

# Comparative Performance of Sonali, Fayoumi and Indigenous Poultry Rearing Under Scavenging System in the *Hoar* Areas of Bangladesh

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**Abstract**—The study was conducted to investigate comparative growth, productive performance and egg quality of Sonali, Fayoumi and Indigenous poultry rearing under scavenging system in the hoar areas. This experiment was carried out at the Noagaon village under South Sunamganjupazila of Sunamganj district from the February 2017 to January 2018. A total of 300 birds (100 of each genotype) were distributed among randomly selected fifteen farmers where each farmer got 20 birds (18 female and 2 male). Among all distributed birds, 100 Sonali and 100 Fayoumi were purchased from Sylhet Government Poultry Farm and 100 indigenous purchased from local farmers. The necessary parameter were recorded, organized and analyzed in Microsoft excel 2010. According to the study, the highest body weight-gain was found in Fayoumi chicken (6.52 g/day) and the lowest in Indigenous chicken (5.95 g/day). The egg production performance was higher in Fayoumi (56 no.) than those of Sonali (52 no.) and Indigenous (44 no.) (up to 52 weeks). Egg quality parameter such as egg weight (g.), yolk weight (g.), shell weight (g.) and yolk index were observed significantly higher in Fayoumi followed by Sonali and Indigenous. The highest mortality was experienced in Sonali (49.46%) followed by Fayoumi (42.82%) and Indigenous (36.35%). Per hen gross profit for rearing Fayoumi, Sonali and Indigenous chicken were TK 691, TK 585 and TK 498 respectively. Thus, this study concluded that Fayoumi performed better than Sonali and Indigenous. Besides, rearing poultry under scavenging system in haor areas may be revealed a potential socio-economic aspect of the small-scale poultry farmers.

**Keywords:** Poultry, Scavenging, Farmer, Egg production.

## 1. INTRODUCTION

Poultry is one of the best tools for poverty reduction throughout the world. Smallholder backyard chicken production is a subsistence activity, providing egg and meat for family consumption and to some extent cash income [6]. Native scavenging chicks are dominant in poultry production in Bangladesh. In the rural households of Bangladesh, poultry

is commonly reared in scavenging system [25]. Smallholder poultry farmers produced 78% eggs and 86% meat under scavenging system [2]. The importance of raising poultry in a developing country like Bangladesh cannot be ignored from economic and nutritional points of view. The contribution of poultry industry to the national economy is very significant. Poultry keeps a great contribution to GDP (Gross Domestic Product) and growth rate in our economy. A large number of people in our country are involved with poultry industry either as full time or in part time basis. About 60 lakhs of people are engaged directly or indirectly in poultry industry [12]. Poultry plays a key role in the agro-based economy of Bangladesh. Poultry are most vital tools due to their key contribution to national economy in generating income, creating employment opportunity and improving the nutritional status of the people of our country. Rural poultry has remarkably contribution to the development of rural families [20]. Traditional family-based production systems still contribute at poultry population globally [16]. In small-scale poultry, improvement in food security occurs through contributing to mixed farming practices [26]. The concept of human nutrition has taken a new dimension. Today emphasis has been given on high protein and low calorie diet, as protein plays a vital role in the balanced health growth of human being. In this circumstance, poultry appears to be a good way of fulfilling the protein gap by providing eggs and meat with low cost. The price of poultry meat is comparatively cheaper than other livestock products like beef, mutton, ducks meat and others. Imbalanced and inadequate food consumption is a major cause of under nutrition or malnutrition. Consumption of protein of animal origin is much lower in Bangladesh than in some other countries of the world. About 60% families of Bangladesh cannot afford their protein requirements in their daily food consumption [21, 22]. Poultry farming can play an important

role in meeting the nutritional deficiency by providing meat and eggs. Egg is full of high quality and easily digestible proteins, vitamins and minerals. Egg is also very rich source of iron, phosphorus, vitamins A, E, K and all B vitamins. Poultry meat is tender, tasty, soft, pliable, smooth, textured, nutritious and flexible breast bone cartilage. Poultry meat contains easily digestible low cholesterol and low fat comparatively with other animal's meat and is generally accepted by all religions and castes. Fayoumi, an ancient breed from the Egyptian City which is well known poultry breed for egg production in Bangladesh. Now a days, it is a well-established poultry breed throughout the world and is also popular breed in India, Pakistan, Sri Lanka and many other countries because of its high profitability with low cost. Farmers can easily rear this breed both in intensive and scavenging systems. The farmers also like Fayoumi because of its bright color. It is hardy, very precisions in early maturing and has excellent flying and escaping capacity [5]. On the contrary Sonali breed is a cross breed, which had been produced from the cross of Road Island Red (RIR) cocks and Fayoumi hens. It has specially been advocated in terms of their high production rate and better adaptability in rural situation [1]. Pure line of RIR cocks and Fayoumi hens has been used for the production of hatchable eggs which are to be used by native broody hens for hatching. Sonali females produce about 180 eggs per year [3]. Rural people especially in *haor* areas are reared Indigenous chicken, Fayoumi and Sonali haphazardly in scavenging system and very few information are available about growth performance, potentiality of production, characteristics quality of egg, several hindrance factors and socio-economic status. Considering these, the study was designed to examine comparative growth performance, productive potentiality, egg quality parameters and socio-economic aspects of rearing of Sonali, Fayoumi and Indigenous chicken in scavenging system of *haor* areas.

