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Comparative evaluation of growth performance of Mewari and Pratapdhan chicken under an intensive system of rearing

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Abstract

This review gathered information about the Growth performance, Production performance and Reproduction performance of indigenous, exotic chickens and hybrids in India. Mewari is indigenous chicken breed and Pratapdhan is a dual-purpose chicken variety developed using Mewari, coloured broiler and Rhode Island Red. Pratapdhan birds were well accepted by the farmers of Rajasthan and adjoining areas. Under an intensive technique of rearing, the performance of Mewari and Pratapdhan chicken was examined. The primary effects of the factorial design used to evaluate the data were genotype, sex, and generation (2 x 2 x 3). All ages showed a substantial difference in body weights ($p \leq 0.05$), with Pratapdhan chicken significantly heavier than Mewari chicken. With the exception of the second week, sex significantly ($p \leq 0.05$) affected body weights at all ages. Across genotypes and generations, male body weights were noticeably greater. Except for the second week of age, the effects of genotype, sex, and generational interactions were all statistically significant. With few exceptions, the body weights showed an upward trend over the generations.

Keywords: Mewari and pratapdhan chicken, growth performance, weeks, intensive system

Introduction

Poultry farming is one of the fastest growing segments of agriculture in world. The Food and Agriculture Organization (FAO) of the United Nations estimates that there will be roughly 27.9 billion heads of poultry worldwide in 2019 (including chicken, duck, goose, guinea fowl, and turkey). With around 93% of this presence, chickens hold the largest part. According to the FAO, the number of chickens has more than doubled since 1990. In 2019, there were 25.9 billion chickens, up from 14.38 billion in 2000. Asian nations make up the major portion of this presence. 15.8 billion chickens were present in Asia overall during that time. The Americas come in second with 5.8 billion people. Poultry meat stands out as the most widely produced type of meat in recent years. Data from the FAO show that poultry will account for 40.6% of the world's 337.3 million tonnes of meat produced in 2020. The desire for alternative meats is reportedly fueling increase in chicken meat production and trade, according to the FAO's "MEAT MARKET REVIEW- Emerging trends and forecast" report, which was released in December 2020. because chicken meat is more affordable for customers to buy than other meats. As a result, the poultry market gradually experiences consequences ranging from production to trade. For instance, production of poultry meat increased to 133.6 million tonnes in 2019 from 127.3 million tonnes in 2018. According to FAO predictions, the world's total production of poultry meat increased by 2.6 percent to 137 million tonnes in 2020. This amounts to almost half the growth rate in 2019. The production of chicken meat, which was 115 million tons in 2018, reached 118 million tons in 2019. The largest share in chicken meat production belongs to the countries of the Americas with a production amount of 47.9 million tons in 2019. In the same year, America is followed by Asia with 42.8 million tons. Data from the FAO show that 1.528 billion eggs were produced globally in 2018. This number rose to 1.577 billion in 2019. Asian nations account for the highest portion of output in 2019 (almost 64 percent of overall production). China produces a significant portion of the goods in the area. There are three different sorts of production systems: backyard, layer, and broiler. 2% of the world's poultry meat production and 8% of all eggs are produced in backyards. Poultry farming carries a pivotal position in current Indian economy and has evolved as an extremely business oriented enterprise Sreenivas *et al.*, (2013)^[24].

The total poultry population in the country has increased by 12.39% over the previous census i.e. 2007. In India estimated poultry population during 2019-20 was 851.81 million numbers, increased by 16.8% over previous census. The demand for chicken products continues to rise, improving the genetic potential of the birds due to ongoing and precise selection and breeding strategies, improving management practices, health coverage, and the availability of high-quality balanced feed (Mohapatra and Mishra, 2008) [14]. Indian agriculture sector contributes 28% to the gross domestic production (GDP) in India, among which 17% of income come from poultry alone. India ranks 3rd in egg production and 5th in meat production in world. The Indian poultry industry is growing at the rate of 8 to 10% for eggs and 15 to 20% for broiler production (Srivastava, 2011) [25]. As per the recommendations of National Institute of Nutrition, we require 180 eggs and 11 kg of poultry meat per capita per year, but we have presently achieved only up to 69 eggs and 3.6 kg of poultry meat per capita per year (Annual Report, 2017-18) which is lower than global average of 8.92 kg and 14.13 kg for egg and meat. The population has increased in rural area by 15.02%, while urban areas have noticed a decline in population by 25.60%. The population of poultry under backyard system is 111.3 million which is 15.27% of total population and out of which majority (83.74%) are desi birds.

