

EFFECT OF DIETARY ENERGY AND CORN GLUTEN FEED ON THE PERFORMANCE OF GROWING WHITE PEKIN DUCKS.

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ABSTRACT:

A factorial design experiment (3x3) was performed to study the effect of three levels of energy (2800, 3000 and 3200 Kcal ME/Kg) and three levels of corn gluten feed, CGF (0, 8 and 16%) on growth performance and economical efficiency of White Pekin ducklings.

A total number of 270 unsexed two-weeks-old White Pekin ducklings were randomly distributed among 9 treatment groups (30 ducklings each) nearly equal in average live body weight. Each group was subdivided into three replicates each of 10 ducklings. Growth performance, some carcass traits, blood constituents and economical efficiency were studied. The results obtained could be summarized as follows:

Live body weight and daily weight gain were significantly ($P<0.05$) higher with the 3000 Kcal ME/Kg diet energy level at most experimental period. During the starter (2 to 7 weeks age) and the whole experimental (2 to 12 weeks age) periods, improved ($P<0.05$) feed conversion values were noticed with the 3000 Kcal ME/Kg diet energy level. Ducklings fed the level of 8% corn gluten feed possessed significantly ($P<0.05$) higher live body weight at 7 and 12 weeks of age than those fed 0 or 16% corn gluten feed. The best feed conversion value was found with ducklings fed 8% CGF. Liver, heart, total giblets and abdominal fat percentages were significantly ($P<0.05$) affected by dietary energy level. The previous carcass traits increased with increasing dietary energy level in Pekin duckling diets. However, no significant effects of dietary energy level on gizzard, carcass and dressing weight percentages of Pekin ducklings were observed. It is worth to note that, liver, heart, carcass and dressing percentages were increased significantly ($P<0.05$) with the increasing the dietary corn gluten feed from 0 to 16%. Increasing the dietary energy level from 2800 to either 3000 or 3200 Kcal ME/Kg diet caused a significant ($P<0.05$) increase in cholesterol blood values. Ducklings fed the diet

contained 3000 Kcal ME/Kg diet and 8% CGF recorded the best EEf as compared with other treatment or control.

From the previous results, it can be concluded that a dietary level of 3000 Kcal ME/Kg diet with 8% CGF is recommended for feeding growing Pekin ducks from 2 to 12 weeks of age.

Keywords: Dietary energy, corn gluten feed, performance, Pekin ducks.

INTRODUCTION

In poultry diets, dietary energy-contributing ingredients' are major cost and optimal energy level is important for lowering feed cost per unit of poultry product. Recently, many studies were conducted to examine the effects of the dietary energy on the growth of broiler chickens. Increasing dietary energy level caused improve feed conversion rate of broilers by reducing feed intake (Dozier *et al.*, 2007 and Ghaffari *et al.*, 2007). However, high dietary energy caused deposition of excess abdominal fat or carcass fat in broilers (Ghaffari *et al.*, 2007) and the abdominal fat was usually considered as a waste product when birds were processed further, which indicated the economic loss for poultry producers.

Yellow corn is one of the richest sources of dietary energy in poultry feeding. According to the published statistics, corn forms the greatest share in Egyptian imported feedstuffs owing to its use in producing certain products for human, animal and poultry intake. Accordingly, there is an urgent need to search for alternative feedstuffs or by-products, which could be used as cheap sources of energy to replace yellow corn grains in the formulated poultry diets.

The production of corn gluten feed (CGF) in Egypt, a co-product of the wet milling industry has been steadily increased during the last years. The incorporation of CGF at 7.5 % in turkey breeder diets improved the productive and reproductive performance (Hillman *et al.*, 1973). El-Deek *et al.* (2009) indicated that CGF could be incorporated successively up to 20% in commercial laying hens diets without adversely affecting productive performance and economical efficiency.

It is well known that ducks are characterized with their high resistant to diseases, high voluntary feed intake and could tolerate high fiber content in their rations.

Therefore, the present study aimed to show some light on the effect of dietary energy and corn gluten feed on the performance of growing while Pekin ducklings, under Egyptian environmental conditions.

MATERIALS AND METHODS

The experimental work of this study was carried out at the Poultry Research Farm, Faculty of Agriculture, Zagazig University, Egypt.

A (3x3) factorial design experiment was performed to study the effect of three levels of energy (2800, 3000 and 3200 Kcal ME/Kg diet) and three levels of corn gluten feed, CGF (0, 8 and 16%) on growth performance and economical efficiency of White Pekin ducklings during the experimental period from 2 to 12 weeks of age.

