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EFFECT OF AZZAWI DATE WASTE MEAL WITH OR WITHOUT AVIZYME SUPPLEMENTATION ON GROWTH PERFORMANCE OF JAPANESE QUAIL

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ABSTRACT: Factorial design experiment (7×2) was carried out including seven levels of Azzawi date waste meal, DWM (0, 5, 10, 15, 20, 25 and 30% of the diet as replacement of yellow corn) and two levels of supplemented Avizyme (0.0 or 0.1 g/kg diet). A total number of 420 unsexed one week old quail chicks, were randomly distributed into fourteen treatment groups, each of 30 chicks, with three replicates each of 10 chicks. Each experiment group was allotted on one of the experimental diets to study the effect of Azzawi date waste meal (DWM) in the diet with or without Avizyme supplementation on the growth performance (live body weight, body weight gain, feed consumption and feed conversion) of growing Japanese quail. Results obtained showed that, chicks fed diets containing DWM up to 30% improved significantly (P<0.01) live body weight at 6 weeks of age, body weight gain during, 3-5 and 1-5 weeks of age as compared to the control group, Feed consumption was insignificantly increased during 1-3 and 1-5 weeks of age by increasing DWM levels in the diets up to 20%, increasing DWM levels from 20 to 25 or 30% resulted significant (P< 0.01) increase in feed consumption compared with control and other dietary treatment groups. Feed conversion during all the experimental periods were not significantly affected due to DWM incorporation up to 20% compared to control. While increasing DWM levels from 20 to 25 or 30% resulted significant (P< 0.01) increase (poorest) in feed conversion compared with control and other dietary treatment groups. Enzyme supplementation of the experimental diets significantly (P ≤ 0.01) improved live body weight at 5 weeks of age and body weight gain through the whole experimental period (1-5 weeks of age) compared with those fed unsupplemented one. While, feed intake and feed conversion insignificantly affected as the diets were supplemented with avizyme. The highest live body weight and body weight gain were recorded for chicks fed diet containing 30% DWM with avizyme supplementation. In conclusion, it could be concluded that, DWM could be used in Japanese quail diets up to 30% with enzyme supplementation (1 g/kg diet) without adverse effect on their growth performance.

Key words: Date waste meal, Japanese quail, avizyme.

INTRODUCTION

Feed represents the major cost of poultry production and accounts about 75% of total production cost. With increasing feeding cost of poultry, nutritionists are forced to look at agricultural by-products of less cost than the conventional feedstuffs. The waste residues of fruits and vegetables after processing could be used as sources of protein and energy in feeding animals and poultry. Recently, the application of non-conventional feedingstuffs in poultry nutrition in developing countries has received considerable attention.

Egypt is one of the developing countries that suffer from a lack of traditional feedstuff due to the high prices which represented for more than 75% of them; also lower cultivated area by

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feedstuff. The use of agriculture waste one of the means to eliminate part of shortage of traditional feedstuff.

Giving the fact that the Middle Eastern countries are the largest producer of dates in the glube, whereas over 70% of the total world production of dates is produced in this area. There are 11.829.410 female date palm in Egypt and total production of date fruits amounts to 1.300.000 tons/year (Omar, 2011). The growing demand of dates enhanced their production which reached 7.2 million tons in 2010 (FAO, 2011) and date by-products represent around 20% of the global date production and have an economic value (Al-Homidan, 2003; Al-Harthi, 2006; El-Deek *et al*., 2010).

Dates and date by-products are used in animal and poultry feeds. Azzawi date meal could be considered as a cheaper by–product and could successfully substitute part of yellow corn in poultry diets. Although the use of date by-products has been mainly in ruminant feeds, many studies have been conducted on feeding broiler on date waste meal (DWM) and resulted in an improvement in broiler performance such as body weight and feed conversion (Al-Homidan 2003; Al-Harthi, 2006; Al-Harthi *et al.*, 2009). Higher crude fiber content in date waste may reduce digestibility and availability of nutrients. Abd El-Rahman *et al.* (1999) reported that the negative effect of anti- nutritional factors in date pits as one component of the DWM or the highest levels of both cellulose and pentosanes (non-starch polysaccharides NSPs) which found to constitute more than 30% of crude fibers of date pits (Lennerts, 1988). Non-starch polysaccharides found to have a negative influence on energy density (dilution effect), entrapping of nutrients, increasing the viscosity of digest and constitute complex formation with minerals, thereby forming a component difficult to digest (Simon, 2000). Also, (Nwokolo *et al*., 1976 ; Onwudike, 1986 and 1988) reported that date waste meals had lower levels of lysine, methionine, leonine and isoleucine and are not adequate to meet bird's requirements.

