Effect of the percentage of protein in the initiator and finisher periods on some of the productive traits for Japanese quail bird

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ABSTRACT

This study was conducted in the poultry field belonging to the Department of Animal Resources, College of Agriculture and Forestry, University of Mosul for the period from 1/5/2018 to 15/6/2018. In this study, 90 chicks of local quail with one day age were used, where was raised collective breeding in the first week, and then distributed to three treatments, each of them consisting of three replicates, with rate of 10 birds in each replicate, which raised in wooden cages with a dimensions of 50 x 50 x 50 cm^2. The first treatment included initiator diet (26% crude protein) from 1 day age to the end of the third weeks, and finisher diet contains 24% crude protein from the fourth week to the end of the sixth week. Third treatment: one diet contains 24% protein throughout the breeding period from 1 one day to the end of the sixth week. All treatments were equal in the metabolic energy (2,900 $kcal.kg^{-1}$) in the diet. The results showed no significant differences ($P \leq 0.05$) in the average percentage of live body weight, feed conversion ratio and protein conversion efficiency at the end of the breeding period. The third treatment was excelled on the first treatments and the second treatment in the percentage of weekly weight gain and relative growth rate, It was also observed that there were significant differences in the amount of consumed feed, which decreased significantly in the second treatment compared to the third treatment at the end of the breeding period (the sixth week). In general, the quail bird needs a diet containing 24% crude protein. Therefore, this study aimed to determine the effect of the percentage of protein in the initiator and finisher periods and the comparison between the three types of diets on some of the productive traits for Japanese quail bird.

Keywords: protein level in diet, quail, productive performance.

1. INTRODUCTION

Protein is considered one of the most important nutrient elements in the growth of Broiler birds, and its sources of the most components of the diet cost due its high prices, so researchers seek to reduce the percentage of protein to the maximum extent so as not to negatively affect the productivity with an improvement in the efficiency of birds and Since the livestock sector is one of the most important agricultural sectors in the world, many species of birds have been domesticated, including ostriches, turkeys, and quail to sustain the production of meat and eggs. where the food shortage is increasing day by day as a result of the continuous population increase, where it became necessary to find solutions to cover the food shortage, therefore, the quail bird was chosen, due to it is a bird fast-growing and production, low cost, resistance to diseases, and its breeding flourishes due its excellence by high productivity, Whether it is eggs or meat in a short period, as well as it is raised according to the intensive breeding systems, where its numbers range (80 - 100 $birds.m^{-2}$) (Abou El-Ela, (1). The researchers found that the level of protein in the diet significantly affected the productivity of birds, where (Dowarah and Sethi (8) found that the lowest level of protein is 23%. This significant was disappeared for the total period (0-6 weeks), while Blake and Hess (6) reported that quail was not affected by changes in protein level. This study aimed to determine the effect of the percentage of protein in the initiator and finisher periods and the comparison between the three types of diets at the protein level on some of the productive traits for Japanese quail bird.

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2. MATERIALS AND METHODS

This study was conducted in the poultry field belonging to the Department of Animal Resources, College of Agriculture and Forestry, University of Mosul for the period from 1/5/2018 to 15/6/2018. In this study, 90 chicks of local quail with one day age were used, where was raised collective breeding in the first week, and then distributed to three treatments, each of them consisting of three replicates, with rate of 10 birds in each replicate, which raised in wooden cages with a dimensions of 50 x 50 x 50 cm2. The feed was provided free as well as the water in the hanging feeders and waters, which were filled manually using a diet made up of crushed grains. The first treatment included initiator diet (26% crude protein) from 1 day age to the end of the third weeks, and finisher diet contains 24% crude protein from the fourth week to the end of the sixth week. Third treatment: one diet contains 24% protein throughout the breeding period from 1 one day to the end of the sixth week. All treatments were equal in the metabolic energy (2,900 kcal.kg^{-1}) in the diet as shown in Table (1) and according to (NRC, 12). Weekly weights were taken collectively using a 5 g sensitive balance, Weekly average for the live body weight, Weekly weight gain, relative growth rate, feed consumption, feed conversion ratio, protein consumption, and protein conversion efficiency. The Completely Randomized Design (CRD) and the SAS (14) were used for data analysis and significant testing among the averages according to Duncan New Multiple tests (Duncan, 7) to find the significant differences between the treatments at the probability level of ($P\leq 0.05$) and according to the following mathematical model:

