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ASSESSMENT OF SOME FEED ADDITIVES AS ANTI-BIOTIC ALTERNATIVES, IN RELATION TO CARCASS CHARACTERISTICS AND ECONOMIC TRAITS OF BROILER CHICKENS

El-Faham, A.I., Nematallah G.M. Ali and M.A.M. Abdelaziz

Poult. Prod. Dep., Fac. of Agric., Ain Shams Uni., Egypt.

Corresponding author: Mrwan Abdelaziz; E-mail: mrwanabdelaziz@agr.asu.edu.eg

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ABSTRACT: The aim of this work was to study the efficacy of antibiotic growth promoter alternatives supplementation in the corn soybean meal diets on growth performance, carcass cuts and lymphoid organs %, some plasma parameters and some economic traits of broiler chicks. 150 one-day-old chicks (Arbor Acers), un-sexed were randomly divided into five experimental treatments with tree replicates per treatment group. The control group (T1) was fed basal (starter and grower) diets without supplementation, while other groups T2: T5 were fed basal diets supplemented with colistin antibiotic 1 g/ kg (Colistix®), Guanidinoacetic acid 0.6 g/ kg (Cre-Amino®), Lactobacillus acidophilus 1 g/ kg (Bio-Bac-Lac®) and Beta Mannanase 0.3 g/ kg (Hemicell®). At 32 days results revealed that, live body weight and daily weight gain for the broiler chicks fed T1, T2 and T3 diets were higher than those fed other dietary treatments. Chicks fed T2 and T3 diets had significant better feed conversion ratio compared with those fed T4 or T5 diets. The best protein (PCR), energy (ECR) conversion ratio and the highest performance index (PI) and production efficiency factor (PEF) were recorded for T1-T3 compared with other dietary treatments (T4: T5). Plasma cholesterol, HDL, LDL and GOT were not significantly different than control, while total lipids, triglycerides or GPT were significant. Difference in carcass cuts were not affected by treatments except breast % was significantly decreased than control. Chickens fed T3 diets showed the highest significant thymus ad bursa % compared with other dietary treatments. The results of economic traits showed that chickens fed basal diets supplemented with 0.6% guanidine acetic acid support and enhance economic efficiency without adverse effect on growth performance of broiler until 32 days of age. Therefore, it could be recommended from this study to supplement 0.6% guanidinoacetic acid to broiler diets under free antibiotic feeding conditions.

Keywords: Feed additives - Broiler - Carcass traits - Economic efficiency

INTRODUCTION

Antibiotics had been considered as essential additives for better growth and maintaining gut ecosystem balance (Huyghebaert et al., 2011) for more than 50 years in poultry. However, in 2006 the European Union imposed a complete ban of using antibiotics in poultry feeds (Singer and Hofacre, 2006; Vesna et al., 2007).

Feed additives alternatives to antibiotics should have the same advantageous properties. (probiotics, prebiotics, synbiotics organic acids, antioxidant and enzymes), herbal products (polyphenols, herbs and spices) and genetically modified foods have been extensively studied in search of alternatives dietary feed additives (Das et al., 2012). These alternatives are beneficially affects the host by selectively stimulating growth or activity of beneficial bacteria and killing harmful bacteria inhabiting in digestive tract of poultry (Vesna et al., 2007; Taherpour et al., 2009; Yang et al., 2009).

The regulatory influence of in-feed antibiotics, endogenous and exogenous enzymes, pre-and probiotics, nutraceuticals in the alteration of microbial population within the gastro-intestinal tract are reported to be directly or indirectly through inhibitory actions; their actions on the substrates that bacteria use (Cowieson et al., 2006; Yang et al., 2009; Bedford and Cowieson, 2012 and Barekatain et al., 2013).

As alternative to antibiotic growth promoters, probiotic have demonstrated positive results in poultry production, due to their potential to decrease the intestinal pH and enhance the bacterial development against pH changes (Ergün et al. 2000; Panda et al., 2000), utilize indigestible carbohydrate (Prins, 1977), helps overcome stress (Patterson and Burkholder, 2003), stimulate, synthesize vitamins, lactic acid and improve appetite (Coates and Fuller, 1977; Nahashon et al., 1994 and Nahashon et al., 1993). However, many studies have been reported that supplementation of probiotics has no positive effect on broiler chicks performance (Ahmed, 2004; Midilli et al., 2008; Rodriguez et al., 2012).

