

Full length paper

COMPARATIVE PERFORMANCE OF COMMERCIAL BROILER HYBRIDS IN SUB-TROPICAL ZONE OF BHUTAN

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ABSTRACT: The study was conducted to evaluate the growth rate and feed conversion ratio of two commercial broiler hybrids namely Vencobb 400Y and Ross 308. A total of 330 unsexed day-old chicks comprising of 165 numbers each of Vencobb 400Y and Ross 308 were used for the study. Each experimental group was randomly allocated with 55 numbers of birds with three replicates and were reared in an open sided poultry shed. The performance data were collected for 42 days and, analyzed using sample independent t-test. There was significant difference ($p=0.00$) between two broiler hybrids in terms of final body weight. Initial body weight of Ross 308 was found higher than the Vencobb 400Y hybrid. However, at the end trial (42 days), the final live body weight of Vencobb 400Y was observed higher than Ross 308. The final live body weights recorded for Ross 308 and Vencobb 400Y were 2280.24 ± 37.75 gm and 2636.20 ± 31.13 gm respectively. The final FCR of 2.02 for Ross 308 and 1.78 for Vencobb 400Y were recorded. There was no significant difference ($p=0.06$) between the two broiler hybrids for feed conversion ratio and mortality. In overall, the performance of these two commercial broiler hybrids was found comparable in sub-tropical zone during spring.

Keywords: Broiler hybrids; body weight; day old chick; feed conversion ratio.

1. INTRODUCTION

Broiler production is one of the ways to supply quality animal protein at relatively low cost (Vasanth et al. 2015). Broiler chicken is the cheapest and safest animal protein that can rapidly and efficiently fulfill the protein shortage (Rahman 2014). The commercial broiler hybrid is one of the fastest growing birds. Thus, with a short production cycle, the economic returns are quick.

Investment in broiler farming has been found most profitable on large farms, followed by medium and small farms (Balamurugan & Manoharan 2014). The modern intensive poultry production system produces marketable size birds at six weeks of age (Shankar et al. 2017). The poultry industry worldwide, is rapidly shaping-up into an attractive enterprise in response to increasing demand for animal protein (Hossain et al. 2011).

Poultry industry plays a vital role in supplying premium quality meat. Protein deficiency has been the major contributory factor in malnutrition (Rokonuzzaman et al. 2015). In many parts of the world, the poultry sector is expected to grow with increasing demand for protein as a result of rising incomes, urbanization and population growth (Mottet et al. 2017). In 2017, Brazil produced 13,250 million tons of chicken followed by the European Union and China with 11,700 and 11,600 million tons of chicken respectively (United States Department of Agriculture [USDA] 2017). In the same year, Brazil exported 4000 million tons of chicken while Japan imported 995 million tons followed by Saudi Arabia and Mexico with 780 and 750 million tons respectively. Among South East Asia countries, poultry is the largest livestock sector in Malaysia, Thailand and Indonesia (Iowa Economic Development Authority [IEDA] 2017). According to Hashim (2015), Malaysian poultry meat production increased from 1.30 million MT in 2010 to 1.5 million MT in 2013, with a growth rate of 12.5% per annum. According to Chatterjee & Rajkumar (2015), India and China are the largest and second largest poultry meat producers in Asia. India produced about 3.8 million tons of poultry meat from 3000 million broilers per annum contributing Rs.70,000 crores to the national GDP (Chatterjee & Rajkumar 2015). In Bangladesh, poultry meat alone contributes 37 % of the total meat production. Throughout the world, poultry meat has become a mass consumer product, in every region with different developments and, in diverse forms (Magdelaine et al. 2008). On an average in 2014, the world consumed poultry meat at the rate of 13.2 kg/capita/year. The highest poultry meat consumption was recorded in the US with 44.1 kg/capita/year,

followed by Saudi Arabia and Malaysia with 43.6 and 40.6 kg/capita/year respectively (OECD/FAO 2015). According to Dawa (2014), about 21.6% of the Bhutanese consume chicken. Prior to the earliest livestock regulations, the per capita poultry meat consumption for Bhutan was recorded at only 0.2 kg (Tobias & Morrison 2009). There has been a remarkable increase in poultry production in the country with a production figure of 1349 MT in 2017 (Bhutan RNR Statistics 2017). Chicken import too has proportionately increased with an import figure of 1583.97 MT (Bhutan RNR Statistics 2017). Thus, the per capita consumption of poultry meat has increased to 3.99 kgs in 2017.

