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Study on the productive and reproductive performance of 3 native genotypes of chicken under intensive management

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Abstract

To improve the native chicken, a total of 75 males and 750 females was reared from the 3 types of chicken namely, Naked neck (NN), Hilly and Non descript *deshi* (ND) which have been collected from different parts of the country. The number of each Naked neck (NN), Hilly and Non descript *deshi* (ND) type of chicken in the foundation stock genotypes were 275 (250 females and 25 males). Multiplication of the established birds has already been started and the present stock will be increased as required for future selective breeding work. These foundation stocks were raised under confinement with standard management practices and vaccination. They were supplied the nutrient as per recommendation. All productive, reproductive and egg quality parameters at 38 weeks of age were studied. The results indicate that the percentage of hatchability on fertile eggs and set eggs and also dead in shell (embryonic mortality) were significantly different ($P<0.01$) among genotypes. No significant difference ($P>0.05$) was observed in age at sexual maturity, fertility, dead in germ, normal chicks and abnormal chicks among the 3 native genotypes. Significantly difference ($P<0.01$) was found in body weight among the 3 native genotypes at 38 weeks of age. Egg weight was similar in NN (42.94) and ND (42.08) and lowest in Hilly (40.25). No significant difference ($P>0.05$) was found in morning egg production rate, egg production, feed intake and survivability. But significantly ($P<0.01$) highest afternoon egg production was found in NN (32.68%) and lowest and similar in Hilly (27.23%) and ND (28.31%). The egg quality traits; egg weight, yolk index and shell thickness were significantly different ($P<0.05$), but the other egg quality traits were not significantly different ($P>0.05$) among 3 genotypes. The native germplasm is very much potential in context of disease resistant and genetic variability under the existing harsh environment. So we can use these for future breeding program to improvement and upgrading the native genotypes and exotic one.

Keywords: Native chicken, Intensive management, Productive, Reproductive and Qualitative traits

Introduction

Poultry play a vital role in rural economy of Bangladesh. It provides a substantial amount of family income for small, marginal and landless poor. Most of the poultry meat (86%) and eggs (75%) are produced from the native flock maintained by farmers (Huque and Stem, 1993). Traditional rural backyard scavenging system consisting of the local native birds with an annual average production of 35-49 eggs/hen each weighing 35-39 g. (Huque, 2001). In rural areas, non-descript native poultry are keeping as scavengers, which produce meat and eggs with little or no investment in feeding, management and housing. The native chicken of Bangladesh are non-descript, i, e, they do not belong to any particular breed/variety. However, some special types of native chicken such as Aseel, Chittagong bird, Naked neck, Hilly etc. are recognized. The poor farmers have no ability to invest on improved technology for modern system of poultry farming with high performing hybrids. A type suitable for rural rearing can only be possible by developing from the native type, which are already adapted under the existing harsh environment. Native poultry represent more than 70 percent of the total poultry where 74 percent of the households keep poultry in Bangladesh. In this country, poultry have been raised under adverse climatic conditions and without protection against

diseases. The total population in Bangladesh is about 90 million and poultry and the egg productions are about 211.4 and 1500 million. To reduce the gap between demand and supply of animal protein, we should take measures to improve the native birds.

Indiscriminate random breeding among native types of chicken and unplanned crossing with exotic breed are destroying the original properties and characteristics of the native chicken. As a result a valuable genetic resource may be of native genotypes lost forever from the native types. The native chicken might have certain favorable genes, which may not be found in the exotic stock and thus may be used for creating new genetic variability. Therefore, the local germplasm must be conserved in adequate quantities for future use and their selective breeding is necessary. Intensive poultry farming in Bangladesh is accelerating at a faster rate in the present decade. To improve the local genotypes, the indigenous stocks should be raised under confinement with standard management practices and vaccination. With those considerations, the present study was designed to compare the productive and reproductive performances of native genotypes under intensive management and to maintain and improve the genetic potentiality of indigenous genotypes through selective breeding

