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Performance of Two Commercial Broiler Strains in Subtropical Environment of Bhutan

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ABSTRACT

A study was conducted with an objective to determine the growth performance and Feed Conversion Ratio [FCR] of two commercial broiler strains [Cobb 400y and Ross 308]. The study used a total of 330 unsexed Day-Old Chicks [165 of each strain]. Fifty-five numbers of each strain were randomly allocated to three replications. At the end of the experiment [42 days], the result showed that the final live body weight of Cobb 400y was better than Ross 308. There was a significant difference in the live weights between two broiler strains. There was no significant difference in the mortality trend between two broiler strains. The significant difference was also not observed in terms of average daily weight gain, FCR and dressing percentage of two commercial broilers. The study results suggest that the performance of Cobb 400y and Ross 308 are comparable under sub-tropical environmental conditions in winter.

1. INTRODUCTION

The global production of poultry meat has been growing faster than any other meat, both in developed and developing countries since the 1960s [Chang 2007]. In developing countries, poultry production is the main source of household nutrition and income [Iqba et al. 2016]. Poultry has become one of the major animal protein sources in the world due to low production cost, changes in lifestyle, trade, and communication in major cities in developing countries [Tangendjaja 2010]. According to Henrique et al. [2017], poultry farming is one of the most developed animal production sectors in recent years, especially in chicken production. However, feed is a primary concern for poultry industry since it constitutes about 60–70 % of the total cost of broiler production [Amao et al. 2015; Pathak et al. 2016].

In India, broiler industry indicates that *Vencobb* is the most preferred breed due to its fast growth, feed efficiency, and ability to withstand extreme temperature and humidity [Wallace and Intodia 2017]. Nidup et al. [2005] reported that Bhutan has not made any significant progress in the areas of poultry breeding and development. Bhutan has produced just 1208.711 MT of chicken in 2016 and 1062.855 MT in 2015 [Policy and Planning Division 2016], which is not sufficient to meet the local demand and have to rely on import. In 2015, Bhutan recorded an import of 58.71% chicken from neighboring countries [Policy and Planning Division 2016]. Looking at the import trend, it will continue to increase in the coming years due to high demand for chicken. Thus, Bhutan has great potential to expand commercial broiler production to substitute import. Broiler production is taken up by both large- and small-scale commercial entrepreneurs in the country.

To enhance broiler production, two commercial broiler strains were imported from India viz. Cobb 400y and Ross 308. These two strains were newly introduced in Bhutan and no studies have been conducted to check the suitability of these strains under Bhutanese farming condition. Therefore, this study was carried out with the main aim to evaluate the performance of Cobb 400y and Ross 308 broiler strains in Bhutan.

2. MATERIALS AND METHOD

2.1 Description of experimental site

The experiment was conducted at the National Poultry Research and Development Centre, Sarpang *Dzongkhag* [District]. The experimental site experiences a warm sub-tropical climate characterized by hot and humid summer and moderately cool and dry winter. The average annual temperature is 22°C and the average annual rainfall ranges from 1200-2500 mm.

2.2 Experimental design and sampling

A total of 330 unsexed chicks were included and chicks were divided into two groups. The first group was allotted 165 chicks of Ross 308 and second group with the same number of chicks of Cobb 400y strain. The Day Old Chicks [DOC] of Ross 308 were hatched from government hatchery and Cobb 400y were imported from West Bengal, India.

2.3 Management of birds

Chicks were reared up to six weeks of age in an open-sided house of deep litter system. Chicks in all replicates were provided uniform stocking density, feed, and water. They were reared under uniform standard management conditions throughout the experimental period. Brooding preparation was made prior to the arrival of chicks. On day zero, feed and water were provided *ad libitum.* Liquid petroleum gas and electric brooders were used during brooding. Chicks were provided uniform brooding facilities of 15-watt Compact Inflorescent bulbs [CFL]. For the first three days, 24 hours lighting was provided, followed by 23 hours lighting till chicks were one week old. Fresh, clean and sun-dried sawdust was used as bedding materials. Chicks were vaccinated as per the vaccination schedule [Table 1].

From day 1 to 23, birds were provided chick starter in accordance with the standard management guidelines of Ross 308 and Cobb. On 24th day, broiler starter [crumble] and broiler finisher [mash] were mixed and fed at 70% and 30%, respectively, to acquaint with the change of feed to broiler finisher. On the following day, birds were provided starter and finisher at 50% each. However, on the 26th day, birds were fed starter and finisher at 30% and 70 %, respectively. From 27th day, birds were provided broiler finisher till 42 days of age.

