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Effect of Supplementation of Aloe Vera Juice on the Carcass Traits of Japanese Quails

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ABSTRACT

An experiment was carried out using 300 Namakkal strain of Japanese quails from day old to five weeks of age to study the effect of aloe vera juice supplementation at different concentrations through drinking water on growth performance. The birds were divided into four treatment groups with three replicates in each treatment and each replicate had 25 birds. The four treatment groups consisted of control group without supplementation of aloe vera juice (T0), treatment group 1 (T1) with supplementation of aloe vera juice at the rate of 1 per cent, treatment group 2 (T2) with 1.5 per cent, and treatment group 3 (T3) with 2 per cent supplementation. Standard management and feeding practices were followed on all treatment groups. The carcass traits such as dressing, eviscerated and inedible parts percentage were recorded by randomly selecting two males and two females (four quails) per replicate i.e. six males and six females (12 quails) from each treatment group and executing a slaughter study at 35 days of age. The results revealed a significantly better ($P<0.05$) carcass traits such as dressing, eviscerated and inedible parts percentage, between all aloe vera juice supplemented groups and the control group and the best carcass yield was observed in T2 group.

Key words: Aloe vera, Japanese quail, carcass traits, dressing percentage, carcass yield

INTRODUCTION

Japanese quail farming has been practiced in many parts of the world. They are a practical solution to the problem of animal protein shortage in developing countries and an alternate to chicken meat in developed countries (Shanaway, 1994). In India, commercial quail production has gained popularity in and around the urban and semi-urban areas due to consumer's demand for alternate meat and egg products. The quail meat is popular for having high protein at 23 per cent and less fat at 3 per cent (Genchev *et al.*, 2008) which is popular for its taste and tenderness. Red meat such as beef and mutton as well as white meat including broiler chicken and duck have more saturated fatty acids

and cholesterol, in comparison with quail meat (Boni *et al.,* 2010; Ionita *et al.,* 2010). Quail meat has favourable effects such as anti-inflammatory, anti-thrombic and atherosclerotic preventing properties as it has a high proportion of unsaturated fatty acid in addition to being a source of conjugated linoleic acid (Nasr *et al.,* 2017). Quail meat provides the essential fatty acids, vitamins and minerals for human body (Cavani *et al*., 2009). Quail meat has higher levels of iron per serving at 3.97mg/100g, in comparison to the iron levels per serving size of beef, pork, lamb and chicken at 2.9, 2.7, 1.4 and 1.5mg/100g, respectively (Chempkemoi *et al*., 2017). Recently, research is also being carried to replace use of antibiotics as growth promoters with natural feed additives in poultry feeds (Weber *et al.,* 2012). Among the herbs, aloe vera is a unique plant which is having great medicinal value (Ezeibekwe *et al*., 2009). The gel contained in Aloe vera leaves is composed of more than 75 biologically active ingredients (Boudreau and Beland, 2006) which have medicinal effects that are useful in treating diseases. Aloe vera has 20 of the 22 required amino acids of which seven are essential amino acids (Jyotsana *et al.,* 2008) and it also contains antimicrobial, prebiotic, immunomodulatory and antioxidant properties (Zhang and Tizard, 1996; Moghaddasi and Verma, 2011; Thivya, 2021). There is an increase in demand focusing on the improvement of both quality and quantity of meat, therefore, the shift is towards the meat that is low in fat and antibiotic free. With all the above mentioned properties in mind, the present study was carried out by supplementing aloe vera juice through drinking water as a herbal growth promoter.

MATERIALS AND METHODS

Experimental Birds and Diet

The day old chicks (DOC) of Japanese quails were procured from a reputed commercial quail farm hatchery in Puducherry, and the experiment was conducted in the Japanese quail unit of Livestock Farm Complex, Rajiv Gandhi Institute of Veterinary Education and Research (RIVER), Puducherry. A total of 300 day old quail chicks were randomly divided into four treatment groups with each treatment group consisting of 75 birds. Control group (T0) was fed with standard feed, Treatment group 1 (T1) was fed with standard feed and drinking water supplemented with 1 per cent aloe vera juice, Treatment group 2 (T2) was fed with standard feed and drinking water supplemented with 1.5 per cent aloe vera juice and Treatment group 3 (T3) was fed with standard feed and drinking water supplemented with 2 per cent aloe vera juice. Each treatment group was further divided into three replicates of 25 birds in each, i.e., Control group was divided into three replicates viz., T0R1, T0R2 and T0R3, Treatment group 1 was divided into T1R1, T1R2 and T1R3, Treatment group 2 was divided into T2R1, T2R2 and T2R3 and Treatment group 3 was divided into T3R1, T3R2 and T3R3.

The compounded feed was formulated as per the recommendation of Department of Poultry Science, Veterinary College and Research Institute (VCRI), Tamil Nadu Veterinary and Animal Sciences University (TANUVAS), Namakkal (Arunrao, 2021); mixed and procured from Feed mill of VCRI, Namakkal. The analysed nutrient composition of feed are presented in table 1.

