



THE PARTIAL AND TOTAL REPLACEMENT OF DATES INSTEAD OF THE WHEAT ON SOME PRODUCTIVE TRAITS OF BROILERS

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Abstract

A total of 240, one day, 40 g weight broiler Ross 308 strain were used, randomly distributed to four treatments with 60 chicks for each treatment, three replicates for each treatment (20 chicks per replicate). The treatments were control without adding (T_1). T_2 , T_3 and T_4 replacement of dates instead of the wheat by 4, 8 and 12% in the basal diet. The results of the study showed a significant improvement ($P \leq 0.05$) on some productive characteristics (body weight, weight gain, feed consumption, feed conversion coefficient, production index) for the powder of dates compared to control treatment. T_3 and T_4 showed a significant superiority ($P \leq 0.05$) which were replaced by 8% and 12% respectively in these traits compared to the first treatment (control) and the second treatment (substituting 4% of the dates), while no significant differences were observed between all the treatments in the mortality.

Key words : Partial and total replacement, dates, wheat, productive traits, broilers.

Introduction

Domestic poultry projects suffer from the difficulty of providing feedstuffs, so nutritionists have begun to look for cheap and available substitute materials to replace wheat and maize, including dates (Al-Farsi, 2006), dates palm that fruit tree had a major role in economic and social life in the arid regions of North Africa and the Middle East (FAO, 2007), there are more than 3000 species of dates in Iraq, Egypt, Morocco, Tunisia and Iran (Al-Gaboori, 2010), as it is produced in very large quantities and surplus from the requirements of the consumer and estimated production in the Arab world by about 3.5 million tons, which constitutes about 80% of the total global production (El-Habba and Al-Mulhim, 2013). Iraq is one of the largest countries producing several types of dates. In 2017, date production was the latest in 618.18 thousand tons (Al-Homidan, 2003), a large proportion of these dates are unfit for human consumption due to its quality degradation estimated at 20% (Al-Ani *et al.*, 2004). Some studies have shown that the date powder contains 8.07% protein, 1.78% fat and 77.54% dissolved carbohydrates (Al-Hiti and Rous, 1978), many amino acids (Sundu *et al.*, 2006), as well as containing many vitamins and minerals (El-sohaimy and Hafez,

2010), dates were one of the richest products with sugars that may exceed 75% of their dry weight, so they are rich in thermal energy (Ismail *et al.*, 2008), the benefits of using dates in poultry diets vary depending on several factors, such as dates, maturity, storage time (Biglari *et al.*, 2009). The objective of this study was to investigate the effect of partial and total replacement of dates instead of the wheat on some productive traits of broilers.

Materials and Methods

Design Experience

This experiment was conducted in the field of poultry at the Research Station and Agricultural Experiments / Faculty of Agriculture / Al-Muthanna University during the period from 2/12/2018 to 7/1/2019, it was built in a 40 x 10 m hall in four-storey batteries. Each floor contains a cage with dimensions of 1.5 x 1 m. A total of 240 broiler chicks Ross 308, one-day age, 40 g weight, were randomly distributed to four experimental treatments with 60 broilers per treatment and three replicates (20 chick / replicate). The treatments were control without adding (T_1). T_2 , T_3 and T_4 replacement of dates instead of the wheat by 4, 8 and 12% in the basal diet, the date powder was substituted for wheat at the age of 14-35 days.

Preparation Dates

The dates were purchased from the local markets. These dates were cleaned and dried for two weeks and then extracted by crush (Morton, 1987), then dried by an electric oven at 60° C (Abdelghani *et al.*, 2004), then mixed with feed ingredients through crunching. The chemical analysis of a sample of dates (Al-Zahdi) extracted from nuclei, dried and grated by taking a sample of (100) g and analyzed in the central nutrition laboratory at Baghdad University and table 1 shows the chemical analysis of dates.

Table 1: Chemical analysis of dates (Al-Zahdi)*.

