Egypt. Poult. Sci. Vol. (43) (III) (523-541) (2023) (2308-1263)

Egyptian Poultry Science Journal

http://www.epsj.journals.ekb.eg/

ISSN:1110-5623(Print)–2090-0570(Online)

USING DATE STONE MEAL WITH OR WITHOUT ENZYMES AS AN ALTERNATIVE FEEDSTUFF IN DUCKS DIETS

M. El-kelawy[1], A. S. El-Shafey[2] and M. S. Refaie [1]
[1]Dep. of Poult. Prod., Fac.of Agric., New Valley Uni., Egypt .
[2]Dep. of Anim. and Poult. Prod., Fac. of Agric., Damanhour Uni., Egypt.

[*]**Corresponding author:** M. El-kelawy[1,*] E-mail: m.elkelawy@gmail.com

Received: 07/08/2023 Accepted: 23 /08/2023

ABSTRACT: A total number of 350 unsexed 7d old ducks were randomly divided among 7 dietary treatments to investigate using date stone meal (DSM) with or without enzymes (EZ) as an alternative feedstuff in duck's diet. Dietary treatments were: the 1st group was used as control and fed control diet contained 0% date stone. Ducks in the 2nd and 3rd, 4th and 5th and the 6th and 7th groups were fed diets contained 10, 15 and 20% DSM either without or with EZ addition, respectively. Results showed that ducks fed basal diet contained DSM at levels of 10%, 15% and 20% and supplemented with EZ had superior ($P \leq 0.05$) live body weight, body weight gain, feed intake, economical efficiency, production index and better feed conversion ratio. As well as, increased serum total protein, albumen, dressing % and total edible parts% compared to those fed diets with DSM without EZ. Ducks fed basal diet contained DSM at level 10% and 15% with EZ supplementation recorded higher significantly ($P \leq 0.05$) crude protein digestibility and serum HDL. While, there were no significantly differences between groups for digestibility of ether extract and apparent ash retention, serum content of globulin, glucose, T3, T4, total lipids, cholesterol, blood hematological indices and immune organs. In conclusion, DSM could be used in ducks diets up to 20% with enzyme supplementation without adverse effect on growth performance, however, DSM at 10 and 15 % with adding enzyme achieve optimum growth performance and economic efficiency during growing period.

Key words: Ducks, date stone meal, enzymes, alternative feedstuff, performance.

INTRODUCTION

In Egypt, ducks play a significant role as a major source of animal protein, whether for meat or egg production (FAO, 2009). However, the development of animal production faces challenges primarily related to the availability and cost of feedstuffs, which account for approximately 55-70% of poultry production expenses (Atteh, 2003). The high cost of conventional feedstuffs, such as corn, due to competition between humans and poultry, has resulted in reduced growth performance and productivity in poultry. Consequently, the shortage and price volatility of feed ingredients have prompted the search for alternative feed sources to address this issue. The inclusion of industrial food wastes in duck diets can serve as a viable replacement for conventional feedstuffs like corn and soybean (Farhat *et al.*, 2001).

In Egypt, date stone meal (DSM) holds the potential to be an alternative energy source in poultry feed ingredients (Tareen *et al.*, 2017).

Date palm (*Phoenix dactylifera L.*) grows in many developing countries and their fruits are well known. According to the FAO, world production of dates was 8.16 mmt in 2018 with Egypt the major supplier (19.5%) of world production. Date palm is rich in minerals and vitamins, with its chemical composition varying based on the nature of the cultivation land. On a dry weight basis, it typically contains about 5-10% moisture, 5-7% protein, 7-10% oil, 10-20% crude fiber, 55-65% carbohydrates, and 1-2% ash (Al-Shahib and Marshall, 2003). Additionally, it is high in fat content (Al-Farsi and Lee, 2008) and contains oils that are rich in oleic acid, which is essential in poultry nutrition (Taha *et al.*, 2013). Date stone meal has been used as a partial replacement for maize or wheat in animal feed formulations, either alone or in combination with organic acids or enzymes supplementation (Daneshyar *et al.*, 2014; Taha *et al.*, 2013; Jaffer, 2010).

Studies have demonstrated that dietary supplementation with date palm components enhances the performance and feed efficiency of poultry (Al-Homidan, 2003; Masoudi *et al.*, 2010). Furthermore, the addition of date fiber at 5% level in broiler diets has been found to improve growth performance (Tabook *et al.*, 2006). Numerous studies have reported positive effects on broiler performance by incorporating date waste meal (DWM) into their diets (Al-Harthi *et al.*, 2009; El-Sheikh *et al.*, 2013; Fadare, 2015). Palm Kernel Cake, derived from the date fruit's pits, kernels, or seeds, is widely used as a source of protein and energy in various livestock species, including rabbit (Orunmuyi *et al.*, 2006), laying hen (Chong *et al.*, 2008) and broiler chickens (Mardhati *et al.*, 2011). These alternatives can help reduce the overall feed costs (Zanu *et al.*, 2012). According to El-Kelawy *et al.* (2020), they was found that incorporating date stone meal into rabbit diets at a level up to 20% with the addition of EZ did not have any negative effects on rabbit performance. Additionally, including up to 10% of date stone meal with EZ resulted in good performance and economic efficiency comparable to the control group, even under the environmental conditions in Egypt.

Hence, the objective of this study is to explore the use of date stone meal with or without enzymes as alternative feedstuff in ducks' diet and examine its effects on growth performance traits, nutrient digestibility and economic efficiency of ducks from 7 to 70 day of age.

MATERIALS AND METHODS

This research was conducted at the Poultry Research Unit (El-Bostan Farm), Department of Animal and Poultry Production, Faculty of Agriculture, Damanhour University, Damanhour, Egypt, from January to March 2023. The objective of this study was to investigate the utilization of date stone meal with or without enzymes as an alternative feed ingredient in the diet of ducks and assess its impact on growth performance, nutrient digestibility, and economic efficiency of ducks from 7 to 70 day of age.

A total of 350 unsexed one-day-old ducks obtained from a commercial hatchery were randomly allocated into seven experimental groups. Each experimental group consisted of 50 ducks distributed among 5 replicates, with each replicate containing 10 ducks. The ducks were reared in floor pens measuring 1.5*1.5m. The ducks of dietary treatments were offered feed according to following: the 1^{st} group served as the control and received a control diet containing 0% date stone. Ducks in the 2^{nd} and 3^{rd} groups were fed diets containing 10% date stone meal, either without or with the addition of enzymes (Kemzyme), respectively. Ducks in the 4^{th} and 5^{th} groups were fed diets containing 15% date stone meal, either without or with the addition of enzymes, respectively. Ducks in the 6^{th} and 7^{th} groups were fed diets containing 20% date stone meal, either without or with the addition of enzymes, respectively. The experimental diets were formulated based on the guidelines provided by NRC (1994). The ingredients and chemical analysis of the experimental diets are presented in Table (1).

