IMPROVING BROILER PERFORMANCE BY SUPPLEMENTING DIETS WITH DIFFERENT PROBIOTIC AND SYMBIOTIC PREPARATIONS

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SUMMARY

An experiment involving 225 unsexed Hubbard broiler chicks was conducted for 35 days to determine the effects of varying probiotic ad symbiotic preparations on their growth performance, carcass traits, intestinal bacteria count and blood parameters (5 treatments, 3 replicates with 15 chicks per replicate). The treatments were, the basal diet without additives (control, T_1), the basal diet with addition of symbiotic preparation (250g/ton) lacto-Pro, (T_2), Bacillus-fort, (T_3), Balacto, (T_4) and probiotic preparation 500g/ton Zado, (T_5).
The results revealed that:

- *Different probiotic and symbiotic preparations (T_{2-5}) significantly increased BWG more than 18% (2284.90 g vs1937.40 g.) as well as FI (3276.25g vs. 2833. 75) and improved FCR from 1.43 vs 1.46 in comparison to the control. The best value was for T4.*
- *No significant differences were observed among treatments on carcass traits or lymphoid organs.*
- *Treatments 2-5 decreased pathogenic bacteria (E.coli and Salmonella) and increased beneficial bacteria (Bacillus subtilis, and Lactobacillus)in the small intestine as compared with the control, T_1.*
- *Plasma Total protein, and Albumin were significantly affected by dietary treatment.*

In conclusion, probiotic and symbiotic supplementation to broiler diets had beneficial positive effects on productive performance and microorganisms in the small intestine.

Keywords: Broiler, probiotic, symbiotic, performance, carcass, bacteria count

INTRODUCTION

Antibiotics have been regularly used as growth promoters in the chicken industry for over 60 years (Libby and Schaible, 1955). On the other hand, antibiotic abuse causes issues such as antibiotic residues, the formation of antibiotic-resistant bacteria, and the development of microbiota disruption, all of which can contaminate poultry products and constitute a major hazard to human health (Boerlin and Reidsmith, 2008; Stanton, 2013). As a result, various alternatives to growth-promoting antimicrobials have been investigated (Huyghebaert *et al.*2011). These techniques have centered on preventing harmful bacteria from multiplying and manipulating beneficial gut microflora to promote health, immunity and performance (Adil and Magray 2012). However, the emergence of antibiotic-resistant microorganisms forced researchers worldwide to employ non-therapeutic and nutraceutical approaches.

As a result, probiotics have attracted more interest as a potential replacement for antibiotic growth promoters to induce growth and maximize the genetic potential of modern broiler breeds (Dhama *et al.* 2011). Probiotics in broiler diets have been proven to boost growth performance when used instead of antibiotic growth promoters in several studies (Shim *et al.* 2010;Wang and Gu 2010; Zakeri and Kashefi 2011). In addition, Eckert *et al*. (2010) Kavazovi *et al*. (2009) Manafi *et al*. (2018) found that probiotics improve growth performance and humoral immune response and leave no residues in meat that could be harmful to consumers' health.

Probiotics alter the intestinal ecosystem by delivering digestive enzymes, lowering pH (Kabir, 2009;Abd El-Hack *et al*., 2020) and influencing intestinal bacteria.

Supplementing with probiotics improved carcass yield, live weight, immunological response, and the appearance of prominent cut up meat pieces (Soomro *et al.*, 2019). In addition, probiotics in broiler diets proved in multiple trials to boost growth performance compared to controls and are as effective as antibiotic growth promoters (Denl *et al.*, 2003; Bai *et al.*, 2013). However, according to Salehimanesh *et al.* (2016), the addition of antibiotics and probiotics has little effect on broiler growth performance, especially in good hygienic circumstances.

Toghyani *et al.* (2011) discovered that utilizing probiotics at a dose of 15 mg/kg can dramatically improve live body weight (LBW), feed conversion ratio (FCR), and feed intake (FI) compared to the control group. Pourakbari *et al*. (2016) discovered that adding probiotics to broiler diets up to 0.02 percent increased DBWG and improved FCR, but probiotics had no effect on FI. Similarly, Machado *et al*. (2020) found that supplementing broiler diets with probiotics improved LBW and increased FI, while there was no effect on FCR. Probiotics supplementation in broiler feed, on the other hand, did not influence broiler performance (Rehman *et al.*,2020) and the microorganism in the small intestine (Abd El-Hack *et al.*, 2020).

