EFFECT OF BLACK SEEDS, GARLIC POWDER OR ENROFLOXACIN ON E-COLI-INDUCED-AIRSACCLUDITIS IN BROILER CHICKENS

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ABSTRACT
Two hundred and fifty Ross-308 broiler chicks were equally divided into 5 treatment groups (Gs). Gs 2-5 were inoculated at 22 days of age in the caudal thoracic air sac with 0.5 ml normal saline containing 10^5 colony forming unit of pathogenic field isolate of *Escherichia coli* (*E. coli*). G 1 kept as negative (-ve) and G 2 as positive (+ve) control (Co). G 3 and 4 were fed either 1% black seed (BS; *Nigila sativa*) or 1% garlic powder (GP; *Allium sativum*) from day 1 to slaughter at 42 days of age, respectively. One-day post inoculation (PI), G5 was given Enrofloxacin^1^ (En) in drinking water for 5 days. Six males and six females from each group were slaughtered 6 days PI for pathological indexes (PIxds; 0-4). Ten days PI, 15 birds from each group were blood-sampled, from the wing vein for the following estimations: 1. Newcastle Disease (ND) ELISA antibody titers (EAbTs), 2. ND Hemagglutination Inhibition antibody titers (HIAbTs), 3. *Mycoplasma galisepticum* (*MG*) EAbTs, 4. Slide films for heterophil/lymphocyte (H/L) ratio. At slaughter, Thymus weight (TW), Spleen weight (SW), and Bursa weight (BW)/body weight (BW) were recorded from 10 birds in each group. Birds were vaccinated against ND by coarse spray at 1, 15 and 30 days of age, and against Infectious bursal disease (IBD) in drinking water at 12 and 22 days of age.

Results showed that all inoculated birds developed signs of airsacculitis second day PI. The mean PIxds were 0, 3.66, 1.33, 1.10 and 0.58 for the Gs, respectively. Gs BS, GP and En were significantly (P< 0.05) differed from +ve Co, but not among themselves. There were no significant differences between the Gs, neither in ND-EAbTs nor in ND-HIAbTs. The *MG*-EAbTs were zero for all the Gs. Mean percentages of SW/BW increased in BS (P< 0.05) and GP over En. The ratios were 0.14, 0.12, 0.14, 0.14, and 0.11 for the Gs, respectively. BW/BW ratio increased (P< 0.05) in BS group over +ve Co and GP groups. However, there were no significant differences in the TW/BW ratio between the groups. In comparison with the −ve Co, the mean H/L ratios for BS and GP were reduced (P< 0.05), while those of +ve Co and En were elevated (P< 0.05). Mean body weights at slaughter were 2540, 2504, 2718, 2607, 2452 grams for the Gs respectively. Group BS was heavier (P< 0.05) than all other Gs, and group GP was heavier than +ve Co and En. There were insignificant differences in mortalities between the Gs.

* Part of M. Sc. Thesis for the second author.
In conclusion, 1% black seed or garlic powder in feed protected the birds against experimentally induced *E. coli* infection at a similar manner as Enrofloxacin therapy in water and improved spleen weight, H/L ratio, birds’ productive performance and had better economic return.

**INTRODUCTION**

Airsacculitis is a respiratory disease of poultry, frequently caused by *Escherichia coli* (*E. coli*), and characterized by thickening and inflaming of air sacs with fibrinous exudates, pericarditis and perihepatitis as squeal to colisepticemia (Stebbins *et al.*, 1992).

Black seeds (*Nigella sativa*) are used as a folk (herbal) medicine all over the world for the treatment and prevention of number of diseases (Hosseinzaah et al., 2008). They are also found to possess antibacterial activity against gram negative and gram positive bacteria, increasing the average body weight, feed intake, improving feed conversion ratio (FCR) and immunity in broilers (Osman and Barody, 1999).

Garlic (*Allium sativum*) is well known as a spice and herbal medicine for the prevention and treatment of variety of diseases (Adibmoradi *et al.*, 2006). It has an antibiotic productive performance when added as a food supplementary in broiler diets, strongly stimulates the immune system, causes quantitative changes of blood leukocytes, enhances digestion, used as growth promoter, increasing body gain, feed intake and feed efficiency (Shalaby *et al.*, 2005; Songsang *et al.*, 2008; Onibli *et al.*, 2009).