All ducklings in the various treatment groups were raised under identical hygienic and managerial conditions. They were housed in well-ventilated brooding facilities and had *ad-libitum* access to feed and water throughout the experimental period, which encompassed the starter phase (1-35 days of age) and the grower-finisher phase (36-70 days of age). Ducks in each replicate were weighed (g) weekly between 7 and 70 d of age, and the BWG (g/duck) was calculated. Feed intake was recorded for each replicate (g/duck) and thereby FCR (g feed/g gain) was calculated. Production index (PI) was measured throughout the experimental period (7-70d of age), according to Attia *et al.* (2012):

$$\text{PI} = \frac{\text{BW (kg)}\ x\ \text{SR}}{\text{PP}\ x\ \text{FCR}}\, x\ 100$$ Where:

EPEI = European Production Efficiency Index. BW = Body weight (kg).

SR = Survival rate (100% - Mortality).

PP = Production Period (days).

FCR = Feed conversion Ratio (kg feed / kg gain).

Thirty-five blood samples were randomly collected at 70 d of age from dietary treatment to determine number of red blood cell (RBC), white blood cell (WBC) and different types of leukocytes according to Hepler (1966). Packed cell volume (PCV %), Hemoglobin (Hgb) concentration and red cell indices (MCH and MCHC) were determined as described by Jain (1986):

Mean Corpuscular Hemoglobin (MCH) (Pg) = HbX10/ RBC's

Mean Corpuscular Hemoglobin Concentration (MCHC) (g/dl) = HbX100/PCV

An Additional fifteen serum samples were obtained also from each treatment at 70 d of age for biochemical analysis using commercial kits. Glucose concentration (mg/dl) according to Trinder (1969), total protein (g/dl) according to Henry *et al.* (1974), albumin (g/dl) according to Doumas (1971), globulin (g/dl) according to Coles (1974) and different types of globulin (α-globulin, β-globulin and γ-globulin) according to Bossuyt *et al*.(2003). Moreover, creatinine and urea were determined using method of Bartles *et al.* (1972), triglycerides according to Fossati and Prencipe (1982), total cholesterol according to Stein (1986), HDL-cholesterol according to Lopez-Virella (1977), and LDL-cholesterol according to Friedewald *et al.*(1972). Alkaline phosphatase (ALP) concentration was determined according to the colorimetric method of Bauer (1982)

Besides, the activity of serum aspartate amino transferase (AST), and serum alanine amino transferase (ALT), were estimated according to Reitman and Frankel (1957) using commercial kits.

Data obtained were analyzed using the GLM procedure (Statistical Analysis System (SAS, 2002), using one-way ANOVA according the following model: Yik= µ+ Ti + eik

Where, Y is the dependent variable; µ is the general mean; T is the effect of experimental treatments; and e is the experimental random error. Before analysis, all percentages were subjected to logarithmic transformation ($\log_{10}x+1$) to normalize data distribution. The differences among means were determined using Duncan's new multiple range test (Duncan, 1955).

RESULTS AND DISCUSSION

Growth performance: The results of growth performance, economical efficiency and production index as affected by different levels of DSM without or with EZ are presented in Table (2). It showed that ducks fed diet included 10% and 15% DSM with EZ had superior ($P \leq 0.05$) BW than those fed diet included 10% and 15% DSM without EZ, but it was not differed when fed 20% DSM with EZ at 35 and 70d of age. Furthermore, the higher ($P \leq 0.05$) values of BWG were found in groups fed diets included 10%, 15% DSM with EZ which were superior ($P \leq 0.05$) than those fed with 10% and 15% DSM without EZ during period 7-35 and 7-70d of age, however, no significant differences were found compared with ducks fed 20% DSM with EZ during same periods. On the other hand, the lower value of BWG was obtained in group fed 20% DSM without EZ than the other groups during 7-35, 36-70 and 7-70d of age.

Results of feed intake showed that there were no significant differences among treatments group during period 7-35d. While, maximum feed intake was observed in control group and groups fed diet included DSM at levels of 10% and 15% with EZ compared to those fed 20% DSM without EZ during period 7-70d without any different with other groups (Table 2).

Results of FCR noted that ducks fed basal diet or diets supplemented with DSM at levels of 10%, 15% and 20% with EZ had better FCR than those fed diet the same levels without EZ during 7-35d and 7-

70d of age. However, the significantly worst FCR ($P \leq 0.05$) was found in group fed diet supplemented with 20% DSM without EZ than all groups during the period from 36-70 d and overall, 7-70d (Table 2).

Results of economical efficiency and production index exhibit that ducks fed basal diet, diet with DSM at levels of 10, 15 and 20% with EZ had better economical efficiency and production index compared to ducks fed diet with 10, 15 and 20%, DSM without EZ, respectively. Moreover, ducks fed 20% DSM without EZ had lower economical efficiency and production index than all other groups (Table 2).

These results agree with Al-Homidan (2003) who found that broiler fed DSM at level of 5,10 and 15% had improved BW and daily gain and reduced feed cost compared to the control group. Al-Saffar *et al*., (2012) conducted that broiler fed diet contains DSM with multienzymes (xylanase, glucanase, cellulase, hemicellulose, protease and amyloglucosidase) had improved growth performance. Also, El-Far *et al*., (2016) found that broiler chickens fed diets containing 2, 4 and 6% DSM improved growth performance. Moreover, Abaza and Omara (2011) and El-Kelawy and El-Kelawy (2016) reported that multienzymes supplementation increased feed intake and improved FCR of rabbits. Tareen *et al.* (2017) found that BW of broiler increased significantly with increasing level of date palm kernel. El-Kelawy *et al.* (2020) reported that rabbits diet supplemented with DSM at levels of 10% and 20% with EZ had superior BW, BWG, economic efficiency, production index and better FCR compared to control group.

Feeding ducks and poultry with date stone meal supplemented with enzymes can potentially contribute to increasing body weight and weight gain. However, it is important to note that the scientific literature specifically exploring the effects of date stone meal and enzyme supplementation on ducks is limited. Most of the available research focuses on poultry, such as broilers and layers.

