ISSN: 0975-833X

Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 15, Issue, 05, pp.24616-24619, May, 2023
DOI: https://doi.org/10.24941/ijcr.45300.05.2023

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

REVIEW ARTICLE

A REVIEW ON INDIGENOUS CHICKENS OF BANGLADESH– UNDERUTILIZED ANIMAL GENETIC RESOURCES FOR GENETIC IMPROVEMENT

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ARTICLE INFO

Article History:
Received 15th February, 2023
Received in revised form
24th March, 2023
Accepted 20th April, 2023
Published online 30th May, 2023

Key words:

Chicken, Genetic, Strategy, Nutrition, Poverty.

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ABSTRACT

Indigenous chickens such as non-descriptive deshi, Aseel, Naked Neck, and Hilly are available in Bangladesh. These chickens are the suppliers of protein and minerals and assist to create employment opportunities for rural people and reducing the poverty level. Their production potentialities in terms of meat and eggs are poor. Usually, a hen lays 50 to 90 eggs per year and their live weight varies from 1000 to 1500 g. There is no proper breeding and conservation strategy to increase their production potentialities that is these genotypes are underutilized. However, if a comprehensive conservation and breeding program is undertaken on these underutilized potential chicken genetic resources they could contribute to meet up the country's nutritional demand as well as it will assist to create opportunities for the unemployed rural people.

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Citation: ***Md. Enamul Haq Hazary and Md. Kabirul Islam Khan.*** **2023.** "A Review on indigenous chickens of Bangladesh– underutilized animal genetic resources for genetic improvement*". International Journal of Current Research*, 15, (05), 24616-24619.

INTRODUCTION

Poultry production is an important sector of agricultural production and also makes a significant contribution to the rural economy. There are 11 species of poultry available throughout the world, among them chicken and duck are common and they are playing the main roles in supplying protein and minerals to human. However, the chicken is fast-growing, most specialized, and commercial species. In the Asia-Pacific region, small-scale family chickens are prevailing in many areas. For small-scale production, indigenous chickens are prioritized as they possess desirable characteristics such as thermo tolerance, disease resistance, better egg productivity and hardy eggshell, high fertility, hatchability rates, meat flavor, and a high carcass percentage (Yemane *et al*., 2014). It is inevitable that indigenous chickens are considered low producers in terms of eggs and meat attributed to their poor genomic potential (Khan *et al.,* 2017; Faruque *et al.,* 2015).However, some chickens are potential and their utilization is still unrevealed as a potential genetic resource for sustainable production. Furthermore, these potential genetic resources require to conserve for future breeding and conservation to utilize as a potential genetic resource. As a result, the current study briefly reviews the underutilized existing genetic resources of chicken in Bangladesh.

Breed and types of chickens available in Bangladesh: A number of breeds, varieties, and strains have evolved during domestication and breeding practices around the world. The poultry population in Bangladesh is estimated at about 375.64 million, whereas the chicken population is about 311.80 million (DLS, 2022). The growth rate of chicken for the last 10 years was 3.75% (Hamid *et al*., 2017). Chicken is an integral part of the farming system in Bangladesh and has created direct, indirect employment opportunities including support services for over 8.5 million people (Hossain, 2020). Different breeds and types of chicken are available in Bangladesh. Chicken originated from a certain place with the same or similar characteristics are of the same class. For example, the Asiatic class, European class, American class, etc. Under a class, chickens with the same size, shape, and characteristic similarities with each other are of the same breed (Islam and Nishibori, 2009) like, Leghorn, Minorca, etc. According to the origin, the chicken is of four types of classes observed.

- Asiatic class: Brahma, Langshan, Cochin, Assel etc.
- English class: Austrolorp, Cornish, Dorking, Orpington etc.
- Mediterranean class: Leghorn, Minorca, Ancona, Fayoumi etc.
- American class: Rhode Island Red, New Hampshire, Plymouth Rock etc.

Table 1. Morphological Characteristics of underutilized chickens found in Bangladesh

Sl. no	Breed/variety	Characteristics
01	Aseel	Deep purple and black plumage color[6], Red earlobes[3,4,] body shape triangular and upright[4,6], skin color whitish to yellowish with yellowish shank[6], massive size and loose of plumage[1]
02	Naked neck	Blackish and reddish plumage color[3,6], skin color yellow[6], shank color grey or yellowish[4,6]. medium size[1,2,3,4]Non-feather neck region[1,2,3,4,6]
03	Hilly chicken	Small size and round[1,2,3], tight plumage[2,3], plumage color grey or reddish[1,3,4,5,6], **s**kin color yellow[1,3,4,6], **e**gg shell color brownish[1,2,3,4,6]
04	Indigenous chicken	Plumage colors black and red[6], white, grey[1,3,4,6], skin color whitish or yellowish[1,2,3], comb type mainly single[1,3,4,6], egg size medium[1,3,4]

[1]Faruque *et al*. (2017), [2]Khan *et al*. (2017), [3]Faruque *et al*. (2010), [4]Bhuiyan *et al*. (2005), [5]Khan *et al*. (2004),Khan, (2019)[6].