Several studies were made on the effect of black seeds and garlic as a supplementary feed ingredient in broiler diets in Iraq (Alaqaby, 2005; Mahmoud, 2006).

This experiment was conducted to study the antibacterial activity of black seed and garlic powder on airsacculitis in broiler chickens caused by induced infection of *E. coli*, in comparison with therapeutic dose of Enrofloxacin. Growth promoting activity and immune response of the two herbs, “black seeds and garlic powder”, were also studied.

**MATERIALS AND METHODS**

The *Eschericia coli* isolate used in this study was initially isolated from the diseased chickens showing typical clinical signs and pathological lesions of airsacculitis. They and those of the experiment were characterized as pathogenic *E. coli* on the basis of Analytic Profile Index (API 20 E) strip micro test. The presence of bacterial strain was determined qualitatively by streaking swabs from air sacs, liver, and spleen taken from the diseased birds directly on blood agar plates. The plates incubated overnight at 37°C for 24 hours then examined for the presence of *E. coli* colonies, which were among the organisms detected. Pure culture technique was done for cultivation colonies of *E. coli*. 10-1-10-10 cultures were prepared (Brown, 2005).

Pilot study was performed to determine the least concentration of colony forming unit cfu/ml of pathogenic *E. coli* that show most clinical signs and pathological lesions of airsacculitis without causing mortality. In addition, re-isolation of pathogenic strain of *E. coli* was made to be used in the main study. Eighteen of
unvaccinated Ross 308 broiler chicks of both sexes were obtained at the day of hatching. The infection was made at 3 weeks of age.

An amount of 0.5 ml of the identified *E. coli* suspensions $10^5$ cfu/ml was injected into the right caudal air sacs between the $4^{th}$ and the $5^{th}$ rib of the pilot study birds and all the main experiment chicks. Laboratory examinations were done to all infected chicks to assess the presence of airsacculitis, which was defined by necropsy examination and bacterial isolation from the infected organs.

Twelve birds 6 males and 6 females were sacrificed at 6 days post infection and then dissected routinely and macroscopically examined. Lesions in air sacs, heart, liver and spleen were scored. Degree of pathological index was given to the lesions namely 0: no lesions found, +1: cloudy air sacs, +2: cloudy air sacs with pericarditis, +3: pericarditis and perihepatitis, +4: pericarditis, perihepatitis with liver enlargement and darkness.

The Kirby-Bauer method was preformed to determine the antimicrobial sensitivity test (AST) which was described by Brown (2005). The isolated *E-coli* found most sensitive to Enrofloxacin (Mobidco, Jordan).

Two hundred and fifty of both sexes were obtained on the day of hatching and reared for 42 days. At 1-day old, 250 Ross 308 broiler chicks were randomly divided into five groups of 50 chicks, representing a negative and a positive control groups (1 and 2) and 3 treatment groups (T1, T2, and T3) as follows:

Group 1: Negative control group (-veC) not infected and not treated.

Group 2: Positive control group (+veC) not treated and injected at 22 days of age with 0.5 ml of $10^5$ CFU/ml of *E.coli*.

Group 3 : (T1) Injected at 22 days of age with 0.5 ml of $10^5$ cfu/ml of *E.coli*, in which 1% black seed was added to the basal diet from day 1 to slaughter.

Group 4 : (T2) Injected at 22 days of age with 0.5 ml of $10^5$ cfu/ml of *E.coli*, in which 1% garlic powder was added to the basal diet from day 1 to slaughter.

Group 5 : (T3) Injected at 22 days of age with 0.5 ml of $10^5$ cfu/ml of *E.coli* in which Enrofloxacin at the rate of 1 ml/l was added to drinking water post infection for five successive days. Basal diet was given to this group.

The basic diet of the main experiment was obtained from commercial feed mill that described in Table 1:

Birds were vaccinated against Newcastle Disease (ND) Clone 30 and Infectious Bronchitis (IB) Ma5 at day 1 by aerosol, ND LaSota at 15 and 30 days by aerosol, Infectious Bursal Disease (IBD) D78 at 12 and 22 days by drinking water, and Coccidiosis coccivac at 3 days by spray on the feed.

