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Effect of Phytobiotics, Probiotics and Toltrazuril on Chicken Coccidiosis

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Abstract

This study was carried out to investigate the effects of phytobiotics (Orego-stim®) and their combinations with probiotics and chemical anticoccidial toltrazuril in prevention of coccidiosis in broilers and also to examine these effects on growth performance, some blood biochemical parameters and immunity indices in broiler chickens. Two hundred and forty, one-day old Cobb chicks were used. They were divided into eight equal groups of 30 birds each. The 1st group was non-infested non-treated group. The other groups were inoculated intra-crop with $1x10^5$ sporulated oocysts of field strain of *Eimeria spp.* on the 8th day of age. The 2nd group was infested non-treated group. The 3rd group was treated with phytobiotics (300 mg/Liter drinking water). The 4th group was treated with probiotic (1 g/ liter drinking water). The 5th group was treated with toltrazuril 2.5 % (7 mg/kg BW. in drinking water). The 6th group treated with phytobiotics plus probiotic. The 7th group treated with phytobiotics plus toltrazuril 2.5 % while, the last group was treated with probiotic beside toltrazuril 2.5 %. Birds received phytobiotics showed better anticoccidial effect, an increase of growth performance parameters (body weight, body weight gain and feed consumption) and decrease of feed conversion ratio. Moreover, an improvement in immunity indices with variable effects on some blood biochemical parameters were resulted. Phytobiotics can be considered a promising high effective anticoccidial, growth promoting and immunomodulating agents.

Keywords: Phytobiotics, Coccidiosis, Performance, Broilers.

Introduction

Chicken coccidiosis is caused by Eimeria spp. which affects most of birds and associated with great economic losses. It can be treated with chemoprophylaxis and anticoccidial feed additives. Many researches are looking for alternative anticoccidial drugs [1]. Phytobiotics are defined as natural feed additives that are safe to animal [2]. They are different substances, mainly plant materials extracts, as leaves, flowers, seeds, buds, fruits, twigs, root, bark, wood, and herbs [3]. The active materials have many various secondary plant metabolites with a wide range of physiological effects [4]. Phytobiotics improve broiler performance [5], whereas others reported no effects on body weight gain and feed intake [6] or feed conversion ratio [7].

Material and Methods

Birds and eexperimental design

Two hundred and forty, one-day old apparently healthy Cobb chicks (male and female) were purchased from Al-Watania poultry company. Chicks were allotted in metal wire-cages for each group from day one. The chicks were divided into eight equal groups, each of 30 birds. The 1st group was non-infested non-treated group. The other groups were inoculated intra-crop on the 8th day of age with $1x10^5$ sporulated oocysts of field intestinal strains of *Eimeria* spp. The 2nd group was kept as infested non-treated group. The 3rd group was treated with phytobiotic (0.3 mL/Liter drinking water). The 4th group was treated with probiotic (1 g/liter drinking water). The 5th group was treated with toltrazuril 2.5% (7 mg/kg BW in drinking water).

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The 6th group was treated with phytobiotic plus probiotic. The 7th group was treated with phytobiotic plus toltrazuril 2.5%, while, the last group was treated with probiotic beside toltrazuril 2.5 %. The chicks were fed starter diet from 1-15 days old and then fed grower diet from 16- 25 days and finally fed on finisher diet from 25 days to the marketing age [8]. All diets were formulated to meet the nutrient requirement of the broilers according to the recommendations of the National Research Council [9]. During the first week of age, the feed was sterilized in the oven at 65ºC for 18 hours to destroy the probable accidental sporulated oocysts of *Eimeria* which may contaminate the rations. Moreover, the water also was sterilized during the first week of age through boiling and cooled before offered to the chicks [10].