Some additives and treatments may counteract some of these problems, for example enzyme mixture could support the endogenous enzymes of the poultry (amylase and protease), down of components in cell wall, which cannot be broken down into absorbable nutrients by endogenous enzymes, lowering the gastrointestinal viscosity in digestive tract, reduced nutrient entrapment and releasing other nutrients like minerals (Tawfeek, 1996 ; Simon, 2000). Limited research have been conducted on the utilization of date waste for quail diets.

Therefore, this work was conducted to study the effect of incorporated different levels of date waste meal (DWM) in the diets as replacement of yellow corn with or without avizyme supplementation on growth performance of growing Japanese quail.

MATERIALS AND METHODS

The present experiment was carried out at the experimental poultry Farm, Poultry Department, Faculty of Agriculture, Zagazig University, Egypt.

A total number of 420 unsexed one week old Japanese quail chicks, nearly similar in live body weigh were randomly distributed into fourteen treatment groups of 30 chicks, each with three replicates of 10 chicks. A factorial design experiment (7×2) was conducted including seven levels of Azzawi date waste meal, DWM, (0, 5, 10, 15, 20, 25 and 30% as replacement of yellow corn) and two levels of dietary avizyme supplementation (0.0 or 0.1 g/kg diet). Each experimental group of chicks was alloted on one of the experimental diets, avizyme used contains enzymes produced by strains of *Trichoderma* and *Bacillus*, and has xylanase, protease, and amylase actiVitam.y. Azzawi date waste meal (DWM) was purchased as residues of food industry from Siwa Oasis, Marsa Matrouh Governorate, Egypt, dried in a force draft oven at 65°C for 24 hours and then ground in a hammer mill before mixing to the diets. The experimental diets were formulated based on the NRC (1994) requirements for quails and were isocaloric and isonitrogenous during the growing period (1-5 weeks of age). Composition and calculated analysis of the experimental diets are shown in Table 1.

Table 1. Composition and calculated analysis of the experimental diets

Ingredient (%)	Date waste meal level (%)						
	0	5	10	15	20	25	30
Corn	54.19	49.19	44.19	39.19	34.19	29.19	23.41
Soybean 44%	32.90	32.61	31.91	31.02	31.02	29.43	28.75
Gluten	7.50	7.60	8.00	8.50	8.50	9.50	10.50
Date waste meal	0.00	5.00	10.00	15.00	20.00	25.00	30.00
Oil	2.10	2.35	2.75	3.20	3.50	3.90	4.20
L-Lysine	0.25	0.26	0.27	0.29	0.29	0.32	0.35
Methionine	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Di Calcium	1.70	1.58	1.40	1.26	1.10	1.00	0.90
Limestone	0.72	0.77	0.84	0.90	0.98	1.02	1.25
Premix	0.30	0.30	0.30	0.30	0.30	0.30	0.30
NACL	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Total	100	100	100	100	100	100	100
Calculated analysis							
Cp	24.05	24.03	24.03	24.00	24.05	24.03	24.05
M.E. Kcal/Kg	3000.2	3000.7	3000.2	3000.8	3000	3000.8	3003.0
Ca (%)	0.80	0.80	0.80	0.80	0.80	0.80	0.80
P (%)	0.45	0.45	0.45	0.45	0.45	0.45	0.45
Lysine (%)	1.30	1.30	1.30	1.30	1.30	1.30	1.30
M+C (%)	0.75	0.75	0.75	0.75	0.75	0.75	0.75

* Growth Vitamin and Mineral premix Each 2 kg consists of :

Vitam. A 12000, 000 IU; Vitam. D3, 2000, 000 IU; Vitam. E. 10g; Vitam. k3 2 g; Vitam. B_1, 1000 mg ; Vitam. B_2, 49g ; Vitam. B_6, 105 g; Vitam. B_{12}, 10 mg; Pantothenic acid, 10 g; Niacin, 20 g , Folic acid , 1000 mg ; Biotin, 50 g; Choline Chloride, 500 mg, Fe, 30 g; Mn, 40 g; Cu, 3 g; Co, 200 mg; Si, 100 mg and Zn , 45 g.

