

Effect of Using High Protein Level in the First Week of Age on Some Productive Traits of Quail

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Abstract: This experiment was conducted on 90-day old unsexed brown quail chicks. Chicks divided into three treatments, each one consists of three replicates by ten birds, that were reared in wooden cages for the duration of the experiment. Treatments of the experimental diet consisted of (1) control group containing 26% crude protein during the period 0-3 weeks. Groups (2) and (3) treatments were given a diet containing 28% and 30% crude protein, respectively, during the first week only then 26% protein during the period 2-3 weeks. All the treatments received the same finisher diet containing 24% crude protein, during 4-6 weeks, all starter and finisher diets contains 2,900 kilocalories/kg ME. The results showed that treatment (2) had significantly ($P < 0.05$) heavy body weight at 2-week age and best daily and total weight gain, best feed conversion, best protein conversion, and best relative growth coefficient during 0 –2 weeks, while there was no significant effect during other periods, and there was no significant difference between treatments in daily or total feed or protein consumption at any period.

Keywords: first week, high protein, quail, starter

INTRODUCTION

Quails can be used for meat production within a short period (4-5) weeks and matures at an early age of 6 weeks so that female birds are usually in full production by about 8 weeks (Jatoi, et al., 2013). With the development of poultry industry and shortening the period required for marketing in modern breeds of broiler chickens from 56 to 49 and 42 days, some researchers indicate the need to reconsider the opinion that nutrition is not important in the early days of life on the basis that the chicks rely on the yolk sac at first week, where the first week represent about 16-20% of the period of rearing and many researchers reported a positive relationship between weight in the first week and the final weight at marketing and since the quail birds were raised for the purpose of meat until the age of 42 days, i.e., the increase in weight in the first week accounted for more than 16% Of the total weight gain, and where the protein ratio is the most important factor affecting growth. (Longo, et al., 2007) reported that the use of high digestible and high-protein diets could be used to meet the needs of chicks in the early days of life and were economically feasible. (Noy, and Sclan, 2001) reported that newly hatched chicks that were dependent on the egg yolk for the energy supply undergoes a rapid shift to the use of carbohydrate in feed and this leads to a development in the growth of small intestine and stimulation of digestive enzymes. (Jull-Madsen, et al., 2004) stated that delaying feed

intake can reduce the immune response and increase the proportion of mortality and reduce the overall performance of birds. (Bidar, et al., 2007) reported that in the past ten years, attention to early nutrition has increased due to the high correlation between body weight at one week and the final weight at marketing. (Saki, 2005) noted that the weight of birds at the age of 6 and 7 weeks was linear relation with weight at one week age and nutrition Immediately after hatching has an important effect on the performance of birds during the rearing period. (El-Hussieny, et al., 2008) reported that nutrients for hatching chicks can obtained from two sources: yolk sac or feed and that early nutrition has an important role in the development of the digestive tract of chicks. (Toledo, et al., 2011) noted that The first two weeks of age represent 17% of the rearing period and 8-10% of the total weight of the birds. (Henderson, et al., 2008) studied the effect of adding a commercial concentrate called EB with the starter diet during the first 24 hours of age, he found that there was no significant effect on live body weight at 7, 21 and 42 days, and in other study he studied the addition of this concentrate in several ways through five treatment, (1) starter (2) 24 hour starvation then starter diet without EB (3) concentrate added on starter diet, (4).concentrate added in transporting cages, (5) concentrate added in transporting cages and on feed, treatment (1) showed the best live weight at the age of one week. (Saki, 2005) study on broiler comparing four treatments: starvation for 12 hours, feeding on a grounded corn, starter, starvation for 24 hours, results showed that the third and fourth treatments significantly exceeded the first treatment in body weight at 42 days of age but the differences were not significant In feed consumption and feed conversion ratio. (El-Hussieny, et al., 2008) study on broiler chicks, he compared the effect of feeding with 23% crude protein starter diet from day old with 1, 2, 3, 4, 5 and 6 days starvation with drinking water. The first treatment showed the best total weight gain and feed conversion ratio during 6 weeks of age. (Longo, et al., 2007) compared the effect of the standard diet of 20.88% CP with other treatments which included the addition of several sources of carbohydrates and proteins to the control diet include cassava starch, sucrose, corn gluten, blood plasma, corn gluten with sucrose, corn gluten with cassava starch, blood plasma with sucrose, , blood plasma with cassava starch, the results of the study showed that there was no significant differences in total weight gain, feed consumption, and feed conversion ratio. In a study conducted by (Hoshmand, 2006) to compare several treatments, the first one is a starter and the second is a starter with the addition of a solution of vitamins and minerals in drinking water and the third is given a pre-starter in first three days then starter diet, the fourth like third with addition of vitamin mineral solution, fifth treatment include starvation during first 24 hours then starter without solution, and the sixth is like fifth but with addition of solution, seven and eight treatments include starvation for first 12 hours then given grounded corn for 12 hours without or with solution respectively, the results showed no significant differences in the final body weight or total feed consumption or feed conversion ratio. (Altine, et al., 2016) noted that a dietary