On the other hand, several studies have indicated that adding prebiotics to the diets of broiler, layer, and pigs improves performance by boosting gut

microbiota (Xu *et al.*, 2003; Pelicano *et al.*, 2004). Synbiotics are characterized by antibacterial, anticarcinogenic, antiallergic, and immune-stimulating properties when prebiotics and probiotics are combined in a single dose. It also enhances mineral absorption, prevents diarrhoea, and optimizes nutrient digestive processes (Gruzauskas *et al*., 2004). In reality, the advantage of synbiotics and a major rationale for their use is that without a prebiotic, a probiotic would have a hard time surviving in the environment because prebiotics is probiotics' food supply.' Therefore, it is advised to refer to the symbiotic due to the beneficial and synergistic benefits of employing a mixture of probiotics and prebiotics.

The goal of this study was to investigate how various effective probiotics and symbiotic preparation additives in broiler chicken meals can affect growth, carcass features, gut bacteria count, and blood parameters.

MATERIALS AND METHODS

Chicks treatments and diets:

A total of 225 unsexed Hubbard one-day old broiler chicks (body weight = 38.89 g) were used in the present study. All chicks were deprived of feed and water for 2 h after hatching. Broiler chicks were randomly allocated to one of five treatment groups of 45 chicks each (3 replectes of 15 chick). The groups were control T_1 (without additional supplementation) and four experimental treatments (T_{2-5}) where the basal diet was enriched by one of symbiotic or probiotic preparations as follows:

- T1 (basal diet), control
- T2 (basal diet + 250g/ton Lacto-Pro)
- T3 (basal diet + 250g/ton Bacillus-fort)
- T4 (basal diet + 250g/ton Balacto)
- T5 (basal diet + 500g/ton Zado).

The experimental groups were fed on commercial diets (Table 1) covering the nutrient requirements according to NRC (1994)

All additives were commercial products available in local market of Egypt and were added according to the manufacturer recommendations

Table 2 shows the composition and the concentration of the live cells (CFU/ g or ..) in each of the products.

All additives were prepared by Bactyzad Company.

The feeds were obtained from a local feed mill company. All feeds were based on corn and soybean meal and didn't contain any antibiotics feed additives (Table1). The experiment lasted 35 days and feeding program consisted of a starter diet until the chicks were 14 days old, followed by grower diet up to 28 days of age, and the finisher diet until the end of experiment (35 days of age).

Table 1. Formulation (%) and calculated chemical analysis of experimental diets

Ingredients	Starter *	Grower *	Finisher *
Yellow corn	57.21	61.05	64.82
Soybean meal 48%	33.65	29.00	24.80
Gluten62%	3.61	3.56	3.15
Dicalcium phosphate	1.88	1.65	1.45
Sun flower oil	1.50	2.50	3.50
Limestone	1.30	1.34	1.35
Premix **	0.30	0.30	0.30
Salt	0.30	0.30	0.30
HCL Lysine	0.09	0.13	0.15
DL Methionine	0.16	0.17	0.18
Total	100.00	100.00	100.00
Calculated analysis ***			
ME	3003.25	3104.89	3201.88
CP%	23.00	21.00	19.00
C/P Ratio	130.59	147.84	168.55
Ca%	1.00	0.95	0.90
Available phosphorus%	0.50	0.45	0.40
Methionine	0.61	0.60	0.58
Meth + Cys	0.95	0.90	0.85
Lysine	1.35	1.25	1.15

* Starter (1-14 day old), Grower (15-28 days- old) and finisher (29-35 day old).