** Calculated according to NRC (1994).

Chicks were grown in brooders with raised wire floors and exposed to 24 hours of a constant light. Feed and water were supplied *ad-libitum* throughout the experimental period. Individual body weight was recorded at one, three and five weeks of age; feed consumption and conversion were recorded during the periods 1-3, 3-5 and 1-5 weeks of age. Data were statistically analyzed on a 7×2 factorial design basis according to Snedecor and Cochran (1982) using SPSS® software statistical analysis program (SPSS, 1999). Differences among means were tested by using Duncan's New Multiple Range Test (Duncan, 1955).

Statistical Model

$$Y_{ijk} = \mu + S_i + A_j + SA_{ij} + e_{ijk}$$

Where:

Yijk = An observation, μ = over all mean, S_i effect of DWM, A_j effect of Avizyme (1 and 2), SA_{ij} effect of interaction and eijk = Random error

RESULTS AND DISCUSSION

Growth Performance

Live body weight and body weight gain

Effect of DWM levels

The average values of body weight and body weight gain as affected by DWM levels in growing Japanese quail diets regardless of avizyme supplementation are presented in Tables 2 and 3.

Obtained results proved that live body weight at 3 weeks of age was not significantly affected by DWM levels in growing Japanese quail diets.

At 5 weeks of age, results presented in Table 2 show that, live body weight was insignificantly increased by increasing the incorporation of DWM up to 25% in growing Japanese quail diets, However increasing DWM in the diets from 25 to 30% resulted significant increase ($P<0.05$) in live body weight when compared with control. It shown that average body weight of quail chicks given diets containing DWM at 30% were heaver by about 1.5% when compared with control.

Generally the heavier live body weight was recorded for birds fed diet containing 30% DWM compared with control and other dietary treatment groups (0, 5, 10, 15, 20 or 25% DWM).

Results illustrated in Table 3 summarize the influence of incorporation different levels of DWM in Japanese quail diets on their body weight gain during the period from 1 to 5 weeks of age.

Statistical analysis showed, significant effects ($P < 0.01$) on body weight gain of Japanese quail chicks due to incorporation of DWM in the diets during the periods 3-5 weeks of age and overall the experimental period (1-5 weeks of age).

From 1-3 weeks of age, the results revealed that, body weight gain was insignificantly ffected due to incorporation of DWM in the diets. However results indicated that, during 3-5 and 1-5 weeks of age incorporation DWM up to 25% in quail diets did not significantly effect daily weight gain, while body weight gain were significantly ($P<0.05$) higher for groups fed diet contained 30% DWM as compared with those fed control group.

The increase in growth rate (live body weight and body weight gain) as affected by DWM may be due to its effect on feed intake (Table 4) which resulted in an increase in feed intake associated with increase of dietary DWM.

Improving live body weight and body weight gain of quail may be due to that dates are very rich in saccharides, their total sugars may reach 87% in the date's stage and the monosaccharaides are mainly 44% glucose and 50 and some succrose (Vandepopuliere *et al*. 1995). Also, these results may be attributed to the presence of hormonal like compounds in date waste meal which acts as a growth promoter and result in increasing weight and performance of quail (Attiat, 1995).

These findings are in agreement with that reported by Babatunde *et al*. (1975) who proved that adding dates extract (Dibs) to broiler ration produced a significant increase in weight gain. Al-Homidan *et al*. (2003) observed that adding date to broiler diets resulted to increase weight gain. Also, Al-Harthi (2006) found that date waste meal can be used up to 21% in the diets of broilers. Another study also proved that the addition of Al-Zahdi date leads to high increase on weight gain Al-Mafragy (1999) stated that, date waste can be fed to broilers up to 20% in the growing-finishing period during 21–40 days of age without negative effects on growth performance, production index and survival rate. Taha *et al*. (2013) the date's sugar caused beneficial effect to broiler chicks when they were added to the diets and improved the digestibility of dry matter. While El-Deek *et al.* (2010) indicated that whole Zahdi dates incorporated at 5, 10 and 30% at the expense of corn have supported growth as efficiently as the control diet. Kamel *et al*. (1981) stated that, incorporated whole Zahdi dates at 5, 10 and 30%at the expense of corn, supported growth as efficiency as the control diets, but the incorporation of 47.7% of whole Zahdi dates as a total replacement of corn resulted in some growth depression, while Tamimie (1959) indicated that there was no significant effect in body weight at the age of week 3 when date with and without seed was substituted with corn in boiler diet.