A total number of 270 unsexed two-week-old White Pekin ducklings were randomly distributed among 9 treatment groups (30 ducklings each) nearly equal in average live body weight. Each group was subdivided into three replicates each of 10 ducklings. Three experimental basal diets were formulated to contain 2800, 3000 and 3200 Kcal ME/Kg diet. Within each dietary energy level, corn gluten feed (CGF) was incorporated at levels 0 (control), 8 and 16% in the starter (from 2 to 7 weeks of age) and finisher (from 7 to 12 weeks of age) mash diets. Composition and calculated analysis of the experimental mash diets are presented in Tables 1 and 2. All experimental diets were isonitrogenous. Ducklings were reared on floor under similar environmental conditions throughout the experimental periods. Feed and water were allowed all the time.

Individual body weights of ducklings were recorded at 2, 7 and 12 weeks of age, and body weight gain was calculated. Feed intake data was recorded weekly on a replicate basis during the experimental periods. Consequently, feed conversion (g feed/g gain) was estimated.

At 12 weeks of age, three birds from each treatment were randomly taken, deprived from feed, but water was allowed, for about 12 hours, weighed, slaughtered to complete bleeding, followed by plucking the feathers then re-weighed. The carcass traits studied were giblets (gizzard, liver and heart) abdominal fat, carcass and dressing weight/100 g body weight. At slaughter time, twenty ml of blood were taken from each slaughtered bird for biochemical charactersting of blood.

Serum was harvested after centrifugation of the clotted blood, stored at -20°C in the deep freezer until the time of chemical determinations. The biochemical characteristics of blood were determined calorimetrically, using commercial kits as described by Emam (2007). Serum total protein and albumin were determined calorimetrically according to Reinhold (1953) and Henry (1974), respectively. Transaminase enzyme activities (AST and ALT) were determined

Table 1: Composition and calculated analysis of the starter diet fed to White Pekin ducklings during the experimental period from 2 to 7 weeks of age.

Items	2800 Kcal/Kg			3000 Kcal/Kg			3200 Kcal/Kg		
	0% CGF ¹	8% CGF	16% CGF	0% CGF	8% CGF	16% CGF	0% CGF	8% CGF	16% CGF
Yellow Corn.	66.50	66.30	64.39	65.20	66.81	59.35	64.10	61.96	53.74
Soybean, 44%.	20.20	19.65	16.33	21.20	19.77	17.32	22.60	20.70	18.20
Corn Gluten Feed, 21%.	0.00	8.00	16.00	0.00	8.00	16.00	0.00	8.00	16.00
Wheat bran.	9.60	0.50	0.00	7.42	0.00	0.00	4.20	0.00	0.70
Cotton seed oil.	0.00	0.00	0.00	2.95	2.18	4.04	5.75	6.10	8.09
Di-calcium phosphate.	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60
DL-Methionine, 99%.	0.03	0.04	0.08	0.03	0.04	0.09	0.03	0.04	0.07
L-Lysine HCL, 98%.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sand.	0.47	2.31	0.00	0.00	0.00	0.00	0.12	0.00	0.00
Salt (NaCl).	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Vit. Min. premix ² .	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
<i>Calculated analysis, ³%:-</i>									
Crude protein.,	16.07	16.06	16.07	16.05	16.08	16.08	16.07	16.08	16.09
ME, Kcal/Kg.	2804	2807	2804	3011	3010	3009	3207	3209	3202
Crude fiber.	3.93	3.53	3.84	3.73	3.49	3.80	3.45	3.45	3.81
Ether extract.	3.07	2.90	2.98	2.94	2.90	2.79	2.78	2.72	2.62
Ash.	2.82	2.24	1.96	2.74	2.22	1.96	2.62	2.21	1.98
Calcium.	0.66	0.67	0.70	0.66	0.67	0.70	0.66	0.68	0.70
Available phosphorus.	0.61	0.59	0.58	0.61	0.59	0.58	0.61	0.59	0.58
Lysine.	0.77	0.74	0.69	0.77	0.74	0.71	0.79	0.76	0.72
Methionine.	0.30	0.28	0.30	0.30	0.28	0.30	0.30	0.28	0.28
Met+Cys.	0.59	0.54	0.52	0.59	0.54	0.53	0.58	0.53	0.50
Price / Ton diet (LE)	1686.20	1699.35	1725.27	1768.88	1780.43	1816.83	1846.95	1867.20	1899.60

