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# EFFECT OF ANTIBIOTIC ALTERNATIVES INCLUSION IN BROILERS DIET ON PRODUCTIVE PERFORMANCE, CARCASS YIELD AND INTESTINAL HISTOLOGY

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**ABSTRACT:** The experiment was carried out to evaluate the response of broilers fed diet supplemented with antibiotic alternatives, Probiotic (BioPlus 2B), Prebiotic (Techno MOs), Synbiotic and medicinal herbs (Mixture of *Origanum majorana*, *Foeniculum vulgare* and *Carum carvi* in ratio 1: 1: 1), on their performance and intestinal histology. A total of 125-day old chicks cobb (500) broiler chicks were randomly distributed into 5 treatments with five replicates of 5 chicks each and raised for 6 weeks. Chicks were kept in cleaned and fumigated cage of wire floored batteries. Experimental diets and water were offered *ad-libitum* over the experimental period starting from one day old.

The experimental treatments received basal diets which were formulated to starter (1-21d) and grower- finisher (22-42d) broiler growth periods. During each growth period, birds received the control diet (un-supplemented), whereas the other groups fed diet contained either of tested feed additives (probiotic, prebiotic, synbiotic or medicinal plants mixture).

The most important results obtained from this study could be summarized as follows: - a highly significant effect ($p \leq 0.05$) on live body weight at the end of experiment period was observed due to the effect of synbiotic treatment compared the other treatments. A highest body weight gain was recorded by the synbiotic treatment compared the control ones. Different feed additives improved feed conversion ratio compared to control ($p \leq 0.001$, for the whole experimental period. All supplements effect the intestinal histology compared to that of the control in duodenum and jejunum، intestine region but the effect is not significant. Also, feed additives led to significant improvement in villus height and crypt depth in ileum region.

In conclusion, results show that synbiotic treatment was the superior in improving productive performance of broilers. Further research is still need to verify current results.

**Key words:** antibiotic alternatives-herbs-performance-intestinal histology-broiler**.**

## INTRODUCTION

Feeding sub-therapeutic levels of antibiotics has been historically a common practice in some sectors of the commercial broiler industry in order to promote growth performance. However, using probiotics frequently in poultry feeds can cause major issues such as increased resistance of harmful bacteria to antibiotics and disrupts the normal microbial balance in poultry products, which consequently increase the negative impact on the healthy gastrointestinal environment (Barton, 2000). The European Union has lately released a report concluding that nearly 25,0000 patients die per year from infections caused by drug-resistant bacteria, which is approximately equal to medical healthcare costs of 1.5€ billion" (Salim *et al*., 2013). Thus, strict regulations have taken effect in controlling the use of antibiotic growth promoters (AGP$_S$) poultry feeds and, consequently, several countries have banned the use of AGP$_S$ in livestock feed and feeding as a precocious, measure to avoid harmful effect on health. This included European Union countries, and some South East Asia countries as well (Goodarzi *et al*., 2013). Therefore, the poultry industry faces a number of challenges to sustain the birds' performance, while keeping in mind other challenges such as the increased cost of feed and the limitations on using antimicrobials in feeds. On the other hand, consumers are well aware of this issue, and thus it is a growing concern for nutritionists in both academia and feed industry to find appropriate alternatives to AGPs to guarantee that poultry products are safe (Salim *et al*., 2013). So, as a result, there is an emerging growing interest in identifying and evaluating of alternative natural feed additives that would benefit productive animal's health and also improve their production performance (Bonos *et al*., 2010). Ideally, all alternatives of growth promoters should result in the same beneficial effect as AGPS; however, the mode of action of AGPs is not very well understood (Huyghebaert *et al*., 2011). In that, using probiotic and prebiotic as a new alternative to antibiotic in poultry diet for animal production and health worldwide in recent years (Erdogan *et al*., 2010 and Sahhin *et al*., 2011). Thus, synbiotic can be used to enhance or better effects than probiotic and prebiotic alone and may present the best answer to antibiotic alternatives (Wiseman, 2012).

Probiotics, are defined as mono- or mixed culture of living microorganisms which beneficially affect the host animal by improving the intestinal microbial bacteria (Fuller, 1992). Probiotics are considered different than AGP$_S$, and there are no residuals in animals' tissue and create no microbial resistance.

