Comparative effectiveness of organic additives and antibiotics in enhancing meat quality and production performance of broiler chickens

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ABSTRACT

This study aims to compare the effectiveness of commercially available Biofactor (BF) water additives and antibiotics (AB) such as Florfenicol, Neomycin sulfate (30.76%), Tylosin, and Enrofloxacin compared to the control group. During the Experimental Periods, the present study investigates a significant increase in the BF group in total Live Body weight (LBW) with 2057.00 gm/bird compared with 1896.28 and 1924.28 gm/bird in control and AB groups, respectively. Furthermore, there is a significant increase in carcass weight (CW) in the BF group with 1608.29 gm/bird compared with 1422.67 and 1526.29 gm/bird in the control and AB groups, respectively. Moreover, the feed intake and feed conversion ratio (FCR) was the best in BF group compared with the control and AB groups. Also, A higher effective intramuscular fat (IMF) content was observed in BF group meat than in the control and AB groups. The lightness (L*) value was significantly highest in BF meat than in control and AB meat. The present research indicates that adding BF additives to water is an alternative to using antibiotics to enhance the productive performance and meat quality in -Arbor Acres-broiler chicks.

Keewords: broiler; Biofactor; antibiotics; intramuscular fat; and meat quality.

INTRODUCTION

The world's population is expected to increase and reach nine billion in 2050. With 70 percentage more food production needed, utilizing finite natural resources like water and agricultural land. Moreover, adapting to potential climate change food security will become a significant concern (FAO *et al.*, 2021)

Food needs rise as a result of the world population's rapid growth. The need for animal feeds, essential to nutrition, is continuously increasing (Yenilmez and Emine, 2014). Poultry meat is essential for people's daily lives since it contains a lot of protein, fat, and trace nutrients. People are becoming increasingly interested in organic meat poultry as their standard of living rises (Fanatico *et al.*, 2005 and Ponte *et al.*, 2008). Breeding for meat poultry has concentrated on increasing growth rates and breast and thigh meat yields. However, the significant increase in these features has been followed by a drop in the quality of broiler meat and in some areas, a decrease in consumer acceptance of the meat (Berri *et al.*, 2001 and Du *et al.*, 2010)

Antibiotics successfully combat infectious diseases and enhance feed efficiency (Engberg *et al.*, 2000). These substances, as well as antibiotic residues in food and the environment (Furtula *et al.*, 2010 and Forgetta *et al.*, 2012), have increased antibiotic resistance (Carvalho and Santos, 2016 and Gonzalez Ronquillo and Angeles Hernandez, 2017). The extensive use of antibiotics and other medications in the livestock production process not only alters the intestinal micro-ecosystem but also leads to the formation of pathogenic bacteria resistant to antimicrobials, posing a severe threat to animal husbandry and human health (Phillips *et al.*, 2004 and Gong *et al.*, 2014).

Scientists are concerned about the threat of antibiotics to human and animal health. Some ideas for reducing antibiotic use in chicken farms can be borrowed. Natural substances with similar favorable effects to growth promoters have been the subject of extensive research. These options aim to reduce animal mortality and increase meat yield while protecting the environment and consumer health. Probiotics, enzymes, organic acids, immunostimulants, bacteriocins, phytogenic feed additives, phytoncides, nanoparticles, and oils are among the most popular (Diarra and Malouin, 2014 and Ghasemi *et al.*, 2014). This work aims to compare the effectiveness of commercially available Biofactor water additives and antibiotics in animal productive performance parameters and meat quality indicators in -Arbor Acres- broiler chicks.

MATERIALS AND METHODS

This study was conducted at the Poultry Research Station, Faculty of Agriculture, Al–

Azhar University, Nasr City, Cairo, Egypt, between April 2021 and June 2022.

This investigation assessed the adding Biofacter (BF) additives to water (saccharomyces cerevisiae extract, beta-glucan, mannan oligosaccharides, organic acids, vitamins, and minerals) as alternative feed additives to alternate antibiotics.

So, productive performance parameters were measured, including carcass characteristics and meat quality, such as chemical composition analysis and meat color of Arbor Acres- broiler chicks.

