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IMPACT OF THREONINE SUPPLEMENTATION ON GROWING JAPANESE QUAIL PERFORMANCE.

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ABSTRACT:

This study was carried out to investigate the impacts of threonine(Thr) supplementation on growing Japanese quail performance. A total number of the experimental birds was 405 at 7 days of age. Japanese quails were divided into nine treatment groups (45 birds in each). Each treatment group contained three replicates (15 birds in each). Threonine supplementation levels to basal diet were (0.0, 0.05, 0.10, 0.15, 0.20, 0.25, 0.30, 0.35 and 0.40% to form 9 experimental diet groups. ***The results showed that***

1- Growth performance: No significant difference among dietary treatments in LBW and LBWG values during all periods (7-21, 22-42 and 7-42 days of age), FI during the period from 7-42 days of age and FC during the periods (21-42 and 7-42 days of age) were observed. Significant effects on FI during the periods (7-21 and 21-42 days of age) and FC during the period from 7-21 days of age were observed. Quails fed (basal diet +0.20% threonine supplementation (diet 5) had better FC value during the period from 7-42 days of age.

2- Slaughter parameters: Feeding different levels of threonine supplementation insignificantly affected slaughter parameters of Japanese quails, expect, breast perimenter length (cm). Quails fed basal diet + 0.40% threonine supplementation (diet 9) had higher breast perimenter length (cm).

3- Economical efficiency: Quails fed basal diet + 0.05% threonine supplementation (diet 2) gave the best economical and relative efficiency values being 2.779 and 111.56 %, respectively followed by quails fed basal diet + 0.2% threonine supplementation (diet 5) (2.776 and 111.44% respectively) when compared with control diet or other dietary treatments.

4- Chemical analysis (moisture, Cp and amino acids)% of breast Japanese quail meat: It shows no significant effect on moisture, protein and amino acids % of quails meats. However, 0.20, 0.30 and 0.40% supplemented Thr showed the highest protein % (as dry matter) were 82.55, 81.95 and 80.10 % Also, moisture % decreased as dietary threonine increased up to 0.35% Thr supplemented. Overall, as

dietary threonine supplementation breast meat of Japanese quails content of Thr increase with no significant differences.

5- *It can be concluded that breast perimenter length gets better as dietary threonine supplementation increase, also, supplementation of 0.05% threonine improved economic efficiency percentages and gave the net profit.*

Keywords: Corn-soybean , threonine levels, carcass, economical parameters, Japanese quails

INTRODUCTION

Quail is the smallest avian species raised for meat and egg production (Panda and Singh, 1990) and as a laboratory animals (Baymgartner, 1990). Threonine may be the third limiting amino acid after methionine and lysine in diets, composed primarily of ground yellow corn and soybean meal, for broiler chickens (Han *et al*., 1992; Frenandez *et al*., 1994 and Kidd *et al.,*1997). Threonine and tryptophan are the third or fourth limiting amino acids, after methionine and lysine, in most diets composed of corn and soybean or peanut meal for broiler chickens (Rogers and Pesti, 1990; Dozier *et al*., 2000 and Rosa *et al*., 2001 a & b), but there is very little information on the threonine requirements of quails. The NRC (1994) recommendation for threonine is 1.02% of diet for Japanese quails during the starting and growing periods. Davis and Austic (1982) reported that the addition of threonine increased growth and feed efficiency in 8 to 21 day old chicks. Ferguson *et al.* (2000) reported that, growth rate increased and feed intake decreased as dietary levels of threonine increased. On the other hand, UZU (1986) found that, additional threonine supplementation produced no further improvements in gain or feed conversion.

In practice, standards of threonine and other amino acids requirements are usually given for optimum performance in different feeding phases. Less information is available on the threonine requirements, carcass and chemical composition of Japanese quail meat (Webel *et al*., 1996).

Although, many studies are available on broilers and chickens, little on growing Japanese quail is available concerning this amino acid on breast meat and growth performance.

Thus, the objectives of this work were to study the effect of dietary threonine levels on the growth performance traits of Japanese quails, as well as, economic efficiency, under environmental Egyptian condition.

MATERIALS AND METHODS

The present experiment was carried out at Inshas Poultry Research Station and Poultry Nutrition Department, Animal Production Research Institute, Agriculture Research Center, Ministry of Agriculture, Egypt during the year 2008. A total number of 405 unsexed 7 days old Japanese quails were distributed into 9 treatments of 45 birds each in three replicates (15 birds each). Diets were formulated to be iso-nitrogenous and iso-caloric containing 24% CP corn-soyabean diet and 2905 kcal ME/kg diet during the growing period (Table 1).