Serological examination was made at 32 days of age to measure of ND antibodies in each group and they were determined. Fifteen birds were blood sampled (8 males and 7 females) per each group from brachial vein directly transferred to non heparinized centrifuge test tubes as described by (Coles, 1986), then serum preparation was performed by the method of Girmes (2002). Serum was stored at $-20^\circ$C, for the Enzyme Linked Immunosorbent Assay (ELISA) and hemagglutination inhibition (HI) analysis.
Table 1. The components basic diet.

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Starter Diet (%)</th>
<th>Grower Diet (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1-21 days</td>
<td>22-42 days</td>
</tr>
<tr>
<td>Concentrated protein</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Soybean meal</td>
<td>34</td>
<td>27</td>
</tr>
<tr>
<td>Corn</td>
<td>38</td>
<td>26</td>
</tr>
<tr>
<td>Wheat</td>
<td>20</td>
<td>38</td>
</tr>
<tr>
<td>Oil</td>
<td>2.8</td>
<td>4</td>
</tr>
<tr>
<td>Limestone</td>
<td>1.45</td>
<td>1.35</td>
</tr>
<tr>
<td>Di calcium phosphate</td>
<td>0.5</td>
<td>0.4</td>
</tr>
<tr>
<td>Enzymes</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>Vitamins and Minerals</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>Colin chloride</td>
<td>0.05</td>
<td>0.05</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

The ELISA was performed to measuring antibody titers against ND Virus, and *Mycoplasma gallisepticum*. Synbiotics Kits were used (Commercial Corporation) for indirect ELISA plate.

Heamagglutination Test (HA) was used to quantify the amount of Newcastle disease virus in suspension. Heamagglutination Inhibition Test (HI) was done to determine the geometric mean of HI titer (Girmes, 2002).

Hematological Studies was done on 10 blood films (equally from both sexes) from each group at 31 days of age for estimation of Hetrophil/Lymphocyte ratio (H/L) and stained according to Coles (1986). H/L ratio was excluded from percent ratio of Hetrophil to percent ratio of Lymphocyte from TWBCc, as described in the (Mahmood, 2006) by follow formula: H/L= Percent of Hetrophil in blood film / Percent of Lymphocyte in blood film.

Immune Organs Weight/ Body Weight were measured at the end of the study; ten birds (equally from both sexes) of each group were weighed individually. After slaughtering, immune organs were weighed including thymus, spleen and bursa of Fibricius and then thymus weight/body weight, spleen weight/body weight and bursa of Fibricius weight/body weight were calculated as described by (Keil,2008) following the mentioned equation: Immune Organ Weight/ Body Weight = Organ Weight (gm)/ Body Weight (gm)X 100.

Productive Performance that was measured for all groups, according to number of formula as described by (Abdulla, 2007).

Live Body Weight (LBW); twenty-four birds, 12 males and 12 females from each group, were weighed individually at 15, 30 and 42 days of age.

The feed consumption (FC) was calculated according to the following equation: Feed consumption= Amount of feed supplied – feed remained at the end of period/ Number of live birds for each group.
Feed conversion ratio (FCR) was calculated for twenty-four birds, 12 males and 12 females in all groups, according to the following equation: Feed conversion ratio = Feed intake during a period / Weight gain during the same period.

Percent of Mortality (PM); mortality of each group was recorded daily and mortality rate of birds at the end of the experiment was calculated according to the following equation:

\[
\text{Percent of Mortality} = \frac{\text{Total mortality}}{\text{Total number of living bird}} \times 100.
\]

Statistical Analysis for the study was subjected to analysis of variance. Most significant differences among means were analyzed by Duncan’s multiple range test and ANOVA table, and some other means were analyzed by Chi-square method by using Statistical Analysis System (SAS, 2005).

RESULTS AND DISCUSSION

The results of antimicrobial sensitivity test are presented. Pathogenic \( E. coli \) isolate is highly sensitive to Enrofloxacin (24mm) diameter zone, moderate sensitivity to Ciprofloxacin, Florphenicol, Chloramphenicol, Gentamycin, Colistin and Trimeth-Sulpha and resistant to Amoxicillin, Ampicilin (-ve), Erythromycin, Oxytetracyclin and Thiamphenicol.