There are growing interests in the potential of enzyme products to improve performance of poultry provided with corn soybean meal-based diets. Exogenous enzymes could improve digestion for protein, starch and fat by removing the antinutritional factors which interfere with normal processes of digestion or by digestion of fiber components that would otherwise pass undigested into the environment and extend the use of enzyme to play a significant role in health of the digestive tract (Bedford, 1996). Hemicell is a fermentation product of Bacillus lentus and its active ingredient is β-mannanase, which can hydrolyze β-mannan in ingredients such as soybean meal (Hossein, 2012). Diets inclusion of β-mannanase reduced intestinal viscosity, reduced the water: feed ratio and dry fecal output of broilers and increased growth and feed efficiency by degrading the β-mannanase (Lee et al., 2003; Daskiran et al., 2004).

Guanidinoacetic acid (GA), also referred to as glycosamine, is a natural precursor of creatine in the vertebrate body. The GA is synthesized in the liver and kidney from arginine and glycine and acted upon by the enzyme transamidinase and subsequently methylated by S-adenosyl-methionine to creatine (Borsook and

Dubnoff, 1940; Wyss and Kaddurah-Daouk, 2000). Positive effects on growth performance were noticed, when broiler diets were supplemented with GA, considerable increases in, creatine levels in serum and muscle (Lemme et al., 2007; Carvalho et al., 2013), the methylation demand (Stead et al., 2006), which can induce the accumulation of homocysteine in the blood (Ohuchi et al., 2008) or lead to a deficiency of methionine, choline, folic acid or vitamin B_{12}. Ringel et al. (2008 a, b) found significant improvements in performance and higher percentage of breast meat from dietary GA supplementation (0.6-1.0 g/ kg).

Therefore, in the present study, the objective was to evaluate the efficiency of a supplementing colistin antibiotic (Colistix®), GA (Cre-Amino®), lactobacillus acidophilus (Bio-Bac-Lac®) or Beta Mannanase (Hemicell®) to a typical corn soybean meal diets on performance, carcass characteristics and economic traits in broiler chickens.

MATERIAL AND METHODS

The experiment was conducted at Poultry Experimental Unit, Agricultural Experiment and Research Station at Shalakan, Ain Shams University, Egypt.

Birds, **husbandry and treatments**:

150 one-day-old Arbor Acers broiler chicks were obtained from a commercial hatchery were randomly assigned to 5 dietary treatments in such a way as to ensure similar mean body weights across treatment, chicks were allotted into 5 experimental dietary treatments in 3 replicates of 10 birds each in a three-deck cage system and received the experimental diets from 0 to 35 days of age. Chicks were fed starter diets from 0 to 14 days of age and then fed grower diets from 15 to 32 days of age.

The experimental diets were as follows:

T1: basal diet with no additive

T2: basal diet+ colistin antibiotic (Colistix® - Agrovet, Perú)

T3: basal diet + Guanidinoacetic acid 0.6 g/ kg (Cre-Amino® - Evonic, Germany)

T4: basal diet + Lactobacillus acidophilus 1 g/ k g (Bio-Bac-Lac® - DaOne, Korea).

T5: basal diet + Beta Mannanase 0.3 g/ kg (Hemicell® - Elanco, USA).

All diets were formulated to provide the nutrient requirements according to guidelines of NRC (1994). The composition and calculated chemical analysis of the experimental diets are shown in Table 1. Feed additives as well as antibiotic growth promoters used in the present study were obtained from the local market. Feed and water were supplied ad-libitum during the 32-day experimental period and chicks were maintained a 23 h light schedule.

Measurements:

Live body weight (LBW) and feed intake were determined at 1. 14 and 32 days of age and daily weight gain (DWG), daily feed intake (DFI), mortality corrected feed conversion ratio (FCR), protein (PCR) and energy (ECR) conversion ratio were calculated by cage at (0-14, 15-32 and 0—32) days of age. Performance index (PI) and production efficiency factor (PEF) were calculated according to North (1981) and Emmert (2000), respectively.

At 32 days of age, 1 chicken close to the mean LBW were selected from each replicate for processing. Breast, thigh, drumstick, wings, neck, abdominal fat and lymphoid organs (spleen, thymus and bursa) weights were recorded and expressed as relative to LBW at processing.