** Each 3 kg contains of the mixture contains: Vit A 12 000 000 IU, Vit D3 2 000 000 IU, Vit E 1g, Vit K3 2 g, Vit B1 1 g, Vit B2 5 g, Vit B6 1.5 g, Vit B12 10 mg, Nicotinic acid 30 g, Pantothenic acid 10 g, Folic acid 1 g, Biotin 50 mg Choline chloride 250 g, Iron 30 g, Copper 10 g, Zinc 50 g, Manganese 60 g, Iodine1 g, Selenium 0.1 g, Cobalt 0.1 g and carrier (CaCO3) to 3 kg. *** According to NRC (1994).

Table 2. Types and numbers of microorganism in the symbiotic and probiotics/ kg products

Product	No of microorganism	Kind of microorganism
Lacto pro (syn)	$1X10^{12}$	Lactobacillus acidophily +100 g manan oligosaccharides +150 g beta glucan
Bacillus-fort (syn)	$2X10^{11}$	Bacillus subtiles +100 g manan oligosaccharides +150 g beta glucan
Balacto (syn)	$5X10^{7}$ $2.5X10^{11}$ $2.5X10^{11}$	Lactobacillus acidophily Bacillus subtiles Bacillus bicleniformis +57 g manan oligosaccharides +68.4 g beta glucan
Zado (pro)	$12X10^{9}$	Ruminococcus flavefacien

Growth performance and carcass traits:

Live body weight (LBW) of the chicks and feed intake (FI, g/period) were weekly recorded by replicate, body weight gain (BWG, g/period) and feed conversion ratio (FCR, feed to gain g/g) were determined with each treatment. At the age of 35 days, three chickens per treatment (one from each replicate) were randomly taken and slaughtered. The percentages of carcass, liver, gizzard, heart, spleen, bursa, thymus and abdominal fat were estimated as carcass traits and immunity-related organs.

Samples collection:

Blood plasma components:

Blood samples from slaughteredbirds were collected in dry, clean centrifuge tubes, and plasma was separated by centrifugation at 3000 rpm for 15 minutes and assigned for further analysis. The plasma sampleswere kept in a deep freezer at (-20 C°) until the time of chemical analysis. Using commercial diagnosing kits provided by a bio-diagnostics business in Egypt, some biochemical parameters of plasma were calorimetrically measured.

Intestinal bacteria:

Also, the ileal were packed on ice and sent to the microbiological laboratory for enumeration of Bacillus subtiles, Lactobacillus, E.Coli and Salmonella counts.

Statistical analysis:

Statistical analysis of data obtained from the present study was conducted using the general linear model (GLM) procedure of SAS® (SAS, 2004). By applying test using one-way ANOVA. Means were compared using Duncan´s range test (Duncan, 1955) where the level of significance was set at minimum ($P \leq 0.05$), and the statistical model was performed as follows:

$Y_{ij} = \mu + T_i + e_{ij}$

Where:

Y_{ij}=the observation; μ=overall mean; T_i=the effect of treatment; E_{ij}=random error.

The symbiotic (syn) and probiotic (pro) used in the trial was a locally products which was prepared by Bactyzad for feed additives. Types and numbers of microorganism contained are shown in Table (2).

RESULTS AND DISCUSSION

Productive performance:

Live body weight (LBW), body weight gain (BWG), feed intake (FI) and feed conversion ratio (FCR) as affected by dietary treatments are presented in Table 3.

Itis worth to note that chicks fed the control diet without probiotic or symbiotic during different periods reflected the lowest significant result in LBW or BWG compared with other dietary treatments (T2-5)

On the other hand,chicks fed diet supplemented with (250 g balacto, T4) gave higher BWG (2284.90 g) compared with those fed diets supplemented 250 g of (lacto-pro, T2), (Bacllus-fort, T3) or 500 g of zado (T5) being 2132.15, 2136.15 and 2132.50 g, respectively.The differences were statistically significant. The synergistic effect between probiotic and prebiotic may improve nutrients utilization, metabolism and absorption and would maintain better environment in digestive tract (Yang *et al 2009*). Similarly, Awad *et al* (2009) reported beneficial effects of symbiotics over a probiotic on productive performance. These results agree with those reported by many investigators. Murshed and Abudabos (2015) found significant higher body weight gain due to inclusion of symbiotics, while, Willis *et al.* (2008)and Mountzouris *et al* (2007) reported that addition of prebiotic, probiotic or symbiotic to broiler diets had no significant effect on body weight.

