

Performance of Sonali Meat Chicken under Farming Condition at Keshabpur Upazila, Jashore



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Abstract

Data were collected from 10 Sonali farms in 4 different villages of Keshabpur upazila of Jashore district of Bangladesh to explore knowledge about the Sonali chicken rearing practices. Maximum farmers reared Sonali in an intensive system, took brooding care. The feed items of Sonali were ready feed and handmade feed. The main water source was a tube well. However, most of the Sonali farmers used vaccines against ND, IBD, IB, F.POX and MAREK'S disease. The present study was aimed to study the trends of body weight gain in Sonali chickens under intensive farming conditions. Data on the study population comprised of 10 farms containing 1500 Sonali chickens on every farm were collected using a predefined questionnaire. Descriptive statistical analyses for variables were performed using SPSS. It was observed that around the same amount of handmade diet was supplied to chickens. Results show that the daily live-weight gain was measured to compare the mean weight gain in Sonali. The average feed intake by a bird at 1st, 10th, 20th, 35th, 45th, and 60th days was 5.50±0.17 gm, 13.41±0.15 gm, 24.60±0.62 gm, 34.00±0.76 gm, 42.70±0.94 gm, and 53.60±1.27 gm, respectively. The average body weight at 1st, 10th, 20th, 35th, 45th, and 60th days was 28.70±0.30 gm, 108.30±0.42 gm, 195.00±4.05 gm, 431.00±10.89 gm, 619.50±17.10 gm and 856.00±26.26 gm, respectively. These variations were highly significant ($p < 0.001$) in Sonali chicken. The average FCR of Sonali chicken at marketing age was 2.1

Keywords: Sonali rearing, growth rate, vaccine, feeding system, chicken

1. Introduction

Bangladesh is an agro-based country in the Southeast Asian region. Livestock specially poultry is an important sector for employment generating and poverty reduction in this country (GOB, 1999). The contribution of poultry to the total animal protein was about 22 to 27 per cent in the country (Ahmed and Haque, 1990). About 89% of the rural people that rear livestock were also found to rear poultry (BBS, 1996). Poultry meat and eggs are used chiefly as human food and poultry meat alone contributed 29% of the total meat production in Bangladesh (BBS, 2001). FAO (2003) estimated the status of poultry production in the country to be 140 million chickens and 13 million ducks. The importance of livestock can be understood by showing its contribution to Gross Domestic Product (GDP). Livestock sectors contribution to GDP was 2.80% in 1990-91, which increased to 2.92% in 2005-06. Now-a-days it increased 7-8% of total GDP. However, the livestock sub-sector grew at a rate higher than the annual growth rate of the overall agricultural sector.

The production and reproductive performance of chickens under intensive management provide important guidelines for the poultry enterprise in the country (Islam et al., 2003). The hybrid "Sonali" is derived from the cross between RIR cock and Fayoumi hen. The average body weight

of the cock is 2.5 kg and a hen is around 2 kg. This cross is popular for its light weight, body color and taste resembling that of indigenous chicken. Currently, Sonali chickens are widely used as an alternative to indigenous/deshi chicken in the country. These two breeds had considerable customer requirements either for meat or egg characteristics. Research reports on the production (meat) performance of Sonali breeds are suitable for the environment of Bangladesh. From the current state of small-scale production units, it has become vital to get some important idea on farming of poultry production scenario in the country, this study was carried with the following objectives.

The objectives were as follows:

- ❖ To evaluate the body weight of Sonali chickens according to their feed under intensive farming conditions.
- ❖ To compare the trend of body weight gain among 10 farm

2. Materials and Methods

2.1 Description of the study area

The present study was about Sonali farm (meat) purpose in Keshabpur, Jashore. There are renowned farms for Sonali chickens in villages of Keshabpur upazila (Figure 1). The mean maximum and minimum temperature of the study period were 40°C and 35°C respectively and its average relative humidity was 62%. Most of the people are depending on poultry farming in this study area.



Figure 1: Map showing Keshabpur Upazilla.

2.2 Study population

A total of 10 farms (Sonali chicken meat purpose) were selected randomly from eleven and five birds from each farm were measured to get body weight weekly. The average flock size of each breed was 1500 chickens.