At the end of the study, blood samples were randomly taken from 3 chickens from each treated group in heparinized tube and centrifuged at 3000 rpm for 15 minutes and plasma were kept at -20° C until analysis. Plasma total lipids, triglycerides, cholesterol, HDL, LDL, GOT and GPT concentrations, were determined by using commercial diagnosing kits [Bio-Diagnostics®, Egypt].

All economic traits were calculated in relation to 1.0 Kg fresh carcass, in terms of costs and returns. Feed costs (L.E) for each treatment was calculated depending on the local market prices of the ingredient and feed additives. Economic efficiency (EE) was calculated using the equation: EE = Net return/ Total costs. While, relative economic efficiency (REE) was calculated in relation to EE of control (T1) group, assuming that relative economic efficiency of (T1) group equals 100.

Statistical analysis:

Data were statistically analyzed according to SAS program (SAS, 2004) using GLM procedure. All the data were subjected to one-way analysis of variance model. Mean differences were tested by Duncan's multiple range (Duncan, 1955).

RESULTS AND DISCUSSION

Growth performance:

The effects of antibiotics growth promoter alternatives (Guanidinoacetic acid (GA), Beta Mannanase (BM) and Lactobacillus acidophilus (LA)] supplementation in broiler diets on live body weight (LBW), daily weight gain (DWG), daily feed intake (DFI) and feed conversion ratio (FCR) during the experimental periods are presented in Tables 2 and 3.

It is worth to note that, inclusion of broiler diets with colistin (T2) or GA (T3) led up to numerical increase in LBW and DWG, compared with the control treatment (T1). However, the corresponding values appeared significantly similar.

In addition, feeding diets containing LA (T4) or BM (T5), till 35 days of age, gave lower LBW and DWG by 9.31, 8.78% and 9.59, 8.35%, respectively compared with those fed control diets. Besides, the differences between treatments were significant.

Data in Table 3, indicate that daily feed intake (DFI) per chicken (g/ d) increased by feeding GA diets (T3) compared with those fed control diets (T1). The corresponding values were 76.55 versus 74.91 (g/ c/ d), without any significant differences.

In the same order, inclusion of broiler diets with colistin (T2), LA (T4) or BM (T5) led to decrease in cumulative feed intake compared with the control group and the corresponding values were 72.01, 73.23 and 73.73 g/ d, respectively. The differences among treatments were not significant. In the same order, values of FCR indicated significant differences between chickens fed supplemented diets compared with those fed control diets (T1). The best FCR was detected for those fed T2 (1.47) or T3 diets. On the other hand, the worst FCR found in chickens fed T4 (1.65) or T5 (1.64), which could be due to the lowest live body weight.

Results of current study are in agreement with those obtained by Carpena et al. (2015) who indicated that GA supplementation optimized reproductive performance of broiler breeders as well as FCR of their progenies. Many authors have been suggested that GA supplementation enhance bird performance because the regeneration of ATP from the creatine and PCR system appears to be paramount importance in the cardiac energy management of fast growing broilers (Nain et al., 2008). Furthermore, GA might also be favorable in young fast-growing chicks because of their high need to supply creatine to growing muscles (Brosnan et al., 2009). Also, Michiels et al. (2012) reported that GA included in all vegetables diets improved animal performance for the whole rearing period and increased breast meat yield.

On the other hand, obtained results disagree with those of El-Yamny and Fadel (2004) and O'Dea et al. (2006). They found no significant differences in FCR between probiotic treatment and control group in protein (PCR) and energy (ECR) conversion ratios.

The effect of antibiotic growth promoter alternatives supplementation on the PCR and ECR of broilers are presented in Table 4. The results indicated that, the best PCR and ECR during experimental period (0-32 d) were detected for chicken fed diet supplemented with colistin, T2 (0.30 and 4.33), respectively. In the same order, worse PCR and ECR were detected for the chickens fed LA diets (T4) being (0.34 and 4.80), respectively compared with those fed control diet, T1 (0.31 and 4.45) with significant differences in most cases.

Obtained results disagree with those reported by Abd El-Gawad et al. (2004) who showed that adding a commercial probiotic to broiler chick diets improved the utilization of protein diets and gave the best economic efficiency.