Table 2. Live body weight, g, ($\overline{X}$ ± SE) of growing Japanese quail as affected by date waste meal, enzyme supplementation and their interaction during the experimental ages

		Age (week)		
		1	3	5
Date waste meal, DWM (%)				
0		31.08±0.20	101.83±0.79	170.67±0.95^{bc}
5		30.70±0.17	103.67±0.64	171.88±0.76^{ab}
10		30.65±0.16	101.42±0.66	171.96±0.59^{ab}
15		30.53±0.10	100.78±1.27	169.75±0.54^{c}
20		30.80±0.16	101.00±1.12	171.68±0.83^{abc}
25		30.67±0.12	101.46±0.54	171.67±1.00^{abc}
30		30.67±0.30	101.75±1.07	173.11±1.43^{a}
Significance		NS	NS	*
Enzyme supplementation, ENZ (g/kg diet)				
0		30.69±0.09	100.66±0.57	170.67±0.33
1		30.77±0.10	101.89±0.51	172.39±0.58
Significance		NS	NS	**
Interaction between DWM×ENZ effect				
DWM (%)	ENZ. (g/kg diet)			
0	0	31.17±0.33	102.33±0.44	172.33±1.20^{c}
0	1	31.00±0.29	101.33±1.64	169.00±0.58^{f}
5	0	30.87±0.32	103.67±1.01	171.25±0.88^{d}
5	1	30.53±0.09	103.67±1.01	172.50±1.32^{c}
10	0	30.60±0.17	101.17±0.88	171.25±0.43^{d}
10	1	30.70±0.31	101.67±1.17	172.67±1.01^{bc}
15	0	30.47±0.12	101.40±2.58	169.67±0.67^{f}
15	1	30.60±0.17	100.17±1.01	169.83±1.01^{f}
20	0	30.70±0.15	98.83±1.17	170.27±1.19^{e}
20	1	30.90±0.30	103.17±0.44	173.09±0.27^{b}
25	0	30.60±0.21	100.53±0.61	169.60±0.31^{f}
25	1	30.73±0.15	102.39±0.45	173.73±0.81^{b}
30	0	30.43±0.20	99.67±0.93	170.33±0.60^{e}
30	1	30.90±0.59	103.83±0.73	175.89±1.44^{a}
Significance		NS	NS	**

** P<0.01,* P<0.05 and NS = Not significant.

Means in the same column within each classification with different letters differ significantly (P<0.05).

Table 3. Daily body weight gain ($\overline{X}$ ± SE) of growing Japanese quail as affected by date waste meal, enzyme supplementation and their interaction during the experimental periods

