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Effect of Adding a Phytogenic Plant Additive (PFA) in some Productive Traits of Broiler Chickens

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Abstract. This experiment was conducted in Poultry house of the Department of Animal Production / College of Agriculture / University of Basrah 19/11/2020 to 23/12/2020to find out the effect of adding the plant additive ((PFA) to feed and water at different time periods on some productive traits of broiler . Two hundred and fifty-two unsexed 1-day-old (ROSS 308) broiler chicks were randomly distributed in 7 groups each one consisting of 3 replicates (12 birds/ replicate) as follows : The results showed that the addition of the phytoogenic to the diet or water led to a significant improvement ($p \leq 0.05$)in the productive characteristics, which included body weight, weight gain, feed intake, and feed conversion coefficient, compared to the control group The results showed that the addition of the phytoogenic to the diet or water led to a significant improvement ($p \leq 0.05$)in the productive characteristics, which included body weight, weight gain, feed intake, and feed conversion coefficient, compared to the control group.

Keywords. Phytogenic, Immunity, Aromatic plants.

1. Introduction

Feed additives are substances added to animal food or to drinking water to improve its quality, promote growth, bypass anti-nutritional factors, absorb toxins and increase body immunity and disease resistance. Therefore, specialists in nutritional sciences tended to use aromatic plants and herbs and their extracts of active substances to stimulate appetite [1-3].

Currently, the use of Phytogenic Plant Additives (PFA), which consists of a group of medicinal plants and their oils, is common due to the fact that these plants possess effective and biologically active substances to stimulate growth, increase production, and reduce mortality as a result of improving the health status of animals and enhance immune system [4-6]. These vegetable additives also contain fat-soluble vitamins (A, D, E, and K), which contribute to increased absorption and digestion of lipoproteins [7].

Aromatic plants and spices contain biologically active substances that stimulate the digestion process and the production of digestive enzymes because they contain many active compounds and chemicals such as anothiol, econol [8,9].

Since aromatic spices and medicinal plants consist of a large number of chemical compounds, therefore, it is likely that these compounds cannot be attributed to a single mechanism of action, but

there are many different mechanisms by which these phenolic compounds work, which are mainly responsible for giving these extracts to these plants the characteristic The mission is as natural antibiotics that do not have any side effects on animals and humans consuming these animals [10-13].

2. Materials and Methods

This study was conducted in the poultry house of the Department of Animal Production / College of Agriculture / University of Basrah and laboratories in Mosul university Ethical approval No. um.VET.2021.5. The chicks were raised in homemade metal batteries consisting of three floors with dimensions of 1 x 1.05 m and a height of 70 cm from the floor. 252 medium meat chicks, weighing 40 g, unsexed, one day old, of the ROSS 308 strain, were randomly distributed in cages with 7 treatments per treatment, 3 replications for each replicate [12], chicks per replicate, according to the complete random design (CRD) [14,15].

The birds were fed on two diets, starting from (1-3) week and contains 23.10% crude protein and 3010 kilocalories/energy representative. A growth leech from the age of 21 days to 35 days contained 20.14% crude protein and 3174 kilocalories/energy represented. Nutrition and provision of drinking water were free and sufficient. Procedures to maintain ideal conditions of heat, humidity and ventilation throughout the study period. PFA was obtained ready by the Austrian company Delacon in the form of dry (powder) and liquid (package) of one liter capacity. The study parameters were the average body weight, cumulative weight gain, conversion feed factor, and feed intake. The average body weight, cumulative weight gain, conversion feed factor, and feed intake.

T1: without any addition (control)،T2: Adding 150-mg dry PFA/kg feed from 1-3 weeks.

T3: Adding 150-mg dry PFA / kg feed from the period (3-5) weeks، T4: add 150 mg dry PFA / kg feed from the period (1-5) weeks، T5: add 3 ml liquid PFA / liter of water for the period (1-3) weeks.

T6: add 3 ml liquid PFA / liter of water for a period (3-5) weeks،T7: add 3 ml liquid PFA / liter of water from the period (1-5) weeks.

Table 1. Percentages of feed materials included in the formation of starter and growth feeds for broiler chickens, and the calculated chemical analysis [14].

