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Research Article

GENDER EFFECT ON GROWTH PERFORMANCE AND NUTRIENT DIGESTIBILITY IN (IBL-80) BROILERS

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ABSTRACT

An experiment was conducted to study the effects of gender on weekly growth performance and nutrient utilization in broilers. Seventy two day old broilers were randomly allotted to 3 treatment groups, each having 4 replicates with 6 birds in each replicate. Diets were formulated as per ICAR 2013 specifications and were fed in 3 phases. Treatment T_1 had only male birds whereas T_2 had only female birds. Under treatment T_3, mixed birds i.e. male as well as female birds were kept. Significantly higher body weight gain and feed intake was observed in male birds than female birds during different weeks. Male birds had higher body weight gain than mixed birds except during 1st and 2nd week of age. Better FCR and PER was observed in mixed birds (T_3) than male (T_1) and female birds (T_2) alone at 3rd to 5th week of age. Male birds had better FCR than female birds at 5th week of age only. CER was better in Treatment T_1 male birds than treatment T_2 and T_3 female and mixed birds during different progressive week of age. Protein and organic matter digestibility was higher in male (T_1) and mixed birds (T_3) than female birds (T_2). It was concluded that male birds had higher body weight gain, feed intake, crude protein digestibility and organic matter digestibility than female birds.

Keywords: Body weight gain, Feed intake, Female birds, Male birds, Nutrient digestibility

Poultry industry is one of the major industries which is supporting the best quality nutrients for human population of the world. Broilers make up a large part of this industry with chicken meat accounting for 86% of the world poultry meat. Indian poultry sector has been growing at a rate of 8-10% annually with broiler meat volumes growing up at a rate of 10% due to increased domestic consumption (Panigrahy *et al.*, 2016). Male broilers have a greater ability to exhibit compensatory growth following a period of under nutrition than females (McMurty *et al.*, 1988; Plavnik and Hurwitz, 1991). Ziaei *et al.* (2007) observed that BWG and FCR were better in males than females. Males had higher nutrient intake and retention than females but ileal digestibility of CP had no significant effect between males and females.

There are many factors that affect growth performance and digestibility of nutrients in broilers, like, feed intake, dietary composition, form of the feed, CP content, ambient temperature, mineral metabolism and genetic factors as well as sex of the bird. In terms of growth performance, females responded differently than males, and had significant effect on the digestibility of various nutrients. Therefore, this study was carried out to evaluate the effect of gender on growth performance and nutrient digestibility in broilers.

MATERIALS AND METHODS

The study was conducted at the poultry farm and poultry nutrition laboratory of the department of animal nutrition, GADVASU, Ludhiana, Punjab. Seventy two day old meat type chicks (IBL-80) were procured from GADVASU hatchery and distributed randomly into 3 treatment groups having total 24 birds per treatment with 4 replicates having 6 chicks in each. The treatment T_1 included only male birds, T_2 included female whereas treatment T_3 had both male and female birds in equal number. The birds under different treatments were fed *ad libitum* diets as per ICAR (2013) specification. The starter diet (0-14 days) had 22% CP and 3000 Kcal/kg of ME whereas grower diet (15-21 day) had 21.5% CP and 3050 Kcal/kg of ME. Finisher diet (22-35 day) contained 19.5% CP and 3100 Kcal/kg of ME. The ingredient composition and nutrient density of different diet are mentioned in Table 1. The birds were weighed on weekly basis to study the weight gain as well as effect of gender on average body weight gain. Similarly, average feed intake on weekly basis was recorded. Feed conversion ratio was calculated by dividing the average feed intake by average weight. Similarly, protein efficiency ratio is amount of average body weight gain per unit of protein consumed. Calorie efficiency ratio is amount of average body weight gain per unit of energy consumed.

A metabolic trial was conducted at the end of experiment. Four birds with comparable body weight were selected from each treatment and were housed in battery brooders. There were 2 replicates of each treatment having 2 birds in each replicate. Birds were fed the same treatment ration for five days as in growth study to provide them adaptation time in the metabolic cages. All the faecal collection trays and feeding trays were cleaned properly to start the metabolic evaluation. After adaptation period of five days, the measured quantity of feed for next three

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Table 1
Ingredient composition and nutrient density of poultry ration

Feed Ingredients	Amount of feed ingredients (percent)		
	Starter feed	Grower feed	Finisher feed
Maize	54.8	57.0	57.0
Soybean Meal	33.5	27.0	27.0
Groundnut Extraction	4.5	4.0	4.0
De-oiled Rice Bran	1.0	5.0	5.0
Oil	2.5	3.5	3.5
Di-calcium Phosphate	1.5	1.9	1.9
Limestone Powder	1.5	1.0	1.0
Methionine (g)	150	100	100
Salt (g)	300	300	300
Additives*(g)	200	200	200
Total (Kg)	100	100	100
CP (%)	22.0	21.5	19.5
ME(Kcal/Kg)	3000	3050	3100