Field intestinal *Eimeria* species were subjected to isolation, propagation, purification and sporulation then were inoculated intracrob in broiler chickens in a dose of ($1x10^5$) sporulated oocysts, each (counted by Hemocytometer apparatus) on the 8th day old. Phytobiotic (Orego-stim®); Orego-stim was produced by Meriden Animal Health Co.-United Kingdom. It contains a- pinene, camphene, B-pinene, sabinene, Myrecene, a-phellandrene, a-terpinene, Limonene, 1.8 cineole, B-Ocimene, Trpinolene, 1-Octn-3-o 1, trans-Sabinene hydrate, Linalool, Cis-sabinene hydrate, terpinrn-4ol, a-Terpineol, borneol, B-Bisabolene, carvacrol 81.89%, y-terpinrnr 5.1%, p- cymene 3.76% and thymol 2.12%. It was given at a dose of 0.3 mL/ liter drinking water all over the experiment. Probiotic (Gro-2-Max®); a product of Bio Natural America Institute (BNA), USA. It is a powder contains *Pediococcus acidilactici*, *Pediococcus pentosaceus*, *Acetobacter aceti* and *Bacillus amyloliquefaciens*. Total bacterial colony count was $2x10^9$. It was given at a dose of 1 g/liter during the whole experimental period. Toltrazuril (Toltacoccin®), a product of Waki Pharma, Egypt, which is a chemical anticoccidial drug with a wide spectrum activity. Toltacoccin® contains toltrazuril 2.5% solution. The drug was given at a dose of 7 mg/kg BW for two consecutive days in drinking water on 14 and 15 days post infection.

Oocysts output

Fecal droppings were daily collected from all chicks of each group for 10 successive days between 5-14 days post infection (PI), and the oocysts were counted in 1 gm of fecal matter by the Mc-Master technique [11]. The oocysts reduction % was calculated according to the following: Reduction percentage = $(X-Y)/X \times 100$, where X is the mean number of oocysts in the positive control group and Y is the mean number of oocysts in the treated group [12].

Lesion scoring

On 7 and 14 days PI with coccidiosis, five chickens from each group were slaughtered and lesions in the duodenum (the organ that mostly affected) were described and scored according to Johnson and Reid [13].

Growth performance parameters

The chicks were individually marked and weighed at one-day old, then body weight was recorded weekly till the end of the experiment (the fifth week). Cumulative feed consumption, cumulative body weight gains and feed conversion ratio (FCR) were calculated [10]. Five birds from each group were randomly selected and slaughtered at 3rd and 5th weeks of age for collecting giblets (empty gizzard, heart and liver without gall bladder).

Blood biochemical parameters and determination of immunity indices

Blood samples were collected from the wing vein of five chickens per each group on the 5th week of experiment. Sera from the collected samples were allowed to separate for determining serum Alanine aminotransferase (ALT), Aspartate aminotransferase (AST) [14], total proteins [15], albumin [16]. The serum globulin was given by subtracting serum albumin from serum total protein. Furthermore, Serum uric acid [17] and creatinine [18] and serum total cholesterol [19] were measured. The bursa of Fabricius, spleen and thymus were collected at the third and fifth week of age from randomly selected five birds per each group which weighed separately.

Table 1: Effect of phytobiotics, probiotic and toltrazuril on oocysts output in experimentally infested broilers with sporulated oocysts of *Eimeria* spp. (Mean ± SEM)[1] (n=5)