Materials	Amount	The ratio (%)
Moisture	10.70 g	10,7
Total solids	89.30 g	89,3
Carbohydrates	79.34 g	% 88,84
Proteins	9.60 g	% 3,24
Fiber	4.20 g	% 4,7
Fats	0.63 g	% 0,71
Energy (kilo calories/ 1 kg diets)	3100	-
Potassium	648 mg	-
Phosphorus	105 mg	%
Calcium	103 mg	-
Iron	13 mg	-
Vitamin A	150 mg	-
Niacin	2.2 mg	-
Tryptophan	17 mg	-

*Chemical analysis of date powder was conducted in the nutrition laboratory at the Faculty of Agriculture - University of Baghdad.

Metabolic energy has been calculated according to the formula (Ministry of Agriculture of Scotland, MAFF) which states the following:

$$(\text{Mg / kg dry matter}) = 0.012 \times \text{Crude protein} + 0.031 \times \text{Crude fat} + 0.005 \times \text{Raw fiber} + 0.014 \times \text{Carbohydrate dissolved substances.}$$

Chicks management

Chicks were reared in the four-storey batteries, one floor space is 1.5 m × 1 m. Each floor contains 20 chicken broilers (each floor representing one duplicate per transaction). Temperature was provided using gas incubators with temperature control by a thermometer from one day to the age of marketing (35 days), use the continuous lighting system 23 hours a day during the first three days of the age of chicks with one hour for the purpose of accustoming the chicks and prevent disturbance and congestion and gradually reduced the number of hours of lighting to be 8 hours a day, 21 days to marketing, provide free feed and water to birds (ad

libitum), the birds were fed on two types of diets, the starter was 1-14 days old for all treatments in the experiment. The control birds continued feeding on the initiator's diet for up to 21 days and were replaced with the growth diet for up to 35 days. dates were replaced by 4, 8, 12% in the second, third and fourth transactions, respectively, instead of wheat at the age of 14-35 days as shown in table 2.

The studied production characteristics are the weekly mean weight, weekly weight gain, weekly feed consumption, feed conversion, mortality and production index.

Completely Randomized Design (CRD) was used to study the effect of different coefficients on the studied traits, comparison of the mean differences between the means of the Duncan (1955) multiples test under a significant level of 0.05 and 0.01, SPSS (2010) was used in statistical analysis.

Results and Discussion

Body weight

Table 3 shows no significant differences in body weight between all the different treatments during the first and second weeks. In the third and fourth weeks, a significant increase ($P \leq 0.05$) was observed in T_3 (8% of the date powder replaced the wheat in the diet) and T_4 (12% of the date powder replaced the wheat in the diet) compared to T_2 (4% of the date powder replaced the wheat in the diet) and T_1 (control treatment), with no significant differences between the second treatment and the control treatment on the one hand and between the third and fourth treatment on the other hand. A significant increase ($P \leq 0.05$) continued in the body weight during the fifth week in T_3 and T_4 compared to T_2 and T_1 .

The reason for this significant increase in body weight was that the use of dates powder in the diet improved digestion and absorption, this results in a positive effect on growth and body weight as well as increased palatability of fodder and attracting birds to feed, the results of this study are consistent with the findings of Mansouri *et al.*, (2005); Al-Dawah (2016), they pointed out that the use of date powder in the diet significantly improved the body weight of broilers, that improvement was explained by the fact that dates contain effective compounds that increase the secretion of digestive enzymes, reflected in the digestive efficiency and absorption of feed intake and better growth and thus a better weight gain.

Body gain

Table 4 shows no significant differences between all treatments in the rate of body gain during the first week

Table 2: The composition of the chemical and the analysis during the period of start and end.

