EFFECT OF DIFFERENT SKIP FEEDING PROGRAMS ON BROILER CHICKS' PERFORMANCE

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ABSTRACT

This study was aimed to find out how the performance of feed at different age periods affect the productive of birds . A total of 240-day-old broiler chicks have been used (Ross 308), were applied. The chick's groups were assigned to four treatments with every replicates four times and were distributed randomly into 16 groups of 15 chicks of average body weight in each pen. The research was conducted out on chicks two weeks old. *T0* (control): (Feed is provided continuously and permanently for birds), *T1*: Skip every 1 day: (Provide the feed for one day and cut it the next day and so on until the age of 42 days), *T2*: Skip every 2 days: (Providing the feed for two consecutive days, cutting it the next day, and so on until the age of 42 days), and *T3*: Skip every 3 days: (Feed is available for three days in front of the chicks, chicks were remained without feeding the next day, and so on until the end of the study so on until the age of 42 days). No significant variations ($P \leq 0,05$) were noticed between the various treatments, during the overall period (15-42) days of age in all characteristics of productive performance, while significant differences were found between the factors in the Production Index and Economic Figure. The differences between treatments are limited to the age periods (15-21), (22-28), and (29-42) days in most characteristics of productive performance.

Keywords: skip feeding, broilers, and performances.

تأثير برامج التغذية بطرق الحجب المختلفة على الأداء الانتاجي لافراخ فروج اللحم

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االمستخلص

وزعت 260 فرخة فروج اللحم (Ross 308)، على أربع معاملات مختلفة، بواقع اربع مكررات لكل معاملة و 15 فرخة لكل مكرر، كانت المعاملات كالاتي: (T_0): (معاملة المقارنة): (تم توفير الغذاء بشكل مستمر ودائم امام الطيور). (*T1*): توفير العلف ليوم واحد وقطعه في اليوم التالي وهكذا حتى عمر 42 يومًا. (*T2*): توفير العلف ليومين متتاليين ثم قطعه في اليوم الثالث، وهكذا حتى عمر 42 يومًا. (*T3*): العلف متاح لمدة ثلاثة أيام متتالية أمام للافراخ، وبقيت الافراخ بدون علف في اليوم الرابع وهكذا حتى عمر 42 يومًا. لم يلاحظ اية فروقات معنوية ($P \leq 0,05$) بين المعاملات المختلفة خلال الفترة الكلية للتجربة من (15–42) يوما منالعمر في الاداء النتاجي لجميع الصفات المدروسة، في حين وجد فروقات معنوية بين المعاملات المختلفة في صفتي الدليل الانتاجي والمؤشر الاقتصادي. انحصرت الاختلافات في الصفات المدروسة في الدراسة في الفترات العمرية من (5–21) ، (22–28) و (29–42) يوم من العمر لمعظم الصفات المدروسة. كان الغرض من هذه الدراسة هو معرفة كيفية تأثير منع العلف في فترات عمرية مختلفة على الأداء الإنتاجي لافراخ فروج اللحم.

الكلمات المفتاحية: افراخ فروج اللحم، تقييد العلف، وزن الجسم وكفاءة التحويل الغذائي

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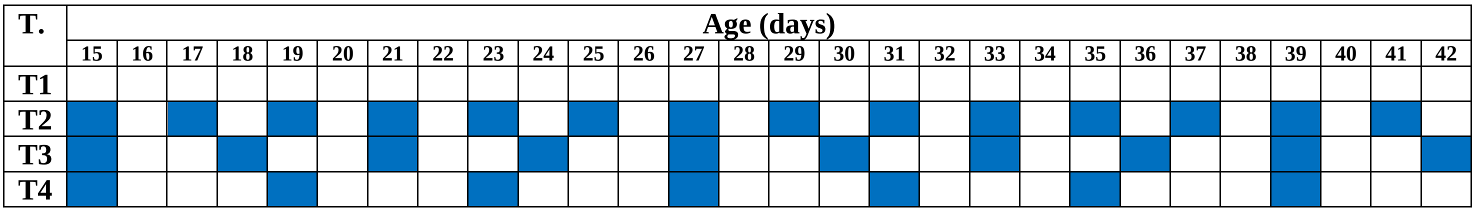
INTRODUCTION