crude protein level of 24% is needed in starter diet for quail and the protein content may be reduced to 20% by 3rd week of age. (Junior, et al., 2017) compared three plans of protein levels during rearing period (1-42) day include (1) 22% CP from 1-42 day, (2) 25% CP from 1-21 day then 22% from 22-42 day, (3) 24% CP from 1-14 day and 22% from 15-35 day, then 20% from 36-42 day, and he did not found a significant difference in feed intake and weight gain and a significant decrease in feed conversion in treatment (1) comparing to other treatments during the total period (1-42) day.

This research aims to study the effect of using high levels of protein in the first week of age of quail on the final marketing weight and some other productive traits.

MATERIALS AND METHODS

This study was carried out in the poultry farm of the animal production Department / College of Agriculture and Forestry / University of Mosul using 90 day old brown quail chicks obtained from the college hatchery divided into three treatments of three replicates by ten birds each, raised in wooden cages consisting of 12 partition of 50 × 50× 50 cm for each partition equipped with plastic feeder and waterier and the cages floor was of wire mesh.

Table (1) protein level % in each period for treatments

Treatments	Weeks					
	1	2	3	4	5	6
Treat. 1	26 %			24 %		
Treat. 2	28%	26%		24%		
Treat. 3	30%	26%		24%		

All diets 2900 Kcal/ kg ME

Table (2) Experimental diets composition *

Ingredients	Starter diets			Finisher diet
	%26	%28	%30	24%
Corn	45.25	38.32	31.42	52.15
Soybean meal	45.26	51.23	57.19	39.3
Protein Conc.	5	5	5	5
Lime	0.78	0.78	0.76	0.79
Di calcium phosphate	0.62	0.57	0.51	0.68
Salt	0.25	0.25	0.25	0.25

	Starter diets			Finisher diet
Sunflower oil	2.84	3.86	4.87	1.83
ME Kcal /kg	2900	2900	2900	2900
CP %	26	28	30	24
Crude fiber %	4.26	4.53	4.79	4.00
Ether extract	5.15	5.94	6.72	4.36

*Ingredients chemical composition (NRC, 1994).

The experimental treatments included three diets as in (Table 2) the control containing 26% crude protein and the second and third treatments on 28 and 30% protein respectively during the first week only, followed by a diet of 26% protein during the second and third weeks. A finisher diet containing 24% crude protein during the period of 4-6 weeks and all diets were 2900 kcal ME / kg as shown in the experiment outline (Table 1).

Birds were weighed collectively for each replicate and the feed weekly with a 5 g sensitivity electric balance. The studied traits included live body weight (g), daily and total weight gain (g), daily and total feed consumption (g), feed conversion coefficient (g feed / g weight gain), daily and total protein consumption (g), protein conversion coefficient (g protein / g weight gain), relative growth rate %.The data were statistically analyzed using (Complete randomized design-CRD) according to the mathematical model.

$Y_{ij} = \mu + T_i + e_{ij}$ using (SPSS 11, 2011) software and F test at $P \leq 0.05$

Result And Discussion

The results in Table (3) shows that the second treatment is superior to the first and third treatments in live body weight at the age of 2 weeks ($P < 0.05$), while the differences were not significant at 4 weeks and the final weight at 6 weeks, where it is clear from table (3) that the second treatment exceeded the first and third treatments in weight gain during the period 0 - 2 weeks but not significant during the periods 2-4, 4-6 or during the total period 0-6 weeks, this results are in agreement with (Reda, et al., 2015) who found a significant effect ($p < 0.01$) on LBW at 3 weeks of age and BWG during 1-3 weeks of age due to different protein level, and that the highest values of LBW at 3 weeks of age and BWG during 1-3 weeks of age were achieved by chicks fed 22% CP compared to other levels (23.5 and 25%). However, LBW at 5 weeks of age and BWG through 3-5 weeks of age and during the whole experimental period were not significantly affected, while (Annaka, et al., 1993) indicated that body weight gains from 2 to 5 weeks before the beginning of egg production increased linearly with increasing dietary CP levels and remained relatively constant thereafter, the CP level requirement for maximum body weight gain and the best feed conversion