Feeding materials	Starter (0-2 weeks)				Starter (2-3 weeks)				Finisher (3-5 weeks)			
	T ₁	T ₂	T ₃	T ₄	T ₁	T ₂	T ₃	T ₄	T ₁	T ₂	T ₃	T ₄
Maize	45.8	45.8	45.8	45.8	12.0	44.0	45.0	43.0	49.8	49.8	49.8	49.8
Wheat	12.0	12.0	12.0	12.0	12.0	8.0	4.0	0	12.0	8.0	4.0	0
Soybeans (48% protein)	35.0	35.0	35.0	35.0	35.0	37.0	36.0	37.0	29.2	29.2	29.2	29.2
Date	-	-	-	-	-	4.0	8.0	12.0	-	4.0	8.0	12.0
The mixture of vitamins and minerals*	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Oil	2.2	2.2	2.2	2.2	2.2	2	2	3	4.0	4.0	4.0	4.0
Limestone	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Diphosphate	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Calcium diphosphate	0.3	0.3	0.3	0.3	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	100	100	100	100
Calculated chemical analysis												
Protein	22.6	22.7	22.5	22.6	22.6	22.4	22.3	22.1	20.0	19.5	19.5	19.5
Energy (kilo calories/ 1 kg diets)	2920	2920	2920	2920	2920	2924	2924	2927	3140	3130	3130	3130
Calcium	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	0.92	0.92	0.92	0.92
Available Phosphorus	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.45	0.50	0.50	0.50
Methionine	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.47	0.47	0.47	0.47
Lysine	1.10	1.10	1.10	1.10	1.15	1.15	1.15	1.15	0.90	0.90	0.90	0.90
Methionine+ Sistine	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.80	0.80	0.80	0.80

* BIRMIX M-25 and its components per 1 kg were: Vitamin E (400.000 IU), vitamin D3 (.000160 IU), vitamin E (1600 IU), vitamin K (80 mg), vitamin B1 (80 mg), vitamin B2 (240 mg), calcium-pantothenate (CAL-PA) Niacin (1400 mg), vitamin B6 (1200 mg), biotin (2 mg), folic acid (40 mg), vitamin B12 (0.4 mg), non-organic calcium phosphate (120.000 mg), phytase (4,000 mg) (20%), energy represented as kg / kg (3000 kcal), no digested lysine (5.71), methionine dehydrated (8.2), chlorine Food salt (5.92). Company address: WWW.birsenkimya.com, bicarbonate phosphate left Of origin contain: 22% inorganic calcium and 18% inorganic phosphorus, the chemical composition calculated on the basis of the installation of feed materials contained in N.R.C (1994).

Table 3: Effect of partial and total substitution of the date powder instead by the wheat in diet on the weekly body weight (g) of broiler± standard error.

Treatment	Age (Week)				
	1	2	3	4	5
T ₁	2.94±159.66	2.42±395.00	5.83±648.15b	8.66±1133.00b	8.66±1785.33b
T ₂	2.42±163.33	3.00±397.40	6.52±662.15b	9.23±1165.00b	11.79±1807.33b
T ₃	3.63±160.83	3.38±398.10	7.21±707.10a	8.14±1256.80a	9.81±1908.00a
T ₄	3.18±161.30	3.68±397.45	6.98±705.50 a	7.76±1251.63a	10.39±1905.00a
Sig.	N.S	N.S	*	*	*

T₁: the control without any replacement. T₂: the date powder to replace instead by the wheat in the diet by 4%. T₃: the date powder to replace instead by the wheat in the diet by 8%. T₄: the date powder to replace instead by the wheat in the diet by 12%. N.S no significant differences. * The different letters within the same column indicate significant differences between the mean at the probability level of 0.05.

and second, while in the third and fourth weeks there was a significant increase ($P \leq 0.05$) in the rate of body gain in T₃ and T₄ compared to T₁ and T₂, with no significant differences between T₁ and T₂ from treatment T₃ and T₄ in the third week on the other hand, there were significant differences ($P \leq 0.05$) between T₁ and T₂ and no significant differences between T₃ and T₄ in the fourth week of birds, no differences were found between all treatments in the fifth week in the same trait, cumulative body gain (1-35) days was the significant increase ($P \leq 0.05$) in T₃ and T₄ compared to T₁ and T₂.

