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EFFECT OF EARLY FEEDING DIET DILUTION BY SPUTTER DATES ON SOME PRODUCTIVE PERFORMANCE OF BROILERS

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Abstract

This study was conducted to determine the effect of early feeding diet dilution by sputter dates on some productive performance of broilers. This experiment was conducted at the poultry farm, Agriculture College, Al-Muthanna University from 2/12/2018 to 7/1/2019. A total of 240, One day, unsexed, broiler Ross 308 were used, in four-story batteries, each floor contains a cage of 1 × 1.5 m, The chicks were randomly distributed to 60 chicks per treatment with three replicates (20 chicks each). The treatments were as follows; T_1: (control treatment), while T_2, T_3 and T_4 feed diluted by the sputter date palm powder by 10, 20 and 30% in the basal diet from 7-21 of bird age respectively. The results of the study showed no significant differences in the production traits (body weight, weight gain, feed consumption and feed conversion coefficient) among all the experiments in the experiment. There was a significant increase ($P \leq 0.05$) in the values of the production index with a significant decrease ($P \leq 0.05$) in the mortality in all the feed dilution treatments compared to the control treatment.

Key words : Early feeding, Diet dilution, Sputter dates, Productive performance, Broilers.

Introduction

The rapid growth and high efficiency of feed conversion to meat shown by modern broiler breeds was the result of the efforts made by specialists in the intensive genetic selection of these breeds as well as their feeding on balanced diets (Al-Gharawi *et al.,* 2018a), This improvement in growth speed negatively affected the immune response of birds and their resistance to metabolic diseases resulting from irregular metabolic processes and imbalance in the acid-alkaline balance of body fluids such as Ascites and sudden death syndrome (Al-Gharawi *et al.,* 2018a), as well as skeletal abnormalities especially in the first three weeks of the of the broiler life (Habib *et al.,* 2019). Therefore, the researchers specialized in the breeding of broilers to search for ways and methods that reduce the negative effects by reducing the growth rate in the early ages of the meat breeds and compensation to the advanced ages of the life of the chickens and called this growth compensatory growth (Al salman and Al-Gharawi, 2019). There are many restriction programs, including the feed dilution program, which aims to reduce energy and protein in the broiler process during the initial stage, with undigested or digestible materials such as oatmeal powder, rice husks, feather powder, sand, oak bark, or digestible materials such as date kernel powder, dried green peel powder or digestible materials but high fiber content such as wheat bran (Al-Zamili *et al.,* 2018). The compensatory growth that occurs when birds return to free nutrition is influenced by many factors, including the genetic of birds, sex and food type (Robinson *et al.,* 1992). Due to the lack of studies in the use of sputter date palm as a diluted material in broiler diets in early ages, this study was established to know the effect on some of the productive characteristics of broilers.

Materials and Methods

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 × 10 m hall in four-storey batteries. Each floor contains a cage with dimensions of 1.5 × 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 T_1: (control treatment), while T_2, T_3 and T_4 feed diluted by the sputter date palm powder by 10, 20 and 30% in the basal diet from 7-21 of

bird age respectively (Table 1).

Table 1: The composition of the chemical and the analysis during the period of start and end.

Finisher (22-35 days)	Starter (1-21 days)	Feeding materials
53.10	44.9	Maize
15.0	18.0	Wheat
27.0	33.0	Soybeans (48% protein)
1.0	1.0	The mixture of vitamins and minerals*
3.0	2	Oil
0.6	0.8	Limestone
0.3	0.3	diphosphate
53.10	44.9	Calcium diphosphate
15.0	100	Total
Calculated chemical analysis		
18.11	20.40	Protein
3118.15	2981.65	Energy (kilo calories/ 1 kg diets)
3.60	3.93	Fiber (%)
0.850	0.930	Calcium
0.45	0.48	available Phosphorus
0.50	0.55	Methionine
1.25	1.35	Lysine

* 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).