Moreover, probiotic improve the metabolism of the host bird in various ways including protein metabolism (Salter et al. 1974), energy metabolism and energy conversion (Muramatsu et al., 1994; Furuse and Yokota, 1984). Similarly, Younis et al. (2016) indicated that supplementation of broiler diets with different alternatives of antibiotic growth promoters, improve protein conversion ratio compared with the control group.

The data in Table 5, showed the relationship between different treatment (T1: T5) and PI and PEF. The response showed significant differences in PI and PEF during experimental period (0-32d) and values ranged between (88.16 and 113.70) for PI and (275.51 and 355.33) for (PEF). Broiler chickens fed LA (T4) diets had the lowest values while broiler chickens fed GA diets (T3) gave the highest values and differences among treatments were significant.

In this connection Younis et al. (2016) reported that, coated organic acids mix or organic acid and probiotic supplementation to chicks feed improved European production efficiency factor by 12.0, 9.5 and 1.74% in compared with those fed the control diet.

Carcass cuts and lymphoid organs:

Table 6, shows the mean percentages for carcass cuts at 32 days of age. Most of studied traits (i.e. Thigh, drumstick, wings and neck %) were not significantly affected by the treatments. The corresponding values ranged between (25.49 and 27.52) for thigh % and ranged between (15.09 and 16.50) for drumstick %, however, the differences were insignificant.

In the same order, relative breast weight was reduced by dietary treatments (T2: T5) in compared with the control group (T1) and the corresponding values for breast % ranged between 41.58 and 45.03%, with significant differences between treatments. From other point chickens fed control diets (T1) reflected the highest breast % and lowest thigh, drumstick, wings and neck % compared to birds fed other four dietary treatments.

It is clearly observed that, dietary addition of GA (T3) could significantly affect the overall means of relative weights of lymphoid organs (Table 6).

Relative lymphoid organ weights are easily measured and reflect the body's ability to afford lymphoid cells during an immune response (Heckert et al., 2002). Chickens fed guanidinoacetic acid (T3) diets reflected the highest relative weights of thymus and bursa, compared with control treatment (T1). However, thymus % weight increased by 65.4% (0.26% versus 0.43%) and Bursa weight % showed similar trend (0.15% versus 0.24). Besides, the differences between the two treatments were significant.

Moreover, the response of spleen weight % to different dietary treatments ($T1_{-7}$) was not significant effect and the corresponding values ranged between (0.15 and 0.23%). The previously stated results agreed with those of Younis et al. (2016), Kirkpinar et al. (2014) and El-Yamny and Fadel (2004). These authors reported that antibiotic growth promoter alternatives had no significant effects on most of dressing percentages, the relative weight of carcass parts and body organs.

Blood plasma parameters:

Data presented in Table 7, showed that plasma total lipids and triglycerides were increased due to different supplementations (T2: T5) as compared to the control treatment (T1) and in most cases differences were significant. These results are disagreed with the results of El-Ghamry and Fadel (2004) and Abdel-Azeem and Hemid (2006) who concluded that dietary biological additives significantly reduced total lipids and cholesterol content of broiler chicks as compared to control group.

The results of plasma metabolite showed that plasma total cholesterol, HDL and LDL were insignificantly affected by different dietary treatments (T1: T5). Ali et al. (2015) found that there were no significant differences in blood parameters due to supplementation of probiotic, prebiotic, synbiotic and antibiotic as growth promoters in broiler diets. There were no significant differences in plasma (AST) concentrations and significant differences in (ALT) enzyme between different dietary treatments (T1: T5). The highest value of ALT was detected for the chicken fed diets supplemented with GA (T3) and the lowest value was found in LA (T4) and the corresponding values were 13.20 and 7.01 U/ L, respectively with significant differences.

Economic efficiency:

All economic traits were calculated in regard to 1.0 kg fresh carcass in terms of costs and returns. As shown in Table 8, it is interesting to state that under the condition of the present study, the chickens fed basal diets supplemented with LA (T4) or BM (T5) gave the lowest economic traits compared with the other treatments. This might be due to the lowest productive performance figures (LBW and FCR) compared with those fed other treatments. On the other hand, using colistin or GA as feed additives in particular (T2 and T3) relatively reduced the feeding cost and total cost of broiler chickens compared with those fed the control diet (T1) and the corresponding reduction values were 2.3 and 1.2%, respectively.