2.4 Data collection and analysis

Two broiler strains were considered as treatment and each strain was divided into three replicates. Chicks were randomly distributed with 55 birds of each strain. Data were collected on body weight gain, Average Daily Gain [ADG] and Feed Conversion Ratio [FCR]. The parameters were recorded weekly and mortality was recorded daily. ADG, FCR, and mortality were calculated using the following formula.

$$\text{ADG} = \frac{\text{Final weight} - \text{Initial weight (g)}}{\text{Age of birds (days)}}$$

$$\text{FCR} = \frac{\text{Total feed Intake (g)}}{\text{final weight gain (g)}}$$

$$\text{Mortality \%} = \frac{\text{No. of dead birds}}{\text{No. of initial birds}} \times 100$$

Table 1: Vaccination schedule

Age	Vaccine	Route
0 day	Marek disease	Subcutaneous
3rd Day	Infectious Bursal Disease	Intraocular
7th Day	Newcastle Disease [B1]	Intraocular
14th Day	Infectious Bursal Disease	Intraocular
28th Day	Infectious Bursal Disease	Intraocular

The daily feed consumption and mortality were recorded in Microsoft Excel. Independent samples t-test was performed to check significant differences between two strains. Statistical Package for Social Science [SPSS] version 23 was used to analyze the dataset.

3. RESULTS AND DISCUSSION

3.1 Live weight

The weekly live weights of two broiler strains are presented in Table 2. The initial mean body weight of Cobb 400y [42.25±3.83 g] was significantly greater than Ross 308 [36.67±2.83 g]. The mean weight of Cobb 400y DoC was slightly greater than the average Cobb standard of 42 g, whereas the average weight of Ross 308 DoC was below the Cobb standard.

From week one to six, the average weekly body weights of Cobb 400y [2555.17±236.21 g] were consistently and significantly greater than Ross 308 [2423.83±210.22 g]. There was a significant difference [$p<0.05$] in the final body weight between Ross 308 and Cobb 400y at six weeks. Cobb 400y broilers attained greater average live weight than Ross 308 birds by 5.44%. These results are supported by Hristakieva et al. [2014] who found a significant difference between two strains. Similarly, a study by Torshizi [2006] revealed a numerically greater body weight of Cobb compared to Ross. On the contrary, Hascik et al. [2010] showed a greater numerical average body weight for Ross 308 than Cobb at the slaughtering age of 35 days, but with no significant difference. Another study by Pascalau et al. [2017] found a slightly greater final body weight for Cobb 500 hybrid with 3.42%, compared to Ross 308 hybrid. Ciurescu and Grosu, [2011] demonstrated that the final body weight of Cobb 500 broilers was slightly lower than Ross 308, but differences were not significant. Amao et al. [2015] observed the final body weight of 1423 g in eight weeks for Cobb strain, which is much lower than the current findings.

Table 2: Weekly Mean Body weight gain of broilers of Ross 308 and Cobb 400**.** Average values within the row with no common superscripts are significantly different at $p<0.05$.

	Mean body weight (g)	
Age	Ross 308	Cobb 400y
Week 0	36.7±2.8^{a}	42.3 ± 3.8^{b}
Week 1	133.3±10.0^{a}	137.7±13.4^{b}
Week 2	371.7±28.3^{a}	398.7±31.8^{b}
Week 3	769.3±59.3^{a}	813.7±64.3^{b}
Week 4	1264.3±105.1^{a}	1340.7±110.9^{b}
Week 5	1921.0±166.7^{a}	2057.3±142.9^{b}
Week 6	2423.8±210.2^{a}	2555.2±236.2^{b}

3.2 Average Daily Gain

Statistically**,** there was no significant difference in average daily weight gain between two commercial broiler strains, except on the second week of rearing. In contrast, Namakparvar et al. [2014] observed a significant difference in body weight gain among three strains of Ross 308, Cobb 500 and Arian.

They also reported that Cobb strain has the highest daily weight gain than Ross 308 and Avian. In the current study, ADG of 57.32±3.90 g and 59.83±0.78 g was recorded for Ross 308 and Cobb 400y, respectively. A study by Amao et al. [2015] revealed 66 g daily weight gain in Cobb strain, which was slightly greater than the current result of 59.83±0.78 g. This result contradicts the findings of Ciurescu and Grosu [2011] that Ross 308 had a higher ADG of 58.05 g and 56.55 g for Cobb 500. Namakparvar et al. [2014] observed an average daily weight gain of 46.1±0.6 g for Ross 308 and 50.7±1.0 g for Cobb 500, respectively, which is lower than the current findings. Pascalau et al. [2017] reported a slightly higher ADG in favor of Cobb 500 [53.69g] against 51.83g in Ross 308.

