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Effect of feeding Azolla leaf powder (*Azolla pinnata*) on the carcass traits and haemato-biochemical parameters of Kadaknath Chicken (*Gallus domesticus*)

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Abstract

The study was conducted to investigate the “Effect of feeding Azolla Leaf Powder (*Azolla pinnata*) on the performance of Kadaknath chicken (*Gallus domesticus*).” One hundred fifty Kadaknath chicks (four weeks old) were used in a completely randomized design in 5 treatments with 3 replications, each consisting of 10 chicks. The treatments were T₁: control, T₂: control group supplemented with Azolla leaf powder @ 2.5%, T₃: control group supplemented with Azolla leaf powder @ 5%, T₄: control group supplemented with Azolla leaf powder @ 7.5% and T₅: control group supplemented with Azolla leaf powder @ 10%. Dressed weight, eviscerated weight and dressing weight percentage was significantly highest in group of birds fed diets containing 5% Azolla leaf powder as compared to rest of the treatment groups. Non-significant effect was found in percent thigh, drumstick, liver, gizzard and heart among different treatment groups. Supplementation of Azolla leaf powder at 5% level significantly increases the Hb (%), PCV (%) and TLC (%).

Keywords: Azolla leaf powder, Kadaknath, dressed weight, eviscerated weight

Introduction

India has largest livestock population in the world. The poultry sector majorly maintain the requirements of protein and nutrition. The poultry industry in India has endured an exemplary transformation in structure and operation during the last two decades and modified into a mega-industry with the presence of a huge number of workers from a mere backward poultry farming that appears to be very fast. The poultry sector in Rajasthan has undergone a paradigm shift in structure and operation which has been its transformation from a were backyard activity into a major commercial Agri-based industry over a period of four decades. The constant efforts in up gradation, modification and application of new technologies paved the way for the Multifood and multifaceted growth in poultry and allied sectors. Three varieties of the Kadaknath breed have been identified based primarily on plumage colour jet black, penciled and golden. Consumers prefer Kadaknath meat due to its desirable flavour and lean meat (0.11 to 0.52% abdominal fat) as compared to broiler meat (1.74 to 1.85% abdominal fat). Increased demand for healthier meat among consumers has led to the rearing of Kadaknath birds in intensive and semi-intensive systems around the major cities in India (Haunshi *et al.* 2021) [5]. Kadaknath chicken meat is famous for its taste and claimed aphrodisiac and medicinal properties. Kadaknath meat is high in protein and also contains 18 kinds of essential amino acids and vitamins B-1, B-2, B-6, B-12, C and E.

Materials and Methods

Preparation of Azolla meal: The Poultry Farm, Department of Animal Production, Rajasthan College of Agriculture, MPUAT, Udaipur provided the Azolla culture. The water in the tank was covered with a fresh Azolla culture, which was harvested and collected after maturation. A brine solution was used to wash and dry the harvested Azolla. Before adding it to the feed, the dried Azolla was ground with a grinder to a consistent size.

Experimental bird details: The experiment was conducted at Poultry Farm, Department of Animal Production, Rajasthan College of Agriculture, MPUAT Udaipur, located in arid region at latitude 24.57 North and Longitude of 73.70 East with 598 meters height from the mean sea level.

This research work was carried out with 150 Kadaknath chicks of four weeks of age procured from the Poultry Farm, Department of Animal Production, Rajasthan College of Agriculture, Udaipur. The chicks were wing banded and distributed randomly in five treatment groups, consisting of 30 chicks in each treatment group with three replications of 10 birds each.

Statistical analysis

The experiment was carried out using a completely randomized design (CRD), and Snedecor and Cochran's (1994) [14] analysis of variance was used to examine the data pertaining to various parameters that were gathered during the current study

Results and Discussion

Carcass characteristics

The information on the carcass characteristics of the Kadaknath Chicken in the various treatment groups is presented in Table 1.

The data revealed that live, dressed, eviscerated and dressing weight different treatments was significantly different whereas percent thigh, drumstick, liver, gizzard and heart percent was statistically non-significant.

The mean live weight was 1010.69±7.63, 1038.39±4.73, 1149.24±3.70, 1095.78±5.95 and 1075.95±12.15 g per bird in T₁, T₂, T₃, T₄ and T₅, respectively. The live weight was significantly highest in T₃ followed by T₄, T₅; T₂ and significantly lowest in control (T₁). The difference between T₄ and T₅ was found non-significant. The mean dressed weight was 723.05±7.19, 761.85±1.16, 889.38±1.05, 833.73±1.11 and 805.94±1.18 g in T₁, T₂, T₃, T₄ and T₅, respectively. The dressed weight was significantly highest in T₃ (889.38±1.05) and significantly lowest in control (723.05±7.19), however, the difference between T₄, T₅; T₂, T₅; T₁ and T₂ was found non-significant. The mean eviscerated weight was 556.95±1.14, 582.62±1.27, 669.20±1.27, 625.94±1.13 and 599.34±1.10 g in T₁, T₂, T₃, T₄ and T₅, respectively. The eviscerated weight showed similar trend being highest in T₃ and lowest eviscerated weight was found in T₁ as compared to rest of the treatment groups except T₂. The difference between