2.3 Data collection time

The study period was conducted from of 1st February 2021 to 30th March 2021. The number and type of chicken reared by the farmers to be influenced by season, the highest number of birds were present on the farm from January to March about (42%) and the lowest number from July to September (about 26%).

2.4 Survey procedure and data collection

Data was collected by direct interviews and by visiting the farms of Sonali farmers in the study area. Secondary data and information were collected from various journals, Upazilla veterinary hospital and government publications. A predefined questionnaire was used to collect the information regarding general management, ration, feed intake, body weight gain, vaccination, disease, biosecurity, experience and education of the farmers. Feed offered to the chicken was measured every morning and refusal were recorded the next day morning and the differences between offered and refusal were calculated as intake. Body weight of chickens was taken 1st, 10th, 20th, 35th, 45th, and 60th days using a digital balance.

2.5 Statistical analysis

Collected data were entered into Microsoft office 2013 Excel worksheet. Descriptive statistics for different variables were analyzed using Statistical Package for the Social Sciences (IBM SPSS) software for Windows 10. The differences in the means of variables ($p < 0.001$). The Pearson correlation between feed intake and weight gain is 0.978 which is significant ($p < 0.01$).

3. General Management

3.1 Preparation of house

Before placing the experimental birds into shads, the whole unit was cleaned and disinfected and kept for two weeks. Phenol was used as a disinfectant and dry rice husk was used as litter. From first day, some farmers increased the space in a farm by following way: day 1-4:- 25 ft long board was rounded and inside of this was used for brooding for 500 chicks. From 4 to 7 day, 42 ft long board was used for this amount.

3.2 Brooding

In a poultry starter house, five brooding boxes were placed for the rearing of chickens until four weeks. One hundred chickens were reared in each box until four weeks and heated with 250-watt bulbs in brooding hay boxes. After four weeks it transferred into the grower house. Chicks of all pens were brooded under the brooder. The chicks were provided with a temperature 34⁰ C at the first week of age, which decreased gradually at the rate of 3⁰ C every week until approximately dropped to 23⁰ C (Table 1).

Table 1: Temperature maintained in the brooder house

Age	Temperature
1 st week	34 ° C
2 nd week	31.5 ° C
3 rd week	27 ° C
4 th week	24.5 ° C
5 th week	23 ° C

3.3 Housing and floor space

The place needed for Sonali depended on how many days it would be reared for. The height of the house was 8-9 ft. The house was constructed east to west direction. The concrete floor was preferable. The floor space required for a Sonali was 0.85-0.95 sq ft.

3.4 Feeder and water management

For the first 3 days, the feed was given ad libitum to the birds on newspaper and water was supplied in round plastic drinkers. Two flat types of feeder for 100 chicks were provided. After seven days, one feeder was provided for 40 birds and one waterer for 50 birds (Table 2). The feeders and drinkers were set properly so that birds were able to eat and drink conveniently. Drinkers were thoroughly cleaned and washed every day. Fresh, clear and cold drinking water was made available all the time. Some water-soluble vitamins and antibiotics were supplied to the birds with drinking water.

Table 2: Number of feeder and waterer requirements for Sonali chicken at different ages

Age	Number of feeder	Number of waterer
1-7 days	2 flat type of feeder for 100 chicks	1-2 for 100 chicks
8-30 days	1 for 40 birds	1 for 50 birds
after 30 days	1 for 30 birds	1 for 40 birds

3.5 Beak trimming

Beak trimming was done between 7 to 10 days for better growth and feed intake.

3.6 Litter management

The surface of the floor is covered with a bedding material called litter. It was placed prior to the chick placed in the house. The best way is to remove all previously used litter and wash the house after every flock. The producer mainly used rice husk collected from auto rice mills as litter material. The depth of the litter was 2 inches in summer and 3 inches in the winter season. Due to the high possibility of fungal infestation, they avoided wood savings. Farmer used to stirrer litter materials two to three times a week. Poultry litter is also a good source of compost preparation that is rich in macro and micronutrients for plant growth (Alam et al., 2013).