However, the obtained results showed that colistin or GA supplementation to chickens feed improved economic efficiency by 3.89 and 5.28%, respectively in compared with those fed the control diets. In connection, a result of Arafa et al. (2017) is in agreement with our finding where the superiority supplementation broiler diets with GA with or without amino acids.

CONCLUSION

In conclusion, the results of the present study suggest that adding GA at level of 0.6 g/ kg diet to broiler chicks (0-32 d) was efficient in improving the growth performance, PI, PEF, economic traits and some physiological responses.

Table (1): Calculated chemical analyses of experimental basal diets.

Chemical Analysis (Calculated)	**Experimental Basal Diets**	
	Starter (0-14 days)	Grower (15-32 days)
Crude Protein %	23.01	21.01
ME Kcal/ Kg diet	3046	3159
Calcium %	1.07	0.90
Available Phosphorus %	0.51	0.45
Lysine %	1.45	1.25
Methionine & Cysteine %	1.08	0.95

Each 3 Kg of premix contains: Vitamins: A: 12000000 IU, Vitamins, D3: 2000000 IU, E: 10000 mg, K3: 2000 mg, B1: 1000 mg, B2: 5000 mg, B6: 1500 mg, B12: 10 mg, Biotin: 50 mg, Choline chloride: 250000 mg, Pantothenic acid: 10000 mg, Nicotinic acid: 30000 mg, Folic acid: 1000 mg, Minerals: Mn: 60000 mg, Zn: 50000 mg, Fe: 30000 mg, Cu: 10000 mg, I: 1000 mg, Se: 100 mg and Co: 100 mg.

Table (2): Effect of different dietary treatments on live body weight and daily weight gain.

Items	**Experimental Treatments**					**Sig.**
	T1	**T2**	**T3**	**T4**	**T5**	
LBW (1 day)	38.83 ± 0.01	39.21 ± 0.01	38.63 ± 0.01	39.60 ± 0.01	40.09 ± 0.01	NS
LBW (14 days)	$335.01^{ab}\pm10.01$	$346.66^{ab}\pm6.01$	$370.01^{a}\pm7.63$	$296.66^{b}\pm9.27$	$316.66^{b}\pm28.91$	*
LBW (32 days)	$1606.25^{a}\pm43.96$	$1609.07^{a}\pm17.18$	$1688.33^{a}\pm3.33$	$1456.67^{b}\pm29.48$	$1476.67^{b}\pm34.92$	**
DWG (g) (0-14 days)	$21.15^{ab}\pm0.71$	$21.96^{ab}\pm0.42$	$23.66^{a}\pm0.54$	$18.36^{b}\pm0.65$	$19.75^{b}\pm2.06$	**
DWG (g) (15-32 days)	$70.62^{a}\pm2.16$	$70.13^{a}\pm0.62$	$73.24^{a}\pm0.51$	$64.44^{b}\pm1.15$	$64.44^{b}\pm0.73$	*
DWG (g) (0-32 days)	$48.98^{a}\pm1.37$	$49.05^{a}\pm0.53$	$51.55^{a}\pm0.10$	$44.28^{b}\pm0.92$	$44.89^{b}\pm1.09$	*

a, b, c, d Means within the same row with different superscripts are significantly different. Sig. = Significance, ** ($P\leq0.01$), * ($P\leq0.05$).
T1: basal diet, T2: basal diet + Colistin 1 g/ Kg, T3: basal diet + Guanidinoacetic Acid 0.6 g/ Kg, T4: basal diet + Lactobacillus acidophilus 1 g/ Kg, T5: basal diet + Beta Mannanase 0.3 g/ Kg.

Table (3): Effect of different dietary treatments on daily feed intake and feed conversion ratio.

