

Full Length Research Paper

Influence of dietary supplemented medicinal plants mixture (Ziziphora, Oregano and Peppermint) on performance and carcass characterization of broiler chickens

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An experiment was conducted to investigate the effects of dietary supplementation of Ziziphora (*Thymus vulgaris*), Oregano (*Oreganum vulgare*) and Peppermint (Lamiaceae *Mentha piperita*) on performance [feed intake, weight gain and feed conversion ratio (FCR)] and carcass characterization of broiler chickens. 240 ROSS strain broiler chicks were selected and divided into 4 treatments and 3 replicates based on completely randomized design. The groups comprised group 1 or control (fed basal diet, without medicinal plant supplementation), group 2 (fed 1% Ziziphora, 0.5% Oregano and 0.5% Peppermint), group 3 (fed 1% Oregano, 0.5 Ziziphora and 0.5% Peppermint) and group 4 (fed 1% Peppermint, 0.5% Ziziphora and 0.5% Oregano). Significant effects of dietary medicinal plants mixture on performance and carcass quality were observed ($P < 0.05$). The highest feed intake (163.53 g) was recorded for group 2, while the highest daily weight gain (166.53 g), best feed conversion ratio (FCR: 1.91), highest carcass yield (70.76% of body weight), lowest abdominal fat (2.34%) and lowest gastrointestinal weight (6.34%) were recorded for group 3, in comparison with other experimental groups. In conclusion, dietary supplementation of 2% from this combination of medicinal plants (1% Oregano, 0.5% Ziziphora and 0.5% Peppermint) caused performance and carcass quality improvement via more weight gain increase in carcass yield and then decreases abdominal fat deposition.

Key words: Dietary supplementation, medicinal plants, carcass characterization, broiler chickens.

INTRODUCTION

Because of utilization of antibiotics and chemical additives, dietary supplementation of medicinal plants as antibiotic replacement is a new approach in modern poultry farming. Because of side effects and hazardous effects of antibiotics and chemical compounds for poultry health and its residues in meat can make danger for human health, consumers prefers organic meat without

chemical or antibiotic residues (Aritajat et al., 2008). Herbal products with attention to their availability, application are used as side effect-less antibacterial and antioxidant supplements many years ago (Khaligh et al., 2011). Jamroz et al. (2005) started more weight gain in broilers fed plant extracts, in comparison with control group. Researchers had suggested that the positive effects of medicinal plants are related to their bioactive compound such as caracrol that cause appetite, secretion of gastrointestinal fluids and helps to digestion and absorption and subsequent weight gain in broiler (Javed et al., 2006; Khaligh et al., 2011). Javed et al.

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(2006) with supplementation of mixture of medicinal plant extracts reported feed efficiency via optimizing feed conversion ratio. Engber et al. (1996) had found that supplementation of plants essential oils did not have significant effect on weight gain for broiler when it compared with amino acid supplementations. They had stated that protein or amino acid concentrations in diets had major role in weight gain where essential oils had minor effect. Lavinia et al. (2009) stated that supplementation of essential oils from medicinal plants caused improving immune-defense in poultry. Demir et al. (2008) showed that three herbal powder (mint, sage and thyme) additions did not have significant effect on performance and relative weights of pancreas, spleen, liver and heart in broiler chickens.

Ocak et al. (2008) with supplementation of peppermint and thyme had reported that from 7 days to 35 days of age, the body weight gain was higher in broilers fed the peppermint-supplemented diet compared to the control, but the effect of peppermint on body weight gain disappeared at 42 days of age. Feed intake, feed to gain ratio, carcass weight, carcass yield, and the relative weights of the edible inner organs and whole gut, and the relative length of the whole gut were not significantly affected by peppermint and thyme contents. Currently, Rahimi et al. (2011) and Khaligh et al. (2011) had shown efficiency of medicinal plant mixture and herbal extracts in improving performance and immune system of broiler chickens. The aim of this study was to investigate the effects of the dietary supplementation of medicinal plants mixture: Ziziphora (*Thymus vulgaris*), Oregano (*Oreganum vulgare*) and Peppermint (Lamiaceae *Mentha piperita*), on performance (feed intake, weight gain and FCR) and carcass characterization of broiler chickens.