This significant increase in weight was explained by the fact that the dates used in the diet contained many sugars, which have a useful role in obtaining the increase of the larger weight because it is better digestion and absorption of dry matter in the bush, as well as containing antioxidants such as phenols and flavonoids that prevent the formation of free radicals, thus preventing disease and the impact on the health and vitality of birds and get better growth (Puvado and Thaxton, 2000).

Feed consumption

Table 5 Note that there are no significant differences

Table 4: Effect of partial and total substitution of the date powder instead by the wheat in diet on the weekly body gain (g) of broiler± standard error.

Treatment	Age (Week)					Total
	1	2	3	4	5	
T ₁	2.94±119.66	0.51±235.34	253.15±3.40 b	2.82±484.85c	1.73±638.00	c 8.66±1745.33
T ₂	2.42±123.33	0.51±234.01	3.52±264.15b	2.71±502.85b	4.61±641.00	b11.79± 1767.33
T ₃	3.63±120.83	0.57±237.22	3.90±309.00a	a 0.92±549.70	4.04±631.00	a 9.81±1868.00
T ₄	3.12±121.30	0.59±236.15	a 3.32±308.4	0.78±540.12a	5.77±640.00	a 10.39±1865.00
Sig.	N.S	N.S	*	*	N.S	*

T₁: the control without any replacement. T₂: the date powder to replace instead by the wheat in the diet by 4%. T₃: the date powder to replace instead by the wheat in the diet by 8%. T₄: the date powder to replace instead by the wheat in the diet by 12%. N.S no significant differences.

* The different letters within the same column indicate significant differences between the mean at the probability level of 0.05.

Table 5: Effect of partial and total substitution of the date powder instead by the wheat in diet on the weekly feed consumption (g) of broiler± standard error.

Treatment	Age (Week)					Total
	1	2	3	4	5	
T ₁	3.7±180.66	0.98±356.17	5.04±479.24	9.24±921.21	9.49±1224.98a	a 9.79±3162.27
T ₂	2.90±183.75	1.94±355.81	2.27±476.69	0.84±920.16	29.66±1166.00a	a 26.53±3102.42
T ₃	3.20±179.24	1.60±359.10	2.78±480.62	4.52±923.80	12.36±1082.94b	c 15.40±3025.71
T ₄	4.04±180.63	1.48±339.16	4.08±480.42	1.54±923.79	15.12±1100.86a	c 15.68±3044.98
Sig.	N.S	N.S	N.S	N.S	*	*

T₁: the control without any replacement. T₂: the date powder to replace instead by the wheat in the diet by 4%. T₃: the date powder to replace instead by the wheat in the diet by 8%. T₄: the date powder to replace instead by the wheat in the diet by 12%. N.S no significant differences.

* The different letters within the same column indicate significant differences between the mean at the probability level of 0.05.

during the first week, second, third and fourth in all transactions in the experiment, during the fifth week, a significant increase ($P \leq 0.05$) was observed in feed consumption in T₁ and T₂ compared to T₃ and T₄, with no significant differences between T₁ and T₂ on the one hand and between T₃ and T₄ on the other hand, the cumulative feed consumption rate (1-35) days showed a significant increase in the feed consumption rate in T₁ compared with other treatments, the results were consistent with those of Afzal *et al.*, (2006) who observed a significant decrease in the feed consumption rate in the transactions containing the date powder with the increase of dates powder in the diet, moral decline in the feed consumption ratio was explained with the increase in the percentage of dates in the diet to contain the dates on

sugars, Which improves digestion and absorption and stimulates the secretion of digestive enzymes, Improves the digestive efficiency of the dry matter and thus the birds obtain their nutrient requirements in the amount of feed available.