T₄, T₅; T₂, T₅ as well as between T₁ and T₂ was found non-significant. The dressing weight (%) was 71.54±1.22, 73.37±0.53, 77.71±0.80, 76.12±0.07 and 74.88±1.04 in T₁, T₂, T₃, T₄ and T₅, respectively. The dressing weight (%) was significantly highest in T₃ as compared to rest of treatment groups except T₄. Significantly lowest value was found in T₁ as compared to rest of treatment groups except T₂. The difference between T₃, T₄; T₄, T₅; T₂, T₅ and T₁, T₂ was non-significant. As percent of slaughter weight, the thigh weight ranged from 14.18±1.10 to 15.77±1.08, drumstick weight ranged from 15.22±1.24 to 16.09±1.21, liver weight ranged from 2.14±0.05 to 2.63±0.06, gizzard weight ranged from 3.09±0.58 to 3.65±0.51 and heart weight ranged from 1.19±0.05 to 1.65±0.06 among different treatment groups. The difference in percent of thigh weight, drumstick weight, liver weight, gizzard weight and heart weight in different treatments were small and non-significant.

The result obtained in present study fall in line with the findings of Naghshi *et al.* (2014) [18] reported that supplementation of 5% Azolla powder in diet, it increased carcass efficiency percentage, whereas there were no significant differences among treatments for liver and gizzard which corroborated the data of present study. Bhattacharya *et al.* (2018) [33], reported that supplementation of Azolla meal at 4.50% in broiler diet resulted in significantly higher desired percentage while there was no significant difference among treatment in the other carcass traits. Further, Mishra *et al.* (2016) [16] found no difference in carcass quality parameters (dressing percentage and ready to cook yield) and cut-up parts (thigh, drumstick, neck and back) except liver weight percent and wings. Lakshmi *et al.* (2019) [15] and Varadharajan *et al.* (2019) [38] reported that giblet percent was higher in 3% Azolla meal fed group as compared to control and 6% Azolla fed group. Thavasi *et al.* (2020) [37] reported that birds fed 0, 3, 6, 9 and 12% Azolla meal in diet had 64.11, 66.14, 69.07, 67.12 and 68.62 average dressing percentage and numerically higher dressing percent was recorded in 6% level followed by 9% level of Azolla meal, which shows the positive and beneficial effects of herbals like Azolla meal feeding on dressing percentage.

Table 1: Effect of feeding Azolla leaf powder on carcass traits of Kadaknath chicken

Parameters	T ₁	T ₂	T ₃	T ₄	T ₅	SEM±	CD at 5%
Live weight (g)	1010.69 ^d ±7.63	1038.39 ^c ±4.73	1149.24 ^a ±3.70	1095.78 ^b ±5.95	1075.95 ^b ±12.15	6.47	20.40
Dressed weight (g)	723.05 ^d ±7.19	761.85 ^{cd} ±1.16	889.38 ^a ±1.05	833.73 ^b ±1.11	805.94 ^{bc} ±1.18	5.72	45.70
Eviscerated weight (g)	556.95 ^d ±1.14	582.62 ^{cd} ±1.27	669.20 ^a ±1.27	625.94 ^b ±1.13	599.34 ^{bc} ±1.10	3.26	35.92
Dressing weight (%)	71.54 ^d ±1.22	73.37 ^{cd} ±0.53	77.71 ^a ±0.80	76.12 ^{ab} ±0.07	74.88 ^{bc} ±1.04	0.67	2.12
Organ weight as percent of slaughter weight							
Thigh weight	14.18±1.10	14.77±1.28	15.77±1.086	14.83±1.069	14.44±1.10	1.03	NS
Drumstick weight	15.22±1.24	15.38±1.12	16.09±1.21	15.55±1.21	15.51±1.21	1.19	NS
Liver weight	2.14±0.05	2.32±0.07	2.63±0.06	2.55±0.06	2.27±0.11	0.06	NS
Gizzard weight	3.09±0.58	3.36±0.43	3.65±0.51	3.42±0.51	3.26±0.48	0.48	NS
Heart weight	1.26±0.06	1.36±0.06	1.65±0.06	1.35±0.11	1.19±0.05	0.06	NS

Means with the same superscript in a particular row do not differ significantly ($p < 0.05$) from each other.