The feed restriction programs are one of the key methods for controlling the growth curvature in broiler chicken to improve production efficiency. Quantities and qualitative feed restriction are techniques that can be used to operate poultry feeding approaches to some degree decrease growth and metabolic rate and thus increase the incidence of certain metabolic diseases such as ascites, lameness, mortality, and sudden death syndrome, thereby increasing feed conversion and decreasing feed costs. It can be also effective in the development of broiler chicken to produce a leaner bird and minimize the harmful effects of fat on human health and to minimize fat accumulation in broiler carcasses using feed restriction programs (24**) .** Full gut limit was accepted to ensure the greatest weight gain during the raising time frame. Along these lines, to accomplish this objective, therefore the executives focus on broiler nutrition and welfare (19) . Broilers were also hereditarily selected to weigh more with better feed conversion in a shorter period. These broiler strains are depicted by the rapid rate of development (18) and over-utilization of feed (17.) Those resulted in increased mortality and ascites and skeletal anomalies (18 , 20) and expanded fat statement (6). Accordingly, the board works on concerning feed and taking care of have been changed to lessen the awful impacts coming about because of not indispensable taking care of. Such activities are intended to reduce the rate of early growth of these modern strains. Such methods require differences in the quantity and consistency of feed. The research's about applied diverse early feed limitation projects to lessen the development rate. Such projects will lead to synchronization of the pace of development of different body organs and reduction of terrible impacts of rapid growth (13 , 21) improve the effectiveness of feed intake and weight gain (9) and decline the feed cost (30 , 33 , 34). Restriction of feed means feeding chicks with a diet that does not meet usual rising nutritional requirements. It is accomplished by restricting taking care of time or lessening the measure of feed offered to the birds or changing the nature of feed by diminishing protein or vitality or both. Early feed restriction relies upon compensatory development wonder (16) in which confined broiler creatures make up for the weight reduction during the limited time frame when feed limitation is finished. (2) announced that The feed restriction applied between the ages of 8-28 days. Control birds display significantly higher body weight and carcass weight cuts ($p<0.05$) compared with restricted ones. The feed conversion ratio applied in the sample was not affected by feed restriction regimes. Restricted birds have struggled to account for the weight loss due to extended feed limitation time.

MATERIALS AND METHODS

The investigation was performed at Poultry Farm /Animal Science Department, College of Agricultural Engineering Sciences, University of Sulaimani/Kurdistan Region of Iraq. A total of two hundred forty (15-day-old) broiler chicks (Ross 308) were used. The birds were reared for two weeks as one group (adaptation period). These chicks were weighed and distributed among pins on day 14 of their maturity, so that the average body weight and variations in each cage were nearly identical. These were then randomly assigned to four treatment classes, so that each treatment provided four replicates per replication of 15 chicks. All the chickens had access to drinking water and feed *ad libitum* and the diets were available as mash table (1), Birds provided the same pre-starter diet until age 14. Chickens were fed the starter diet (from day 15 to day 21 of age), grower diet (from day 22 to day 35 of age) and finisher diet (from day 36 to day 42 of age).

Each pen-confined group was fed one of the following four diets (Figure 1) for 42 days.



The white colour indicates the days when feed is provided to the chicks
The blue colour indicates the days when feed was banned from the chicks

Figure 1. Diet distributing within the age days

T_0: Control: (Feed is provided continuously and permanently for birds),
T_1: Skip every 1 day: (Provide the feed for one day and cut it the next day and so on until the age of 42 days),
T_2: Skip every 2 days: (Providing the feed for three consecutive days, cutting it the next day, and so on until the age of 42 days), and
T_3: Skip every 3 days: (Feed is available for three days in front of the chicks, chicks were remained without feeding the next day, and so on until the end of the study).