Enrofloxacin was chosen here for its large sensitive zone (diameter 24mm) on the \( E. coli \)-isolate in comparison with the other antibiotics used in this experiment. Amara et al. (1995) reported that a large number of \( E. coli \) strains were resistant to Enrofloxacin and Ciprofloxacin. The isolated \( E. coli \) here showed complete resistance (diameter zero mm) to some antibiotics namely Amoxicillin, Ampicilin (-ve), Erythromycin, Oxytetracyclin and Thiamphenicol. The resistance of \( E. coli \) to the antibiotics is due to their wide use for the treatment of general bacterial infection in broilers (Lambie et al., 2000; Islam et al., 2004).

Results of airsacculitis Indexes showed that all inoculated birds developed airsacculitis second day post inoculation. The mean indexes of the five experimental groups were 0, 3.66, 1.33, 1.16 and 0.58 respectively. G3, G4 and G5 were significantly different (\( P = 0.05 \)) from G2 but not among themselves. Significant differences (\( P = 0.05 \)) were evident for the four experimental groups in comparison with the negative control group.

The significant differences (\( P = 0.05 \)) in airsacculitis index between BS, GP and En Groups in comparison with the positive control group (+ve Co) may be attributed to the antibacterial activity of BS, GP and En. However, the insignificant differences (\( P \geq 0.05 \)) between BS, GP and En could be due to the antibacterial effect of the two supplemented herbs, which was acted in a similar manner as En therapy in water. The antibacterial activity of BS was due to the thymoquinon activity, which is one component of the seeds (El-Fatatry, 1975; Arici et al., 2005). Salem (2005) suggested that diethyl ether extract was one component of BS inhibits the gram positive and gram-negative bacteria, including \( Pseudomonas aeroginosa \) and \( E. coli \). Furthermore, the ether extract showed synergistic and additive antibacterial effect with several antibiotics (Hanafy and Hatem, 1991).

It was reported earlier that garlic, like all allium vegetables, contains a wide range of thiosulphinates such as allicin which is thought to be responsible for
antibacterial activity. Antibacterial activity of garlic is due to the inhibition of succinic dehydrogenase via the inactivation of thiol group (Jonkers et al., 1999; Indu et al., 2006).

Table-2 shows that there were no significant differences ($P \geq 0.05$) in ND antibodies (Abs) titer tested by ELISA between the groups. However, the calculated means were 363.0, 359.1, 410.8, 410.9 and 553.2 respectively.

Regarding the Ab titers of ND tested by HI, the means showed no significant differences ($P \geq 0.05$) between the groups. However, the calculated means of the titers were 9.0, 15.1, 12.9, 19.5 and 14.1 respectively.

The insignificant differences in the ND Antibody Titers (AbTs) might be due to the small sample size that was analyzed for each group. However, Durrani et al. (2007) who incorporated 2, 3 and 4gm of BS/Kg in the diet of broiler chickens noticed that only 3 and 4gm/Kg of BS increased the AbTs against ND. Alaqaby (2005) observed that the supplementation of BS at the rate of 2% in the diet of broiler chicken raised significantly the HI AbTs against ND when compared with the control group. Mahmood (2006), who supplemented 2% of BS in the feed of broiler chickens, reported a significant increase in the ELISA and HI AbTs against ND when compared with the control group.

With regard to GP supplementation, Jafari et al. (2008) examined diets supplemented with 1 and 3% GP in broiler chickens and demonstrated that the mentioned rates could not enhance the serological response of broilers to NDV vaccine. Jafari et al. suggested that the possible reason for the significant results might be due to insufficient active constituents of GP to stimulated humoral immunity. However, Haq et al. (1999) studied the effect of GP supplementation at the rate of 2gm/Kg in broiler diets on AbTs against ND and reported a significant increase in the titers in comparison with the control group. Mahmood (2006) supplemented 1% of GP in the diet of broiler chickens and observed a significant increase in the AbTs against ND.