Experimental design and treatments

A total of 63 one-day-old broiler chicks (Arbor Acres) (average weight of 38 g) were obtained from a commercial hatchery. Water and feed were provided *ad libitum* until two days of age. After that, birds were divided into three groups with three replicates per treatment; every replicate consisted of 7 birds per replicate. All birds that received a commercial diet exceeded the nutrition requirements (Table1).

Experimental diets and water consumption:

There was a two-phase feeding schedule, with a starting diet until age of 21 days and a grower diet until 35 days of age. The two basal diets' makeup is shown in **Table (1).** The same batch of ingredients was used to produce the meals for each period, and each diet within a period had the same components. Diets were formulated according to broiler nutrition requirements. In order to avoid any deficiency of essential amino acids, minerals, and vitamins, the diets were provided with a synthetic amino acid, including hydroxy L-Lysine and DL-Methionine, and pre-mix at the recommended levels to meet the need of requirements. During all periods, broilers were provided unlimited water and feed *ad libitum*. Birds were divided into three groups with three replicates per treatment; every replicate consisted of 7 birds per replicate. The control group was fed the basal diet without any growth promoter addition to water; the Antibiotic (AB) group (G1): was fed the basal diet supplemented with antibiotics to water during the brooding period from 3 to 10 days of age only (Table 2). Biofactor (BF) group (G2) was fed the basal diet supplemented with Biofactor additive to water (50 ml of the BioFactor (BF) compound per liter of water) eight hours before use to ferment the compound. The compound content is available in (Table 3).

Medical care and vaccination program

All groups were vaccinated with the recommended vaccination for broilers. All groups were given multi Vit. (AD3E) by a dose of 1mL/L and minerals by 5mL/L of drinking water twice weekly and repeated in need.

Productive performance measurements

Weekly live body weights (LBW) of chickens and feed intake (FI) were recorded during all periods. Thus, body weight gain (BWG) and feed conversion ratio (FCR) were calculated weekly. Mortality was monitored and recorded daily.

LBW = Every bird was weighed individually, FI = feed intake/number of birds per replicate, BWG = final LBW (g) – initial LBW (g), and FCR = Total FI (g) / BWG (g)

Sample collection

At the end of the study (35 days of age), 21 birds randomly chosen from each treatment were used to perform a slaughter test and assess carcass attributes. Birds were slaughtered after being individually weighed. Their feathers were mechanically removed. Each bird's head, legs, gizzard, liver, heart, spleen, bursa, thymus gland, and abdominal fat were removed from the body and weighed separately. The raw breast samples were preserved at -20 °C until the chemical composition and meat color were examined.

Chemical composition and meat color analysis

Chicken breast muscle samples were analyzed at Cairo University Research Park (CURP)/ Faculty of Agriculture for meat quality traits.

In order to create a homogeneous combination, 50 g of meat samples were collected and blended for at slightest 30 but no more than 60 s. Samples were put on a petri dish, and chemical analysis of nine samples per group was performed using a Food Scan™ Pro meat analyzer (Foss Analytical A/S, Model 78810, Denmark). Each sample's composition of moisture, fat, protein, and collagen (in %) was measured (Anderson, 2007)

The transverse chicken breast muscle segment was used for the meat color analysis measured by Chroma meter (Konica Minolta, model CR 410, Japan) calibrated with a white plate and light trap supplied by the manufacturer. The color was expressed using the CIE Commission International de l'E′ clairage, 1976 L, a, and b color systems (Robertson, 1977). A total of three spectral readings were taken for each sample at different locations of the LD muscle. Lightness (L*) (dark to light), the redness (a*) values (reddish to greenish). The yellowness (b*) values (yellowish to bluish) were estimated.

. Official recommendations on uniform color spaces. Color difference equations and metric color terms, Suppl. No. 2. CIE Publication No. 15 Colourimetry. Paris.

Statistical analysis

Results were reported as the means ± SD. The General Linear Models (GLM) technique of the SPSS software package SPSS version 25 (IBM Corp, 2017). was used to analyze the data. Using one-way ANOVA, all data were examined using a random design. Duncan's multiple comparison tests (Duncan, 1955) were used to assess group differences at a $P < 0.05$.