Table 1. Nutrition composition

Ingredient, % as feed-basis	Starter diet (15-21 days) %	Growth diet (22-35 days) %	Finisher diet (36-42 days) %
Wheat	23.6	23	27.5
Corn	35.5	34.8	39.7
Meat and bone meal (40%)	3	0.6	0.4
Soybean meal (%44)	29.9	33.04	23.28
Sunflower seed Oil	4	5	5
Dual-calcium phosphate	2.3	1.94	1.86
Limestone	1.15	1.16	1.11
Salt	0.25	0.25	0.25
Methionine	0.2	0.11	0.8
Premix[1]	0.1	0.1	0.1
Total	100	100	100
Chemical analysis of the feed[2]			
** Crude protein %	22	20	17
* Metabolizable energy Kcal/kg	2919	3056	3079
** Ether extract %	5.3	6.05	6.12
* Crude fibre %	3.57	3.65	4.00
** Calcium %	1.19	1.11	1.22
** Phosphor %	0.76	0.55	0.57
* Lysine %	1.19	1.2	1.01
* Methionine + Cysteine %	0.89	0.92	0.89

[1]**Premix (Vitamin. A 800.000 IU; Vitamin. D3 170.000 IU; Vitamin. E 980 mg; Vitamin. K 95 mg; Vitamin. B1 13 mg; Vitamin. B2 220 mg; Vitamin. B6 75 mg; Vitamin. B12 800 mg; Folic acid 20 mg; Choline Chloride 12.000 mg; Antioxidant 1.900 mg; Iron 2.500 mg; Copper 400 mg; Zinc 2.600 mg; Selenium 7.5 mg; Calcium 24.00%; Sodium 5.40%; Phosphorus 8.40%; Methionine 5.40%; Methionine + Cystine 5.70% and Lysine 5.60%.**
[2]**The nutritinal requirement determined according to [2]. * calculated, ** chemical analysis.**

Data collection:

1- Live body weight: Weighed the birds per replicate at the beginning of the experiment and thereafter daily (15, 22 28, 35, and 42 days of age).

2- Body weight gain : At the beginning of the experiment, all of chicks were weighed. There was no significant differences among them, and the primary average weight of chicks in different pans was almost equal. At the end of each week, every pan's chicks were weighed, and deduced from their first week's weight. Therefore, weekly weight gain can be measured. The same method was applied to measure weight gain in the periods from 15-21, 22-28, 29-35, 36-42 and 1-42 days old.

3- Feed intake: To determine feed intake, specific amounts of ration were weighed and given to the birds for every pan at the beginning of week. At the end of week, the rest of the ration from every pan were weighed and deducted from the original ration, so weekly consumed diet can be yielded. Feed intake in 15-21, 22-28, 29-35, 36-42 and entire feed intake in 1-42 days intervals old was calculated

4- Feed conversion ratio: After measuring feed intake and body weight gain over a week, the following equitation used to determine feed conversion ratio:

$$\frac{\textbf{Feed intake over a week}}{\textbf{week's beginning weight} - \textbf{week's ending weight}}$$

Feed conversion ratio analysis was calculated in 15-21, 22-28, 29-35, 36-42 days old, and also the whole period intervals

5- Production Index (PI): Production index calculated by the following formula [15]:=

$$\frac{\boldsymbol{average\ body\ weight\ X\ viability\ percentage}}{\boldsymbol{number\ of\ days\ breeding\ X\ feed\ conversion\ ratio\ X\ 10}}$$

Production index was calculated in age periods of 15-21, 22-28, 29-35, 36-42 days.

6- Economic Figure (EF): Economic figure determined by formulae below (16):

$$\frac{\textbf{the total weight of the birds marketed (g)}}{\textbf{number of birds marketed X the length of the rearing (days) X feed conversion ratio}}$$

Methods of data analysis: All data collected during the experiment were analysed using Excel software. Calculations for the parameters will performing for the different treatments. Data were analysed using (16). Significant Treatment differences were d at a level of 5 % by (7).

