

The Effect of Partial Replacement of Maize by Date Pits on Broiler Performance

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This experiment was carried out in the poultry farm of the Faculty of Veterinary Medicine, University of Kufa, from 24/10/2016 to 29/11/2017. Two hundred forty unsexed one – day old Ross broiler's chicks were allocated to four treatments in two replicates of 30 chicks each. The treatments were: T1 (control) contained corn without date pits; T2 (5% date pits replacement of corn); T3 (10% date pits replacement of corn); T4 (15% date pits replacement of corn). The results showed that no significant differences in live body weight, feed intake during the periods 0–5 weeks of age while there were significant differences ($p < 0.05$) in feed conversion ratio and the best value recorded in (T1) 1.72 and the lowest in (T4) 1.84 which contained 15% date pits. No significant differences in the percentage of giblets weight, intestinal length, carcass weight, dressing percentage, cut-up parts of carcass. It can be concluded that it is possible to completely replace date pits at 15% for corn without negative effects on dressing percentage and carcass cuts.

Keywords: Date pits, Broiler diet, Chicks, Dressing, cereal.

Poultry feeding is a great bother to poultry industry in Iraq. know that the cost of feed in broiler production could reach 75% of the total operational production cost. Nutritionists have attempted to reduce feed cost by using locally available cheaper unconventional feedstuffs (Alkassar, 2010). A raw material feeding import amounted to 800,000 tones in 2014 So the production of energy rich cereal grains in Iraq for incorporation in poultry feeds is lacking and the industry relies on costly, irregular unguaranteed raw material important. Iraq is the largest producer of dates in the world with 16.492 million date palm trees producing 17.6% of the world date, 676,111 tones in the year 2014) General Statistically Organization – Iraq, 2013).

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The date pits (DP) which produced, especially from the industry of date confectionery could be partly substituted imported corn or other cereals in poultry feed. About 11-18% of date fruit weight is the seed which is composed of carbohydrates, dietary fiber, fat, ash and protein (Hussein et al, 1998). Kamel et al (1981) found that date pits up to 15% added to chicks diets supported growth similar to birds fed control diets. The addition of date pits and date fruits to the diets significantly improved the body weight gain (BWG) of chicks as compared to chicks fed the control diet, after the first 2 weeks of the experiment. In addition, including date pits at 10% level to the finisher diets improved BWG and feed conversion ratio (FCR) of broiler chicks (Hussein et al, 1998). (Vandpopulere et al, 1995) suggested that date pits at levels ranging from 5 – 27% could be included in broiler diets with no deleterious effect on growth performance. (El-Hag, et al, 1995;

Al-Maezooqi *et al.*, 2000) concluded that date fiber could be used up to 15% in broiler and layer diets with no significant reduction in performance. Weight gains of broiler receiving diets containing 10% uncooked date pits were increased as compared to birds fed the control diet (Hussein and Alhadrami, 2003). (Tabook *et al.*, 2006) showed that substitution of corn by 10-15% date fiber in broiler diet significantly decreased nitrogen corrected apparent metabolisable energy (AMEn). They also reported that the inclusion of date fiber in the broiler diets except at 5% depressed average BWG, feed intake (FI) and FCR. (Jumah *et al.*, 1973) found a gradual reduction in BWG of broiler diets included varying levels 0, 5, 15% of date pits. The extracts of date palm flesh and pits have been reported to have free radical scavenging activity (Chaira *et al.*, 2007). The phenols content in date seed oil were also found to be higher than the olive oil and can be a good source for natural phenolic compounds (Besbes *et al.*, 2004c). In another study, 2015 $\frac{1}{4}$ g Gallic acid/g of phenolic content have been directly extracted from the seed of a variety of date fruit (Amany *et al.*, 2012). review had shown that the total tocopherol content of date seed oil found by (Nehdi *et al.*, 2010) is higher than that of olive oil. The review also shown that the antioxidant content in date seed oil is higher than commercial virgin coconut oil (Marina *et al.*, 2009b). The proteins, mineral ions and fat contents in date seeds make it as a valuable ingredient in animal feed production (Ali-Mohamed and Khamis, 2004).