Feed intake and Feed conversion ratio:

Data in table (3) indicated that feed intake per bird (g) was significantly increased by feeding diet supplemented with symbiotics or probiotics preparation (T2-5) compared with the control diets during different experimental periods. The increase in feed consumption was more pronounced during the starting period (1-14 days) and growing period (15-28 days), while it was not significant during the finishing period (29-35 days). Increasing feed consumption could be related to that broiler chicks consume more feed to meet energy to maximize

growth during short rearing periods. On the contrary, to these results of Nematallah *et al.*, (2015) and Awad *et al* (2009) stated that feed consumption decreased as a result of supplying probiotic, prebiotic or symbiotic preparation, while Kavazović *et al.* (2019)stated that the average feed intake was not affected by applying probiotics.

Table 3.Effect of dietary treatments on productive performance of broiler chicks

Items	Experimental treatments					
	T1	T2	T3	T4	T5	Sig.
Live body weight (gm)						
1 day	38.85	38.85	38.85	38.85	38.85	NS
14 days	417.50^{d} ±5.95	457.50^{c} ±11.98	465.00^{bc} ±8.41	505.01^{a} ±10.99	455.00^{c} ±17.55	*
28 days	1647.50^{e} ±20.56	1863.75^{bc} ±19.51	1863.75^{bc} ±19.51	1990.00^{ab} ±47.95	1832.50^{c} ±76.49	*
35 days	1976.25^{c} ±24.94	2170.00^{b} ±28.57	2175.00^{b} ±25.01	2323.75^{a} ±34.05	2171.25^{b} ±86.41	**
Body weight gain(gm)						
1-14 days	378.65^{d} ±5.95	418.65^{c} ±11.98	426.15^{bc} ±8.41	466.15^{a} ±10.99	416.15^{c} ±17.55	*
15-28 days	1230.01^{d} ±16.45	1406.25^{bc} ±10.07	1398.75^{bc} ±11.61	1485.00^{ab} ±37.24	1377.50^{c} ±59.24	*
29-35 days	328.76^{b} ±9.65	306.25^{b} ±30.23	311.25^{b} ±16.63	333.75^{ab} ±25.52	338.75^{ab} ±13.44	*
1-35 days	1937.40^{c} ±24.94	2132.15^{b} ±28.57	2136.15^{b} ±25.01	2284.90^{a} ±34.05	2132.50^{b} ±86.41	**
Feed intake(gm)						
1-14 days	436.25^{c} ±5.54	477.50^{b} ±12.50	497.50^{ab} ±10.50	518.75^{a} ±9.43	483.75^{ab} ±18.41	*
15-28 days	1733.75^{d} ±23.57	1972.50^{bc} ±13.62	1961.25^{bc} ±17.83	2073.75^{ab} ±51.83	1945.00^{c} ±78.04	*
29-35 days	663.75 ±18.41	635.00 ±53.77	622.50 ±29.47	683.75 ±49.38	678.75 ±26.32	NS
1-35 days	2833.75^{c} ±35.49	3085.00^{b} ±44.67	3081.25^{b} ±39.75	3276.25^{a} ±39.81	3107.50^{b} ±113.66	**
Feed conversion ratio						
1-14 days	1.15^{ab} ±0.01	1.14^{bc} ±0.01	1.17^{a} ±0.01	1.11^{d} ±0.01	1.16^{ab} ±0.01	*
15-28 days	1.41 ±0.01	1.40 ±0.01	1.40 ±0.01	1.39 ±0.01	1.41 ±0.01	NS
29-35 days	2.02^{ab} ±0.01	2.08^{a} ±0.03	2.01^{b} ±0.02	2.05^{ab} ±0.01	2.00^{b} ±0.01	*
1-35 days	1.46^{a} ±0.01	1.44^{ab} ±0.01	1.45^{ab} ±0.01	1.43^{b} ±0.01	1.46^{a} ±0.01	*
Mortality rate						
1-35 days		0	0	0	0	
Performance index*						
1-35 days	135.36	150.69	150.00	162.50	148.72	
European production efficiency factor						
1-35 days	386.74	430.56	428.57	464.29	424.90	

a,b Means in the same row with the same letters are not significantly different. MSE: Mean standard error NS: Non-significant **: ($P \leq 0.01$). *Performance index = (LBW (Kg)/FCR)×100