In respect of ELISA test for Abs titers against MG, no Abs were detected in all the groups. The absence of AbTs of Mycoplasma Gallisepticum (MG), here, indicates that the clinical signs of airsacculitis infection which was observed in the second day post infection were mainly due to the inoculated E.coli in the caudal thoracic air sac.

Results of Hetrophil (H) / Lymphocyte (L) H/L Ratio (Table 5) shows that differences ($P \leq 0.05$) were evident between the groups. It may be noticed that groups 3 and 4 (0.28 and 0.30 respectively) recorded the lowest ratio and groups 2 and 5 (0.41 and 0.39 respectively) the highest ratio.

Many workers reported that the Hetrophil/Lymphocyte (H/L) ratio was an excellent indicator for stresses in chickens (Gross and Sigel, 1983; Kassab et al., 2000). The stress may be pathological, nutritional or environmental (Al-Murrani et al., 1997; Kassab et al., 2000; Amedy, 2008). The effect of stress in chickens was characterized by elevation of hetrophil and reduction of lymphocyte due to the increased corticosteron level in serum (Glick, 1958: Mahmood, 2006; Abuzeed, 2008). In this study, the lowest ($P \leq 0.05$) H/L ratio was recorded in the BS group (0.28) followed by GP group (0.30) which suggests that BS and GP are good anti stress factors when added to the feed. Mahmood (2006) suggested that BS and GP have an anti stress activity in chicken and demonstrated negative correlation between H/L ratio
and body weight, suggesting that the stress increased H/L ratio and decreased body weight due to reduction in feed intake.

### Table 2. Effect of black seeds, garlic powder in feed and Enrofloxac in water on immune status in the blood and organs of broiler chickens.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Test</th>
<th>ELISA for ND</th>
<th>HI for ND</th>
<th>ELISA for MG</th>
<th>H/L</th>
<th>TW/BW</th>
<th>SW/BW</th>
<th>BW/BW</th>
</tr>
</thead>
<tbody>
<tr>
<td>G1-ve Control</td>
<td></td>
<td>363.0±25</td>
<td>9.0</td>
<td>0.0</td>
<td>0.34±0.0</td>
<td>0.23±0.0</td>
<td>0.14±0.0</td>
<td>0.19±0.02</td>
</tr>
<tr>
<td>G 2+ve Control</td>
<td></td>
<td>359.1±32</td>
<td>15.1</td>
<td>0.0</td>
<td>0.41±0.0</td>
<td>0.21±0.0</td>
<td>0.12±0.0</td>
<td>0.16±0.01</td>
</tr>
<tr>
<td>G3 1%Black seeds</td>
<td></td>
<td>410.8±22</td>
<td>12.9</td>
<td>0.0</td>
<td>0.28±0.0</td>
<td>0.22±0.0</td>
<td>0.14±0.0</td>
<td>0.22±0.02</td>
</tr>
<tr>
<td>G4 1%Garlic powder</td>
<td></td>
<td>410.9±24</td>
<td>19.4</td>
<td>0.0</td>
<td>0.30±0.0</td>
<td>0.22±0.0</td>
<td>0.14±0.0</td>
<td>0.13±0.01</td>
</tr>
<tr>
<td>G5 Enrofloxacin</td>
<td></td>
<td>553.2±43</td>
<td>14.1</td>
<td>0.0</td>
<td>0.39±0.0</td>
<td>0.24±0.0</td>
<td>0.11±0.0</td>
<td>0.19±0.01</td>
</tr>
</tbody>
</table>

*Statistical significance N.S. | N.S. | * | N.S. | * | * |

1- (Mean± Standard error).
2- Fifteen birds, 8 males and 7 females were taken from each group at 32 days of age.
3- TW/BW; Thymus weight/Body weigh, SW/BW; Spleen weight/Body weight, BW/BW; Bursa weight/Body weight.
4- Enrotrill®, MOBEDCO-Jordan.

a, b and c different manuscripts indicated significant differences (P ≤ 0.05) * between means. N.S.: no significant differences.

In contrast, Enrofloxac in, here, elevated H/L ratio (0.39) similarly (P ≥ 0.05) as +ve Co group (0.41) in comparison (P ≤ 0.05) with the -ve Co group (0.34). The results in this work demonstrate that En therapy increased stress, while BS and GP supplementation decreased stress which, in turn, reflects on the body weight which will be discussed later.

