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PRODUCTIVE PERFORMANCE OF BROILER CHICKS AS AFFECTED BY AN INITIAL FEED RESTRICTION AND SUBSEQUENT REFEEDING

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ABSTRACT

An experiment was conducted to examine the productive performance of broiler chicks subjected to feed restriction by feeding diets deficient in energy and protein levels of 90% , 80% or 70% of starter recommended requirements during the second week (8-14 days) of age as compared to those fed 100% of starter recommended requirements. Then, birds were switched during 14-21 days of age to the control starter diet. Seventy two day-old broiler chicks were allocated to 4 treatment groups of 18 chicks each in individual cages where every chick represents one replicate. All treatment groups were fed the same grower and finisher diets from 22 to 37 days and 38 to 49 days of age, respectively.

The body weight gain was depressed significantly by feed restriction at the end of the restriction period (14 days of age). However, at the age of 21 days, accelerated growth eliminated any gap in body weight. There are significant differences in feed conversion ratio among all treatments during the period of feed restriction. After 21 days of age, prior feed restriction had no negative effect on body weight gain neither from 22-37 days nor from 38-49 days. Subjecting broiler chicks to early life mal nutrition was more efficient in converting feed to gain compared to control diet. The efficiency of energy utilization and protein utilization efficiency (PUE) improved when the bird subjected to early energy-protien restriction and subsequent refeeding. Accordingly, the net profit improved compared to that of the control.

In conclusion, early feed restriction at levels of 90% , 80% or 70% of starter recommended requirements during the period from 8 to 14 days of age could be used in broiler diets without adverse effects on their productive performance

INTRODUCTION

The improvement in body weight-for-age of modern broiler chicks, due to an increased growth rate associated with higher nutrient supply, has led to more frequent occurrence of metabolic and skeletal disorders and increased fat deposition (Yu and Robinson, 1992). This dramatic increase in growth rate is manifested primarily in the first four weeks after hatching (Marks, 1979). Most broilers are fed *ad.libitum* and the problems associated with fast growth are particularly evident under this feeding system (Jones and Farrell, 1992, Yu and Robinson, 1992).

Lesson *et al.* (1991) reported that tempering of growth rate can greatly reduce the incidence of such problems, although slower growth is often considered uneconomical. However, a period of slower growth followed by compensation to normal market weight-for-age offers some potential advantages. Doyle and Lesson (1998) reported that compensatory growth has been shown to occur in most farm animals, even in the broiler chicks which has a very short grow-out cycle. This compensatory growth follows a period of feed nutrients restriction imposed usually by either physical feed restriction or the feeding of a diet very low in nutrients density.

Feed restriction for a period of 6 days allowed for complete body weight recovery, while recovery was not seen when restriction was more prolonged at 12 days (Ballay *et al.*, 1992). Most workers recommended feed restriction of not more than 7 and 5 days for male and female broilers, respectively, to allow for full body weight recovery (Plavnik and Hurwitz, 1991 and Jones and Farrell, 1992). Initiation of 6 days feed restriction at any age between 3 and 11days of age seems to permit complete body weight recovery by 8 weeks of age in male broilers (Plavnik and Hurwitz, 1988). Similarly, other workers have recommended the commencement of restriction at 5 to 7 days of age (Rosebrough *et al.*, 1986).

Achieving growth retardation mal nutrition may require extra labour or mechanization to apply physical feed restriction, or the use of non–digestible materials to dilute the feed. An alternative method of retarding early growth is the restriction of intake of specific nutrients, such as protein (Moran, 1979). Broilers require 220 g. dietary crude protein/Kg diet during the starting period for optimal growth (NRC, 1994). They tend to increase their feed intake to make up for deficiencies when fed diets that are marginally deficient in crude protein (Fisher, 1984). However, feed intake is depressed by feeding diets that are severely deficient in crude protein (Plavnik and Hurwitz, 1990). On the other hand, Calvert *et al.* (1987) used two levels of dietary ME during mal nutrition period of 6-12 days of age. Complete growth was observed by all growth- retarded birds by 56 days of age. Lesson *et al.* (1991) and Yu and Robinson (1992) suggested that birds, even thought in negative energy balance, were able to gain weight due to change in body composition, i.e. used fat reserve and deposited more lean tissue.