**European production efficiency factor = (LBW (Kg) × motility % / FCR × age)

Table 3 showed significant differences in feed conversion ratios among groups fed different dietary treatments (T2-5) compared to the control group, during different experimental periods (except growing period).The associated FCR values varied from 1.43 to 1.46, with substantial differences among treatments. The chicks which were fed T4 diet had the best FCR during the overall period of 1-35 days of age, the worst FCR was reported in chicks fed control diets.

The obtained results were in agreement with those reported by Naik *et al.* (2000) who reported that supplementation of lactobacillus to the basal diet improved feed efficiency in broilers as compared to the control group. However the combination of several probiotics yields a good feed conversion on broiler (Rocha *et al.* 2010). Moreover, Nematallah *et*

al. (2015) found that FCR was improved in chicks fed prebiotic, probiotic or symbiotic diets compared with control diets.

Performance index (PI) and European production efficiency factors (EPEF):

Table 3 shows the values of performance index and European production efficiency factor at 35 days of age for chicks fed different dietary treatments. Generally, different feed additives, symbiotic and probiotic supplementation to broiler diets (T2-5) increased PI and EPEF compared to control group (T1). The corresponding values of PI for chickens fed different dietary treatments T2-5 ranged between (148.72 and 162.50 vs. 135.36) while, (EPEF) values ranged between (424.90 and 464.29 vs. 386.74) .Chicken fed T4 diet showed the highest value of PI and EPEF compared with other treatments. These results agree with those of Kavazovic *et al.* (2019), Kavazovic *et al.* (2009) and Timmerman *et al.* (2006) who stated that supplementing probiotic to broiler diets significantly improved PI and EPEF values compared to the control group.

Carcass traits:

Table 4 shows the effect of different dietary treatments on carcass traits and lymphoid organs for chickens slaughtered at 35 days of age. Experimental treatments with different feed additives T2-5 had no significant effect on studied parameters compared with the control. The corresponding values for dressing percentages ranged between 68.64 and 71.44 %, Total edible parts(%)ranged between 72.11and 75.11 %. The findings similar to our study had reported by Anjum *et al.* (2005), Awad *et al.* (2009) and Nematallah *et al.* (2015) who didn't find variation in carcass characteristics between control and probiotic supplemented treatments. In contradictory Mehr *et al.* (2007) and Pourakbari *et al.* (2016) found that there werevariation in carcass characteristics between control and probiotic supplemented treatments**.**

Lymphoid organs %:

Regarding lymphoid organs (weight %), different feed additives to basal diet (T2-5) exhibited no significant differences in the spleen, bursa and thymus% compared to control (Table 4).

The finding of the present study showed agreement with the observations of Awad *et al.* (2009), Naseem *et al.* (2012) who did not report any significant differences in lymphoid organs values due to probiotic supplementation.

Table 4. Effect of dietary treatments on carcass traits of broiler chicks

Items %	Experimental treatments					
	T1	**T2**	**T3**	**T4**	**T5**	**Sig.**
Carcass	71.44 ±0.53	68.64 ±0.65	69.80 ±0.16	70.39 ±0.16	69.72 ±0.65	NS
Liver	2.03 ±0.14	2.00 ±0.15	2.07 ±0.06	2.00 ±0.19	2.12 ±0.05	NS
Gizzard	1.11 ±0.12	0.97 ±0.06	0.91 ±0.12	0.88 ±0.07	0.86 ±0.06	NS
Heart	0.51 ±0.04	0.50 ±0.05	0.57 ±0.02	0.51 ±0.02	0.57 ±0.06	NS
Giblets	3.66 ±0.24	3.47 ±0.16	3.55 ±0.20	3.39 ±0.26	3.55 ±0.10	NS
Total edible parts	75.11 ±0.37	72.11 ±0.63	73.35 ±0.37	73.79 ±0.19	73.27 ±0.72	NS
Abdominal fat	1.16 ±0.06	1.16 ±0.06	1.29 ±0.08	1.65 ±0.07	1.24 ±0.15	NS
Lymphoid organs %						
Spleen	0.13 ±0.04	0.23 ±0.03	0.19 ±0.01	0.17 ±0.03	0.22 ±0.03	NS
Bursa	0.10 ±0.04	0.17 ±0.01	0.20 ±0.04	0.15 ±0.01	0.17 ±0.02	NS
Thymus	0.19 ±0.018	0.33 ±0.01	0.38 ±0.08	0.30 ±0.01	0.34 ±0.05	NS