Groups	Oocyst output											
	Days post infestation											
	5	6	7	8	9	10	11	12	13	14	Overall mean	R %
I	0.00 ± 0.00 [e]	0.00 ± 0.00 [e]	0.00 ± 0.00 [e]	0.00 ± 0.00 [e]	0.00 ± 0.00 [e]	0.00 ± 0.00 [d]	0.00 ± 0.00 [d]	0.00 ± 0.00 [c]	0.00 ± 0.00 [c]	0.00 ± 0.00 [c]	0.00 ± 0.00 [d]	0.00
II	16.32 ± 1.05 [a]	37.66 ± 2.33 [a]	96.05 ± 4.59 [a]	172.38 ± 6.77 [a]	144.67 ± 7.55 [a]	123.50 ± 5.33 [a]	104.21± 4.82 [a]	87.89 ± 2.11 [a]	70.72 ±3.20 [a]	59.55 ± 1.55 [a]	90.59 ± 1.62 [a]	0.00
III	9.10 ± 0.52 [b]	20.74 ± 0.86 [b]	47.00 ± 0.11 [b]	80.38 ± 1.44 [b]	62.30 ± 2.67 [b]	38.25 ± 1.17 [b]	24.05 ± 0.95 [b]	13.34 ± 0.17 [b]	3.74 ± 0.08 [b]	2.55 ± 0.03 [b]	30.79 ± 1.80 [b]	67.33
IV	9.46 ± 0.42 [b]	21.57 ± 1.22 [b]	48.88 ± 2.02 [b]	83.59 ± 3.45 [b]	64.79 ± 4.11 [b]	39.78 ± 2.44 [b]	25.01± 1.33 [b]	13.88 ± 0.85 [b]	3.89 ± 0.07 [b]	2.65 ± 0.05 [b]	32.03 ± 2.18 [b]	70.02
V	7.91 ± 0.33 [b]	17.42 ± 0.85 [c]	36.80 ± 2.11 [c]	71.06 ± 1.82 [c]	55.59 ± 2.73 [c]	31.11 ± 1.63 [c]	31.11± 1.63 [c]	7.40 ± 0.34 [c]	3.23 ± 0.16 [b]	1.36 ± 0.08 [bc]	25.98 ± 1.42 [b]	72.75
VI	8.92 ± 0.46 [b]	20.32 ± 0.85 [b]	46.06 ± 2.15 [b]	78.77 ± 3.42 [b]	61.06 ± 2.66 [b]	37.49 ± 1.75 [b]	23.57± 1.36 [b]	13.07 ± 0.85 [b]	3.67 ± 0.17 [b]	2.50 ± 0.08 [b]	30.18 ± 1.33 [b]	65.98
VII	4.76 ± 0.14 [d]	12.75 ± 0.83 [d]	22.36 ± 1.14 [d]	43.01 ± 3.21 [d]	31.28 ± 1.42 [d]	20.06 ± 1.33 [c]	10.79 ± 0.36 [c]	1.70 ± 0.07 [c]	0.00 ± 0.00 [c]	0.00 ± 0.00 [c]	14.64 ± 1.02 [c]	85.52
VIII	4.57 ± 0.21 [d]	12.24 ± 1.05 [d]	21.46 ± 1.12 [d]	41.29 ± 2.13 [d]	30.03 ± 1.72 [d]	19.26 ± 0.82 [c]	10.36 ± 0.64 [c]	1.64 ± 0.07 [c]	0.00 ± 0.00 [c]	0.00 ± 0.00 [c]	14.05 ± 0.96 [c]	82.10

[1]SEM=Standard Error of Mean. [a-e] Values followed by different superscript letters were significantly different at (P ≤ 0.05). R%= Reduction percentage = (A−B)/A × 100, where A is the mean number of oocysts in the infected non-treated group and B is the mean number of oocysts in the treated group. I (Non-infested non-treated, -ve control), II (Infested non-treated, +ve control), III (Phytobiotics), IV (Probiotic), V (Toltrazuril), VI (Phytobiotics + Probiotic), VII (Phytobiotics + Toltrazuril), VIII (Probiotic + Toltrazuril).

Statistical analysis

Statistical analysis was conducted with the Statistical Package SPSS [20]. The Shapiro-Willk test was performed to check the data normality and it was used to compare the means among different groups. One-way ANOVA was used to compare the means among different groups. Duncan's multiple range test was conducted to determine the significant level [21]. When probability values were less than 5% ($P < 0.05$), it considered statistically significant.

Results and Discussion

Phytobiotics treated groups (phytobiotics group, phytobiotic and probiotic group and phytobiotics and toltrazuril group) showed significantly decreased oocyst output until 14 days PI (Table 1) and lesion scores (Table 2) at the 3rd and the 5th week of coccidial infestation. Essential oils supplemented chickens specially in birds fed Oregano essential oils, thyme and Garlic at doses of 10, 10 and 5 mg/kg feed, respectively, showed a gradual decreased oocysts outputs that shed from infested supplemented groups compared with chicken treated with Amprolium sulfate (chemical anticoccidial) [22].