Results of Immune Organs Weight/Body Weight (Table 5) reveal that there were no significant differences (P ≥ 0.05) in TW/BW between the groups. The means of SW/BW showed significant differences (P ≤ 0.05) between the groups. The mean ratio of G1, G3 and G4 were 0.14, 0.14 and 0.14 gm respectively which were the highest in comparison with the lowest recorded in G2 and G5 that are 0.12 and 0.11 gm respectively.
In respect to BW/BW the significant, the highest ratio was recorded in G3 (0.22 gm) followed by groups 1 and 5 (0.19 and 0.19 gm respectively), then G2 (0.16 gm) and G4 (0.13 gm), which was the lowest among the groups. In respect to Thymus Weight/body Weight (TW/BW), Spleen Weight/Body Weight (SW/BW) and Bursa Weight/Body Weight (BW/BW), the significant differences (P ≤ 0.05) were found only in SW/BW and BW/BW.

The significant reduction in SW/BW in group En therapy (0.11) is attributed to immunosuppressive effect of this antibiotic (Kassab and Al-Adhadh, 2000; Kassab and Al-Kinani, 2001; Kassab and Al-Hashimi, 2001). Black seeds and garlic powder groups (0.14 and 0.14 respectively) showed an elevated ratio of the organs weight/BW in comparison to the +ve Co group. This indicates that these two herbs had an immunostimulanting effect against E. coli infection. Regarding the BW/BW the highest ratio (P ≤ 0.05) recorded in BS group (0.22), this is due to its immunogenic effect as mentioned earlier, while in GP group the ratio was the lowest (P ≤ 0.05; 0.13) when comparing the results of pathological indexes with the organ weights. It may be suggested that GP was more antibacterial than immunogenic agent, while BS was visa versa (Osman and Barody, 1999; Sivam, 2001; Nasir and Grahorn, 2006; Indu et al., 2006). However, Mahmood (2006) reported that the highest ratio of SW/BW and BW/BW was recorded in groups containing 2% BS and 1% GP in the feed of broiler chickens.

Results of Productive Performance (Table 3) show Live Body Weight was significantly different among all experimental groups at different age periods. At 42 days of age the heaviest body weight (P ≤ 0.05) was recorded in G3 which was 2718 gm, while those of G5, G2 and G1 were 2452, 2504 and 2540 gm respectively. The mean of G4 is 2607 gm was different significantly (P ≤ 0.05) from groups 1, 2 and 5.

The feed consumption of G5 was increased numerically over the four other groups, G4 and G3 consumed less feed than the negative control group and at the same time G4 consumed less feed than G3. The least consumption was recorded in the positive control group.

Data on Feed Consumption (FC; gm/bird/period) are presented in Table-7. It may be seen that at the end of the experiment (1-42 days of age), the means were 4400, 4305, 4397, 4359 and 4415 for the groups 1, 2, 3, 4 and 5 respectively.

With regard to productive performance, here, it may be seen that BS and GP at 1% incorporation rate in feed improved (P ≤ 0.05) Live Body Weight (LBW), arithmetically decreased Feed Consumption (FC) and improved (P ≤ 0.05) feed utilization (FCR).

It seems that the BS at 1-42 days of age improved body weight (2718 gm) more than all the other groups followed by GP (2607 gm), -ve Co group, +ve Co group and then En group (2452 gm). These results suggest that BS and GP had a beneficial effect over En therapy. This may be due to the stress and immunosuppressive effect of antibiotic therapy mentioned earlier. The performance is the ultimate parameters that the producer looks forward to.

In regard to FC at 1-42 days of age, the results of this study demonstrate that there are no significant differences, but arithmetically, GP group and then BS group consumed the least amount of feed (4359 and 4397 respectively) in comparison with En group and –ve Co group. In contrast En group, arithmetically, consumed the largest
amount of feed in comparison with the other four groups. The results of LBW and FC are normally a reflection to FCR, therefore, at 1-42 days of age BS recorded the best (P≤ 0.05) FCR (1.66) among all groups followed by 1.72 of GP.