		Experimental period (week)		
		1-3	3-5	1-5
Date waste meal, DWM (%)				
0		5.05±0.06	4.92±0.07^{cd}	4.99±0.03^{b}
5		5.21±0.05	4.87±0.03^{d}	5.04±0.03^{ab}
10		5.05±0.06	5.03±0.02^{c}	5.05±0.02^{ab}
15		5.02±0.09	4.93±0.07^{cd}	4.97±0.02^{b}
20		5.01±0.08	5.05±0.03^{bc}	5.03±0.03^{ab}
25		5.06±0.03	5.01±0.05^{bc}	5.04±0.04^{ab}
30		5.08±0.07	5.10±0.04^{b}	5.09±0.04^{a}
Significance		NS	**	*
Enzyme supplementation, ENZ. (g/kg diet)				
0		5.00±0.04	5.00±0.04	5.00±0.01
1		5.08±0.04	5.04±0.03	5.06±0.02
Significance		NS	NS	**
Interaction between DWM×ENZ effect				
DWM (%)	ENZ. (g/kg diet)			
0	0	5.08±0.01	5.00±0.09	5.04±0.05^{a}
0	1	5.02±0.12	4.83±0.09	4.93±0.02^{b}
5	0	5.20±0.09	4.83±0.04	5.01±0.04^{a}
5	1	5.22±0.07	4.92±0.02	5.07±0.04^{a}
10	0	4.83±0.07	5.22±0.03	5.02±0.02^{a}
10	1	4.85±0.10	5.29±0.02	5.07±0.05^{a}
15	0	5.07±0.19	4.88±0.14	4.97±0.03^{b}
15	1	4.97±0.07	4.98±0.01	4.97±0.03^{b}
20	0	4.87±0.09	5.10±0.03	4.98±0.05^{b}
20	1	5.16±0.01	4.99±0.03	5.08±0.01^{a}
25	0	5.00±0.03	4.93±0.06	4.96±0.02^{b}
25	1	5.12±0.03	5.10±0.04	5.11±0.03^{a}
30	0	4.95±0.07	5.05±0.02	5.00±0.02^{a}
30	1	5.21±0.05	5.15±0.06	5.18±0.04^{a}
Significance		NS	NS	**

** P<0.01, * P<0.05 and NS = Not significant.

Means in the same column within each classification with different letters differ significantly (P<0.05).

Table 4. Daily feed intake ($\overline{X}$ ± SE) of growing Japanese quail as affected by date waste meal, enzyme supplementation and their interaction during the experimental periods

		Experimental period (week)		
		1-3	3-5	1-5
Date waste meal, DWM (%)				
0		12.63±0.24b	19.10±0.58^{c}	15.86±0.40^{b}
5		12.68±0.33b	18.61±0.34^{c}	15.65±0.34^{b}
10		12.93±0.19b	18.96±0.25^{c}	15.95±0.19^{b}
15		13.44±0.37b	19.35±0.38^{bc}	16.39±0.37^{b}
20		13.41±0.25b	19.31±0.33^{bc}	16.36±0.28^{b}
25		14.65±0.27a	20.53±0.39^{ab}	17.59±0.31^{a}
30		15.10±0.30a	21.15±0.30^{a}	18.12±0.29^{a}
Significance		**	**	**
Enzyme supplementation, ENZ. (g/kg diet)				
0		13.61±0.25	19.67±0.29	16.64±0.26
1		13.48±0.24	19.47±0.25	16.48±0.24
Significance		NS	NS	NS
Interaction between DWM×ENZ effect				
DWM (%)	ENZ. (g/kg diet)			
0	0	12.61±0.54	19.52±1.22	16.06±0.88
0	1	12.65±0.03	18.68±0.02	15.67±0.02
5	0	12.86±0.58	18.89±0.58	15.87±0.58
5	1	12.50±0.42	18.33±0.42	15.42±0.41
10	0	12.90±0.18	18.92±0.54	15.91±0.36
10	1	12.97±0.39	19.00±0.11	15.98±0.24
15	0	13.44±0.48	19.47±0.60	16.46±0.53
15	1	13.43±0.67	19.23±0.59	16.33±0.63
20	0	13.46±0.54	19.16±0.68	16.31±0.60
20	1	13.37±0.09	19.45±0.26	16.41±0.14
25	0	14.93±0.22	20.65±0.61	17.79±0.41
25	1	14.37±0.48	20.40±0.60	17.39±0.53
30	0	15.09±0.47	21.09±0.43	18.09±0.45
30	1	15.10±0.47	21.20±0.52	18.15±0.45
Significance		NS	NS	NS

** P<0.01 and NS = Not significant.

Means in the same column within each classification with different letters differ significantly (P<0.05).

Effect of avizyme supplementation

The average values of body weight and body weight gain of Japanese quail chicks as affected by dietary avizyme supplementation regardless of diatery DWM level are presented in Tables 2 and 3.

Obtained results proved that live body weight at 3 weeks of age and body weight gain during 1-3, and 1-5 weeks of age were not significantly affected by avizyme addition in growing Japanese quail diets.