Date stone meal is rich in carbohydrates, proteins, fiber, and minerals, which can contribute to the overall nutrient density of the feed. These nutrients are essential for growth, muscle development, and weight gain in ducks and poultry (Ravindran, 2013). Also, incorporating date stone meal in their diet can provide an additional energy source, promoting weight gain (Engberg *et al.,* 2006). Moreover, date stone meal contains dietary fiber, which can positively impact gut health and digestion in birds. Dietary fiber can promote the growth of beneficial gut bacteria and enhance nutrient absorption. Improved digestion and nutrient utilization can support weight gain in ducks and poultry (Choct, 2015). Furthermore, enzymes, can be added to the feed along with date stone meal. These enzymes help break down complex carbohydrates and proteins, improving their digestibility and availability for absorption. Enhanced nutrient digestibility can contribute to increased body weight and weight gain (Bedford and Schulze, 1998). On the other hand, El-Deek *et al.* (2010) demonstrated that incorporating up to 10% date stone meal (DSM) in broiler diets had no negative effects on growth performance. Similarly, Jaffer (2010) observed that replacing maize with 0%, 5%, 10%, and 15% of date by-product, with or without enzyme supplementation, did not affect BW, feed intake, FCR, or economic efficiency. These findings suggest that incorporating DSM at levels of 10% or 15% with enzyme supplementation in duck diets could lead to superior BW and BWG. This improvement is attributed to the enhanced nutrient digestibility and utilization facilitated by the enzymes, allowing for the utilization of by-products in poultry nutrition (Daghir, 2008). Furthermore, the increase in feed intake and improvement in FCR resulting from enzyme supplementation lead to increased crude protein (CP) intake and essential amino acids, which are crucial for optimal bird performance (Masoudi *et al.*, 2011). The combination of low price DSM and the higher weight gain of ducklings likely contributes to the improved economic efficiency when DSM is supplemented with enzymes (El-Sheikh *et al.*, 2015).

Apparent digestibility: The results of apparent digestibility as affected by different levels of DSM without or with enzymes are presented in Table (3). Digestibility of dry matter, crude protein and crude fiber are significantly higher ($P \leq 0.05$) in control and 10%DSM with EZ following by those fed 15%DSM with EZ then 10%DSM without EZ and those fed 20%DSM without EZ. On the other hand, it was noted that there was no significant difference among treatments for digestibility of ether extract and apparent ash retention. These results are consistent with the findings of Attia and Al-Harthi (2015), who reported that feeding broiler chickens with date waste at a level of 200 g/kg in the diet did not affect nutrient digestibility, except for a decrease in crude protein (CP) digestibility. Similarly, Ibrahim *et al.* (2010) demonstrated that the addition of a commercial enzyme complex slightly improved the digestibility coefficients of dry matter (DM), crude protein (CP), crude fiber (CF), ether extract (EE), and nitrogen-free extract (NFE) in date stone. El-Kelawy and El-Kelawy (2016) also found that rabbits fed DSM diet with multienzymes had significantly higher digestibility coefficients of DM, CP, NFE, and digestible crude protein (DCP) compared to those fed the control diet. In contrast, El-Deek *et al.* (2010) reported that broiler chickens fed diet supplemented with date stone meal at a level of 150 g/kg diet had no effect on nutrient digestibility. Additionally, Al-Harthi (2006) found that substituting maize with date waste in broiler diets significantly decreased CF digestibility.

The addition of enzymes benefits nutrient digestibility primarily due to the partial degradation of soluble β-glucan, which reduces the viscosity of intestinal contents and improves nutrient absorption (Hesselman and Aman, 1986; Rotter *et al.*, 1989). These findings are also supported by the research of El-Manylawi and El-Banna (2013). The decrease in nutrient digestibility with increasing levels of date stone meal may be attributed to its high CF content, which can reduce the digestibility and availability of nutrients (El-Sheikh *et al.*, 2013). The reduced digestibility of the date stone meal experimental diets without enzymes could be attributed to the high levels of non-starch polysaccharides (NSPs). Fasiullah *et al.*

(2010) reported that exogenous microbial enzymes enhance the digestion of NSPs by breaking down cellulose, hemicellulose, pectins, and lignified complexes, leading to improved feed utilization and growth performance (Garcia *et al.*, 2005; Falcao-e-Cunha *et al.*, 2007).

Blood parameters: The results of biochemical constituents of blood serum of ducks as affected by different levels of DSM without or with EZ are presented in Table (4). It was noted that serum total protein and albumen were significantly higher ($P \leq 0.05$) for groups fed control, 10 and 15% DSM with EZ than those groups fed the same levels without EZ. On the other hand, there is no difference between those fed all DSM levels with enzyme and control. However, there were no significant differences among treatments for serum blood globulin, albumin/globulin, glucose, T3 andT4.

Concerning results of liver function presented in Table (5) showed that there was no significantly difference among treatment groups for AST, ALT, ALT/AST ratio, Creatinine, urea and Urea/ creatinine. Also, data of lipid profile are listed in Table (6). It exhibited that HDL was significantly higher ($P \leq 0.05$) for groups fed control, 10% and 15% DSM with EZ than those fed 10, 15 and 20% DSM without EZ. However, there were no significant differences among treatment groups for total lipids, cholesterol, triglycerides and LDL. Furthermore, data of hematological traits Table (7) showed that there were no significant differences among treatments for hematological traits including hemoglobin, red blood cell, packed cell volume, white blood cells, MCH, MCHC, lymphocytes, monocytes, basophils, eosinophils, heterophils and heterophils / lymphocytes ratio

These findings align with the results reported by Abdel-Fattah *et al.* (2012), demonstrating that the inclusion of crushed date palm did not have an impact on the activities of plasma ALT and AST, thus not affecting liver function in growing Barki lambs. Similarly, Mohammed (2013) observed that supplementing the diet with date palm led to higher levels of serum total protein and albumin. This improvement in biochemical constituents could be attributed to the enhanced utilization of nutrients, particularly protein and sugars found in dates, which are easily digested and absorbed. On the other hand, Masoudi *et al.* (2011) reported that including 20% date pits in broiler diets resulted in increased HDL concentration and decreased LDL concentration.

Carcass characteristics: The results of carcass characteristics of ducks as affected by different levels of DSM without or with EZ are presented in Table (8). It showed that dressing % and total edible parts % were higher ($P \leq 0.05$) in control and 10% DSM with EZ following by those fed 15 and 20% DSM with EZ then 10% DSM without EZ than those fed 20% DSM without EZ. On the other hand, data showed that gizzard% was higher ($P \leq 0.05$) in ducks fed DSM diets with or without EZ than those fed control diet. Moreover, the lower value of abdominal fat % was obtained significantly ($P \leq 0.05$) in ducks fed 10% DSM with EZ than those fed DSM without EZ at level 10%, 15% and 20%, but it was not significant differences with groups fed control, 15% and 20% DSM with EZ. On contrary there were no significant differences among treatments group in the percentages of liver, heart pancreas, proventriculus and immune organs (spleen or thymus).