MATERIALS AND METHODS

In present study, 240 day old broiler chicks (Ross-308) were divided into 4 treatment and 3 replicate in each one, and reared for 42 days. Experimental groups were as group 1 or control (fed basal diet, without medicinal plant supplementation), group 2 (fed 1% Ziziphora, 0.5% Oregano and 0.5% Peppermint), group 3 (fed 1% Oregano, 0.5 Ziziphora and 0.5% Peppermint) and group 4 (fed 1% Peppermint, 0.5% Ziziphora and 0.5% Oregano). The basal diet for all of groups was formulated according to NRC-1994 recommendations, based on corn and soybean meal for 1 to 21 days of age and 22 to 42 days of age. Performed research design was based on completely randomized design (CRD) (Table 1). At day-21 and day-42 (end of rearing period), feed intake, body weight and FCR were determined for all of experimental groups. At day-42, two chicks from each replicate were slaughtered and carcass characterization, including carcass yield, gastrointestinal tract (without gizzard), gizzard, breast, thighs and abdominal fat deposits were determined as percent of chilled carcass weight.

Statistical analysis

Statistical analyses were performed by Sas ver.9.1 software. Duncan multiple tests was done for detection of significant

difference between experimental groups, $P < 0.05$.

RESULTS

Obtained from control and medicinal plant supplemented groups were presented as Tables 2 and 3. Different letters in each column shows significant different ($P < 0.05$).

Medicinal plant mixture caused differences between performance of experimental groups ($P < 0.05$) (Table 3). Effects of dietary medicinal plant supplementation on carcass yield and characterization in 42 day old broiler chickens. Ziziphora supplementation may inhibit of feed consumption; lower feed intake (147.6 g) was recorded for group 4. In other groups regardless to minor increases in feed intake, in statistical term did not have any considerable difference for feed consumption of groups. Increased feed consumption caused more weight gain (84.90 g) for group 3, when compared with other groups. Also, group 3 had best feed conversion ratio (FCR: 1.91) when it compared with control group (Table 2).

Experimental groups had significant differences for some carcass characterization ($P < 0.05$). Highest carcass yield (70.76%), lowest abdominal fat deposition (2.34%) and lowest gastrointestinal weight (6.34%) were observed in group 3. there was no significant difference for other carcass traits and increases in breast and liver percentages were not significant.

DISCUSSION

Al-Kassie (2010) reported that the chicks fed with 0.50% peppermint performed better than those fed with 1.5% peppermint, with regards to weekly body weight gain, feed conversion ratio and dressing percent, whereas the liver weight showed significant difference between treatments when compared with the control. Ocak et al. (2008) could not observe any considerable effect of dietary peppermint supplementation on performance (feed consumption, weight gain or feed conversion ratio), but supplemented peppermint and thyme caused lower abdominal fat pad when compared with non-supplemented diet. In another study with mint supplementation performance improvement was reported.

In Al-Ankari et al. (2004) diet including 150 g/kg habek mint make a significant improvement in the mean body weight, daily average gain, and feed intake and food conversion ratio. Ghalyanchi et al. (2008) had reported that supplementation of Ziziphora had not any significant effect on broiler performance (feed intake, weight gain or FCR). Our finding for group 3 (high ziziphora content) is in agreement with that of Ghalyanchi et al. (2008), which shows that no performance improvement was observed in this treatment. Roofchae et al. (2011) had reported

Table 1. Ration ingredients and nutrients for broiler chickens (%).

| Feed ingredients (%) | Rearing period | | | |
|---|----------------|--------------|---------|--------------|
| | Starter | | Grow | |
| | Control | Supplemented | Control | Supplemented |
| Corn | 58.76 | 55.71 | 54.20 | 51.14 |
| Wheat | 0 | 0 | 15 | 15 |
| Soybean oil | 32.67 | 32.92 | 23.82 | 24.07 |
| Fish meal | 3 | 3 | 3 | 3 |
| Medicinal plants | 0 | 2 | 0 | 2 |
| Vegetable oil | 2.45 | 3.3 | 1.17 | 2.02 |
| Bone meal | 1.60 | 1.58 | 1.58 | 1.49 |
| Oyster shell | 0.65 | 0.62 | 0.5 | 0.48 |
| Salt | 0.25 | 0.22 | 0.23 | 0.22 |
| Mineral supplement | 0.25 | 0.25 | 0.25 | 0.25 |
| Vitamin supplement ¹ | 0.25 | 0.25 | 0.25 | 0.25 |
| Mineral supplement | 0.25 | 0.25 | 0.25 | 0.25 |
| Methionine | 0.15 | 0.15 | 0.07 | 0.07 |
| Estimated nutrients concentrations in ration | | | | |
| Metabolizable energy (Kcal/kg) | 3000 | 3000 | 3000 | 3000 |
| Crude protein (CP) % | 21.56 | 21.56 | 18.75 | 18.75 |
| Calcium (%) | 0.94 | 0.94 | 0.84 | 0.84 |
| Available phosphorus % | 0.42 | 0.42 | 0.38 | 0.38 |
| Sodium (%) | 0.14 | 0.14 | 0.14 | 0.14 |
| Linoleic acid (%) | 1.43 | 1.36 | 1.29 | 1.23 |
| Crude fiber | 3.71 | 4.36 | 3.32 | 3.97 |
| Lysine (%) | 1.25 | 1.25 | 1.02 | 1.02 |
| Methionone (%) | 0.39 | 0.39 | 0.34 | 0.34 |
| Met + Cys (%) | 0.68 | 0.68 | 0.87 | 0.87 |
| Tryptophan (%) | 0.25 | 0.24 | 0.29 | 0.28 |