Phytobiotics treated groups showed a significant increase of body weight, body weight gain and feed consumption with significant decrease of feed conversion ratio (FCR) as showed in Table (3). These results may be attributed to that phytobiotics increase villus height in different parts of the small intestine mainly in duodenum, therefore, increasing nutrient absorption [23]. There was an improvement of gut equilibrium which was achieved through enhancement in activities of digestive enzymes and nutrient absorption, reducing bacterial counts, fewer fermentation products, less activity of the gut-associated lymphatic system, and a greater prececal nutrient digestion.

Table 2: Effect of phytobiotics, probiotic and toltrazuril on lesion scores in experimentally infested broilers with sporulated oocysts of *Eimeria* spp. (Mean ± SEM) (n=5)

Group	3rd week	5th week
Non-infested non-treated (-ve control)	0.00 ± 0.00 ^{d}	0.00 ± 0.00 ^{e}
Infested non-treated (+ve control)	3.67 ± 0.23 ^{a}	3.33 ± 0.15 ^{a}
Phytobiotics	2.33 ± 0.11 ^{b}	2.00 ± 0.09 ^{b}
Probiotic	2.00 ± 0.08 ^{b}	1.66 ± 0.10 ^{c}
Toltrazuril	1.66 ± 0.06 ^{c}	1.33 ± 0.08 ^{d}
Phytobiotics + Probiotic	2.33 ± 0.03 ^{b}	1.66 ± 0.02 ^{c}
Phytobiotics + Toltrazuril	1.33 ± 0.07 ^{c}	1.00 ± 0.03 ^{d}
Probiotic + Toltrazuril	2.00 ± 0.06 ^{b}	1.66 ± 0.01 ^{c}

SEM=Standard Error of Mean. The data collected were subjected to analysis of variance (ANOVA), ^{abc} Values within a column followed by different superscript letters were significantly different at ($P \leq 0.05$).

In addition, some phytogenic compounds seem to promote intestinal mucus production [4]. Chickens fed on oregano essential oils, thyme and garlic in doses of 10, 10 and 5 mg/kg feed, respectively, showed an improvement in body weight, relative growth rate and FCR [22]. Birds received Satureja khuzistanica Jamzad essential oil had the highest feed intake [24].

Phytobiotics treated groups at the 5th week showed no significant effect on liver function tests, AST and ALT, serum uric acid and creatinine levels. But, they showed significant increase of serum total protein, albumin and globulin levels. On the other hand, these groups showed a significant decrease of total serum cholesterol level as shown in Table (4). Phytobiotics treated groups at the 3rd and 5th week showed significant increase on average bursa and spleen weight to body weight ratio without bursal atrophy and spleen hypertrophy in the 5th week. Phytobiotics treated chickens and phytobiotics and toltrazuril treated group showed a significant increase of average thymus weight to body weight ratio. But, phytobiotic and probiotic treated group showed a significant decrease of average thymus weight to body weight ratio without atrophy in thymus index. These results may be explained due to essential oils reinforce the animal's immune status in poultry by increasing the rate of lymphocyte proliferation and phagocytosis, as well as, the level of serum IgG, IgA, IgM, C3 and C4 [25].

The mixture of three phytogenics; carvacrol, cinnamaldehyde and capsicum oleoresin (Xtract TM®) enhanced Hemagglutinine inhibition titers against Newcastle disease vaccine which had significant positive effects on the immune response [26]. Phytobiotics treated groups at the 3rd and 5th week showed significant decrease of gizzard and liver weight without changes in heart weight. Phytogenic feed additive containing essential oils of thyme and star anise did not significantly affect the heart weight in broiler chickens [27].