a,b Means in the same row with the same letters are not significantly different. MSE: Mean standard error NS: Non-significant **: (P≤ 0.01).

Microbiological measurements:

Table 5 shows the effect of dietary treatments on the pathogenic and beneficial bacteria in small intestine (mean log 10 CFU/g) of broiler chicks. Results indicated that supplementing different symbiotic or probiotic preparations (T2-5) increased the mean of log 10 CFU/g of bacillus subtilis and lactobacillus count in the small intestine compared with the control group (T1).

The lowest count of log 10 CFU/g of pathogenic bacteria observed in broiler chickens that were fed T4 diets, being (2.72 vs. 4.79) for E. Coli and (2.40 vs. 4.83) for salmonella count compared with the control group. Similarly, the highest counts (log 10 CFU/g) of beneficial bacteria were observed in the small

intestine of broilers that were fed (T3 and T4) diets, being (5.66 and 3.48 vs. 2.30) for bacillus subtilis and (T4 and T5) diets, being (8.83 and 6.59 vs. 3.34) forlactobacillus count compared with the control group.

Table 5.Effect of dietary treatments on pathogenic and beneficial bacteria (Log 10 CFU/g)in small intestine of broiler chicks

Items	Experimental treatments				
	T1	T2	T3	T4	T5
Pathogenic bacteria					
***Salmonella subtilis* count log**	4.83	4.66	4.52	2.40	3.41
***E.Coli* count log**	4.79	4.72	4.65	2.72	3.36
Beneficial bacteria					
***lactobacillus* count log**	3.34	4.68	4.71	8.83	6.59
***Bacillus subtilis* count log**	2.30	2.62	5.66	3.48	2.80

The result are in line with the findings of Kabir *et al.* (2005) who found that probiotics can remove harmful pathogens through competition for attachment to the wall of the small intestine. In addition, some types of bacteria could inhibit the activity and growth of pathogenic microbes through the production of organic acid, hydrogen peroxide and bacteriocins (Sari and Akbar, 2019) and lower the pH level of the digestive tract which distribute pathogenic bacteria metabolism due to unsuitable environment conditions (Mousavi *et al.* 2018).

Blood plasma parameters:

Results in table 6 showed that using symbiotic or probiotic treatments (T2-5) gave the highest values for total protein and albumin with significant difference in most cases compared with control group (T1). Values of total protein and albumin were significantly increased by 14.0 and 13.0% as a result of feeding (T2 and T5) as compared to those fed the control diet. There were no significant differences between A/G ratios.

These results are in agreement with those reported by Pourakbari *et al.* (2016); Awad *et al.* (2009); Aliakbarpour *et al.* (2012). They reported that adding the biological additives (fungi, active yeast or probiotics) to broiler diets increased total protein, albumin and globulin compared to the control group. However, Nematallah *et al.* (2015) found that there were no significant differences in total protein, albumin and globulin due to probiotic supplementation in broiler diets.

Regarding lipid metabolism, results showed that different dietary treatments (T2-5) had no significant effects on all measured parameters (triglyceride, total lipid and cholesterol). These results are in agreement with Nematallah *et al.* (2015) who found that there were no significant differences in blood plasma parameters due to probiotic supplementation. On the other hand, our results disagree with the finding of Ashayerizadeh *et al.* (2011), and Pourakbari *et al.* (2016) who reported that dietary biological additives significantly reduced total lipids and cholesterol content of broiler chicken as compared to the control diet.