Materials and Methods

A foundation stock consisting of 75 males and 750 females was established from the 3 types of chicken namely, Naked neck (NN), Hilly and Non descript *deshi* (ND) which have been collected from different parts of the country. The number of each Naked neck (NN), Hilly and Non descript *deshi* (ND) type of chicken in the foundation stock genotypes were 275 (250 females and 25 males). Multiplication of the established birds has already been started and the present stock will be increased as required for future selective breeding work. These foundation stocks were raised under confinement with standard management practices and vaccination. The birds were housed in an open sided semi gable type roof with concrete floor. Fences were made from galvanized wire net. The adult birds were reared in a cage individually. The house was cleaned, washed and then disinfected before the start of the experiment. Feed and water were offered two times in a day at morning and evening. Both feeders and drinkers were cleaned daily in the morning. They were supplied the nutrient as per recommendation. All productive, reproductive and egg qualities at 40 weeks of age parameters were studied. All the collected parameters were analyzed through a SPSS statistical package in the computer. One thermometer and a dry and wet bulb hygro-meter were hanged in the experimental room to record temperature and relative humidity. The temperature and humidity percentages were recorded 3 times a day i.e. morning, noon and evening in each day.

For reproductive performance
Selective breeding:

Population of the 3 native genotypes in pedigree selection

Name of genotype	Sex	No. of day old chicks	No. of growing chicks		No. of adult bird	No. of Selected bird	
			5 wk.	16 wk.		Selected	Spare
NN	Male	250	85	80	80	16	10
	Female	250	230	200	200	80	-
Hilly	Male	250	85	80	80	16	10
	Female	250	230	200	200	80	-
ND	Male	250	85	80	80	16	10
	Female	250	230	200	200	80	-

Basis of selection

Data have been collected from the genotypes on the basis of the following selection index parameters such as age at sexual maturity, body weight, egg production and egg weight. The selection Index were computed by the following equation:

Selection Index I = b1X1 + b2X2 + b3X3 +.....+ bnXn
X1,X2,...Xn represent the phenotypic value for the trait
b1,b2....bn denote the relative weight given to each of the trait

Results and Discussion

Reproductive traits

Reproductive traits of Nacked neck (NN), Hilly and Non descript *deshi* (ND) genotypes of chicken is shown in Table 1. Among the 3 native genotypes no significant difference (P>0.05) was observed in age at sexual maturity, fertility, dead in germ, normal chicks and abnormal chicks. Islam *et al.*(1981) and Hoque *et al.*(1975) reported that the fertility and age at first lay were 83% and 175days (25 weeks) respectively. The age at sexual maturity among the 3 native genotypes observed in the present study contradicts the result of Barua (1992); Huque *et.al.* (1990); Sazzad (1986); BLRI (1999) and Huque (1999). They observed that Deshi chicken attains puberty relatively earlier than other indigenous types and the higest days at maturity was 240-300 days in Aseel birds follwed by 234 and 175 days respectively in Naked Neck and deshi chicken. But it was found that percentage of hatchability on fertile eggs and set eggs and also dead in shell (embryonic mortality) were significantly different (P<0.01) among genotypes. The hatchability of set eggs in Deshi chicken obtained coincides with the findings of Barua (1992) and Sazzad (1986). They showed that the hatchability of set eggs was 75-87% in Deshi chicken.

Table 1. Reproductive traits of Naked neck (NN), Hilly and Non descript *deshi* (ND) genotypes of chicken

Parameter	Genotypes				Level of significance+
	NN	Hilly	ND	Average Mean	
	Mean ±SE	Mean ±SE	Mean ±SE	±SE	
Age at sexual maturity (wks)	23.49 ±0.28	23.35±0.29	23.50±0.19	23.45±0.15	NS
Fertility (%)	88.09±2.11	88.40±2.31	94.86±1.38	90.45±1.48	NS
Hatchability on fertile eggs (%)	78.33±0.28^a	90.79±1.55^b	88.86±1.93^b	85.99±6.19	**
Hatchability on set eggs (%)	68.99±1.49^a	80.26±2.50^b	84.29±2.10^b	77.84±2.51	**
Dead in germ (%)	1.55±0.82	1.2±0.60	2.06±1.36	1.60±0.50	NS
Dead in shell (%)	19.81±1.06^b	8.01±1.50^a	8.9±2.90^a	12.24±2.14	**
Normal Chicks (%)	99.25±0.75	98.96±1.04	98.91±1.09	99.03±0.48	NS
Abnormal chicks (%)	0.75±0.75	1.04±1.04	1.09±1.09	0.96±0.48	NS

+NS, P>0.05; *P<0.05; **P<0.01
a,b Values with superscripts within the same row differs significantly