Table 2. Productive and reproductive performance of underutilized indigenous chicken

Traits	Indigenous chicken variety			
	Non-descriptive Deshi	Naked neck	Hilly	Aseel
Hatch weight (g)	26-32[2,13]	30[2,6]	33[14],26-30[6,13]	28.9[5]
4th-week weight (g)	231[14]	212[14]	253[14]	142.4[5]
8th-week weight (g)	571[14]	545[14]	675[14] 504[19]	
12th-week weight (g)	943[14] 979[10]	940[10] 835[14]	1251[10] 1194[14]	821.2[5]
16th-week weight (g)	1300[10]	1213[10]	1502[10]	1122.5[5]
Age at first egg (days)	186[9], 175[2,4], 190-200[2]	175[9,2,7], 153[10]	161[10], 150[11], 168[15] 160-190[16]	202[1],270[2]
Live Weight at sexual maturity (g)	806[9], 1141[2], 1212[12]	1181[12], 1149[11], 782[9]	1326[11], 1499[12], 1420[15], 1429[10]	1500[2]
Mature live weight of hen (g)	1000 - 1300[2,6,8,22]	1200- 1500[2,6,13]	1401[19,20],1700-2250[6,8]	2062[1],2288[2]
Mature live weight of cock	1300[23] 1600-700[13] 2000-2500[13]	1500-2000[13]	2500-3000[13] 2690[19,20]	3749[1] 3000[2]
Growth rate of females (g /week) from 8 to 30 weeks	37[18]	36[18]	43[18]	
Egg production/hen /year (no.)	45-50[2,3], 79[21],	50-55[2,3]	80-100[2,6,8,11]	24-48[1],33[2]
No. of eggs/clutch	9 -17[6,21,22]	10-12[3,4,6]	8-11[3,6,7,21]	10-12[1]
No. of clutch/year	3-4[2,11] 4[9]	4[9]	5-6 [15]	2-4[1]
Egg weight (g)	35-39[2,6]	42-44[7,8,13]	42-45[1,7,13]	37-48[1],44 - 48[2]
Mortality (%)	4[25], 19[23]	-	15[23]	
Fertility (%)	89[14], 86[12], 83[2,5]	75[17], 80[6,7,8]	96[2,3,4] 88[13], 87[15], 85[12]	
Hatchability (%)	75 – 87[2,6], 73[9]	70-80[2,6,7,17], 77[9]	91[2,3], 84[15], 80[13]	71.68[1]

[1]Sarker*et al*. (2012), [2]Bhuiyan *et al.* (2005), [3]Barua (1992), [4]Sazzad (1986), [5]Rajkumar*et al*. (2017), [6]Khan *et al*. (2004); [7]Haque and Assaduzzaman (1990), [8]Ahmed and Islam (1985), [9]Jahan *et al*. (2017), [10]BLRI (2016);[11]BLRI(2004), [12]Faruque *et al.* (2015),[13]BLRI (2017),[14]Faruque *et al.* (2017),[15]Khan *et al*. (2017), [16]Islam *et al.* (2003),[17]Salauddin *et al*.(1995),[18]Sarker *et al.* (2014), [19]Rahman(2003), [20]Rahman *et al*. (2010),[21]Khan *et al*. (2018), [22]Das *et al*. (2008), [23]Rahman and Salauddin (2017).

Chicken are three types on the basis of production

Layer: The layer is for egg production and is used for commercial purposes. Some popular layer breeds: Leghorn, Minorca, and Fayoumi; and layer strains: ISA brown, Novogen brown, B.V. 300, ISA White, Lohmann Brown, Lohmann White, Hisex Brown, Hisex White, Starcross-579, Hy-line,etc (BPD, 2019).

Broiler: Broiler chickens are meat-type chickens; they are mostly reared worldwide for commercial purposes. Star brow, Mini brow, Hi-line, Hubbard classic, Cob 500 and Lohmann meat, Starbro, Ross, Arbor Acres, and Vancobb etc. are popular broiler strains (BPD, 2019).

Dual (egg and meat) type: These types of breeds are used for the purpose of both egg and meat production. Rhode Island Red, New Hampshire, Plymouth Rock, etc. (Islam and Nishibori, 2009) are popular breeds for both meat and egg production.

