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Study on Climatic Adaptability of Improved Poultry Varieties under Backyard Rearing System at NICRA Village of Darrang District of Assam

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ABSTRACT

This study was carried out to evaluate the productive abilities of Kamrupa, Rainbow Rooster, Kalinga Brown, and Indigenous chickens as well as their adaptability to the agroclimatic conditions of the Darrang district in Assam when raised in backyard. To assess the birds in the backyard system, data were gathered on a variety of characteristics, including body weight, age at first egg, yearly egg production, survivability, etc. The mean body weights, egg production and egg weights were significantly higher in improved varieties (Kamrupa, Rainbow Rooster and Kalinga Brown) than indigenous variety at different ages. In comparison to Kamrupa, Rainbow Rooster, and Kalinga Brown chickens, the indigenous chicken reached maturity later. As the birds in all the studied breeds grew older, the mortality rates decreased. It can be inferred that the Kamrupa, Rainbow Rooster, and Kalinga Brown birds are well-suited to the climate of the Darrang district and can be raised in backyard systems for small-scale production of meat and eggs, providing a means of subsistence and ensuring nutritional security for rural communities

Key Words: Kamrupa, Rainbow Rooster, Kalinga Brown, Body weight, Egg, Backyard system

INTRODUCTION:

An important factor in improving the economic standing of India's rural populace is the poultry industry. Large amounts of cattle and poultry are abundant in North East India, and they are essential for raising the socioeconomic standing of the majority of rural residents. Having livestock, contributes significantly to a person's livelihood by creating jobs and boosting incomes. One of the main factors contributing to the growth in rural incomes is the diversification of agriculture through animal husbandry. India is ranked third in the world for egg production and eighth for meat production, according to production data from the Food and Agriculture Organization Corporate Statistical Database (FAOSTAT) (2020). The nation's egg output is increasing at an annual growth rate (CAGR) of 7.4%. In the current situation, urban and peri-urban areas account for the majority of commercial chicken production. Only 25 percent of people who live in cities eat between 75 and 80 percent of chicken and egg products. Malnutrition results from the lack of access to highly nutritious products like meat and eggs for rural residents due to the unavailability of poultry products and their low purchasing power. While large-scale commercial poultry production remains concentrated in urban and peri-urban areas, free-range and small-scale semicommercial backyard poultry production can be advantageously promoted in rural areas. It can be a potent tool for ending hunger, reducing rural poverty, and generating gainful employment. Resource-poor households' dietary protein intake and incomes can benefit from backyard production. Moreover, backyard systems are expected to generate a positive economic return despite growing competition from the commercial sector due to lower opportunity costs of resources and higher market prices offered for local poultry. In the current situation, the animal husbandry industry has also been impacted by climate change. Since birds can only withstand very small temperature variations, poultry, or chickens, are more susceptible to the effects of climate change. The average global temperature increased by 0.65 ºC during the 20th century, and tropical regions saw increases in precipitation of 0.2% to 0.3%. Since poultry do not have sweat glands, they are not well suited to high ambient temperatures. Chickens have a higher internal body temperature (41-42ºC) than humans and livestock from mammals (36-39ºC). When it comes to heat stress, poultry are much less resilient than other animals.

There is a dearth of information on systematic studies on the reproductive and productive performance of HYV birds in backyard systems, as well as their suitability for the environment and climate of Darrang district, Assam. The goal of this study is to determine how well HY poultry breeds, namely Kamrupa, Rainbow Rooster, and Kalinga Brown birds, perform in the climatic conditions of Darrang district. These breeds were given to farmers in the NICRA village of Darrng district, and their performance was studied.