Prebiotics can be identified as non-digestible feed ingredients with selective effects on intestinal microbiota (Huyghebaert *et al*., 2011). The compounds known as prebiotics which have including various structures that usually including sugars, yeasts, and healthy moulds which can play a key role in animals health improvement (Patterson and Burkholder, 2003). They currently divided into disaccharide, oligosaccharide and resistant starch in nature (Ferreira *et al*., 2011).

Synbiotic concept was the first defined as mixture of probiotic and prebiotic, which favourably affect the well-being of the host by improving the viability of feed-supplemented microbial cultures in the gastrointestinal tract. This effect is mediated by selectively stimulating the growth of a portion of the health-enhancing bacteria and / or by activating their metabolism (Ouwehand *et al*., 2007). Medicinal plant is a plant that contains, in one or more of its parts, components which can be used for therapeutic purposes either directly or indirectly by chemical synthesis of therapeutically-valid materials (Lammia, 2004). Some medicinal plants are used in herbalism and such plants have an important role in the development of human cultures around the world (Bassam, 2012). Consequently, the present study was set up to investigate the response of broilers to diet supplemented with either of the -antibiotic alternatives being probiotic (BioPlus 2B), prebiotic (Techno MOs), synbiotic and medicinal herbs (Mixture of *Origanum majorana, Foeniculum vulgare* and *Carum carvi* in ratio 1:1:1) and their effect on productive performance and. intestinal histology traits

## Materials and Methods

The experimental work of the current study was carried out at the Poultry Research Centre, Faculty of Agriculture, Alexandria University and was done on November to December 2013 for 42 consecutive days. The current study was designed to investigate the effect of feeding diets supplemented with either of -antibiotic alternative, probiotic (BioPlus 2B), prebiotic (TechnoMos), synbiotic and medicinal herbs (Mixture of *Origanum majorana, Foeniculum vulgare* and *Carum carvi* in ratio 1:1:1) on the productive performance, carcass yield and intestinal histology traits.

probiotic (BioPlus 2B), prebiotic (TechnoMos) was purchased from the local market which was a German originated and imported within the same production season, and medicinal herbs (Mixture of *Origanum majorana, Foeniculum vulgare* and *Carum carvi* in ratio 1:1:1) was purchased from the local market.

All alternative additives are powder in the form of commercial products, which are added according to the levels recommended by the manufactures.

1- Probiotic (BioPlus 2B), mixture of *Bacillus licheniformis* sposer and *Bacillus subitlis* sposer in ratio 1:1.

2- Prebiotic, TechnoMos: biological active materials from the cell wall fractions of *Saccharomyces cerevisiae* rich in 1,3 B-glucans and mannans 1000g, contains

Total Glucans 24%

B-glucans 20%

a-glucans and free glucans 4%

Total mannans 18%

3- synbiotic:( mixture of probiotic and prebiotic in ratio 1:1)

4- Herbs: (Mixture of *Origanum majorana, Foeniculum vulgare* and *Carum carvi* in ratio 1:1:1)

**Experimental diets**

The experimental treatments received a corn-soybean meal basal diet and depending on the addition as follows:

1. The basal diet served as the control(un-supplemented).
2. The basal diet supplemented with probiotic (1g/Kg)
3. The basal diet supplemented with prebiotic (1g/Kg)
4. The basal diet supplemented with probiotic and prebiotic (Synbiotic) (1g/Kg)
5. The basal diet supplemented with mixture of medicinal herb (1.5g/Kg).

The basal diets were in mash form and were formulated for the starter (1-21d) and grower-finisher (22-42d) diets to cover all recommended nutrient requirement according to cobb broiler nutrition guide is presented in Table (1).

**Experimental birds and management**

A total of 125-day-old chicks Cobb (500) broiler chicks were obtained from a commercial hatchery and vaccinated on d.1 for Marek, infections bronchitis and Newcastle disease.

Birds were weighed individually, and randomly divided into five experimental groups. Each group had five replicates of five birds each.

Prior to start the experiment, all cages were cleaned and disinfected, and all chicks were kept under similar environmental and hygienic conditions. Feed and water continued to be provided *ad libitum* throughout the trial and had free access to water and fed regularly. Minimum and maximum ambient temperature was 24 and 33°C, respectively, and lighting was continuous throughout the experiment.

