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COMPARISON OF EFFECT OF ANTIBIOTICS (FLAVOMYCIN), PROBIOTICS (PROTEXIN), PREBIOTICS (IMMUNOVAL) AND SYNBIOTICS (BIOMIN IMBO) ON WEEKLY GROWTH AND ECONOMICAL INDICES OF BROILERS

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ABSTRACT

An experiment was conducted in order to investigation on effect of antibiotics (Flavomycin), probiotics (Protexin), prebiotics (Immunoval) and synbiotics (Biomin IMBO) on weekly growth and economical indices of broilers. The studied treatments were as follows: treatment 1: basal diet (control); treatment 2: basal diet included 15 ppm antibiotics Flavomycin; treatment 3: basal diet included 0.10 g/kg probiotics Protexin; treatment 4: basal diet included 0.10 g/kg prebiotics Immunoval; and treatment 5: basal diet included 0.15 g/kg synbiotics Biomin IMBO. From obtained results, dietary additive type had significant effect on weight of 1 chick at 42th days of age ($P \leq 0.05$), so Biomin IMBO synbiotics had the highest weight of 1 chick at 42th days of age significantly (3131.225 g). Also, dietary additive type had significant effect on feed cost per kg live weight ($P \leq 0.05$), so Biomin IMBO synbiotics had the best feed cost per kg live weight significantly (26777.396 Rials/kg). Dietary additive type had significant effect on production index ($P \leq 0.05$), so Biomin IMBO synbiotics had the best production index significantly (440.336).

Key words: Chick, Probiotics, Prebiotics, Synbiotics, Weight, Production Index

INTRODUCTION

There are new additives such as probiotics, prebiotics and synbiotics as alternative of antibiotics for broiler feeding. Meanwhile, there are some researches and report about effects of probiotics **[1, 2, 3, 4]**, prebiotics **[5, 6]** and synbiotics **[7, 8, 9, 10, 11, 12]** on broiler performance. However, there is not report for comparison of Protexin, Immunoval and Biomin IMBO as an alternative for antibiotics (Flavomycin) on weekly growth and economical indices of broiler chickens. The objective of the present study was to investigate the effects of standard (recommended by manufacturer) levels of a probiotics (Protexin), prebiotics (Immunoval) and synbiotics (Biomin IMBO) and antibiotics (Flavomycin) on the weekly growth and economical indices in broiler chicks.

MATERIALS AND METHODS

Two hundred day-old Ross 308 male broiler chickens were purchased from a commercial hatchery. The broiler chickens were placed in land cages with dimensions of 1.5 × 1.0 meters, which provided a floor area of 0.15 m^2 per bird, in a thermostatically-controlled curtain side-wall poultry barn. The cage floors were covered with paper roll litter, and the birds remained in the land cages for the duration of the experiment, which ended at 42 days of age. Each cage of 10 chickens was assigned to a specific dietary treatment group.

Ambient temperature within the poultry barn was maintained with supplemental heat from thermostatically controlled gasoline rocket heaters, and humidity was added to the barn atmosphere via a water spray to maintain relative humidity between 55-65%. Ambient temperature was controlled at 32 °C at placement and decreased periodically to 24 °C at 3 weeks of age and was maintained at 24 °C until the termination of the investigation. Lighting was provided by 23 watt fluorescent tubes in ceiling fixtures. Constant light was provided on day 1, but on day 2, lighting was established at 21 hours per day until the end of the study. Air circulation within the poultry barn was facilitated by 3 wall-mounted 60 cm diameter fans on one end of the barn and 160 cm diameter wall-mounted fans on the other end of the barn to establish tunnel ventilation.

A three phase feeding program was used in this investigation and consisted of provision of starter feed from 1^{st}-14^{th} days of age, grower feed from 15^{th}-28^{th} days of age, and finisher feed from 29^{th}-42^{nd} days of age. The ingredient and nutrient composition of diets are shown in **Tables 1 and 2**. The diets met

or exceeded Ross 308 catalogue recommendations.