¹ CGF= Corn gluten feed² Vitamin and mineral premix at 0.3% of the diet supplies the following per kg of the diet: Vit A 12000IU, Vit D₃ 2000 IU, Vit. E 40 mg, Vit K₃ 4 mg, Vit B₁ 3 mg, Vit B₂ 6 mg, Vit B₆ 4 mg, Vit B₁₂ 0.3 mg, Niacin 30 mg, Panthothenic acid 12 mg, Folic acid 1.5 mg, Biotin 0.08 mg, Choline chloride 50% 700 mg, Mn 100 mg, Cu 10 mg, Fe 40 mg, Zn 70 mg, Se 0.3 mg, I 1.5 mg, Co 0.25 mg, CaCO₃ added at 3000 g.³ Calculated according to **NRC (1994)**.

Table 2: Composition and calculated analysis of the finisher diet fed to White Pekin ducklings during the experimental from 7 to 12 weeks of age.

Items	2800 Kcal/Kg			3000 Kcal/Kg			3200 Kcal/Kg		
	0% CGF ¹	8% CGF	16% CGF	0% CGF	8% CGF	16% CGF	0% CGF	8% CGF	16% CGF
Yellow corn.	68.80	68.02	66.40	67.20	71.00	63.75	65.40	66.10	58.80
Soybean,44 %.	17.10	15.90	13.50	18.10	16.40	13.90	19.20	17.45	14.90
CGF	0.00	8.00	16.00	0.00	8.00	16.00	0.00	8.00	16.00
Wheat bran.	10.60	3.20	0.00	8.55	0.00	0.00	6.47	0.00	0.00
Cotton seed oil.	0.00	0.00	0.00	3.00	1.41	3.10	5.80	5.28	7.09
Di-calcium phosphate.	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
DL-Methioni 99%.	0.02	0.05	0.08	0.04	0.05	0.08	0.03	0.05	0.08
L-Lysine HCL, 98%.	0.00	0.03	0.06	0.01	0.04	0.07	0.00	0.02	0.03
Sand.	0.38	1.70	0.86	0.00	0.00	0.00	0.00	0.00	0.00
Salt (NaCl).	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Vit. Min. premix ² .	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
<i>Calculated analysis,³%:-</i>									
CP	15.05	15.03	15.06	15.05	15.01	15.02	15.04	15.03	15.00
ME,Kcal/Kg.	2825	2818	2811	3029	3011	3001	3209	3206	3203
CF	3.88	3.60	3.69	3.69	3.35	3.66	3.49	3.32	3.62
EE.	3.18	3.04	3.03	3.04	3.03	2.93	2.90	2.85	2.75
Ash.	2.71	2.18	1.81	2.63	2.06	1.80	2.55	2.06	1.79
Calcium.	0.63	0.65	0.67	0.63	0.64	0.67	0.63	0.65	0.67
Available P	0.59	0.57	0.56	0.59	0.57	0.56	0.58	0.57	0.55
Lysine.	0.69	0.69	0.68	0.71	0.70	0.70	0.72	0.70	0.67
Methionine.	0.28	0.28	0.28	0.29	0.28	0.28	0.28	0.28	0.28
Met+Cys.	0.56	0.52	0.49	0.57	0.52	0.49	0.56	0.51	0.48
Price / Ton diet (LE)	1654.80	1673.20	1698.50	1742.23	1744.45	1778.85	1811.71	1827.60	1860.25

¹ CGF= Corn gluten feed² Vitamin and mineral premix at 0.3% of the diet supplies the following per kg of the diet: Vit A 12000IU, Vit D₃ 2000 IU, Vit. E 40 mg, Vit K₃ 4 mg, Vit B₁ 3 mg, Vit B₂ 6 mg, Vit B₆ 4 mg, Vit B₁₂ 0.3 mg, Niacin 30 mg, Panthothenic acid 12 mg, Folic acid 1.5 mg, Biotin 0.08 mg, Choline chloride 50% 700 mg, Mn 100 mg, Cu 10 mg, Fe 40 mg, Zn 70 mg, Se 0.3 mg, I 1.5 mg, Co 0.25 mg, CaCO₃ added at 3000 g.³ Calculated according to **NRC (1994)**.

CGF: Corn Gluten Feed, 21%.

calorimetrically using available commercial kits produced by Bio-Meraux, France. The globulin values were obtained by subtracting the values of albumin from the corresponding values of total protein (Coles, 1974).