Table (3) Effect of treatments on body weight and weight gain (g) *

Treatments/ CP	First 26%	Second 28%	Third 30%
Body weight (g)			
1 day	0.55 ± 7.50	0.43 ± 6.83	0.60 ± 7.33
2 week	0.58 ± 63.67 b	2.93 ± 70.17 a	1.70 ± 63.50 b
4 week	5.97 ± 156.17	7.97 ± 160.83	4.92 ± 158.0
6 week	24.39 ± 206.33	15.62 ± 199.57	9.07 ± 202.17
Weight gain (g) Total			
0-2 week	56.17 ± 0.58 b	63.34 ± 2.93 a	56.17 ± 1.77 b
2-4 week	92.5 ± 6.38	90.67 ± 10.68	94.50 ± 4.92
4-6 week	50.17 ± 18.47	38.74 ± 9.83	44.17 ± 5.00
0-6 week	198.83 ± 24.39	192.74 ± 15.63	194.84 ± 9.07
Daily weight gain (g)			
0-2 week	4.01 ± 0.04 b	4.52 ± 0.21 a	4.01 ± 0.17 b
2-4 week	6.61 ± 0.46	6.48 ± 0.76	6.75 ± 0.35
4-6 week	3.58 ± 1.32	2.77 ± 0.70	3.16 ± 0.36
0-6 week	4.73 ± 0.58	4.59 ± 0.37	4.64 ± 0.22

*means with different letters differs significantly (P < 0.05)

Table (4) Effect of treatments on feed and protein consumption

Treatments	First 26%	Second 28%	Third 30%
Total feed consumption			
0-2 week	138.83 ± 9.84	138.47 ± 3.77	139.67 ± 3.12
2-4 week	293.17 ± 27.14	± 30.73 299.33	302.83 ± 10.41
4-6 week	60.37 ± 370.33	355.67 ± 30.73	343.57 ± 23.65
0-6 week	802.33 ± 32.93	793.47 ± 16.76	786.07 ± 12.90
Daily feed consumption			
0-2 week	9.92 ± 0.70	9.89 ± 0.27	9.98 ± 0.22
2-4 week	20.94 ± 1.94	21.38 ± 0.88	21.63 ± 0.74
4-6 week	26.45 ± 4.31	25.40 ± 2.19	24.54 ± 1.69
0-6 week	19.10 ± 0.78	18.89 ± 0.40	18.72 ± 0.31

Treatments	First 26%	Second 28%	Third 30%
	Total protein consumption		
0-2 week	36.10 ± 0.16	36.85 ± 0.98	37.98 ± 0.81
2-4 week	76.03 ± 6.91	73.46 ± 3.30	75.71 ± 2.50
4-6 week	88.88 ± 14.49	85.36 ± 7.38	82.46 ± 5.68
0-6 week	201.01 ± 7.45	195.67 ± 3.63	196.15 ± 3.10
	Daily protein consumption		
0-2 week	2.58 ± 0.18	2.63 ± 0.11	2.71 ± 0.07
2-4 week	5.43 ± 0.49	5.24 ± 0.44	5.41 ± 0.36
4-6 week	6.35 ± 1.03	6.09 ± 0.70	5.89 ± 0.41
0-6 week	4.79 ± 0.18	4.65 ± 0.12	4.67 ± 0.12

*means with different letters differs significantly (P <0.05)

ratio estimated to be 20.18%, while (Soarez, et al., 2013) reported a quadratic effect of protein level (18, 20, 22, 24 and 26%) on weight gain during rearing period 7-35 days of quail age. (Murakami, et al., 1993) indicated that after lysine and methionine + cystine requirements were met, 20% crude protein level resulted in best performance from 1 to 42 days of age, (Weber, and Reid, 1967) indicated that Lower protein levels of 20 to 24% were adequate for the Bobwhite quail if provided supplemental lysine and methionine, while Ratriyanto et al (2017) did not find any effect of protein level on feed intake.

Table (4) shows no significant differences in the daily and total feed consumption during all the studied periods., and this in agreement with (Toledo, et al., 2011) and with (Annaka, et al., 1993) who found no significant effect of protein level on feed intake. Table (5) shows that the second treatment was significantly (P< 0.05) better than the first and third treatments during the period 0 - 2 weeks only in feed and protein conversion ratio, while the differences were not significant during the rest of periods and total period (0-6) week, this may be due to improvement in weight gain during 0-2 weeks .