RESULTS AND DISCUSSION

Growth performance during the experimental periods.

The effects of feeding control, G1, and G2 on broiler chicks' growth performance are displayed in Tables (4-7). During the first two weeks, the results were significant in the first two weeks in G1 group with high Live Body weight (430.38 gm/bird), body weight gain (239.28 gm/bird), and low Feed intake (320.50 gm/bird) with a better feed conversion ratio (1.35) than control (Tables 4-7). On the hand, no significant between the control and G2 groups in live Body weight (LBW), body weight gain (BWG), Feed intake (FI), and Feed conversion ratio (FCR) ($P \leq 0.05$). In the third week, growth performance was enhanced in the G2 group. The live Body weight (LBW) increased significantly in the control group, with no significant between G2 and G1 groups (Table 4). Feed intake in the G1 group was the lowest among all groups. Also, the G2 group decreased feed intake significantly more than the control group (Table 6). In the 4^{th} to 5^{th}-week duration, the G2 group significantly increased in live body weight (LBW) compared to the control and G1 groups (Table 4).

Reversible feed intake (FI) was significantly the lowest in the G1 group during the fifth week (Table 6). Moreover, In the fourth week, the feed conversion ratio (FCR) was the best sign in the G2 group with the G1 group and no significance in the fifth week between the two groups (Table 7). During the experimental periods from 0 to 35 days old, a significant increase in the G2 group in total live body weight (LBW) with 2057.00 gm compared with 1896.28 and 1924.28 gm in control and G1 groups, respectively (Table 4). Furthermore, a significant increase in carcass weight (CW) in BF group with 1608.29 gm compared with 1422.67 and 1526.29 gm in the control and G1 groups respectively (Table 4).

Body weight gain (BWG) also showed significant results among all groups. G2 group has the highest body weight gain (BWG) compared to the control and G1 groups with 2018.70 gm/bird vs. 1857.99 and 1885.99 gm/bird, respectively (Table 5). Feed intake (FI) was the lowest significantly in the G2 group during the experimental period, with 3384.90 gm/bird vs. 3471.50 gm/bird and 3390.90 gm/bird in control and G1 groups, respectively. Moreover, the Feed conversion ratio (FCR) was the best in G2 group, with a significant value of 1.69 compared with 1.89 and 1.82 in the control and G1 groups, respectively.

The present study showed that supplementing with the Biofactor (BF) additives to water (saccharomyces cerevisiae extract, beta-glucan, mannan oligosaccharides, organic acids, vitamins, and minerals) as alternative feed additives increased broilers' body weight and also reduced feed intake and feed conversion ratio. In line with the research on supplementing prebiotic substances such as β-1, 3/1, 6-glucans, and mannoproteins improved poultry productivity, supported a healthy gastrointestinal tract, and offered an antibiotic-free alternative (Zhang *et al.*, 2005 and Morales-López *et al.*, 2009).

Furthermore, the broiler diets were supplemented with varying doses of mannan oligosaccharides (MOS), dramatically raising the broilers' body weight and enhancing feed conversion efficiency (Benites *et al.*, 2008 and Bozkurt *et al.*, 2008). Several researchers reported that prebiotic treatment did not impact performance, in contrast to the earlier findings (Geier *et al.*, 2009 and Corrigan *et al.*, 2011 and Houshmand *et al.*, 2012). Nevertheless, statistical analysis of several experiments, including prebiotic addition in broiler chicken diets showed that it positively impacted the growth and performance of the animals. These outcomes have been validated by holo- and meta-analysis of numerous research studies carried out over time employing prebiotics in feed. It was demonstrated that consuming a yeast cell-wall supplement significantly increased body weight by 1.61% and decreased FCR by 1.99% in the diets. Moreover, prebiotics increased body weight by 5.41 percent, lowered FCR by 2.54 percent, and decreased mortality by 10.5

percent (Rosen, 2007 and Hooge and Connolly, 2011).