* Additives include Vit. A 8,25,000 IU, Vit. D3 1,20,000 IU/, Vit. K 100 mg, Riboflavin 500 mg, Thiamine 80 mg, Pyridoxine 160 mg, Vit. E 800 mg, Cyanocobalamine 100 mcg, Niacin 1200 mg, Calcium Pantothenate 80 mg, Manganese Sulphate 25 g, Ferrous Sulphate 10 g, Copper Sulphate 500 mg, Zinc Oxide 8 g, Potassium Iodide 100 mg, Coccidiostat 60 g.

consecutive days was offered to each replicate both in the morning and evening. The residual feed left was removed on 4th day and weighed to record the actual consumption of feed for each replicate. The faeces voided by each replicate were collected daily in the morning and weighed. 25 ml of 10% sulphuric acid was mixed in the faeces to avoid nitrogen loss and dried separately at 80 ºC in hot air oven for estimating other nutrients. Faecal samples collected for three consecutive days of each replicate were mixed properly. The sample of faeces were grounded and analyzed for various proximate parameters (AOAC, 2005). The collected data of different experiments was subjected to statistical analysis using one way ANOVA in Software Package for Social Sciences (SPSS, version 22.0) to test the difference between various treatments. Treatment means were compared by Duncan's Multiple Ranged Test (Duncan, 1995) at 5% level of significance (P≤0.05).

RESULTS AND DISCUSSION

Effect of gender on growth performance

The data pertaining to the weekly growth performance in terms of average body weight gain (ABG), average feed intake (AFI), feed conversion ratio (FCR), protein efficiency ratio (PER) are presented in Table 2 and calorie efficiency ratio (CER) in Table 3, respectively.

Average body weight gain was significantly (P≤0.05) higher in male as well as mixed grouped birds as compared to female birds at 1st week of age. Male birds had significantly (P≤0.05) higher average body weight gain at all weeks of age than female birds. Moreover, male birds have significantly (P≤0.05) higher ABG as compared to mixed birds at 3rd, 4th and 5th week of age. Significantly (P≤0.05) higher ABG was also observed in mixed birds as compared to female birds at 1st, 3rd, 4th and 5th week of age. Similarly, significantly (P≤0.05) higher ABG in male birds as compared to females was also reported by Panigrahy *et al.* (2016), Kalita and Sapcota (2014), Amponsah *et al.* (2012), Hernawan *et al.* (2012), Narahari and Kumararaj (2008) and Azahan *et al.* (2007). But, Beg *et al.* (2016) reported that there was no significant difference in body weight gain between male, female and mixed groups. Bhardwaj (2016) also did not found any significant difference in average body weight gain at 3rd, 4th, 5th, 6th weeks of age in male, female and straight run broilers.

Average feed intake was significantly (P≤0.05) higher in male birds as compared to female birds at all weeks of age. Moreover, male birds had significantly (P≤0.05) higher feed intake as compared to mixed birds at 2nd, 3rd, 4th and 5th week of age. Although, mixed grouped birds had significantly (P≤0.05) higher feed intake as compared to female grouped birds at 1st, 2nd and 5th week of age. Ayhan *et al.* (2005) and Bhardwaj (2016) also reported that male birds consume more feed as compared to female birds. But, Beg *et al.* (2016) reported that average feed consumption was significantly higher (P≤0.05) in male and female group than unsexed group of birds and there was no significant difference between male and female group in feed consumption.

There was no significant difference in FCR in 1st and 2nd week of age. Mixed grouped birds had the better FCR and differed significantly (P≤0.05) from male and female grouped birds at 3rd and 4th week of age. There was no significant difference in FCR in male and female birds except at 5th week of age where male birds had significantly (P≤0.05) better FCR from the female birds. At 5th week of age, mixed grouped birds gave the significantly (P≤0.05) better FCR as compared to male and female birds. Moreover, male birds had significantly (P≤0.05) better FCR as compared to female birds at 5th week of age. Ayhan *et al.* (2005) and Panigrahy *et al.* (2016) also reported that male birds had better FCR than female birds. Moreover, Beg *et al.* (2016) reported that FCR was significantly (P≤0.05) better in male birds (1.45) than female birds