The experimental treatments were as follows:-

Treat.$_1$ Birds were fed the basal diet (without threonine supplementation), which contain 0.94% threonine (diet $_1$).
Treat.$_2$ basal diet + 0.05% threonine (diet $_2$).
Treat$_3$ basal diet + 0.1% threonine (diet $_3$).
Treat. $_4$ basal diet + 0.15% threonine (diet $_4$).
Treat. $_5$ basal diet + 0.2% threonine (diet $_5$).
Treat. $_6$ basal diet + 0.25% threonine (diet $_6$).
Treat.$_7$ basal diet + 0.30% threonine (diet $_7$).
Treat. $_8$ basal diet + 0.35% threonine (diet $_8$).
Treat. $_9$ basal diet + 0.40 % threonine (diet $_9$).

The experimental diets were supplemented with minerals and vitamins mixture to cover the recommended requirements according to NRC, 1994. Threonine used in present study was obtained from Degussa company, Germany. Quails were individually weighed to the nearest gram at (7, 21 and 42 days of age). Birds were raised in electrically heated batteries with raised wire mesh floors and had a free access to feed and water. The birds were reared under similar environmental conditions and were fed the experimental diets from 7 days until 42 days of age. At the same time live body weight and feed consumption were recorded and feed conversion (g feed /g gain) and body weight gain were calculated. At the end of the growing period (42 days of age), slaughter tests were performed (3 males and 3 females) birds of each treatment. Birds were individually weighted to the nearest gram and slaughtered by severing the jugular vein. Feather weight was calculated. Carcass, dressing, whole front, whole rear and giblets (empty gizzard, liver and heart) were weighed and their percentages to live body weight were calculated. Breast thickness, perimeter and keel length (cm) were calculated. Breast meat samples were secured at 42 days of age from one bird per treatment chosen randomly to determine amino acids, protein and moisture according to A. O. A. C. methods (2005).

Table 1: Composition and analyses of the basal experimental diet.

Items	**%**
Yellow corn	61.15
Soybean weal (44% cp)	31.75
Corn gluten	8.50
Sodium chloride	0.30
Di calcium phosphat	1.80
Limestone	1.20
Vitamin and Minerals premix*	0.30
Total	**100.00**
Calculated analysis:**	
Crude protein %	24.06
ME Kcal /kg feed	2909
Methionine + cystine %	0.88
Lysine %	1.14
Methionine %	0.48
Threonine %	0.94
Av. Phosphor %	0.49
Calcium %	0.99

*Supplied per kg of diet: vit A, 12000 IU, Vit. D3 2200 IU; Vit. E, 10 mg: Vit. K, 2mg; Vit B_1, 1mg: Vit. B_2, 3 mg; Vit. B_6, 1.5 mg; Vit. B_{12}, 10mg; Nicotinic acid, 30 mg; Folic acid, 1 mg; Pantothenic acid, 10 mg; Biotin, 50mg; Choline chloride, 250 mg; Copper, 10 mg; Iron, 30 mg; Manganese, 60 mg; Zinc, 50mg; Iodine, 1 mg, Selenium, 0.1 mg Coblat, 0.1 mg.
**According to NRC (1994)

Economical efficiency for meat production, the amount of feed consumed during the entire experimental periods was obtained and multiplied by the price of one kg of each experimental diet which was estimated based upon local current prices at the experimental time.

Data were analyzed according to statistical analysis system user's Guide (SAS 1996). Separation among means was carried out using Duncan's multiple range test (Duncan, 1955).