Indigenous chickens: Native chickens are very important to humans as a means of support and poverty alleviation in developing countries (Yemane *et al.,* 2014). As with other chicken production in other developing countries, poultry farming in Bangladesh is mainly a backyard type. It plays a key role as a profitable business for the economic development of Bangladesh. Moreover, the indigenous chickens, including Non-descriptive deshi, Aseel, Naked Neck, and Hilly chickens mostly are varied in morphological and phenotypic features, but they are well adjustable under natural conditions (Noor *et al.,* 2021). Variations of the indigenous chickens of Bangladesh could be found on the basis of plumage color, comb type, and feather pattern, and production performance (Faruque *et al*., 2017, Khan *et al*., 2017). Deshi cockerel has high demand the in local market due to its tenderness and special taste (Ahmed and Ali, 2007) and they are popular with rural, peri-urban and urban people (Chowdhery, 2012). The preference of indigenous chicken is for pigmentation, taste, leanness, firmness, flavor, and suitability for special dishes (Islam et al., 2002). The morphological characteristic of the available genotype of chickens in Bangladesh is presented in Table 1.

Performance of underutilized Indigenous chickens: The productive and reproductive performance of native chickens especially for non-descriptive deshi (ND), naked neck (NN), and hilly (HH) chickens are presented in Table 2. Indigenous chickens have poor productivity, usually, they are laying 45 to 50 eggs (Rahman and Salah Uddin, 2017) and 1.0 to 1.5 kg of meat per year (Islam *et al.,* 2003) with an average egg weight 30 to 40g/egg, (Khan *et al.,*2017) and attain 1212.2±6.6 g live weight at a mature age (Faruque *et al*., 2015).Further, Desha *et al*. (2015), found hatchability of NN and ND chicken 71.80% and 77.52% respectively and the weight at 17th weeks of male and female was 1093g and 507g. While, Jahan *et al.* (2017) observed that the productive traits of ND chickens such as body weight at hatch, and body weight at ASM were 24-25g, 782-817g, and 25 weeks to 26.50 weeks respectively. Moreover, the eggs per clutch, clutch per year, hatchability, and survival were 11.04-12.89, 3.74-4.15, 70.31-76.67, and 48.86-61 respectively. Magothe *et al.* (2012), obtained that hens lay about 45 eggs per year with a range between 30 and 75 eggs under free-range and semi-free-range systems with a mean egg weight of 47.4 g (range 36 to 52 g).

Rahman *et al.* (2013) stated that the hen day egg production of hilly chicken is 22.10%, the average egg weight is 42.6 g, the daily feed intake during the laying period was 101g, The mortality was 16.4%, the average body weights of productive female and male hilly chicken were 1701.6 g and 2690 g, respectively, Fertility of hatching eggs of hilly chicken was 96.33% and hatchability of eggs of hilly chicken was 91.35%. Khan *et al.* (2017) reported that in consideration of three traits (egg production, egg weight and mature live weight) in different types of hilly and non-descriptive deshi chickens, the hilly produced (7.67 numbers /month /chicken) more eggs than deshi types (6.85 number /month /chicken). Among the hilly chickens, the reddish

brown type produces more eggs than the spotted black and white type (Khan *et al.,* 2018). Khan *et al*. (2018), observed characterized two hilly (RB and SWB) chickens that the no. egg production/ month/ bird, egg production/bird/year, egg weight (g), live weight of female chicken (g), and clutch size (d) were 7.89, 94.66, 41.52, 1454.58,11.07 respectively in the hilly RB chicken as well as 6.52, 78.24, 41.63, 1366.15, 12.03 respectively in the hilly SWB chicken. Moreover, the egg weight of both types of hilly chickens ranged from 40.46 to 43.85g. Among the different types of native chickens the production potentialities (live weight, egg production and egg weight, etc.) of hilly chicken is relatively higher as compared with other native chickens of Bangladesh (Khan *et al*., 2017). Furthermore, native Hilly chickens are unique for their well adaptive, comparatively higher resistance to disease, broodiness, and higher survivability in comparison to other natives (Khan *et al.,* 2017; Faruque *et al.,* 2015).

CONCLUSION

It is mentionable that indigenous chickens are poor producers of eggs and meat but, they adapt to the hot humid climate, are resistant to poor management, and tolerate the disease. Further, this chicken has a huge potential in enhancing the availability of eggs and meat in rural areas, besides generating employment and a supplementary income and empowering women, etc. In Bangladesh still, there are some underutilized potential chicken genetic resources available. These underutilized potential chicken genetic resources could contribute to meet up the country's nutritional needs as well as the generation of income opportunities for the unemployed rural people. However, to utilize these potential chicken genetic resources structural genetic improvement and conservation program is essential.

ACKNOWLEDGMENT

The authors express their sincere gratitude to the Krishi Gobeshona Foundation (KGF) (Grant No. KGF BKGET, CRP-IV/Hill-Livestock/ Fund Released/2017/703, Date: 09-04-2017), for providing funds to implement this research.

Disclosure of interest: The authors report no conflict of interest.

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