However, enzyme supplementation of the experimental diets significantly ($P \leq 0.01$) improved live body weight at 5 weeks of age and body weight gain through the whole experimental period (1-5 weeks of age) compared with those fed unsupplemented one. The improvement in live body weight and body weight gain due to enzyme supplementation may be attributed to increased in digestion and absorption of all nutrients and not simply to the starch alone (Bedford and Morgan, 1996). Moreover, Non starch polysaccharides may coat the nutrients contained in the feed. The addition of cell wall degrading enzymes may release nutrients coated by non strach polysaccharides (NSP) contained in the feed and favor their digestion (Classen, 1996 ; Cowan *et al.,* 1996). It is well known that also, enzymes decrease the viscosity of the digestive contents (Bedford, 1995) which may allow a better contact of nutrients with endogenous and absorptive mucosae cells and there for a better use of the diet. Marquardt *et al.,*(1996) observed that enzymes caused a decrease in the water content of excreta, which will benefit a management productiVitam.y and quality of the end product.

Our results agree with other investigate (Aboul Ela *et al*., 2005; Eliwah *et al.,* 2016) who found an improvement in broilers and quail chicks growth performance (live body weight and body weight gain) with enzyme supplementation of diet including high level of fiber. However, Ghanem *et al*. (2015) indicated that enzyme preparation failed to obtain a significant increase in live body weight and body weight gain of broiler chicks

Interaction effects (dietary DWM levels and avizyme)

The interaction effect due to dietary NSOM level and avizyme supplementation on live body weight and body weight gain at different ages are given in Tables 2 and 3.

There were no significant differences among the treatment groups due to the interaction effect between dietary DWM level and avizyme supplementation on live body weight at 3 weeks of age and body weight gain through 1-3 and 3-5 weeks of age (Tables 2 and 3). While, the interaction effect between DWM level and avizyme supplementation was significant ($P \leq 0.05$) on body weight at 5-weeks of age and body weight gain during 1- 5 weeks of age. It is clear that the highest live body weight and body weight gain were recorded for chicks fed diet containing 30% DWM with avizyme supplementation. On the other hand, the lowest values for live body weight and body weight gain were observed for chicks fed diet containing 0.0 DWM with avizyme supplementation.

Afsharmanesh *et al*. (2016) stated that ,there were significant increase in body weight gain in broiler chicks given 75g date pits/kg diet with enzyme supplementation during 21-42 days of the experimental period.

Feed Consumption and Feed Conversion Ratio

Effect of DWM levels

The average feed consumption (g/b/d) and feed conversion ratio as affected by dietary DWM levels irrespective of avizyme supplementation during the different experimental periods are shown in Tables 4 and 5.

Results in Table 4 reveal that, feed consumption had significantly ($P<0.01$) affected due to DWM inclusion levels through the different experimental periods (1-3, 3-5 and 1-5 weeks of age). During 1-3 and 1-5 weeks of age, results showed that, feed consumption was insignificantly increased by increasing DWM levels in the diets up to 20%, increasing DWM levels from 20 to 25 or 30% resulted significant ($P< 0.01$) increase in feed consumption compared with control and other dietary treatment groups.

Table 5. Feed conversion ratio ($\overline{X}$ ± SE) of growing Japanese quail as affected by date waste meal, enzyme supplementation and their interaction during the experimental periods