Additionally, organic acids that have been examined and proven to boost poultry performance include citric acid (Haque *et al.*, 2010 and Salgado-Tránsito *et al.*, 2011), lactic acid (Adil *et al.*, 2010 and Adil *et al.*, 2011). Acids such as tartaric, sorbic, and malic. According to research, they were employing blends of organic acids rather than a single acid to increase these acids' therapeutic benefits. It examined whether different organic acid mixtures enhance the FCR in broiler chickens (Samanta *et al.*, 2008 and Samanta *et al.*, 2010).

Furthermore, using amino acids in feeding reduces nitrogen loss during protein metabolism, resulting in low ammonia excretion in the environment, enhancing birds' growth performance, and improving feed conversion efficiencies which are considered one of the limiting amino acids in the diet of chicken and has significant effects on growth performance and meat yield (Beski *et al.*, 2015 and Zhai *et al.*, 2016) .

Vitamins are vital nutraceuticals for optimal general health and physiological processes like development, growth, maintenance, and reproduction. Vitamins have catalytic effects that make it easier for nutrients to be synthesized; this regulates metabolism and impacts the functionality and health of poultry such as B vitamins that have crucial roles in poultry metabolism because the majority of them are coenzymes, which combine with more giant enzyme molecules to speed up a variety of metabolic processes. Energy metabolism involves the vitamins B1, B2, B6, biotin, pantothenic acid, and niacin (Weber, 2009). Additionally, for optimal health and metabolic processes, minerals are essential nutraceuticals. The efficiency of using microelements is a crucial subject in contemporary poultry feeding (Alagawany *et al.*, 2020). So,the present research indicates that adding BF additives to water (saccharomyces cerevisiae extract, beta-glucan, mannan oligosaccharides, organic acids, vitamins, and minerals) to alternate antibiotics increased broilers' body weight and also reduced feed intake and feed conversion ratio.

Physicochemical properties and meat quality in chicken breast muscle

The fat content of chicken breast meat samples is given in Table 8 using Duncan's multiple comparison test (P < 0.05; Table 8). A higher effective intramuscular fat content was observed in the G2 group meat than in the control and G1 group meat, 1.41 % for the G2 group vs. 1.08% and 1.17% for the control and G1 group, respectively Fig. -1-. Although the value of crude protein in the G1 group was better than in the control and G2 groups, no statistically significant differences existed between the three groups. Collagen recorded high content in the control group and the lowest was in the G2 group without statistically significant differences between the three groups. Moisture was the highest value in the G2 group, but without any significant differences between the three groups.

The present study showed that supplementing with the Biofactor (BF)addition to water (saccharomyces cerevisiae extract, beta-glucan, mannan oligosaccharides, organic acids, vitamins, and minerals) as alternative feed additives enhanced the intramuscular fat (IMF%) significantly compared to control and AB group.

Meat quality features such as juiciness, flavor, water-holding capacity, and tenderness of the meat can be attributed mainly to the amount of intramuscular fat (IMF), total muscle fat, and the makeup of its fatty acids (Cui *et al.*, 2012 and San *et al.*, 2021).

Intramuscular fat also plays a vital role in enhancing meat quality by decreasing cooking and drip loss (Gerbens *et al.*, 2001). These previous characteristics are considered the most vital meat quality indicator and significantly influence consumer preference. The present research indicates that adding BF to the diet may help broilers produce higher quality meat. Concerning meat color, the lightness (L*) value was significantly highest in G2 meat than in control and G1 meat (P > 0.05), with a 56.56 score G2 vs. 53.58 and 53.05 for control and G1, respectively (Table 9). On the other hand, the reddish (a*) value was significantly highest in control and G1 than in G2 meat. The yellowness (b*) values were the highest in the control meat but with no significance in the G2 group meat, with 11.15 for the control group compared to 10.63 for the G2 group Fig. -2-.

According to the color of the muscle, Qiao *et al.* (2001) divided chicken breast muscle into three categories: "lighter than normal" (L*>53), "normal" (48< L* >53), and "darker than normal" (L*< 48). However, in the present study, breast meat L* values in the BF meat group were more than average in the previous study. Another study reported that Dark (L*< 50), standard (50 L* 56), or pale (L* > 56) are the lightness (L*) values (Petracci *et al.*, 2004).