3.7 Sanitation

About 500 gm salt per 100 liters water was used in the floor & 5 ft surrounding of farm. After drying out 1 kg lime per 1000 sq ft was overlaid in land and after that disinfectant was sprayed in the house. Maximum farmers gave one month gap between two flocks.

3.8 Record keeping

Successful production generally requires more record keeping than conventional production. Most of the farmers (90%) kept their livestock records now-a-days and 10% of farmers do not keep their records. However, farmers mostly kept flock records, vaccination records, feed records, weight records, diseases record, mortality record, lightings record etc.

3.9 Vaccination

Vaccination schedule varies in different areas due to some factors such as weather, the prevalence of a disease in this area, maternal antibody etc. The chickens were vaccinated against the most common chicken diseases of the area namely Newcastle and Bursa (Gumboro), and fowl pox

(Table 3). For meat purposes, it was similar to broiler (4 vaccines initially). It is better to give a live vaccine(ND+ Bronchitis) at 42 days of age. At present for meat purposes, the killed vaccine has been provided in Sonali flock. In this case, two types of killed vaccine schedule was followed: one was ranikhet killed or ranikhet +gumburo killed at 17 days age and another was vactormune vaccine (preserved in liquid nitrogen) Marek's+Ranikhet at DOC.

Table 3. Schedule for vaccination and its route

Age (Days)	Vaccine	Route
03-05	IB,ND Vaccine	Eye Drop
12	IBD Vaccine	Eye Drop
17	IB,ND Vaccine	Eye Drop
22	IBD Vaccine	Eye Drop
25-28	ND Vaccine	S/C in Neck
35	F-Pox Vaccine	Inj. inWings

IBD= Infectious Bursal Disease, ND= Newcastle/Ranikhet Disease, F.Pox=Fowl Pox, IB=Infectious Bronchitis

4. Result and Discussion

4.1 Ration

The handmade diet was composed of maize, wheat, soybean toasted, Rice polish, Protein concentrate, salt, limestone and premix used during the study (Table 4). During the starter period (1-35) days, a starter ration containing 20% CP and 2800 kcal ME/kg, was provided to each chicken each day. Three plastic tube feeders and three bell-shaped (round) plastic waters were used to provide feed and water every day in brooding hay boxes. During the growing period (36-60) days, grower ration containing 18.5% CP, 2700 kcal ME/kg was supplied to each chicken per day. The average daily feed intake of Fayoumi chicken was similar with report of Khan et al. (2006), Akhtar et al. (2007) and Rizwanual et al. (2011).

Table 4. Ration used for different ages of Sonali under intensive farming system

Ingredients	From 1-60 days
Crushed Maize	50%
Crushed wheat	10%
Rice polish	14%
Soybean	13%
Crushed oyster	04%
Protein conct./bone meal	08%
Common salt	0.5%
Limestone	0.25%
Vit. Mineral pre.	0.25%

4.2 Socioeconomic status farmers and rearing system of Sonali chicken:

Table 5 shows the socio-economic factors related to Sonali meat production. Data were collected from 10 farms about their socio-economic condition related to sonali chicken production, including age of the farmers, family size, education, occupation, land size, training and source of capital, purchase time of Doc and the duration of the batch interval. Table 5 indicates that the highest proportion (70%) of the farmers are educated whereas, 30% belonging to uneducated. The result was fit to the study of Kumar and Mahalati, (1994), and 20%. Vaccination has been done by most of the farm 90%. Their experience level 80%. Most of them are farmers 70% and 30% are doing another job like teacher, dealer, shopkeeper etc. Their Sonali chicken rearing housing is maximum building 80% and semi building is 20%. Maximum management have been practiced by the workers. Maximum farms batch interval was 60 days in Sonali meat production. Most of the farmers maintain bio security 70% and others do not know the importance of it. Sonali bird disease prevalence is higher than other birds. Ambar et al. (1999) showed the highest livability (97.7%) in the RIR × Fayoumi cross compared to purebreds and the lowest in Deshi chicken which are similar to the present study. The majority of the farmers are used disinfectant their farm twice in a day. The market price of Sonali meat bird is very profitable.