The project statistical model is as follows:

X*ij* = µ + T*j* + e*ij*

X*ij*: Observation of the i replicate in j treatment

µ: Mean of all the data

T*j*: The effect of j experimental treatments

e*ij*: The effect of experimental error

RESULTS AND DISCUSSION

Results about the average live body weight (g) of broilers for the different skip feeding programs in different ages are presented in Table 2. No significant differences were obtained at 14 and 42 days of age in all restricted fed groups (T_0, T_1, T_2 and T_2). For the 21, 28, and 35 days of age, birds of T_1 and T_2 had significant (P≤ 0.05) lower body weight than birds of T_0 and T_3. At 21, 28, and 35 days of age birds of T_0 (the control treatment) significantly heavier (P ≤ 0.05) average body weights throughout the experiment which was (1016.67, 1591.67, and 2266.67 g) respectively. At marketing age (42 days of age), the heaviest body weight was belonged to T_0 birds (3026.67 g), while the lower body weight was recorded in T_1 (2711.67). The reduction in different skip feeding programs on live body weight may be mainly due to the decrease in nutrient utilization results from the intake of a relatively high amount of feed for a short period after the removal of the feed or may be due to the release of essential nutrients during the off-feed period through catabolism of body reserves (18 and 19). (20) The growth rate of broilers has been reported to be related to feed intake. These findings also strengthen what previously stated by (21) that improvement in body weight of birds is highly correlated to feed, also, they are in agreement with previous reports of (22).

Table 2. Effect of different skip feeding programs on live body weight (g) (mean ± SEM

Treatment	Age (days)				
	14 day	21 day	28 day	35 day	42 day
T_0	491.67 ± 08.34[a]	1016.67 ± 16.67[a]	1591.67 ± 071.20[a]	2266.67 ± 50.69[a]	3026.67 ± 132.46[a]
T_1	458.34 ± 08.34[a]	800.00 ± 10.41[b]	1425.00 ± 101.04[ab]	1866.67 ± 106.39[b]	2711.67 ± 22.05[a]
T_2	450.00 ± 25.00[a]	833.34 ± 58.34[b]	1275.00 ± 101.04[b]	1912.34 ± 7.22[ab]	2840.00 ± 57.74[a]
T_3	491.67 ± 22.05[a]	975.00 ± 70.85[a]	1450.00 ± 25.00[ab]	2090.00 ± 172.65[ab]	2736.67 ± 178.15[a]

a, b Means are significantly due to different letters in the same column (P ≤ 0.05)

The results shown in Table (3) indicate the effect of different skip feeding programs on the amount of feed intake (g), from observing the data that in the age periods of (15-21), (22-28) and (29-35) days, Significant variations between different treatments (P≤ 0.05) and there is a difference between the treatments in the amount of feed consumed. On the other hand, there were no differences between the treatments in the two age periods (36-42) and (15-42) days .The largest amount of diet consumed in the age group (15-42) days was by birds belonged to treatment T_2, which consumed diets for two days and cut off diets on the third day, which was (4199.63) g. In contrast, the lowest amount of diets consumed was by birds belonged to treatment T_1 that ingested feed on the day and cut off the feed on the next day, which was (3627.97) g. The results of feed intake in this study during the age periods of (36-42) and (15-42) days are consistent with that of (1, 23 ,28)) through their study on preventing feeds for different age periods and providing different amounts of feed to broiler chicks, also, the results detected in present study somewhat agree with those reported by (5), conversely, (25) that the skipping programs increase feed intake

Table 3. Effect of different skip feeding programs on feed intake (g) (mean ± SEM)

Treatment	Age periods (days)				
	15-21	22-28	29-35	36-42	overall 15-42
T_0	708.89 ± 57.14[a]	900.00 ± 25.46[ab]	1127.38 ± 63.74[ab]	1414.82 ± 130.31[a]	4151.08 ± 264.17[a]
T_1	478.89 ± 28.05[b]	686.67 ± 20.00[c]	1003.39 ± 76.31[b]	1459.03 ± 94.30[a]	3627.97 ± 180.29[a]
T_2	513.23 ± 07.70[b]	984.43 ± 69.49[a]	1210.31 ± 40.16[a]	1491.67 ± 13.02[a]	4199.63 ± 104.36[a]
T_3	575.00 ± 19.89[b]	832.97 ± 10.35[b]	1276.22 ± 19.79[a]	1465.75 ± 51.53[a]	4149.93 ± 090.02[a]

a, b Means are significantly due to different letters in the same column (P ≤ 0.05)