Moreover, Wilkins *et al.* (2000) found that the overall mean of L* value was 55.2, ranging from 45.0 (dark) to 67.3 (pale). Slight differences, however, might not be quite as significant, and it is unclear to what extent paleness or darkness constitutes discrimination. Furthermore, dark meat generally has a low consumer desirability score, while the most desirable coloring for meat is pale red (Jeremiah *et al.*, 1972)

CONCLUSIONS

This study showed that feeding broilers BF (50m /letter) supplemented broilers improved body weight gain, carcass weight, feed intake, and feed conversion efficiency, enhanced the meat's quality such as intramuscular fat and meat coloring. It was determined that the BF, animal, environment, and consumer-friendly may be utilized as an adequate substitute for commonly used antibiotics.

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Table 1: Basal diet fed to broilers during the experimental periods.

Ingredients	Starter (1-21d)	Grower (22-35d)
Yellow Corn (7.5%)	56.0	59.60
Gluten meal (62%	7.19	7.0
Soybean meal (44% CP)	30	26.7
Di-calcium phosphate(CaHPO4)	1.9	1.65
Calcium carbonate (Caco)	1.4	1.2
Sodium chloride (Nacl)	0.35	0.35
Vegetable oil	2.2	2.7
Pre-mix*	0.3	0.3
DL-Methionine (100%)	0.3	0.21
L-Lysine (100%)	0.4	0.3
Total(Kg)	100	100
Calculated Analysis		
Crude protein (%).	22.97	21.56047
Metabolizable energy (Kcal /Kg).	3028.9	3103.438
Calcium (%).	1.0543	0.9143
Available phosphorus (%).	0.502	0.45004
L-Lysine (%).	1.426	1.24529
DL-Methionine (%).	0.6939	0.58712
Methionine + Cystine (%).	1.071	0.94762

*Premix supplied per Kg of diet: Vit. A, 12000 I.U; Vit. D_3, 3100 I.U; Vit. E, 30 mg; Vit. K_3, 1.65 mg; Vit. B_1, 4.4mg; Vit. B_2, 5.5mg; Vit. B_6, 3.3mg; Vit. B_{12}, 15µg; Niacin, 53 mg; Pantothenic acid, 11 mg; Folic acid, 1 mg; Biotin, 200µg; Choline chloride, 715mg; Copper, 9 mg; Iodine, 1.1mg; Iron, 88 mg; Manganese, 66 mg; Zinc, 40 mg, Cobalt, 0.2mg and Selenium, 0.3 mg.

Table 2: Antibiotic (AB) additive to broilers during the period from 3 to 10 days of age.

Antibiotic	Concentration
Florfenicol*	100mg /1liter
Neomycin sulfate (30.76%)	1g/liter
Tylosin	0.5g/liter
Enrofloxacin	100mg/liter

*The antibiotic Florfenicol was added separately from the other antibiotics.

Table 3: Biofactors (BF) additive to broilers during the experimental periods.

Compound	Concentration
Saccharomyces cerevisiae extract	500ml
1.6,1.3 Beta-glucan	19.5gm
Mannan oligosaccharides (MOS)	14 gm
L-lysine HCL	4202 mg
Choline HCL 75%	19224 mg
Vitamin B2	3000 mg
Lactic acid (98%)	37.5 ml
Malic acid (98%)	5 ml
Citric acid (90%)	35 ml
Tartaric acid (90%)	3.5 ml
Aspartic acid (99%)	11 ml
Phosphoric acid (85%)	35 ml
Calcium lactate (98%)	16.5 gm
Potassium citrate (99%)	16 gm
Sodium citrate (99%)	17.5 gm
Propylene glycol	50 gm
Distilled Water up to	1 liter

*50 ml of the Bio Factor (BF) compound was added per liter of water eight hours before use to ferment the compound

Table 4: Means ± SD of live body weight (LBW)/bird and carcass weight (CW)/bird during the experimental periods.