A study conducted by Hussein *et al.* (1998) on chicks diet had shown that the body weight and feed utilization of the chicks improved as the chicks were fed on diet that had been enriched with date seed.

(Aldhaheri *et al.*, 2004) found that the feeding studies using date seed as a part of the diet of Windstar rats gave no effect to the testosterone level of male rats, while the increase in date seed intake by the female Windstar rats caused the estradiol in the rat's serum level to decrease. In addition, the nickel which is toxic to plants and animals have been found to occur in low amount in date seed compared to coffee and barley, which indicate the safety level of the date seed to be used as a food or animal feed ingredient (Ali-Mohamed and Khamis, 2004). Other than the date seed, the date seed oil also found to be beneficial to be used

for the health purpose which is also known as the oleic-linoleic oil is due to the high content of both oleic and linoleic acid (Nehdi *et al.*, 2010). The oleic acid plays an important role for the prevention of the cardiovascular disease. Oleic acid which categorized as long chain fatty acid that is taken in diet is increased the high density lipoprotein (HDL) content in blood, and at the same time lowering the low density lipoprotein (LDL) content (Gilmore *et al.*, 2011). This condition could prevent cardiovascular diseases. A study had been conducted on the effect of sperm quality after supplemented with date seed oil (Fatma *et al.*, 2009). The study that have been carried out on 16 men aged from 25 to 45 years old found that the level of lipid peroxidation of spermatozoa added with date seed oil decreased significantly. They also found that the ability of sperms to initiate the acrosome reaction (when the sperm cells meet the oocyte) have also improved. As a result, the capability of the sperm to fertilize the oocyte is increase, They concluded that the protection against the lipid peroxidation was due to the presence of natural antioxidants in date seed oil. The objective of this study is to investigate the possibility of substitute cheap dates pits as potential alternative for expensive conventional feed using the high carbohydrate content. The response of broiler to partial replacement of corn was studied by taking parameters of broiler growth, feed intake, feed conversion ratios (FCR), and carcass traits during starter and grower periods.

MATERIALS AND METHODS

Experimental procedure

Each experimental group was fed *ad libitum* with its own diet for 42 d. Feed intake, gain weight and feed conversion ratio were determined in each period weekly. The study was conducted according to the International Guidelines for research involving animals (Directive 2010/63/EU), specially slaughtering birds according to the Islamic procedures

Bird husbandry

240 day-old (four groups of 60 chicks each), commercial broiler chicks from the Ross strain were obtained from a private hatchery at Babylon town in middle of Iraq. On arrival at the site of the experiment at the faculty of veterinary

medicine poultry farms (Semi closed house) contained floor pens were weighed (average 38 gm/bird) and divided into four groups of 60 chicks each. The groups were assigned at random to four experimental diets. of 3 replicates, 20 chicks each. Birds of all treatments were reared on similar environmental and management conditions through 35 days of the feeding period. birds were treated and vaccinated according to the recommended practices in commercial operations. Birds were housed on a floor of a suitable size house and were managed as any commercial broiler flock. At the end of 35 days of age, ten birds were taken randomly from each replicate. Chicks were killed according to the routine practices adopted in commercial boiler slaughterhouse. Weights of visceral organs like liver, heart, kidneys, were recorded as percent of live body weight. Total hot carcass weight was recorded then each carcass was split into cuts, each cut and weight was recorded. Weights of wings, neck, head, and feet were also recorded.

Experimental Diet

The experimental rations were formulated at the experiment site. Raw ingredients were bought from local market then mixed into rations to fit the NRC (1994) requirements. Four types of rations were formulated, the starter and the growing diets. The starter diets were fed from day 1 to day 14.

