



FACULTY OF AGRICULTURE

*Minia J. of Agric. Res. & Develop.*  
*Vol. (38), No. 1, pp. 115-127, 2018*

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## **EFFECT OF USING DIETARY NATURAL FEED ADDITIVES ON SOME PRODUCTIVE PERFORMANCE OF GROWING JAPANESE QUAIL**

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Received: 20 March (2018)

Accepted: 22 April (2018)

### **ABSTRACT:**

This study was carried out to study the effect of adding some natural feed additives such as, onion, garlic, red pepper and anise at the level of 0.5% from each into growing Japanese quail diet on some growth performance and carcass traits. A total number of 300 quail chicks two weeks old were randomly divided into 5 treatments groups (60 chicks each). Each group was subdivided into 3 replicates 20 chicks each. The experimental treatments started from 2 weeks old until 6 weeks of age. Diets and water were supplied *ad-libitum*. Live body weight and feed intake were weekly recorded during the experimental period. Feed conversion ratio for each replicate was calculated. At the end of the experiment 6 weeks of age, 3 birds from each treatment were selected, weighted and to determine some carcass traits. Obtained results declared that, at the end of the experiment (6 weeks of age), there was a slight improvement ( $P \geq 0.05$ ) in body weight and body weight gain for birds fed dietary onion followed by quails fed dietary red pepper compared with other dietary treatments. No significant effect was detected on feed intake. The best ( $P > 0.05$ ) feed conversion ratio during the period from were 2-4 weeks were recorded for birds fed on dietary garlic followed by birds fed on dietary onion or control diet. The greatest numerically insignificant ( $p > 0.05$ ) giblets proportions was recorded for birds fed dietary onion followed by those fed on garlic diet compared with other dietary groups. the best insignificant ( $p > 0.05$ ) dressing% was recorded for birds fed dietary anise followed by those fed on dietary onion compared with other dietary groups. No significant effect was noticed on mortality rate.

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**Keywords:** herbal feed additives, productive response, Japanese quail

## INTRODUCTION

The use of antibiotic growth promotants (AGP) to improve animal performance has been practiced during the last 50 years. However, when animals are exposed to low levels of antibiotics, resistant cells survive and grow producing antibiotic-resistant populations. Consequently, the use of AGP in animals food has been banned in the European Union (1998) and many other countries. In this context, alternatives to AGP are of importance. Most supplements which are used as alternatives to AGP have effects on gut Microflora, either directly or indirectly (Garcia et al., 2007).

Feed additives has an effective compounds in their tissues including phenols and polyphenols, terpenoids and essential oils, alkaloids, lectins and polypeptides and other compounds that applied antibacterial and immune stimulation effects (Giannenas et al., 2003), digestive process stimulation (Cross et al., 2007), reducing levels of blood fat and cholesterol (Chowdhury et al., 2002;), antioxidant property (Faix et al., 2009) and finally the growth stimulator (Ciftci et al., 2005). For examples of the feed additives are onion, garlic, red pepper and anise. Onion (*Allium cepa*), has the properties of strengthening the immune system. Previous studies suggested that the biological properties of onion are widely related to sulfur containing compounds (Kurita et al., 1979).

Moreover, garlic has several beneficial effects on both humans and animal having antimicrobial, antioxidant properties (Konjufca et al., 1997); antiviral (Weber et al., 1992) and antifungal (Ankri and Mirelman, 1999). Garlic (*Allium sativum*) has been recognized for its strong stimulating effect on the immune system and very rich aromatic oils enhance digestion in birds (Gardzielewska et al., 2003). Also, antimicrobial peptides from red pepper (*Capsicum annum*. L), are very efficient in inhibiting growth in human and plant pathogenic bacteria and fungi (Alaa, 2010). Hence, anise (*Pimpinella anisum*) has been used over the years for its antioxidant (Gulcin et al., 2003), antimicrobial (Al-Kassie, 2008), antibacterial (Tabanca et al., 2003) and antifungal (Soliman and Badea, 2002) properties. Therefore, the present study were conducted to speculate the effects of adding some natural feed additives such as, dried onion, dried garlic, red pepper and anise at the levels 0.5% from each into growing Japanese quail diet on growth performance and some carcass traits.

