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Kavita Meena

Department of Animal
Nutrition, Post Graduate
Institute of Veterinary
Education and Research,
RAJUVAS, Bikaner, Rajasthan,
India

Manju

Department of Animal
Nutrition, Post Graduate
Institute of Veterinary
Education and Research,
RAJUVAS, Bikaner, Rajasthan,
India

Sheela Choudhary

Department of Animal
Nutrition, Post Graduate
Institute of Veterinary
Education and Research,
RAJUVAS, Bikaner, Rajasthan,
India

Monika Karnani

Department of Animal
Nutrition, Post Graduate
Institute of Veterinary
Education and Research,
RAJUVAS, Bikaner, Rajasthan,
India

Vijay Prakash Saini

Department of Animal
Nutrition, Post Graduate
Institute of Veterinary
Education and Research,
RAJUVAS, Bikaner, Rajasthan,
India

Dharmendra Chharang

Department of Animal
Nutrition, Post Graduate
Institute of Veterinary
Education and Research,
RAJUVAS, Bikaner, Rajasthan,
India

Corresponding Author:

Kavita Meena

Department of Animal
Nutrition, Post Graduate
Institute of Veterinary
Education and Research,
RAJUVAS, Bikaner, Rajasthan,
India

Effect of ajwain, coriander, cumin and fennel seeds powder on carcass characteristics of broiler chickens

Kavita Meena, Manju, Sheela Choudhary, Monika Karnani, Vijay Prakash Saini and Dharmendra Chharang

Abstract

The current study was carried out on broiler chickens to examine the impact of adding powdered ajwain, coriander, cumin and fennel seeds to the diet (spices and herbs). The treatment groups are made up of the control group T₁, which was fed only the basic food, group T₂, which fed 1% Ajwain seed powder as a supplement, group T₃, which fed 1% Coriander seed powder, group T₄, which fed 1% Cumin seed powder, and group T₅, which fed 1% Fennel seed powder as well as the basic feed. Broilers are reared for 35 days. After 35 days one bird per replicate is sacrificed to see the effect on carcass parameters. For examination of blood and serum parameters blood sample is collected on the day 21st and 35th of the trial. The supplementation of herbs and spices showed significantly ($p < 0.05$) higher effect on gizzard weight and no significant effect on dressed weight, eviscerated weight, heart, liver, giblet, spleen, drumstick, intestine length, pH and water holding capacity (WHC) have been observed.

Keywords: Broilers, carcass, giblets, pH, WHC

1. Introduction

In India today, poultry is one of the agricultural sectors with the fastest growth and the best fraternity. More than 80% of India's total poultry is produced by commercially organized farms. Among the broiler market, around 65-70 percent is gained from Cobb breed. The broilers in India are usually reared for 35-40 days of age to a market weight of 1.8 to 2.2 kg. The average daily protein consumption of people in developing nations falls below recommended levels. To close this gap, poultry production is playing a significant role in comparison to countries like Brazil, the United States, South Africa, Canada, China, and Indonesia, where per capita consumption of grill meat is 45 kg, 43 kg, 34 kg, and 31 kg, respectively, India consumes a very little amount of the meat just 3.35 kg annually per person. Including minerals such as iron, selenium, zinc, and B complex vitamins, poultry flesh is a good source of protein, vitamins and minerals. Additionally, it is a key source of vitamin B₁₂. India rank is 6th in chicken meat production in the world with 2.76 million ton (FAO 2014). The development of the poultry industry in India can be associated with a variety of factors, including rising earnings, a fast-growing middle class, and the emergence of vertically integrated poultry producers that have lowered consumer prices by reducing production and marketing cost.

2. Materials and Methods

2.1 Experimental birds

200 day old van Cobb unsexed healthy chicks were procured from local hatchery. All of the chicks were weighed at random and placed into a total of five experimental groups, each with 40 birds and four replicates (each with 10 birds), for a total of five groups.

The study was conducted at the Livestock Farm Complex, Post Graduate Institute of Veterinary Education and Research (PGIVER), Jamdoli, Jaipur, Rajasthan, India. The experimental research was carried out in the winter months of November and December 2020 for a period of 35 days. Vaccination of New Castle / Ranikhet disease (V.H strain) and infectious bursal disease were accomplished on the seventh and fourteenth days after the chicks were procured for the experiment, respectively. The bedding was made of dried sawdust. For the duration of the experiment, each group received identical routine management procedures for feeding, watering, illness prevention, etc.

2.2 Experimental feeds

According to the BIS (2007) [6], commercial suppliers were used to obtain the ISO-certified basal diet in the form of chick starter and finisher. Ajwain, Coriander, Cumin, and Fennel seeds were purchased in the necessary amounts from the market.