The sputter date palm was obtained from Najaf province from the mills industry, where the seeds were removed and then spread to the ground, fluctuated from three to four times a day for twenty days until the humidity dropped to 12%, the dried quantities were then collected and grated in the grater was the diameter of the sieve (sieve) is 2-3 millimeters, in the Agricultural Research and Experiments Station of the Faculty of Agriculture, Al-Muthanna University. Chemical analysis of sputter date palm was analyzed in the National Nutrition Laboratory in Al-Qadisiyah province (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 treatments 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

Table 3 shows the effect of feed dilution on sputter date palm at an early age in the weekly body weight, the table indicates no significant differences during the first week among all the treatments in the experiment, while a significant decrease ($P \leq 0.05$) in the third treatments (20% dilution of the sputter date palm powder for the basal diet) and the fourth treatment (30% dilution of the sputter date palm powder for the basal diet) compared to the control treatment in the second week of bird age, there were no significant differences between the third and fourth treatments on the one hand and between the second treatment and control treatment on the other hand. The reason for this decrease was the fact that the diets of low-energy birds and protein were reduced to reduce the time-wasting powder and with the increased rate of dilution in poultry feed, this result was agreed with the findings of Al-Hayali (2004); Al-Zamili *et al*., (2018); Al-Jiyashi (2018), when the fodder was reduced by sawdust and date seed powder in the diet, indicated a significant decrease in the weighting of the dilution treatments compared to the control treatment, continued moral decline in dilution treatments, compared with control in the rate of body weight in the third week. In the fourth week, the mean differences between the first, second and third treatments disappeared in the body weight, except the fourth treatment, in the fourth week, the mean differences between the first, second and third treatments disappeared in the body weight, except the fourth treatment, showed a significant decrease in the rate of body weight compared to the first and second treatment, there were no significant differences between the third and fourth treatments in the same trait**,** this reduction is explained by the severity of dietary rationing in this

Table 2: Chemical composition of dried sputter date palm powder.

Material	Contents
Humidity (%)	9.00
Dry matter (%)	91.00
Crude protein (%)	6.00
Crude fiber (%)	24.92
Fats (%)	0.95
Soluble carbohydrates (%)	53.60
Ash (%)	5.53
Energy (kilo calories/ 1 kg diets)	2312.70

treatment and its continued effect on body weight in the birds of this treatment compared to other treatments. In the fifth week, there were no significant differences between the weight rates between all the treatments to remove the effect of dietary rationing in the fifth week, thus giving a close weight between all treatments, the result was consistent with Ibrahim *et al.,* (2007) when wheat fodder was reduced by 45, 30, 15% with similar weights at the age of marketing.

Table 4 shows the effect of feed dilution with sputter date palm powder at an early age at the weekly gain (g) of broilers, the table indicates that there were no significant differences in the first week between all the treatments in the experiment. While in the second and third weeks there was a significant decrease ($P \leq 0.05$) in T_4, T_3 and T_2 compared with control treatment**,** the diets fed to the birds were low in energy and protein due to the dilution of the sputter date palm powder, which resulted in reduced nutrients in the diet, which did not meet the requirements of the broilers, but only for maintenance, affecting the rates of body gain in these treatments compared to the control treatment, agreed with Hassanabadi and Moghaddam (2008); Khudair and Ibrahim (2010); Sharma *et al.,* (2012); Al-Gharawi *et al.,* (2018); Al-Jayashi (2018) who observed a significant decrease in the rates of body weight gain during the dietary rationing period. In the fourth week there was a significant increase ($Pd \leq 0.05$) in the rate of weight gain in the treatment of dilution compared to the first treatment (control), with a significant difference between the dilution treatments in the same trait and the same week, the moral increase in the rate of increase in the mitigation treatments for compensatory growth in the birds of these transactions was explained by the expiry of the rationing period and the return of birds to free feeding. In the fifth week, the moral superiority ($P \leq 0.05$) continued in the rate of weight gain for the third and fourth treatments compared to the first and second**.** While there were significant differences ($P \leq 0.05$) between the third and second treatment on the one hand did not show significant differences between the second treatment and the treatment of control on the other hand. Cumulative weight gain (1-35) days showed no significant differences between all treatments, this explained full compensation growth in dilution treatments, the results were consistent with those observed by Ibrahim *et al*., (2007), who obtained similar weights in all the wheat dilution treatments (15, 30, 45%) compared to the weight of the body, full compensatory growth in them