These findings are consistent with the observations made by Abonyi and Uchendu (2005), who reported that broilers fed a finishing diet containing 20% palm kernel meal exhibited significantly higher final BW and dressing% compared to the control group. Conversely, Osman *et al.* (1995) found that the inclusion of DSM in starter and grower Pekin duckling diets did not significantly affect dressing percentage, but it led to an increase in gizzard%, as well as in the weight and length of the digestive tract. The increase in gizzard% may be an adaptive response of the birds to better digest and fibrous feed associated with high levels of DSM.

IN CONCLUSION

The results of this study indicated that DSM could be incorporated in ducks diets up to 20% with enzyme supplementation without adverse effect on growth, however, DSM at 10 and 15 % with adding enzyme achieve the optimum performance and economical efficiency during growing period.

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

Ingredient	Starter Diets (1-35 d)				Grower-finisher Diets (36-70 d)			
	Control	10% DSM	15% DSM	20% DSM	Control	10% DSM	15% DSM	20% DSM
Corn, Grain, %	59.00	50.40	47.00	42.90	67.00	58.00	53.50	49.70
Soybean Meal, 44%	35.40	28.60	25.40	22.00	27.00	23.00	20.10	16.10
Soybean Oil	1.50	1.60	1.39	1.44	1.34	1.87	2.00	2.00
Corn Gluten Meal, %	0.00	5.00	7.00	9.50	0.00	3.00	5.20	8.00
Sand	0.00	0.30	0.11	0.06	0.56	0.03	0.10	0.10
Date stone meal**	0.00	10.00	15.00	20.00	0.00	10.00	15.00	20.00
Dical. Phos.	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70
Vit + Min. Premix*	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Limestone	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
Common Salt	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
DL-Methionine	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
L-Lysine HCl	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
TOTAL	100.00	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Determined[1] and calculated[2] composition (% as fed basis)								
Dry matter[1]	85.20	85.70	86.00	86.10	85.7	85.95	86.39	86.23
Dry matter[2]	85.97	86.29	86.45	86.62	86.01	86.32	86.48	86.64
ME (kcal/kg)[2]	2910	2910	2910	2910	3000	3000	3000	3000
Crude protein[1]	20.86	20.82	20.79	20.81	17.96	17.93	17.91	17.98
Crude protein[2]	21.00	21.00	21.00	21.00	18.00	18.00	18.00	18.00
Ether extract[1]	3.97	4.42	4.37	4.76	475	5.01	5.12	5.39
Ether extract[2]	4.03	4.56	4.81	5.07	4.66	5.13	5.38	5.66
Crude fiber[1]	3.91	4.39	4.65	4.89	3.54	4.23	4.64	4.87
Crude fiber[2]	3.85	4.45	4.79	5.10	3.42	4.19	4.52	4.80
Calcium[2]	1.08	1.06	1.05	1.04	1.06	1.05	1.04	1.03
Total phosphorus[2]	0.71	0.67	0.65	0.63	0.68	0.64	0.62	0.60
Available phosphorus[2]	0.46	0.44	0.43	0.43	0.45	0.43	0.42	0.41
Lysine[2]	1.22	1.06	0.99	0.91	1.01	0.91	0.84	0.75
Methionine[2]	0.47	0.51	0.52	0.54	0.44	0.45	0.47	0.49

* Vit + Min Premix provides the following (per kg of diet): Vitamin A, 1800 mg retinol; Vitamin E, 6.67 mg d-alpha-tocopherol; menadione, 2.5 mg; Vit D3, 50 mcg cholecalciferol; riboflavin, 2.5 mg; Ca pantothenate, 10 mg; nicotinic acid, 12 mg; choline chloride, 300 mg; vitamin B12, 4 mcg; vitamin B6, 5 mg; thiamine, 3 mg; folic acid, 0.50 mg; biotin 0.2 mg; Mn, 80 mg; Fe, 40 mg; Cu, 4 mg; Se, 0.10 mg.

** contained 91.77% dry matter,7.01 % crude protein, 12.22%crude fiber, 7.65% Ether extract, 2371kcal ME.

*** The same were repeated with 0.01% Enzyme complex (Kemzyme) contains 300 µ/g beta-glucanase , 5000 µ/g cellulase, 450 µ/g alfa amylase and 450 µ/g protease and lipase.

Table (2): Effect of dietary inclusion with different levels of DSM without or with enzymes on growth performance, economical efficiency and production index of ducks during 7-70 days of age.

Items	Dietary groups							SEM	P value
	Control	10% DSM	10% DSM, EZ	15% DSM	15% DSM, EZ	20% DSM	20% DSM, EZ		
Live body weight (g)									
7d	233	226	232	225	228	229	230	3.98	0.76
35d	1445^{a}	1363^{bc}	1443^{a}	1339^{cd}	1432^{a}	1301^{d}	1408^{ab}	17.52	0.005
70d	2717^{a}	2547^{b}	2684^{a}	2509^{b}	2672^{a}	2337^{c}	2610^{ab}	37.36	0.008
Body weight gain (g)									
7-35 d	1212^{a}	1137^{bc}	1211^{a}	1114^{cd}	1204^{a}	1072^{d}	1179^{ab}	17.12	0.006
36-70d	1273^{a}	1184^{a}	1241^{a}	1170^{a}	1241^{a}	1036^{b}	1202^{a}	37.22	0.003
7-70d	2485^{a}	2321^{b}	2452^{a}	2284^{b}	2444^{a}	2108^{c}	2381^{ab}	36.85	0.007
Feed intake (g)									
7-35d	3123	3075	3111	3072	3096	3002	3064	39.38	0.432
36-70d	6457^{a}	6382^{abcd}	6452^{ab}	6357^{cd}	6444^{abc}	6314^{d}	6363^{bcd}	28.69	0.007
7-70d	9579^{a}	9457^{ab}	9563^{a}	9429^{ab}	9540^{a}	9316^{b}	9427^{ab}	54.52	0.023
Feed conversion ratio (g feed/g gain)									
7-35d	2.58^{b}	2.70^{ab}	2.57^{b}	2.76^{a}	2.57^{b}	2.80^{a}	2.60^{b}	0.05	0.007
36-70d	5.09^{b}	5.40^{b}	5.20^{b}	5.54^{b}	5.20^{b}	6.15^{a}	5.29^{b}	0.204	0.02
7-70d	3.86^{c}	4.08^{bc}	3.90^{c}	4.15^{b}	3.91^{c}	4.43^{a}	3.96^{bc}	0.075	0.001
Economical efficiency, Relative economical efficiency and production index									
EC.EF.	44.7^{abc}	40.9^{bc}	47.1^{abc}	40.6^{c}	48.2^{a}	33.7^{d}	47.8^{ab}	2.19	0.001
Relative EC.EF	100.0	91.5	105.4	90.8	107.8	75.4	106.9	-	-
PEI	100.7^{a}	89.3^{b}	98.4^{a}	87.2^{b}	97.8^{a}	75.7^{c}	94.2^{ab}	2.67	0.004

^{a,b,c,d} Means in the same row followed by different letters are significantly different at ($P \le 0.05$); SEM, Standard error of mean. EC.EF.= Economical efficiency, Relative EC.EF= Relative Economical efficiency, PEI= Production efficiency index

Table (3): Effect of dietary inclusion with different levels of DSM without or with enzymes on the apparent digestibility of the nutrients and ash retention (%) of ducks.