The worst FCR was found in the En therapy group, this is due to the infection and stress induced by antibiotic therapy. Abu-Dieyeh and Abu-Darwish (2008) supplemented 1, 1.5 and 2% BS powder in the feed of broiler chickens as a natural feed additive and observed the highest (P≤ 0.05) body weight and best FCR in those broiler chickens that consumed 1.5% of BS powder. Al-Beitawi and El-Ghousein (2008) examined 9 dietary groups: control, 1.5%, 2%, 2.5% and 3% of crushed and uncruushed BS as feed additive for broiler chickens and suggested that chickens feed 1.5% crushed BS recorded higher LBW and better FCR in comparison with all the other groups.

The low performance in +ve Co group in this experiment is mostly due to the induced colibacillosis infection. Ask et al. (2006a) reported that chicks infected with E.coli showed a reduction in appetite with decreased feed intake and energy availability for growth. Ask et al. (2006b) reported that colibacillosis had adverse effects on growth and health, growth retardation being the main problem, reduced eating behavior leading to reduce feed intake. Russell (2003) recorded loss of appetite in the birds affected with airsacculitis due to E.coli infection that had a negative impact on the body weight of broiler chickens. Sell et al. (1997) reported that the weight gain and feed efficiency were markedly impaired by E.coli infection of turkeys after 7 days of exposure.

In addition to the stress and immunosuppresion caused by En mentioned earlier, antibiotics in general limited the growth and colonization of numerous non-pathogenic species of bacteria in the gut including Lactobacilli, Bifidobacteria, Bacteroides and Enterococci. This may reduced the production of antagonistic microbial metabolites, which adversely affected the physiology of the host birds and reduces the weight and length of the intestines of poultry (Zimber and Visek, 1972; Truscott and Al- Sheikly, 1977).

Percent of Mortality are presented in (Table 3) The result of Chi-square indicate that there is no significant difference (P≥ 0.05) between the five experimental groups. The low mortality in the present experiment, especially after infection, did not give indication to whether any of the treatment groups had beneficial effect on this experiment. However, Stoof (2008) recorded that mortality of colibacillosis usually remained below 5%.

In calculating the fusibility study (no room to tabulate the calculation here) it was found that the use of BS had much better economic return than GP and En. In addition, the use of GP had a better retrain over En. Using En therapy surely caused an economic loss to producers.

In conclusion Black seeds and garlic powder at the rate of 1% in feed has an antibacterial effect against induced aiersacculitis caused by Escherichia coli, reduces stress, improved immune response and productive performance.
Table 3: Effect of black seeds, garlic powder in feed and Enrofloxacin in water on live body weight (LBW: gm) Feed consumption (FC; gm) and feed conversion ratio (FCR; %) in the broiler chickens.

<table>
<thead>
<tr>
<th>Days</th>
<th>Groups²</th>
<th>LBW 42 days</th>
<th>FC 1-42 days</th>
<th>FCR 1-42 days</th>
<th>Mortality Rate %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>G1 –veControl</td>
<td>2540±49.7 b</td>
<td>4400</td>
<td>1.77±0.03 ab</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>G2 +ve Control</td>
<td>2504±61.4 b</td>
<td>4305</td>
<td>1.77±0.04 ab</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>G3 1% Black seeds</td>
<td>2718±59.7 a</td>
<td>4397</td>
<td>1.66±0.04 c</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>G4 1% Garlic powder</td>
<td>2607±53.8 ab</td>
<td>4359</td>
<td>1.72±0.04 bc</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>G5 Enrofloxacin³</td>
<td>2452±36.17 b</td>
<td>4415</td>
<td>1.84±0.03 a</td>
<td>4</td>
</tr>
</tbody>
</table>

Statistical significance * NS * Total 3.2 NS

1- (Mean± Standard error).
2- Twenty four birds, 12 males and 12 females from each group were weighted.
3- Enrotrill®, MOBEDCO-Jordan.

a, b and c different manuscripts indicated significant differences (P ≤ 0.05) * between means. NS; no significant difference.

REFERENCES


Sell, J.L., D.W. Trampel and R.W. Griffith (1997). Adverse Effect of *Escherichia coli* infection of Turkeys were noted alleviated by supplemental dietary vitamin E. Poult. Sci. 76: 1682-1687.