Starting from age of 15 days, growing diets were fed till the end of the experiment (day 35). A controlled conventional diet was composed of soybean, corn, and concentrates. Table (1) shows the chemical analysis of date pits powder, table (2) shows of composition experimental diet which was used for feeding. crush dates pits were incorporated in diets at 5, 10, and 15% replacing corn. The pits are grinding before being fed to animals. The diets used in the experiment as shown in Table (2) were as follows:

1. Basal diet without date pits.
2. Basal diet with 5% date pits.
3. Basal diet with 10 % date pits.
4. Basal diet with 15% date pits.

Date pits was added to replace similar percentages of corn. The food and water was provided *ad-libitum*. All diets were iso calories & iso crude protein.

Dates analysis

Table (1) show The chemical analysis of whole dates was obtained from date pits by a dry

sample weighing 200g. The sample was analyzed to yield information on moisture content, crude protein, ether extract, and total ash according to the procedure of (AOAC), 1998.

Statistical analysis

Statistical analysis of date was performed on the basis of one way analysis of variance (ANOVA). All experimental data were analysis according to SAS as a complete randomized design. All statements of significance are based a probability ($P < 0.05$). The mean values were compared by Duncan's Multiple Range Test.

RESULT AND DISCUSSION

Table (3) and statistical analysis show no significant differences in weight gain trait among all treatment in starter & finisher periods, this mean that nutritive value for date pits closely to corn, this result agreed with (Vandepopuliere *et al.*, 1995) indicated that there was no significant effect in bodyweight at the age of week 3 when date with and without seed was substituted with corn in boiler diet. While our result didn't agreed with many studies (Batal and Parsons, 2004; Taha *et al.*, 2013) and these differences may be due to the strain of broiler and type of treatments. also there was no significant differences in feed intake during starter period, and found that less value 408.6 gm/bird in T4 (15% D.P instead of corn) vs. T1 control diet which recorded 459.5 gm/bird. while in finisher periods appear significant differences trends to control diets (without date pits). the highest feed intake was 3656.4g/bird, and the lowest value in T1 3307.0g/bird, these differences may be due to the less of available energy in date pits because of the birds eat to satisfy their needs of energy. this result agreed with The result agreed with Al-Mafraji *et al.*, 1999, who found significant increase in feed intake due to date pits to broiler diet. A similar result proved by Taha 2013 reported that there is a significant increase in feed intake when date flesh is added to broiler ration under heat stress while (Al-yousif and Vandepopuliere, 1985) didn't find any significant difference between performance characteristics of birds which are fed whole date at levels 8, 16, and 24% and control group. Feed conversion ration didn't differ among all treatment in starter period. while appeared differences in finisher period and the best value recorded in

T1(control) 1.82 g feed/ g gain and the lowest value in T4(15% date pits) 1.96 g feed/ g gain at probability(Pd^{0.05}),this result showed that the nutritive value of corn more than date pits because of less fiber and corn more digestibility than date pits. This result agree with the findings of (Kamel et al, 1981) who indicated that the replacement of maize by whole dates resulted in decreased growth performance and, increased the feed conversion ratio. The result disagree the several

researchers who reported that a good performance of broiler was found when they were fed with diets supplemented with whole dates or date pulp (El-Deek et al., 2010; Hussein et al. 1998).

In general, table(4) showed that (T2) and control treatment(T1) were the best in feed conversion ratio value at age 35 day 1.73,1.72 respectively and no significant differences between them ,however, broilers in T4(15% D.P) recorded the large value (1.84) which was best significantly (p^{0.05})more than T3(1.78),these results mean that feed FCR increased as date pits percent increase in ration,this may be due to increase the fiber percent in diets because of the high percent fiber percent in date pits and this causes exciting more feed in feces with low digestibility.