Table 3: The effect of feed dilution by sputter date palm at an early age in the weekly body weight (g) of broilers (mean ± standard error).

Age (week)					Treatments
5	4	3	2	1	
6.81±1765.60	5.31±1134.70 a	5.06±752.65 a	2.55±392.34 a	0.86±132.85	T_1
7.90±1769.85	6.40±1131.60 a	5.88±698.03 b	6.06±370.30 ab	1.21±133.35	T_2
9.97±1774.77	5.40±1124.90ab	7.62±658.83 c	8.83±356.40 bc	1.06±132.60	T_3
11.06±1767.35	7.67±1106.80 b	6.11±621.55 d	9.75±342.70 c	1.50±131.30	T_4
N.S	*	*	*	N.S	Sig.

T_1: the control without any replacement. T_2: feed diluted by the sputter date palm powder by 10% in the basal diet from 7-21 of bird age. T_3: feed diluted by the sputter date palm powder by 10% in the basal diet from 7-21 of bird age. T_4: feed diluted by the sputter date palm powder by 10% in the basal diet from 7-21 of bird age. * The different letters within the same column indicate significant differences between the mean at the probability level of 0.05. N.S: Non-significant.

Table 4: The effect of feed dilution by sputter date palm at an early age in the weekly weight gain (g) of broilers (mean ± standard error).

Total	Age (week)					Treatments
	5	4	3	2	1	
6.81±1726.60	1.50±630.90c	0.24±382.05d	2.54±360.35a	3.75±259.45a	0.86±93.85	T_1
7.90±1730.85	1.50±638.25c	0.51±433.57c	0.17±327.73b	3.11±236.95b	1.21±94.35	T_2
9.97±1735.57	4.75±649.87b	2.51±466.07b	1.21±302.43c	3.92±223.80bc	1.06±93.60	T_3
11.08±1729.01	3.38±660.55a	1.55±485.21a	3.63±278.85d	5.25±211.40c	1.50±91.30	T_4
N.S	*	*	*	*	N.S	Sig.

T_1: the control without any replacement. T_2: feed diluted by the sputter date palm powder by 10% in the basal diet from 7-21 of bird age. T_3: feed diluted by the sputter date palm powder by 10% in the basal diet from 7-21 of bird age. T_4: feed diluted by the sputter date palm powder by 10% in the basal diet from 7-21 of bird age. * The different letters within the same column indicate significant differences between the mean at the probability level of 0.05. N.S: Non-significant.

and therefore gave weights not different from the control treatment at the age of marketing, the results were different with AL-Zamili *et al*., (2018), AL-Gharawi *et al*., (2018) who found that dietary codification had a significant effect on weight gain rates compared to control treatment.