$$Y_{ij} = \mu + t_i + E_{ij}$$

1. RESULT AND DISCUSSION

Table (2) shows the effect of the treatments in the average body weight (g/week) that there are no significant differences between the different treatments under the probability level ($P\leq 0.05$) between the different treatments except for the fourth week of age, where the second treatment (percentage of Protein for the initiator and finisher is 26%) was significantly excelled on the first treatment (percentage of Protein for the initiator is 26% and for finisher is 24%) while we note that there are no significant differences between these treatments with the third treatment and the values of treatments amounted to (154.33, 116.90 and 145.53 g), respectively. The results were agreed with (11,18), while Jianlin et al., (12) found that reducing the percentage of protein from 22.48% to 18.10% and 18.06%, the body weight decreased significantly. Attia et al., (12) found that there were significant differences at the protein level of (22%, 24%) for the third and sixth weeks respectively, and significant differences were observed in the feed consumption for the total period (1-6 week) where it was significantly increased for the protein level (22%) compared to (24%) with an improvement in the feed conversion ratio with decreasing the percentage of protein.

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Table 1: Composition of the used diets in the experiment

Treatment / Feed materials	First treatment		Second treatment	Third treatment
	%26	24%	%26	%24
Yellow corn	44.61	51.2	44.61	51.2
Soybeans meal	45.93	40.11	45.93	40.11
Concentrated Proteins	5	5	5	5
Limestone	0.5	0.5	0.5	0.5
Dicalcium phosphate	1.56	1.63	1.56	1.63
salt	0.25	0.25	0.25	0.25
Premix	0.1	0.1	0.1	0.1
plant oil	2.05	1.21	2.05	1.21
Total	100	100	100	100
metabolic Energy	2900	2900	2900	2900
Crude protein	26	24	26	24
Calcium	1	1	1	1
Raw fiber	4.3	4.03	4.3	4.03
Ether Extract	4.35	3.72	4.35	3.72
Lysine	1.54	1.41	1.54	1.41
Methionine and Cysteine	0.95	0.9	0.95	0.9
Arginine	1.62	1.46	1.62	1.46
Phenylalanine	1.16	1.06	1.16	1.06
Phenylalanine and Tyrosine	2.17	1.98	2.17	1.98
Thrombin	0.92	0.84	0.92	0.84
Tryptophan	0.37	0.33	0.37	0.33
Leucine	2	1.9	2	1.9
Iso-Leucine	1.03	0.94	1.03	0.94
Valine	1.13	1.04	1.13	1.04
Histidine	0.6	0.6	0.6	0.6

Chemical composition for feed materials according to (NRC, 1994)

Ingredients of premix: Vitamin A 2500, Vitamin D3 500 / IU, (Vitamin E1, C5, Dicalcium phosphate 80, Sodium Chloride 70, Magnesium Sulphate 20, Zinc Sulphate 2, Iron Sulphate 1.5, Sodium Propionate 5) mg, (Potassium iodide 15, cobalt chloride 10, manganese sulphate 750, sodium selenate 1000) μg, calcium carbonate 1 g.

Table 2: Effect of different levels of protein in the average weight of body live (g).

Age (week)	Treatment			LSD
	T1= 24% -26%	T2= 26%	T3= 24%	
0 (initiator)	7.50± 0.01	7.67±0.01	6.67±0.01	----
1	29.50±0.89 a	27.23±0.71 a	30.96±0.20 a	N.S
2	36.66±0.33 a	a 60.83±3.44	58.83±2.08 a	N.S
3	111.33±0.72 a	108.16±4.63 a	107.96±0.83 a	N.S
4	116.90±6.3 b	154.33±3.94 a	145.53±5.28 ab	S
5	185.66±2.91 a	181.56±5.57 a	176.50±5.29 a	N.S
6	213.66±6.93 a	212.33±4.16 a	217.33±5.57 a	N.S

The different characters horizontally indicate significant differences between the treatments below the probability level ($P \leq 0.05$).

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As for the weekly weight gain, Table (3) shows that there were significant differences between the treatments at the first week of the age, where the third treatment was significantly excelled on the second treatment and there was no significant difference between it and the first treatment, which amounted to (24.29, 19.57, 22.00 g), respectively. While note that the level of protein (26.6% initiator and 24%finisher) in the first treatment at the second week was significantly excelled on the third treatment (26% protein) and did not significantly differ the second treatment with the two previous treatments where the treatments amounted to (34.16, 27.86, 33.6), respectively. There were also significant differences during the sixth week where the third treatment (24% protein) was significantly excelled on the first and second treatments, which amounted to (40.83, 28, 29.76 g) for the three treatments, respectively. As for the relative growth rate, Table (4) shows that the growth rate agrees with the results of the weight gain as shown in Table (3), where the first and second treatments were significantly excelled on the third treatment at the second week, which amounted to (73.38, 76.47, 61.9%). In the fifth week, the third treatment was excelled on the second treatment, while there was no significant difference between it and the first treatment, which amounted to (18.73, 16.8, 17.27%), respectively. The third treatment was excelled on the first and second treatments at the sixth week (20.57, 15.35, 13.94%), respectively.