Productive parameters

Productive performance of Naked neck (NN), Hilly and Non descript *deshi* (ND) genotypes of chicken under intensive management is shown in Table 2. Body weight at 38 wks of age was significantly (P<0.01) highest in Hilly (1429.06g) compared to ND (1358.37g) followed by NN (1252.26g). The result of present study is supported by many previous findings Okada *et al.* (1988); Huque and Assaduzzaman (1990) and BLRI (1999).They reported that the mature body weight of Deshi and Naked Neck was 1-1.3 and 1.171 kg respectively. Huque (1999) also reported that the mature body weight of Deshi chicken was 1-1.5 kg. Egg weight was the highest (P<0.01) and similar in NN (42.94g) and ND (42.08g) and lowest in Hilly (40.94g).Hoque *et al.*(1975); Sazzad (1986); Ahmed and Islam (1985) and Huque (1999) are in partial agreement with this result. They observed egg weight varied from 35-39g in Deshi and was 42g in Naked Neck chicken. No significant difference (P>0.05) was found in egg production and also morning egg production rate. But significantly (P<0.01) highest afternoon egg production was found in NN (32.68%) and lowest and similar in Hilly (27.23%) and ND (28.31%). No significant differences (P>0.05) in feed intake and survivability were found among the genotypes Hoque *et al.* (2003). Azizul and Reza (1980) observed that mortality rate was slightly lower in Naked Neck than Deshi chicken.

Table 2. Productive performance of Naked neck (NN), Hilly and Non descript *deshi* (ND) genotypes of chicken under intensive management

Parameter	Genotypes				Level of significanc+
	NN	Hilly	ND	Average	
	Mean ±SE	Mean ±SE	Mean ±SE	Mean ±SE	
Body wt (g/bird) (at 38 wks of age)	1252.26±2.20 [a]	1429.06±1.82[b]	1358.37±1.84[c]	1346.57±25.72	**
Egg weight (g)	42.94±0.43[a]	40.25 ±0.44[b]	42.08 ±0.29	41.76±0.23[a]	**
Egg production (%) (at 32-40 wks of age)	55.40±1.85	56.48±1.90	57.27±1.26	56.39±0.98	NS
Egg production (%) (Morning)	70.80±2.55	72.76±1.18	70.00±1.76	71.18±1.15	NS
Egg production (%) (Afternoon)	32.68±1.24[a]	27.23±1.39[b]	28.31±1.45[a]	29.41±0.79	**
Feed intake (g/bird/d)	83.68±1.07	82.87±0.21	83.00±0.97	83.19±0.44	NS
Survivability (%)	96.00±0.06	96.67±1.20	94.67±1.20	95.78±0.60	NS

+NS, P>0.05;*P<0.05; **P<0.01
a,b,c Values with superscripts within the same row differs significantly

Egg quality traits:

Egg quality traits of Naked neck, Hilly and Non descriptive *deshi* chicken is shown in Table 3. It was observed that egg weight was significantly (P<0.05) highest in NN (46.45g) intermediate in Hilly (44.83g) and lowest in ND (43.83g). Egg weight, Yolk index and shell thickness were significantly different (P<0.05) among the genotypes. On the other hand the variation in Albumen index, Yolk Color, Shape index, Haugh unit, Shell surface area, Breaking strength, Membrane weight, Shell weight, Albumen weight and Yolk weight among the genotypes were statistically non-significant.

Table 3. Egg quality traits of Naked neck, Hilly and Non descriptive *deshi* chicken