		Experimental period (week)		
		1-3	3-5	1-5
Date waste meal, DWM (%)				
0		2.50±0.06^{bc}	3.88±0.09^{abc}	3.19±0.07^{c}
5		2.43±0.07^{c}	3.82±0.08^{bc}	3.13±0.07^{c}
10		2.67±0.03^{b}	3.61±0.04^{c}	3.14±0.04^{c}
15		2.68±0.06^{b}	3.94±0.12^{ab}	3.31±0.07^{bc}
20		2.68±0.05^{b}	3.83±0.07^{bc}	3.25±0.05^{c}
25		2.90±0.07^{a}	4.10±0.10^{ab}	3.50±0.08^{ab}
30		2.98±0.08^{a}	4.15±0.04^{a}	3.56±0.06^{a}
Significance		***	**	***
Enzyme supplementation, ENZ. (g/kg diet)				
0		2.73±0.06	3.94±0.07	3.33±0.05
1		2.65±0.04	3.87±0.04	3.26±0.04
Significance		NS	NS	NS
Interaction between DWM×ENZ effect				
DWM (%)	ENZ. (g/kg diet)			
0	0	2.48±0.10	3.90±0.19	3.19±0.15
0	1	2.52±0.07	3.87±0.07	3.19±0.00
5	0	2.48±0.13	3.91±0.14	3.20±0.13
5	1	2.39±0.05	3.73±0.07	3.06±0.06
10	0	2.67±0.07	3.62±0.09	3.15±0.07
10	1	2.67±0.03	3.59±0.03	3.13±0.03
15	0	2.66±0.05	4.01±0.24	3.33±0.12
15	1	2.70±0.13	3.86±0.11	3.28±0.12
20	0	2.76±0.07	3.76±0.14	3.26±0.10
20	1	2.59±0.02	3.90±0.05	3.24±0.03
25	0	2.99±0.05	4.19±0.15	3.59±0.09
25	1	2.81±0.11	4.01±0.14	3.41±0.12
30	0	3.06±0.13	4.18±0.07	3.62±0.10
30	1	2.90±0.08	4.12±0.05	3.51±0.06
Significance		NS	NS	NS

*** P<0.001, ** P<0.01 and NS = Not significant.

Means in the same column within each classification with different letters differ significantly (P<0.05).

At 3-5 weeks of age, results indicated that inclusion of DWM at a levels of 25 or 30% in growing Japanese quail diets increased significantly (P<0.01) feed consumption as compared with control. Increasing feed consumption due to using DWM may be due to improving the quail appetite.

These results disagreement with that obtained by Khidr *et al*. (2005) who observed that feeding hens on diet inclusion 8, 16, or 24%, DWM did not affect feed consumption. Also El-Sheikh *et al*. (2013) found that feed consumption did not significantly affected by Azzawi date meal (ADM) levels (10, 20. 30 and 40%) during the interval periods and the whole experimental period. On the contrary, Hermes and Al-Homidan, (2004) found that inclusion of whole dates (20, 24 and 28%) in the layer diets reflected a significant reduction in feed consumption compared with their control group.

Concerning feed conversion ratio, it is worth to note that, feed conversion during all the experimental periods were not significantly affected due to DWM incorporation up to 20% compared to control (Table 5). While increasing DWM levels from 20 to 25 or 30% resulted significant (P< 0.01) increase (poorest) in feed conversion compared with control and other dietary treatment groups.

El-Sheikh *et al.* (2013) found that Hens fed on 30 or 40% azzawi date meal (ADM) levels recorded the best significant (P<0.05) values of feed conversion ratio during 36 to 40 week of age compared to control. Youssef *et al*. (2015) who indicated that the replacement of maize by whole dates resulted in decreased growth performance and increased the feed conversion ratio. Al-Mafragy (1999) proved a significant increase in feed conversion in groups supplemented with date flesh in the dietary diet.

Generally it could be concluded that diets contained 25 or 30% DWM had higher feed consumption and worst the values of feed conversion ratio of quail chicks than those in control.

Effect of avizyme supplementation

The average feed intake and feed conversion values of Japanese quail chicks as affected by avizyme supplementation, irrespective of dietary DWM levels, during the different growing periods are shown in Tables 4 and 5.

Results indicated that feed intake insignificantly affected as the diets were supplemented with avizyme.

Regarding feed conversion ratio, results in Table 5 show that, the average values of feed conversion were not significantly affected due to avizyme supplementation compared to unsupplemented one.

The present results are in agreement with those obtained by Ghanem *et al*. (2015). Who indicated that avizyme preparations failed to obtain significant improvement in feed intake and feed conversion ratio

However, contradicting results were obtahned by Eliwah *et al.* (2016) who indicated that avizyme supplementation in broiler chick diets significantly improved feed consumption and feed conversion. Brenes *et al.* (1993) found that addition of roxazyme and avizyme to diets containing bedford barley improved feed to gain ratio by about 5% over 6 weeks period for both male and female broilers.