Table 3: Effect of different levels of protein in the average weight gain (g).

Age (week)	Treatment			LSD
	T1= 24% -26%	T2= 26%	T3= 24%	
1	ab 22.00±0.89	b 19.57±1.72	a 24.29±0.20	S
2	a 34.16±0.97	ab 33.60±1.93	b 27.86±2.26	S
3	a 47.66±1.01	a 47.33±1.42	a 49.13±2.17	N.S
4	a 44.83±3.41	a 46.16±1.16	a 37.56±4.53	N.S
5	a 29.50±0.89	a 27.23±1.71	a 30.96±0.20	N.S
6	b 28.00±4.08	b 29.76±2.70	a 40.83±1.97	S

The different characters horizontally indicate significant differences between the treatments below the probability level (P≤0.05).

Table 4: Effect of different levels of protein in the relative growth rate

Age (week)	Treatment			LSD
	T1= 24% -26%	T2= 26%	T3= 24%	
1	a 118.80±1.99	a 111.71±4.22	a 120.61±0.41	N.S
2	a 73.38±2.69	a 76.47±0.73	b 61.90±3.66	S
3	a 54.19±1.11	a 56.12±1.48	a 58.98±1.21	N.S
4	a 33.48±2.15	a 5.27±1.78	a 29.47±2.94	N.S
5	ab 17.27±0.77	b 16.18±0.58	a 18.73±0.13	S
6	b 13.94±1.74	b 15.35±1.42	a 20.57±1.05	S

The different characters horizontally indicate significant differences between the treatments below the probability level (P≤0.05).

In the amount of feed consumption, Table (5) shows that there were significant differences between the treatments. In the first week, the first treatment was excelled on the second and third treatments and the second treatment was excelled on the third treatment and the values of the treatments amounted to (43.33, 41.67, 40.9 g). At the second week, the first treatment was excelled on the third treatment and the two treatments did not differ significantly with the second treatment, which amounted to (95.5, 80.33, 90.50 g), respectively. In the fourth

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week, the second treatment was excelled on the first and third treatments, which amounted to (192.83, 151.83, 153.30 g), respectively. In the fifth and sixth week, the third treatment was significantly excelled on the second treatment and did not differ significantly with the fourth treatment, which amounted to (203, 145.5, 162.33 g) and (243.6, 174.60, 202 g) for the three treatments and for the two weeks, respectively. The increase in the average feed consumption was due to compensating of the reduction in the percentage of protein 24% compared to 26% because small chicks need a higher percentage of protein in younger ages. These results agree with (Reda et al., (17), where they did not show a significant difference in the weight of the living body, with different to the percentage of protein in the diet (22, 23.5, 25%). At the fifth week, it found a superiority in the weight gain and decrease in feed consumption for the second and third treatments compared to the percentage of protein (22%) for quail birds. it is also mentioned that the weight gain of the treatments (22, 23.5% protein) was excelled on the protein level (20%). The results differed with (Djouvinov and Mihailov, 9) where the protein level (23.4, 22.1%) in the diet did not affect the average of feed consumption.

Table 5: Effect of different levels of protein in the average of feed consumption

Age (week)	Treatment			LSD
	T1= 24% -26%	T2= 26%	T3= 24%	
1	a 43.33±0.01	b 41.67±0.01	c 40.90±0.01	S
2	a 95.50±5.67	ab 90.50±2.84	b 80.33±2.04	S
3	a 141.33±11.97	a 128.17±4.47	a 129.92±8.77	N.S
4	b 151.83±5.26	a 192.83±4.38	b 153.30±7.80	S
5	ab 162.33±15.84	b 145.50±3.00	a 203.00±16.39	S
6	ab 202.00±19.01	b 174.60±3.60	a 243.60±19.67	S

The different characters horizontally indicate significant differences between the treatments below the probability level ($P \leq 0.05$).