Table (4) Effect of treatments on feed and protein conversion ratio

Treatments	First 26%	Second 28%	Third 30%
	Feed conversion ratio		
0-2 week	b 2.47 ± 0.16	a 2.19 ± 0.05	b 2.49 ± 0.06
2-4 week	3.17 ± 0.52	3.30 ± 0.55	3.20 ± 0.27
4-6 week	7.38 ± 2.24	9.18 ± 1.89	7.78 ± 0.85
0-6 week	4.04 ± 0.36	4.12 ± 0.27	4.03 ± 0.14

Treatments	First 26%	Second 28%	Third 30%
Protein conversion ratio			
0-2 week	0.64±0.04 b	0.58 ±0.01 a	0.68±0.01 b
2-4 week	0.82±0.13	0.81 ±0.14	0.80 ± 0.06
4-6 week	1.77 ±0.54	2.20 ±0.45	1.87 ±0.20
0-6 week	1.01 ± 0.09	1.02 ± 0.07	1.01 ± 0.04

Table (5) Effect of treatments on relative growth rate %

Treatments	First 26%	Second 28%	Third 30%
0-2 week	157.84±0.3 b	164.48 ±1.32 a	158.61 ±0.73 b
2-4 week	84.09±3.74	78.39±7.61	85.29±2.53
4-6 week	27.22 ± 8.29	21.36 ±8.90	24.49 ±4.26
0-6 week	185.84±1.72	186.71±1.03	185.99±0.59

(Blake, and Hess, 2013) found that Period FCR appeared to be unaffected by dietary CP regimen while (Siyadati, et al., 2011) found that average feed intake increased at the quails fed with diets containing low crude protein 21% (with high ME:CP ratio) than that diets containing high crude protein 27% (with low ME:CP ratio) in the starter period 1-21 day. The result of this research indicated that increasing protein level during first week had no positive effect on quail performance, which may mean that it is not enough to improve the performance of quails, where (Marks, 1993) indicated that whereas populations selected under low-protein environments do not require high-protein diets for full expression of their genetic potential for growth, and as local quails may be did not need to high level of protein to express their growth ability at this age. (Junior, et al., 2017) indicated that The best nutritional plan for meat quail was which included three types of diet, 24-22-20 % crude protein during 1-15, 16-35-36-42 day of age respectively as it provided a lower cost of diet per kilogram of quail produced and better performance results with out affecting carcass traits.

Conclusion

The result of this research indicated that increasing protein level during the first week only had no positive effect on quail performance, which may mean that it is not enough to improve the performance of quails and may need a longer period.

References

- Altine, S, M; Sabo.N ; Muhammad, N; Abubakar, A; Saulawa, L. A. (2016). "Basic nutrient requirements of the domestic quails under tropical conditions: A review". *World scientific news*.49 (2) :223-235.

- Annaka, A;Tomizawa, K.; Momose, Y;Watanabe, E.;and Ishabashi, T. (1993). "Effects of dietary protein level on performance of japanese quail". *Animal science technology*.64 (8) :797- 806.
- Bidar, N ; Rezaei, M ; Sayyah zadeh, H ; and kermanshahi, H. (2007)."Feeding periods and sodium levels of prestarter diet on broiler performance and serum electrolytes".*Journal of animal and veterinary advances*.6:959-963.
- Blake, j.P; and.Hess, J.B. (2013). "Changes in protein level for bobwhite quail". *journal of applied poultry research*.22:511-515.
- El-husseiny, O.M;Abou el-wafa, S;and el-komy, M.A (2008)."Influence of fasting or early feeding on broiler performance".*International journal of poultry science*.7:263-271.
- Henderson, S.N;vicente, J.I ; Pixiey, C.M ;Hargis, B.M ;andTellez.G. (2008)."Effect of An early nutritional supplement on broiler performance ". *International journal of poultry science*. 7: 211-214.2008.
- Hoshmand, M (2006)." Effect of early feeding programs on broiler performance".
international journal of poultry science. 5:1140-1143.
- Jatoi.A.S;Sahota, A.W;Akram, M;javed, K.M;jaspal, H;Hussain, J;Mirani, A.H, and Mehmood, S (2013)."Effect of different body weight categories on the productive performance of four close-bred flocks of japanese quails (coturnix coturnix japonica) ". *The.Journal of animal & plant sciences*.23 (1) :7-13.
- Junior, D.N.G;Pereira, A.A;Junior, D.M.D;Alcantara, R.S.D;Silva, W.A.D;Moraes, S.D.S;Almeida, V.V. (2017)."Evaluation of nutritional plans for meat quail". *Revista brasileira de zootecnia*.38 (2) :821-830.
- Longo, F.A;menten, J.F; Edroso, A.A ;Figueiredo, A.N ;Racanizzi, A.M.C;and Sorbara, J.O.B (2007)."Performance and carcass composition of broilers fed different carbohydrate and protein sources in the prestarter phase". *Journal of applied poultry research*. 16:171-177.
- Marks, H.I (1993)."The influence of dietary protein level on body weight of japanese quail lines selected under high and low protein diets". *Poultry science*.72:1012-1017.
- Murakami A.E;Moraes, V.M.B, Arika, J; Junqueira, O.M; and.Kronka, S.N (1993). "Protein and energy levels in japanese quail (Coturnix Coturnix Japonica) diets". *Revista brasileira de zootecnia*. 22 (4) :541-552.
- Noy, Y;& Sklan, D (2001)."Yolk and exogenous feed utilization in the posthatch chick". *Poultry science*.80: 1490 – 1495.
- NRC (1994)."Nutrient requirement of poultry". *National Research Council. National Academy Press*.9th Ed.Washington.dc.