This study was carried out to examine the productive performance of broiler chicks subjected to feed restriction by feeding diets deficient in energy and protein levels of 90%, 80%, or 70 % of starter recommended requirements during the second week (8-14 days of age) as compared to those fed 100% of starter recommended requirements.

MATERIALS AND METHODS

Seventy two day-old commercial Arbor Acres broiler chicks were wing banded, weighed and randomly allocated to 4 treatment groups of 18 chicks each in individual cages where every chick represents one replicate, in such a way that the mean weight of all groups was approximately similar. All the birds were fed the same starter diet (Diet 1) until the 7th day of age. Three tested diets (2, 3 and 4) representing 90%, 80% or 70 % of the starter energy and protein requirements were offered to treatment groups 2, 3 and 4, respectively, between 7 and 14 days of age. The levels of minerals and vitamins supplementation were the same in all experimental diets. Between 14 and 21 days of age, all birds were switched again to the control starter diet (Diet 1). All treatment groups were fed the same grower and finisher diets from 22 to 37 and from 38 to 49 days of age, respectively. The experimental diets and their calculated analysis are presented in Table (1). The birds were exposed to 24 hours daily of artificial light throughout the experimental period, which lasted for 7 weeks. Chicks of all experimental treatments were kept under similar hygienic and environmental conditions and vaccinated against common diseases. Feed was offered to the chicks *ad.libitum* all over the experimental period. Birds have access to water through automatic drinkers. Feed intake and live body weight were individually recorded at 7, 14, 21, 37 and 49 days of age. Also, body weight gain and feed conversation ratio were calculated during the studied periods. The protein utilization efficiency (PUE) as g. weight gain/ g. protein consumed, energy utilization (ME consumed Kcal/ g. weight gain) and performance index ("live body weight, Kg/feed conversation ratio" x 100) were calculated. The economical efficiency (the net revenue per unit feed cost) was calculated from input–output analysis.

Data were statistically analyzed using the linear model (SX, 1992). A simple one way classification analysis was used followed by L.S.D test for testing the significance between means.

RESULTS AND DISCUSSION

Average live body weight values of birds in the different groups from 0-7 weeks of age are presented in Table (2). It appeared that chicks of all treatments had similar body weight in 7, 21, 37 and 49 days of age. There were no significant differences in body weight between treated groups and the control. On the other hand, the average live body weight values of the experimental groups were significantly decreased at the end of feed restriction period (14 day of age) as compared to the control group. Thus, chicks receiving 90%, 80% or 70% of starter recommended requirements from 7 to 14 days of age showed 8.8%, 20% or 30.8% decrease in live body weight, respectively, than the control group. The present observation indicated that body weight was depressed during feed restriction period.

Data presented in Table (2) showed the average values of body weight gain for the experimental groups at periods of (0-7), (7-14), (14-21), (0-21), (22-37), (0-37), (38-49) and (0-49) days of age. It appeared that chicks of all treatments had similar weight gain in the first week of age (0-7 day). From 7-14 days of age, chicks of control treatment (T_1) which fed 100% of the starter recommended requirements recorded a higher value of body weight gain than the other treatment groups. The influence of feed restriction in the 2^{nd} week on the body weight gain of chicks from 7 to 14 days of age showed a reduction of 31.9 grams (17.9%), 56.5 grams (31.7%) and 86.3 grams (48.4%) for groups T_2, T_3 and T_4, respectively relative to control group. The statistical analysis showed that the birds fed diets containing either 80% or 70% of starter recommended requirements (T_3 or T_4) significantly ($P < 0.05$) reduced body weight gain than the control group (T_1) at the restriction period. However, the difference between group (T_2) which fed diet containing 90% of starter recommended requirement and control group (T_1) was not significant ($P > 0.05$).