Antibiotics Flavomycin or flavophospholipol (15 ppm), probiotics Protexin (0.1 g/kg), prebiotics Immunoval (0.1 g/kg) and synbiotics Biomin IMBO (0.15 g/kg) powders were added based on manufacturer recommendation to the basal starter, grower and finisher diets for evaluation of their in broiler chicks. Therefore, the studied treatments were as follows:

Treatment 1: Basal diet (control)

Treatment 2: Basal diet included 15 ppm antibiotics Flavomycin

Treatment 3: Basal diet included 0.10 g/kg probiotics Protexin

Treatment 4: Basal diet included 0.10 g/kg prebiotics Immunoval

Treatment 5: Basal diet included 0.15 g/kg synbiotics Biomin IMBO

Antibiotics Flavomycin inhibits microorganisms reproduction by intervening in the biosynthesis of murein, the structural substance of their cell walls. Specifically, the enzyme glyconsyltransferase, that plays an essential role in the synthesis of the cell wall of Gram-positive bacteria, cannot distinguish between flavophospholipol and the natural murein compound. This prevents murein synthesis from taking place. Damage to the murein layer causes cells to burst. However, the desirable lactobacilli and bifidobacteria are unharmed.

Probiotics Protexin containing different microbiota composition were obtained from the local market and included (*Lactobacillus plantrum*), (*Lactobacillus bulgaris*), (*Lactobacillus acidophilus*), (*Lactobacillus rhamnosus*), (*Bifidobacteriumbifidium*), (*Streptococcus thermophiles*), (*Enterococcus facium*), (*Aspergillusoryzae*) and (*Candida pintolopesii*).

Prebiotics Immunoval as a dietary supplement made from Astragalus, beta 1,3 glucans, lactoferrin and L-glutamine.

Synbiotics Biomin IMBO contained fructo oligosaccharides, phycophytic substances, cell wall fragments, inulin, and (*Enterococcus faecium*) (3×10^9 cfu/g).

A total of 200 one-day-old male chicks of the Ross 308 strain **[13]** were allotted to 20 groups (5 treatments and 4 replicates for each treatment) of 10 birds, such that mean group body weights were similar for each group.

This study was conducted in a completely randomized design with five treatments and four replicates per treatment. Data were analyzed by **[14]**, using the generalized linear model (GLM) procedure and the

statistical comparison was made by Duncan test at the 95% probability level.

RESULTS AND DISCUSSION

The effects of diet supplementation with recommended levels of probiotics, prebiotics, synbiotics and antibiotics are presented in **Tables 3-6**.

From obtained results, it is showed that dietary additive type had not significant effect on feed intake at 1st week (P>0.05), although Immunoval prebiotics had the highest feed intake at 1st week numerically (20.467 g/day). Also, dietary additive type had significant effect on weight gain at 1st week (P≤0.05), so Biomin IMBO synbiotics had the highest weight gain at 1st week significantly (16.503 g/day). Dietary additive type had significant effect on feed efficiency at 1st week (P≤0.05), and Biomin IMBO synbiotics had the best feed efficiency at 1st week significantly (1.231). From obtained results, it is showed that dietary additive type had not significant effect on energy intake at 1st week (P>0.05), and Immunoval prebiotics had the highest energy intake at 1st week significantly (59.968 kcal/day). Meanwhile, dietary additive type had significant effect on energy efficiency at 1st week (P≤0.05), and Biomin IMBO synbiotics had the best energy efficiency at 1st week significantly (3.606 kcal/g). Dietary additive type had not significant effect on protein intake at 1st week (P>0.05), however Immunoval prebiotics had the highest protein intake at 1st week significantly (4.482 g/day). Meanwhile, dietary additive type had significant effect on protein efficiency at 1st week (P≤0.05), and Biomin IMBO synbiotics had the best protein efficiency at 1st week significantly (0.270 g/g).