The feed conversion ratio was not affected as shown in Table (6), although there were significant differences in the average of weight gain as shown in Table (3) and the average of feed consumption as shown in Table (5), Where there was no significant difference between the different treatments for the different weeks except the first week, where the feed conversion ratio improved in the third treatment compared to the second treatment, while there were no significant differences between the first treatment and the other two treatments, which amounted to (1.66,2.15, 1.97), respectively. This confirms that the increase in the amount of feed consumption in the last two weeks has been reflected directly on the average of weight gain, thus it did not affect the final weights of birds at the fifth and sixth weeks as shown in Table (2). these results agree with (Djouvino and Mihailov, 9), where he did not find significant differences between The levels of used protein in the feed conversion ratio, as well as Siyadati et al., (15) who did not find any effect for the different level of the protein (21, 24, 27%) in the diet on the feed conversion ratio. As well as, Soarez et al., (16) where he indicated that the different protein levels of (18, 20, 22, 24, 26 %) also had no significant effect. Alagamang et al, (3) used in different levels (22, 24, 22, 20), (22, 20, 18, 16), (22, 20, 18, 16)% for the initiator , growth, and finisher diet. There was a significant increase in the weight of the live body with a high percentage of protein and improvement in the feed conversion ratio at the age of 42 days.

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Table 6: Effect of different levels of protein in feed conversion ratio

Age (week)	Treatment			LSD
	T1= 24% -26%	T2= 26%	T3= 24%	
1	ab 1.97±0.08	a 2.15±0.18	b 1.66±0.02	S
2	a 2.72±0.10	a 2.41±016	a 2.91±0.22	N.S
3	a 2.96±0.27	a 2.70±0.09	a 2.64±0.11	N.S
4	a 3.44±0.38	a 2.27±0.12	a 4.24±0.79	N.S
5	a 5.72±0.63	a 5.39±0.42	a 6.54±0.54	N.S
6	a 7.34±0.48	a 5.94±0.45	a 5.98±0.52	N.S

The different characters horizontally indicate significant differences between the treatments below the probability level (P≤0.05).

Table (7) shows the effect of protein levels in protein consumption, where it was observed significant differences between the treatments below the probability level (P≤0.05) where the protein consumption decreased in the first week with decrease their percentage in the diet. The first treatment was excelled on the second and third treatments which amounted to (11.26, 10.83, 0.631), respectively. In the fourth week, the second treatment was excelled on the first and third treatments which amounted to (46.28, 36.44, 36.79), respectively. it was not observed significant differences were observed between the first and third treatments. In the fifth and sixth weeks, the second treatment was excelled on the second treatment (48.72, 34.92, 40.40) and (58.46, 41.89, 48.64) for the three treatments and for the two weeks respectively. The first treatment did not differ significantly with the second and third treatments.

Table 7: Effect of different levels of protein in protein consumption

Age (week)	Treatment			LSD
	T1= 24% -26%	T2= 26%	T3= 24%	
1	a 11.26±1.01	b 10.83±0.01	c 10.63±0.01	S
2	a 24.83±1.47	a 23.53±0.73	a 21.75±1.32	N.S
3	a 36.74±3.11	a 33.32±1.16	a 33.78±2.28	N.S
4	b 36.44±1.26	a 46.28±1.05	b 36.79±1.87	S
5	ab 40.40±3.80	b 34.92±0.72	a 48.72±3.93	S
6	ab 48.64±4.69	b 41.89±0.86	a 58.46±4.72	S

The different characters horizontally indicate significant differences between the treatments below the probability level (P≤0.05).

As for protein conversion efficiency, Table (8) shows that there are no significant differences between the three treatments for the different weeks except the first week, where the protein conversion efficiency improved with decrease in the percentage of protein in the third treatment compared to the second treatment (0.43, 0.55) while the first treatment (0.50) did not differ significantly from the second and third treatments. Akinbola and Lyayi (4) confirmed by using different protein levels (20,22,24, 26) the presence of significant differences in the amount of feed consumption and in the protein conversion efficiency between all protein levels. In a study of Sethi and Dowarah (8) by using three levels of protein on quail (23, 25, 27)% in the starting period (1-21) days and in the finisher (18, 20, 22) for the period (22-35 days), they did not find a significant difference in the final weight and the average weight gain. There was also a significant excelling in feed consumption for the protein level (27%) on the protein level (23, 25%). There was also an improvement in the food conversion ratio and in the protein conversion efficiency with a high percentage of

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protein in the diet. The results differed with (Ghesari et al., (10) where used different protein levels (26, 24,22, 20) for the period (0-14) days, (24,22,20,18) for the period (15-28 days), and (22, 20, 18, 16) for the period (29-49 days). It was noted that there is a significant superiority in the body weight for the high protein levels and for different periods.