Table 5. Data collected from farms overall management

Traits	Category	Farms(total 10)	Percentage (%)
Vaccination	Yes	09	90
	No	01	10
Education	Yes	07	70
	No	03	30
Experience	Yes	08	80
	No	02	20
Floor/Litter	Concrete ; rice husk	05	50
	Muddy ; rice husk	05	50
Disease	Yes	02	20
	No	08	80
Training	Yes	06	60
	No	04	40
Housing	Tin and wire	02	20
	Building and wire	08	80
Management	Owner	03	30
	Workers	07	70
Disinfectant	Once	02	20
	twice	08	80
Biosecurity	Yes	07	70
	No	03	30
Profession	Farmer	07	70
	Job	03	30
Batch interval	60 days	09	90
	55 days	01	10

4.3 Average feed intake wise daily body-weight gain in Sonali

Feed intake

The mean feed intake was by a bird at 1st, 10th, 20th, 35th, 45th, and 60th days and their feed intake was 5.50±0.17gm, 13.41±0.15gm, 24.60±0.62gm, 34.00±0.76gm, 42.70±0.94gm, and 53.60±1.27gm (Table 6). Feed intake per bird was increased according to their age day by day. The average daily feed intake of Fayoumi chicken was similar with report of Khan et al. (2006), Akhtar et al. (2007) and Rizwan et al. (2011). The feed intake was the highest in commercial broiler though it is rear only 30-35 days. There are remarkable feed intake differences between commercial broiler and Sonali Ali and Bala, (2005)

Body weight gain

The body weight gain in Sonali was 1st, 10th, 20th, 35th, 45th, and 60th days was respectively 28.70±0.30 gm, 108.30±0.42 gm, 195.00±4.05 gm, 431.00±10.89 gm, 619.50±17.10 gm and 856.00±26.26 gm, respectively (Table 6). Body weight was increased according their age and feed intake day by day. The difference of mean weight did vary significantly ($p > 0.001$). Variation in phenotypic values of traits may be varied due to variation in quantitative traits. Faruque et al., (2010). Azharul et al. (2005) found higher meat yield in crossbred RIR × Fayoumi (Sonali) compared with pure Fayoumi breed. Aktaruzzaman (2002) reported that the body weight of Sonali is approximately 1.8 kg at its mature age.

Table 6: Descriptive statistics of feed intake and weight gain of Sonali chicken at day 1 to 60.

Days	Feed intake (gm/day) (Mean±SE)	Weight gain (gm/day) (Mean±SE)	FCR (Mean±SE)
1 st	5.50a±0.17	28.70a±0.30	0.19a±0.00
10 th	13.41b±0.15	108.30b±0.42	0.87b±0.00
20 th	24.60c±0.62	195.00c±4.05	1.42c±0.03
35 th	34.00d±0.76	431.00d±10.89	1.60d±0.04
45 th	42.70e±0.94	619.50e±17.10	1.72d±0.04
60 th	53.60f±1.27	856.00f±26.26	2.06e±0.06
F- value	559.02	556.04	373.74
Level of significance	0.001	0.001	0.001

The mean difference significance at $p < 0.001$

4.4 Feed conversion ratio (FCR)

FCR is the mass of the feed intake divided by the body mass gain. FCR shows that how efficiently a bird can convert the feed into body mass. Birds that have low FCR value are considered efficient users of feed. Here the FCR of the study farm was 2.1 and it was calculated by the following formula:

FCR = Total intake of feed ÷ Total body weight gain (from day 1-60)

$$= (1755 \text{ kg} \div 856 \text{ gm})$$

$$= 2.1$$

Average feed intake, live weight gain and R-squared value of Sonali chicken from day-1 to 60 days The Pearson correlation between feed intake and weight gain is 0.978 which is significant ($p < 0.001$). The R^2 value of feed intake and body weight gain are shown in Figure 2. Although, the mean body weight gains in 35th and 55th days were higher. Variation in phenotypic values of traits

may be varied due to variation in quantitative traits (Faruque et al., 2010), however, in the present variations in body weight gain are likely due to the differences for management and feeding among farms. The average FCR of Sonali chicken at marketing age 60 days was 2.1 . According their age increased their feed and body weight also increased. The superior FCR is found in commercial broiler due to its superior genetic conformation. Inferior FCR found at Sonali bird (Ali and Bala, 2005).