Items	Experimental Treatments					Sig.
	T1	T2	T3	T4	T5	
DFI (g) (0-14 days)	$26.75^{bc}\pm0.66$	$27.78^{b}\pm0.11$	$32.35^{a}\pm0.31$	$25.25^{c}\pm0.83$	$26.27^{bc}\pm0.41$	*
DFI (g) (15-32 days)	112.36±2.21	106.41±3.65	110.92±1.06	110.55±4.09	110.65±2.75	NS
DFI (g) (0-32 days)	74.91±1.31	72.01±2.02	76.55±0.47	73.23±2.55	73.73±1.66	NS
FCR (0-14 days)	1.26±0.04	1.26±0.02	1.36±0.02	1.37±0.01	1.36±0.16	NS
FCR (15-32 days)	$1.59^{ab}\pm0.03$	$1.52^{b}\pm0.06$	$1.51^{b}\pm0.01$	$1.71^{a}\pm0.04$	$1.71^{a}\pm0.02$	*
FCR (0-32 days)	$1.53^{ab}\pm0.03$	$1.47^{b}\pm0.05$	$1.48^{b}\pm0.01$	$1.65^{a}\pm0.03$	$1.64^{a}\pm0.03$	*

a, b, c, d Means within the same row with different superscripts are significantly different. Sig. = Significance, ** ($P\leq0.01$), * ($P\leq0.05$).
T1: basal diet, T2: basal diet + Colistin 1 g/ Kg, T3: basal diet + Guanidinoacetic Acid 0.6 g/ Kg, T4: basal diet + Lactobacillus acidophilus 1 g/ Kg, T5: basal diet + Beta Mannanase 0.3 g/ Kg.

Table (4): Effect of different dietary treatments on protein conversion ratio (PCR) and energy conversion ratio (ECR).

Items	Experimental Treatments					Sig.
	T1	T2	T3	T4	T5	
PCR (g protein/ g gain) (0-14 days)	0.29±0.01	0.29±0.01	0.31±0.01	0.31±0.01	0.31±0.03	NS
PCR (g protein/ g gain) (15-32 days)	$0.33^{ab}\pm0.01$	$0.32^{b}\pm0.01$	$0.32^{b}\pm0.01$	$0.36^{a}\pm0.01$	$0.36^{a}\pm0.01$	*
PCR (g protein/ g gain) (0-32 days)	$0.31^{ab}\pm0.01$	$0.30^{b}\pm0.01$	$0.32^{ab}\pm0.01$	$0.34^{a}\pm0.01$	$0.33^{ab}\pm0.02$	*
ECR (Kcal/ g gain) (0-14 days)	3.86±0.13	3.86±0.07	4.17±0.08	4.19±0.03	4.15±0.49	NS
ECR (Kcal/ g gain) (15-32 days)	$5.03^{ab}\pm0.12$	$4.79^{b}\pm0.21$	$4.78^{b}\pm0.03$	$5.41^{a}\pm0.13$	$5.42^{a}\pm0.07$	**
ECR (Kcal/ g gain) (0-32 days)	4.45±0.11	4.33±0.14	4.48±0.03	4.80±0.08	4.79±0.25	NS

a, b, c, d Means within the same row with different superscripts are significantly different. Sig. = Significance, ** ($P\leq0.01$), * ($P\leq0.05$).
T1: basal diet, T2: basal diet + Colistin 1 g/ Kg, T3: basal diet + Guanidinoacetic Acid 0.6 g/ Kg, T4: basal diet + Lactobacillus acidophilus 1 g/ Kg, T5: basal diet + Beta Mannanase 0.3 g/ Kg.

Table (5): Effect of different dietary treatments on performance index and production efficiency factor.

Items	Experimental Treatments					Sig.
	T1	T2	T3	T4	T5	
PI[1] (0-32 days)	$105.13^{a} \pm 4.95$	$109.94^{a} \pm 5.31$	$113.70^{a} \pm 0.24$	$88.16^{b} \pm 1.98$	$89.99^{b} \pm 3.50$	**
PEF[2] (0-32 days)	$328.53^{a} \pm 15.47$	$343.57^{a} \pm 16.61$	$355.33^{a} \pm 0.75$	$275.51^{b} \pm 6.19$	$281.23^{b} \pm 10.95$	**

a, b, c, d Means within the same row with different superscripts are significantly different. Sig. = Significance, ** ($P \leq 0.01$), * ($P \leq 0.05$).

1: North (1981), 2: Emmert (2000).

T1: basal diet, T2: basal diet + Lactobacillus acidophilus 1 g/ Kg, T3: basal diet + Colistin 1 g/ Kg, T4: basal diet + Guanidinoacetic Acid 0.6 g/ Kg, T5: basal diet + Beta Mannanase 0.3 g/ Kg.