Feed conversion

Table 6 indicates that there were no significant differences in the first and second weeks between all the treatments used in the experiment in the feed conversion coefficient, in the third, fourth and fifth weeks, and cumulative feed conversion (1-35) days, a significant improvement ($P \leq 0.05$) was observed in the food conversion factor in T₃ and T₄ compared to T₁ and T₂, There were no significant differences between T₃ and

Table 6: Effect of partial and total substitution of the date powder instead by the wheat in diet on the weekly feed conversion (g diet/ g weight gain) of broiler± standard error.

Treatment	Age (Week)					Total
	1	2	3	4	5	
T ₁	0.051±1.51	0.05±1.5	0.011±1.85c	0.011±1.90c	0.011±1.92c	c 0.004±1.81
T ₂	0.057±1.49	0.05±1.52	0.012±1.76b	0.020±1.84b	0.012±1.85b	b 0.020±1.75
T ₃	0.052±1.50	0.03±1.51	0.011±1.52a	0.011±1.68a	0.011±1.70a	a 0.005±1.61
T ₄	0.055±1.44	0.02±1.52	0.012±1.53a	0.005±1.69a	0.012±1.72a	a 0.024±1.63
Sig.	N.S	N.S	*	*	*	*

T₁: the control without any replacement. T₂: the date powder to replace instead by the wheat in the diet by 4%. T₃: the date powder to replace instead by the wheat in the diet by 8%. T₄: the date powder to replace instead by the wheat in the diet by 12%. N.S no significant differences.

* The different letters within the same column indicate significant differences between the mean at the probability level of 0.05.

Table 7: Effect of partial and total substitution of the date powder instead by the wheat in diet on the mortality and production index of broiler± standard error.

Treatment	Mortality (%)	Production Index
T ₁	1.66±1.66	276.83±4.72b
T ₂	1.66±1.66	289.18±1.95b
T ₃	1.66±1.66	330.92±5.08a
T ₄	5±2.88	316.73±10.43a
Sig.	N.S	*

T₁: the control without any replacement. T₂: the date powder to replace instead by the wheat in the diet by 4%. T₃: the date powder to replace instead by the wheat in the diet by 8%. T₄: the date powder to replace instead by the wheat in the diet by 12%. N.S no significant differences. * The different letters within the same column indicate significant differences between the mean at the probability level of 0.05.

T₄ with significant improvement ($P \leq 0.05$) in T₂ compared to control treatment.

The reason for this moral improvement in the values of the food conversion coefficient with the increase in the percentage of dates powder in the diet to contain the dates on sugars such as glucose and fructose, which improves digestion and absorption of dry matter, Positively reflected on the digestive efficiency of feed intake and therefore on the feed conversion factor, Obtain greater growth and hence better weight gain with less feed intake than date-free transactions.

Mortality and Production Index

Table 7 shows no significant differences in the mortality among all the transactions in the study, This is due to the absence of significant differences in the use of dates powder in the bush and in different percentages because it contains antioxidants (phenols and flavonoids) as it prevents the formation of free radicals and thus prevent the occurrence of pathological injuries and the impact on the health and vitality of birds and reduce the losses in them (Javanmardi *et al.*, 2003).

The same table indicates a significant increase ($P \leq 0.05$) in the values of the production index with increasing the substitution ratio of the date powder in the diet in favor of T₃ and T₄ compared to T₁ and T₂, The table also shows no significant differences in the values of the production index between T₃ and T₄ on the one hand and between T₁ and T₂ on the other hand. The moral superiority demonstrated by the high levels of dates powder (T₃ and T₄) in the values of the production index compared with the rest of the transactions in the experiment, it is due to the reflection of the moral improvement in the conversion coefficient of food as well as the improvement in body weight with no significant differences in the proportion of losses between

transactions, Reflecting the improvement in the values of the production index (Javanmardi *et al.*, 2003).

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