Group Period LBW (gm)	(Control)	(G1)	(G2)
(0WK)	38.3 ±0 .000	38.3 ±0 .000	38.3 ±0 .000
(1WK)	185.04±19.30^{ab}	191.09±13.19^{a}	179.19±20.92^{b}
(2WK)	390.23±45.38^{b}	430.38±29.41^{a}	405.23±36.64^{b}
(3WK)	758.09±103.78^{b}	815.57±82.88^{a}	821.71±85.33^{a}
(4WK)	1324.00±148.17^{b}	1339.71±137.25^{b}	1432.19±113.73^{a}
(5WK)	1896.28±187.95^{b}	1924.28±202.20^{b}	2057.00±158.13^{a}
CW (gm)/5Wk	1422.67±139.70^{c}	1526.29±130.24^{b}	1608.29±115.70^{a}

a,b and c values in the same row with different letters showed significant results (P ≤ 0.05).

Table 5: Means ± SD of body weight gain (BWG) during the experimental periods.

Group period BWG (gm)	(control)	(G1)	(G2)
(0WK)	38.3 ±0 .000	38.3 ±0 .000	38.3 ±0 .000
(1WK)	146.74 ±19.30^{ab}	152.79 ±13.198^{a}	140.89±20.92^{b}
(2WK)	205.19±43.49^{b}	239.28±25.79^{a}	226.04±42.82^{ab}
(3WK)	367.85±120.68	385.19±103.95	416.47±78.19
(4WK)	565.90±183.60	524.14±168.99	610.47±141.37
(5WK)	572.28±266.79	584.57±264.08	624.80±200.19
(0-5WK)	1857.99±187.95^{b}	1885.99±202.20^{b}	2018.70±158.13^{a}

a,b and c Values in the same row with different letters showed significant results (P ≤ 0.05).

Table 6: Means ± SD of feed intake (FI) during the experimental periods.

Group period FI (gm)	(control)	(G1)	(G2)
(1WK)	148.20±0 .000^{a}	145.00±0 .000^{b}	140.50±0.00^{c}
(2WK)	330.60±0.000^{ab}	320.50±0 .000^{b}	340.60±0.00^{a}
(3WK)	798.00±0 .000^{a}	747.70±0.000^{c}	787.30±0.00^{b}
(4WK)	1171.50±0.00^{b}	1235.50±0.00a	1078.10±0.00^{c}
(5WK)	1023.20±0.00^{b}	942.20±0.00^{c}	1038.40±0.00^{a}
(0 – 5WK)	3471.50±0.00^{a}	3390.90±0.00^{b}	3384.90±0.00^{c}

a,b and c Values in the same row with different letters showed significant results (P ≤ 0.05).

Table 7: Means ± SD of feed conversion ratio (FCR) during the experimental periods.

Group period FCR (gm)	(control)	(G1)	(G2)
(1WK)	1.02±.148^{a}	.95±.086^{a}	1.01±.159^{a}
(2WK)	1.70±.463^{a}	1.35±.149^{b}	1.55±.294^{a}
(3WK)	2.52± 1.278^{a}	2.18±.991^{a}	1.95±.374^{a}
(4WK)	2.34±1.03^{ab}	2.82±1.84^{a}	1.84±.382^{b}
(5WK)	2.16±1.009^{a}	1.24±2.06^{b}	1.82±.607^{ab}
(0 -5WK)	1.89±.188^{a}	1.82±.204^{a}	1.69±.119^{b}

a,b, and c values in the same row with different letters showed significant results (P ≤ 0.05).

Table 8: Means ± SD of chemical composition analysis of chicken breast muscle.

Group chemical composition	(control)	(G1)	(G2)
Intramuscular Fat(%)	1.0867±.17716^{b}	1.1711±.18775^{b}	1.4144±.14518^{a}
Crude protein(%)	22.3633±.45327	22.6622±.38072	22.3089±.72377
Collagen(%)	1.0611±.23804	.8889±.18671	.8756±.09315
Moisture(%)	74.7100±.33208	74.6889±.87543	75.0156±.35388

a,b, Values in the same row with different letters showed significant results (P ≤ 0.05)

Table 9: Meat color analysis of chicken breast muscle.