Dietary additive type had significant effect on feed intake at 2nd week (P≤0.05), so Immunoval prebiotics had the highest feed intake at 2nd week significantly (60.099 g/day). Also, dietary additive type had significant effect on weight gain at 2nd week (P≤0.05), so Biomin IMBO synbiotics had the highest weight gain at 2nd week significantly (46.917 g/day). Dietary additive type had not significant effect on feed efficiency at 2nd week (P>0.05), however Biomin IMBO synbiotics had the best feed efficiency at 2nd week numerically (1.281). From obtained results, it is showed that dietary additive type had significant effect on energy intake at 2nd week (P≤0.05), so Biomin IMBO synbiotics had the highest energy intake at 2nd week significantly (176.092 kcal/day). Meanwhile, dietary additive type had not significant effect on energy efficiency at 2nd week (P>0.05),

however Biomin IMBO synbiotics had the best energy efficiency at 2nd week numerically (3.755 kcal/g). Dietary additive type had significant effect on protein intake at 2nd week (P≤0.05), and Biomin IMBO synbiotics had the highest protein intake at 2nd week significantly (13.162 g/day). Meanwhile, dietary additive type had not significant effect on protein efficiency at 2nd week (P>0.05), however Biomin IMBO synbiotics had the best protein efficiency at 2nd week numerically (0.281 g/g).

Dietary additive type had significant effect on feed intake at 3rd week (P≤0.05), so Protexin probiotics had the highest feed intake at 3rd week significantly (110.706 g/day). Also, dietary additive type had significant effect on weight gain at 3rd week (P≤0.05), so Protexin probiotics had the highest weight gain at 3rd week significantly (64.350 g/day). Dietary additive type had significant effect on feed efficiency at 3rd week (P≤0.05), so Biomin IMBO synbiotics had the best feed efficiency at 3rd week significantly (1.604). From obtained results, it is showed that dietary additive type had significant effect on energy intake at 3rd week (P≤0.05), so Protexin probiotics had the highest energy intake at 3rd week significantly (333.780 kcal/day). Meanwhile, dietary additive type had significant effect on energy efficiency at 3rd week (P≤0.05), so Biomin IMBO synbiotics had the best energy efficiency at 3rd week significantly (4.836 kcal/g). Dietary additive type had significant effect on protein intake at 3rd week (P≤0.05), and Protexin probiotics had the highest protein intake at 3rd week significantly (21.698 g/day). Meanwhile, dietary additive type had significant effect on protein efficiency at 3rd week (P≤0.05), so Biomin IMBO synbiotics had the best protein efficiency at 3rd week significantly (0.314 g/g).

Dietary additive type had significant effect on feed intake at 4th week (P≤0.05), so Protexin probiotics had the highest feed intake at 4th week significantly (156.991 g/day). Also, dietary additive type had significant effect on weight gain at 4th week (P≤0.05), so Biomin IMBO synbiotics had the highest weight gain at 4th week significantly (89.146 g/day). Dietary additive type had significant effect on feed efficiency at 4th week (P≤0.05), so Biomin IMBO synbiotics had the best feed efficiency at 4th week significantly (1.725). From obtained results, it is showed that dietary additive type had significant effect on energy intake at 4th week (P≤0.05), so Protexin probiotics had the highest energy intake at 4th week significantly (473.328

kcal/day). Meanwhile, dietary additive type had significant effect on energy efficiency at 4th week (P≤0.05), so Biomin IMBO synbiotics had the best energy efficiency at 4th week significantly (5.201 kcal/g). Dietary additive type had significant effect on protein intake at 4th week (P≤0.05), and Protexin probiotics had the highest protein intake at 4th week significantly (30.770 g/day). Meanwhile, dietary additive type had significant effect on protein efficiency at 4th week (P≤0.05), so Biomin IMBO synbiotics had the best protein efficiency at 4th week significantly (0.338 g/g).

Dietary additive type had not significant effect on feed intake at 5th week (P>0.05), however Protexin probiotics had the highest feed intake at 5th week numerically (191.992 g/day). Also, dietary additive type had significant effect on weight gain at 5th week (P≤0.05), so Protexin probiotics had the highest weight gain at 5th week significantly (104.139 g/day).