Average initial body weight of all treatments was almost similar. The chicks were weighed (g) and their feed intake was recorded for the same period. Subsequently, their body weight gain (BWG) were calculated by subtracting initial live body weight from the final one for each growth period, feed conversion ratio (FCR), representing the amount of feed in kilograms required to produce one kilograms of weight gain.

**Slaughter testing**

At the end of the experiment (42 days of age), five birds from each treatment were randomly chosen and slaughtered by cutting the jugular veins of the neck according to the Islamic religion instruction with a sharp knife. After complete bleeding was achieved, the slaughtered weight was recorded. After words, the carcass was opened down and all entrails were removed and the empty carcass, liver, gizzard, heart, pancreas and intestine were separately weight, each was proportioned to the live pre- slaughter weight to obtain a relative weight.

Dressing percentage was calculated according to Steven *et al*., (1981) as follows:

Dressing % = [dressing weight/ per-slaughter live body weight] ×100

Where: Dressing weight = weight of empty carcass (Offal free) without head.

**Histological examination:**

Histology procedure for measuring villus height and crypt depth was followed as described by (Sheikh *et al*., 2010). Briefly, 2-cm segments from the middle part of the duodenum and jejunum were excised, flushed with physiological saline and immediately immersed in a 10% buffered formalin solution until further processing. After samples were embedded in paraffin, a 5-µm section of each sample was placed on a glass slide and stained with haematoxylin and eosin. Villus height was measured as the distance from the tip of the villus to the villus crypt junction, while crypt depth was measured as the depth of the invagination between adjacent villi. A total of 10 villi and 10 crypts per sample (40 villi and 40 crypts per treatment) were measured using light microscope.

**Statistical analysis:**

Data from all response variable were subjected to one analysis of variance applying SAS **program (SAS, 2008) using General Linear Model (GLM), Significant difference among treatment means were separated using (Duncan,1995)** at 0.05, 0.01 and 0.001 probabilities.

*The statistical model used was as follows:*

$Y_{ijk} = \mu + Ti + e\ ij$

Where:

$Y_{ijk}$ Observed value of the dependent variable μ Overall mean

$T_i$ = Effect of feed additives inclusion (I = 1, 2, 3, 4, 5)

$e_{ij}$ = random error

## RESULTS AND DISCUSSION

### Productive performance traits

1- Live Body Weight

Effects of studied different feed additives on live body weight are presented in Table (2). It is clearly showing that feeding either of studied feed additives of probiotic, prebiotic, synbiotic or herb containing experimental diets increased live body weight by about 2.97, 1.50, 4.77 and 3.37 % over that of the control group, respectively. Such increment was significant with treatment of synbiotic.

**2- Live Body Weight gain**

Results of body weight gain are presented in Table (3) shows that inclusion of probiotic, prebiotic, synbiotic or the mixture of medicinal plant had highly significant increase in weight gain at the age of 6 weeks compared with that of the control. Similar to the above result of body weight, the highest gain was recorded by treatment of synbiotic which had an increase by about 4.89% over that of the control.

**3- Feed Intake**

As seen in Table (4), there is a tendency to decrease the amount of feed intake during growth period of (1-42d) as incorporated either of the studied material as a feed additive into the experimental diets. Such decrement was the highest with treatment of probiotic followed by synbiotic ones.

**4- Feed conversion ratio**

With feeding experimental diets to age of 42 days, it is obvious that birds received diet of synbiotic recorded the best value of feed conversion ratio compared with the other studied dietary treatments. Such improvement was higher by 16.38, 1.99, 3.40 and 3.40 than those of the control, in probiotic, prebiotic and herbs mixture, respectively. In connection, there are numerous studies on the effect of using additives (probiotic, prebiotic, and synbiotic) on the productive performance. Most of them showed that these components lead to improving, BWG, and FCR in broilers (Bai *et al*., 2017, Utami and Wahyono., 2018). It may be due to the increase beneficial bacteria and improve metabolism of these microbial population leading to improve digestion and feed conversion efficiency.

The improvement in the BW, BWG, FI and FCR as affected by probiotic supplementation may be due to increase the efficiency of digestion and nutrients absorption processes. The inclusion of desirable microorganisms (probiotics) in the diet allows the rapid development of beneficial bacteria in the digestive tract of the host, improving its performance (Alkhalaf., 2010). As a consequence, there is an improvement in the intestinal environment, increasing the efficiency of digestion and nutrient absorption process. Our findings are in the same line with several studies demonstrating that probiotic dietary supplementation improves the BW and daily weight gain. Also, different levels of yeast on performance values of broiler chicken leads to the best feed conversion ratio was (1.8) and the supplementation of (0.3%) yeast could improve performance values in feed conversion ratio (Tyfor *et al*., 2015).