Table 8: Effect of different levels of protein in protein conversion efficiency

Age (week)	Treatment			LSD
	T1= 24% -26%	T2= 26%	T3= 24%	
1	ab 0.50±0.02	a 0.55±0.04	b 0.43±0.01	S
2	a 0.72±0.02	a 0.70±0.03	a 0.79±0.08	N.S
3	a 0.77±0.07	a 0.70±0.02	a 0.73±0.04	N.S
4	a 0.82±0.09	a 0.99±0.02	a 1.11±0.17	N.S
5	a 1.35±0.14	a 1.29±0.10	a 1.57±0.12	N.S
6	a 1.73±0.13	a 1.40± 0.11	a 1.43±0.12	N.S

The different characters horizontally indicate significant differences between the treatments below the probability level ($P \leq 0.05$).

REFERENCES

1 - Abu Al-Ala, Salah al-Din (2005). Quail (Breeding - Caring - Nutrition - Projects). Al Dar Al Arabia For Publishing & Distribution.

2- Abbasali.G; H.A.Halaji; G.Maghsoudinegad; M.Toghyani; A.Alibmani and S.E.Saeid (2011). Effect of different dietary levels of energy and protein on performance of Japanese quails(*Coturnix coturnix japonica*). (2011) 2nd International Conference on Agricultural and Animal Science vol. 22

3- Alagawany, M; M.M.El-Hindawy; A.I.Attia(2014). Impact of protein and certain amino acids levels on performance of growing Japanese quail. Universal Journal of Applied Science .2: 105-110.

4-Akinbola, D.D.; E.A.Iyayi.(2016). Crude Protein and Energy Requirements of Japanese Quail (*Coturnix coturnix japonica*) During Rearing Period. *J. World Poult. Res.* 6(2): 99-104, June 25, 2016

5- Attia.A.I; Kh.M.Mahrose; I.E.Ismail and D.E.Abou-Kasem(2012). The response of growing Japanese quail raised under two stocking densities to dietary and energy levels. Egyptian J. Anim prod., 47 Suppl. Issue ,Nov .(2012):159-167.

6- Black, J.P; and J.B.Hess (2013). Changes in protein level for bobwhite quail. Journal of applied poultry research. 22: 511-515.

7-Duncan, D.B. (1955). Multiple ranges and multiple F Test.

8- Dowarah.R; and A.P.S.Sethi .(2014). A various dietary level of protein and energy interaction on growth performance of white plumage Japanese quails. Veterinary world .7:398-402.

9- Djouvinov, D;, and R.Mihailov(2005). Effect of low protein level of protein on performance of growing and laying Japanese quail *(Coturnix Coturnix japonica)*.Bulgarian Journal of veterinary medicine

10-Gheisari, A.; H.A.Halaji; G.Maghsoudinegad; M. Toghyani; A. Alibemani and S.E.Saeid .(2011). Effect of different dietary levels of energy and protein on performance of Japanese quails (*Coturnix coturnix japonica*). 2011 2nd International Conference on agricultural and animal science.8:91:98.

11- Kidd, B.J;and M.T.Kerr(1999). Amino acids supplementation of an ideal amino acids basis .journal of applied poultry research .8:310-320.

12- Jianlin,S.I; C.A.Fritts; D.J.Burnham; P.W.Waldroup. (2004). The extent to which crud protein may be reduced in corn-soybean

ISSN 2072-3875

meal broiler diets through amino acid supplementation. International Journal of poultry science . 3: 46-50.

13- NRC (1994). Nutrient requirement of poultry. 9th edition national academy press. Washington. D.C.USA.

14 -SAS (2003). Statistical Analysis System User's Guide. (Version 9.1.3). SAS Institue Inc., Cary North Carolina, U.S.A.

15-Siyadati, S.A; M.Irani; K.Ghazvinian; A.M.Aghsaghali; V.Rezaipoor; H.Fathi; K.Alipoor; and S.Z.Ghavidel (2011). Effect of varying dietary ratio on productive performance and carcass characteristics of japan quail.Annals of biological research .2: 149-155.

16- Soares.R.Da.TRN;J.B.Foneseca;A.S.De.O.Dos.Santos; M.B.Mercandante. (2003). Protein requirement of Japanese quail (*Coturnix Coturnix japonica)*during rearing and laying periods.Brazilian Journal of poultry science. 5:153-156.

17- Reda, F.M; E.A.Ashour; M.Algawany and M.E.Abd El-Hack. (2015). Effect of dietary protein, Energy and lysine intake on growth performance and carcass characteristics of growing Japanese quails. Asian Journal of Poultry Science ISSN 1819-3609.

18-Waldroup, P.W; Q.j.; and C.A.Frita (2005). Effect of supplementing broiler diets Low in crud protein with essential and non-essential amino acids international journal of poultry science. 4: 425-431.

ISSN 2072-3875