RESULTS AND DISCUSSION

Live body weight (LBW) and live body weight gain (LBWG):

Results presented in Table 2 reveled no significant difference among dietary treatments in LBW and LBWG values during the periods (7-21 days), (22-42 days) and (7-2 days) post hatch were observed. On the other hand, lower LBW and LBWG values were recorded with the quails fed control diet at the end of the growing period (42 days of age). However quails fed basal diet + 0.4 (%) threonine (9 th diet) (Maximum addition of THR in the experiment) had high LBW and LBWG values at 42 days of age (end of the experiment). These results are agreement with those obtained by Ojano *et al.* (2002) who reported that, threonine levels (0.78 and 0.87, %) had no significant effect on body weight and gain for male broilers at 3-6 week old. Morales *et al.* (1994) found that addition 0.03 or 0.06 (%) threonine to diets containing at least 0.78 or 0.79 (%) total threonine did not improve performance of broiler chickens from 0 to 4 weeks old. Kidd *et al.* (1996) found that threonine supplementation did not show any significant linear or quadratic responses with respect to body weight from 1 to 56 days of age for broiler chickens. Trindade *et al*. (1999) reported that threonine levels had no effect on performance for broilers from 22 to 42 days of age. Smith and Waldroup (1988) reported that, weight gain was not improved further by additional dietary threonine of male broiler chickens from 7-20 days of age.

Feed intake (FI) and feed conversion (FC):

The data of Table 2 indicated that feeding different levels of threonine supplementation significantly ($P \leq 0.05$) affected FI during the period from 7-21 days of age. Quails fed basal diet + 0.05 (%) threonine (diet 2) had lower FI during the period from 7-21 days of age. However, results in Table 3 indicated that feeding different levels of threonine supplementation insignificantly affected FI during the period from 22 - 42 or 7-42 days of age and FC during the periods from 7-21, 22-42 or 7-42 days of age. Quails fed control diet + 0.15 (%) thronine (4 th diet) had lower FI (11.98 g feed per day) value, while, quails fed 0.20 (%) threonine (5 th diet) had better FC (2.94 feed / g gain) values, respectively during the periods from 7-42 days of age. These results may be due to the high LBW and LBWG values, which were recorded for this group, during the same period. These results agree with the findings of Nadeem *et al*. (2004) found that supplementation of L-threonine to the basal diet improved feed consumption in both starting and growing birds. A significant increase in feed gain ratios in the starting phase was also observed. Holsheimer *et al.*(1994) reported that, improvements in feed / gain ratio were obtained when dietary threonine content was increased to 7.25 g/kg for male broiler chickens from 7-21 days of age. Kidd *et al.* (2001) reported that increasing

dietary threonine from 6.0 to 7.0 g/ kg diet improved feed intake for broiler chicks from 5 to 15 days of age. Ciftci and Ceylan (2004) reported that increasing threonine supplementation improved feed intake of the periods from 0-3 and 3-6 weeks of age for broiler chickens.

While, these results disagree with those obtained by Kidd *et al*. (2001) who found that, increasing dietary threonine from 6.0 to 7.0 g/kg diet improved body weight gain during the period from 5 to 15 days of age for broiler chicks. Dozier *et al.* (2000) reported that increasing threonine from 0.56 to 0.74 (%) improved growth rate during 42 to 56 days of age in male broilers.

Slaughter parameters:

Percentage of carcass, dressing, whole front, whole rear, giblets and feather of live body weight were not significantly affected by different experimental diets (Table 3). The highest carcass, dressing whole front and whole rear% were observed from quails fed the basal diet + 0.10% threonine supplementation (diet 3).These results are generally in agreement with those reported by kidd *et al*. (1996) who found that, no significant differences were observed in 42 day carcass characteristics for methionine supplementation of broiler chickens. Trindade *et al.* (1999) reported that, threonine levels had no effect on carcass traits Dozier *et al*. (2000) found that, increasing dietary threonine did not alter carcass yield of broiler chickens Dozier *et al*. (2001) reported that, dietary threonine concentration did not influence chilled carcass yield. Kidd *et al.* (2003) found that threonine had minmal effects on carcass attributes.

Breast diameter:

The breast diameter of different experimental treatments are listed in Table 3. Breast thickness (cm) and keel length (cm) were not significantly affected by different dietary treatments. However quail fed 0.10(%) threonine diets had significantly ($P \leq 0.05$) higher of breast perimeter (cm) compared to those fed other diets.

Generally, the highest breast thichness, perimeter and keel length (cm) values were observed for quails fed the basal diet + 0.40 (%) threonine supplementation (9^{th} diet)These results are in agreement with those reported by Ciftci and Ceylan (2004) who found that, incremental increases in dietary threonine increased breast yield of broiler chickens. Corzo *et at*. (2003) reported that, breast meat improved in a linear manner with increasing dietary threonine of female broilers.