On the other hand, there were no significant differences in feed consumption when different levels of live yeast probiotic were added to the chick's diet (Tabidi *et al*., 2013).

The control group and supplemented group had no significant effect in average daily feed intake, but improved FCR by

8.5 and 12.7 %respectively, compared with control group when chicks fed probiotic, prebiotic and synbiotic in broiler's performance (Taheri *et al*., 2014).

In the same line with this study, Calik *et al*., (2017) observed an increase (P=0.013) in body weight gain when birds were fed diets supplemented with synbiotic during the overall experimental period. Also, Sarangi *et al*., (2016) and Kamel and Mohamed (2016) studied the effects of dietary supplementations of probiotic, prebiotic, and synbiotic on growth performance of broiler chickens. They found that the highest body weight observed in a synbiotic group. Moreover, the body weight of broiler chicks at 28 and 42 days of age was also increased ($p<0.05$) by supplementing diet with probiotic and prebiotic compared to that of the control group.

Abdel-wareth *et al*., (2012) showed that herbs and herbal by products which are incorporated in poultry diets stimulating body weight gain (BWG) and improved feed efficiency. Also, some herbal supplements have improved growth performance, feed conversion efficiency, carcass and meat quality in broilers (Thayalini *et al*., 2011).

**Slaughter Traits**

Carcass and heart percentages were not significantly affected by feeding studied feed additives as shown in (Table 6). The result of this study is in agreement with the previous research demonstrated by (Sahin *et al*., 2008 and Chumpawadee *et al*.,2009), who noticed no significant positive effect of synbiotic, probiotic and prebiotic on carcass yield of quails and broilers. On the other hand, liver relative weight significantly differed ($p\leq0.05$) with either of the feed additives inclusion compared with that of the control, where the lowest liver relative weight was recorded by the prebiotic and herb treated groups. Meanwhile, no significant was detected with dietary studied of feed additives.

Gizzard relative weight was affected significantly with different feed additives as shown in Table (6). In that, Probiotic, prebiotic, synbiotic and herb treatments were numerally reduced gizzard relative weight. Such reduction was significant with probiotic and synbiotic treatments. Also, it can be noted that pancreas relative weight was significantly increased by 35.39% by incorporating either of synbiotic or mixture of herbs over that of the control respectively. Mohammed and Abbas (2009) had reported that an increase in pancreatic weight was attained with fennel containing diet. Moreover, intestinal relative weight was significantly affected with using either of studied feed additives as shown in Table (6). Such increment was 1.01, 1.00, 1.10 and 1.30 were recorded by dietary treatments of probiotic, prebiotic, symbiotic and studied herbs compared with that of the control.

**Intestinal histology:**

Villus height and crypt depth of broilers intestines as affected by different dietary additives are presented in Table (7). Dietary probiotic, prebiotic, synbiotic and herbs mixture supplementation led to insignificant increase on villus height and crypt depth in jejunum and duodenum compared to that of the control in this intestine region. Probiotic, prebiotic, synbiotic and herb treatments caused significant increase villus height and crypt depth compared to that of the control in ileum, as they were increased to reach 103, 100, 107 and 104% in ileum, respectively. In connection, increasing the villus height in the small intestine leads to a larger surface area which enhances the nutrients absorption in the intestine (Caspary, 1992). The intestinal crypt is the main source for villus renewal which is needed in the event of normal sloughing or inflammatory effects caused by pathogens or their toxins and high demand of tissue. Deeper crypts indicate fast tissue turnover (Yason *et al*., 1987 and Anonymous, 1999). Intestinal epithelial cells generated in the crypt move along the villus surface towards the villus tip and are released into the intestinal lumen within 2-4 days (Imondi and Bird, 1996; Potten, 1998). Shortened villi and deeper crypts may result in reduction of nutrient absorption, increased secretion in the gastrointestinal tract and poor performance (Xu *et al*., 2003). In contrast, increased villus height and villus height/crypt depth ratio are directly associated with increased epithelial cell turnover (Fan *et al*.,1997) and longer villi are associated with activated cell mitosis (Samanya and Yamauchi, 2002). Accordingly, the increase observed in this study in both villus height and crypt depth explains the better body weight gain and feed utilization under the different feed additives. The increased villus height observed in this study comes in agreement with the findings of Edens *et al*., (1997) who showed that the increase in villus height has improved nutrient absorption which promote performance and nutritional efficiency due to addition of *Lactobacillus reuteri* in vivo and ex vivo. Sahane (2001) and Pelicia *et al*., (2004) suggested that improvement in broiler performance might be attributed to an enhanced digestibility of nutrients in the ileum. Afsharmanesh *et al*., (2013) reported that prebiotic treatment caused a substantial increase in the villus height and villus height/crypt ratio in both duodenum and ileum. Also, addition of probiotic in broiler chickens' diet was associated with increased intestinal villus height (Heak *et al*., 2017).

