The Effect of Adding Different Levels of Inulin During Life Periods On Some Productive Performance Qualities Of Broiler

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Abstract. To assess the use of different levels of Inulin during life periods on the productive performance of broilers. 180 one-day-old un naturalized chicks were bred from ROSS308.. Chicks were randomized to six feeding transactions with three replicates per transaction and ten chicks per repeater according to the Complete Random Design CRD and according to the following: T1: (control treatment) without any addition. T2: addition of 750 mg Inulin/kg feed at the age of 1-3 weeks; T3: addition of 1500 mg Inulin/kg feed at the age of 1-3 weeks, T4: addition of 750 mg Inulin/kg feed at the age of 3 -5 weeks, T5: addition of 1500 mg Inulin/kg feed at the age of 5-3 weeks, T6: addition of 1125 mg Inulin/kg feed at the age of 1-5 weeks. The results showed a significant improvement in body weight, weight gain, feed conversion ratio and production index of the feeding birds in relation to the ratio in which Inulin was added compared to the control group and gave T3,T6 the best results.

Key word: Inulin, Age, Broiler performance.

* Part of the master's thesis of the first author.

Introduction

Poultry projects are an important pillar of countries' national income, as well as the fact that white meat is a rich source of proteins, minerals and vitamins, and as a result of the negative effects of using antibiotics both to treat and stimulate growth, in particular its residues in meat and its impact on the health of consumers from many countries (1). Medicinal herbs and plants and their extracts (2) and (3) which promotes the beneficial microbiology of the birds' digestive tract and misses the opportunity to grow harmful microbiology and thereby strengthen a bird's immune system and increase its production (4), Inulin is now widely used as a bio-probiotic as a potent growth-stimulating material (5). Inulin are polysaccharides found in many plants including dandelion (6) and (7). Inulin has a positive effect on bird health and improves immunity against many diseases (8).

Materials and methods

180 meat chicks were reared at the age of one day, a non-naturalized ross 308 broiler with an average weight of 42 g. The chicks were randomized to six treatments and three

replicates per transaction, 10 birds per replicate, according to the Completely Random Design (CRD). The study used two ready-made samples, one of which was a diet (protein 23.04% and 2945 kcal/kg feed metabolizable energy) in the period from 1 to 21 days of life and another end diet (protein 19.14% 3170 kcal/kg feed metabolizable energy) was used during the period of 22 to 35 days (Table 1). The treatments were as follows: T1: without addition (control), T2: addition of 750 mg

Inulin/kg feed at the age of 1-3 weeks, T3: addition of 1500 mg Inulin/kg feed at the age of 1-3 weeks, T4: addition of 750 mg inulin/kg feed at the age of 3-5 weeks, T5: addition of 1500 mg Inulin/kg feed at the age of 5-3 weeks, T6: addition of 1125 mg Inulin/kg feed at the age of 1-5 weeks. It was *ad libtum* throughout the experiment. The chicks were reared in metal cages, and the size of cage was 120 × 80 cm high and included 18 cages. All administrative measures necessary for breeding have been taken to ensure ideal heat and humidity levels throughout the trial period.

The productive traits of live body weight, weight gain, feed intake, feed conversion ratio, mortality and production index were measured according to (9).

Table (1) components of the relation served in the experiment and its chemical composition.

Material %	starter	grower
Yellow corn	44.2	48.7
wheat	16	20
Bean Soy (48%)	32	22
Protein center (40%)	4	4
Premix (29%)	1	1
Limestone	2	1.5
Vegetable oil	0.5	2.5
Salt food	0.3	0.3
Calculated chemical analysis (1)		
Protein%	19.14	23.04
Energy kcal/kg	3170	2945

(1) The Concentrated Protein imported from Jordan. Company of FAPCO. Containing 2200 kcal / kg, 50% crude protein, 2.5% methionine + cysteine, 3% lysine, 3% phosphorous and 8% calcium

Statistical Analysis

A fully randomized design (One Way ANOVA) was applied to analyze experimental data using the program SPSS (10). Duncan's multiple range tests (11) were also used to assess significant differences between the means at a 0.05 percent level of significance.