Chemical analysis of breast Japanese quail meat: (Moisture, crude protein and amino acids):

Results in Table 4 show the chemical analysis of breast Japanese quail meat as affected by threonine supplementation levels: As dietary Thr supplemented level increased moisture (%) decreased up to 0.35(%) supplemented Thr also, meat chemical composition of Thr increased. However, 0.20, 0.30 and 0.40 (%) Thr supplemented treatments showed the highest protein percentage (as dry matter) were 82.55, 81.95 and 80.10 (%). These findings are in a good agreements with those obtained by Corzo *et al*. (2003) who investigated that carcass, as well as, breast meat improved in linear manner with increasing dietary Thr. On other hand, Ojano and Waldroup (2002) reported that there was a significant interaction of Lysine and threonine on breast yield. Also, Kidd *et al*. (1997) reported that lysine and threonine interact to increase live weight gain and breast fillet yields. Bae *et al*. (1999) reported that threonine content of chick muscle was 4.02%. Thr. addition did not influence carcass composition (Reginatto *et al*., 2000).

Economic efficiency:

Results in Table 5 show the EEF value, during the period from 7-42 days of age. Quails fed basal diet + 0.05 (%) threonine (2^{nd} diet) had the best economical and relative efficiency values being 2.779 and 111.56 (%), respectively when compared with the other treatments.

Conclusively, from these results it could be concluded that threonine supplementation at level 0.05 (%) improved growth performance traits, net revenue economic efficiency and relative economic efficiency.

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تأثير إضافة الثريونين للعليقة على أداء السمان الياباني

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تهدف الدراسة إلى دراسة تأثير إضافة الثريونين على أداء السمان الياباني. في هذا البحث استخدام عدد ٤٠٥ كتكوت سمان عمر ٧ أيام قسمت إلى ٩ معاملات (٤٥ طائر/ معاملة) وبكل معاملة ثلاث مكررات (١٥ طائر/ مكررة) وذلك بإضافة الثريونين بمعدل (صفر، ٠.٠٥، ٠.١٠، ٠.١٥، ٠.٢٠، ٠.٢٥، ٠.٣٠، ٠.٣٥، ٠.٤٠%) إلى العليقة، وكانت هناك ٩ معاملات وعلائق تجريبية:

وتتلخص النتائج المتحصل عليهما فيما يلي:

١- لم يكن هناك أي تأثير معنوي بين المعاملات بالنسبة لوزن الجسم الحي ومعدل الزيادة في وزن الجسم خلال كل الفترات (من ٧-٢١ يوم و من ٢٢ – ٤٢ يوم ومن ٧- ٤٢ يوم) وكذلك الغذاء المأكول خلال الفترة من ٧-٤٢ يوم وأيضاً معدل تحويل الغذاء خلال الفترتين من ٢١-٤٢ يوم ومن ٧-٤٢ يوم. بينما كان هناك تأثير معنوي إستهلاك الغذاء خلال الفترتين من ٧-٢١ يوم و ٢١-٤٢ يوم وأيضا معامل تحويل الغذاء في الفترة من ٧-٢١ يوم. أظهر السمان المغذي على العليقة الأساسية مضاف إليها ٠.٢% ثريونين (عليقة ٥) أحسن قيمة لمعدل تحويل الغذاء خلال الفترة من ٧-٤٢ يوم.

٢- لم يكن هناك أي تأثير معنوي بين المعاملات على صفات الذبيحة بالنسبة للسمان الياباني المغذي على مستويات مختلفة من الثريونين ما عدا محيط الصدر حيث كان هناك تأثيراً معنوياً وكانت أكبر محيط للصدر للمعاملة التي تغذت على العليقة الكنترول مضاف إليها ٠.٤٠% ثريونين (عليقة ٩)

٣- أعطي السمان المغذي على عليقة الكنترول + ٠.٠٥% (عليقة ٢) إضافة الثريونين أحسن قيم للكفاءة الاقتصادية والنسبية (٢.٧٧٩ و ١١١.٥٦% على التوالي) تلاها السمان المغذي على عليقة الكنترول+ ٠.٢٠% ثريونين مضاف (عليقة ٥) (٢.٧٧٦ و ١١١.٤٤%) عند مقارنتها مع العليقة الأساسية (الكنترول) وباقي المعاملات الغذائية.

٤- نستنتج من هذه النتائج أن إضافة ٠.٠٥% ثريونين إلى العليقة الأساسية للسمان (الكنترول) أدي إلى تحسين معدل اداء النمو، و الكفاءة الاقتصادية وأعطي أفضل ربح.