Use of Garlic (Allium sativum), Black Cumin Seeds (Nigella sativa L.) and Wild Mint (Mentha longifolia) in Broiler Chickens Diets

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Abstract: This experiment was conducted for comparison, the effect of garlic powder, black cumin seeds powder and wild mint powder on performance and carcass characteristics of broiler chickens. Based on a randomized completely design, 320 days old Ross 308 broilers were distributed into 16 floor pens and reared for 42 days. A basal diet was formulated according to NRC recommendations for starter (0-21 days) and grower (22-42 days) periods. The basal diet was also supplemented with garlic powder, black cumin seeds powder and wild mint powder, resulting 4 dietary treatments were prepared including control group. Each dietary treatment was fed ad-libitum to 4 replicates group of 20 birds at the beginning of rearing period. There were no significant differences in feed consumption at all of treatments in rearing period (p>0.05). The birds fed the diet containing black cumin seeds powder had the highest body weight gain as compared with other treatments (p<0.05). The best Feed Conversion Ratios (FCR) was recorded with birds fed diets contained black cumin seeds powder compared with control and other groups through all growing periods (p>0.05). The lowest (p<0.05) abdominal fat percent were recorded for broilers fed the diets supplemented with garlic powder and black cumin seeds powder (p<0.05). Also, the highest carcass percent were recorded for birds fed diets supplemented with black cumin seeds powder and garlic powder (p<0.05). The percent of breast in birds received black cumin seeds powder significantly was higher than wild mint and control groups (p<0.05). The percent of thigh was not affected with feed treatments (p>0.05).

Key words: Broiler, garlic, black cumin seeds, wild mint, performance, carcass

INTRODUCTION

Feed is the major segment of cost of production in poultry industry. Efforts have been made since the very beginning of poultry industry to increase the efficiency of feed utilization to minimize per unit cost of production. In view of the ban on antibiotic that were previously and still in most of developing countries are used as growth promoters, poultry scientists today are challenged to find out new alternatives to these synthetic growth promoters that could be as or more effective to keep the poultry gut healthy and well balanced with normal micro flora that is recognized as a fundamental precondition for cost efficient and environmentally sound poultry production. Medicinal plants and herbs found in nature are mostly utilized for treatment and curative purposes by human beings since long. The active constituents in leaves, stem, seeds and roots burks of these medicinal plants are highly effective to combat different diseases and improve the digestion that in turn could improve the performance of the recipients. Garlic (Allium sativum) is well known as a spice and herbal medicine for the prevention and treatment of a variety of diseases (Adibmoradi et al., 2006). The major active ingredients of garlic are allicin, ajoene, S-allyl cysteine. Garlic has been found to demonstrate antimicrobial activity (Adibmoradi et al., 2006), lower serum and liver cholesterol (Qureshi et al., 1983) and improve productive performance of broiler chicks (Demir et al., 2003). Black cumin seeds (Nigella sativa L.) is one of the most popular plants used in this field. The composition and properties of cumin seeds have been fairly investigated and the results of these investigations were reviewed (Houghton et al., 1995; El-Ally et al., 1975; Mahfouz and El-Dakhakhry, 1960). These researchers reported that cumin seeds, or their extracts have anti-microbial, anti-histaminic, anti-tumour, anti-hypertensive and anti-inflammatory effects. Wild Mint (Mentha longifolia) known as horse or habek mint is often used in domestic herbal remedy, being valued especially for its antimicrobial, antiseptic,

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antispasmodic, choleretic, carminative and central nervous system stimulant properties and its beneficial effects on the digestion (Chopra et al., 1986). The major compounds are carvone (67.3%), limonene (13.5%), I, 8-cineole (5.4%), menthone (2.9%), linalool (2.8%) and isomenthone (1.2%) that exhibit strong antibacterial and antioxidant activities (Yunus et al., 2004). The present study aimed to comparing the effect of adding garlic powder, black cumin seeds powder and wild mint powder in diets on boilers performance.