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

Ingredients %	Treatments					
	Starter (0-21 day)				Grower	Finisher
	1	2	3	4		
Yellow corn	53.47	57.67	47.13	35.68	60.16	59.98
Soybean meal (44%)	30.00	33.00	25.09	13.99	24.25	28.84
Corn gluten meal (62%)	8.92	1.84	0.02	-	7.36	1.84
Wheat bran	-	3.52	24.00	46.73	-	-
Mono Calcium	1.33	1.24	0.85	0.43	1.38	1.37
phosphate	1.87	1.88	2.05	2.26	1.75	1.73
Lime stone	3.41	-	-	-	4.13	5.40
Vegetable oil	0.42	0.41	0.40	0.37	0.42	0.42
Na Cl	0.07	0.11	0.12	0.10	0.09	0.12
DL-methionine	0.21	0.03	0.04	0.14	0.16	-
L-lysine HCl	0.30	0.30	0.30	0.30	0.30	0.30
Vit. & Min. Mixture*						
Total	100	100	100	100	100	100
Calculated analysis **						
Crude protein %	23.00	20.7	18.4	16.00	20.00	18.50
ME (Kcal/Kg diet)	3100.0	2790	2481	2170	3200	3200
Calcium %	1.00	1.00	1.00	1.00	0.95	0.95
Available phosphorus %	0.45	0.45	0.45	0.45	0.45	0.45
Methionine %	0.52	0.48	0.45	0.35	0.49	0.46
Methionine + Cystine %	0.91	0.82	0.77	0.64	0.83	0.77
Lysine %	1.20	1.1	0.96	0.84	1.01	0.95
Na %	0.18	0.18	0.18	0.18	0.18	0.18
EE %	6.09	2.87	3.13	3.44	6.94	8.15
CF %	3.60	4.11	5.22	6.33	3.30	3.52
Cost/kg. (L.E)	1.50	1.27	1.12	0.98	1.44	1.39

* Contains: Vit.A 12 mIU; Vit D_3 2.2 mIU; Vit.E 10g; Vit.K_3 2g; Vit Bi 1g; Vit.B_2 5g; Vit B_6 1.5g; Vit B_{12} 10mg; Niacin 30g; pantothenic acid 10g; Folic acid 1g; Biotin 50mg; Choline 300g; Iron 30g; Iodine 1g; Zinc 50g; Manganese 60g; Copper 4g; Selenium 100 mg; Cobalt 100 mg.

** According to NRC (1994).

When birds resumed eating the control starter diet after 14 days of age, body weight gain from 14-21 days remarkably increased for experimental groups compared to the control group. These results showed that during the refeeding period, birds subjected to early feed restriction (T_2, T_3 or T_4) recorded higher weight gain than the control group (T_1). There were no significant differences in weight gain of the control group and those fed 90% starter requirements (T_2). However, there were significantly higher values ($P < 0.05$) of body weight gain for T_3 and T_4 than the birds of control group. These data suggest that body weight gain was depressed by feed restriction at the end of the restriction period (14 days of age). However, at the age of 21 days, accelerated growth eliminated any gap in body weight. Thereafter, significant differences among treatments which observed during restriction period disappeared at that time.

Table (2): Live body weight (gram/bird) and body weight gain (gram/bird) of broiler chicks subjected to energy - protein restriction from 7 to 14 days of age.