The economical efficiency (EEf) of experimental diets was estimated depending upon feeding cost and price of body weight during the experimental periods.

Data were statistically analyzed according to ANOVA procedures of SAS (SAS Institute, 1999). Means differences were compared using Duncan's multiple range test (Duncan, 1955).

RESULTS AND DISCUSSION

Growth Performance:

The main effects of energy and corn gluten feed levels on growth performance of White Pekin ducklings during the different experimental periods from 2-12 weeks of age are presented in Tables 3 and 4.

Live body weight and weight gain:

Effect of energy level:

At 7 and 12 weeks of age, the different energy levels studied showed significant effect ($P < 0.05$ or $P < 0.01$) on live body weight of ducklings. Ducklings received 3000 Kcal ME/Kg diet had higher ($P < 0.05$) body weights when compared with those received either 2800 or 3200 Kcal ME/Kg diet (Table 3).

The average weight gain of ducklings followed nearly the same trend observed with live body weight. Weight gain of ducklings was significantly ($P < 0.05$) higher with the 3000 Kcal ME / Kg diet energy level as compared to 2800 and 3200 Kcal ME/Kg diet levels during 2 to 7 weeks of age (starter period), while it was significant ($P < 0.05$) when compared with the 3200 Kcal ME/Kg diet energy level during 2 to 12 weeks of age (whole experimental period).

Effect of corn gluten feed:

The data showed that the ducklings fed the level of 8% corn gluten feed possessed significantly ($P < 0.05$) higher live body weight than those fed either 0 or 16% CGF at 7 weeks of age, and only significant for those fed 8% CGF compared with those fed 16% CGF at 12 weeks of age. Similar results were

observed for weight gain, during 2 to 7 and 2 to 12 weeks of age. However, weight gain was not significantly affected by dietary CGF% during 7 to 12 weeks of age (Table 3).

Feed intake and feed conversion

Effect of energy level:

Results of the present study showed that feed intake significantly ($P<0.05$) decreased as dietary energy level increased from 2800 to either 3000 or 3200 Kcal ME/Kg diet during the all experimental periods (Table 4). The low energy feed was responsible for any increase in feed intake during the starter and finisher periods. This may be explained on the basis that ducklings required more dietary energy values covered by increasing feed intake to certain extent.

Data in Table 4 showed that feed conversion values were improved ($P<0.05$) with increasing the dietary energy level from 2800 to either 3000 or 3200 Kcal ME/Kg diet during the starter (2 to 7 weeks age) and the whole experimental (2 to 12 weeks age) periods. While, energy level had no significant effect on feed conversion ratio during the finisher period (7 to 12 week age). Improvement in feed conversion ratio of ducklings appears to be due to higher growth rate caused by the 3000 Kcal ME/Kg diet energy level.

Effect of corn gluten feed:

Dietary CGF at different levels had no significant effect on feed intake of ducklings, during all the experimental periods (Table 4).

Results of feed conversion ratio showed no significant differences among various treatments due to CGF level effects during 2 to 7 and 7 to 12 weeks of age, while it was significantly ($P<0.05$) affected during 2 to 12 weeks of age (Table 4). The best feed conversion value was recorded with ducklings fed CGF at the level of 8%, which may be due to the higher growth rate at this level, while the poorest value was observed for those fed the diet with 16% CGF.

Interaction effects:

The interaction effects between dietary energy and CGF levels on all growth performance traits studied were significant ($P<0.05$ or $P<0.01$), except for weight gain and feed conversion during 7 to 12 weeks of age (Tables 3 and 4). When taking live body weight and body weight gain into consideration, it could be concluded that the level of 3000 Kcal ME/Kg diet with 8% CGF would be reasonable for feeding White Pekin ducklings from 2 to 12 weeks of age.

Results of growth performance are in agreement with those obtained by Fan *et al.* (2008) who recorded that, as dietary energy increased from 2600 to 3100 Kcal of ME/Kg diet, the weight gain of ducks significantly increased, while the feed intake and feed/gain ratio significantly decreased and similar supporting results using broilers were reported by Dozier *et al.* (2007) and Ghaffari *et al.* (2007).

The present results of growth performance as affected by dietary CGF level are in agreement with those reported by Hillman *et al.* (1973) they found that, the performance of breeder turkeys was improved when CGF was included at 7.5% of the diet. Whereas, Salama (2002) concluded that the performance of broiler chicks was not significantly affected when CGF was incorporated up to 6% in the diets. Owings *et al.*, (1988) reported that CGF can be included, on a nutritional basis, up to 10% of the diet without negatively influencing growth performance of turkey.