**MATERIALS AND METHODS**

**Bird and diet:** In this study, 320 broiler chickens of the commercial Ross 308 strain were used in a randomized completely design with 4 treatment and 4 replicates in each treatment and 20 birds/replicates and reared on the floor pens for 42 days. A basal diet was formulated as control according to NRC (1994) recommendations for starter (0-21 days) and grower (22-42 days) periods. The required amount of growth stimulating additives under study was added to the basal diet so that, in addition to the control treatment, four dietary experimental treatments containing garlic powder (1000 g ton⁻¹), black cumin seeds powder (1000 g ton⁻¹) and wild mint powder (1000 g ton⁻¹) were prepared (Table 1). During the experiment, water and feed were given to the birds ad-libitum.

**Sample collection:** Weighing of the feed and chickens were made on a weekly basis. At the end of the experiment, 2 birds from each replicate of treatments were slaughtered for separation of carcasses (Perreault and Leeson, 1992).

**Statistical analysis:** All data were analyzed using the one-way ANOVA procedure of SAS® (1998) for analysis of variance. Significant differences among treatments were identified at 5% level by Duncan (1955) multiple range tests.

**RESULTS AND DISCUSSION**

**Growth performance:** The effect of experimental treatments on the performance of broiler chickens is given in Table 2. Feed consumption did not differ between treatments (p>0.05). The body weight gain was significantly increased for birds fed black cumin seeds powder compared to control group (p<0.05). From 0-42 days of age, Feed Conversion Ratios (FCR) was improved significantly by supplementation with black cumin seeds powder compared to other groups (p<0.05). In starter period (0-21 days) the black cumin seed powder showed a better FCR than wild mint powder and control groups (p<0.05).

In summary, supplementation of the diet with black cumin seeds powder significantly improved body weight gain and feed conversion ratio. Guler et al. (2006), Abu-Dieyeh and Abu-Darwish (2008) and Al-Beitawi and El-Ghouseinet (2008) reported that black cumin seeds powder can improve the performance of birds, which was in contrast to those of Osman and El-Barody (1999).

The data of present study show that dietary garlic and wild mint powder can not affect the growth performance of broiler chickens. The results was consistent with Dey and Samanta (1993) who reported that supplementation of garlic powder in diet had no significant effect on weight gain and feed conversion ratio. In the other hand, Shi et al. (1999) and Al-Ankari et al. (2004), observed a positive effect of garlic powder and wild mint powder on broiler performance, respectively.

Variance among reports of researchers could be related to differences in management and environmental conditions that be exist in various experiments. It's suggested that under benefit management and/or environmental conditions, the effect of such feed additives may be worthless. The positive effect of supplementation with black cumin seeds powder on performance may be due to rich nutrients content of unsaturated and essential fatty acids, essential amino acids and carotene in the black cumin seeds. It is also a source of calcium, iron, sodium and potassium that are considered essential cofactors in various enzyme functions (Takruri and Dameh, 1998; Tierra, 2006; Salma et al., 2007). In addition, there are other pharmacologically positive effects of black cumin seeds.
Table 2: The main effects of treatments on performance of broiler chickens (Mean±SE)

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Feed consumption (g)</th>
<th>Body weight gain (g)</th>
<th>Feed conversion ratio (g g⁻¹)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.21 ± 0.02</td>
<td>0.42 ± 0.04</td>
<td>0.21 ± 0.02</td>
</tr>
<tr>
<td>Control</td>
<td>114.6 ± 11.0</td>
<td>42.06 ± 1.7</td>
<td>472.7 ± 15.2</td>
</tr>
<tr>
<td>Black cumin seeds</td>
<td>107.0 ± 10.3</td>
<td>41.99 ± 1.4</td>
<td>1846.2 ± 27.3</td>
</tr>
<tr>
<td>Wild mint</td>
<td>117.0 ± 11.7</td>
<td>42.18 ± 1.3</td>
<td>1987.0 ± 21.5</td>
</tr>
<tr>
<td>Garlic</td>
<td>118.7 ± 11.8</td>
<td>42.68 ± 0.6</td>
<td>2062.4 ± 18.0</td>
</tr>
<tr>
<td>SEM</td>
<td>43.8 ± 4.3</td>
<td>53.68 ± 0.3</td>
<td>73.47 ± 0.9</td>
</tr>
<tr>
<td>p-value</td>
<td>0.82 ± 0.03</td>
<td>0.97 ± 0.03</td>
<td>0.09 ± 0.03</td>
</tr>
</tbody>
</table>