Results and discussion

The results of the statistical analysis (Table 2 and 3) showed the effect of adding different levels of inulin on the average weight of the broiler and the increase in the weight of the broiler. A significant increase ($p \leq 0.01$) of the addition of Inulin treatment was in body weight and weight gain. In week (1,2,3,4),the increase ($p \leq 0.05$) was higher in T3 and T6 than in all other treatments. In the fifth week, T6 had the highest significant level ($p \leq 0.05$) in live weight, while a significant increase ($p \leq 0.05$) of T5 and T6 in weight gain was during the fifth week. Whereas cumulative weight gain showed a significant increase ($p \leq 0.05$) for T6 birds of all other treatments and this is may be due to the role of inulin in increasing digestion and absorption of nutrients as it acts as an active substance in stimulating growth (5) and (12). Or because Inulin contains many valuable nutrients such as proteins, vitamins and minerals, as well as many active biocompanics (13). These results are consistent with those of (14) and (12), who proved that the Inulin caused a significant increase in body weight and weight gain.

Table (2) Effect of adding different levels of Inulin on body weight (g) of broiler during different ages (Mean± SE)

Treatments	Age				
	Week 1	Week 2	Week 3	Week 4	Week 5
T1	146.94[b] ± 2.70	408.89[c] ±5.00	917.63[c] ±2.41	1485.97[d] ±1.44	1951.52[e] ±2.40
T2	150.44[b] ±2.28	432.64[b] ±3.75	949.44[b] ±2.37	1524.53[b] ±2.17	1998.39[d] ±5.70
T3	160.41[a] ±3.31	464.47[a] ±3.55	997.05[a] ±4.19	1597.38[a] ±6.29	2092.24[b] ±2.42
T4	146.33[b] ±1.46	403.75[c] ±3.20	917.47[c] ±2.45	1506.15[c] ±2.39	1990.15[d] ±3.70
T5	147.33[b] ±1.19	403.44[c] ±4.03	914.66[c] ±1.23	1511.11[c] ±1.54	2012.98[c] ±4.93
T6	151.94[b] ±1.60	460.14[a] ±3.44	989.16[a] ±3.01	1589.72[a] ±2.57	2098.16[a] ±5.72
Sig. level	*	*	*	*	*

SE: standard error* Different letters vertically are significant at (P<0.05). T1: Control Treatment, T2, Second Treatment (750ml/KG) Inulin at age 1-3 weeks, T3, third transaction (1500 mg/kg) Inulin at age 1-3 week, T4 Fourth transaction (750 mg/kg) Inulin at the age of 5-3 weeks, (1500 mg/kg) inulin at age 5-3 weeks, T6 Sixth treatment: (1125 mg/kg) Inulin at age 1-5 weeks.

Table (3) The effect of adding different levels of Inulin in the rate of weight gain (g) of broiler during different ages (Mean± SE).

Treatments	Age					Cumulative
	Week 1	Week 2	Week 3	Week 4	Week 5	
T1	104.94[b] ± 2.70	261.95[c] ±6.50	508.75[b] ±5.79	568.34[c] ±0.99	465.55[c] ±0.99	1909.52[d] ±2.42
T2	108.44[b] ±2.28	282.19[b] ±4.07	516.80[b] ±2.04	575.08[c] ±3.36	473.87[bc] ±3.66	1956.39[d] ±5.70
T3	118.41[a] ±3.31	304.06[a] ±5.12	532.58 [a] ±2.99	600.33[a] ±2.18	501.86[a] ±4.40	2057.24[a] ±2.42
T4	104.33[b] ±1.46	257.42[c] ±4.67	513.72[b] ±2.90	588.68[b] ±0.24	483.99[b] ±3.32	1948.15[c] ±3.71
T5	105.33[b] ±1.19	256.11[c] ±4.03	511.22[b] ±2.80	596.44[a] ±2.38	501.87[a] ±6.12	1970.98[b] ±4.93
T6	109.94[b] ±1.60	308.19[a] ±2.33	529.02[a] ±2.47	600.57[a] ±3.73	508.44[a] ±8.23	2056.16[a] ±5.73
Sig. level	*	*	*	*	*	*