Haemato-biochemical parameters of

The data revealed that all the haemato-biochemical parameters of Kadaknath chicken in different treatment differ statistically except monophil (%), heterophils (%), eosinophil (%), heterophils and lymphocyte ratio (H:L ratio). The percent haemoglobin (Hb) was 11.80±0.26, 12.80±0.10, 13.77±0.72, 12.11±0.45 and 12.12±0.12 in T₁, T₂, T₃, T₄ and T₅, respectively. The haemoglobin (%) was significantly highest in T₃ as compared to rest of the treatment groups

except T₂. Lowest lymphocyte (%) found in T₁, T₄, T₅ as compared to rest of the treatment groups except T₂. The difference between T₂ and T₅ as well as between T₁, T₂, T₄ and T₅ was statistically non-significant. The packed cell volume (PCV) was 39.13±2.98, 40.23±1.39, 43.20±3.82, 37.40±2.51 and 33.33±1.27 percent T₁, T₂, T₃, T₄ and T₅, respectively. The packed cell volume (PCV) was significantly lowest in T₅ as compared to rest of treatment groups except T₄ and highest in T₁, T₂, T₃ as compared to rest of treatment

groups except T₄. The difference between T₁, T₂, T₃ and T₄ as well as between T₄ and T₅ was non-significant. The total leucocyte count (n/μl) was 58.58±1.97, 60.67±1.24, 66.82±0.46, 61.58±1.02 and 59.52±0.45 in T₁, T₂, T₃, T₄ and T₅, respectively. The total leucocyte count (TLC) was significantly highest in T₃ as compared to rest of treatment groups and lowest in T₁, T₂, T₄, T₅. The difference between T₁, T₂, T₄ and T₅ was found non-significant. The total erythrocyte count (n/μl) was 0.93±0.08, 1.17±0.09, 1.393±0.12, 1.12±0.06 and 0.97±0.09 in T₁, T₂, T₃, T₄ and T₅, respectively. The total erythrocyte count (TEC) was significantly highest in T₃ as compared to rest of treatment groups except T₂, T₄ and lowest in T₁, T₅ as compared to rest of treatment groups except T₂ and T₄. The difference between T₂, T₃ and T₄ as well as between T₁, T₂, T₄ and T₅ was found non-significant. The percent monophils ranged from 2.000±0.57 to 5.667±1.33, heterophils ranged from 15.67±2.18 to 18.67±1.20, eosinophils ranged from 1.67±0.33 to 2.33±0.33 and H:L ratio ranged from 0.197±0.07 to 0.250±0.02 among different treatment groups. The difference in percent monophils,

heterophils, eosinophil, heterophil and lymphocyte ratio (H:L ratio) did not differ significantly among different treatments.

The results of present study are in close agreement with the findings of Kamel and Hamad (2021) who reported that dietary dried Azolla had significant improvement at different levels in some haemato-biochemical parameters compared with the control group while value of PCV revealed non-significant difference. Both Hb and TLC values increased in all groups fed with DA compared with the control group. This incremented value could be due to the fact that Azolla has high phenolic and flavonoid content. On the other hand, Mishra *et al.* (2016) [16] stated that bird fed with Azolla at 5 and 7.5% level have higher heterophils, and lymphocytes values than control ones. Thavasi *et al.* (2020) [37] mentioned that there were significant increases in the PCV and RBC for the birds provided with diet supplemented with 5% Azolla. These results are in contract with the findings of Kumar *et al.* (2018) [35] who recorded that supplementation of DA at 2.5, 5, 7.5, and 10% had no effect on the HB, heterophils level and TLC.

Table 2: Effect of feeding Azolla leaf powder on haemato-biochemical parameters of Kadaknath chicken

Parameters/Treatments	T1	T2	T3	T4	T5	S.Em±	CD at 5%
Hb (%)	11.80 ^b ±0.26	12.80 ^{ab} ±0.10	13.77 ^a ±0.72	12.11 ^b ±0.45	12.12 ^b ±0.12	0.40	1.25
PCV (%)	39.13 ^a ±2.98	40.23 ^a ±1.39	43.20 ^a ±3.82	37.40 ^{ab} ±2.51	33.33 ^b ±1.27	1.71	5.40
TLC (n/μl)	58.58 ^b ±1.97	60.67 ^b ±1.24	66.82 ^a ±0.46	61.58 ^b ±1.02	59.52 ^b ±0.45	1.08	3.40
TEC (n/μl)	0.93 ^b ±0.08	1.17 ^{ab} ±0.09	1.39 ^a ±0.12	1.12 ^{ab} ±0.06	0.97 ^b ±0.09	0.09	0.28
Monophils (%)	2.000±0.57	3.333±0.33	5.667±1.33	3.667±1.45	4.000±1.15	0.89	NS
Heterophils (%)	15.67±2.18	16.33±2.03	18.67±1.20	18.33±0.88	16.00±0.57	1.28	NS
Eosinophil (%)	1.67±0.33	2.00±0.58	2.00±0.58	2.33±0.33	2.00±0.57	0.49	NS
Basophils (%)	0.00±0.00	0.00±0.00	0.00±0.00	0.00±0.00	0.00±0.00	0.000	0.000
HL ratio	0.250±0.02	0.213±0.04	0.213±0.03	0.250±0.01	0.197±0.07	0.02	NS

Means with the same superscript in a particular row do not differ significantly ($p < 0.05$) from each other.

Conclusion

From the experiment, it was concluded that, incorporation of Azolla leaf powder at 5% level in the diet improved live weight, dressed weight, eviscerated weight and haemato-biochemical parameters which were at par with standard basal diet.

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Conflict of interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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