The level of date pits had no significant effect on carcass cuts (Thighs, Breast, Neck, Wing, Back,feet,head)percentage as shown in table(5). The best weights of carcass were observed of chicks receiving date pits also carcass cuts

Table 1. Approximate composition of date pits (%)

Moisture	10
Crude protein%	7.0
Ether extract %	6.8
Crude fiber %	18.0
Ash %	2.0
NFE %	56.2

Table 2. Starter and finisher experimental diets used in the experiment

Ingredient composition	Treatment							
	T1	Starter diets			T1	Grower diets		
	T1	T2	T3	T4	T1	T2	T3	T4
Yellow corn	58.0	55.1	52.2	49.3	60.0	57.0	54.0	51.0
Date pits	—	2.9	5.8	8.7	—	3.0	6.0	9.0
Soybean meal	35.0	35.0	35.0	35.0	30.0	30.0	30.0	30.0
Protein Conc.*	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Corn Oil	—	—	—	—	3.0	3.0	3.0	3.0
Di calcium phosphate	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Limestone	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Common salt	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Total	100	100	100	100	100	100	100	100
Chemical analysis								
Crude protein%	22.80	22.75	22.70	22.65	20.60	20.55	20.50	20.45
M.E Kcal/kg	2912.00	2912.00	2912.00	2912.00	3130.00	3130.00	3130.00	3130.00
Methionine%	0.51	0.51	0.51	0.51	0.47	0.47	0.47	0.47
Meth+Cys %	0.85	0.85	0.85	0.85	0.80	0.80	0.80	0.80
Lysine%	1.10	1.10	1.10	1.10	0.90	0.90	0.90	0.90
Ca%	1.02	1.02	1.02	1.02	0.92	0.92	0.92	0.92
Available P%	0.54	0.54	0.54	0.54	0.50	0.50	0.50	0.50
Crude fiber%	3.60	4.10	4.60	5.10	3.50	4.00	4.50	5.00
C/P Ratio	127.70	128.00	128.30	128.60	151.90	152.30	152.70	153.00

* The protein concentration(provimi :3304(5%)-Jordan, provided the following per kilogram of diet: ME 2000Kcal;Crude protein 40%;Fat 3%;Fiber 5%;Ca 6.5%;Lys. 3.5%;Aval.P 5.5%;Na 2.5%;Cl 2.4%;Methionine 4.5%;Meth+Cys. 4.9%; vitamin A;200000 IU ;V.D3 60000 IU;V.E 500 mg; V.K 65 mg; V.B1 20 mg;V. B2 110 mg;V.B3 600mg;V.B5 160 mg; V.B6 50mg; V .B9 12mg;V.B1.20 mg;Biotin 2000mg;Choline 8000mg;Fe 880mg;Zn 1250mg;Mn 1240mg;Cu 100mg;Se 4mg;I 18mg;BHT 175 mg;Phytase 20000Iu .

percente . At the same time, these chicks had the lowest weights of non-edible cuts as head and feet. These findings may explain the increased body gain and feed conversion efficiencies observed in the chicks receiving 5,10,15% date pits instead of corn. As indicated earlier, the broiler chicks on date pits diets had the equal quantity of heaviest meat with control treatment (corn without date pits) as indicated by breast or thigh meat contents. There are several factors that affect the dressing percent of an animal, these is the type of diet which will have influence on performance of that animal.

Level of date pits had no significant effect on weights of the edible organs: gizzard, liver, heart, as % live weight (Table 6). Similar findings were reported when broilers were fed diets high in fiber in replacement of corn (Kamel et al., 1981). However, Also, levels of date pits had no significant effect on the percent of of the inedible organs: esophagus, crop, lungs, proventriculus, trachea (Table 6). Weights recorded for these organs were the same as those of broilers consuming regular

broiler diets. However, researchers found that fiber levels had certain influence on gastrointestinal tract and its accessory organs. Abo omar and Gavoret (1995); Rabayaa (2000) and Abu Ghazala (2004) showed the effect of different levels of fiber on these parameters. Even though fiber had variable effects on the measured parameters, fiber differently exerted its effect. The chicks consuming date pits at rate of 15% instead of corn had higher, percent of small intestine compared to control treatment groups, This study results agreed with Similar findings were observed when date pits diets were fed to broiler chicks and in rats receiving a high fiber diets (Dunaif and Sheeman, 1981). The highest percent of large intestine was in the chicks consuming date pits in their diets, while the lowest weights were for chicks consuming the control diet. Similar trend was observed for percent of cecum, where the control chicks had the lowest cecum percent. This results may be due to high fiber levels when fed to monogastric animals, increased the colon and rectum weights (Pekas et al., 1983).