2.3 Carcass parameters

One bird from each replication that had a body weight similar to the average for the group was chosen aftermost the trial to estimate the carcass findings. Prior to sacrifice, the selected birds were given a 12-hour fast to allow the gut contents to empty. According to protocol, the occipito-atlantal joint of the broilers was severed, and the broilers were then allowed to bleed out totally (Panda, 1995) [15]. After being scorched, The birds were mechanically de-feathered, and the carcasses have been dissected to assess various carcass findings.

2.4 Carcass yield / Dressed weight

$$\text{Dressed weight (\%)} = \frac{\text{Live weight - Wt. of feather, shank, head and blood}}{\text{Live weight}} \times 100$$

2.5 Eviscerated weight

$$\text{Eviscerated weight (\%)} = \frac{\text{Dressed weight - weight of viscera except giblet}}{\text{Live weight}} \times 100$$

Weight of chicken giblets and internal organs

$$\text{Giblet weight (\%)} = \text{weight of heart} + \text{weight of Gizzard} + \text{weight of Liver}$$

After all attachments were taken out, the weight of the chicken giblets (gizzard, heart, and liver) was taken into account using an electronic balance.

2.6 Intestine length

With the aid of a measuring tape, the length of the intestine was measured from the pyloric end of the proventriculus to the cloaca after washing it with an ordinary saline solution.

2.7 pH of meat

Fresh meat's pH is thought to be a good measure of how well animals were handled and how stressed they were before slaughter. The pH of the meat was measured by Trout *et al.* (1992) using a digital pH meter with a combined glass electrode. The pH meter was calibrated with standard buffer solutions of pH 4, 7, and 10. About 10 g of meat sample were used for the pH measurement after being homogenized in 50 ml of distilled water for 1 minute. The reading was taken at 25 °C after the electrode was stabilized.

2.8 Water holding capacity of meat

The ability of meat to retain water when exposed to external forces like cutting, rinding, pressing, boiling, etc. is referred to as water holding capacity.

Procedure - A portion of meat (0.5 g) was placed between the centers of two Whatman filter sheets No. 1 after being weighted. Glass plates or polyethylene sheets were kept below and above the filter papers holding the sample. After that, we put pressure on it for five minutes by leaving weights weighing 18.5 kg on it. The weight of the meat flakes was

measured after it was removed. The weight was again taken when the filter sheets had dried at room temperature.

3. Statistical analysis

In order to detect any significant differences between treatment groups, Snedecor and Cochran's (2004) [18] one-way analysis of variance was used to statistically analyze the experimental data using SPSS Ver. 24.0. The Duncan's Multiple Range Test was used to compare mean values (Duncan, 1955) [10]. The findings were analyzed and presented as means \pm pooled SEM.

4. Result and Discussion

Antibiotic Growth Promoters (AGP) must be used less frequently and substitutes for AGP in chicken feed as a result of the European Union's restriction on their usage. Since consumers have embraced botanical products as non-antibiotic compounds, also referred to as phytogenic feed additives, they have attracted more attention recently (Toghyani *et al.*, 2015) [19].

4.1 Dressed and eviscerated weight

The effects of adding herbs and spices seeds powder (Ajwain, Coriander, Cumin, and Fennel) to the treatment groups on dressed weight and eviscerated weight did not significantly differ the treatment groups, according to statistical analysis of the data. and presented in Table 1. The maximum dressed weight was observed in T₃ group followed by T₂, T₅, T₄ and T₁ groups. The maximum eviscerated weight was observed in T₃ and the minimum eviscerated weight was recorded for T₁ i.e. control group.

The results are well corroborated with the findings of Amouzmehr *et al.* (2012) [4] who reported that Dietary treatments (thyme and garlic extract) did not induce any significant effect on the carcass yield (%). Moreover Kheiri *et al.* (2018) [4] and Deepthi *et al.* (2020) [8] reported inclusion of ajwain powder in the diet had no effect ($p > 0.05$) on carcass characteristics in quails. Rashid *et al.* (2014) [16] reported that Dietary (CSM) coriander seed meal did not modify the dress yield. Berrama *et al.* (2017) [5] observed that supplementing diet with 0.2% of cumin did not significantly ($p > 0.05$) affect weights of carcass. Abdel-Azeem (2006) [1] reported that supplementation of natural feed additive (fenugreek and Fennel) into broiler diets did not affect the relative weights of liver and heart. Abdullah and Rabia (2009) [2] reported that addition of 1, 2 and 3 g/kg fennel seeds to the broiler diets resulted in no significant differences in dressing percentage. On the other hand; Denli *et al.* (2004) [9] found significant effect of essential oil of thyme and black seed on carcass yield and carcass weight. Zhang *et al.* (2009) [21] and Javed *et al.* (2009) [13] also observed that dressing percentage increased significantly when certain spices were added to the ration.