Parameters	Treatment			Mean ± SE	Level of significance +
	NN	Hilly	ND		
	Mean ± SE	Mean ± SE	Mean ± SE		
Egg weight	46.45±1.17	45.83±0.89	43.83±1.02	45.04±0.64	0.007*
Albumen index	0.083±0.001	0.073±0.008	0.056±0.013	0.071±008	0.453^{NS}
Yolk index	0.46±0.008	0.42±0.005	0.40±0.012	0.428±0.01	0.009*
Yolk Color	6.66±0.33	5.66±0.66	6.33±0.16	6.22±0.26	0.332^{NS}
Shape index	0.77±0.011	0.79±0.003	0.77±0.013	0.778±0.006	0.300^{NS}
Haugh unit	74.76±5.35	72.93±5.44	62.45±12.36	70.04±4.6	0.566^{NS}
Shell surface area (SSA)	59.68±1.06	58.20±00.81	57.29±0.93	58.93±0.58	0.727^{NS}
Breaking strength(BS)	1.70±0.037	1.64±0.029	1.61±0.34	1.65±0.02	0.290^{NS}
Shell thickness	0.446±0.003	0.406±0.006	0.413±.005	0.420±0.006	0.004*
Membrane thickness	0.026±0.006	0.023±0.003	0.03±0.005	0.026±0.003	0.076^{NS}
Shell weight	4.93±0.366	3.96±0.427	4.11±0.448	4.43±0.25	0.325^{NS}
Membrane weight	0.32±0.11	0.14±0.037	0.13±0.028	0.20±0.04	0.188^{NS}
Albumen weight	24.49±0.66	22.89±1.02	22.04±0.54	23.14±0.527	0.154^{NS}
Yolk weight	14.67±0.355	14.63±0.238	14.21±0.588	14.50±0.22	0.706^{NS}

+ NS, P>0.05;*P<0.05

The native genotypes are very much potential in context of disease resistant and genetic variability under the existing harsh environment. So we can use these for future breeding program to improvement and upgrading the native genotypes and exotic one.

References

Ahmed, S and Islam, N. 1985. Backyard poultry development project in 100 villages. *Proceedings of the 1st Conferrence of Bangladesh Animal Husbandry Association.* February 23-24, 1985. BARC. Dhaka: 133-138.

Azizul, H.D. and Reza, A. 1980. A comparative study of the performances of exotic breeds and indigenous birds under Bangladesh condition. M. Sc. Thesis, Department of Poultry Science. Bangladesh Agricultural University. Mymensingh.

Barua, A. 1992. A study on the performances of Rhode Island Red, indigenous chicken and their crossbred chickens with or without extra feeding under the rural condition of Bangladesh. M. Sc. Thesis, Department of Poultry Science. Bangladesh Agricultural University. Mymensingh.

BLRI.1999. Research Achievement and Activities Report, 1999. Bangladesh Livestock Research Institute , Savar , Dhaka, Bangladesh.

Huque, Q.M.E., Ebadul, M.H. and Rigor, E.M. 1990. The effect of chick separation on productivity of the hen and chick. Asian-Aust. J. of Anim. Sci. 3(2): 121-123.

Huque, Q.M.E. and Assaduzzaman, U. 1990. Feeding pattern of birds under scavenging condition and formulation of supplementary ration using the local ingredients. *Second Annual report*,Poultry Production research Division, Bangladesh Livestock Research Institute , Savar , Dhaka, Bangladesh.

Hoque, M., Ali, A. and Rahim, Q.M.F. 1975. A study on the upgrading of indigenous chickens of Bangladesh with White Leghorn, New Hampshire and White Cornish. Poultry Breeding Project. Department of Animal Breeding and Genetics. Bangladesh Agricultural University. Mymensingh.

Huque, Q.M.E. 1999. Poultry research and development in Bangladesh. *Proceedings of the 1st Seminar and International Poultry Show.* Organized by the Would Poultry Science Association, Bangladesh Branch, Dhaka: 276-278.

Huque, Q.M.E. 2001. Poultry Industry in Bangladesh and Strategies for its improvement. *Proceedings of the 2nd Seminar and International Poultry Show.* Organized by the Would Poultry Science Association, Bangladesh Branch, Dhaka: 276-278.

Huque, Q.M.E. and Stem, C. 1993. Current status of poultry production and marking system in Bangladesh, Bangladesh Agricultural Research Council, USAID/CHECCHI & Company Consulting, Inc.

Islam, A.B.M.M., Huque, M.M. and Rahim, Q.M.F. 1981. Reproductive performance of upgraded Indigenous Chicken . *Poultry Adviser.* 17: 32-37.

Okada, I., Maeda,Y., Ota, K., Namikawa,T., Amano,T., Kurosawa, Y., Hasnath, M.A., Faruque, M.O., Majid, M.A. and Karim, M.D.R. 1987. Genetic study on native chickens in Bangladesh. In: Genetic studies on breed difference action of the native domestic animals in Bangladesh, part. 2. Hiroshima University. 1987:11-26.

Sazzad, M.H. 1986. Reproductive performance of Deshi hens under scavenging and intensive system of rearing , Proceedings of 1st Annual Livestock Research Institute, Savar, Dhaka.