**Table (1):** Composition and Calculated Analysis of the Experimental Basal Diets

| Ingredients, % | Experimental Basal Diets | |
|---|---|---|
| | Starter | Grower -finisher |
| Yellow Corn | 552.00 | 600.00 |
| Soybean Meal 44% | 310.00 | 262.00 |
| Corn Gluten Meal | 80.00 | 80.00 |
| Di-calcium phosphate | 15.00 | 15.00 |
| Lime stone | 13.00 | 13.00 |
| Salt (NaCl) | 3,5 | 3.5 |
| Veg. oil | 20.00 | 20.00 |
| L- lysine | 0.00 | 0.20 |
| DL-Methionine | 1.58 | 1.95 |
| Premix | 3.00 | 3.00 |
| Total | 1000 | 1000 |
| Calculated analysis | | |
| Crude Protein % | 23.46 | 21.3 |
| M.E. (Kcal/ kg) | 3149 | 3285 |
| C/P | 134 | 154 |
| Fat | 5.8 | 6.4 |
| Crude Fiber % | 2.44 | 2.63 |
| Calcium % | 1.02 | 0.98 |
| Phosphorus% | 0,50 | 0.50 |
| Methionine% | 0.45 | 0.43 |
| Lysine | 1.19 | 1.07 |

(g/Kg) Premix each kg contain vit.A (12M.I.U), vit. D3 (3 U. I. U.), vit, E (10g), vit. B2 (5g), vit.B6 (1.5g), vit.B12(10g), Pantaththenic acid (10g), Nicotinic acid (20g), Folic acid (1000mg), Biotin (100g), Choline chloride (500g), copper (15g), Iodine (9g), Iron (35g), Manganese (66g), Zinc (66g).

**Table (2):** Effect of antibiotic alternatives inclusion in broiler diets on body weight at different ages.

| Ages, d. | Control | Additives | | | | S.O.V |
|---|---|---|---|---|---|---|
| | | Probiotic | Prebiotic | Synbiotic | Herb | |
| 1 | 40.54±0.45 | 40.40±0.36 | 40.44±0.27 | 39.98±0.32 | 40.86±0.37 | NS |
| 7 | 163.88±1.52 | 162.01±1.28 | 164.34±1.76 | 165.50±1.45 | 162.56±3.13 | NS |
| 14 | 404.64$^{ab}$±6.90 | 405.30$^{ab}$±9.32 | 394.08$^{b}$±8.00 | 406.16$^{ab}$±7.97 | 410.34$^{a}$±6.85 | * |
| 21 | 750.30±13.60 | 766.55±18.89 | 728.74±15.21 | 755.34±16.73 | 739.42±18.46 | NS |
| 28 | 1181.44±38.01 | 1188.27±45.30 | 1142.9±39.63 | 1177.40±44.1 | 1191.18±44.28 | NS |
| 35 | 1614.98$^{a}$±67.70 | 1593.51$^{ab}$±72.84 | 1545.88$^{b}$±68.6 | 1578.33$^{ab}$±71.1 | 1620.62$^{a}$±75.66 | * |
| 42 | 1976.88$^{c}$±83.81 | 2035.51$^{ab}$±92.63 | 2006.57$^{b}$±80.6 | 2071.08$^{a}$±84.8 | 2043.42$^{ab}$±89.29 | * |

a,b,c,…Means with different superscripts in certain column for each effect at age are significantly different (*p≤ 0.05) (**p≤ 0.01) (***p≤0.001) NS= Non significant