3.3 Feed Conversion Ratio

The mean FCRs of two broiler strains from first to sixth weeks are presented in Figure 1. Two broiler strains did not differ significantly in FCR. This result is supported by Ciurescu and Grosu [2011] who observed no significant difference among three broiler strains of Ross 308, Cobb 500 and Arbor Acres. Further, Pascalau et al. [2017] demonstrated a slightly higher FCR value of Ross 308 [1.88] than Cobb 500 [1.84]. In this experiment, the FCR values of 1.81 and 1.91 were observed for Cobb 400y and Ross 308, respectively, at 42 days of age. A study by Iqbal [2012] revealed FCR of 2.17 for Ross 308 in seven weeks of age in Pakistan. In the present study, Ross 308 exhibited a slightly higher FCR value than Cobb 400y. This indicates that Cobb 400y performed better than Ross 308 during the experiment. In contrast, Hascik et al. [2010] revealed a FCR value 1.64 for Ross 308, which is slightly lower than 1.7 of Cobb 500 at 35 days. Pathak et al. [2016] recorded a FCR value of 1.85 in Cobb 400, which is slightly higher than 1.81 for Cobb 400y in this study.

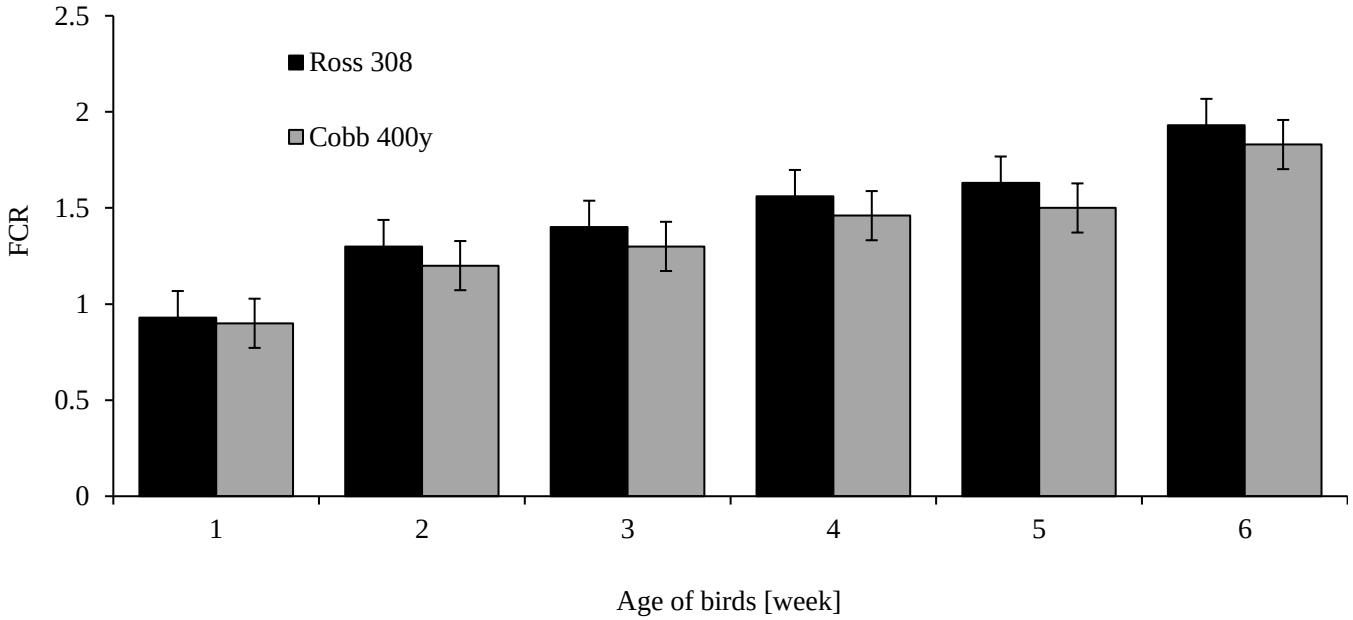

Figure 1: Week-wise FCR of two broiler strains.

3.4. Mortality

There was no significant difference in mortality between two broiler strains. At the end of the experiment, 2.42% mortality was observed in both strains. For both strains, mortality was observed only during brooding period. A similar result was obtained by Rokonuzzaman et al. [2015] between three improved breeds of Cobb-500, Hubbard Classic, and Arbor Acres.

3.5 Dressing percentage

The dressing percentage between Ross 308 and Cobb 400y strains were not significantly different, although Cobb 400y tended to have higher numerical values than Ross 308. Eviscerated percent of 78 and 77 were observed in Ross 308 and Cobb 400y, respectively [Table 3]. In contrast, Rahman [2014] revealed a dressing percentage of 69.29±0.11 for Cobb 500 and 69.12±0.12 for Ross 308 at 35 days of age. The dressing percent of Ross 308 in this study was slightly better than the results of 72.2% by Havenstein et al. [2003].

Table 3: Live weight and whole carcass yields of two commercial broilers at six weeks of age.

	Ross 308	Cobb 400y
Live weight [g]	2423	2555
Eviscerated weight [g]	1890	1966
Eviscerated [%]	78	77

4. CONCLUSIONS

Although, Cobb 400y strain is slightly better than Ross 308, it can be concluded that both broiler strains are suitable for a profitable broiler farming in winter season in subtropical environment of Bhutan.

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