## MATERIALS AND METHODS

A total number of 300 quail chicks at two weeks old were randomly divided into 5 treatments groups 60 chicks each. Each group was subdivided into 3 replicates of (20 chicks each). The birds were housed in cleaned and fumigated battery cages (100x70x20) in an

open house. Feed and water were offered *ad-libitum* to the birds during the experimental periods (2-6 weeks of age). All chicks were reared under similar hygienic and environmental conditions. Onion (*Allium cepa*) and garlic (*Allium sativum*) bulbs were peeled grated into smaller pieces and air-dried. The dried garlic and onion were separately pulverized and stored in cellophane bags until being used. The red pepper (*Capsicum annum.L*) and anise (*Pimpinella anisum*) were purchased from local market, ground separately to a fine powder. Each of natural feed additives (onion, garlic, red pepper and anise) were added into the basal diet at limit of 0.5% (w/w). Basal diet had (25 % CP and 2945 Kcal ME/Kg diet) according to NRC, (1994). The 1<sup>st</sup> group was fed on a basal diet without feed additives (control). However, the 2<sup>nd</sup>, the 3<sup>rd</sup>, the 4<sup>th</sup> and the 5<sup>th</sup> groups were fed on a basal diet supplemented with 0.5% (w/w) onion, garlic, red pepper and anise, respectively. The ingredients and proximate chemical analysis of the experimental basal diets (*percent as fed*) are presented in Table (1). The performance of the experimental birds in term of body weight, body weight gain, feed intake, and feed conversion ratio were weekly recorded. Health of the experimental stock and mortality rate were closely observed and daily recorded. At the end of the

experiment at 6 weeks old, 3 birds from each treatment were randomly selected, weighted and slaughtered after 12 hours of fasting. After complete bleeding, birds were scalded; feathers were picked by hand and eviscerated. Different organs (liver, heart and gizzard) were removed, weighed and expressed as a percentage of live body weight. Dressing present was calculated using the following equation:- Carcass weight (g) / Live body weight(g) x100

Statistically

Results were statistically analyzed according to the following model.

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

Where:

$Y_{ij}$  = Experiment observations.

$\mu$  = the overall mean.

$T_i$  = the effect of dietary treatment.

$i$  = T1, ----- T5.

$E_{ij}$  = the experimental error.

Premixes contributed the following nutrients per kilogram of complete feed: vitamin A, 2,300 IU; vitamin D3, 400 IU; vitamin E, 1.8 mg; vitamin B12, 3.5 mg; riboflavin, 1.4 mg; panthotenic acid, 2 mg; nicotinic acid, 7 mg; pyridoxine, 0.25 mg; folic acid, 0.15 mg; menadione, 0.3 mg; thiamin, 0.15 mg; manganese oxide, 35 mg; ferrous sulfate 35 mg; zinc oxide, 30 mg; copper sulfate, 60 mg; cobalt carbonate, 5 mg; potassium iodine, 0.6 mg; selenium vanadate, 0.09 mg. Based on NRC (1994).

Table (1): Ingredients and proximate chemical analysis of the experimental basal diets.

Ingredients	%
Grain sorghum	55.05
Soybean meal	29.85
Gluten	10.00
Mono calcium phosphate	0.65
Calcium carbonate	1.55
Lysine	0.19
Molasses	2.00
Vegetable oil (corn)	0.16
Common salt	0.25
Premix	0.30
Total	100.00
Calculated analysis	Starter diet
Crude protein ( Starter diet)	25%
Metabolizable energy(Kcal/Kg)	2945 Kcal/Kg
Crude fiber	2.42
Ether extract	2.82

## RESULTS AND DISCUSSION

### Body weight and body weight gain

The effect of natural feed additives supplementation (onion, garlic, red pepper and anise) at the level of 0.5% (w/w) of each additive on body weight and body weight gain (gm/bird) of growing Japanese quails are presented in Tables (2 and 3). The data revealed that, no significant ( $P > 0.05$ ) differences were detected in body weight and body weight gain among dietary treatments. Whereas, at the end of the experiment (6 weeks of age), there was a slight numerically improvement ( $P > 0.05$ ) in body weight and body weight gain for birds fed on diets supplemented with dietary onion followed by quails fed on diet with dietary red pepper compared with other dietary treatments .