Table 1: Nutrient composition of Japanese quail diets from 0 to 5 weeks of age (dry matter basis).

Nutrient composition	Age	
	Chick (0 to 2 weeks)	Grower (3 to 5 weeks)
Moisture (%)	**10.77**	**10.20**
ME (kcal/kg) *	**2950**	**2950**
Crude Protein (%)	**23.13**	**20.25**
Crude Fibre (%)	**4.48**	**4.74**
Ether Extract (%)	**3.30**	**3.48**
Total Ash (%)	**8.18**	**8.76**
Calcium (%)	**1.30**	**1.40**
Total Phosphorus (%)	**0.78**	**0.83**

* Calculated value

Standard feeding practice was followed for all treatment groups uniformly. During first two weeks of brooding period, feed was provided using one feed tray for each replicate, after which the birds were fed using one linear feeder per replicate. The chicks were provided measured quantity of feed on a daily basis.

The feeding regimens of chicks were as given below

a) Starter ration was given from 0 to 2 weeks of age.
b) Grower ration was given from 3 to 5 weeks of age.

Aloe Vera Supplementation

The commercially available aloe vera juice, with a content of 99.8 per cent aloe vera (which is approved by Ministry of Ayush, Government of India, for human consumption), was mixed with drinking water at the rate of 1 per cent, 1.5 per cent and 2 per cent from day one to the end of the trial on 35th day. Adlibitum quantity of drinking water supplemented with required quantity of aloe vera juice was provided throughout the study period for T1, T2 and T3, while the control group (T0) was provided with adlibitum quantity of potable drinking water.

Carcass traits

At the end of trial period, on 36th day of age, a total of twelve birds (6 male and 6 female) from each treatment group was selected randomly (i.e., 2 male and 2 female from each replicate) and slaughtered in the Department of Livestock Products Technology (LPT), RIVER and carcass yield was studied. Birds were fasted for 12 hours before slaughter. They were provided with adequate clean drinking water during fasting period and were weighed. Forty eight birds (all groups) were slaughtered as per the standard slaughter procedure and various carcass traits were recorded.

Live weight at slaughter

The live weight (g) of each bird, replicate wise in all treatment groups were recorded just before slaughter.

Dressing percentage

The dressing percentage was calculated by dividing dressed carcass weight with giblets, with the live weight and multiplied by 100.

$$\text{Dressing percentage} = \frac{\text{Dressed carcass weight with giblets}}{\text{Live weight}} \times 100$$

Eviscerated weight

Weight of carcass was taken after evisceration (removal of visceral organs, skin with feathers, shank, feet and head).

Eviscerated weight = pre-slaughter live weight – collective weight of blood, skin with feathers, head, shank, giblets, abdominal fat and intestine.

$$\text{Eviscerated yield (\%)} = \frac{\text{Eviscerated weight}}{\text{Live weight}} \times 100$$

Giblet weight

The weight of giblets (liver without gall bladder, heart without pericardium and gizzard without inner lining) was recorded.

Giblet weight = collective weight of liver, heart and gizzard.

$$\text{Giblet yield (\%)} = \frac{\text{Giblet weight}}{\text{Live weight}} \times 100$$

Inedible parts weight

Total weight of head, skin with feathers, shank, intestine, abdominal fat and lung was recorded.

Statistical Analysis

The data collected was analyzed using Analysis of Variance (ANOVA) as per Snedecor and Cochran (1994). The data was grouped according to the treatment groups (T0, T1, T2 and T3) and were subjected to least square analysis of variance using SPSS 18.0. In addition Arithmetic mean and Standard error were also calculated.

RESULTS AND DISCUSSION

The results regarding the carcass traits such as dressing, eviscerated, giblet and inedible parts percentage are as follows

Table 2: Effect of aloe vera juice supplementation on (mean±SE) carcass traits (%) of Japanese quails*

Carcass traits (%)	Treatment groups			
	T0	T1	T2	T3
Dressing percentage**	71.13± 0.31^{a}	73.93± 0.56^{b}	74.47± 0.31^{b}	73.49± 0.39^{b}
Eviscerated percentage**	65.32± 0.26^{a}	68.29± 0.58^{b}	69.31± 0.31^{b}	68.44± 0.30^{b}
Giblet percentage**	5.81±0.16^{b}	5.64±0.10^{b}	5.16±0.16^{a}	5.05±0.16^{a}
Inedible parts percentage**	28.87± 0.31^{a}	26.07± 0.56^{b}	25.53± 0.31^{b}	26.51± 0.39^{b}

*Mean of 12 values

**Means within a row with different superscripts differ significantly (P<0.05)

The mean dressing percentage of Japanese quails were 71.13±0.31, 73.93±0.56, 74.47±0.31 and 73.49±0.39 per cent for the groups T0, T1, T2 and T3, respectively. Statistical analysis of data revealed a significant (P<0.05) difference between control group and all aloe vera juice supplemented groups. However, the mean dressing percentage of all aloe vera juice supplemented groups (T1, T2 and T3) were statistically comparable. The birds belonging to 1.5 per cent aloe vera juice supplemented

group (T2) had the highest mean dressing percentage, while the birds belonging to control group (T0) had the lowest mean dressing percentage. The mean dressing percentage of 1 and 2 per cent aloe vera juice supplemented groups (T1 and T3, respectively) were intermediate.