Age	Treatments				SEM*	P**
	1	2	3	4		
Live body weight (g/bird)						
Day-old	42.9	12.8	43.4	43.9	1.15	0.76
7 days	100.6	100.3	101.3	101.1	4.39	0.99
14 days	278.9^{a}	245.7^{b}	223.1^{b}	193.1^{c}	13.28	0.00
21 days	586.4	574.8	568.6	545.2	23.10	0.34
37 days	1638	1630	1635	1639	45.01	0.99
49 days	2646	2633	2639	2654	69.31	0.99
Body weight gain (g/bird)						
0-7 days	57.7	57.6	57.9	57.2	3.82	1.00
7-14 days	178.3^{a}	145.3^{b}	121.8^{c}	92.0^{d}	10.62	0.00
14-21days	307.6^{b}	329.1^{ab}	345.4^{a}	352.1^{a}	11.81	0.00
0-21 days	543.6	532.0	525.1	501.3	22.73	0.31
22-37days	1052	1056	1066	1094	30.74	0.52
0-37days	1595	1588	1591	1595	44.84	0.99
38-49days	1008	1003	1004	1015	31.74	0.98
0-49days	2603	2590	2596	2610	69.00	0.99

a, b ..... means with different superscript(s)In the same row are significantly different ($P < 0.05$). * Standard error mean for comparison. ** Probability.

After 21 days of age, prior to feed restriction had no negative effect on body weight gain neither from 22-37 days nor from 38-49 days. Similarly, weight gain values between 0-37 days and between 0-49 days were not affected by the 7-14 days period of diet adjustment. These results agreed with those of Saleh *et al.*, (1996) and Lippens *et al.*, (2000) who reported that feed restriction during the second week of age significantly decreased body weight during this period. At the end of the experiment, body weight of birds subjected to feed restriction treatments did not significantly differ from that of the control group. Lesson *et al.* (1991) showed that the body weight gain over the entire 0-21 day starter period was not affected by early feed restriction. Also, during the growing (22-37 day) and finishing (38 – 49 day) periods, prior feed restriction had no effect on weight gain ($P > 0.05$) and compensatory growth seemed complete in terms of overall weight gain.

In accordance with the current results, Plavnik and Hurwitz (1988 and 1989) have shown complete recovery in growth of broiler chicks subjected to sever energy restriction during early growth period. The same authors assumed that energy will be the most limiting nutrient to growth. Wilson and Osbourn (1960) suggested that total compensatory growth is possible following either protein or energy mal nutrition. Lesson *at al.* (1991) and Yu and Robinson (1992) suggested that birds, even thought in negative energy balance, were able to gain weight due to change in body composition, i.e. used fat reserve and deposited more lean tissue.

Average amounts of feed consumed by different experimental groups of broiler chicks as well as the corresponding average of feed conversion were given in Table (3 and 4). The results showed that there were no significant differences for feed consumption traits. However, the birds subjected to early life mal nutrition exhibited less cumulative feed consumption compared to the control group. These results agree with those reported by Jones and Farrell (1992) who found that feed intake in early feed-restricted birds was not significantly deceased as compared with the control.

With respect to feed conversion ratio (Table 4), it could be noticed that there are significant difference ($P < 0.05$) among all treatment during the period of feed restriction (from 7- 14 days). The best feed conversion ratio was recorded by chicks of control group (T_1). However, the results showed significantly improved feed conversion by increasing of feed restriction level as compared to control group during the age intervals studied (14-21, 22-37, 38 - 49 or 0-49 days of age). These results indicated that subjecting broiler chicks to early life mal nutrition was more efficient in converting feed to gain compared to control group. A trend towards improvement in feed conversion was observed with increasing the level of feed restriction. The best feed conversion value was recorded by chick fed 70% of starter requirements (T_4) during all these age intervals studied.

The present study confirms previous observations (Plavnik and Hurwitz, 1988; and Zubair and Lesson 1996) that suggested a beneficial effect from early feed restriction in improved feed conversion of broiler chicks. Osbourn and Wilson (1960) concluded that increased appetite following refeeding is largely responsible for any improved growth and feed conversion associated with compensatory growth. Zubair and Lesson, (1996) showed that feed restriction at early age, followed by a period of compensatory growth, may be useful to decrease problems associated with early life fast growth in broiler chicks, e.g. a high incidence of metabolic disorders. Moreover, the efficiency of growth may be improved by such feeding strategies due to a lower fat deposition and lower maintenance requirements for energy (Zubair and Lesson, 1996).