Some carcass traits:

Effect of energy level:

Data in Table 5 showed that liver, heart, giblets and abdominal fat percentages of White Pekin ducklings at 12 weeks of age were significantly ($P < 0.05$) affected by dietary energy level. The previous carcass traits increased with increasing dietary energy level. However, no significant effects of dietary energy level on gizzard, carcass and dressing weight percentages of Pekin ducklings were observed. Similar results were obtained by Fan *et al.* (2008) who found that high dietary energy had no significant effect on breast and leg meat, but abdominal fat increased ($P < 0.05$) when dietary ME was above 2700 Kcal /Kg diet in White Pekin ducklings. Also, some researchers observed no significant effects of high energy diets on breast meat yield of broilers (Yalcin *et al.*, 1998 and Dozier *et al.*, 2006), but increasing dietary energy might cause deposition of excess abdominal or carcass fat in broiler (Summers *et al.*, 1992, Leeson *et al.*, 1996 and Ghaffari *et al.*, 2007). The increase in abdominal fat percentages with increasing dietary energy level may be due to the use of iso-protein diets in the present study which may increase the dietary ME/CP ratio and this change may caused excess abdominal fat in ducks. The previous explanation is supported by results of Scott *et al.* (1959). Furthermore, more fat deposition caused by high-energy diets may be due to higher efficiency of energy retention at this instance, similar results in broilers were reported by Jackson *et al.* (1982) and Furuse *et al.* (1985). Moreover, Boekholt *et al.* (1994) found that the efficiency of energy retention

was higher in fat than in protein when high energy diets were consumed by broilers.

Effect of corn gluten feed:

Results presented in Table 5 showed that liver, heart, carcass and dressing percentages were significantly ($P<0.05$) affected when CGF was incorporated in the diets of Pekin ducklings. However, gizzard, giblets and abdominal fat did not show any significant effect due to incorporation of CGF in the diets. It is worth to note that, liver, heart, carcass and dressing percentages were significantly ($P<0.05$) increased by the increasing dietary CGF from 0 to 16%. In this respect, Salama, (2002) found that carcass, dressing, giblets and abdominal fat was not significantly affected when CGF was incorporated in broilers diet up to 6%. Owings *et al.* (1988) reported that dietary levels of CGF, whether fed from day-old or at 9 weeks of age did not significantly affected yield of carcass parts or composition of turkeys. The same authors demonstrated that CGF can be successfully used on a nutritional basis to constitute up to 10% in growing turkey diet without negative effects on growth performance and carcass aspects.

Interaction effects:

Interaction between dietary energy levels and CGF levels were significant ($P<0.05$) on liver, heart and giblets percentages. The highest values of these parts were observed for ducklings given 3200 Kcal ME/Kg diet without CGF in the diet and the lowest values of forementioned traits were obtained for ducklings given 2800 Kcal ME/Kg diet with 16% CGF (Table 5).

Some blood serum constituents:

Effect of energy level:

Results in Table 6 showed that the dietary energy level had significant ($P<0.05$) effect on cholesterol, AST and total protein of blood serum of White Pekin ducklings at 12 weeks of age. The increase in dietary energy level in ducklings diet was accompanied with an increase in both AST and total protein values which indicated an increase in liver function and confirmed that there was a damage in hepatic cells due to high energy levels. Similar results with broilers were obtained by Shehata (1995) and El-Hindawy *et al.* (1998).

Moreover, data in Table 6 indicated that increasing the dietary energy level from 2800 to either 3000 or 3200 Kcal ME/Kg diet caused a significant ($P<0.05$) increase in cholesterol values. Also, values of triglycerides increased with increasing dietary energy level, but the differences due to energy level effect in

duckling diets were not significant. Nearly results were obtained by Shehata (1995) and El-Hindawy *et al.* (1997) with broiler chicks. They found that chicks fed high dietary energy level caused a significant increase in total lipids.

Effect of corn gluten feed:

Results of blood serum constituents studied of ducklings fed CGF at 12 weeks of age are presented in Table 6. The components of blood serum indicated that serum AST was significantly ($P<0.05$) increased and total protein decreased with increasing CGF levels up to 16%. Whereas, ALT, albumin and globulin contents were not significantly affected by CGF level in duckling diets.