Pratapdhan, a dual purpose chicken variety developed for rural poultry production at MPUAT, Udaipur is among various improved chicken varieties suitable for backyard poultry farming were developed over the years from different places, these varieties resemble indigenous fowl in body conformation, multi coloured plumage, dull shanks, pink skin and single comb, to scavenging in small scale poultry operation by both public and private sector organizations, have generated new opportunities for poultry production. The study was designed in a way to know the effect of breed, sex, generations and their interactions on comparative performance of Mewari and Pratapdhan chicken with respect to growth under intensive system of rearing.

Materials and Methods

The research work was undertaken to study performance of Mewari and Pratapdhan chicken with respect to growth and production parameters. The observations were recorded in the ongoing project on AICRP on Poultry breeding at Poultry farm, Department of Animal Production, Rajasthan College of Agriculture, Udaipur. The experiment was conducted at Poultry farm, Department of Animal Production located in arid region at 24.35 North and Longitude of 74.42 East, Height from the mean sea level 582.2 Meter. A survey was conducted in the project on demand and liking of farmers / poultry keepers for type of birds and also rearing practices. Majority of the farmers opted for dual purpose chicken as their first liking. Based on survey, the technical programme was designed to develop a dual purpose location specific germplasm. Three breeds namely Mewari, local native germplasm, coloured broiler (Coloured synthetic female line, CSFL) and Rhode Island Red were maintained at the farm to produce two and three breed crosses. The "BNR" (Broiler X Native) X RIR, a dual purpose three breed cross named PRATAPDHAN developed in the project for rural poultry farming was released for distribution to farmers. PRATAPDHAN a dual type chicken variety was developed at

AICRP on Poultry Breeding, MPUAT, Udaipur. The Pratapdhan has genetic constitutions as 25% native, 25% Coloured Broiler (Coloured Synthetic Female Line) and 50% RIR.

Rearing and management practices: A total of 844, 1393 and 995 chicks of Mewari (3232) and 451, 775 and 409 chicks of Pratapdhan (1635) were produced in first (G1), second (G2) and third (G3) generations, respectively. The chicks were wing banded and reared under standard management in each generation. The chicks were reared in brooder cum grower houses having 10' x 10' rooms for brooding of the chicks. Brooder temperature was maintained at 95°F in the first week and gradually reduced to 74°F by the end of the 5th week. Chicks were provided *ad libitum* grower ration (2800kcal/kg of ME and 20 per cent CP on calculated basis) till 18th week of age. During the grower stage, birds were provided only day light. Females were housed in individual cages at 18th weeks of age and reared upto 72 weeks of age. During the layer stage, birds were provided 16 hours of light including day light. The chicks were vaccinated against common diseases as per standard vaccination program laid down at the farm.

Traits studied: The data on body weights at day old, 2, 4, 8, 20 and 40 weeks of age; were recorded in Mewari and Pratapdhan chicken in all three generations.. Birds were weighed individually at different ages and data recorded on body weights were analyzed statistically.