Lee and Lesson (2001) studied the effect of early life mal nutrition on male broilers. They concluded that when feed restriction was applied early, or for shorter periods of time, growth compensation occurred. Improved growth was associated with improved feed conversion (significantly). Zubair and Lesson, (1994) reported that the improvement in feed efficiency noted with the use of feed restriction programs is due to reduced overall maintenance requirements. This reduction seems to be due to a transient decrease in basal metabolic rate of feed restricted birds and is linked with a smaller body weight during early growth, leading to less energy needed for maintenance. Consequently, there is current interest in the use of feed restriction programs to modify bird growth patterns and decrease their maintenance requirement which showed to improve feed efficiency.

The quantities of energy and protein consumed by the birds of each group are shown in Table (5). It is apparent that the lowest values of energy consumption were recorded for treatment (4) followed by treatment (3) then treatment (2) and the highest energy intake was recorded for the control group (1) during the periods: 7-14, 0-21, 0-37 and 0-49 days of age. The quantity of calories needed to produce one gram body weight gain (Table 4) during the restricted feed period (7-14 days of age) was lower for control treatment (1) followed by treatment (2) then treatment (3) and finally the treatment (4). However, during other experiment periods, the best efficiency of energy utilization was recorded for the birds of treatment (4) followed by treatment (3) then treatment (2) and the worst value of energy utilization was recorded for control group (1). This means that efficiency of energy utilization improved when the birds subjected to early-energy protein restriction and subsequent re-feeding. This improvement can be explained in the ground that the birds, even though in negative energy balance, were able to gain weight due to change in body composition, i.e. used fat reserve and deposed more lean tissue (Yu and Robinson, 1992).

Table (3): Feed intake (gram/bird) of broiler chicks subjected to feed restriction from 7 to 14 days of age.

Treatments / Age (days)	Feed intake				SEM*	P**
	1	2	3	4		
0-7	78.6	78.4	79.1	79.7	4.61	0.99
7-14	270	280	289	262	18.74	0.52
14-21	498	501	491	488	17.02	0.86
0-21	846	859	859	829	34.68	0.80
22-37	2324	2280	2264	2265	51.08	0.61
0-37	3171	3139	3123	3095	69.44	0.75
38-49	2268	2214	2177	2179	50.76	0.24
0-49	5439	5353	5300	5274	108.53	0.45

a, b ..... means with different superscript(s)in the same row are significantly different ($P < 0.05$).
* Standard error mean for comparison.
** Probability.

Table (4): Feed conversion ratio of broiler chicks subjected to feed restriction from 7 to 14 days of age.

Treatments / Age (days)	Feed conversion ratio				SEM*	P**
	1	2	3	4		
0-7	1.362	1.362	1.366	1.396	0.03	0.70
7-14	1.514^{d}	1.923^{c}	2.371^{b}	2.848^{a}	0.03	0.00
14-21	1.620^{a}	1.524^{b}	1.423^{c}	1.386^{d}	0.18	0.00
0-21	1.559^{c}	1.620^{b}	1.636^{ab}	1.650^{a}	0.016	0.00
22-37	2.213^{a}	2.165^{b}	2.126^{b}	2.075^{c}	0.02	0.00
0-37	1.991^{a}	1.983^{a}	1.965^{ab}	1.941^{b}	0.18	0.04
38-49	2.257^{a}	2.208^{ab}	2.169^{bc}	2.158^{c}	0.026	0.00
0-49	2.093^{a}	2.067^{ab}	2.044^{bc}	2.023^{c}	0.017	0.00

a, b ..... means with different superscript(s)in the same row are significantly different ($P < 0.05$).
* Standard error mean for comparison.
** Probability.