The mean eviscerated percentage of Japanese quails were 65.32±0.26, 68.29±0.58, 69.31±0.31 and 68.44±0.30 per cent for the groups T0, T1, T2 and T3, respectively. Statistical analysis of data revealed a significant (P<0.05) difference between control group and all aloe vera juice supplemented groups. However, the mean eviscerated percentage of all aloe vera juice supplemented groups (T1, T2 and T3) were statistically comparable. The birds belonging to 1.5 per cent aloe vera juice supplemented group (T2) had the highest mean eviscerated percentage, while the birds belonging to control group (T0) had the lowest mean eviscerated percentage. The mean eviscerated percentage of 1 and 2 per cent aloe vera juice supplemented groups (T1 and T3, respectively) were intermediate.

The mean giblet percentage of Japanese quails were 5.81±0.16, 5.64±0.10, 5.16±0.16 and 5.05±0.16 per cent for the groups T0, T1, T2 and T3, respectively. Statistical analysis of data revealed a significant (P<0.05) difference between control group and aloe vera juice supplemented groups except T1 group. The birds belonging to control group (T0) had significantly (P<0.05) highest mean giblet percentage than the birds given 1.5 and 2 per cent aloe vera juice supplementation (T2 and T3, respectively). The lowest mean giblet percentage was recorded in T3 group. As the concentration of aloe vera juice supplementation increases, there is a corresponding decline in the mean giblet percentage, which may require further detailed research study.

The mean inedible parts percentage of Japanese quails were 28.87±0.31, 26.07±0.56, 25.53±0.31 and 26.51±0.39 per cent for the groups T0, T1, T2 and T3, respectively. Statistical analysis of data revealed a significant (P<0.05) difference between control group and all aloe vera juice supplemented groups. However, mean inedible parts percentage of all aloe vera juice supplemented groups were statistically comparable. The birds belonging to 1.5 per cent aloe vera juice supplemented group (T2) had the lowest mean inedible parts percentage, while the birds belonging to control group (T0) had the highest mean inedible parts percentage. The mean eviscerated percentage of 1 and 2 per cent aloe vera juice supplemented groups (T1 and T3, respectively) were intermediate.

From the above data it can be observed that the overall carcass yield was significantly higher (P<0.05) in all the treatment groups supplemented with aloe vera juice than that of the control group. The result obtained was in agreement with that of Durrani *et al.* (2008), Tariq *et al.* (2015) and Bejar (2018) who observed a significantly better carcass yield in broilers when supplemented with aloe vera (as extract or powder) through water or feed, in comparison to the carcass yield of the control group. Other researchers such as Darabighane *et al.* (2011), Singh *et al.* (2013), Oliveira *et al.* (2016), Brindha *et al.* (2017) and Islam *et al.* (2017) also observed a slightly higher carcass yield in broilers supplemented with aloe vera than the carcass yield of the control group.

The results of the present study is in disagreement with Bernard *et al.* (2016) and Jamir *et al.* (2019) who observed, both a significant increase (P<0.05) and a decrease in carcass yield of broilers supplemented with aloe vera than that of the control group. The results are also in discrepancy with Mehala and Moorthy (2008) and Shokraneh *et al.* (2016) who observed no difference in the carcass yield of broilers belonging to aloe vera supplemented groups and the control group. On supplementation of aloe vera juice to quails Habibi and Ghahtan (2020) observed a lesser carcass yield than the quails in the control group. The results are also in disagreement with the findings of Onyeji *et al.* (2021) who observed a lesser carcass yield in broilers supplemented with aloe vera juice than that of the control group.

From the above data it may be inferred that, supplementation of aloe vera juice improved all the carcass traits positively, except the giblet weight and its percentage. Among the treatment groups, higher carcass yield with less inedible parts percentage was observed in birds supplemented with 1.5 per cent aloe vera juice followed by 1 and 2 per cent aloe vera juice supplemented groups. In corroboration with the growth performance data, it can be inferred that aloe vera juice supplementation through drinking water to Japanese quails aids in better utilization of nutrients which might have helped for the improvement in carcass traits.

CONCLUSION

Japanese quails supplemented with aloe vera juice through drinking water at 1.5 per cent performed better than the other treatment groups, it may be concluded that aloe vera juice supplementation at 1.5 per cent will be beneficial in improving the overall carcass yield of Japanese quails.

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