Given the current chicken import trend, it will continue to increase in coming years. Thus, Bhutan has great potential to expand commercial broiler production to substitute import. In-country produce ensures better quality assurance. Broiler farming is undertaken by both the small scale and large-scale commercial entrepreneurs under different farming conditions. In Bhutan, two commercial broiler hybrids (Ross 308 and Vencobb 400Y) are reared. However, no comparative studies had been undertaken so far to find the breed/s that is more suitable to Bhutanese context and seasons. The parent breeder of Ross 308 is imported from India by the National Poultry Research and Development Centre (NPRDC), Sarpang. Commercial Broiler Day-Old Chicks (DoC) of Vencobb 400Y is imported by private entrepreneurs. Therefore, this research was designed to compare the production performance of two renowned broiler commercial hybrids. Such assessment of the fast-growing broiler hybrids will help increase in-country chicken production, thereby reducing the import.

2. MATERIALS AND METHODS

2.1 Experimental site

The experiment was conducted in the premises of NPRDC (26° 52' 35" N 90° 15' 2" E, 346 meters above sea level), Sarpang

Dzongkhag (District) between 28th February 2018 to 11th April 2018. The experiment site has warm sub-tropical characterized by hot summer and moderately cool winter. The average temperature is 22°C and the average

annual rainfall ranges from 1200 mm to 2500 mm (Dzongkhag 2018).

2.2 Experimental design and birds

A total of 330 unsexed chicks comprising of 165 chicks each of Ross 308 and Vencobb 400Y were used in this study. The Ross 308 DoCs were hatched at NPRDC, whereas Vencobb 400Y DoCs were imported from M/S Eastern Hatcheries Pvt. Ltd., West Bengal, India. These two broiler hybrids were considered as treatment birds. 55 DoCs of each hybrid were in each treatment group. There were three replicates of each treatment group.

2.3 Management of experimental birds

All chicks were reared up to six weeks of age in an open-sided house under deep litter system. The chicks in all replicates were provided uniform stocking density, feed, and water. They were reared under identical standard management conditions throughout the experimental period. Brooding preparation was made prior to the arrival of chicks. Chicks were provided uniform lighting facilities of 15-watt compact florescent light (CFL) bulbs. For the first three days, 24 hours of lighting was provided followed by 23 hours of lighting until chicks attained one week. Fresh, clean and sun-dried sawdust was used as bedding materials. Liquid petroleum gas and electric brooders were used for brooding. Chicks were vaccinated as per the standard vaccination schedule as in Table 1.

2.4 Feeding regime

At day zero, chicks were fed ad libitum. From day 1 to 23, birds were provided chick starter in accordance with standard management

guidelines of Ross 308 and Vencobb 400Y (Aviagen 2009 & Cobb 2013). On the 24th day, broiler starter (crumble) and broiler finisher (mash) were mixed and fed at 70: 30 ratio. On day 25, birds were provided starter and finisher at 50 % each. On the 26th day, birds were fed starter and finisher at 30 % and 70 % respectively. From 27th day, the birds were provided broiler finisher till 42 days of age.

2.5 Data collection

The data was collected for 42 days of rearing from 28th February to 11th May, 2018. The body weights were measured (Phoenix, with 0.001g precision) at weekly intervals and mortality recorded on a daily basis. FCR, mortality and Average Daily Gain (ADG) were determined on a weekly basis by using the following formulae:

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

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

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

2.6 Data Analysis

The data were entered in Microsoft Excel 2010. The normality of data was tested with the Shapiro Wilk test and homogeneity of variance by Levene's test. The growth performance and FCR of two commercial hybrid broilers were tested with sample independent t-test. The two broiler breeds were the independent variables while FCR and body weight were the dependent variables. Differences in dependent variables were considered significant when *p* values were less than 0.05. The statistical software

Table 1: Vaccination schedule adopted

Age	Vaccine	Route
0 day	Marek disease	Sub-Coetaneous Muscular
3rd Day	Infectious Bursal Disease	Intra ocular
7th Day	Newcastle Disease(B1)	Intra ocular
14th Day	Infectious Bursal Disease	Intraocular
28th Day	Infectious Bursal Disease	Intraocular

Statistical Package for Social Science (SPSS) version 23 was used to analyze the data (IBM n.d.).