It was observed from the results shown in Table (5) that the amount of energy intake from 7-14 days of age were 837, 780, 716 and 569 Kcal per bird for treatments (1), (2), (3) and (4), respectively. In view of these energy intake values, actual growth rate achieved during this period (7-14 days of age) was unexpected ,for example, birds fed the high level of energy-protein restriction diet (treatment 4) consumed 81 Kcal ME/day and exhibited growth rate of 13 gm/bird/day (92 gm gain/bird/week). Assuming a maintenance energy requirement of 1.5 x $W^{0.67}$ (Plavink and Hurwitz, 1989), then the mean 7-14 day maintenance requirement is 50 Kcal ME/day. Growth of 13 gm/day was evidently achieved with a daily ME allowance of only 31 Kcal/day. These data suggest that either maintenance energy calculation (Plavink and Hurwitz, 1989) is too high, or that growth per se was accompanied by a change in carcass composition. Results of protein consumption and protein utilization are in accordance with those obtained for energy intake and efficiency of energy utilization of different treatments.

Table (5): Protein utilization efficiency (PUE), efficiency of energy utilization (EEU) and performances index (PI) of broiler chicks as affected by dietary treatments.

Items	Treatments			
	1	2	3	4
7-14 days of age:				
Protein intake (g/bird)	62.1	57.88	53.14	42.18
PUE	2.87	2.51	2.29	2.18
Relative	100	87.46	81.79	75.96
Energy intake (Kcal/bird)	837	780	716	569
EEU	4.69	5.36	5.88	6.18
Relative	100	114.29	125.37	131.77
PI	17.71	15.04	13.36	11.80
Relative	100	84.91	75.43	66.65
0-21 days of age:				
Protein intake (g/bird)	194.6	191.1	184.4	172.7
PUE	2.79	2.78	2.85	2.91
Relative	100	99.64	102.15	104.30
Energy intake (Kcal/bird)	2622	2576	2484	2328
EEU	4.82	4.84	4.73	4.63
Relative	100	100.41	98.13	96.06
PI	37.64	35.61	34.76	33.82
Relative	100	94.61	92.35	89.85
0-37 days of age:				
Protein intake (g/bird)	659.5	647.2	637.2	625.7
PUE	2.42	2.45	2.50	2.55
Relative	100	101.24	103.31	105.37
Energy intake (Kcal/bird)	10144	9873	9729	9577
EEU	6.36	6.22	6.11	6.00
Relative	100	97.80	96.07	94.34
PI	82.45	82.46	83.29	85.05
Relative	100	100.01	101.02	103.15
0-49 days of age:				
Protein intake (g/bird)	1079.2	1056.8	1039.9	1028.8
PUE	2.41	2.45	2.50	2.54
Relative	100	101.66	103.73	105.39
Energy intake (Kcal/bird)	17404	16958	16695	16549
EEU	6.68	6.55	6.43	6.34
Relative	100	98.05	96.26	94.91
PI	126.68	127.39	129.25	131.92
Relative	100	100.56	102.03	104.14

The values of feed cost and economical efficiency calculated for each treatment are given in Table (6). The production costs included chick price, feed cost, labor cost, fuel, electricity, veterinary management and other miscellaneous cost items. However, in this study, all these items are similar for the chicks within the different treatments except the feed cost which varies due to the variations in the price of its components and feed consumption values. By definition, economical efficiency denotes to money input/out put, thus, by difference, the return per bird could be easily calculated. The results indicated that the total feed cost value was higher for birds of control group (T_1) than those recorded for the other treatments. Also, the lowest net profit was recorded for chicks fed the control diet.

These results cleared that the use of energy-protein restriction at three levels (90, 80 or 70%) of starter requirements improve the values of economical efficiency based on dividing the net profit by total feed cost.

In conclusion, early energy-protein restriction at levels of 90, 80 or 70% of starter recommended requirements during the period from 7 to 14 days of age could be used in broiler diets without adverse effects on their productive performance.

