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Dietary effects of herbal feed additive supplementation and pelleting of feed on carcass traits of broilers

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Abstract
The research work was carried out to study the effect of pelleting as well as supplementation herbal feed additives (*Aloe vera* and amla) on carcass traits of broilers. A forty-two days trial was conducted with a flock of two hundred and forty, day-old broiler chicks. Chicks were randomly assigned to eight dietary treatments with three replicates per treatment and ten birds per replicate. The eight dietary treatments were T1: basal diet with antibiotic in mash form, T2: basal diet with antibiotic in pellet form, T3: basal diet with 1% *Aloe vera* in mash form, T4: basal diet with 0.5% *Aloe vera* in pellet form, T5: basal diet with 1% aloe in pellet form, T6: basal diet with 1% amla in mash form, T7: basal diet with 0.5% amla in pellet form and T8: basal diet with 1% amla in pellet form. The results of the study revealed that dietary supplementation of amla (mash and pellet form) had significantly higher eviscerated percent, drawn percent and giblet percent in comparison to basal diet. However, *Aloe vera* supplementation had no significant effect on carcass traits of broiler. Similarly, pellet fed birds had no significant effect on carcass traits in terms of dressing percent, eviscerated percent, drawn percent and giblet percent. It can be concluded from results that supplementation of amla either in mash or pellet form had beneficial effects on the carcass traits of broiler birds.

Keywords: Broilers, amla, *Aloe vera*, carcass traits, pelleting

Introduction
Now-a-days poultry industry is one of the fastest growing segments of agriculture sector with annual growth rates of 8-10 percent. Broiler production is quite attracted by many poultry farmers due to its exponential production, higher return, higher weight gain and less space necessity. The basic objectives of modern broiler farming are faster growth, high feed conversion efficiency and liveability. Recent trend in broiler production is to offer feed containing feed additives to improve feed efficiency and obtained maximum return in shortest possible time. Earlier antibiotics were used as growth promoters but they have negative impact on animal health and its production. Ban or time bound decline in use of AGP provides good scope for other growth promoters. Recently, the emphasis is being directed towards herbal formulations. Amla (*Emblica officinalis*) belongs to family '*Euphorbiaceae*' is one of the richest sources of ascorbic acid, minerals, amino acids, tannins and phenolic compounds, emblicanin A and B, pendugluconin, superoxide dismutase, catalase, peroxidase (Bhattacharya *et al*., 2000; Rajak *et al*., 2004) [1, 9]. *Aloe vera* (*Aloe barbadensis*) known as one of the oldest herbs with therapeutic properties, antibacterial (especially Gram-positive bacteria), antiviral property due presence of an alkaloid (Aloe emodin) and antifungal activity. Feed contribution near about 60-70% of the total production cost and feed processing further adds to its cost. However, feed processing also provides an area to improve broiler performance. Therefore, there is the need for the preparation of feeds prior to the process of digestion to improve its value. Feed pelleting is an important aspect commonly used in the formulation of feed to improve feed intake and growth performance in broilers. Pelleting is a process consisting of mechanically pressing the mash feed into hard dry pellets or "artificial grains". Keeping the above properties in mind, the following study was planned.

Materials and Methods
Experimental design
Completely Randomized design was used as experimental design at uniform and standard management practices.

Ethical approval
The experiment was conducted in accordance with guidelines approved by Institutional Animal Ethics Committee, 12/CCSEA Dated 12.4.2022 in the Department of Animal Nutrition, Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar.