Items	Dietary groups							SEM	P value
	Control	10% DSM	10% DSM, EZ	15% DSM	15% DSM, EZ	20% DSM	20% DSM, EZ		
DM	73.4[a]	67.6[abc]	73.6[a]	66.4[bc]	72.0[ab]	62.6[c]	68.1[abc]	2.05	0.005
CP	82.4[a]	78.4[abc]	83.9[a]	69.6[cd]	80.2[ab]	66.4[d]	72.8[bcd]	3.03	0.002
EE	82.4	77.9	81.5	74.0	79.9	72.2	78.5	3.35	0.308
CF	36.9[a]	32.7[bc]	34.6[ab]	30.5[cd]	33.2[bc]	29.2[d]	32.7[bc]	0.97	0.002
AAR	49.8	46.1	49.8	47.2	49.3	46.2	49.7	1.51	0.283

[a, b] Means in the same column followed by different letters are significantly different at ($p \leq 0.05$); SEM, Standard error of means. DM= Dry matter, CP= Crude protein, EE= Ether extract, CF= Crude fiber. AAR= Apparent Ash retention

Table (4): Effect of dietary inclusion with different levels of DSM without or with enzymes on biochemical constituents of blood serum of ducks.

Items	Dietary groups							SEM	P value
	Control	10% DSM	10% DSM, EZ	15% DSM	15% DSM, EZ	20% DSM	20% DSM, EZ		
Total protein (g/dl)	6.50[a]	5.84[bc]	6.32[a]	5.74[bc]	6.28[a]	5.50[c]	6.12[ab]	0.13	0.001
Albumin (g/dl)	3.36[abc]	3.00[d]	3.52[a]	3.08[bcd]	3.42[a]	3.04[cd]	3.32[abcd]	0.11	0.010
Globulin (g/dl)	3.14	2.84	2.80	2.66	2.86	2.46	2.80	0.16	0.166
Albumin/globulin	1.07	1.07	1.26	1.21	1.21	1.24	1.23	0.10	0.675
Glucose (mg/dl)	169	171	177	169	175	168	170	6.36	0.921
T3 (ng/dl)	2.17	2.14	2.13	2.14	2.12	2.11	2.32	0.07	0.461
T4 (ng/dl)	14.0	13.0	13.9	13.9	13.7	13.1	13.0	1.26	0.990

[a,b,]Means in the same row followed by different letters are significantly different at ($p \leq 0.05$); SEM, Standard error of mean; T3= Triiodothyronine; T4= Thyroxine.

Table (5): Effect of dietary inclusion with different levels of DSM with or without enzymes on liver and kidney function of ducks.

Items	Dietary groups							SEM	P value
	Control	10% DSM	10% DSM, EZ	15% DSM	15% DSM, EZ	20% DSM	20% DSM, EZ		
Liver function									
AST (U/L)	52.6	56.2	53.0	55.6	58.0	55.2	55.2	2.69	0.822
ALT (U/L)	60.6	60.4	59.0	63.4	63.4	60.8	61.6	3.26	0.956
ALT/AST ratio	1.16	1.07	1.12	1.14	1.09	1.11	1.11	0.05	0.875
Renal function									
Creatinine(mg/dl)	0.78	0.809	0.766	0.801	0.776	0.811	0.821	0.017	0.076
Urea (mg/dl)	2.25	2.37	2.12	2.21	2.42	2.21	2.21	0.16	0.856
Urea/ creatinine	9.84	8.69	9.75	9.49	9.27	9.41	9.32	0.71	0.942

[a,b,c] Means in the same row followed by different letters are significantly different at ($P \leq 0.05$);. SEM= Standard error of means. AST= Aspartate amino transferase; ALT= Alanine amino transferase.

Table (6): Effect of dietary inclusion with different levels of DSM without or with enzymes on lipid profile of ducks.

Items	Dietary groups							SEM	P value
	Control	10% DSM	10% DSM, EZ	15% DSM	15% DSM, EZ	20% DSM	20% DSM, EZ		
Total lipids (mg/ dl)	559	545	554	553	519	528	493	23.24	0.404
TChol. (mg/ dl)	167	172	161	174	169	170	166	4.17	0.495
TG (mg/ dl)	184	182	183	179	181	179	182	5.04	0.982
HDL (mg/ dl)	48.8^{a}	42.2^{c}	46.4^{ab}	42.0^{c}	45.8^{ab}	41.6^{c}	43.8^{bc}	1.11	0.004
LDL (mg/ dl)	81.5	92.9	78.4	96.0	87.1	92.3	85.9	4.84	0.149

[a,b,c] Means in the same row followed by different superscripts are significantly different at($p \leq 0.05$); SEM= Standard error of means, Chol.= Total cholesterol; TG= Triglycerides; HDL= High-density lipoprotein; LDL= Low-density lipoprotein,

Table (7): Effect of dietary inclusion with different levels of DSM without or with enzymes on Hematological traits of ducks.