Group Coloring	(control)	(G1)	(G2)
L*	53.58±1.39^{b}	53.05±1.17^{b}	56.56±1.59^{a}
a*	11.697±.673^{a}	11.251±.755^{a}	9.364±.930^{b}
b*	11.156±.983^{a}	9.901±.819^{b}	10.633±.635^{ab}

a,b, Values in the same row with different letters showed significant results (P ≤ 0.05). Lightness (L*) (dark to light), and the redness (a*) values (reddish to greenish). The yellowness (b*) values (yellowish to bluish)

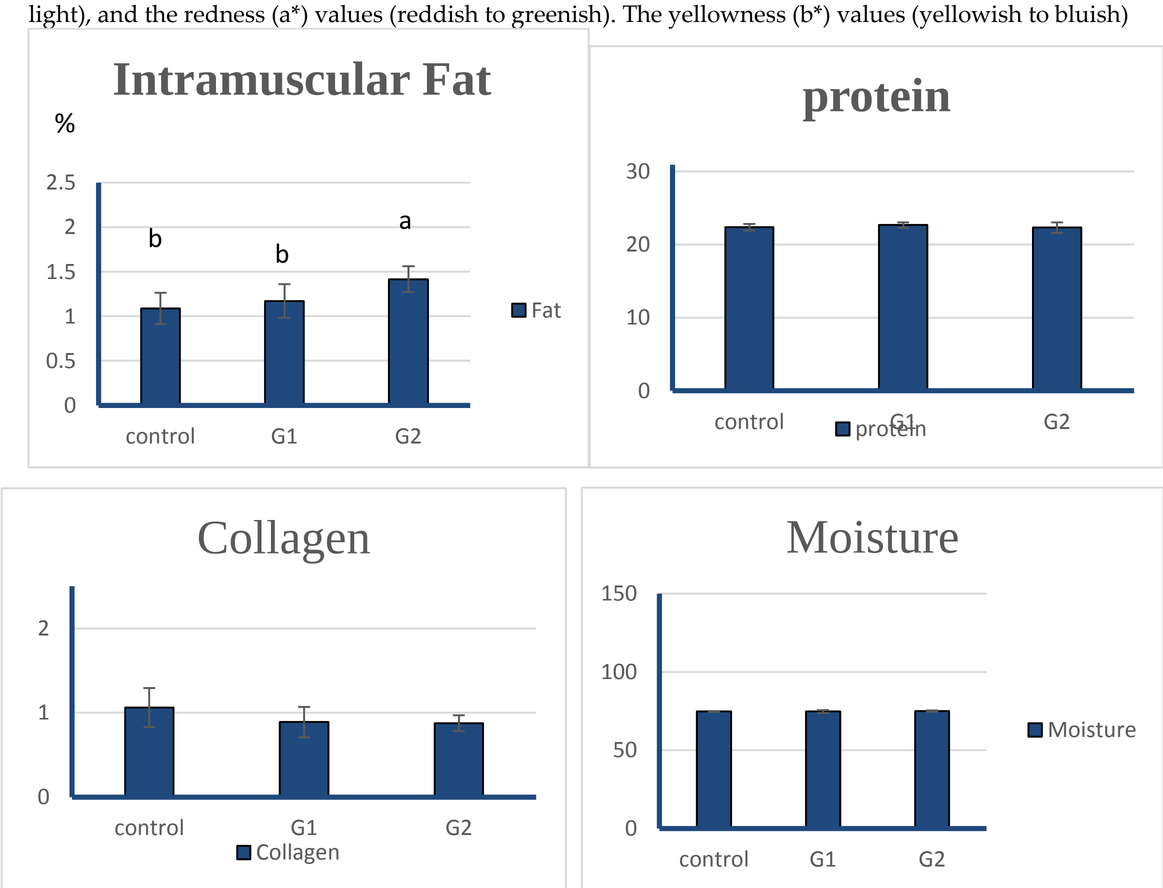

Figure 1: Chemical composition analysis of chicken breast muscle. a,b, Values with different letters show significant results (P ≤ 0.05).