Birds and management
A total of 240 commercial broiler chicks (Ven cobb strain) were randomly distributed into eight treatment groups each having three replicates with ten birds per replicate. Chicks were housed under standard managemental conditions. Feed and water were made available *ad-libitum*. The chicks are fed with standard basal diet (BIS 2007) in three different growth phases i.e., pre-starter (0-7 days), starter (8-21 days) and finisher (22-42 days). The first and second group (T_1 and T_2) were taken as control in which basal diet with antibiotic was given in mash and pellet form, respectively. In third (T_3) group basal diet with 1% *Aloe vera* supplementation in mash form, while in fourth and fifth (T_4 and T_5) group basal diet in pellet form is supplemented with 0.5% and 1% *Aloe vera*, respectively. In the similar way, in sixth group (T_6) basal diet in mash was supplemented with 1% Amla powder and in seventh and eighth group (T_7 and T_8) basal diet with 0.5% and 1% Amla supplementation, respectively in pellet form. Various carcass characteristics like dressing percentage, eviscerated percentage, liver percentage, heart percentage, gizzard percentage, giblet percentage and abdominal fat percentage were studied by slaughtering birds by using standard slaughter procedure. For this, one bird from each replicate was taken randomly, at the end of 6th week. The birds were kept off feed and water 3 hours prior to their sacrifice. Immediately after recording their live weights, the birds were sacrificed by severing the jugular vein and allowed to bleed completely following scientific method of slaughtering. Their heads were removed at the at lanto-occipital joint and shank at hock joint.

Dressed weight = Live weight – (blood, feathers, head, shank and skin losses).
Dressing percentage = (dressed weight/live weight) ×100
Eviscerated weight = Dressed weight - weight of viscera
Eviscerated percentage = (Eviscerated weight / live weight) × 100
Drawn weight = Eviscerated weight + weight of giblets
Drawn percentage = drawn weight/live weight) ×100
Giblet weight = weight of heart + weight of liver + weight of gizzard

Housing and management
The experimental chicks were reared under deep litter system of housing. Weighed amount of feed was offered on paper sheets for first 3 days and thereafter in automatic feeders up-to 21 days of age. Afterwards, feed was offered in hanging feeders maintained at appropriate heights. Chicks were provided *ad-libitum* clean drinking water throughout the experiment. The chemical composition and cost of feed ingredients and phase wise ration has been shown in table 1.

Table 1: The chemical composition and cost of feed ingredients used for ration formulation

Ingredient	CP%	CF%	EE%	Total ash%	NFE%	ME* (kcal/kg)	Cost (Rs./kg)
Maize	8.9	2.34	3.5	1.64	83.622	3300	20.25
Soybean meal	43.50	6.74	1.32	5.92	42.52	2250	46.44
Fish meal	43.90	1.42	7.10	17.50	30.08	2180	57.51
Ground nut cake	43.40	6.70	8.20	7.15	35.15	2690	321.30
Vegetable oil	-	-	-	-	-	8800	110.00

*Values according to BIS, 2007

Statistical analysis
Data was analysed statistically as described by Snedecor and Cochran (1994) [11]. Analysis of variance was used to study the differences among treatment means and they were compared by using Duncans Multiple Range Test (DMRT) as modified by Kramer (1956) [5].

Results and Discussion
The mean values of data regarding carcass characteristics of the experimental birds under different dietary treatments are presented in Table 2.

Table 2: Percent mean values of carcass characteristics of the experimental birds under different dietary treatments