Feed Ingredients	Starter diet 1-21 days	Growing diet 22-35 days
Corn	42.75	41.75
wheat	15.0	22.0
Soybean meal 44%	34.5	27.0
Protein Concentrate	5.0	5.0
Vegetable oil	0.8	2.3
Premix (a mixture of vitamins and minerals)	0.2	0.2
Limestone	1.5	1.5
Table salt	0.25	0.25
Total	100	100
Represented energy (kg)/kcal)	3010	3174
Crude protein %	23.10	20.14
Energy: Protein	130.30	157.6
Calcium (%)	0.925	0.988
Available phosphorous %	0.42	0.51
Lysine %	1.35	1.17
Methionine %	0.52	0.49
Methionine % + cysteine %	0.886	0.826
Tryptophan	0.295	0.261

3. Results and Discussion

The results of the statistical analysis Table (2) The effect of adding imported PFA on the body weight (g) of broiler chickens indicated that there were significant differences between the treatments at the level ($P \leq 0.05$), and all treatments had a significant improvement in live body weight compared to the control treatment (without addition) as it was T4 , T7 1983.40 , 1965.43 , respectively, compared to

T1, which amounted to 1737.36 , as the addition of dry and liquid PFA all brought positive results in the live body weight of broiler chickens, and the reason for this is due to the presence of active and biologically active substances in both additions [15]. As the reason for improving liver enzymes and other antioxidant enzymes in the blood serum of birds is due to the active substances present in the plant additive PFA, as it contains natural antioxidants that suppress free radicals and thus reduce oxidative stress, which is beneficial to the general health of birds and thus to the traits Bird productivity [13].

Table 2. Effect of adding imported PFA in feed and water on the average body weight (g) of broiler chickens at the age of 35 days (mean ± standard error).

	Age per week				
Treatments	**1**	**2**	**3**	**4**	**5**
T1	142.3 ± 1.45	341.70 c ± 5.97	800.73 c ± 4.37	1299.03 c ± 8.63	1737.36 c ± 14.20
T2	143.86 ± 2.92	377.06 b ± 8.53	852.03 b ± 1.51	1353.36 b ± 3.31	1806.70 b ± 6.64
T3	143.36 ± 1.21	378.03 b ± 10.57	863.36 b ± 1.68	1362.03 b ± 6.07	1813.37 b ± 5.98
T4	152.78 ± 1.43	442.03 a ± 1.56	928.37 a ± 4.43	1490.73 a ± 6.38	1983.40 a ± 3.29
T5	143.33 ± 1.87	368.40 b ± 6.03	851.70 b ± 3.35	1348.36 b ± 6.00	1803.71 b ± 3.15
T6	143.70 ± 1.65	373.03 b ± 12.98	847.00 b ± 13.00	1358.36 b ± 7.23	1815.00 b ± 7.63
T7	150.36 ± 2.31	417.13 a ± 6.98	903.41 a ± 17.59	1480.13 a ± 5.74	1965.43 a ± 2.60
Significant	N.S	*	*	*	*

* Significance indicates that there are significant differences between the treatments at the level ($P \leq 0.05$).
T1 basic diet without addition (control) ، T2 Add 150 mg dry PFA / kg feed from the period (1-3) week.
T3 Add 150 mg dry PFA / kg feed from the period (3-5) weeks ، T4 Add 150 mg dry PFA / kg feed from the period (1-5) weeks، T5 Add 3 ml of liquid PFA / liter of drinking water during the period (1-3) weeks.
T6 Add 3 ml of liquid PFA / liter of drinking water for a period of (3-5) weeks،T7 Adding 3 ml / liter of liquid PFA to water from (1-5) weeks.

Table No. (3) indicates the effect of imported PFA on the weekly and cumulative weight gain (gm) of broiler chickens, and a significant difference ($P \leq 0.05$) appears between the experimental treatments. (T4, T7) had the highest cumulative weight gain, which amounted to (1886.40,1925.43) respectively, compared to the control treatment T1, which was 1697.36, and the reason is due to the presence of active substances in the commercial PFA, which was reflected in the characteristic of live weight and thus on the weekly cumulative weight gain, as these effective compounds work In a significant way, in the elimination of pathogens, whether in the intestine or in other areas, to get rid of pathogens and toxins, and thus positively affects the health of the animal and its interaction in improving body weight and weight gain [16]. These results agreed with [11]. There was a significant increase in the value of body weight and weight gain of birds fed on diets to which the vegetable additive (PFA) was added.