Table 6. Effect of dietary treatments on blood plasma parameters

Items	Experimental treatments					
	T1	T2	T3	T4	T5	Sig.
Total protein (mg/dL)	5.57^{b} ±0.23	6.36^{a} ±0.14	6.03^{ab} ±0.08	6.00^{ab} ±0.15	6.43^{a} ±0.17	*
Albumin (A) (mg/dL)	2.92^{bc} ±0.09	3.30^{a} ±0.05	2.76^{c} ±0.14	3.06^{ab} ±0.03	3.30^{a} ±0.05	**
Globulin (G) (mg/dL)	2.64 ±0.26	3.06 ±0.13	3.27 ±0.13	2.93 ±0.12	3.13 ±0.21	NS
A/G ratio	1.13 ±0.12	1.08 ±0.05	0.85 ±0.07	1.04 ±0.03	1.06 ±0.09	NS
Triglycerides (mg/dL)	94.66 ±3.92	101.66 ±5.54	106.66 ±6.22	102.00 ±2.08	100.33 ±7.05	NS
Total Lipids (mg/dL)	318.00 ±15.30	299.66 ±11.05	327.66 ±45.31	329.00 ±12.28	325.00 ±8.88	NS
Cholesterol (mg/dL)	140.00 ±1.15	132.33 ±1.85	130.66 ±8.83	140.33 ±3.75	139.33 ±3.51	NS

a,b Means in the same row with the same letters are not significantly different. MSE: Mean standard error NS: Non-significant **: ($P \leq 0.01$).

CONCLUSION

In conclusion, probiotic and symbiotic supplementation to broiler diets had positive effects on productive performance and microorganisms in the small intestine.

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تحسين الاداء الانتاجي لدجاج اللحم بإضافة مستحضرات مختلفة من البروبيوتك والسيمبيوتك الى العلائق

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اجريت هذه التجربه باستخدام ٢٢٥ كتكوت هبرد غير مجنس منعمر يوم حتى ٣٥ يوم لدراسة تاثير مستحضرات مختلفه من البروبيوتيك والسيمبيوتيك للعلائق على الاداء الانتاجى وصفات الذبيحه ومحتوى الامعاء من البكتيريا الضارة والنافعة وبعض صفات بلازما الدم.

اشتملت التجربة على ٥ معاملات و٣ تكرارات بكل منها ١٥ كتكوت. وكانت المعاملات التجريبيه كتالي T1 كنترول (بدون اضافات) و T2- 4 عليقة الكنترول مضاف اليها مستحضرالسيمبيوتك (٢٥٠ جرام للطن) من لاكتوبرو (T2) وباسيلونورت (T3) وبلاكتو (T4) ومستحضربروبيوتك (٥٠٠ جرام للطن) زادو

اهم النتائج

- جميع الاضافات حسنت معنويا الزيادة فى وزن الجسم ب ١٨ % (١٩٣٧.٤٠ مقابل ٢٢٨٤.٩٠ جم) وكذلك استهلاك العلف (٢٨٣٣.٧٥ مقابل ٣٢٧٦.٢٥ جم) و معامل التحويل الغذائي (١.٤٦ مقابل ١.٤٣) بمقارنه (T1 كنترول وT4).
- لا يوجد فرق في صفات الذبيحه او الاعضاء اللمفاويه
- انخفاض في البكتيريا الضاره (اشرشيا كولاى والسالمونيلا) وزياده البكتيريا النافعه (باسيلس سبتلس ولاكتوباسيلس) فى الامعاء مقارنة بالكنترول
- تأثر معنويا البروتين الكلى والالبيومين في بلازما الدم بينما لم تتاثر المحتويات من الدهون الكليه و الجلسريدات الثلاثيه والكولسترول

الإستنتاج:

اضافه المستحضرات الحيويه من البروبيوتك والسيمبيوتك الى علائق دجاج اللحم له أثير إيجابي على الآداء الإنتاجي والمحتوى البكتيري الضار والنافع في الامعاء بدون تأثير على صفات الذبيحه.