Dietary additive type had significant effect on feed efficiency at 5th week (P≤0.05), so Biomin IMBO synbiotics had the best feed efficiency at 5th week significantly (1.804). From obtained results, it is showed that dietary additive type had not significant effect on energy intake at 5th week (P>0.05), however Protexin probiotics had the highest energy intake at 5th week significantly (597.096 kcal/day). Meanwhile, dietary additive type had significant effect on energy efficiency at 5th week (P≤0.05), so Biomin IMBO synbiotics had the best energy efficiency at 5th week significantly (5.609 kcal/g). Dietary additive type had not significant effect on protein intake at 5th week (P>0.05), however Protexin probiotics had the highest protein intake at 5th week significantly (32.831 g/day). Meanwhile, dietary additive type had significant effect on protein efficiency at 5th week (P≤0.05), so Biomin IMBO synbiotics had the best protein efficiency at 5th week significantly (0.308 g/g).

Dietary additive type had not significant effect on feed intake at 6th week (P>0.05), however Immunoval prebiotics had the highest feed intake at 6th week numerically (231.428 g/day). Also, dietary additive type had significant effect on weight gain at 6th week (P≤0.05), so Biomin IMBO synbiotics had the highest weight gain at 6th week significantly (120.857 g/day). Dietary additive type had significant effect on feed efficiency at 6th week (P≤0.05), so Biomin IMBO synbiotics had the best feed efficiency at 6th week significantly (1.874). From obtained results, it is showed that dietary additive type had not significant

effect on energy intake at 6th week (P>0.05), however Immunoval prebiotics had the highest energy intake at 6th week significantly (719.742 kcal/day). Meanwhile, dietary additive type had significant effect on energy efficiency at 6th week (P≤0.05), so Biomin IMBO synbiotics had the best energy efficiency at 6th week significantly (5.828 kcal/g). Dietary additive type had not significant effect on protein intake at 6th week (P>0.05), however Immunoval prebiotics had the highest protein intake at 6th week significantly (39.574 g/day). Meanwhile, dietary additive type had significant effect on protein efficiency at 6th week (P≤0.05), so Biomin IMBO synbiotics had the best protein efficiency at 6th week significantly (0.320 g/g).

Dietary additive type had significant effect on weight of 1 chick at 42th days of age (P≤0.05), so Biomin IMBO synbiotics had the highest weight of 1 chick at 42th days of age significantly (3131.225 g). Also, dietary additive type had significant effect on feed cost per kg live weight (P≤0.05), so Biomin IMBO synbiotics had the best feed cost per kg live weight significantly (26777.396 Rials/kg). Dietary additive type had significant effect on production index (P≤0.05), so Biomin IMBO synbiotics had the best production index significantly (440.336).

Obtained results confirm positive effects of dietary additive on broiler growth and economical traits. Similar reports published previously **[15, 16, 17, 18, 19]** and our findings confirm these reports. As conclusion, these additive improve economical incomes of farmers and can use safely as alternatives instead of antibiotics.

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Table 1: Feed ingredients of used diets during the starter (1st-14th days of age), grower (15th-28th days of age), and finisher (29th-42nd days of age) periods

Ingredient (%)	Starter period (1st-14th days of age)	Finisher period (15th-28th days of age)	Finisher period (29th-42nd days of age)
Corn	55.66	61.20	65.54
Soybean Meal	37.00	30.00	27.0
Ca%22P%18	1.70	1.70	1.50
CaCO3	1.40	1.50	0.80
Lysine-Hydro-Chloride	0.15	0.15	0.05
DL-Methionine	0.20	0.26	0.17
Threonine	0.03	0.03	0.04
Choline Chloride	0.10	0.10	0.10
Vitamin premix*	0.25	0.25	0.25
Mineral premix**	0.25	0.25	0.25
NaCl	0.23	0.33	0.20
Sodium bicarbonate (NaHCO3)	0.17	0.17	0.15
Multi-enzyme	0.05	0.05	0.03
Phytase enzyme	0.01	0.01	0.05
Formaldeide	0.10	0.10	0.00
Anti-fungus	0.10	0.10	0.05
Plant oil	1.20	2.30	3.60
Anti-coccidial	0.05	0.05	0.05
Curcuma longa	0.15	0.15	0.00
Growth promoter	0.00	0.10	0.10
Vitamin E	1.20	1.20	0.07
Total	100	100	100

***Calcium Pantothenate: 4 mg/g; Niacin: 15 mg/g; Vitamin B6: 13 mg/g; Cu: 3 mg/g; Zn: 15 mg/g; Mn: 20 mg/g; Fe: 10 mg/g; K: 0.3 mg/g**