Table 3: Effect of phytobiotics and their combination with probiotic and toltrazuril on broilers growth performance parameters (average body weight, cumulative body weight gain, cumulative feed consumption and cumulative feed conversion ratio represented in grams) experimentally infested with sporulated oocysts of *Eimeria* spp. (Mean ± SEM)[1] (n=5)

Groups	[2] BW						[3] CBWG	[4] CFC	[5] CFCR
	1st day	7th day	14th day	21th day	28th day	35th day			
I	47.2 ± 0.539	141.00 ± 3.68	422.76 ± 14.23 [a]	615.13 ± 13.25 [b]	941.92 ±12.18 [b]	1282.45 ± 34.12 [c]	246.76 ± 9.88 [c]	41640 ± 22.65 [c]	168.75± 0.02 [c]
II	47.82 ± 0.88	144.54 ± 1.93	364.76 ± 15.13 [b]	571.14 ± 12.26 [c]	862.72 ±36.02 [c]	1095.72 ± 27.43 [d]	136.28± 8.65[d]	40643 ± 18.78 [d]	298.23± 0.01 [a]
III	47.85 ± 0.68	151.00 ± 2.91	434.32 ± 9.36 [a]	676.47 ± 26.52 [a]	1072.03 ±48.17 [a]	1473.00 ± 36.16 [b]	297.82± 8.44 [b]	35370 ± 16.78 [b]	118.76± 0.07 [d]
IV	47.42 ± 0.52	142.30 ± 1.65	422.89 ± 11.12 [a]	651.33 ± 43.48 [a]	1026.15 ± 68.33 [a]	1427.23 ± 41.66 [b]	306.20± 9.45 [b]	40965 ± 20.87 [b]	133.78± 0.06 [d]
V	46.88 ± 0.55	140.06 ± 2.87	376.24 ± 8.16 [b]	625.37 ± 17.54 [b]	961.15 ±34.16 [b]	1256.17 ±62.76 [c]	201.84± 10.11 [c]	40610 ± 21.75 [c]	201.20± 0.02 [b]
VI	46.26 ± 52	150.72 ± 1.64	440.42 ± 5.57 [a]	688.47 ± 33.16 [a]	1087.38 ±59.63 [a]	1604.00 ± 52.13 [a]	412.16 ± 10.78 [a]	39105 ± 22.36 [a]	94.88 ± 0.01 [d]
VII	47.22 ± 0.26	143.72 ± 2.45	430.77 ± 10.57 [a]	670.16 ± 31.44 [a]	1065.46 ±82.75 [a]	1454.00 ± 42.45 [b]	292.04 ± 9.73 [b]	37620 ± 17.56 [b]	128.82± 0.03 [d]
VIII	46.78 ± 0.34	150.72 ± 1.36	427.56 ± 12.57 [a]	657.78 ± 42.11 [a]	1031.52 ± 78.31 [a]	1427.23 ± 41.66 [b]	291.77 ± 7.89 [b]	41035 ± 19.58 [b]	140.64± 0.02 [d]

[a-d] Mean values within the same column with different superscript letters are statistically different at $p \leq 0.05$. [1]SEM: standard error of mean. [2]BW: Body weight. [3]CBWG: Mean group cumulative body weight gain. [4]CFC: Mean group cumulative feed consumption. [5]CFCR: Mean group cumulative feed conversion ratio. I (Non-infested non-treated, -ve control), II (Infested non-treated, +ve control), III (Phytobiotics), IV (Probiotic), V (Toltrazuril), VI (Phytobiotics + Probiotic), VII (Phytobiotics + Toltrazuril), VIII (Probiotic + Toltrazuril).

