consumption for broilers.

Treatments	**Feed consumption average(g/bird) for weeks**					
	1	**2**	**3**	**4**	**5**	**total**
T1	**15.09±162.33([2])**	**12.22±399.56**	**18.31±604.81**	**b 9.10±799.36**	**b 4.30±987.71**	**b 6.22±2953.78**
T2	**11.33±174.16**	**14.30±393.70**	**17.90±591.75**	**b 8.20±814.99**	**b 5.03±1004.55**	**b 5.50±2979.17**
T3	**12.80±162.66**	**15.50±388.13**	**15.70±594.82**	**b 7.17±814.96**	**b 4.75±1000.87**	**b 6.90±2961.45**

T4	**15.20±171.08**	**19.80±400.91**	**20.11±616.04**	**a 10.33±875.96**	**b 5.20±1005.34**	**a10.77±3069.35**
T5	**19.90±180.00**	**14.44±382.00**	**17.40±609.72**	**b 8.57±801.75**	**a 6.22±1020.26**	**b 7.66±2993.73**
significant level	N.S	N.S	N.S	**	**	**

N.S - There are no significant differences between the treatments 0
** The vertically different letters indicate a significant difference ($p<0.01$) between the treatments.
(1) Treatments T1 - control group T2 and T3 delaying the provision of feed and water for 4 and 8 hours, respectively T4 - early feeding using a pre-starter inside the hatching machine - T5 early feeding using a pre-starter outside the hatching machine.
(2) (mean + standard error).

Weekly and cumulative feed conversion ratio

Table 5: The effect of early feeding in the hatching machine on the value of the weekly and total food conversion ratio for a period of 1-5 weeks for broilers, a significant improvement was observed in favor of treatment T4 at the level of probability ($p<0.05$) compared with all experimental treatments, while no significant differences were recorded between treatments T1 and T2 and T3 and T5

Table (5) The effect of early feeding in the hatching machine on the weekly and cumulative feed conversion ratio for broilers

Treatments	**weeks**					
	1	**2**	**3**	**4**	**5**	**cumulative**
T1	**0.08 ±1.29(2)**	**0.05±1.40**	**b 0.01±1.32**	**b 0.01±1.64**	**abc 0.02±1.90**	**a 0.09± 1.52**
T2	**0.09±1.21**	**0.05±1.43**	**ab 0.02±1.33**	**b 0.01± 1.64**	**ab 0.01±1.93**	**a 0.10±1.57**
T3	**0.08±1.119**	**0.01±1.470**	**a 0.01±1.36**	**a 0.03± 1.86**	**a 0.02±1.95**	**a 0.10±1.58**
T4	**0.06±1.11**	**0.01±1.36**	**c 0.01±1.27**	**d 0.02±1.46**	**c 0.02±1.79**	**b 0.09±1.47**
T5	**0.09±1.25**	**0.02±1.39**	**b 0.01±1.32**	**c 0.03±1.58**	**bc 0.07±1.82**	**a 0.08± 1.54**
significant level	**N.S**	**N.S**	**N.S**	**	**	**

N.S - There are no significant differences between the treatments 0
** The vertically different letters indicate a significant difference ($p<0.01$) between the treatments.
(1) Treatments T1 - control group T2 and T3 delaying the provision of feed and water for 4 and 8 hours, respectively T4 - early feeding using a pre-starter inside the hatching machine - T5 early feeding using a pre-starter outside the hatching machine.
(2) (mean + standard error).

Productivity Index and Economic Indicator

Table 6 the effect of early feeding in the hatching machine on the productivity index and the economic index for broilers, and there was a significant increase in the values of the production index and the economic index in favor of treatment T4 at the level of probability ($p<0.01$) compared to all other experimental treatments, while no significant differences were recorded between treatments T1, T2, T3, and T5 ,The reason for the T4 treatment was excelled on the rest of the other experimental treatments may be due to the increase in the average body weight of the treatment on the one hand and the result of the moral improvement of the food conversion ratio on the other hand, which was positively reflected on the values of the production index and the economic indicator.

Table (6) The effect of early feeding on the hatching machine on the production index and the economic indicator for broilers

Treatments	Economic Indicator	Productivity Index
T1	b 4.74±368.20	b 4.72± 368.25(^{2})
T2	b 13.04±352.90	b 13.04±352.96
T3	b 5.13±348.44	b 5.13±348.48
T4	a 4.97±409.16	a 4.95±409.24
T5	b 2.86±367.41	b 2.88± 367.48
significant level	**	**

N.S - There are no significant differences between the treatments 0
** The vertically different letters indicate a significant difference ($p<0.01$) between the treatments.
(1) Treatments T1 - control group T2 and T3 delaying the provision of feed and water for 4 and 8 hours, respectively T4 - early feeding using a pre-starter inside the hatching machine - T5 early feeding using a pre-starter outside the hatching machine.
(2) (mean + standard error).

Discussion

The productive traits significantly excelled in favor of the treatments in which the chicks were fed early may be due to the effective role of early feeding using the pre-starter feed on nutrients, which provide chicks with two sources of energy, the first source is from the yolk sac and the second is from external feed (Lowman and Parkhurst, 20144; Ahmed, 2015 Areaare; et al., 2020)This, in turn, is positively reflected in a significant increase in the average live body weight and final weight gain, and this is due to the effect of early feeding in accelerating the growth and

development of the digestive system of hatched chicks and increasing the length of the villi, which increases the absorption area for nutrients, which improves the chicks' benefit from the food intake, which in turn is reflected positively in the average live body weight, weight gain and food conversion ratio (Obeid, 2010) and because of the direct relationship between the feed intake and the activity of digestive enzymes in the intestine, in addition to the positive role of early nutrition in the microbial activity in the intestine, which makes the bird eat more feed (Sklan and Tucker, 2004).As a result of early feeding that leads to the development of the alimentary canal, especially the length and depth of villi and layer, and the increase in the number of beneficial microorganisms and their role in food analysis, which leads to an increase in the surface area for absorption and increases the utilization of the feed intake and a significant improvement in the conversion ratio (Jassem and Zanka, 2014). The reason may be due to the acceleration of the consumption of the yolk sac, which leads to the development of the intestine, an increase in its length and surface area for absorption, and exposure of food to digestive enzymes, which is positively reflected in the weight gain and increased utilization of the consumed feed. Which is positively reflected in the improvement of the food conversion ratio (Obeid, 2010), in addition to an increase in digestive enzymes that leads to an improvement in the value of the food conversion ratio (Al-Janabi and Al-Shukri, 2019).

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