SE: standard error* Different letters vertically are significant at (P<0.05). T1: Control Treatment, T2, Second Treatment (750ml/KG) Inulin at age 1-3 weeks, T3, third transaction (1500 mg/kg) Inulin at age 1-3 week, T4 Fourth transaction (750 mg/kg) Inulin at the age of 5-3 weeks, (1500 mg/kg) inulin at age 5-3 weeks, T6 Sixth treatment: (1125 mg/kg) Inulin at age 1-5 weeks

Table (4) shows the effect of adding different amounts of Inulin to feed consumption, as the results of the table show, they indicate a significant (P0.05) increase in T1, T4 and T5 treatment on feed consumption during week 1. At week 2 there was no effect on feed consumption between the groups. at week 3 T1, T4 and T5 feed consumption increased. During week 4, T1, T2, and T4 feed consumption increased. At week 5, T1, T4, T5, and T6 increased, and T1, T4, T5 gave the best cumulative feed intake results. This may be due to the role of Inulin in the production of short-chain fatty acids that stimulate the bird's physiological and vital functions, thus contributing to increased nutrient uptake and improved feed intake (15). which was consistent with (14), (12) and (16).

Table (4) The effect of adding different levels of Inulin in the Feed consumption (g) of broiler during different ages (Mean± SE).

Treatments	Age					Cumulative
	Week 1	Week 2	Week 3	Week 4	Week 5	
T1	109.72^{a} ± 2.18	357.91^{a} ±1.97	651.22^{ab} ±7.13	903.97^{ab} ±3.13	1018.14^{a} ±9.44	3040.95^{a} ±16.16
T2	101.41^{b} ±2.27	354.02^{a} ±6.44	647.50^{b} ±5.04	904.13^{ab} ±7.60	977.85^{b} ±6.26	2984.91^{b} ±17.41
T3	102.50^{b} ±3.02	352.52^{a} ±4.96	643.19^{b} ±1.57	884.24^{cd} ±4.56	992.18^{b} ±3.09	2974.63^{b} ±7.99
T4	107.41^{from} ±1.86	349.72^{a} ±3.14	662.44^{a} ±1.67	917.56^{a} ±4.94	997.76^{ab} ±10.47	3034.89^{a} ±8.89
T5	108.25^{from} ±1.52	359.94^{a} ±7.94	662.11^{a} ±3.74	899.58^{bc} ±5.27	1014.36^{a} ±5.09	3044.51^{a} ±10.31
T6	102.16^{b} ±1.92	357.08^{a} ±6.31	643.05^{b} ±2.60	882.36^{d} ±5.07	999.18^{ab} ±4.64	2983.83^{b} ±10.46
Sig. level	*	N.S.	*	*	*	*

N.S. not significant. SE: standard error* Different letters vertically are significant at (P<0.05). T1: Control Treatment, T2, Second Treatment (750ml/KG) Inulin at age 1-3 weeks, T3, third transaction (1500 mg/kg) Inulin at age 1-3 week, T4 Fourth transaction (750 mg/kg) Inulin at the age of 5-3 weeks, (1500 mg/kg) inulin at age 5-3 weeks, T6 Sixth treatment: (1125 mg/kg) Inulin at age 1-5 weeks.

Table 5 indicates the effect of adding different levels of Inulin on the feed conversion ratio of broilers (g feed/g weight gain), and shows a significant improvement ($p \leq 0.05$) on the feed conversion ratio in week 1 of T2, T3 and T6, while in week 2, week 3, week 4 and cumulative weeks, T3 and T6 recorded the best feed conversion ratio. At week 5, T3, T5 and T6 a significantly improved feed conversion ratio was recorded ($p \leq 0.05$) compared to other groups studied. This may be because Inulin, as dietary fiber, affects gut function, improving its function and stimulates physiological and vital functions that contribute to the absorption of nutrients, which in turn improves the efficiency of food conversion (17) and (15) according to a previous study published by (12), (18) and (19).

Table (5) Effect of adding different levels of Inulin on feed conversion ratio (g feed/g weight gain) for broiler during different ages (Mean± SE).