Table 4: Effect of phytobiotics and their combination with probiotic and toltrazuril on some blood biochemical parameters in broilers experimentally infested with sporulated oocysts of *Eimeria* spp. (Mean ± SEM)[1] (n=5)

Groups	blood biochemical parameters							
	[2]ALT (U/L)	[3]AST (U/L)	Total protein (gm./dl)	Albumin (gm./dl)	Total globulin (gm./dl)	Uric acid (mg./dl)	Creatinine (mg./dl)	Cholesterol (mg./dl)
Non-infected non-treated (-ve control)	26.82 ± 1.18 [b]	53.66 ± 0.86 [b]	4.62 ± 0.25 [b]	2.76 ± 0.18 [b]	1.86 ± 0.08 [c]	10.22 ± 0.02	0.35 ± 0.06	152.17 ± 2.47 [a]
Infected non-treated (+ve control)	40.42 ± 1.37 [a]	81.78 ± 2.57 [a]	3.98 ± 0.14 [c]	1.76 ± 0.08 [c]	2.22 ± 0.12 [b]	10.18 ± 0.03	0.33 ± 0.03	138.37 ± 1.24 [b]
Phytobiotics	27.06 ± 0.96 [b]	56.17 ± 0.28 [b]	5.71 ± 0.17 [a]	2.95 ± 0.11 [a]	2.76 ± 0.17 [a]	10.32 ± 0.02	0.36 ± 0.07	123.18 ± 2.44 [c]
Probiotic	25.47 ± 0.74 [b]	53.22 ± 1.34 [b]	5.22 ± 0.13 [a]	3.1 ± 0.16 [a]	2.12 ± 0.13 [b]	10.24 ± 0.03	0.35 ± 0.08	140.33 ± 1.13 [b]
Toltrazuril	24.19 ± 0.82 [b]	53.89 ± 1.22 [b]	4.58 ± 0.07 [b]	2.7 ± 0.11 [b]	1.88 ± 0.09 [c]	10.25 ± 0.05	0.34 ± 0.07	155.34 ± 1.46 [a]
Phytobiotics + Probiotic	27.93 ± 0.79 [b]	55.95 ± 0.48 [b]	5.82 ± 0.14 [a]	3.36 ± 0.12 [a]	2.46 ± 0.16 [a]	10.30 ± 0.09	0.33 ± 0.09	125.62 ± 1.44 [c]
Phytobiotics + Toltrazuril	27.37 ± 0.56 [b]	51.24 ± 0.72 [b]	5.64 ± 0.16 [a]	3.26 ± 0.17 [a]	2.38 ± 0.13 [a]	10.21 ± 0.04	0.35 ± 0.05	127.39 ± 2.82 [c]
Probiotic + Toltrazuril	26.83 ± 0.91 [b]	55.69 ± 0.47 [b]	5.18 ± 0.17 [a]	3.11 ± 0.18 [a]	2.07 ± 0.12 [b]	10.27 ± 0.06	0.34 ± 0.02	137.17 ± 1.73 [b]

[a-c] Mean values within the same column with different superscript letter are statistically different at ($p \leq 0.05$). [1]SEM: standard error of mean. [2]ALT: Alanine transaminase. [3]AST: Aspartate aminotransferase.

Conclusion

Phytobiotics, probiotic and toltrazuril improved the lesion scores, oocyst output reduction percentage in coccidial infested broiler chickens while phytobiotics and probiotic improved the growth performance parameters (body weight, body weight gain, feed consumption and FCR). Therefore, phytobiotics and probiotic have anticoccidial effect. Phytobiotics and probiotic may improve the immune status of broilers with no significant effects on giblet weights. Phytobiotics can be used as a potential alternative anticoccidials in broilers to avoid side effects of chemical anticoccidial drugs.

Conflict of interest

The authors declare no conflict of interest.

References

[1] Abbas, R.Z.; Iqbal, Z.; Blake, D.; Khan, M.N. and Saleemi, M.K. (2011): Anticoccidial drug resistance in fowl coccidia: the state of play revisited. World's Poult Sci J, 67(2): 337-350.

[2] Lee, K.W.; Everts, H.; Kappert, H.J.; Frehner, M.; Losa, R. and Beynen, A.C. (2003): Effects of dietary essential oil components on growth performance, digestive enzymes and lipid metabolism in female broiler chickens. Br Poult Sci, 44(3): 450-457.

[3] Windisch, W.; Schedle, K.; Plitzner, C. and Kroismayr, A. (2008): Use of phytogenic products as feed additives for swine and poultry. J Anim Sci, 86(14 suppl):140-148.