****Vitamin A: 5000 IU/g; Vitamin D3: 500 IU/g; Vitamin E: 3 mg/g; Vitamin K3: 1.5 mg/g; Vitamin B2: 1 mg/g**

Table 2: Nutrient analysis of used diets during the starter (1st-14th days of age), grower (15th-28th days of age), and finisher periods (29th-42nd days of age)

Nutrient analysis	Starter period (1st-14th days of age)	Finisher period (15th-28th days of age)	Finisher period (29th-42nd days of age)
Energy (kcal/kg)	2930	3015	3110
Crude protein (%)	21.90	19.60	17.10
Calcium (%)	1.10	0.95	0.80
Phosphorus (%)	0.53	0.51	0.46
Lysine (%)	1.52	1.34	1.28
Methionine (%)	0.68	0.62	0.53
Methionine + Cysteine (%)	1.16	1.10	0.87
Ether extract (%)	7.41	8.22	9.76
Crude fiber (%)	3.92	3.74	3.89

Table 3: Performance mean (±SEM) of Ross 308 broilers at 1st and 2nd weeks of age fed the different types of dietary additives from 1st-6th weeks of age*							
Trait Treatment	**Feed intake (g/chick/day)**	**Weight gain (g/chick/day)**	**Feed Efficiency**	**Energy Intake (kcal/chick/day)**	**Energy Efficiency (kcal/gr)**	**Protein Intake (gr/chick/day)**	**Protein Efficiency (gr/gr)**
	1st week of age (1st-7th days of age)						
Control: No additive	**20.339^{a}**	**15.443^{c}**	**1.317^{a}**	**59.593^{a}**	**3.859^{a}**	**4.454^{a}**	**0.288^{a}**
15 ppm Flavomycin antibiotic	**20.142^{a}**	**15.702^{bc}**	**1.283^{ab}**	**59.015^{a}**	**3.759^{ab}**	**4.411^{a}**	**0.281^{ab}**
0.1 g/kg Protexin probiotics	**20.267^{a}**	**16.199^{ab}**	**1.251^{bc}**	**59.382^{a}**	**3.666^{bc}**	**4.438^{a}**	**0.274^{bc}**
0.1 g/kg Immunoval prebiotics	**20.467^{a}**	**16.327^{a}**	**1.254^{bc}**	**59.968^{a}**	**3.674^{bc}**	**4.482^{a}**	**0.275^{bc}**
0.15 g/kg Biomin IMBO synbiotics	**20.300^{a}**	**16.503^{a}**	**1.231^{c}**	**59.480^{a}**	**3.606^{c}**	**4.446^{a}**	**0.270^{c}**
P	**0.944**	**0.006**	**0.011**	**0.944**	**0.011**	**0.944**	**0.011**
SEM (Standard Error of Mean)	**0.275**	**0.190**	**0.015**	**0.807**	**0.045**	**0.060**	**0.003**
	2nd week of age (8th-14th days of age)						
Control: No additive	**55.593^{b}**	**41.198^{b}**	**1.349^{a}**	**162.886^{b}**	**3.952^{a}**	**12.175^{b}**	**0.295^{a}**
15 ppm Flavomycin antibiotic	**58.621^{a}**	**44.414^{a}**	**1.320^{a}**	**171.759^{a}**	**3.867^{a}**	**12.837^{a}**	**0.289^{a}**
0.1 g/kg Protexin probiotics	**59.270^{a}**	**45.120^{a}**	**1.315^{a}**	**173.661^{a}**	**3.854^{a}**	**12.980^{a}**	**0.288^{a}**
0.1 g/kg Immunoval prebiotics	**55.346^{b}**	**41.844^{b}**	**1.324^{a}**	**162.165^{b}**	**3.880^{a}**	**12.121^{b}**	**0.290^{a}**
0.15 g/kg Biomin IMBO synbiotics	**60.099^{a}**	**46.917^{a}**	**1.281^{a}**	**176.092^{a}**	**3.755^{a}**	**13.162^{a}**	**0.281^{a}**
P	**0.007**	**0.001**	**0.342**	**0.007**	**0.342**	**0.007**	**0.342**
SEM (Standard Error of Mean)	**0.945**	**0.796**	**0.022**	**2.769**	**0.064**	**0.207**	**0.005**