4.2 Giblet and offals weight

The statistical review of the data found no evidence of a substantial impact from adding herbs and spices (Ajwain, Coriander, Cumin and Fennel) to the diet, on heart, liver and giblet except gizzard which showed highly significant ($p < 0.01$) effect of herbs and spices in the diet of broilers and is presented in Table 2.

The highest gizzard weight (g) was recorded in T₅ group which was non-comparable with other treatment groups except T₂ group which was not significantly differed from T₅ group. There were no significant difference among T₁, T₃ and T₄ groups. The weights of the heart, liver, and giblet did not

change considerably after adding herbs and spices to the diet. This result is in conformity with the findings of Deepthi *et al.* (2020) [8] who reported that incorporation of ajwain powder up to 1.0% level in the diet had no effect ($p>0.05$) on percent weight of heart, liver and giblets in quails which was also in agreement with the findings of earlier researchers (Habibi *et al.*, 2016; Falaki *et al.*, 2016; Samadian *et al.*, 2017; Chowdhury *et al.*, 2018; Kheiri *et al.* 2018) [12, 4, 11, 17, 7]. Berrama *et al.* (2017) [5] reported that supplementing diet with 0.2% of cumin did not significantly ($p>0.05$) affect weights of gizzard, liver and heart. Abdullah and Rabia (2009) [2] reported that addition of 1, 2 and 3 g/kg fennel seeds to the broiler diets resulted in no significant differences in heart, liver and gizzard.

4.3 Internal organs

The statistical analysis of data showed no significant effect ($p>0.05$) of supplementation of herbs and spices (Ajwain, Coriander, Cumin and Fennel) on intestine length and is presented in Table 3. Numerically higher value was observed in T₃ group and lower in control group.

The statistical analysis of data showed no significant effect ($p>0.05$) of supplementation of herbs and spices (Ajwain, Coriander, Cumin and Fennel) on spleen and drumstick weights in broiler chickens.

4.4 Meat quality evaluation

The pH of the meat and its ability to hold water were the same across all treatment groups, no significant difference was observed in all the treatment groups.

5. Conclusion

At the end of the experiment, on the basis of the performance of broilers subjected to feeding of 1 per cent Ajwain, Coriander, Cumin and Fennel seeds powder along with basal diet in respect to carcass characteristic's gizzard weight is highly significant ($p<0.01$) dressed and eviscerated weight, heart, liver giblet intestine length and water holding capacity is non significantly increases in comparison to control group.

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Table 1: Mean values of carcass traits (per cent) in different treatment groups

Group	Dressed weight	Eviscerated weight
T ₁	76.24±0.490	68.21±1.050
T ₂	76.51±0.748	69.36±1.202
T ₃	77.36±0.743	70.92±1.040
T ₄	76.35±0.336	69.71±0.439
T ₅	76.45±0.490	69.85±0.803

Table 2: Mean values of offal's weight (g) in different treatment groups

Group	Heart	Liver	Gizzard	Giblet
T ₁	9.77±0.378	36.88±0.956	24.15 ^a ±0.720	70.65±0.450
T ₂	10.61±0.415	33.08±2.273	29.60 ^{bc} ±1.055	73.11±1.895
T ₃	9.68±0.454	40.52±1.515	25.81 ^{ab} ±0.410	75.98±1.622
T ₄	9.34±0.474	36.51±2.362	21.93 ^a ±1.031	67.12±2.744
T ₅	9.52±0.388	36.62±2.042	31.32 ^c ±3.425	72.42±3.329

Within a column, the mean with various superscripts differs significantly.

Table 3: Mean values of spleen weight (g), drumstick weight (g) and intestine length (cm)

Group	Spleen	Drumstick	Intestine length
T ₁	1.98±0.136	182.25±2.773	189.75±1.103
T ₂	2.06±0.282	187.38±7.570	192.50±3.227
T ₃	1.73±0.193	189.75±14.465	198.00±6.620
T ₄	1.92±0.082	176.50±8.065	191.75±1.181
T ₅	1.84±0.179	183.50±11.717	193.00±3.785

Table 4: Mean values of meat pH and water holding capacity (per cent)

Group	pH	Water holding capacity
T ₁	6.15±0.03	62.25±0.750
T ₂	6.12±0.09	63.00±1.291
T ₃	6.15±0.03	63.75±1.031
T ₄	6.20±0.04	65.25±1.377
T ₅	6.18±0.03	62.50±0.645

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