**Table (3):** Effect antibiotic alternatives inclusion in broiler diets on live body weight gain at different ages.

| periods, d | Control | Additives | | | | S.O.V |
|---|---|---|---|---|---|---|
| | | Probiotic | Prebiotic | Synbiotic | Herb | |
| (1-7) | 123.34±1.53 | 122.85±1.63 | 123.90±1.75 | 125.52±1.39 | 121.70±3.11 | NS |
| (7-14) | 240.76±6.44 | 246.04±9.07 | 229.74±7.24 | 240.66±7.27 | 247.78±6.44 | NS |
| (14-21) | 345.66±10.44 | 357.65±12.99 | 334.66±11.58 | 349.34±12.41 | 329.08±15.01 | NS |
| (21-28) | 431.14±26.44 | 421.10±30.66 | 414.20±28.57 | 421.90±30.14 | 451.78±29.30 | NS |
| (28-35) | 433.54±33.29 | 403.30±32.24 | 405.79±31.49 | 396.51±30.28 | 429.42±36.62 | NS |
| (35-42) | 361.32$^{c}$±25.87 | 495.81$^{a}$±27.71 | 460.69$^{ab}$±23.9 | 490.04$^{a}$±24.39 | 422.80$^{b}$±19.87 | ** |
| (1-42) (overall) | 1936.34$^{c}$±83.87 | 1997.06$^{ab}$±91.85 | 1966.14$^{b}$±80.6 | 2031.12$^{a}$±84.8 | 2002.56$^{ab}$±89.35 | * |

a,b,c,…Means with different superscripts in certain column for each effect at age are significantly different (*p≤ 0.05) (**p≤ 0.01) (***p≤0.001) NS= Non significant

**Table (4):** Effect of antibiotic alternatives inclusion in broiler diets on feed intake (FI) at different ages.

| periods, d. | Control | Additives | | | | Probability | SEM |
|---|---|---|---|---|---|---|---|
| | | Probiotic | Prebiotic | Synbiotic | Herb | | |
| (1-7) | 157.50$^{ab}$ | 164.18$^{a}$ | 161.50$^{a}$ | 150.50$^{b}$ | 144.00$^{c}$ | *** | 2.21 |
| (7-14) | 264.50$^{a}$ | 253.95$^{b}$ | 251.50$^{b}$ | 248.00$^{bc}$ | 244.00$^{c}$ | *** | 3.11 |
| (14-21) | 473.00$^{a}$ | 438.44$^{b}$ | 438.50$^{b}$ | 433.50$^{bc}$ | 424.50$^{c}$ | *** | 4.56 |
| (21-28) | 702.00$^{a}$ | 633.57$^{c}$ | 670.00$^{b}$ | 633.50$^{c}$ | 706.50$^{a}$ | *** | 14.41 |
| (28-35) | 785.00$^{a}$ | 673.73$^{d}$ | 672.50$^{d}$ | 681.00$^{c}$ | 698.50$^{b}$ | *** | 26.67 |
| (35-42) | 885.00$^{a}$ | 830.00$^{b}$ | 751.65$^{c}$ | 756.00$^{c}$ | 760.50$^{c}$ | *** | 34.13 |
| (1-42) | 3267.03$^{a}$ | 2899.83$^{d}$ | 2940.20$^{bc}$ | 2902.05$^{c}$ | 2978.50$^{b}$ | *** | 85.69 |

a,b,c,…Means with different superscripts in certain column for each effect at age are significantly different (*p≤ 0.05) (**p≤ 0.01) (***p≤0.001) NS= Non significant SEM=Poold Standard Error