The slightly improvement in body weight and body weight gain as

a result of adding onion and red pepper may be due to that the vital compounds in onion like sulfur containing compounds (Alliin, Diallylsulfides and Al-licin) that act as antibacterial, antiviral, antiparasitic, antifungal properties and has antihypertensive, hypoglycemic, antithrombotic, antihyperlipidemic, anti-inflammatory and antioxidant activity that might keep birds in good health condition; which in agreement with those found by (Lampe, 1999). Also, onion were contains sulfur compounds, sugar, calcium, sodium and potassium salts, iodine, silica, iron, phosphorus and A, B and C vitamins which may help in improving growth. Previous studies suggested that the biological

properties of onion are widely related to sulfur-containing compounds (Kurita *et al.*, 1979). Also, antimicrobial peptides from red pepper are very efficient in inhibiting growth of human and plant pathogenic bacteria and fungi. (Alaa Abdul Aziz., 2010). The present results are in agreement with the finding of An, et al, (2015) who found that, the chicks fed on diet with 0.3% or 0.5% onion extract showed a similar body

weight to that of medicated control group. Also, Ademola *et al.*, (2004) reported that no significant difference ( $P > 0.05$ ) in average live body weight of broiler chicks fed garlic at 5 mg/kg diet. Also, Soltan *et al.*, (2008) observed that, non-significantly ( $p > 0.05$ ) decrease was found in body gain as a result of feeding broiler chicks on dietary anise seeds (1.5 g/kg diet) when compared with the control one.

Table (2): Effect of dietary feed additives supplementation on body weight (gm) of growing Japanese quails.

Traits	Age weeks	Treatments (0.5% of each additive)					±SE	Significance
		Control	Onion	Garlic	Red pepper	Anise		
Body weight	2	58.83	58.91	58.91	58.83	85.91	0.08	NS
	3	90.00	94.70	92.75	91.00	93.68	1.82	NS
	4	125.40	133.42	129.66	124.71	126.47	2.45	NS
	5	146.71	155.62	152.19	152.34	151.61	2.89	NS
	6	162.81	168.08	157.83	163.74	160.93	4.61	NS

NS =Not significance ( $p > 0.05$ ) ±SE =Standard error

Table (3): Effect of dietary feed additives supplementation on cumulative body weight gain (gm/bird) of growing Japanese quails.

Traits	Age weeks	Treatments (0.5% of each additives )					±SE	Significance
		Control	Onion	Garlic	Red pepper	Anise		
Body weight gain	2-3	31.16	35.79	33.83	32.16	34.76	1.87	NS
	2-4	66.57	71.75	70.75	63.70	67.41	2.17	NS
	2-5	85.22	103.22	93.27	93.50	92.69	4.09	NS
	2-6	103.97	112.68	98.91	104.91	102.01	4.89	NS

NS= Not significance ( $p > 0.05$ ) ±SE= standard error

### Feed intake and Feed conversion

The effects of dietary feed additives supplementation (onion, garlic, red pepper and anise) at the level of 0.5% for each additive on feed intake and feed conversion of growing Japanese quails during the experimental periods from 2 - 3, 2 - 4, 2- 5 and 2 - 6 weeks of age are presented in Tables (4 and 5).

Data in Table (4) showed that, there was in significant difference ( $P>0.05$ ) in feed intake as a result of adding different sources of feed additives to Japanese quails diet during all experimental period. At the end of the experiment (6 weeks of age), birds fed dietary feed additives showed a slight numerically insignificant improvement ( $P>0.05$ ) in feed

intake compared with the control diet.