Treatments	Dressed (%)	Eviscerated (%)	Drawn (%)	Liver (%)	Heart (%)	Gizzard (%)	Giblet (%)	Abdominal fat (%)
T_1	73.34±0.05	64.23^{a}±0.06	70.49^{a}±0.09	3.05^{a}±0.01	0.93^{a}±0.01	2.28^{a}±0.02	6.26^{a}±0.02	0.78^{b}±0.02
T_2	73.38±0.09	64.21^{a}±0.07	70.73^{a}±0.22	3.07^{a}±0.03	0.92^{a}±0.02	2.31^{a}±0.03	6.32^{a}±0.02	0.77^{b}±0.01
T_3	73.46±0.07	64.29^{a}±0.06	70.80^{a}±0.27	3.08^{ab}±0.02	0.93^{a}±0.01	2.32^{a}±0.02	6.34^{a}±0.02	0.73^{a}±0.00
T_4	73.44±0.05	64.24^{a}±0.05	70.76^{a}±0.43	3.07^{a}±0.01	0.93^{a}±0.01	2.31^{a}±0.01	6.32^{a}±0.01	0.74^{a}±0.00
T_5	73.54±0.05	64.35^{a}±0.04	70.82^{a}±0.89	3.08^{ab}±0.01	0.93$_{a}$±0.01	2.32^{a}±0.02	6.34^{a}±0.03	0.73^{a}±0.01
T_6	73.49±0.52	64.49^{b}±0.05	71.20^{b}±0.28	3.19^{c}±0.02	0.96^{b}±0.02	2.43^{b}±0.02	6.60^{c}±0.04	0.75^{b}±0.01
T_7	73.46±0.06	64.39^{ab}±0.07	71.09^{ab}±1.05	3.15^{c}±0.04	0.95^{b}±0.02	2.40^{b}±0.03	6.49^{b}±0.02	0.76^{b}±0.01
T_8	73.51±0.09	64.54^{b}±0.07	71.29^{b}±0.76	3.20^{c}±0.01	0.96^{b}±0.01	2.44^{b}±0.03	6.62^{c}±0.05	0.75^{b}±0.01

Means bearing different superscripts in a column differ significantly (p<0.05)

Feed supplemented with different levels of *Aloe vera* and amla did not show any significant difference in between different dietary treatments when dressed percentage data was observed. But eviscerated percent, drawn percent, liver percent, heart percent, gizzard percent, giblet percent and abdominal fat percent were significantly (p<0.05) higher in groups supplemented with amla in comparison to *Aloe vera* supplemented groups and un-supplemented groups. Eviscerated weight percentage mean values in different treatments ranged from 64.21% in T_2 to 64.54% in T_8. The highest eviscerated percentage and drawn percentage was obtained in the treatment group supplemented with 1% Amla

powder in pellet form followed by 1% Amla in mash form which differed significantly from other treatment groups. Groups T_1 and T_2 (basal diet with antibiotics in mash and pellet form respectively) had no significant ($p<0.05$) difference on eviscerated and drawn percentage. Significant ($p<0.05$) difference was found in the mean weight percent of liver, heart and gizzard of broiler chickens in Amla supplemented groups both in mash and pellet form in comparison to other treatment groups while no significant ($p<0.05$) difference was observed in liver, heart and gizzard percentage between control and *Aloe vera* supplemented groups. The giblet percentage in various treatment groups ranged from 6.26% to 6.62%. Significantly higher giblet percentage was seen in all groups supplemented with amla powder in mash as well as pellet form. The effect of *Aloe vera* supplementation in broiler diet did not affect the giblet percentage. Significantly ($p<0.05$) lower abdominal fat was observed in 1% *Aloe vera* supplemented group in mash as well as in pellet form in comparison to that of control group.

The results of Fallah (2015) [4] and Salarya *et al.* (2014) [10] were also similar to the present study as the carcass characteristics and internal organ mass was not affected by the addition of *Aloe vera* in feed of broilers. In contrary to that Yadav *et al.* (2017) [12] showed that dietary addition of *Aloe vera* had significant effect on drawn percentage, eviscerated percentage, giblet percentage however no effect was observed on dressing percentage. Similar findings in amla supplementation were reported by Mandal *et al.* (2016) [8] who reported significant difference in giblet, liver and gizzard percentage in Amla powder supplemented groups but in contrary to that Kumar *et al.* (2014) [6] observed that supplementation of amla had significant ($p<0.05$) effect on dressing percentage of broilers. On the other hand, Choudhary *et al.* (2015) [3] and Kumar *et al.* (2012) [7] found no significant effect of supplementation of amla in feed on carcass characteristics and weight of internal organs respectively in comparison to control diet.

Conclusion

From the results of above-described research it can concluded that supplementation of feed with amla plays a significant role in improving the carcass characteristics. However, pelleting of feed and *Aloe vera* supplementation did not show any significant effects on carcass characteristics of broilers.

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