MATERIALS AND METHODS

The current study was carried out at the NICRA village in the Darrang District under KVK Darrang as part of the NICRA project. In the Darrang district, 400 nos. of 15-day-old Kamrupa birds, 400 nos. of 15-day-old Rainbow Rooster birds, and 200 nos. of 15-day-old Kalinga Brown birds were given away to rural farmers in the NICRA village. Assam Agricultural University developed the Kamrupa birds, Rainbow Roosters were developed by Indbro Research & Breeding Farm, and Kalinga Brown were developed by Central Poultry Development Organization and Training Institution. The birds were given to 50 nos. farmers in total after discussions with VCRMC. Each of the fifty randomly chosen farmers from the Darrang district's flood-prone NICRA village received twenty chicks. Thus, a total of 1,000 chicks were utilized. The farmers who kept at least ten local chickens of various ages in their traditional system and had experience raising poultry from the area were chosen at random. Prior to supplying the chicks, the chosen farmers received training in "improved poultry rearing scientifically." The birds were vaccinated and given medication according to the standard schedule. Up until they were 20–25 days old, the chicks were raised in a hover brooder, which was constructed locally and consisted of a bamboo cage with four electric light bulbs. The chicks were provided with ad libitum broiler starter feed and clean drinking water at this stage. Once the chicks were acclimated to natural scavenging, they were released and given extra food in the morning and evening for a few days. Throughout the day, the free-range birds were permitted to forage in the vicinity of the farmer's home, where they consumed insects, earthworms, seeds, grasses, fallen grains, kitchen scraps, and other delectable materials. Intraocular vaccinations were administered to the birds on days five and twenty-four against the Ranikhet disease vaccine (Lasota strain) and on day fourteen against the Gumboro disease vaccine (Intermediate strain). The age at first egg, average body weight at 4^{th}, 8^{th}, 12^{th}, 16^{th} and 20^{th} weeks of age, yearly egg production, and survivability were all noted. The means of various traits were computed using standard statistical techniques. Standard methods were also employed to calculate the economics of the rearing.

RESULTS & DISCUSSION:

Body weight*:* The mean body weight of Kamrupa at 4^{th}, 8^{th}, 12^{th}, 16th, and 20^{th} weeks of age was recorded as 232.87 ± 5.27, 536.49 ± 5.74, 698.51 ± 12.45, 918.93 ± 11.01, and 1259.61 ± 8.93. The average body weight of a rainbow rooster was recorded as 311.76 ± 5.01, 635.03 ± 9.71, 982.73 ± 13.31, 1262.10 ± 14.59, and 1599.73± 11.13, and for Kalinga Brown, it was 313.73 ± 5.17, 615.04 ± 10.10, 761.59 ± 11.31, 1050.50 ± 13.75, and 1422.23 ± 15.20 for combined sex at 4^{th}, 8^{th}, 12^{th}, 16th, and 20^{th} weeks of age, respectively. In contrast, the backyard system yielded average body weights of 793.74±8.72, 631.60±5.65, 491.49±5.09, and 360.42±3.56 for native birds at the corresponding ages. It was observed that the body weight of kamrupa, rainbow rooster, and kalinga brown was considerably greater than that of the indigenous chicken. This finding may have been caused by the birds' distinct genetic composition. The current findings were consistent with the findings of Saikia *et al.* (2023). Across all studied varieties, males had higher mean body weight values than females. Male dominance may stem from factors like feeding and hormonal differences that cause males to build muscle more quickly than females. This study is supported by the numerous prior investigations (Ghosh *et al*., 2005) that have shown male birds to have a significantly higher body weight than female birds.

Egg production and weight: Table 1 presents the overall mean age at first egg for Kamrupa, Rainbow Rooster, and Kalinga Brown, which were found to be 163.10± 8.63, 170.11± 7.13, and 164.39 ±7.12 days, respectively. When native chickens laid their first eggs, they were on average 201.93±5.69 days old. The findings showed that the improved breed of chicken reached maturity ahead of the native Assamese chicken. The superiority of the birds' nutrition and germplasm may be the cause of all the improved varieties' noticeably lower ages.

The results of Islam *et al*., 2017 and Saikia *et al*., 2023 also support the fact that the mean annual egg production values in Kamrupa, Rainbow Rooster, and Kalinga Brown birds were significantly higher than the corresponding values of indigenous ones. 180.67±3.10, 187.51±7.17, and 192.00±2.19 were the mean annual egg production values reported for Kamrupa, Rainbow Rooster, and Kalinga Brown, respectively. The native birds lay 72.10±3.50 eggs annually. The extremely low yearly egg production in indigenous birds may be caused by the lengthy pauses between two clutches that are governed by their genetic makeup, leading to broodiness of these birds in those pauses