Data in Table (5) revealed that, there was in significant difference ( $P>0.05$ ) in feed conversion ratio as a result of adding different sources of feed additives to Japanese quails diet during all experimental period except the period from 2-4 weeks of age, where the best ( $P>0.05$ ) feed conversion ratio during the period from 2-4 weeks of age was found for birds fed dietary garlic and onion diet compared with other dietary treatments. However, the lowest ( $P>0.05$ ) feed conversion ratio during the same period was found for birds fed dietary anise followed by birds fed dietary red pepper or control diet. Moreover, the lowest ( $P>0.05$ ) feed conversion ratio during the whole experimental period (2-6 weeks of age) was recorded for birds fed dietary garlic compared with other dietary treatments.

The slight improvement in feed intake as a result of adding feed additives to Japanese quails diet may be due to active ingredients such as anethole in anise and borneol, carnosol, carnosic acid and caffeic in medical herbs. That was achieved through stimulating effect on digestive system and increasing production

of digestive enzymes and improving utilization of digestive products through enhancing of liver function (Hernandez *et al.*, 2004). Moreover, the non-significant improvement in feed conversion ratio as a result of feeding birds dietary feed additives from different sources may be due to the insignificant enhancement in feed intake (Table 4) and body weight (Table 2). The present results are in agreement with the finding of, Al-homidan., (2005) who found that, no effect on feed intake as a result of adding 2% of dried onion in broiler chickens diet. Also, Soltan *et al.*, (2008) reported that, no significant ( $p < 0.05$ ) effect in feed intake between groups fed dietary anise at levels of 0.25, 0.5, 0.75 and 1.0 g of anise/kg. on the other hand, Aji *et al.*, (2011) revealed that diet contained 100mg of onion supplementation significantly ( $P<0.05$ ) increased their feed intake. Moreover, supplemented broiler chickens diet with 25, 50, 100 mg of onion decreased feed conversion ratio of birds. Goodarzi *et al.*, (2014) found that, broilers receiving 10 or 30 g onion/kg had lower feed conversion ratio (FCR) compared to broilers receiving antibiotic during starter period ( $P<0.05$ ).

Table (4): Effect of dietary feed additives supplementation on cumulative feed intake (gm/bird) of growing japanes quail.

Traits	Age weeks	Treatments (0.5% of each additives)					±SE	Significance
		Control	Onion	Garlic	Red pepper	Anise		
Feed intake	2-3	94.75	99.40	96.91	98.41	103.50	3.77	NS
	2-4	190.62	202.22	196.66	188.50	206.75	6.65	NS
	2-5	278.52	316.71	300.55	290.08	315.91	12.90	NS
	2-6	413.69	448.03	448.17	421.47	413.59	20.70	NS

NS= Not significance ( $P>0.05$ ) ±SE = standard error

Table (5): Effect of dietary feed additives supplementation on cumulative feed conversion ratio (gm, feed/gm ,gain) of growing Japanese quails.

Traits	Age weeks	Treatments (0.5% of each additives )					±SE	Significance
		Control	Onion	Garlic	Red pepper	Anise		
Feed conversion ratio	2-3	3.07	2.77	2.91	3.07	2.99	0.22	NS
	2-4	2.88	2.82	2.78	2.96	3.07	0.13	NS
	2-5	3.26	3.10	3.22	3.11	3.41	0.19	NS
	2-6	4.00	3.99	4.54	4.02	4.07	0.24	NS

NS= Not significance (P>0.05) ±SE = standard error

### CARCASS TRAITS

The effects of dietary feed additives supplementation (onion, garlic, red pepper and anise) at the level of 0.5% for each additive on absolute weights of some carcass traits and its proportions as a percent of live body weight for Japanese quails at the end of the experiment ( at 6 weeks of age) are presented in Table (6). Data revealed that, there were no significant differences (P>0.05) in absolute weights of all studied traits in the present study among all dietary treatments. Also, no significant differences (P>0.05) were detected in relative weights of all studied traits as a present of live body weight among all dietary treatments. In general, the greatest numerically insignificant (p>0.05) carcass weights was recorded for birds fed dietary anise followed by dietary red pepper and the control diet compared with other dietary groups. While, the best numerically insignificant (p>0.05) edible weights was recorded for birds fed control diet compared with other dietary feed additives groups. In general, the greatest numerically insignificant (p>0.05) dressing % was recorded for birds fed dietary anise followed by dietary onion compared with other dietary