- Reda.F.M ;Ashoure.A ;Alagawany, M;and Abd El-hack, M.E (2015).. "Effect of dietary protein, energy and lysine intake on growth, performance and carcass characteristics of growing japanese quails". *Asian journal of poultry science*.9 (3) :155-164.
- Ratriyanto, A; Indreswarj, R; Nuhriawangsa, AMP (2017). "Effects of Dietary Protein Level and Betaine Supplementation on Nutrient Digestibility and Performance of Japanese Quails". *Brazilian journal of poultry science*.19 (3) :445-453.
- Saki, A.A. (2005). "Effect of post hatch feeding on broiler performance". *International journal of poultry science*.4: 4-6.
- Siyadati1.S.A;Irani.M;Ghazvinian, K;Mirzaei-aghsaghali, A;Rezaipoor, V; Fathi.H; Alipoor, K; and Zamanzad- ghavidel, S. (2011). "Effect of varying dietary energy to protein ratio on productive performance and carcass characteristics of japanese quail". *Annals of biological research*, 2 (1) :149-155.
- Soarez, R.D ;Fonesca, J.B;Santos, A.S; and Mercandante, M.B (2003). " Protein requirement of japanese quail (*Coturnix Coturnix Japonica*) during rearing and laying periods". *Brazilian journal of poultry science*.5 :153 -156.
- Spss 11 (2011). "Statistical package for the social sciences". *Spss Inc. Chicago.il.USA*.
- Toledo, R.S ;Rostagno, H.S; Albino, I.F.T ;junior, J.G.D; and Carvalho, C.D (2011). "Crude protein level of pre-starter diets and nutritive solution for broilers". *Revista brasileira de zootecnia*.40.10:2199-2204.
- Weber, C.W.;& Reid, B.I (1967). "Protein requirements of coturnix quail to five weeks of age". *Poultry science*, 46 (5) : 1190–1194.

تأثير استخدام نسبة عالية من البروتين في الأسبوع الأول من العمر على بعض الصفات الإنتاجية للسمان

الملخص: أجريت هذه الدراسة على 90 من أفراخ السمان البني غير المجنسة قسمت إلى ثلاث معاملات كالاتي (1) عليقة بادئة تحتوي على 26% بروتين خام خلال الفترة 0-3 أسبوع، والمعاملتين الثانية والثالثة أعطيت عليقة تحتوي على 28% و30% بروتين خام على التوالي خلال الأسبوع الأول فقط ثم عليقة بادئة تحتوي على 26% بروتين خلال الفترة 2-3 أسبوع، وقد أعطيت جميع المعاملات عليقة ناهية واحدة تحتوي على 24% بروتين خلال الفترة 4-6 أسبوع وقد احتوت جميع العلائق البادئة والناهية على 2900 كيلو كالوري/ كغم من الطاقة الممتلئة. أظهرت النتائج أن المعاملة الثانية كانت ذات وزن جسم أعلى معنوياً (احتمال ≥ 0.05) وزيادة وزنية يومية وكلية ومعامل تحويل غذائي ومعامل تحويل بروتين ومعامل النمو النسبي أفضل معنوياً (احتمال ≥ 0.05) خلال الفترة 0-2 أسبوع، في حين لم يكن التأثير معنوياً خلال الفترات الأخرى، كما لم يظهر اختلاف معنوي في استهلاك العلف أو البروتين اليومي أو الكلي خلال جميع الفترات .

الكلمات المفتاحية: الأسبوع الأول، بروتين عالي، السمان، بادئة.