3. RESULTS DISCUSSIONS

3.1 Body weight

The initial body weights of Ross 308 and Vencobb 400Y were 47.20 ± 0.42 g and 43 ± 0.35 gm respectively. Though the initial body weight of Ross 308 was comparatively higher than Vencobb 400Y, the final average live body weight of later was higher under the same environmental and management

conditions. The final average live body weights were recorded at 2280.24 ± 37.75 gm and 2636.20 ± 31.13 gm for Ross 308 and Vencobb 400Y respectively (Figure 1). A highly significant difference ($p = 0.001$) was observed between two commercial broiler hybrids' body weight at 42 days of age. At the end of the experiment, Vencobb 400y broilers attained higher average live weight than Ross 308 birds by 15.61%. The results of this study are supported by Hristakieva et al. (2014) where a significant difference was observed between two hybrids. Similarly, Torshizi, (2006) in their study revealed numerically

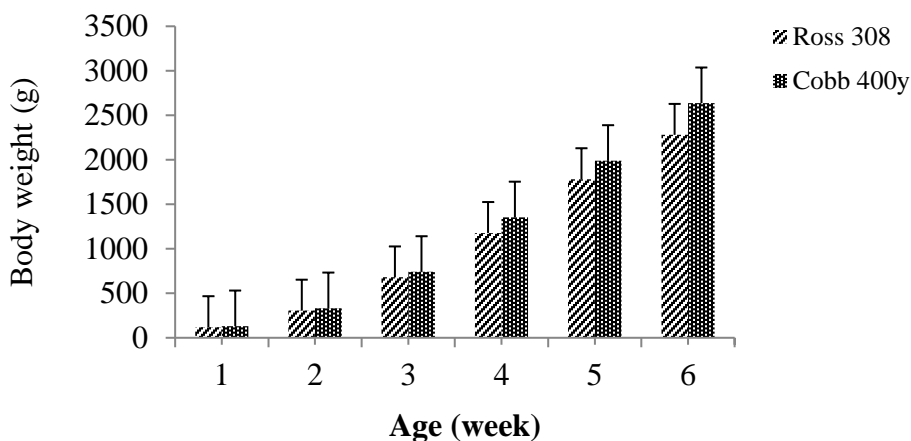


Figure 1: Average live body weight of two commercial broiler hybrids

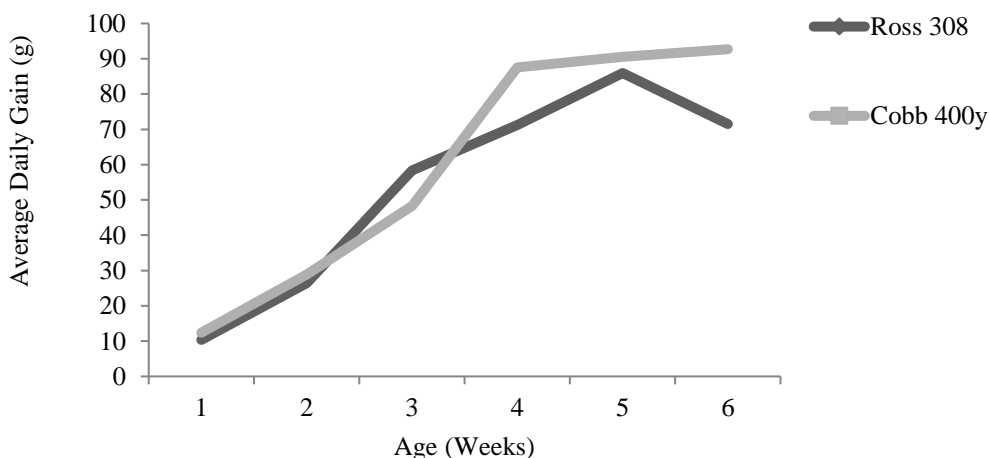


Figure 2: Average daily weight gain of two commercial broiler hybrids

higher body weight of Vencobb compared to Ross. Another study by Pascalau et al. (2017) observed slightly superior final body weight for Vencobb 500 hybrid by 3.42% compared to Ross 308 hybrid. On contrary, Hascik et al. (2010) showed high numerical average body weight for Ross 308 compared to Vencobb at slaughtering age of 35 days. However, no significant difference was observed. Ciurescu & Grosu (2011) demonstrated a slightly lower final body weight for Vencobb 500 broilers than Ross 308, but difference was not significant ($p > 0.05$). Amao et al. (2015) found the final body weight of 1423g in eight weeks for Vencobb hybrid which is much lower than the current study findings. The relatively higher initial body weight for Ross chicks may be attributed to the fact that they are hatched on station while the Vencobb 400Y DoCs were imported from India because of which chicks are expected to undergo transit weight loss. The differences in the performances of broiler hybrids may be affected by various factors like breeding, management, nutrition, disease control, weather conditions and so on.