* a,b: Means in each column with different superscripts are significantly different (p<0.05).

Table 3: The effect of herbal additives on carcass composition of broiler chickens

<table>
<thead>
<tr>
<th>Treatments</th>
<th>As %</th>
<th>Control</th>
<th>Black cumin seeds</th>
<th>Wild mint</th>
<th>Garlic</th>
<th>SEM</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carcass</td>
<td>77.2 ± 0.8</td>
<td>82.1 ± 0.4</td>
<td>89.0 ± 0.8</td>
<td>82.3 ± 0.2</td>
<td>0.63</td>
<td>0.0094</td>
<td></td>
</tr>
<tr>
<td>Thigh</td>
<td>32.7 ± 0.9</td>
<td>31.5 ± 0.5</td>
<td>28.9 ± 0.5</td>
<td>32.4 ± 0.2</td>
<td>0.88</td>
<td>0.4300</td>
<td></td>
</tr>
<tr>
<td>Breast</td>
<td>31.6 ± 0.8</td>
<td>36.7 ± 0.7</td>
<td>28.3 ± 0.8</td>
<td>35.9 ± 0.6</td>
<td>1.12</td>
<td>0.0080</td>
<td></td>
</tr>
<tr>
<td>Abdominal fat</td>
<td>1.57</td>
<td>0.99</td>
<td>1.88</td>
<td>1.02</td>
<td>0.07</td>
<td>0.0001</td>
<td></td>
</tr>
</tbody>
</table>

* a,b: Means in each row with different superscripts are significantly different (p<0.05).

on growth performance of broiler birds, which may also be attributed to its content of volatile oil (Hay and Waterman, 1993) or essential oil (Cyren and Dung, 1999). It has been shown that the essential oil of black cumin seeds has certain biological functions that could act not only as antibacterial, anti-oxidants (Al-Harthi, 2004), but also as a stimulant of digestive enzymes in the intestinal mucosa and pancreas that improve the digestion of dietary nutrients and feed efficiency, subsequently increasing the growth rate (Platek and Srinivasan, 1996, Lee et al., 2004).

Carcass composition: The effects of experimental treatments on carcass composition of broiler chickens are reported in Table 3. The birds under black cumin seeds powder and garlic powder treatments had the highest percent carcass (p<0.05). Similarly, the birds under black cumin seeds powder and garlic powder treatments had the lowest abdominal fat percent than other groups (p<0.05). The experimental treatments had no significant effect on the percent of thigh (p>0.05). Also, birds under black cumin seeds powder treatment had the highest breast percent as compared with other treatments (p<0.05).

The positive effect of the black cumin seeds powder use on the percent of broiler carcasses (Guler et al., 2006) confirm the results of this experiment. In the Abaza et al. (2008) study, adding 0.1% black cumin seed oil to the birds' ration, decreased the percent of abdominal fat. However, our findings on carcass characteristics were in contrast to those of Guler et al. (2006), Javandel et al. (2008) and Durrani et al. (2007).

CONCLUSION

The results of this study indicated that feeding growing chicks on diet containing natural feed additives as black cumin seeds powder improved chicks performance, digestibility and decreased abdominal fat compared to the control group. Further researches are needed to get better understanding of the effect of natural feed additives in poultry production and their beneficial impact on human health.

REFERENCES


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