Table (6): Effect of different dietary treatments on carcass cuts and lymphoid organs

Items	Experimental Treatments					Sig.
	T1	T2	T3	T4	T5	
Breast % of Carcass	$45.03^{a} \pm 0.91$	$42.51^{b} \pm 0.70$	$42.65^{b} \pm 0.73$	$41.58^{b} \pm 0.52$	$42.16^{b} \pm 0.74$	*
Thigh % of Carcass	25.49±0.59	26.80±0.52	26.40±0.93	27.52±0.58	26.70±0.33	NS
Drumstick % of Carcass	15.09±1.25	16.06±0.45	16.50±0.39	15.98±0.29	16.01±0.28	NS
Wings % of Carcass	11.37±0.09	11.48±0.29	11.40±0.20	11.75±0.21	11.79±0.31	NS
Neck % of Carcass	3.01±0.10	3.13±0.14	3.03±0.07	3.16±0.13	3.34±0.10	NS
Spleen % of LBW	0.15±0.02	0.19±0.02	0.16±0.01	0.15±0.01	0.23±0.04	NS
Thymus % of LBW	$0.26^{b} \pm 0.01$	$0.26^{b} \pm 0.06$	$0.43^{a} \pm 0.05$	$0.34^{ab} \pm 0.04$	$0.29^{b} \pm 0.01$	*
Bursa % of LBW	$0.15^{b} \pm 0.01$	$0.14^{b} \pm 0.02$	$0.24^{a} \pm 0.03$	$0.19^{ab} \pm 0.02$	$0.16^{b} \pm 0.01$	*

a, b, c, d Means within the same row with different superscripts are significantly different. Sig. = Significance, ** ($P \leq 0.01$), * ($P \leq 0.05$).

T1: basal diet, T2: basal diet + Colistin 1 g/ Kg, T3: basal diet + Guanidinoacetic Acid 0.6 g/ Kg, T4: basal diet + Lactobacillus acidophilus 1 g/ Kg, T5: basal diet + Beta Mannanase 0.3 g/ Kg.

Table (7): Effect of different dietary treatments on some blood plasma parameters.

Items	Experimental Treatments					Sig.
	T1	**T2**	**T3**	**T4**	**T5**	
Total Lipids mg / dL	229.67^{b}±17.67	354.01^{a}±28.91	364.01^{a}±24.01	374.01^{a}±8.14	376.01^{a}±31.75	**
Triglycerides mg / dL	47.33^{b}±9.35	53.33^{b}±4.25	59.33^{ab}±3.92	74.33^{a}±5.54	52.33^{b}±4.91	*
Cholesterol mg / dL	117.01±6.01	106.01±4.72	109.01±10.53	117.33±4.17	107.01±9.45	NS
HDL mg / dL	54.33±6.74	53.33±6.38	57.01±8.73	62.33±6.06	53.67±6.17	NS
LDL mg / dL	48.33±3.38	40.66±0.88	40.33±1.20	41.33±1.76	44.01±3.61	NS
S-GOT (AST) U / L	28.93±1.58	30.46±0.49	27.30±1.50	25.50±1.84	28.10±1.54	NS
S-GPT (ALT) U / L	9.80^{ab}±0.55	10.98^{ab}±0.00	13.20^{a}±2.38	7.01^{b}±0.95	11.20^{ab}±1.40	*

a, b, c, d Means within the same row with different superscripts are significantly different. Sig. = Significance, ** (P≤0.01), * (P≤0.05).
T1: basal diet, T2: basal diet + Colistin 1 g/ Kg, T3: basal diet + Guanidinoacetic Acid 0.6 g/ Kg, T4: basal diet + Lactobacillus acidophilus 1 g/ Kg, T5: basal diet + Beta Mannanase 0.3 g/ Kg.

Table (8): Effect of different dietary treatments on economic traits in regard to 1.0 Kg fresh carcass.

