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Effect of feed particle size on carcass characteristics of commercial broiler chicken

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Abstract
The effect of feed particle size on the carcass characteristics of the commercial broiler chicken evaluated in this study was conducted at College of Poultry Production and Management, Hosur. The carcass characteristics like dressing yield, evisceration yield, gizzard weight, liver weight, heart weight and abdominal fat weight were studied at the end of 5 weeks of age and the results are presented.

Keywords: Particle size, commercial broiler chicken, carcass characteristics, dressing yield

Introduction
The feed particle size reduction is one of the most important step in mash feed manufacturing process. The broiler chicken meat requirement is linearly increased with the growing population. The carcass characteristics are the important factor to evaluate the quality of the production process. Hence the present study is aimed to assess the carcass characteristics of commercial broiler chicken with respect to feed particle size at the end of 5 weeks of age.

Materials and Methods
The present biological experiment is carried out with a total of 180 commercial broiler chicks reared under open-sided deep litter poultry housing system up to 35 days of age. A total of 36 broiler chicks were maintained in each treatment group having three replicates per treatment and each treatment group comprises of 12 birds in each replicate, totalling 36 birds in each treatment group. Each treatment groups were fed with different particle size of feed comprising of fine texture mash diet with the Geometric Mean Diameter (GMD) of 807 µm, coarse texture mash diet with the GMD of 1019 µm, medium texture 1 mash diet with the GMD of 970 µm, medium texture 2 mash diet with the GMD of 940 µm and medium texture 3 mash diet with GMD of 873 µm. At the end of 5 weeks of age, 6 birds from each treatment group were subjected to slaughter studies and carcass characteristics were analysed.

Measurements of parameters
1. **Feed particle size:** The feed particle size is analysed using test sieves as per standard procedure of ASAE (2008) [1].
2. **Dressing yield*:** The dressed carcass is weighed with heart, gizzard and liver.
3. **Eviscerated yield*:** The dressed carcass is calculated without heart, gizzard and liver.
4. **Gizzard weight*:** Inner kaolin layer is peeled off and contents inside the gizzard were removed and then weight was taken.
5. **Liver weight*:** The liver weight is measured after removal of gall bladder from the liver.
6. **Heart weight*:** The heart weight is taken after removal of the pericardium layer.
7. **Abdominal fat*:** The abdominal fat pad is removed and weighed.
   (* converted to per cent of live weight).

Statistical analysis
The data collected on various response criteria were subjected to statistical analysis in Completely Randomized Design (CRD) as per the methods suggested by Snedecor and Cochran (1989) [2] and the means of different experimental groups were tested for statistical significance by Duncan's multiple range test (Duncan, 1955) [3].

Results and Discussion

Over all mean values for carcass characteristics for different feed particle size is presented in the Table 1 and 2.

Carcass characteristics

The mean carcass characteristics of broiler chicken (expressed as percentage of Pre-slaughter live weight) at the end of 5 weeks of age, as influenced by the feed particle size is presented in Table 1 and 2.

Table 1: Mean±(S.E.) Carcass characteristics (expressed as percentage of Pre-slaughter live weight) of broiler chicken as influenced by different feed particle size at the end of 5 weeks of age

Treatment Groups	Dressing yield	Eviscerated carcass yield	Abdominal Fat
Fine texture diet	78.56^{b}± 0.55	73.56± 0.73	1.59± 0.24
Coarse texture diet	78.62^{ab}± 0.19	74.02± 0.26	1.96± 0.15
Medium texture 1 diet	78.83^{ab}± 0.44	74.03± 0.45	1.92± 0.25
Medium texture 2 diet	79.35^{ab}± 0.53	74.67± 0.49	1.73± 0.14
Medium texture 3 diet	80.23^{a}± 0.77	75.36± 0.69	1.85± 0.21

Table 2: Mean±(S.E.) Giblet yield (expressed as percentage of pre-slaughter live weight) of broiler chicken as influenced by different feed particle size at the end of 5 weeks of age

Treatment Groups	Gizzard	Liver	Heart
Fine texture diet	2.19 ± 0.16	2.14 ± 0.13	0.68± 0.05
Coarse texture diet	1.98 ± 0.14	2.05 ± 0.05	0.56± 0.03
Medium texture 1 diet	2.03± 0.07	2.17± 0.11	0.61± 0.03
Medium texture 2 diet	2.07± 0.03	2.03± 0.11	0.58± 0.02
Medium texture 3 diet	1.94± 0.16	2.28± 0.08	0.65± 0.09

The medium texture 3 diet with GMD of 873 µm had significantly higher dressing yield of 80.23 percent compared to the fine texture diet with the GMD of 807 µm (78.56 per cent). The result of the study is in agreement with the Rohini (2016) [4] who found that the medium ground diet had higher dressing yield compared to the fine ground feed.

The result of the current study revealed that the feed particle size did not have any significant effect on eviscerated carcass yield per cent. The result is in accordance with the Yan *et al.* (2015) [5] who observed that the mash feed particle size of fine (2 mm screen hole diameter), medium (5 mm screen hole diameter) and coarse (8 mm screen hole diameter) particle sizes revealed no significant effect on carcass yield with 75.25, 74.19 and 75.04 per cent respectively, in commercial broiler chicken at 41 days of age.

The results of the study have shown that the feed particle size did not have any significant effect on abdominal fat weight. The result is in agreement with Yasar (2003) [6], who reported that the commercial broiler chicken fed with fine texture diet (4 mm screen hole diameter), medium texture 1 diet (5 mm screen hole diameter), medium texture 2 diet (6 mm screen hole diameter), coarse texture diet (7 mm screen hole diameter) and whole wheat diet had no significant difference in amount of abdominal fat at 35.5, 37.7, 34.3, 36.6 and 33.4 g / bird respectively.

The result of the current study revealed that the feed particle size did not have any significant effect on gizzard weight. The result is in accordance with Yan *et al.* (2015) [5], who reported that the broiler chicken fed with fine (2 mm screen hole diameter), medium (5 mm screen hole diameter) and coarse (8 mm screen hole diameter) ground mash feed had no significant effect on gizzard development (1.05, 1.09 and 1.16 g / 100 g of BW) at 41 days of age.

The results of the current study have shown that the feed particle size did not have any significant effect on heart, liver and gizzard yield per cent. The result is in agreement with the Rohini (2016) [4], who reported that the giblet (heart, liver and gizzard) weight had no significant effect with two different feed particle size GMD±GSD of 954.00±1.83 and 1051.00 ± 1.88 µm (heart weight 4.85 and 4.89 g / Kg BW, liver 19.07 and 20.86 g / Kg BW and gizzard 20.22 and 18.24 g / Kg BW).

Conclusion

The medium texture 3 mash diet with GMD of 873 µm had better dressing yield, compared to fine texture mash diet with GMD of 807 µm. Higher dressing yield is obtained from broilers fed with Medium particle size feed compared to fine ground feed. The energy requirement for medium grinding of feed is lower compared to the fine grinding (Mugabi *et al.*, 2019) [7]. The power consumption could be reduced through medium grinding of the feed.

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