Table 5 shows the effect of feed dilution with sputter date palm powder at an early age at the feed consumption (g) of broilers, the table indicates no significant differences in feed consumption during the first week**.** In the second week there was a significant decrease ($P \leq 0.05$) in feed consumption in the fourth feed reduction treatment compared to the control treatment, no significant differences between the third and fourth treatment on the one hand and between the first and second treatment on the other hand**.** Moral decline ($P \leq 0.05$) in the third week continued in feed consumption in dilution treatments compared to control treatment**,** the appearance of the differences between the first and second transactions, the lack of appearance between the third and fourth in the rate of feed consumption, this decrease in feed consumption in the dilution treatments is explained by the increase in the percentage of fiber and cellulosic substances in them due to the increase in the percentage of sputter dates**,** which leads to an increase in feed intake from feed, which causes the bird to be satisfied with a small amount of feed**,** which reduces the proportions of important nutrients needed by the birds and the result of this adversely affect the growth and non-acceptance of birds for fodder, which increased the proportion of sputter date palm**,** this result was agreed with the findings with Hassanabadi and Moghaddam (2008); Khudair and Ibrahim (2010), who indicated that the reduction of fodder feed diluted with rice fodder and early-age lumber resulted in a significant decrease in the daily feed consumption of dietary dilution compared with the control treatment during the period of food rationing. Feed consumption during the fourth week showed a significant increase ($P \leq 0.05$) in the feed consumption rate in the food reduction treatments compared to the control treatment with significant differences between the same dilution treatments**,** this increase in feed consumption was attributed to the return of birds to free feeding after the end of the rationing period in order to compensate for the shortfall in growth during the period of dietary rationing. Therefore, they ate more feed than control for full compensatory growth**.** In the fifth week and the cumulative feed consumption rate (1-35) days, the differences between all the transactions disappeared, this result came in agreement with Rezaei *et al.,* (2006); Khudair and Ibrahim (2010), who indicated that early-age food rationing with reduced fodder had no significant effect on total feed consumption.

Table 6 shows the effect of feed dilution with sputter date palm powder at an early age at the feed conversion (g diet/g weight gain) of broilers, the table showed no significant differences ($P \leq 0.05$) during the first week between all treatments,

In the second and third weeks, the control treatment was significantly better ($P \leq 0.05$) compared to the dilution dietary treatments. The deterioration of the food conversion factor is due to the high percentage of fiber and cellulose by increasing the dilution rate with sputter dates, which affects the gastrointestinal and nutrient efficiency of intestinal nutrients, lower the rate of increase in weight gain, which reduces the feed conversion factor, this result was agreed with AL-Zamili *et al*., (2018); AL-Gharawi *et al*., (2018); Aljayashi (2018), note that degradation of the food conversion factor occurred during the period of dietary rationing when the feed was diluted with diluted feedstocks, this is explained by the fact that the decline in the efficiency of digestion and absorption of feed diluted with diluted feed materials is high in fiber, which is reflected in growth and increase in weight and thus on food conversion coefficient. In the fourth and fifth weeks, there was a significant improvement ($P \leq 0.05$)

Table 5: The effect of feed dilution by sputter date palm at an early age in the weekly feed consumption (g) of broilers (mean ± standard error).

Total	Age (week)					Treatments
	5	4	3	2	1	
9.27±3016.92	10.22±1121.95	6.46±676.23d	5.83±630.61a	4.57±446.14a	2.19±141.71	T_1
9.69±3013.98	10.73±1110.56	7.62±737.04c	5.62±595.46b	5.31±426.51ab	1.44±143.41	T_2
12.19±3046.35	11.08±1114.50	5.40±794.41b	7.79±550.58c	6.81±416.26bc	1.78±141.33	T_3
13.33±3036.94	13.98±1142.69	6.81±825.97a	7.85±546.55c	7.56±399.54c	2.62±139.68	T_4
N.S	N.S	*	*	*	N.S	Sig.

T_1: the control without any replacement. T_2: feed diluted by the sputter date palm powder by 10% in the basal diet from 7-21 of bird age. T_3: feed diluted by the sputter date palm powder by 10% in the basal diet from 7-21 of bird age. T_4: feed diluted by the sputter date palm powder by 10% in the basal diet from 7-21 of bird age. * The different letters within the same column indicate significant differences between the mean at the probability level of 0.05. N.S: Non-significant.

Table 6: The effect of feed dilution by sputter date palm at an early age in the weekly feed conversion (g diet/ g weight gain) of broilers (mean±standard error).