Interaction effects (dietary DWM levels and avizyme)

Results reflection the averages feed consumption and feed conversion of Japanese quail chicks as affected by the interaction between dietary DWM levels and avizyme supplementation during the different experimental periods are presented in Tables 4 and 5. The interaction effect between dietary DWM levels and avizyme supplementation were not significant on feed consumption and feed conversion through all the different experimental periods. Within any DWM level, avizyme supplementation increased feed intake insignificantly when compared with the groups fed diets without avizyme supplementation. It is worthy to note that, chicks fed on diets contained 30% DWM with avizyme supplementation had the highest feed intake values, while those fed on diets contained 5% DWM with avizyme supplementation had the lowest feed intake.

Petterson and Aman (1989) established that supplementation with anappropriate avizyme can partially degrade feed endosperm cell walls, giving more rapid and extensive digestion of

starch, protein and other nutrients in the small intestine, and consequently a higher feed intake and better feed conversion efficiency. In addition, avizyme supplementation increases the rate of passage, which may improve feed intake (Brenes *et al.,* 1996).

The present results are in agreement with Torki and Ghasemi (2014) who found that the interaction between whole date waste and enzyme supplementation on feed intake and feed conversion were not significant in laying hens.However, Afsharmanesh *et al*. (2016) stated that, there were significant increase in feed intake in broiler chicks given 75g date pits/kg diet with enzyme supplementation uring 21-42 days of the experimental period.

In conclusion, it could be concluded that, DWM could be used in Japanese quail diets up to 30% with enzyme supplementation without adverse effect on their growth performance. These findings justify further research on the effects of adding more different levels of DWM supplemented with different levels of enzyme at different ages on growth performance for Japanese quail are required to attain the optimal results.

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تأثير مسحوق مخلفات البلح العزاوى مع أو بدون إضافة إنزيم الأفزيم على أداء النمو فى السمان الياباني

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صممت تجربه عامليه (٢×٧) اشتملت على ٧ مستويات من مسحوق مخلفات البلح العزاوى (صفر، ٥ ، ١٠، ١٥، ٢٠، ٢٥ و٣٠%) في العليقة ومستويين من الإنزيم (صفر، ١جم/كجم علف) تم استخدام ٤٢٠ كتكوت سمان غير مجنس في عمر أسبوع وتم توزيعهم علي ١٤ معامله تجريبية بكل معامله ٣٠ كتكوت مقسمه علي ٣ مكررات في كل مكررة ١٠ كتكوت تم دراسة أداء النمو (وزن الجسم – الزيادة في وزن الجسم – الزيادة في وزن الجسم – الغذاء المأكول – الكفاءة التحويلية) للسمان الياباني النامي خلال الفترة من ١-٥ أسابيع وقد أظهرت النتائج ما يلي – وزن الجسم عند ٦ أسابيع والزيادة الوزنية خلال ٣-٥ و١-٥ أسابيع من العمر تحسنت معنويا في الكتاكيت التي غذيت علائق تحتوي علي مسحوق مخلفات البلح العزاوى حتي ٣٠%، الغذاء المستهلك زاد زيادة غير معنوية بزيادة مسحوق مخلفات البلح العزاوى في العلائق حتي ٢٠% خلال الفترة من ١-٣ و١-٥ أسابيع من العمر لكنه زاد معنويا بزيادة مسحوق مخلفات البلح من ٢٠-٢٥% أو٣٠% مقارنه بالكنترول و المجاميع التجريبية الأخرى، لم تتأثر الكفاءة التحويلية معنويا بإضافة مسحوق مخلفات البلح العزاوى حتى مستوى ٢٠% فى العليقة لكن بزيادته من ٢٠-٢٥ أو ٣٠ % أدى إلى ارتفاع الكفاءة التحويلية، أدى إضافة الانزيم إلى العلائق إلى تحسن معنوى فى وزن الجسم عند ٦ أسابيع و الزيادة فى وزن الجسم من ١-٥ أسابيع لكن لم يتأثر الغذاء المستهلك والكفاءة التحويلية معنويا بإضافة الانزيم، أظهرت النتائج أن أعلى وزن للجسم والزيادة الوزنية تم تسجيلها للكتاكيت التى غذيت على علائق تحتوى على ٣٠% مسحوق مخلفات بلح مضاف إليها انزيم، يمكن التوصية باستخدام مسحوق مخلفات البلح العزاوى حتى ٣٠ % مع إضافة الانزيم بدون تأثيرات عكسية على معدل أداء النمو للسمان الياباني.

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