The effects of different skip feeding programs on body weight gain (g) in different age periods of broiler chickens are reported in Table 4. The results observed that, except for (36-42) days of age and the entire experimental period (1-42) days of age, Significant differences in body weight gain (P ≤ 0.05) in the other age periods between the skipping treatments. In general, the results of treatment *T0*, which is the comparison treatment without skipping, and dealing *ad libitum*, is more weight gain compared to other treatments except for the age period of (22-28) days, then the treatment *T1* is more weight gain compared to the rest of the treatments, the results of the body weight gain in the age period indicate Entire (15-42) days that the treatment birds *T0* are more weight gain than other treatments, which amounted to (2535.00) g. In contrast, the treatment birds *T3* are the smallest in weight gain and they were (2245.00) g. These results are similar to those found by 13, they showed in their study that the birds of skipping treatments were more gained of body weight than the birds of treatment without skipping, on the other hand, the results of this study are inconsistent with what was found by 28, where they confirmed in their study that the restriction treatments were more gained in body weight than the comparison treatment. The cause of the preeminence of the treatments in the rate of the weight gain of the broiler chicks in this study is may be due to the advantage in live body weight and good correlation between live body weight and increase weight gain [29]. The continuity of diets in birds works on the order of the digestive system. This, in turn, helps in the growth of the gastrointestinal tract and thus raises the body weight (4).

Table 4. Effect of different skip feeding programs on body weight gain (g) (mean ± SEM)

Treatment	Age periods (days)				
	15-21	22-28	29-35	36-42	overall 1-42
T_0	525.00 ± 25.00^{a}	575.00 ± 87.80^{a}	675.00 ± 114.57^{a}	760.00 ± 99.88^{a}	2535.00 ± 140.75^{a}
T_1	341.67 ± 8.34^{b}	625.00 ± 101.04^{b}	441.67 ± 36.33^{b}	845.00 ± 108.98^{a}	2253.34 ± 22.05^{a}
T_2	383.34 ± 50.69^{b}	441.67 ± 116.67^{ab}	637.34 ± 93.82^{a}	927.67 ± 64.96^{a}	2390.00 ± 80.37^{a}
T_3	483.34 ± 22.05^{a}	475.00 ± 25.00^{ab}	640.00 ± 160.65^{a}	746.67 ± 43.34^{a}	2245.00 ± 177.37^{a}

a, b Means are significantly due to different letters in the same column (P ≤ 0.05)

The results shown in Table 5 clarify the effect of different skip feeding programs on feed conversion ratio (g feed intake / g live body weight gain) between the treatments at different age periods, from observing the results it was found the absence of significant differences (P ≥ 0.05) between the treatments in the age periods (15-21), (29-35), and (1-42) days lternatively, there was significant differences (P ≤ 0.05) between treatments in the two age periods (22-28) and (36-42) days. From the results recorded in the age period (1-42) day, we find that the T1 treatment birds are more efficient than other treatments in feed conversion ratio which was (1.62) when compared with (1.87) and it is less feed conversion ratio which was recorded by the T3 treatment birds. The results of this study in Table (5) on feed conversion ratio were consistent with what was found by (24) where showed that there were no significant differences (P ≤ 0.05) between different treatments in the overall period (1-42) days. 32 Similar findings were discovered after a physical feed restriction of 85 and 70 percent at 35 days. The significant difference in body weight (p<0.05) between ad libitum care and small broiler chicks imitated that the restriction was necessary, not allowing complete recovery at the age of 42 days. This result confirmed that no compensatory growth took place at this age (30). Quantitative or qualitative feed limitation for broiler chicks can improve the feed conversion ratio, and diminishing fat statement in broiler carcasses, also, such limitation can lessen feed costs by maintain feed costs by avoid wastage (23).