Table 3. The effect of adding PFA on the weekly and cumulative weight gain (g) of broiler chickens at the age of 35 days.

	Age per week					
Treatments	**1**	**2**	**3**	**4**	**5**	**Cumulative weight gain**
T1	102.33 ± 1.45	199.36 c ± 4.66	459.03 c ± 2.85	457.30 c ± 8.30	397.33 c ± 7.26	1697.36 c ± 14.20

Treatments	Age per week 1	2	3	4	5	Cumulative weight gain
T2	103.86 ± 1.92	234.86 b ± 9.68	473.30 b ± 11.34	501.33 b ± 4.48	453.67 b ± 8.56	1767.00 b ± 6.50
T3	103.36 ± 1.21	234.67 b ± 9.93	485.33 b ± 12.24	498.70 b ± 6.85	454.67 b ± 5.33	1776.74 b ± 5.98
T4	112.78 ± 1.43	289.25 a ± 2.88	486.34 a ± 3.18	622.36 a ± 5.07	495.67 a ± 3.89	1886.40 a ± 3.16
T5	103.33 ± 1.87	225.06 b ± 6.45	483.30 b ± 9.31	496.66 b ± 9.28	455.34 b ± 8.66	1763.69 b ± 2.90
T6	103.70 ± 1.65	229.33 b ± 12.33	473.97 b ± 12.97	511.36 b ± 19.30	465.64 b ± 1.68	1775.00 b ± 7.63
T7	110.36 ± 1.31	266.67 a ± 7.17	486.28 a ± 17.68	626.71 a ± 12.01	535.40 a ± 8.34	1925.43 a ± 2.60
Significant	N.S	*	*	*	*	*

* Significance indicates that there are significant differences between the treatments at the level ($P \leq 0.05$). T1 basic diet without addition (control) T‹2 Addition of 150-mg dry PFA/kg feed during the period (1-3) weeks.T3 Addition of 150-mg dry PFA/kg feed during the period (3-5) weeks‹T4 Addition of 150-mg dry PFA/kg feed during the period (1-5) weeks‹T5 Add 3 ml of liquid PFA / liter of drinking water during the period (1-3) weeks‹T6 Add 3 ml of liquid PFA / liter of drinking water for a period of (3-5) weeks.T7 Adding 3 ml / liter of liquid PFA to water from (1-5) weeks.

Table No. (4) indicates the effect of adding PFA on the feed conversion factor (kg) for broiler chickens and table No.(5) indicates the effect of adding PFA on the feed consumed at the age of 35 days, as the results indicated that there were significant differences between the coefficients of the experiment during the study period, where the best results were in (T4, T7) as they were (1.68 , 1.72) respectively, compared to the control treatment T1, which was 1.93 , then the other coefficients of the experiment were positive in the feed conversion treatment compared to the control treatment, corresponding to a decrease in the amount of feed consumed. So the results indicated that there were significant differences between the coefficients of the experiment during the study period, where the best results were in (T4, T7) as they were (3192.50 , 3278.92) respectively, compared to the control treatment T1, which was 3369.33 . Which indicates the maximum benefit from the amount of wraps ingested by birds, and the reason for this may be attributed to the use of PFA food additives, which contain the same components of medicinal plants, which may be the effective materials contained in these materials have improved the sensory performance of birds by increasing the bird's appetite and corresponding to it Elimination of pathogens and toxins inside the digestive system due to the active chemical substances and biologically active substances in these medicinal plants consisting of PFA, which led to an improvement in live body weight and cumulative weight gain and maximum utilization of the amount of feed consumed and thus increasing the efficiency of feed conversion [17]. These results agreed with [18,19], where they noticed a significant improvement in the feed conversion efficiency of birds fed on diets to which the plant additive (PFA) was added. And a decrease in the amount of feed consumed by birds [20].

Table 4. The effect of adding PFA on the conversion feed factor in kg of broiler chickens at the age of 35 days (mean ± standard error).