**Table (5):** Effect of antibiotic alternatives inclusion in broiler diets on feed conversion ratio at different ages.

| periods, d | Control | Additives | | | | Probability | SEM |
|---|---|---|---|---|---|---|---|
| | | Probiotic | Prebiotic | Synbiotic | Herb | | |
| (1-7) | 1.27$^{b}$ | 1.34$^{a}$ | 1.31$^{ab}$ | 1.20$^{c}$ | 1.21$^{c}$ | *** | 0.03 |
| (7-14) | 1.13$^{a}$ | 1.08$^{b}$ | 1.13$^{a}$ | 1.06$^{b}$ | 1.00$^{c}$ | *** | 0.05 |
| (14-21) | 1.42 | 1.33 | 1.38 | 1.30 | 1.41 | NS | 0.12 |
| (21-28) | 1.89$^{b}$ | 1.92$^{b}$ | 2.09$^{a}$ | 1.91$^{b}$ | 1.91$^{b}$ | * | 0.30 |
| (28-35) | 2.37$^{a}$ | 2.16$^{b}$ | 2.00$^{d}$ | 2.09$^{c}$ | 2.07$^{c}$ | * | 0.33 |
| (35-42) | 2.91$^{a}$ | 1.76.5$^{b}$ | 1.79$^{b}$ | 1.69$^{b}$ | 1.88$^{b}$ | *** | 0.19 |
| (1-42) overall | 1.77$^{a}$ | 1.51$^{b}$ | 1.54$^{ab}$ | 1.48$^{c}$ | 1.54$^{ab}$ | *** | 0.06 |

a,b,c,…Means with different superscripts in certain column for each effect at age are significantly different *p≤ 0.05) (**p≤ 0.01) (***p≤0.001) NS= Non significant SEM= Poold Standard Error

**Table (6):** Effect of antibiotic alternatives inclusion in broiler diets on carcass yield of broiler.

| Trait, % | Control | Additives | | | | Probability |
|---|---|---|---|---|---|---|
| | | Probiotic | Prebiotic | Synbiotic | Herb | |
| Carcass | 72.43±1.04 | 74.55±0.65 | 74.53±0.61 | 73.63±1.04 | 71.79±7.98 | NS |
| Liver | 2.53[a]±0.10 | 2.31[ab]±0.04 | 2.13[b]±0.06 | 2.38[ab]±0.11 | 2.18[b]±0.17 | * |
| Gizzard | 1.69[a]±0.11 | 1.47[b]±0.08 | 1.54[ab]±0.07 | 1.42[b]±0.07 | 1.61[ab]±0.08 | * |
| Heart | 0.45±0.01 | 0.45±0.02 | 0.45±0.02 | 0.48±0.02 | 0.48±0.01 | NS |
| Pancreas | 0.17[b]±0.01 | 0.18[b]±0.01 | 0.20[ab]±0.02 | 0.23[a]±0.01 | 0.23[a]±0.02 | * |
| Intestinal weight | 4.59[b]±0.17 | 4.79[b]±0.31 | 4.81[ab]±013 | 4.99[ab]±0.29 | 5.83[a]±0.65 | * |

a,b.c,…Means with different superscripts in certain column for each effect at age are significantly different (*p≤ 0.05) (**p≤ 0.01) (***p≤0.001) NS= Non significant

**Table (7):** Effect of non-antibiotic feed additives on intestinal histology.

| Trait | Control | Additives | | | | Probability |
|---|---|---|---|---|---|---|
| | | Probiotic | Prebiotic | Synbiotic | Herb | |
| DouVillus height(µm) | 1527.50±55.85 | 1554.00±51.20 | 1603.67±68.5 | 1545.67±49.59 | 1571.01±52.4 | NS |
| Crypt depth(µm) | 221.16±5.92 | 228.66±4.26 | 230.83±7.19 | 235.83±5.10 | 233.16±3.85 | NS |
| VH/CD | 6.91±0.10 | 6.80±0.11 | 6.95±0.10 | 6.53±0.08 | 6.71±0.13 | NS |
| Jejunum villus height (µm) | 1127.33±41.94 | 1138.50±45.25 | 1146.83±45.2 | 1146.17±47.6 | 1148.67 [a]±45.9 | NS |
| Crypt depth(µm) | 219.33±7.65 | 221.01±5.65 | 223.50±6.43 | 230.16±5.09 | 225.33[b]±5.10 | NS |
| VH/CD | 5.15±0.03 | 5.15±0.08 | 5.11±0.07 | 4.96±0.09 | 5.08±0.10 | NS |
| Ileum villus height (µm) | 934.01[d]±29.99 | 1031.55[b]±60.29 | 972.50[c]±46.12 | 1053.33[a]±71.3 | 1050.67[a]±74.0 | *** |
| Crypt depth (µm) | 182.16[c]±3.39 | 187.33[b]±2.81 | 182.10[c]±3.30 | 194.50[a]±4,50 | 190.21[ab]±3.98 | *** |
| VH/CD | 5.11[b]±0.09 | 5.48[a]±0.25 | 5.33[ab]±0.17 | 5.38[ab]±0.25 | 5.51[a]±0.30 | * |

a,b.c,…Means with different superscripts in certain column for each effect at age are significantly different (*p≤ 0.05) (**p≤ 0.01) (***p≤0.001) NS= Non significant