Items	Dietary groups							SEM	P value
	Control	10% DSM	10% DSM, EZ	15% DSM	15% DSM, EZ	20% DSM	20% DSM, EZ		
RBC's (10^6/cmm^3)	3.99	3.90	3.80	3.94	3.90	4.09	4.28	0.34	0.967
HB (g/100ml)	12.0	13.0	12.2	12.8	12.4	12.6	12.4	0.42	0.685
PCV %	32.2	37.8	35.4	36.6	33.8	37.0	34.6	1.63	0.233
MCV	81.2	99.7	95.9	97.0	88.9	91.6	84.3	8.46	0.685
MCH (Ug)	30.3	34.3	33.1	33.9	32.5	31.3	30.2	2.79	0.902
MCHC (%)	37.2	34.6	34.5	35.1	36.9	34.1	36.1	0.92	0.123
WBC's (10^3/cmm^3)	27.60	26.6	28.8	28.4	26.2	27.0	27.6	1.32	0.798
Lymphocytes (%)	44.2	43.6	44.4	45.2	42.8	44.0	44.0	1.10	0.844
Monocytes (%)	16.8	15.8	16.2	16.0	16.2	16.0	15.8	0.34	0.425
Basophils, (%)	0.40	0.80	0.40	0.40	0.40	0.60	0.40	0.24	0.850
Eosinophils, (%)	13.6	13.4	12.4	12.6	13.6	13.2	13.4	0.55	0.597
Heterophils, (%)	25.0	26.4	26.6	25.8	27.0	26.2	26.4	1.17	0.930
Hetero/Lympho ratio	0.575	0.611	0.601	0.572	0.634	0.598	0.603	0.04	0.941

[a, b] Means in the same row followed by different letters are significantly different at ($p \le 0.05$); SEM, Standard error of means. HB= Hemoglobin; RBC's= Red blood cell; PCV= Packed cell volume; WBC's= White blood cells.

Table (8): Effect of dietary inclusion with different levels of DSM without or with enzymes on Carcass characteristics of ducks.

Items	Dietary groups							SEM	P value
	Control	10% DSM	10% DSM, EZ	15% DSM	15% DSM, EZ	20% DSM	20% DSM, EZ		
Carcass characteristics									
Dressing,%	70.44^{a}	66.38^{bc}	70.06^{a}	64.62^{cd}	69.16^{ab}	62.30^{d}	67.64^{abc}	1.12	0.001
Total edible parts, %	75.70^{ab}	72.16^{bc}	76.08^{a}	70.72^{cd}	75.18^{ab}	68.46^{d}	73.70^{abc}	1.18	0.005
Liver,%	2.17	2.08	2.25	2.27	2.17	2.22	2.19	0.118	0.941
Gizzard,%	2.55^{b}	3.15^{a}	3.16^{a}	3.19^{a}	3.26^{a}	3.33^{a}	3.30^{a}	0.101	0.001
Heart,%	0.532	0.568	0.628	0.642	0.578	0.616	0.574	0.039	0.446
Pancreas, %	0.304	0.340	0.344	0.342	0.342	0.348	0.346	0.015	0.413
Proventriculus,%	0.218	0.216	0.206	0.234	0.240	0.238	0.244	0.014	0.405
Fat,%	0.396^{ab}	0.430^{a}	0.254^{b}	0.442^{a}	0.312^{ab}	0.440^{a}	0.320^{ab}	0.047	0.042
Intestinal,%	3.21	2.93	3.16	2.74	2.89	2.80	2.74	0.196	0.466
Immune organs									
Spleen,%	0.024	0.024	0.028	0.034	0.024	0.026	0.030	0.003	0.261
Thymus,%	0.310	0.282	0.294	0.310	0.328	0.328	0.296	0.031	0.920

[a,b,c,d] Means in the same row followed by different letters are significantly different at ($P \leq 0.05$); SEM, Standard error of mean.

REFERENCES

Abaza, M. and M. E. Omara 2011. Effect of dietary corn cobs and EZ supplementation on growing rabbits performance. Journal of Production and Development 16(3): 507-527.

Abdel-Fattah, M.S., Afaf A. Abdel-Hamid, Ashgan M. Ellamie, M.M. El-Sherief and M.S. Zedan 2012. Growth rate, some plasma biochemical and amino acid concentrations of Barki lambs fed ground date palm at Siwa Oasis, Egypt. American-Eurasian Journal. Agricultural and Environmental Sciences, 12 (9): 1166-1175.

Abonyi, F. O., and C. N. Uchendu 2005. Effect of graded levels of palm kernel cake finisher diet on broiler performance. Paper presented at: 30th Annual Conference of Nigerian Society of Animal Production (NSAP), 2005 Mar 20_24. Nsukka, Nigeria: University of Nigeria. p. 204- 206.

Al-Farsi, M.A., and C.Y. Lee 2008. Nutritional and functional properties of dates: A. review. Critical Reviews in Food Science and Nutrition, 48(10), 877-887.

Al-Harthi, M.A. 2006. The influence of date waste meal supplemented with enzymes, probiotics or their combination on broiler performance. Egyptian Poultry Science, 26:1031-1055.

Al-Harthi, M. A., A. A. El-Deek, H.M. Yakout and M. AL-Refaee 2009. The nutritive value of date waste meal as a feedstuff for Lohmann Brown pullets and layers. Journal. Poultry Science, 46, 303-312.

Al–Homidan, A.H. 2003. Date waste (whole dates and date pits) as ingredients in broiler diets. Egyptian Poultry Science, 23, 15–35.

Al-Saffar, A.E., Y.A. Attia, M.B. Mahmoud, H.S. Zewell and F.Bovera 2012. Productive and reproductive performance and egg quality of laying hens fed diets containing different levels of date pits with enzyme supplementations. Tropical Animal Health and Production, 45, 327–334.

Al-Shahib, W. and R. J. Marshall 2003. Fatty acid content of the seeds from 14 varieties of date palm *Phoenix dactylifera* L. International Journal of Food Science and Technology, vol. 38, no. 6, pp. 709–712.

Atteh, J.O. 2003. Romancing the chicken: , The sixty inaugural lecture of the University of Ilorin.

Attia, Y. A., El-Tahawy, W. S., Abd Al-Hamid, A. E., Hassan, S. S., Nizza, A., El-Kelawy, M. I. 2012. Effect of phytate with or without multienzyme supplementation on performance and nutrient digestibility of young broiler chicks fed mash or crumble diets. Ital. J. Anim. Sci., 11: 303-308.

Attia, Y.A. and M.Al-Harthi 2015. Effect of supplementation of date waste to broiler diets on performance, nutrient digestibility, carcass characteristics and physiological parameters. European Poultry Science, 79, 1–10.

Bartles, H., Bohmer, M. and Heierli, C. 1972. Serum creatinine determination without protein precipitation. Clin. Chim. Acta 37: 193-197.

Bauer, J.D. 1982. Clinical laboratory methods 9thed . Tne C.V. Mosby Company, 1180 USA

Bedford, M. R., and Schulze, H. 1998. Exogenous enzymes for pigs and poultry. Nutrition Research Reviews, 11(1), 91-114.

Bossuyt, X., Lissoir, B., Mariën, G., Maisin, D., Vunckx, J., Blanckaert, N. and Wallemacq, P.2003. Automated Serum Protein Electrophoresis by Capillarys. Clin Chem Lab Med; 41(5):704–710

Choct, M. 2015. Managing gut health through nutrition. British Poultry Science, 56(4), 483-492.