*** Means (± standard error) within each column of dietary treatments with no common superscript differ significantly at P<0.05.**

Table 4: Performance mean (±SEM) of Ross 308 broilers at 3rd and 4th weeks of age fed the different types of dietary additives from 1st-6th weeks of age*							
Trait Treatment	**Feed intake (g/chick/day)**	**Weight gain (g/chick/day)**	**Feed Efficiency**	**Energy Intake (kcal/chick/day)**	**Energy Efficiency (kcal/gr)**	**Protein Intake (gr/chick/day)**	**Protein Efficiency (gr/gr)**
	3rd week of age (15th-21st days of age)						
Control: No additive	**100.378^{b}**	**55.968^{b}**	**1.800^{a}**	**302.640^{b}**	**5.428^{a}**	**19.647^{b}**	**0.353^{a}**
15 ppm Flavomycin antibiotic	**101.614^{ab}**	**57.621^{b}**	**1.763^{a}**	**306.365^{ab}**	**5.314^{a}**	**19.916^{ab}**	**0.345^{a}**
0.1 g/kg Protexin probiotics	**110.706^{a}**	**64.350^{a}**	**1.721^{ab}**	**333.780^{a}**	**5.188^{ab}**	**21.698^{a}**	**0.337^{ab}**
0.1 g/kg Immunoval prebiotics	**102.456^{ab}**	**60.135^{ab}**	**1.704^{ab}**	**308.906^{ab}**	**5.137^{ab}**	**20.081^{ab}**	**0.334^{ab}**
0.15 g/kg Biomin IMBO synbiotics	**103.057^{ab}**	**64.203^{a}**	**1.604^{b}**	**310.716^{ab}**	**4.836^{b}**	**20.199^{ab}**	**0.314^{b}**
P	**0.190**	**0.002**	**0.063**	**0.190**	**0.063**	**0.190**	**0.063**
SEM (Standard Error of Mean)	**3.072**	**1.446**	**0.044**	**9.262**	**0.133**	**0.602**	**0.009**
	4th week of age (22nd-28th days of age)						
Control: No additive	**146.850^{b}**	**78.307^{c}**	**1.876^{a}**	**442.752^{b}**	**5.658^{a}**	**28.783^{b}**	**0.368^{a}**
15 ppm Flavomycin antibiotic	**152.636^{ab}**	**81.357^{bc}**	**1.879^{a}**	**460.196^{ab}**	**5.667^{a}**	**29.917^{ab}**	**0.368^{a}**
0.1 g/kg Protexin probiotics	**156.991^{a}**	**86.946^{ab}**	**1.807^{ab}**	**473.328^{a}**	**5.447^{ab}**	**30.770^{a}**	**0.354^{ab}**
0.1 g/kg Immunoval prebiotics	**152.028^{ab}**	**84.825^{ab}**	**1.794^{ab}**	**458.365^{ab}**	**5.408^{ab}**	**29.798^{ab}**	**0.352^{ab}**
0.15 g/kg Biomin IMBO synbiotics	**153.753^{ab}**	**89.146^{a}**	**1.725^{b}**	**463.565^{a}**	**5.201^{b}**	**30.136^{ab}**	**0.338^{b}**
P	**0.201**	**0.11**	**0.025**	**0.201**	**0.025**	**0.201**	**0.025**
SEM (Standard Error of Mean)	**2.812**	**1.988**	**0.033**	**8.478**	**0.099**	**0.551**	**0.006**
*** Means (± standard error) within each column of dietary treatments with no common superscript differ significantly at P<0.05.**							