The observed significantly higher mean egg weights in Kamrupa, Rainbow Rooster, and Kalinga Brown breeds compared to native chicken may be attributed to those breeds' higher body weights and Assamese indigenous chickens' inferior genetic makeup. The weight of the eggs was measured and found to be 56.07 ± 3.59, 56.97 ± 3.53, and 55.87 ± 4.08 g. In contrast, the native breed yielded eggs weighing 36.17±2.30 grams. These findings agree with those of Saikia *et al.*

Parameters of study		**Kamrupa**	**Rainbow Rooster**	**Kalinga brown**	**Indigenous (Local)**
Mean Body weight (g)					
4^{th} week	Male	265.01 ± 6.58	339 ± 6.09	321.31 ± 6.72	201.30±3.41
	Female	201.49 ± 5.04	284.53 ± 5.13	268.65 ± 3.61	180.81±3.08
	Overall	232.87 ± 5.27	311.76 ± 5.01	313.73 ± 5.17	195.18±2.74
8^{th} week	Male	581.51 ± 6.48	703.01 ± 5.47	658.26 ±9.16	379.77±8.93
	Female	491.28 ± 5.01	567.17 ± 6.96	499.81 ±11.03	355.01±5.11

	Overall	536.49 ± 5.74	635.03 ± 9.71	615.04 ± 10.10	360.42±3.56
12th week	Male	795.23 ± 11.04	1021.07 ± 10.63	814.03 ±7.14	535.10±7.15
	Female	601.79 ± 8.31	890.59 ± 11.71	701.34 ±6.82	471.64±6.24
	Overall	698.51 ± 12.45	982.73 ± 13.31	761.59 ±11.31	491.49±5.09
16th week	Male	996.23 ± 5.75	1299.67 ± 10.51	1261.17 ± 8.48	677.13±7.29
	Female	841.63 ± 9.61	1026.31 ± 7.90	919.83 ± 6.41	612.01±3.01
	Overall	918.93 ± 11.01	1262.10 ± 14.59	1050.50 ± 13.75	631.60±5.65
20th week	Male	1290.97 ± 10.72	1891.67±10.75	1667.83 ± 8.24	850.00±7.77
	Female	1010.33 ± 9.69	1405.31 ± 15.00	1299.67 ±5.71	761.32±7.97
	Overall	1259.61 ± 8.93	1599.73± 11.13	1422.23 ± 15.20	793.74±8.72
Age at first egg laying (days)		163.10± 8.63	170.11± 7.13	164.39 ±7.12	201.93±5.69
Egg production (number / duck / year)		180.67± 3.10	187.51±7.17	192.00±2.19	72.10±3.50
Average Egg weight (g)		56.07 ± 3.59	56.97±3.53	55.87 ± 4.08	36.17±2.30
Egg colour		Brown	Brown	Brown	White
Survivality (%)		97.01 ±1.03	96.13 ± 1.90	96.39 ± 1.41	99.39±2.01
B:C ratio		2.55	2.57	2.60	1.04

Adaptability: It was discovered that early chick mortality was higher than that of adult chicken, regardless of variety. In each of the three scenarios, the mortality rates dropped as the birds grew older. The survivability values for Kamrupa, Rainbow Rooster, and Kalinga Brown were 97.01 ±1.03, 96.13 ± 1.90, and 96.39 ± 1.41, accordingly. The results indicate that these poultry breeds can adapt to the climatic conditions in the Darrang district of Assam, as evidenced by their lower mortality rate.

Economics: According to Chatterjee *et al*. (2002), backyard farming systems were relatively less expensive than intensive systems when it came to keeping birds. In accordance with the study, at backyard rearing systems, Kamrupa, Rainbow rooster, and Kalinga brown had benefit cost ratios of 2.55, 2.57, and 2.60, respectively. This suggests that raising high-yielding poultry breeds, such as Kamrupa, Rainbow Rooster, and Kalinga Brown, is a more advantageous and cost-effective option than raising Assamese indigenous birds locally for meat and eggs.

CONCLUSION:

Based on the results of this study, it can be said that improved chicken breeds perform significantly better than native chicken breeds in terms of body weight, egg production, and survival in a backyard rearing environment. According to the study, the improved chicken varieties Kamrupa, Rainbow Roosters, and Kalinga Brown were well-adopted in the backyard rearing system in the Darrang district's agroclimatic conditions and offered a sufficient economic advantage. Thus, the introduction of small-scale chicken farming into rural households' backyards will improve the rural population's economic and nutritional standing.

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