[4] Burt, S. (2004): Essential oils: their antibacterial properties and potential applications in foods -a review. Int J Food Microb, 94(3): 223-253.

[5] Cross, D.E.; Mcdevitt, R.M.; Hillman, K. and Acamovic, T. (2007): The effect of herbs and their associated essential oils on performance, dietary digestibility and gut microflora in chickens from 7 to 28 days of age. Br Poult Sci, 48(4): 496-506.

[6] Nasir, Z. and Grashorn, M.A. (2010): Effects of Echinacea purpurea and Nigella sativa supplementation on Broiler performance, carcass and meat quality. J Anim Feed Sci, 19: 94-104.

[7] Ocak, N.; Erener, G.; Burakak, F.; Sungu, M.; Altop, A. and Ozmen, A. (2008): Performance of broilers fed diets supplemented with dry peppermint (*Mentha piperita* L.) or thyme (*Thymus vulgaris* L.) leaves as growth promoter source. Cz J Anim Sci, 53(4): 169-175.

[8] Steven, L. and John D.S. (2008): Feeding program for Broiler chickens. Commercial Poult Nut, British Librar, 3: 229-296.

[9] National Research Council (NRC) (1994): Nutrient requirements of Poultry. National Academy Press, Washington. D.C, 7: 19-26.

[10] Seddiek, Sh.A.; Mobarak, M.G.; Ali, M.M.A. and Metwaly, A.M. (2008): Potentiation of Salinomycin Anticoccidial Effect with Butylated Hydroxy Toluene (BHT) In Broilers. Special Issue for 5th Scientific Conference 21-23. Suez Canal Vet Med J, 8(2): 241-258.

[11] Georgi, J. and Georgi, M. (1990): Parasitology for Veterinarians. 5th Edition, W.B. Saunders Company, Philadelphia, London, Toranto, Montereal, Sydney, Tokyo.

[12] Ali, M. Ali.; Seddiek, Sh.A. and Khater, H.F. (2014): Effect of butyrate, clopidol and their combination on the performance of broilers infested with *Eimeria* maxima. Assiut Vet Med J, 61(146): 24-33.

[13] Johnson, J. and Reid, W.M. (1970): Anticoccidial drugs: Lesion scoring techniques in battery and floor pen experiments with chickens. Exp Parasitol, 28(1): 30-36.

[14] Varliy, H. (1974): Clinical chemistry methodology, past and present. Ann Clin Chem, 11: 161-163.

[15] Domas, B.L. (1975): Colorimetric determination of total protein. Clin Chem, 21(1): 159-166.

[16] Doumas, B. (1971): Colorimetric method for albumin determination. Clin Chim Acta, 31: 87-92.

[17] Haisman, P. and Muller, B.P. (1977): Glossary of clinical chemistry and terms. Butter worth, London, P126.

[18] Henry, R.J. (1974): Clinical chemistry, principles and techniques. Harper and Raw, 2: 525-531.

[19] Flegg, H.M. (1973): Quantitative-enzymatic-colourimetric determination of total cholesterol and HDL-C in serum or plasma. Ann Clin Biochem, 10: 79-88.

[20] SPSS Inc. Released (2009): PASW Statistics for Windows, Version 18.0. Chicago: SPSS Inc.

[21] Duncan, D.B. (1955): Multiple range and multiple F tests. Biometrics, 11: 1-42.

[22] Abou-elkhair, R.; Gaafar, K.M.; Elbahy, N.M.; Helal, M.A.; Mahboub, H.D.H. and Sameh, G. (2014): Bioactive Effect of Dietary Supplementation with Essential Oils Blend of Oregano, Thyme and Garlic oils on Performance of Broilers Infested with Eimeria species. Glob Vet, 13(6): 977-985.

[23] Ganguly, S. (2013): Promising Pharmaceutical Effect of Various Biological and Inorganic Agents as Feed Supplements for Livestock and Poultry with Discussion on Research proven Facts and Establishment of Concept: A Specialized Review. IJRPLS, 1(2):115-120.