groups. While, The greatest numerically insignificant (p>0.05) edible proportions was recorded for birds fed dietary onion followed by garlic diet compared with other dietary groups. These findings were in acceptance with those noticed by Goodarzi *et al.*, (2014), they found that, internal organ weights were not affected by dietary onion (*Allium cepa* L.) as an antibiotic at levels of 10 or 30g fresh onion bulbs /kg diet. Moreover, Aditya *et al.*, (2017) reported that, no differences were observed in carcass dressing weight when broiler chicks were fed dietary onion extract at levels of 5, 7.5, and 10 g / kg of basal diet respectively.

The effects of dietary feed additives supplementation (onion, garlic, red pepper and anise) at the level of 0.5% for each additive on mortality rate (%) of Japanese quails during 2 - 6 weeks of age are presented in Table (7). The data showed that, there was no significant difference (P>0.05) in mortality rate as a result of adding different sources of feed additives into Japanese quail diet during all experimental period. At the end of the experiment (at 6 weeks of age), birds fed red pepper or anise diets showed a slight numerically insignificant improvement (P>0.05)

in mortality rate compared with other dietary treatments. The worst insignificant mortality rate was

found for birds fed dietary garlic followed by those fed onion or control diets.

Table (6): Effect of dietary feed additives supplementation on some carcass characteristics of growing Japanese quails.

Traits	Treatments (0.5% of each additive)					±SE	Significance
	Control	Onion	Garlic	Red Pepper	Anise		
Live bodyweight(gm)	203.33	180.00	191.66	201.66	198.33	10.90	NS
Carcass weight(gm)	140.00	130.00	131.66	140.00	145.00	6.10	NS
Dressing%	68.99	72.25	68.88	69.69	73.10	1.69	NS
Giblets weight (gm)	12.44	12.32	11.98	10.61	11.84	0.88	NS
Giblets weight %	6.13	6.89	6.29	5.26	5.95	0.54	NS

NS= Not significance (P>0.05) ±SE= standard error

### Mortality rate

The slight numerically insignificant improvement (P>0.05) in mortality rate as a result of adding red pepper or anise, may be due to herbs, spices, and various plant extracts acted as possible alternatives to antibiotic growth promotants. (Harnandez et al. 2004). Griggs and Jacob (2005) reviewed the antimicrobial and growth promotants effects of a range of plant extracts which have been studied in poultry. Moreover, anise (*Pimpinella anisum* L.) has been used in medications for a long time as a stimulating affecter on digestion and as antiparasitic ,(Çabuk et al, 2003), antibacterial (Tabanca et al., 2003),antifungal,(Soliman and Badea,2002) and antipyretic (Afifi et al., 1994).

Awad Elkareem., (2007) found that, broiler chicks fed on diet contained 1, 1.5 and 2% hot red pepper had similar mortality rate. Atapattu and

Belpagodagamage., (2010) found that, mortality percentages of broiler chicks fed dietary 0, 1, 3 and 5% chili powder were 3.3, 3.4, 0 and 0 %, respectively and were not significantly different among treatments 0 (control), 1, 3 or 5% of CHPW of broilers. Sunbul and Al-Khalani., (2011) revealed significant (p<0.05 ) decrease in mortality of broiler chicks when birds were fed on diets contained two source of medicinal plants (Anise seed , A and Roselle flower ,K) at the level of 6kg/Ton from A and K , respectively.

Fadlalla et al., (2010) showed significant (p<0.05) improvement in mortality rate ratio of broilers fed 0.3% garlic. While , Fayed et al., (2011) found that supplementation of garlic powder in broiler diets with 1 kg/ton and 0.5 kg/ton had no significant differences in mortality rate. Moreover, Puvāča et al., (2014) found that, the highest mortality rate (5.1 %) was recorded in control

treatment when added garlic to broiler chicks.

Table (7): Effect of dietary feed additives supplementation on mortality % at 6 weeks of age of growing Japanese quails.