تأثير الحبة السوداء أو مسحوق الثوم بالعطارة أو الأنتروفلكسسين بالماء على التهاب الأكياس الهوائية المحدث بالاثير كساب
قسم الثروة للحيوانات / كليه الزراعة / جامعة صلاح الدين خرستان العراق
قسم الجراحة والباطنية / كليه الطب البيطري / جامعة دهوك / خرستان العراق

المستخلص
تم تتزيع 250 فح في لحم نوع Ross 308 بعمر يوم واحد بالمنساوي على خمسة عامات. حفزت
طيار المعاملة 2-5 بعمر 22 يوماً في كيس العداء الصلدي الخافي بـ 0.5 مل من المحم الوضعي
وعدت المجموعة الأولى E-coli الحاوي على 10⁵ cfu في عزلة حلقية مرضية من الأنثريكلا القواربية
وآراماً %1 GPA الطريقة سالبة ve والثانية سالبة %. اطلعت المجموعة الأثرة BS والرابعة SW/BW
على التوالي من عمر يوم واحد ولغاية %1 مسرح الثومSG سوداء النورا Ullus sativum أو %1 مسرح الثوم
المادة الأنتروفلكسسين بنسبة 1 مل / لتر من %1
الماء والرش لمدة خمسة أيام بعد حقن الجراثيم بعمر واحد وظهور الأعراض. بعد 6 أيام من الحقن تم ذبح
6 افراز ذكور و 6 أنثى من كل مجموعة وتم تقدير المنسب المرضي pathological index
وبعد 10 أيام من الحقن تم اخذ دم من الجناح من 15 طير من كل مجموعة لغرض تقدير الفحوصات
الائية :- 1- المعيار الحمضي لمريض نيوكاسل بوساطة الأليزا والثلاثين المدني 2- مايكوبلازا
الآليزا OM PS BW/BW بوساطة الأليزا 3- شرائح زجاجية لفحص معدل H/L وتم قياس نتائج
ومن بعد دنوج وضفت عدة الوحدة H/L والجربان والجمال SW/BW وتم قياس وزن الجسم للاستراح منتصراً من 10 دجاجات
من كل مجموعة. تم تفتيق الإفراز ضد نيوكاسل بالرش بعمر 1 و 15 و30 يوماً وشد الكبد لبما
الشرب بعمر 12 و 22 يوماً

أوضح النتائج بأن جميع الطيور المحفونة بالجراثيم أظهرت علامات تنفيذية في اليوم التالي
للحقن وكان المنسب المرضي 0.66 و3.63 و1.10 و0.58 للمجموعات الخمسة على التوالي. إن
نسبة من %1 في المحم الوضعي من %1 GP وBS كانوا أفضل (p<0.05) في المنسب المرضي من %1
بعضهم ولم يكن هناك فارق معنوي بين المجموع في إضاد نيوكاسل للفحص المستخدمين. وسجلت
الس جرثيم %1 من SW/BW وBS في نسبة %1 الضاد صفرًا لجميع المجموعات. كان هناك زيادة (p<0.05)
بالمقارنة ب %1 GP وBS BW/BW بين المجموع. بالمقارنة ب %1 GP وBS BW/BW بين المجموع. بمقارنة بين %1
ان معدلات وزن الجسم وقت التسويق كانت EN و GP وBS BW/BW كان وافضاً (p<0.05) بينما ذلك ل %1

* البحث مقتبس من رسالة ماجستير للباحث الثاني.

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5) 405 و 254 و 2504 و 2718 و 2607 و 2452 غم للمجامع على التوالي، حيث تفوق (p<0.05) وزن مجموعة En و المجموعة BS على جميع المجامع. وتفوقت مجموعة GP على المجموعة الها. لم يكن هناك فروق معنوية في نسب الها نتاء بين مجموعات التجربة.

يُنصح من البكتيريا 1% من كل من الحبة السوداء أو مسحوق الثوم في الحمية تحمي فروج الحم من الإصابة الجوية بجرثومة E.coli بشكل يشابه العلاج بالاتروفلوكساسين في ماء الشرب وقد H/L وناتج الإنتاجي للدجاج وعائد اقتصادي أفضل.