Table 3. Effects of different levels of date pits on the average of broiler performance

Treatments	Starter.W.G (g/bird)1-14 d	Grower.W.G (g/bird) 15-35d	F.I/starter period(g/bird)	F.I grower period(g/bird)	Starter (F.C.R)	Grower (F.G.R)
T1 (control)	370.3	1817.1	459.5	**3307.1b	1.16	1.82c
T2 (5%D.P)	383.1	1820.3	452.0	3367.5b	1.18	1.85c
T3 (10%D.P)	359.4	1850.1	427.6	3515.2a	1.19	1.90b
T4 (15%D.P)	340.5	1865.5	408.6	3656.4a	1.20	1.96a
Significant	N.S*	N.S	N.S	P d 0.05	N.S	P ≤ 0.05

*N.S:mean no significant difference

**Means in the same columns with different superscripts were significantly (p<0.05) Different

Table 4. Accumulative broiler performance at all experimental periods

Treatments	Weight gain 1-35d	Feed intake 1-35d	Feed conversion ratio 1-35d
T1 (control)	2187.4	3766.6 b	**1.72 c
T2 (5%D.P)	2203.4	3819.5 b	1.73 c
T3 (10%D.P)	2209.5	3942.8 a	1.78 b
T4 (15%D.P)	2206.0	4065.0 a	1.84 a
significant	N.S*	N.S	P ≤ 0.05

*N.S:mean no significant difference

**Means in the same columns with different superscripts were significantly (p<0.05) Different

Table 5. Effects of different levels of date pits on broiler dressing & carcass cuts & external organs

Treatments	Livewt.(g)	Carcasswt(g)	D%*	Thighs	Breast	Neck	Wing	Back	Feet	Head
T1 (control)	2225.4	1584.4	71.2	22.5	20.4	5.5	8.3	14.5	4.3	2.6
T2 (5%D.P)	2241.4	1613.8	72.0	22.6	20.3	5.3	8.4	14.3	4.2	2.4
T3 (10%D.P)	2247.5	1620.4	72.1	22.6	20.3	5.3	8.4	14.3	4.2	2.4
T4 (15%D.P)	2244.0	1617.9	72.1	22.6	20.3	5.3	8.4	14.3	4.2	2.3
Significant	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S

*D%: dressing percent

N.S:mean no significant difference

Table 6. Effects of different levels of date pits on broilers visceral organs and gastrointestinal tract segments (Mean as % live weight)

Treatments	Gizzard	Liver	Heart	esophagus	crop	Lung	trachea	proventriculus	SI	cecum
T1 (control)	3.1	2.1	0.58	0.09	0.10	0.58	0.05	0.11	3.9	0.30
T2 (5%D.P)	3.0	2.1	0.6	0.10	0.10	0.59	0.05	0.11	4.1	0.33
T3 (10%D.P)	3.0	2.0	0.6	0.10	0.10	0.60	0.05	0.11	4.3	0.34
T4 (15%D.P)	3.0	2.0	0.6	0.10	0.10	0.61	0.05	0.11	4.7	0.38
Significant	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S

N.S:mean no significant difference

In conclusion, including date pits broiler diet up to 9% showed growth performance comparable to the corn. The advantage in using date pits in broiler feed had positive effect on their performance and will be of no harmful effects and might be economically feasible because of they are an inexpensive feed ingredient found in Iraq.

Our recommendation that date pits are cheap by-products with high energy content that can provide a potential alternative for conventional energy feed ingredients in the poultry industry. This will help reduction of reliance on foreign imports of raw materials, will cope with international policies of relying on agro-industrial by-products for animal feed to reduce competition with man for cereals and to help reducing environmental pollution.

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