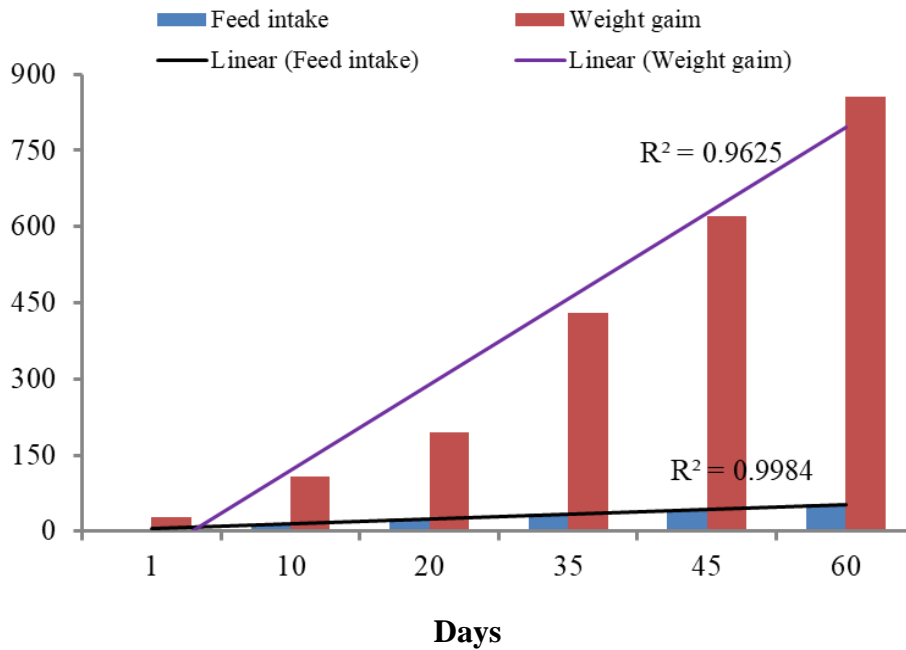


Figure 2: Average feed intake, live weight gain and R-squared value of sonali chicken from day-1 to 60 days

5. CONCLUSION

Sonali chickens are adapted and perform well under intensive management conditions for meat production in villages of Keshabpur upazila. Sonali chicken farming on a commercial basis is a popular sector in Bangladesh. Despite some drawbacks, young people are gradually involved in this sector and becoming self-employed. So, The government should take steps to lessen the problems and take initiatives to save the poultry industry by formulating a policy and implementing it. This study revealed that the best body weight gain from Sonali after 60 days of age was 950 gm. In contrast, the mean body weight gain in 60 days was 856 gm and the FCR was 2.1 Sonali chickens are very adaptable in an intensive farming system of Bangladesh and could be a good choice for meat producers who can regularly supply supplementary feed. Sonali meat is the future to fulfill the protein source and the profitable business.