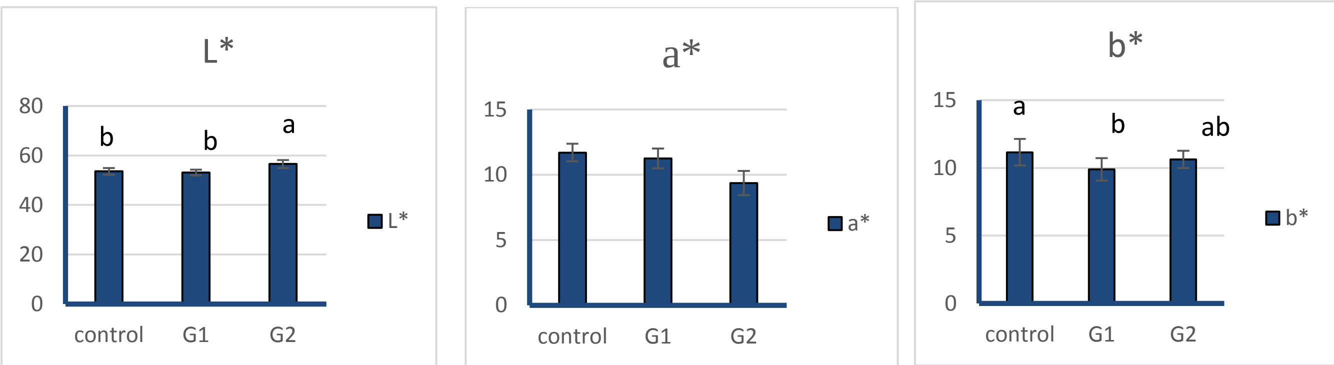

Figure 2: Meat color analysis of chicken breast muscle. a, b, Values with different letters show significant results (P ≤ 0.05).

مقارنة فاعلية الإضافات العضوية والمضادات الحيوية فى تحسين جودة اللحم والأداء الإنتاجى لدجاج التسمين

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الملخص العربي

هدفت هذه الدراسة إلى مقارنة فعالية بعض الإضافات الحيوية Biofactor (BF) (مستخلص الخميرة, البيتا جلوكان, منان اوليجوسكرايد,والأحماض العضويه والأملاح المعدنية وبعض الفيتامينات) والمضادات الحيوية (AB) مثل فلورفينيكول وكبريتات نيومايسين (30.76٪) وتيلوزين وإنروفلوكساسين مقارنة بمجموعة التحكم (الضابطة). حققت خلال فترة الدراسة مجموعة الإضافات الحيوية (BF) زيادة معنوية في مجموع وزن الجسم الحي (LBW) بمقدار - 2057.00جرام/طائر مقارنة مع 1896.28 و 1924.28 جرام/طائر في مجموعتي التحكم ومجموعة المضادات الحيوية (AB) على التوالي. علاوة على ذلك ، حدثت زيادة معنوية في وزن الذبيحة (CW) في مجموعة (BF) بمقدار 1608.29 جرام/طائر مقارنة مع 1422.67 و 1526.29 جرام/طائر في المجموعتين الضابطة و (AB) على التوالي. علاوة على ذلك ، كان تناول العلف ونسبة تحويل العلف (FCR) هو الأفضل في مجموعة BF مقارنة بمجموعة التحكم ومجموعة المضادات الحيوية (AB). أيضًا ، لوحظ وجود زيادة معنوية من الدهون مابين العضلية (IMF) في لحوم مجموعة BF مقارنة بمجموعتي التحكم وAB. كانت درجة سطوع اللون (L *) أعلى معنويًا في لحوم مجوعة الاضافات العضوية BF منها في لحوم المجموعة الضابطة ومجموعة المضادات الحيوية (AB) والتى تعتبر من الصفات التى يفضلها المستهلك وتعبر عن ارتفاع جودة اللحم . هذه النتائج تشير الى أنه من الممكن استخدام الإضافات الحيوية مثل (مستخلص الخميرة, البيتا جلوكان, منان اوليجوسكرايد, الأحماض العضوية و الأملاح المعدنية وبعض الفيتامينات) بديلاً لاستخدام المضادات الحيوية لتحسين الأداء الإنتاجى وجودة اللحم فى دجاج التسمين .

الكلمات الاسترشادية: دجاج التسمين، إضافات حيوية، مضادات حيوية، دهون عضلية، جودة اللحوم.