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## الملخص العربى

# تأثير اضافة بدائل المضادات الحيوية لاعلاف كتاكيت التسمين علي الأداء الإنتاجى وصفات الذبيحة وهستولوجى القناة الهضمية

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أجريت الدراسة بمركز بحوث الدواجن- كلية الزراعة- جامعة الأسكندرية خلال الفترة من شهر نوفمبر الى شهر ديسمبر 2013 لتقييم إستجابة الكتاكيت المغذاه على العلف المحتوى بدائل المضادات الحيوية بروبيوتيك بريبيوتيك و سنبيوتك و مخلوط الأعشاب الطبية ( مكون من الشمرو البردقوش و الكراوية) بنسب خلط (1: 1: 1) وتأثير ذلك على الأداء الإنتاجى لكتاكيت التسمين صفات الذبيحة وهستولوجيا القناة الهضمية.

تم توزيع عدد 125 كتكوت تسمين عمر يوم سلالة كوب 500 عشوائيا على 5 مجاميع تجريبية بكل مجموعة خمس مكررات وبكل مكررة خمسة كتاكيت. ربيت تلك الكتاكيت تحت ظروف بيئية متماثلة فى أقفاص بداخل بطاريات متعددة الأدوار مصنوعة من السلك النظيف والمعقم واستمرت الإضاءة الاصطناعية 24 ساعة يوميا خلال فترة التجربة كلها. ومن بداية التجربة تم تقديم كل من العلف والماء بصورة حرة للكتاكيت.

تم تجهيز5 تركيبات علفية (بادئ و نامى) وتغطية جميع متطلبات المكونات المغذية لكتاكيت التسمين خلال مرحلتين النمو البادئ (1-21) يوم من العمر والنامى والناهى (22-42) يوم من العمر. حيث استخدم 4 إضافات غذائية هى البروبايوتيك، البريبايوتيك، السنبيوتيك، ومخلوط الأعشاب الطبية تم إضافتها لتشكل العلائق المختلفة

وتم تلخيص النتائج المتحصل عليها فى النقاط التالية:-

1. هناك فروق معنوية (م≤0.05 ) لوزن الجسم الحى فى نهاية فترة التجربة نظرا لإضافة مخلوط الأعشاب والبروبايوتيك و البيبايوتك و السنبيوتيك مقارنة بالعليقة الكنترول.
2. لوحظ وجود أعلى وزن جسم مكتسب مع استخدام العلائق المحتوية على السنبيوتيك مقارنة بالعليقة الكنترول .
3. أعلى استهلاك علف كان فى المجموعة الكنترول بينما أقل استهلاك فى المجموعة المغذاة على البروبايوتيك يليها السينبيوتك .
4. أدت الاضافات الى تحسن نسبة التحويل الغذائى لكل من بروبايوتيك، بريبايوتيك، سنبيوتيك، والأعشاب الطبية على التوالي (م≤0.001) مقارنة بالكنترول.
5. إضافة السنبيوتيك أظهرت أفضل نسبة تحويل غذائى مقارنة بالمعاملات الأخرى.
6. أدت إضافة بروبيوتك، بريبيوتك، سينبيوتك ومخلوط الاعشاب لزيادة غير معنوية فى طول الخملات وعمق الجوفى فى الاثنى عشر والصائم مقارنة بالمجموعة الكنترول. أيضا تلك الإضافات أدت إلى زيادة معنوية فى ال Vills height and crypt depthفى منطقة الدقاق مقارنة بالمجموعة الكنترول.
7. لوحظ أدنى وزن نسبى للكبد تحت مجموعات تغذية البريبيوتك ومخلوط الأعشاب. انخفض الوزن النسبى للطحال مع إستخدام العلائق المختلفة مقارنة بالكنترول . بينما الاضافات الغذائية المختلفة أدت الى زيادة الوزن النسبى للأمعاء.

يمكن استنتاج أنه فى ظل ظروف الدراسة، ان السنبيوتيك له أثار كبيرة على الأداء وصفات الذبيحة الا أن الامر يحتاج الى مزيد من البحوث فى ذلك الشأن. .