References

- Khan, M.K.I. (2003). Crossing Hilly with RIR and Fayoumi for the Development of Layer Chicken Suitable for Semi-scavenging System with Sonali and Nera as Control. An Applied Research Project. Pp 25-29.
- Faruque, M.O.; Hasnath, M.A.; Mostafa, K.G.; Ikuo, O.; Takashi, A. and Takao, N.1987. Conservation of livestock genetic resources in Bangladesh-Past, Present and Future. Genetic Studies on Breed Differentiation of Native Domestic Animal in Bangladesh. Journal Name 2:129-137.
- Khan, M.R. and Roy, P.C. (2003). Credit Policy, Disbursement and its impact on poultry industry in Bangladesh. 3rd International Poultry Show and Seminar. February 28-March 2. (2003). 44 pp.
- Ahmed, Z. (1997). Semi-scavenging poultry model production chin. Impact of smallholder livestock Development project in some selected Areas of Bangladesh. Livestock Research for Rural Development. 9(4): 23.
- Faruque, S., Siddiquee, N.U., Afroz, M.A. and Islam, M.S. (2010). Phenotypic characterization of native chicken reared under intensive management system. J. Bangladesh Agric. Univ. 8(1): 79-82.
- GOB -Government of Bangladesh (1999). The Report on the Economic Survey of Bangladesh, Ministry of Finance, Government of Peoples' Republic of Bangladesh, Dhaka
- Islam, S., Uddin, M.S., Sarker, N.R., Faruque, S. and Khatun, R. (2003). Study on the productive and reproductive performance of 3 native genotype of chickens under intensive management Executive summaries of research report. Ann. Res. Rev. Workshop 11-12 May, pp: 6-8.
- Production project. International Workshop on Crop and Animal Farming System Research, Asian Farming System Net-work, Dhaka, Bangladesh
- BBS-Bangladesh Bureau of Statistics (2001). Statistical Year Book of Bangladesh. Bangladesh Bureau of Statistics, Ministry of Planning, Government of People's Republic of Bangladesh, Dhaka.
- FAO-Food and Agricultural Organization (2003). Production Year Book. 56. Rome, Italy.
- Islam, M.A.; Ranving, H. and Howlider M.A.R. (2004). Incubation capacity of broody hens and chick performance. Proceedings of the second annual scientific conference. Chittagong Government Veterinary College held on 25-26 February 2004. Pp 3-19.
- Alam F, Hashem MA, Rahman MM, Rahman SME, Hossain MM and Rahman Z (2013). Effect of bulking materials on composting of layer litter. Journal of Environmental Science and Natural Resources, 6: 141-144.

Azharul, I.M., Ranvig, H. and Howlider, M.A.R., (2005). Comparison of growth rate and meat yield characteristics of cockerels between Fayoumi and Sonali under village conditions in Bangladesh. *Livestock Research for Rural Development*, 17(2): 77-82.

Dutta, R.K., Islam, M.S. and Kabir, M.A., (2013). Production performance of indigenous chicken (*Gallus domesticus* L.) in some selected areas of Rajshahi, Bangladesh. *American Journal of Experimental Agriculture*, 3(2), p.308.

Kumar, V. P. and Manotosh, S. (1994). Relationship between scientific knowledge and its adoption in poultry management by farmers. *Indian J. Poult. Sci.* 29(2): 207-208.

Ambar MAJ, Bhuiyan AKFH, Hoque MA and Amin MR (1999). Ranking of some pure and crossbred chicken using scoring indices. *Indian Journal of Poultry Science*, 34(2): 140-146.

Ali, M.A. and Bala, B.K. (2005). Low Cost Tunnel Ventilation with Locally Available Materials and Impact on Broiler Performance. In 4th International Poultry Show and Seminar, held on March 10-12, 2003, Organized by World's Poultry Science Association, Bangladesh Branch, Dhaka, pp.122-123.

Azharul, I.M., Ranvig, H. and Howlider, M.A.R. (2005) Comparison of Growth Rate and Meat Yield Characteristics of Cockerels between Fayoumi and Sonali Under Village Conditions In Bangladesh. *Livestock for Rural Development*, 17: Page number.

Akhtar-Uz-Zaman, M., (2002). Egg Production Performance Of Different Breed/Breed Combinations Of Chicken In Semi Scavenging System Under PLDP. M.Sc. thesis, Department of Animal Breeding and Genetics, Danish Institute of Agricultural Sciences, Foulum, Denmark. pp 4-5.

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Biography

Sheikh Asif Rayhan was born on July 5, 1995. Son of Mst. Rebeka Khatun and S.M Abul Bashar. He was from Keshabpur, Jashore. He passed Secondary School Certificate (SSC) examination in 2011 from Keshabpur Govt. Pilot School and College followed by Higher Secondary Certificate (HSC) examination in 2013 from Govt. Keshabpur College. Now he is an intern veterinarian under the Faculty of Veterinary Medicine in Chittagong Veterinary and Animal Sciences University (CVASU). In future, he would like to work as a veterinary practitioner and do research on infectious diseases of large animals in Bangladesh.