Chong, C.H., I. Zulkifli and R., Blair 2008. Effects of dietary inclusion of palm kernel cake and palm oil, and enzyme supplementation on performance of laying hens. Asian Australasian Journal of Animal Sciences. 21:1053-1105.

Coles, E. H. 1974. Veterinary clinical pathology . IST ED. 211-213 W.B. saunder, company, Philadelphia, London, Toronto.

Doumas, B. 1971. Colorimetric determination of serum albumin. Clin. Chim. Acta 31: 400-403.

Duncan, D. B. 1955. Multiple range and multiple “F” test. Bio- metrics.11,1-42.

Daghir, N.J. 2008. Feedstuffs used in hot regions. (Daghir, NJ) in “Poultry Production in Hot Climates; CABI: Wallingford, UK,;pp. 160–196.

Daneshyar, F., N. Afzali and H. Farhangfar 2014. Effects of different levels of date pits in broilers feed contaminated with aflatoxin B_1 on broilers performance and carcass characteristic. African Journal of biotechnology, 13(1), 185–193.

El-Deek, A.A., Y.A. Attia and M.A. Al-Harthi 2010. Including whole inedible date in grower-finisher broiler diets and the impact on productive performance, nutrient digestibility and meat quality. Animal, 4, 1647–1652.

El-Far, A.H., H.A. Ahmed and H.M. Shaheen 2016. Dietary supplementation of phoenix dactylifera seeds enhances performance, immune response, and antioxidant status in broilers. Oxidative Medicine Cellular Longevity, 1–9.

El-Kelawy, H. M. and M. I. El-Kelawy 2016. Impact of dietary supplementation with multi enzyme and/or probiotic on growth performance, nutrients digestibility and blood constituents of growing rabbits. Egyptian Journal Nutrition and Feeds, 19 (2): 313-323.

El-Kelawy, M. I. , A. S. El-Shafey and H. A. Hamdon (2020). The effects of date stone meal with or without enzymes supplementation on growth performance, nutrient digestibility and economical efficiency of rabbits. Egyptian Journal of Nutrition and Feeds (2020), 23 (1): 87-98.

El-Manylawi, M. A. and H. M. El-Banna 2013. Effect of feeding date stone meal supplemented with Allzyme® on performance of growing New Zealand Rabbits. Egyptian Journal Animal Production, 50(2):103-109.

El-Sheikh, S. E. M., N. A. Al-Shokiry, A. A. Salama and R.E. Khidr 2013. Utilization of Azzawi date meal in local laying hen diets. Egyptian Poultry Science, 33 (3): 1115-1127.

El-Sheikh, S.E.M., M. H. Mona; A.A. Salama and M. El-Saeed 2015. Effect of using date waste meal asa desert product in ducks feeding. Journal of Advances in Environmental Biology, 9(22) Special, PP: 155-163.

Engberg, R. M., Hedemann, M. S., and Jensen, B. B. 2006. The influence of grinding and pelleting of feed on the microbial composition and activity in the digestive tract of broiler chickens. British Poultry Science, 47(5), 587-598.

Fadare A.O. 2015. Feed utilization of New Zealand white, Californian, Palomino brown and Havana black rabbit in the humid tropics. Sky Journal of Agricultural Research Vol. 4(2):38-41.

Falcao-e-Cunha, L., L. Castro-Solla; L. Maertens; M. Marounek; V. Pinheiro; J. Freire and J.L. Mour 2007. Alternatives to antidote growth promoters in rabbit feeding: A review. World Rabbit Science 15: 127-140.

FAO 2009. Characterization of domestic chicken and duck production systems in Egypt. Prepared by Haitham M. Yakout, Mohamed Kosba and Olaf Thieme. AHBLPromoting strategies for prevention and control of HPAI.Rome.

Farhat, L.N. , E. R. Chavez1 and S. P. Touchburn 2001. Comparison of growth performance, carcass yield and composition, and fatty acid profiles of Pekin and Muscovy ducklings fed diets based on food wastes. Canadian Journal of Animal Science, 81 (1): 107-114.

Fasiullah, M. S., Z. H. Khandaker, K. M. S. Islam, M. Kamruzzaman and R. Islam 2010. Effect of dietary enzyme supplementation on nutrient utilization and growth performance of rabbit. International Journal of Biological Research, 1(3): 17-21.

Fossati, P. and Prencipe, L. 1982. Serum Triglycerides Determined Colorimetrically with an Enzyme that Produces Hydrogen Peroxide. Clinical Chemistry, 28, 2077-2080.

Friedewald, W. T., Levy, R. T. and Frederickson, D. S.1972. Estimation of the concentration of low-density lipoprotein cholesterol in plasma without use of the preparative ultracentrifuge. Clin. Chem. 18: 499-502.

Garcia, A.I., J. Garcia, E. Corrent, S. Chamorro, P. Garcia-Rebollar, C. De Blas and R. Carabano 2005. Effet de l'age du lapin, de la source de protein et de l'utilisationd' enzymessur les digestibilities apparentness de la matiereseche et de la protein brute sur un aliment lapin. In Proc.: ll'emesJournees de la Recherche Cunicole, Paris, France, 197-200.

Hepler O. E. 1966. Manual of clinical laboratory methods. Thomas, sparing field. ILL inois.

Henry, R., Cannon, D. and Winkelman, J. 1974. Clinical chemistry, principles and techniques, 2nd edition, Harper and Row, New York , USA

Hesselman, K. and A. Aman 1986. The effect of Beta-glucanase on the utilization of starch and nitrogen by broiler chicken fed on barley low on viscosity. Animal Feed Science Technology 15:83-93.

Ibrahim, M. R., H. M. El-Banna and M. A. El- Manylawi 2010. Evaluating utilization of ground date stone meal with or without kemzyme in the diets of growing New Zealand rabbits. IV International Date Palm Conference, 15–17 March, 2010, Abu Dubi, UAE. Acta Hort. (ISHS) 882:691-697.

Jaffer, M.J. 2010. Effect of using date by-product with enzyme on performance and blood parameter of Broiler. International Journal of Poultry Science, 9(9), 895-897.

Jain, N.C 1986. Schalm's Veterinary Haematology, 4th edn. Lea and Febiger, Philadelphia, USA, pp. 140-175.

Mardhati, M., H. K. Wong and S. Noraini 2011. Growth performance and carcass quality of broilers fed with palm kernel meal-based rations. Journal of Tropical Agriculture and Food Science, 39:157-166.