3.2 Average Daily Gain

At the first week, an average daily weight gain for Ross 308 was 10.35 ± 0.08 g and 12.39 ± 0.21 g for Vencobb 400Y (Figure 2). There was a significant difference ($p > 0.05$) between two broiler hybrids' ADG except on

week three and five. The result is supported by Namakparvar et al. (2014) where a significant difference was observed in body weight gain among three hybrids of Ross 308, Vencobb 500 and Arian. They observed Vencobb hybrid had the highest daily weight gain compared to Ross 308 and Arian. In the current study, an average daily weight gain of 53.15 ± 2.88 g and 60.07 ± 3.19 g was observed for Ross 308 and Vencobb 400Y, respectively for 42 days. A study by Amao et al. (2015) revealed 66 g daily weight gain in Vencobb hybrid which was slightly greater than the current result. This result contradicts the study by Ciurescu & Grosu (2011) where Ross 308 had higher average daily weight gain of 58.05 g as compared to 56.55 g for Vencobb 500. Namakparvar et al. (2014) observed average daily weight gain of 46.1 ± 0.6 g for Ross 308 and 50.7 ± 1 g for Vencobb 500 which are lower than the current study results. Pascalau et al. (2017) observed a slightly higher average daily weight gain in Vencobb 500 (53.69g) as compared to Ross 308 at 51.83g.

3.3 Feed Conversion Ratio

The final FCR of 2.02 and 1.78 was observed for Ross 308 and Vencobb 400Y, respectively (Figure 3). There was no significant difference in FCR between Ross 308 and Vencobb 400y ($p > 0.05$). This result

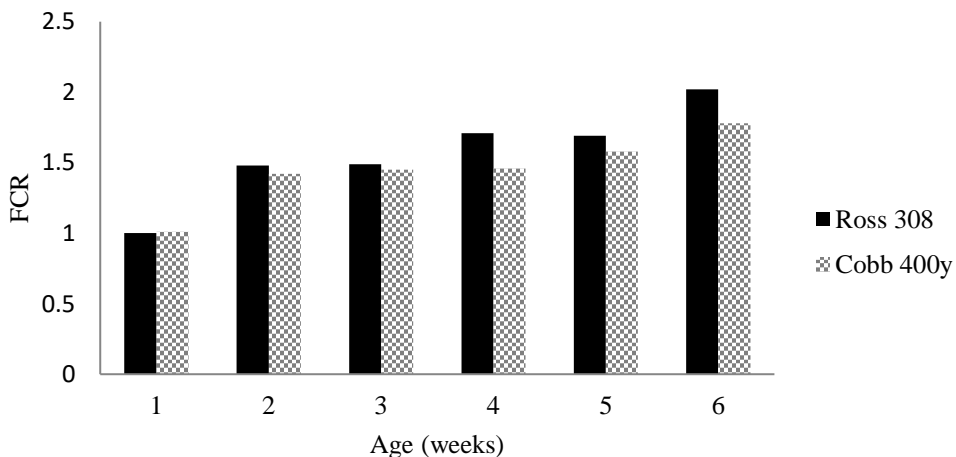


Figure 3: Comparison of FCR between two commercial broiler hybrids

is supported by Ciurescu & Grosu, (2011) who observed no significant difference among three broiler hybrids of Ross 308, Vencobb 500 and Arbor Acres. The FCR of Vencobb 400Y chicken is slightly better than Ross 308. In contrast, Pascalau et al. (2017) demonstrated a slightly better FCR value of 1.88 for Ross 308. 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 chicken exhibited slightly higher FCR value compared to Vencobb 400Y. This indicates that Vencobb 400Y performed better than Ross 308 during the experiment. In contrast, Hascik et al. (2010) revealed 1.644 as FCR value of Ross 308 which is slightly lower than 1.7 of Vencobb 500 at the age of 35 days. Pathak et al. (2016) recorded FCR value of 1.85 in Vencobb 400Y which is slightly higher than 1.78 for Vencobb 400Y in this study. This difference could be attributed to the independent variables, breed and season.

3.4 Mortality

Statistically, the result demonstrated no significant difference ($p > 0.05$) between two broiler hybrids in terms of mortality. At the end of the experiment, 7.87 % and 6.06 % of mortality were recorded for Ross 308 and Vencobb 400Y respectively. Similar result was obtained by Rokonzaman et. al (2015) where no significant difference was observed between three improved breeds of Vencobb-500, Hubbard Classic, and Arbor Acres.

4. CONCLUSION

The performance of Vencobb 400Y and Ross 308 broiler hybrids were found comparable in the sub-tropical zone during spring. There was no significance difference in FCR, the main criterion for evaluation of performance and profitability. But, the contribution of season to this result need to be further authenticated. The trial needs to be conducted for repeatability in other agro-ecological zones. In addition, faster growing Vencobb 400Y has its own share of animal welfare

issues. Thus, choice of hybrid must be made with care and further scientific evidences.

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