Traits	Treatments (0.5% of each additive)					±SE	Significance
	Control	Onion	Garlic	Red pepper	Anise		
Total	60	60	60	60	60	0.00	.
Died birds	5.33	5.33	6.33	4.66	4.66	1.23	NS
Mortality %	8.88	8.89	10.56	7.78	7.78	2.05	NS

### CONCLUSION

It could be concluded that using some natural feed additives as a growth additives i.e. onion, garlic, red pepper and anise at the level of 0.5% of each to Japanese quail diet could improve growth performance and some carcass traits.

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تأثير استخدام بعض الإضافات الغذائية الطبيعية في علائق السمان الياباني علي النمو وبعض الصفات الانتاجية

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أجريت هذه التجربة لدراسة تأثير بعض الإضافات الغذائية الطبيعية مثل البصل والثوم والشطة والينسون ( المطحون ) بنسبة 0.5 % لكل منها كإضافات غذائية طبيعية علي بعض الاستجابات الإنتاجية للسمان الياباني النام. وفي هذه الدراسة تم استخدام 300 طائر عمر أسبوعين تم تقسيمهم عشوائيا الي 5 معاملات بحيث تحتوي كل معاملة علي 60 طائر كما ان كل معاملة احتوت علي 3 مكررات بكل مكررة 20 طائر. تم تقسيم المعاملات التجريبية علي النحو التالي:- المعاملة الأولى : تم تغذيتها علي عليقه اساسية بدون اي اضافات. المعاملة أثنائية : تم تغذيتها علي العليقه الأساسية مضاف لها البصل المطحون بنسبة 0.5 % . المعاملة أالثالثة : تم تغذيتها علي العليقه الأساسية مضاف لها الثوم المطحون بنسبة 0.5 % . المعاملة الرابعة : تم تغذيتها علي العليقه الأساسية مضاف لها الشطة المطحونة بنسبة 0.5 % . المعاملة الخامسة : تم تغذيتها علي العليقه الأساسية مضاف لها الينسون المطحون بنسبة 0.5 % . وقد بدأت المعاملات التجريبية عند عمر (2 اسبوع) يوم الي عمر 6 اسابيع. وخلال التجربة تم تسجيل وزن الجسم الحي والغذاء المأكول اسبوعيا لكل مكررة. كما تم حساب معدل التحويل الغذائي (جم غداء : جم زيادة في الوزن) لكل معاملة اسبوعيا كما تم تسجيل حالات النفوق كل أسبوع إن وجدت. وفي نهاية التجربة عند عمر(6 اسابيع ) تم اجراء تجربة الذبح وتم وزن الذبيحة بعد الترييش والتتظيف وكذلك

وزن الاعضاء الداخلية (الكبد والقلب والقانصة) وكذا تم حساب النسبة المئوية لهم منسوبا الي وزن الجسم الحي.

#### وكانت النتائج كالتالي :-

في نهاية التجربة عند عمر 6 أسابيع لوحظ تحسن طفيف غير معنوي في وزن الجسم والزيادة في وزن الجسم بالنسبة للطيور التي تغذت علي عليه البصل تليها الطيور التي تغذت علي الشطة مقارنة بالمعاملات الاخرى. كما لوحظ تأثير غير معنوي علي كمية الغذاء المأكول. واتضح ان افضل معدل تحويل غذائي اثناء الفترة من 2-4 اسابيع سجل عند تغذية الطيور علي عليه الثوم تليها الطيور التي غذيت علي عليه البصل والكنترول. وأظهرت النتائج ان احسن تأثير غير معنوي للنسبة المئوية للأجزاء المأكولة سجل في الطيور التي تغذت علي عليه البصل تليها الطيور التي تغذت علي عليه الثوم مقارنة بالمجموعات الاخرى ،ووجد ايضا ان افضل تأثير غير معنوي للنسبة المئوية للتصافي سجل في الطيور التي تغذت علي عليه الينسون تليها الطيور التي تغذت علي عليه البصل مقارنة بالطيور التي تغذت علي علائق المجموعات الاخرى. ووجد ايضا انه يوجد تأثير غير معنوي علي معدل النفوق.