It is worth to note that cholesterol content was significantly ($P<0.05$) decreased with increasing the dietary CGF levels. This may be due to that CGF contains cholesterol suppressive agents and that the mechanism of their hypocholesterolemic action is at the level of suppression of cholesterol biosynthesis. Also, increasing the dietary CGF level from 0 to either 8 or 16% caused a significant ($P<0.05$) decrease in triglycerides contents (Table 6).

Interaction effects:

The interaction effects due to dietary energy and CGF levels were significant ($P<0.05$) on all serum blood constituents studied (triglycerides, cholesterol, AST, ALT, total protein, albumin and globulin), except albumin content (Table 6).

Economical efficiency:

Data presented in Table 7 showed that ducklings fed the diet contained 3000 Kcal ME/Kg diet recorded the best economical efficiency (EEf) value as compared with other energy levels.

It is clear that duckling fed on the diet contained 8% CGF had better EEf value as compared with the other treatment or the control (Table 7).

The best results of EEf values were recorded by ducklings fed 3000 Kcal ME/Kg diet with 8% CGF up to 12 weeks of age.

Conclusively, from the nutritional and economical point of view it can be concluded that a dietary level of 3000 Kcal ME/Kg with 8% CGF is recommended for feeding of growing White Pekin ducklings from 2-12 weeks of age, under Egyptian environmental conditions.

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تأثير طاقة الغذاء والجلوتوفيد علي أداء البط البكيني الأبيض النامي.

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صممت تجربة عامليه 3×3 لدارسة تأثير ثلاث مستويات من الطاقة (٢٨٠٠ ، ٣٠٠٠ ، ٣٢٠٠ كيلو كالورى طاقة ممثلة /كجم علف) وثلاث مستويات من الجلوتوفيد (علف جلوتين الذرة) صفر و ٨ و ١٦ % على نمو البط البكيني الأبيض عند عمر ٢ حتى عمر ١٢ أسبوع. أستخدم عدد ٢٧٠ بطة غير مجنسة عند عمر ٢ أسبوع قسمت عشوائيا إلى ٩ مجموعات (٣٠ طائر في كل مجموعة) متساوية تقريبا في الوزن. وقسمت كل مجموعة إلى ثلاث مكررات في كل منها ١٠ طيور. تم دراسة معدل النمو وبعض صفات كل من الذبيحة والدم وكذلك الكفاءة الاقتصادية. وأوضحت النتائج ما يلي:

زاد متوسط وزن الجسم وكذلك والزيادة في وزن الجسم معنويا ($P < 0.05$) مع العلاقة المحتوية علي مستوي الطاقة ٣٠٠٠ كيلو كالورى طاقة ممثلة/ كجم علف. كذلك تحسنت قيم معدل التحويل الغذائي مع مستوي الطاقة ٣٠٠٠ كيلو كالورى/ كجم علف وذلك أثناء فترة البدء (من ٢ إلى ٧ أسابيع من العمر) وطول فترة التجربة (من ٢ إلى ١٢ أسبوع من العمر). زاد متوسط وزن الجسم في الطيور التي غذيت علي مستوي ٨% جلوتوفيد معنويا ($P < 0.05$) عند عمر ٧ و ١٢ أسبوع مقارنة مع المستويات الأخرى. سجلت أحسن قيم لمعدل التحويل الغذائي عند مستوي ٨% جلوتوفيد. تأثرت النسبة المئوية لكل من وزن الكبد والقلب ومجموع الأعضاء المأكولة ودهن البطن معنويا بمستوي الطاقة في العلاقة وقد زادت كل القيم السابقة بزيادة مستوي الطاقة في العلف. بينما لم يكن هناك تأثير معنوي لمستويات الطاقة علي النسبة المئوية لوزن كل من القونصة و الذبيحة والتصافي كذلك نسبة الكبد والقلب والذبيحة زادت معنويا ($P < 0.05$) مع زيادة نسبة الجلوتوفيد من صفر إلى ١٦% في العلف. الطيور التي غذيت علي المستوي المرتفع من الطاقة زادت معنويا ($P < 0.05$) في قيم الكوليسترول في الدم. أحسن كفاءة اقتصادية كانت للطيور التي غذيت علي مستوي ٨% جلوتوفيد بالمقارنة مع باقي المعاملات.

الخلاصة: يمكن التوصية بالتغذية علي مستوي الطاقة ٣٠٠٠ كيلو كالورى/ كجم علف مع ٨% جلوتوفيد للبط البكيني الأبيض في الفترة من ٢ إلى ١٢ أسبوع من العمر.