Statistical analysis: Randomized Design (CRD) with factorial was utilized for the analysis growth traits (Snedecor and Cochran 1994). A non-orthogonal factorial experiment with sex and hatch (2 × 4) as main effects for growth was employed for analysis of data using univariate GLM procedure of SPSS 16.0 for Windows (SPSS Inc. 1998) [23] and the individual means were compared using

Results and discussion

Growth performance: Genotype, sex and generation effects were significant ($P \leq 0.05$) on body weights up to 40 weeks of age, except 2nd week body weight, wherein sex had non-significant effect on body weight. The interaction effects were also significant ($P \leq 0.05$) on body weights at all ages except at 2nd week. Pratapdhan males in either generation 2 or 3 significantly performed better than others across the genotype, sex and generations. The performance of G3 was significantly better than other generations and also between the sexes and genotypes. This might be attributable to the fact that the parents of these birds were on genetic improvement through selection for body weight, which might have improved the body weight over the generations. The positive effect of selection in terminal cross was an established fact in poultry by many authors (Rajkumar *et al.* 2011, 2016, 2020; Haunshi *et al.* 2019; Jareda *et al.*, 2021) [22, 21, 20, 10]. The body weights were highest in Pratapdhan males at all ages in second or third generations followed by Pratapdhan females. The Mewari males in third generation had higher body weights than Mewari females of all generations. The results indicated that Pratapdhan performed better than Mewari, further males of Pratapdhan had higher body weights than all and both Pratapdhan and Mewari chicken performed better in third generation indicating effect of generation by way of selection

being followed in the parents. The data on three factor interaction indicated that the all three factors *viz.* breed, sex and generation had pronounced ($p < 0.05$) effect on body weights individually as well as in interactions. The juvenile body weights recorded in Mewari chicken in present study was higher than the body weights recorded by Haunshi and Doley (2011) [7] in Mizo local chicken, however the adult body weights in present study were slightly lower, which may be attributed to the genotype and environmental factors prevailed during the experiment. The body weights found at 8 weeks of age in Mewari and Pratapdhan were higher than body weights found in indigenous and crosses reported by Padhi *et al.* (1999) [17] and Padhi *et al.* (2004) [16] in Nicobari fowl and crosses. The body weight found in present study was comparable with the body weights reported by Jha *et al.* (2013) [12] in improved and desi birds under intensive system of rearing. Haunshi *et al.* (2009) [8] have also reported higher body weights in improved germplasm than Miri type of chicken at all the ages, which corroborates findings of present study where Pratapdhan had higher body weights at all ages compared to Mewari chicken. Further, similar to present study they also reported significant effect of sex on body weights. The body weights at 20 and 40 weeks of age were higher ($p < 0.01$) in Pratapdhan chicken. The adult body weights found in the present study were slightly lower than the body weights reported by Niranjana *et al.* (2008) [15] in different crosses for backyard poultry. The body weight recorded in Mewari chicken at 20 and 40 weeks of age in the present study were higher than Miri chicken as reported by Haunshi *et al.* (2009) [8]. The body weights of Miri type chickens recorded at four to eight weeks of age were slightly better than those reported for Nicobari fowl (Chatterjee *et al.* 2002) [4]. The body weights recorded in the present study at 20 weeks of age were higher than body weights reported by Padhi *et al.* 2004 [16] in Nicobari fowl and crosses. Hassen *et al.* (2006) [6] and Alam *et al.* (2014) [1] reported similar slow growth pattern of adult non-descript local hens in Ethiopia and Bangladesh respectively. Thakur *et al.* (2006) [26] suggested that *Kadakhnath* breed reared under tribal villages in central India exhibited similar growth pattern like *Mewari* breed. The body weights of Pratapdhan and Mewari were higher and lower than the indigenous Aseel breed at different weeks of age Haunshi *et al.* (2009) [8]; Rajkumar *et al.* (2017) [19] respectively. Higher body weight in commercial *Vanaraja* compared to the present findings was reported by Islam *et al.* (2014) [11]. The adult body weight of Mewari in the present study was slightly higher than the body weights reported by Mishra *et al.* (2019) [13] in local native germplasm under free range conditions, which may be attributed to intensive management system.

Conclusion

Pratapdhan chicken has shown significantly higher growth performance as compared to Mewari chicken under intensive system of management in all generation. The results suggest that Pratapdhan could be potential improved germplasm for backyard poultry production.

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