Treatments	Age per week 1	2	3	4	5	Total feed conversion efficiency
T1	1.37 ± 0.06	1.62 a ± 0.02	1.72 a ± 0.02	1.79 a ± 0.01	2.70 a ± 0.04	1.93 a ± 0.01
T2	1.32 ± 0.02	1.49 b ± 0.05	1.62 b ± 0.01	1.75 a,b ± 0.05	2.36 b ± 0.04	1.81 b ± 0.04
T3	1.33 ± 0.04	1.45 b ± 0.03	1.58 a,b ± 0.04	1.77 a,b ± 0.02	2.46 b ± 0.08	1.82 b ± 0.02
T4	1.30 ± 0.02	1.42 b ± 0.03	1.33 b ± 0.03	1.37 c ± 0.04	1.80 c ± 0.07	1.68 c ± 0.03
T5	1.34 ± 0.02	1.45 b ± 0.16	1.62 a,b ± 0.01	1.72 a,b ± 0.01	2.42 b ± 0.04	1.81 b ± 0.04

	Age per week					
Treatments	**1**	**2**	**3**	**4**	**5**	**Total feed conversion efficiency**
T6	1.33 ± 0.03	1.45 b ± 0.02	1.62 a,b ± 0.02	1.74 a,b ± 0.03	2.53 b,c ± 0.06	1.85 a,b ± 0.04
T7	1.30 ± 0.02	1.43 b ± 0.02	1.42 a,b ± 0.03	1.60 c ± 0.03	1.92 c ± 0.04	1.72 b,c ± 0.05
Significant	*	*	*	*	*	*

* Significance indicates that there are significant differences between the treatments at the level ($P \leq 0.05$). T1 basic diet without addition (control)، T2 Add 150 mg dry PFA / kg feed from the period (1-3) week.T3 Add 150 mg dry PFA / kg feed from the period (3-5) weeks،T4 Add 150 mg dry PFA / kg feed from the period (1-5) weeks،T5 Add 3 ml of liquid PFA / liter of drinking water during the period (1-3) weeks.T6 Add 3 ml of liquid PFA / liter of drinking water for a period of (3-5) weeks،T7 Adding 3 ml / liter of liquid PFA to water from (1-5) weeks.

Table 5. Effect of adding dry and liquid PFA on the amount of feed intake (g) for broiler chickens at the age of 35 days (mean ± standard error).

	Age per week					
Treatments	**1**	**2**	**3**	**4**	**5**	**Cumulative feed intake**
T1	141.22 ± 5.77	324.33 c ± 11.54	815.40 a ± 17.49	901.66 a ± 7.23	1186.71 a ± 20.24	3369.33 a ± 13.34
T2	137.04 ± 3.57	350.66 b ± 16.17	773.04 a ± 15.14	880.15 b ± 15.22	1073.37 b,c ± 14.56	3214.27 b,c ± 24.15
T3	138.43 ± 4.31	342.66 b,c ± 10.17	768.37 a ± 13.61	886.73 b ± 6.68	1120.09 b ± 40.39	3256.29 b,c ± 25.82
T4	146.97 ± 4.86	394.59 a ± 27.42	658.36 b ± 4.43	958.47 a ± 10.06	1034.11 c ± 30.07	3192.50 c ± 25.21
T5	139.25 ± 3.08	326.84 b,c ± 12.05	781.50 a ± 8.70	860.23 c ± 11.51	1106.59 b,c ± 25.94	3214.42 b,c 34.14
T6	138.62 ± 4.21	335.17 b,c ± 16.00	769.42 a ± 7.88	893.10 b,c ± 29.37	1163.74 b ± 31.77	3300.07 b,c ± 20.02
T7	144.00 ± 3.50	384.04 a ± 7.81	690.03 b ± 30.53	1010.78 a ± 39.83	1050.07 c ± 50.77	3278.92 c ± 117.03
Significant	N.S	*	*	*	*	*

* Significance indicates that there are significant differences between the treatments at the level ($P \leq 0.05$). T1 basic diet without addition (control)، T2 Addition of 150-mg dry PFA/kg feed during the period (1-3) weeks.T3 Addition of 150-mg dry PFA/kg feed during the period (3-5) weeks،T4 Addition of 150-mg dry PFA/kg feed during the period (1-5) weeks،T5 Add 3 ml of liquid PFA / liter of drinking water during the period (1-3) weeks،T6 Add 3 ml of liquid PFA / liter of drinking water for a period of (3-5) weeks.T7 Adding 3 ml / liter of liquid PFA to water from (1-5) weeks.

Conclusion

All treatments where PFA was added to the feed and water dominated the control treatment (nil PFA) as to the live body weight, weight gain, Feed Conversion ratio, reduction in feed intake, increase of production index, mortality and increased of measure of economic efficiency of the diet.

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