Table (6): Effect of experimental treatments on the economical efficiency of broiler production.

Items	Treatment			
	1	2	3	4
Average feed intake(g/bird):				
Starter (g/bird)*	846.2	579.3	570.5	567.3
Restricted (g/bird)	-	279.6	288.8	252.1
Grower (g/bird)	2324.4	2280.2	2264.1	2265.4
Finisher (g/bird)	2268.7	2214.1	2176.9	2178.9
Feed cost :				
Starter (LE/bird)	1.27	0.87	0.86	0.85
Restricted (LE/bird)	-	0.36	0.32	0.25
Grower (LE/bird)	3.34	3.28	3.26	3.26
Finisher (LE/bird)	3.16	3.09	3.04	3.04
Total feed cost (LE/bird)	7.78	7.59	7.47	7.39
Average live weight (g/bird)	2646	2633	2639	2654
Price of 1Kg live weight (LE)	6.00	6.00	6.00	6.00
Total revenue(LE/bird)	15.98	15.80	15.84	15.93
Net revenue(LE/bird)	8.20	8.21	8.36	8.53
Economic efficiency	105.5	108.1	112	115.4
Relative economic efficiency	100	102.5	106.1	109.4

* Average feed consumed by feed restricted groups (2, 3 and 4) during the 1st and the 3rd week.

** Control group (1) has not consumed restricted diet.

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الأداء الإنتاجي لكتاكيت اللحم المعرضة لتحديد الغذاء في العمر المبكر

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أجريت تجربة لتقييم الأداء الإنتاجي لكتاكيت اللحم المغذاة علي علائق تحتوي علي ١٠٠% ، ٩٠% ، ٨٠% ، ٧٠% من الاحتياجات الغذائية من كل من البروتين والطاقة القابلة للتمثيل خلال الأسبوع الثاني من العمر(٨-١٤ يوم) . استخدم ٧٢ كتكوت عمر يوم تم تقسيمهم إلي أربعة معاملات بكل منها ١٨ طائر في أقفاص فردية (١٨ مكرر بكل معاملة).

تم تغذية طيور جميع المعاملات علي عليقة بادئ واحدة في فترتى الأسبوع الأول (١-٧ يوم) والأسبوع الثالث (١٤-٢١ يوم) من العمر وكذلك عليقة نامي خلال المدة من ٢٢ إلي ٣٧ يوم من العمر. في حين استخدمت عليقة ناهي موحدة من عمر ٣٨ حتى ٤٩يوم.

أوضحت النتائج إنخفاض وزن الجسم معنويا في نهاية الأسبوع الثاني بتحديد الغذاء خلال الفترة من ٨-١٤ يوم وكذلك تدهور معامل التحول الغذائي معنويا. وفي نهاية فترة البادئ (٢١ يوم) قامت طيور المجموعات المعرضة لتحديد الغذاء (٩٠%، ٨٠%، ٧٠% من الاحتياجات) بتعويض النقص في أوزان الجسم واستمرت في ذلك حتى نهاية التجربة حيث اختفي التأثير السلبي لتحديد الغذاء علي وزن الجسم وتحسن معامل التحويل الغذائي لها عن مجموعة المقارنة.كما لوحظ تحسن كفاءة الطيور في استخدام كل من الطاقة والبروتين بزيادة نسبة تحديد الغذاء في العمر المبكر وعليه تحسن العائد الاقتصادى مقارنة بمجموعة المقارنة.

يستخلص من هذه النتائج أن تحديد الغذاء بمستوي ٩٠%، ٨٠%، ٧٠% من محتوي العليقة البادئة من كل من الطاقة والبروتين خلال الفترة من ٨-١٤ يوم من العمر يمكن أن يستخدم كنظام غذائي بدون أي تأثيرات سلبية علي معدلات الأداء الإنتاجي لكتاكيت اللحم.