Treatments	Age					Cumulative
	Week 1	Week 2	Week 3	Week 4	Week 5	
T1	1.05[a] ± 0.03	1.37[a] ±0.03	1.28[a] ±0.00	1.60[a] ±0.00	2.19[a] ±0.02	1.60[a] ±0.00
T2	0.94[b] ±0.04	1.25[b] ±0.01	1.25[b] ±0.01	1.57[a] ±0.00	2.06[b] ±0.00	1.53[c] ±0.00
T3	0.87[b] ±0.00	1.16[c] ±0.01	1.21 [c] ±0.00	1.47[c] ±0.01	1.98[bc] ±0.01	1.45[d] ±0.00
T4	1.03[a] ±0.02	1.36[a] ±0.04	1.29[a] 0.00 ±	1.56[a] ±0.00	2.02[b] ±1.97	1.56[b] ±0.00
T5	1.03$_a$ ±0.02	1.41[a] ±0.04	1.30[a] ±0.01	1.51[b] ±0.01	2.02[bc] ±1.97	1.54[b] ±0.00
T6	0.93[b] ±0.02	1.16[c] ±0.01	1.22[c] ±0.00	1.47[c] ±0.01	1.97[c] ±0.02	1.45[d] ±0.00
Sig. level	*	*	*	*	*	*

SE: standard error * Different letters vertically are significant at (P<0.05). T1: Control Treatment, T2, Second Treatment (750ml/KG) Inulin at age 1-3 weeks, T3, third transaction (1500 mg/kg) Inulin at age 1-3 week, T4 Fourth transaction (750 mg/kg) Inulin at the age of 5-3 weeks, (1500 mg/kg) inulin at age 5-3 weeks, T6 Sixth treatment: (1125 mg/kg) Inulin at age 1-5 weeks.

The results of the statistical analysis in table (6) showed that there is no significant effect on mortality and vitality of the chickens fed on relational to which Inulin was added at different levels at the age of 35 days. This is may be due to the beneficial effects of Inulin on bird health and improved disease resistance (8). These results were consistent with (20), (16) and (19). The table showed a significant effect (P≤0.05) on the value of the production index, where T3 increased which did not differ from T6 compared to other experimental treatments. This can be attributed to the use of Inulin in broiler nutrition, which acts as a bioenhancer, leading to beneficial changes in the composition of intestinal fluorescence in favor of beneficial bacteria and stimulation of the immune system from through direct contact with bacteria and their health-promoting products with the cells of the immune system. This reduces the number of deaths and increases the proportion of vitality, reflecting the improvement of the production guide (20).

Table (6) Effect of adding different levels of Inulin in the Mortality (%) and vitality (%) and Production Index of broiler during different ages (Mean± SE).

Transactions	Mortality%	Vitality%	Production Index
T1	5.56[a] ±5.56	94.44[a] ±5.56	330.45[c] ±20.31
T2	5.55[a] ±2.78	94.45[a] ±2.78	353.40[bc] ±9.37
T3	2.78[a] ±2.78	97.22[a] ±2.78	400.80[a] ±10.11
T4	5.55[a] ±2.78	94.45[a] ±2.78	344.73[c] ±10.09
T5	5.55[a] ±2.78	94.45[a] ±2.78	351.61[bc] ±9.43
T6	5.55[a] ±2.78	94.45[a] ±2.78	390.13[ab] ±10.92
Morale level	N.S.	N.S.	*

N.S. not significant. SE: standard error* Different letters vertically are significant at (P<0.05). T1: Control Treatment, T2, Second Treatment (750ml/KG) Inulin at age 1-3 weeks, T3, third transaction (1500 mg/kg) Inulin at age 1-3 week, T4 Fourth transaction (750 mg/kg) Inulin at the age of 5-3 weeks, (1500 mg/kg) inulin at age 5-3 weeks, T6 Sixth treatment: (1125 mg/kg) Inulin at age 1-5 weeks.

Conclusions

It is concluded that adding Inulin in 1500 mg/kg at 1-3 weeks of age and 1125 mg/kg at 1-5 weeks of age has the potential to improve performance traits (body weight, weight gain, feed conversion ratio and performance index in the broiler.

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