Total	Age (week)					Treatments
	5	4	3	2	1	
0.003±1.74	0.012±1.77b	0.014±1.76b	0.003±1.74a	0.008±1.71a	0.01±1.50	T_1
0.003±1.74	0.014±1.73ab	0.014±1.69a	0.01±1.81a	0.003±1.79b	0.005±1.51	T_2
0.003±1.75	0.006±1.71a	0.013±1.69a	0.03±1.81a	0.003±1.85c	0.01±1.50	T_3
0.003±1.75	0.014±1.72a	0.012±1.69a	0.05±1.95b	0.01±1.89 d	0.01±1.52	T_4
N.S	*	*	*	*	N.S	Sig.

T_1: the control without any replacement. T_2: feed diluted by the sputter date palm powder by 10% in the basal diet from 7-21 of bird age. T_3: feed diluted by the sputter date palm powder by 10% in the basal diet from 7-21 of bird age. T_4: feed diluted by the sputter date palm powder by 10% in the basal diet from 7-21 of bird age. * The different letters within the same column indicate significant differences between the mean at the probability level of 0.05. N.S: Non-significant.

in the dietary reduction treatments compared to the control treatment for full compensatory growth in birds and compensating the birds for their loss of growth during the period of dietary rationing and the positive effect on the food conversion factor. The cumulative dietary conversion factor (1-35) showed no significant differences between all treatments to achieve full compensatory growth after the period of dietary rationing and to compensate the birds for the shortage that occurred during the dietary rationing period. Therefore, the birds showed a cumulative conversion coefficient along the duration of breeding.

Table 7 shows the effect of feed dilution with sputter date palm powder at an early age at the mortality (%) and production index of broilers, the table shows a significant decrease ($P \leq 0.05$) in the mortality in all the second, third and fourth dilution treatments compared to the control treatment**,** this decrease in morbidity in dilution treatments was explained by slowing down growth during the period of dietary codification and thus increasing the immune response in the bird's body, which reduces or decreases the chance of disease compared with the treatment of free-feeding control**,** the growth rate is high during the period of food rationing compared to the birds of food rationing in early ages and this led to a decrease in the immune response in the body of the bird because of a negative correlation coefficient between immunity and growth and therefore the birds were more vulnerable to injuries and the high percentage of total mortality. In addition, the modern breeds of meat breeds are characterized by rapid growth due to rapid metabolism, making the body need more oxygen necessary for metabolism and rapid metabolism requires a high concentration of thyroid hormone excreted from the thyroid gland, resulting in increased morbidity, thus increased the mortality (Al-Hayali, 2004)**.** As for the values of the production index, the same table indicates a significant increase ($P \leq 0.05$) in the values of the production index of the dilution coefficients compared to the control treatment and the absence of significant differences between the dilution treatments, this finding indicates that the adoption of fodder reduction has a clear effect on improving the values of the production guide and this result is consistent with Willson *et al*., (2002), who noticed a significant improvement in the values of the production guide as a result of feeding the birds on feed diluted with different feedstocks compared to control treatment.

Table 7: The effect of feed dilution by sputter date palm at an early age in the mortality (%) and production index of broilers (mean ± standard error).

Production Index	Mortality(%)	Treatments
236.33 b±5.21	18.33 a±1.66	T_1
281.46 a±4.88	3.33 b±1.30	T_2
284.38 a±5.01	1.67 b±0.50	T_3
283.14 a ±3.32	1.67 b±0.33	T_4
*	*	Sig.

T_1: the control without any replacement. T_2: feed diluted by the sputter date palm powder by 10% in the basal diet from 7-21 of bird age. T_3: feed diluted by the sputter date palm powder by 10% in the basal diet from 7-21 of bird age. T_4: feed diluted by the sputter date palm powder by 10% in the basal diet from 7-21 of bird age. * The different letters within the same column indicate significant differences between the mean at the probability level of 0.05. N.S: Non-significant.

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