[24] 24. Settle, T.; Leonard, S.S.; Falkenstein, E.; Fix, N., Van Dyke, K. and Klandorf, H. (2014): Effects of a Phytogenic Feed Additive Versus an Antibiotic Feed Additive on Oxidative Stress in Broiler Chicks and a Possible Mechanism Determined by Electron Spin Resonance. Int J Poult Sci, 13(2): 62-69.

[25] 25. Zeng, Z.K.; Zhang, S.; Wang, H.L. and Piao, X.S. (2015): Essential oil and aromatic plants as feed additives in non-ruminant nutrition: a review. J Anim Sci Biotechnol, 6: 7.

[26] 26. Gharib, H.B. (2014): Evaluation of using dietary phytogenics, as growth promoters, on broiler performance, under normal and Subnormal temperature conditions. Egy J Anim Prod, 51(1): 49-59.

[27] 27. Amad, A.A.; Männer, K.; Wendler, K.R.; Neumann, K. and Zentek, J. (2011): Effects of a phytogenic feed additive on growth performance and ileal nutrient digestibility in broiler chickens. Poult Sci, 90(12): 2811-2816.

الملخص العربى

تأثير الفيتوبيوتك والبروبيوتيك والتلترازوريل على كوكسيديا الدواجن

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تهدف هذه الرسالة لمعرفة تأثير استخدام الفيتوبيوتيك (اوريجو ستيم®) وخليطها مع البروبيوتيك, و التلترازوريل على طفيل الكوكسيديا في دجاج التسمين. وأيضا لمعرفة تأثيرات تلك المركبات على معدلات نمو الطائر وتم قياسات الدم البيوكيميائية ومؤشرات المناعة فى دجاج التسمين. أجريت هذه الدراسة على عدد ٢٤٠ كتكوت عمر يوم من نوع كب. قسمت الكتاكيت الى ثمانى مجموعات متساوية , بكل مجموعة ٣٠ كتكوت. حيث كانت المجموعة الأولى غير معدية بحويصلات الكوكسيديا وغير معالجة. تمت العدوى التجريبية لباقى المجموعات لكل واحد بجرعة (١×١٠ ٥) حويصلة متجرثمة من الأيميريا الحقلية عند عمر ثمانية أيام. المجموعة الثانية معدية وغير معالجة. المجموعة الثالثة معدية ومعالجة بالفيتوبيوتيك بجرعة ٣٠٠ مجم/ لتر ماء شرب. المجموعة الرابعة معدية ومعالجة بالبروبيوتيك بجرعة ١ جم/ لتر ماء شرب. المجموعة الخامسة معدية ومعالجة بالتلترازوريل (٢,٥%) بجرعة ٧ مجم/ كجم من وزن الطائر بماء شرب. المجموعة السادسة معدية و معالجة بخليط من مركبات الفيتوبيوتيك والبروبيوتيك بنفس الجرعات السابقة. المجموعة السابعة معدية و معالجة بخليط من مركبات الفيتوبيوتيك و التلترازوريل ٢.٥ % بنفس الجرعات السابقة. اما المجموعة الثامنة معدية و معالجة بخليط من مركبات البروبيوتيك و التلترازوريل ٢.٥ % بنفس الجرعات السابقة. أظهرت النتائج ان كل المجموعات المعالجة بالفيتوبيوتيك لها تأثير ايجابى للكوكسيديا كما أبدت تلك المجموعات زيادة معنوية فى معدلات النمو (وزن الجسم – وزن الجسم المكتسب – استهلاك العلف) ونقص معنوي فى معدل التحويل الغذائى وتحسن ملحوظ فى مؤشرات المناعة مع تأثيرات متفاوتة على بعض قياسات الدم البيوكيميائية . نستخلص من ذلك أن استخدام الفيتوبيوتيك له تأثيرايجابى على الكوكسيديا حيث قلل عدد حويصلات الكوكسيديا و محفزا للنمو ورافعا للمناعة.