Table 5: Performance mean (±SEM) of Ross 308 broilers at 5th and 6th weeks of age fed the different types of dietary additives from 1st-6th weeks of age*							
Trait Treatment	**Feed intake (g/chick/day)**	**Weight gain (g/chick/day)**	**Feed Efficiency**	**Energy Intake (kcal/chick/day)**	**Energy Efficiency (kcal/gr)**	**Protein Intake (gr/chick/day)**	**Protein Efficiency (gr/gr)**
	5th week of age (29th-35th days of age)						
Control: No additive	**174.157^{a}**	**90.778^{b}**	**1.917^{ab}**	**541.627^{a}**	**5.960^{ab}**	**29.781^{a}**	**0.328^{ab}**
15 ppm Flavomycin antibiotic	**182.957^{a}**	**93.228^{ab}**	**1.960^{a}**	**568.995^{a}**	**6.097^{a}**	**31.286^{a}**	**0.335^{a}**
0.1 g/kg Protexin probiotics	**191.992^{a}**	**104.139^{a}**	**1.845^{bc}**	**597.096^{a}**	**5.737^{bc}**	**32.831^{a}**	**0.315^{bc}**
0.1 g/kg Immunoval prebiotics	**177.550^{a}**	**96.474^{ab}**	**1.841^{bc}**	**552.179^{a}**	**5.725^{bc}**	**30.361^{a}**	**0.315^{bc}**
0.15 g/kg Biomin IMBO synbiotics	**187.314^{a}**	**103.707^{a}**	**1.804^{c}**	**582.546^{a}**	**5.609^{c}**	**32.031^{a}**	**0.308^{c}**
P	**0.590**	**0.082**	**0.009**	**0.590**	**0.009**	**0.590**	**0.009**
SEM (Standard Error of Mean)	**8.468**	**3.790**	**0.029**	**26.335**	**0.089**	**1.448**	**0.005**
	6th week of age (36th-42nd days of age)						
Control: No additive	**212.035^{a}**	**103.614^{b}**	**2.047^{a}**	**659.430^{a}**	**6.365^{a}**	**36.258^{a}**	**0.350^{a}**
15 ppm Flavomycin antibiotic	**213.207^{a}**	**105.550^{b}**	**2.024^{ab}**	**663.072^{a}**	**6.295^{ab}**	**36.458^{a}**	**0.346^{ab}**
0.1 g/kg Protexin probiotics	**229.514^{a}**	**120.232^{a}**	**1.909^{bc}**	**713.789^{a}**	**5.938^{bc}**	**39.247^{a}**	**0.326^{bc}**
0.1 g/kg Immunoval prebiotics	**231.428^{a}**	**119.142^{a}**	**1.945^{abc}**	**719.742^{a}**	**6.048^{abc}**	**39.574^{a}**	**0.333^{abc}**
0.15 g/kg Biomin IMBO synbiotics	**226.521^{a}**	**120.857^{a}**	**1.874^{c}**	**704.480^{a}**	**5.828^{c}**	**38.735^{a}**	**0.320^{c}**
P	**0.094**	**0.001**	**0.040**	**0.094**	**0.040**	**0.094**	**0.040**
SEM (Standard Error of Mean)	**5.932**	**3.023**	**0.041**	**18.449**	**0.127**	**1.014**	**0.007**
*** Means (± standard error) within each column of dietary treatments with no common superscript differ significantly at P<0.05**							

Table 6: Economical performance mean (±SEM) of Ross 308 broilers fed the different types of dietary additives from 1st-6th weeks of age*							
Trait Treatment	**Weight of 1 chick at 42th days of age (gr/chick)**	**Feed cost per kg live weight (Rial/kg)**	**Production index**				
Control: No additive	**2738.675^{c}**	**29016.274^{a}**	**361.745^{de}**				
15 ppm Flavomycin antibiotic	**2826.900^{c}**	**28839.944^{a}**	**357.988^{e}**				
0.1 g/kg Protexin probiotics	**3100.650^{ab}**	**27839.178^{ab}**	**408.910^{ab}**				
0.1 g/kg Immunoval prebiotics	**2972.775^{b}**	**27950.000^{ab}**	**395.666^{bc}**				
0.15 g/kg Biomin IMBO synbiotics	**3131.225^{a}**	**26777.396^{b}**	**440.336^{a}**				
P	**0.000**	**0.016**	**0.001**				
SEM (Standard Error of Mean)	**46.977**	**430.480**	**11.409**				
*** Means (± standard error) within each column of dietary treatments with no common superscript differ significantly at P<0.05**							