¹Vit. A: 22500 IU, Vit. D₃: 5000 IU, Vit. E: 45 IU, Vit.K: 5 mg, Vit.B₁: 4.3 mg, Vit.B₂: 16.5 mg, Vit.B₁₂: 0.04 mg, pantotenoic acid: 24.5 g, folic acid: 2.5 mg, niacin: 74 mg, pyridoxine: 7.3 mg, biotin: 0.04 mg, for per kg of diet.

Table 2. Effects of dietary medicinal plant supplementation on performance of broiler chickens.

| Treatment | Feed consumption (g) | Weight gain (g) | FCR |
|-----------|----------------------|---------------------|--------------------|
| 1 | 160.19 ^a | 73.7 ^b | 2.17 ^a |
| 2 | 166.53 ^a | 80.22 ^{ab} | 2.08 ^a |
| 3 | 161.8 ^a | 84.90 ^a | 1.91 ^b |
| 4 | 147.6 ^b | 76.01 ^b | 1.94 ^{ab} |
| SEM | 2.68 | 1.59 | 0.045 |

Different letters in each column shows significant different (P<0.05).

that supplementation of 600 and 1200 mg/kg of oregano essential oil significantly improved feed conversion ratio compared with the control group in grower and overall experimental period. Also, Radwan et al. (2008) had show efficiency of oregano supplementation in medicinal plant mixture (1.0% oregano, rosemary or 0.5% curcuma

longa) for laying hens performance improvement via suitable reductive performance, fertility and hatchability. Our observation about performance and carcass quality improvement for group 3 (higher oregano content) is in agreement with Roofchae et al. (2011) and Radwan et al. (2008) reports. With attention to efficiency of medicinal

Table 3. Effects of dietary medicinal plant supplementation on carcass yield and characterization of broiler chickens, presented as percent of chilled carcass weight.

| Trait (%) | Treatment | | | | SEM |
|------------------------|---------------------|---------------------|--------------------|--------------------|------|
| | 1 | 2 | 3 | 4 | |
| Carcass yield | 69.14 ^{ab} | 69.34 ^{ab} | 70.76 ^a | 68.02 ^a | 0.55 |
| Abdominal fat | 3.52 ^a | 2.91 ^{ab} | 2.34 ^b | 3.12 ^a | 0.22 |
| Gastrointestinal tract | 6.75 ^{bc} | 8.80 ^a | 6.34 ^c | 7.92 ^{ab} | 0.43 |
| Gizzard | 2.9 | 2.92 | 2.53 | 2.98 | 0.15 |
| Breast | 32.12 | 31.43 | 33.48 | 31.59 | 0.68 |
| Tights | 28.78 | 27.67 | 26.7 | 27.62 | 0.76 |
| Liver | 2.88 | 3.24 | 2.59 | 3.19 | 0.22 |

Different letters in each column shows significant different (P<0.05).

plants mixtures (Khaligh et al., 2011; Rahimi et al., 2011) in broiler performance improvement as new approach in medicinal plant use in animal nutrition.

Conclusion

It was concluded that dietary supplementation of 1% Oregano, 0.5 Ziziphora and 0.5% Peppermint as a suggested medicinal mixture could improve broiler performance and carcass quality via more weight gain, increase carcass yield and decrease abdominal fat deposition. A complete research with biochemical assays of nutrients composition of this herbal mixture is needed to help formulating medicinal plants included diets for poultry and may be a useful method to production of organic broilers.

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