Table 5. Effect of different skip feeding programs on feed conversion ratio (g feed intake / g live body weight gain) (mean ± SEM)

Treatment	Age periods (days)				
	15-21	22-28	29-35	36-42	overall 1-42
T_0	1.35 ± 0.08^{a}	1.67 ± 0.32^{ab}	1.75 ± 0.22^{a}	1.91 ± 0.23^{ab}	1.65 ± 0.09^{a}
T_1	1.41 ± 0.06^{a}	1.16 ± 0.18^{b}	2.05 ± 0.53^{a}	1.78 ± 0.22^{ab}	1.62 ± 0.07^{a}
T_2	1.40 ± 0.20^{a}	2.45 ± 0.42^{a}	2.01 ± 0.38^{a}	1.63 ± 0.10^{b}	1.77 ± 0.10^{a}
T_3	1.20 ± 0.07^{a}	1.77 ± 0.08^{ab}	2.39 ± 0.77^{a}	2.29 ± 0.15^{a}	1.87 ± 0.12^{a}

a, b Means are significantly due to different letters in the same column (P ≤ 0.05)

The effect on production index of various skip feeding programs are given in Table (6). In all points, the results showed important differences (P ≤ 0.05).In period (15-21) days of age the best measure of index of production was (374.08) in T_3 whereas lowest mean of production index was (272.17) in T_1. For period (22-28) days of age the highest mean represents in T_1 (483.73) compared with T_2 which have lowest mean (347.34). In period (29-35) days the best mean of T_0 up to

(396.09), whilst the lowest mean was (316.24) in T_3. For period (36-42) days of age Significant differences ($P \leq 0.05$) between treatments were observed., the better mean represents in T_2 which was reached (413.61), while the lowest mean was recorded in T_0 which was (304.32). The production index is counted as one of the important factors of assessment of production performance of broiler c2hicks, as the higher production index gives economic indicator for a good rearing, so depended on productive efficiency factor in the evaluation of rearing for broiler chickens. The advantages of production index in this study are due to the superiority of the treatments in rise in body weight and increase of body weight gain that consider one of the important factors in calculation of productivity efficiency (16 ,22). Table 6 also shows the results of economic figure in the study, it indicates that there was significant differences ($P \leq 0.05$) in the economic figure between the treatments, T_0 birds have recorded highest economic figure which was (43.30) in compare with (35.14) which belonged to T_3 birds. These differences among the treatments in economic figure values may be due to in the evolution of body weight, which is paying increasing economic index, as is the economic index is calculated depending on the weight of the body so it can observe treatment improved in body weight had a high economic indicator since there a positive correlation between them (16).

Table 6. Effect of different skip feeding programs on Production Index and economic figure (mean ± SEM)

Treatment	Age periods (days)				Economic Figure
	15-21	22-28	29-35	36-42	
T_0	370.40 ± 4.65^a	453.39 ± 4.02^b	396.09 ± 3.47^a	304.32 ± 2.46^d	43.30 ± 1.15^a
T_1	272.17 ± 4.51^b	483.73 ± 1.9^d	334.17 ± 3.28^b	325.18 ± 2.92^a	39.79 ± 0.64^b
T_2	285.17 ± 2.84^a	347.34 ± 4.05^c	352.36 ± 1.21^d	413.61 ± 1.79^b	38.34 ± 0.87^b
T_3	374.08 ± 2.37^c	374.08 ± 2.40^a	316.24 ± 3.50^c	350.15 ± 2.40^c	35.14 ± 0.99^c

a, b Means are significantly due to different letters in the same column ($P \leq 0.05$).

Conclusion

In this study, we find that the provision of diets for three days and cutting it on the fourth day did not affect the productive performance of birds as evidence that the chicks takes enough during the three days and that the effect of skipping is limited mostly to the two treatments in which fodder is provided between day and day and the treatment in which it is served diets for two days and cut on the third day, which is an indication that the chicken is affected by cutting feed for close periods.

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