Table 2
Effect of gender on growth performance of broilers

AGE	GENDER		
	Male	Female	Mixed
Body Weight Gain (g)			
1st week	89.63 ± 1.13[a]	84.72 ± 0.81[b]	88.60 ± 0.88[a]
2nd week	152.29 ± 3.16[a]	144.24 ± 2.07[b]	147.89 ± 1.87[ab]
3rd week	235.06 ± 1.87[a]	220.11 ± 1.39[c]	226.47 ± 1.37[b]
4th week	276.82 ± 1.43[a]	247.17 ± 1.27[c]	254.68 ± 1.41[b]
5th week	353.29 ± 2.60[a]	322.44 ± 1.56[c]	344.06 ± 1.43[b]
Average Feed Intake (g)			
1st week	151.33 ± 1.76[a]	141.27 ± 1.04[b]	152.72 ± 1.18[a]
2nd week	263.80 ± 3.43[a]	244.61 ± 3.23[c]	248.91 ± 3.05[b]
3rd week	443.22 ± 1.71[a]	411.22 ± 2.31[b]	414.47 ± 2.18[b]
4th week	548.41 ± 2.53[a]	490.78 ± 1.53[b]	494.18 ± 1.63[b]
5th week	796.49 ± 4.22[a]	759.48 ± 3.09[c]	777.07 ± 3.42[b]
Feed Conversion Ratio (FCR)			
1st week	1.69 ± 0.023	1.68 ± 0.020	1.72 ± 0.019
2nd week	1.74 ± 0.025	1.69 ± 0.023	1.68 ± 0.018
3rd week	1.88 ± 0.014[a]	1.86 ± 0.011[a]	1.83 ± 0.011[b]
4th week	1.98 ± 0.013[a]	1.98 ± 0.011[a]	1.94 ± 0.012[b]
5th week	2.25 ± 0.023[b]	2.41 ± 0.015[a]	2.20 ± 0.014[c]
Protein Efficiency Ratio (PER)			
1st week	2.68 ± 0.036	2.70 ± 0.033	2.62 ± 0.030
2nd week	2.64 ± 0.037	2.67 ± 0.035	2.69 ± 0.029
3rd week	2.47 ± 0.019[b]	2.49 ± 0.015[b]	2.55 ± 0.016[a]
4th week	2.60 ± 0.017[b]	2.59 ± 0.015[b]	2.65 ± 0.017[a]
5th week	2.28 ± 0.024[b]	2.13 ± 0.013[c]	2.33 ± 0.015[a]

[a,b] - Values bearing different superscripts within a row differ significantly at p≤0.05

Table 3
Effect of gender on calorie efficiency ratio and nutrient digestibility in broilers

AGE	GENDER		
	Male	Female	Mixed
Calorie Efficiency Ratio (CER)			
1st week	0.198 ± 0.02	0.197 ± 0.02	0.198 ± 0.02
2nd week	0.192 ± 0.02	0.191 ± 0.02	0.192 ± 0.02
3rd week	0.179 ± 0.01[a]	0.175 ± 0.01[b]	0.174 ± 0.01[b]
4th week	0.166 ± 0.01[a]	0.162 ± 0.01[b]	0.163 ± 0.01[b]
5th week	0.146 ± 0.01[a]	0.134 ± 0.01[c]	0.143 ± 0.01[b]
Nutrient Digestibility (%)			
Crude protein	69.69 ± 0.54[a]	65.80 ± 0.34[b]	68.70 ± 0.42[a]
Ether extract	88.12 ± 0.31	87.03 ± 0.35	87.70 ± 0.38
Fiber	36.79 ± 0.37	35.60 ± 0.31	36.32 ± 0.42
Organic matter	73.84 ± 0.67[a]	70.21 ± 0.60[b]	72.47 ± 0.71[a]
Calcium	50.76 ± 0.23	48.57 ± 0.27	49.40 ± 0.20
Phosphorus	46.52 ± 0.35	46.06 ± 0.30	46.33 ± 0.33

[a,b] - Values bearing different superscripts within a row differ significantly at p≤0.05

(1.61) and unsexed birds (1.58). Bhardwaj (2016) and Sam *et al.* (2010) reported that there was no difference in FCR of male and female birds.

There was no significant difference in PER in 1st and 2nd week of age. Mixed birds had the better PER and differ significantly (P≤0.05) from male and female grouped birds at 3rd, 4th, 5th week of age. There was no significant difference in PER in male and female birds except at 5th

week of age where male birds had significantly (P≤0.05) better than the female birds. Samarakoon and Samarasinghe (2012) reported that male birds have significantly (P≤0.05) higher PER than female birds.

Male birds had the better CER and differ significantly (P≤0.05) from female and mixed birds at 3rd, 4th and 5th week of age. Moreover mixed birds had better CER than female birds at 5th week of age.

Effect of gender on nutrient digestibility

The data pertaining to effect of gender on nutrient digestibility is given in Table 3. Results depict that male and mixed birds had significantly (P≤0.05) higher digestibility coefficient for crude protein and organic matter as compared to female birds. Overall digestibility of ether extract, fibre, calcium and phosphorus remains unaffected in different treatments. Ziaei *et al.* (2007) reported that male birds have higher nitrogen retention than female birds. But, Kim and Corzo (2012) reported that there was no significant effect of sex on apparent ileal amino acid digestibility. Soleimani *et al.* (2010) also observed that no significant effect of sex on standardized ileal amino acid digestibility of soybean meal suppressed under heat exposure.

CONCLUSION

Male birds had significantly (P≤0.05) higher average body weight gain and feed intake at all weeks of age than female birds. But, mixed birds had better feed conversion ratio during different weeks of age. Moreover, male and mixed birds had significantly (P≤0.05) higher digestibility coefficient for crude protein and organic matter as compared to female birds. Overall digestibility's of ether extract, fibre, calcium and phosphorus remains unaffected in different treatments.

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