Items	Experimental Treatments				
	T1	**T2**	**T3**	**T4**	**T5**
Feed Cost* (LE)	13.35±0.29	13.05±0.51	13.19±0.05	14.51±0.31	14.38±0.31
Total Cost¥ (LE)	19.46±0.42	19.15±0.57	19.01±0.04	21.25±0.28	21.02±0.41
Total Return# (LE)	35.00	35.00	35.00	35.00	35.0
Net Return (LE)	15.53±0.42	15.85±0.57	15.99±0.04	13.75±0.28	13.98±0.41
Economic Efficiency	79.97±3.98	83.0±5.36	84.19±0.41	64.79±2.18	66.61±3.20
Relative Economic Efficiency¤	100.00	103.89±6.71	105.28±0.51	81.01±2.73	83.29±4.00

* Feed cost is calculated in relation to 1.0 Kg carcass. ¥ Total cost = (feed cost + price of one-day live chicks + incidental costs) calculated in regard to 1.0 Kg carcass.
# According to the local price of Kg fresh carcass which was 35.00 L.E. ¤ Assuming that the relative economic efficiency of control group equals 100.
T1: basal diet, T2: basal diet + Colistin 1 g/ Kg, T3: basal diet + Guanidinoacetic Acid 0.6 g/ Kg, T4: basal diet + Lactobacillus acidophilus 1 g/ Kg, T5: basal diet + Beta Mannanase 0.3 g/ Kg.

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Feed additives - Broiler - Carcass traits - Economic efficiency

الملخص العربى

تقييم بعض إضافات الأعلاف كبدائل للمضادات للحيوية، وعلاقتها بخصائص الذبيحة والمقاييس الاقتصادية لبدارى التسمين

أحمد إبراهيم سليمان الفحام - نعمة الله جمال الدين - مروان عبدالعزيز محمود عبدالعزيز
قسم إنتاج الدواجن - كلية الزراعة - جامعة عين شمس - شبرا الخيمة - القاهرة - مصر

يهدف هذا البحث لدراسة فاعلية إضافة بدائل المضادات الحيوية المنشطة للنمو إلى العلائق المكونة من الذرة و كسب فول الصويا على الأداء الإنتاجي وقطعيات الذبيحة والأعضاء الليمفاوية وتركيب بلازما الدم والعائد الإقتصادي لبدارى التسمين.

استخدام في هذه التجربة 150 كتكوت لحم غير مجنس (أربوأيكرز) عمر يوم قسمت على 5 معاملات غذائية وتحتوي كل معاملة على 3 مكررات المعاملات الغذائية:

T1 عليقة قاعدية (بادئ ونامي) بدون إضافات (كنترول)

المعملات من T2 إلى T5 تمثل عليقة قاعدية مضاف إليها:

- كوليستين (مضاد حيوي) 1/ كجم (T2)
- جوانيد وأستيك اسيد 0.6/ كجم (T3)
- لاكتوباسيلس أسيدوفلس 1 جم/ كجم (T4)
- بيتامنانيز 0.3 جم/ كجم (T5)

يمكن تلخيص النتائج المتحصل عليها عند عمر 32 يوم كالآتي:

- تحسن الوزن الحي والوزن المكتسب اليومي معنوياً لبدارى التسمين المغذاة على علائق (T1: T3) بالمقارنة بالمعاملات الأخرى.
- سجلت الطيور المغذاة على علائق T2 وT3 أفضل قيم معامل التحويل الغذائي بفارق معنوى بالمقارنة بتلك المغذاة على علائق T4 أوT5.
- سجل معامل تحويل البروتين (PCR) والطاقة (ECR) ودليل الأداء (PI) وقيمة العائد الإنتاجي (PEF) أفضل النتائج معنوياً الطيور المغذاة على علائق (T1: T3) بالمقارنة بمعاملات T4 أوT5.
- لم يتأثر محتوى بلازما الدم من الكولسترول وHDL وLDL وGOT بالمعاملات الغذائية بينما تأثر المحتوى من الدهون الكلية والجلسريدات الثلاثية وGPT معنوياً بالمعاملات الغذائية المختلفة.
- لم تتأثر قطعيات الذبيحة بالمعاملات الغذائية فيما عدا % للصدر حيث انخفضت معنوياً للمعاملات المختلفة بالمقارنة بالكنترول وسجلت الطيور المغذاة على عليقة T3 أعلى قيم % ثيموسية وبرسا.
- أظهرت ذبائح الكتاكيت المغذاة على عليقة قاعدية مضاف إليها جوانيد واستيك اسيد (0.6/ كجم وT3) أفضل عائد اقتصادي لبدارى التسمين حتى عمر 32 يوم.

لذلك نستخلص في هذه الدراسة، أنه يمكن التوصية بإضافة 0.6% جوانيدواستيك أسيد إلى علائق بدارى التسمين الخالية من المضادات الحيوية (كمنشط نمو).