Masoudi, A., M. Bojarpour, M. Chaji, M. Eslami and K. Mirzadeh 2010. Economic value of date pits replaced with maize in broiler chicken diet. Journal of Animal and Veterinary Advances, 9, 1578–1581.

Masoudi, A., M. Chaji, M. Bojarpour and K.h. Mirzadeh 2011. Effects of different levels of date pits on performance, carcass characteristics and blood parameters of broiler chickens. Journal of Applied Animal Research, 39(4):399-405.

Mohammed, M.F. 2013. The influence of adding date to broiler diet on performance and blood characters. International Journal of Advanced Biological Research, Vol. 3(4) 2013: 540-544.

National Research Council, NRC 1994. Nutrient requirement of poultry. National Academy Press, Washington, D.C., USA.

Lopez-Virella, M.F., Stone, S., Eills, S. and Collwel, J.A. 1977. Determination of HDL-cholesterol using enzymatic method. Clin. Chem. 23: 882-884.

Orunmuyi, M., G.S.Bawa, F.D. Adeyinka, O.M. Daudu and I.A. Adeyinka 2006. Effects of graded levels of palm kernel cake on performance of grower rabbits. Pakistan Journal of Nutrition, 5:71-74.

Osman, A. M. A., M. A. Toson, A. H. El-Bogdady 1995. Effect of replacing part of starter and grower diets by date stone meal on performance of pekin duckling. The Journal of Agricultural Science, Mansoura University, 20, 2151–2159.

Ravindran, V. 2013. Poultry feed availability and nutrition in developing countries. In Sustainable Food Security in the Era of Local and Global Environmental Change (pp. 365-375). Springer.

Reitman, S. and Frankel, S. 1957. A Method for determination of enzymatic activities. American Journal of Clinical Pathology, 287: 56-58.

Rotter, B. A., R.R. Marquardt, W. Guenter, C. Biliaderis and C.W. Newman 1989. In vitro viscosity measurement of barley extracts as predictors of growth responses in chicks fed barley-based diets supplemented with a fungal enzyme preparation. Canadian Journal Animal Science, 69: 431-439.

Tabook, N., I. Kadim, O. Mahgoub and W. Al-Marzooqi 2006. The effect of date fiber supplemented with an exogenous enzyme on the performance and meat quality of broiler chickens. British Poultry Science, 47, 73–82.

Taha, H.J., F.M. Al-Yasri, M.H. Mayada and F. Alkhilani 2013. Effect of addition different levels of dates flesh (*Phoenix dactyliphera L*) to ration contain probiotic on boiler chickens performance reared under heat stress. International Journal of Advanced Biological Research, 3 (2) 2013: 306-31.

Tareen, M.H., R. Wagan, F.A. Siyal, D. Babazadeh, Z.A. Bhutto, M.A. Arain and M. Saeed 2017. Effect of various levels of date palm kernel on growth performance of broilers, Veterinary World, 10(2): 227-232.

SAS Institute 2002. SAS/STAT User's guide statistics. SAS institute INC., Cary. NC, USA.

Stein, E. A. 1986. Quantitative enzymatic colorimetric determination of total cholesterol in serum or plasma. In: Textbook of Clinical Chemistry. N. W. Tietz, editor. WB. Saunders, Philadelphia, USA Pp. 879-886.

Trinder, P. 1969. Enzymatic colorimetric determination of glucose in serum, plasma or urine. Ann. of Clin. Biochem. 6: 24-26.

Zanu, H.K., J. Abangiba, W. Arthur-Badoo, A.D. Akparibo and R. Sam 2012. Laying chickens' response to various levels of palm kernel cake in diets. The International Journal of Livestock Production, 3(1): 12-16.

Ducks, date stone meal, enzymes, alternative feedstuff, performance.

الملخص العربي

استخدام مسحوق نوى البلح مع أو بدون الإنزيمات كمادة علف بديلة في علائق البط

محمود إبراهيم الكيلاوي[1]، علي سعيد الشافعي[2] ومحمد سيد رفاعي[1]

[1]قسم انتاج الدواجن- كلية الزراعة – جامعة الوادي الجديد - مصر
[2]قسم الإنتاج الحيواني والداجني - كلية الزراعة – جامعة دمنهور – مصر

أجريت هذه الدراسة في وحدة بحوث الدواجن بمزرعة البستان، قسم الإنتاج الحيواني والداجني، كلية الزراعة جامعة دمنهور. هدفت هذه الدراسة إلى تقييم استخدام مسحوق نوي البلح مع أو بدون إضافة الإنزيمات كمادة علف بديلة في علائق البط . تم استخدام عدد 350 بطة غير مجنسة عمر 7 يوم قسمت عشوائيا إلي 7 معاملات غذائية وهي كالتالي المجموعة الأولي: الكنترول صفر % مسحوق نوي البلح . تم تغذية البط في المجموعة الثانية والثالثة، الرابعة والخامسة، والسادسة والسابعة علي علائق تحتوي علي 10، 15 ،20% مسحوق نوي البلح بدون أو مع إضافة الإنزيمات علي التوالي. أظهرت النتائج أن تغذية البط علي علائق تحتوي علي 10، 15، 20% مسحوق نوي البلح مع إضافة الإنزيمات أدت إلي زيادة وزن الجسم، معدل الزيادة في وزن الجسم ، معدل الغذاء المأكول ، الكفاءة الاقتصادية ، دليل الإنتاج وتحسن معدل التحويل الغذائي بالإضافة إلي زيادة البروتين الكلي والألبيومين لسيرم الدم، ونسبة الذبيحة المجهزة ونسبة الأجزاء الكلية المأكولة مقارنة بالمعاملات التي غذيت علي 10 ،15% مسحوق نوي البلح بدون إضافة الإنزيمات. أدت تغذية البط علي علائق تحتوى 10 ،15% مسحوق نوي البلح مع إضافة الإنزيمات إلي زيادة معامل هضم البروتين والكوليسترول عالي الكثافة. بينما لا يوجد أي اختلافات معنوية ما بين المجموعات لمعامل هضم الدهون، معامل هضم الرماد ومحتوي السيرم من الجلوبيولين، الجلوكوز، T3 T4 ، الدهن الكلية ،الكوليسترول ، القياسات الهيماتولوجية للدم والاعضاء المناعية. مما سبق يتضح أنه يمكن استخدام مسحوق نوى البلح في علائق البط حتى نسبة 20٪ مع إضافة إنزيمات دون أن يكون هناك أي تأثير سلبي على أداء النمو. ويمكن تحقيق الأداء الأمثل للنمو والكفاءة الاقتصادية عند استخدام مسحوق نوى البلح بنسبة 10 و 15٪ مع إضافة الإنزيمات خلال فترة النمو.