## 2. MATERIALS AND METHODS

This experiment is conducted at the Noagaon village under South Sunamganjupazila of Sunamganj district from the February 2017 to January 2018. There were three bred of chicken like Sonali, Fayoumi and Indigenous were taken for the study. The experiment was laid in CRD (Completely Randomized Design) with five replications of each breed. Fifteen farmers were selected in the village for poultry rearing and each farmer provided twenty birds (18 female and 2 male). Sonali and Fayoumi birds were purchased from Government poultry farm; Sylhet and Indigenous birds were collected from local farmers. Age of the birds at the time of purchasing was 28 days. These chicks were scavenged in around the farmer's homesteads and meet a major part of their feed requirements; an additional feed was given as supplement. The farmers were provided feed to their chicken scattered for 2 to 3 or more times a day schedule and mainly given boiled

rice, broken rice, rice polish etc. Most of the part of feed demands of chicks fulfilled from the scavenging areas. The scavenging areas were farmer's yard and surrounding fields of paddy, wheat, mustered and vegetables from where chicks fed grains, insects, earth worm and vegetables leaves. The farmers provided a night shelter for their chicks. The shelters were mainly made by wood, bamboo, tin etc. The location of the shelter was mainly at side the of their kitchen houses. This shelter had saved the chicks from predators and hazardous environmental conditions. More or less same management was provided to the three breeds of chicken. Baby chick Ranikhet disease vaccine (BCRDV), Ranikhet disease vaccine (RDV), Gamboro and Fowl Pox vaccines and Fowl Cholera vaccine (Table 1) were provided for the prevention of these diseases. This is because; the disease is common and fatal for the chicken and sometimes may cause death of 100% chicken. Body weight gain, parameters belong to production performance, egg qualities and mortality rate were recorded. The body weight was measured by using modern electronic balance and calculated daily basis weight gain. Data were collected at 2 weeks of interval on the body weight gain. Egg collection was done twice in a day. Each and every egg was weighed using electronic balance capable of measuring up to 0.1 g. After breaking, egg shell, yolk and albumen was being weighed separately. Clean, dried egg thicknesses were measured by micrometer. The measure of "the shape index" was recorded by determining the height of shape divided by shape width. The measure of "the albumin index" was recorded using the formula: the height albumin divided by albumin width. The measure of yolk quality "the yolk index" was recorded as the value of the height of yolk divided by yolk width. Haugh unit score of individual egg was determined by using egg weight and albumen height. Albumen height was measured using Vernier caliper. The Haugh unit values were calculated for individual egg using the following formula:

$$HU = 100 \log (h - 1.7w^{0.37} + 7.6)$$

Where,

$h$  = observed height of the albumen in millimeters

$w$  = weight of egg in grams

Mortality (%) is calculated by number of dead chicks up to specified time multiply with 100, then divided by total chicks. All the collected data were input, organized and analysed into Microsoft office excel-2010.

## 3. RESULTS AND DISCUSSIONS

### 3.1 Body weight and weight gain

The weight of the experimental birds were measured and the body weight gains of Sonali, Fayoumi and Indigenous chickens were insignificant during 4-6 and 18-22 weeks of age but significant during 6-18 weeks of rearing (Table 2). It was

observed that the body weight gain of three breeds of chicken were increasing up to 18 weeks of age and also observed decreasing rate up to the 22 weeks of age (Table 2). But highest weight gain was found at 8 to 12 weeks of age among the three breeds (Table 2). The highest body weight gain was found in Fayoumi chicken (6.52 g/day) and the lowest (Table 2) in Indigenous chicken (5.95 g/day). This finding were higher in comparison to the report of [13], where they found the highest body weight gain in Sonali chicken (4.56 g/day) and lowest in Indigenous chicken (2.26 g/day). In these findings, the final body weight of Fayoumi, Sonali and indigenous chicken were 821.52, 796.32 and 749.7 g respectively which were lower than the report of [10] and they observed the body weight of Fayoumi chicken was 1253.11 g. at 24 weeks of age under intensive management. The lower

**Table 1: Vaccination schedule for the experimental chickens**

Vaccine	Age(days)	Vaccine against Disease	Dose(ml)	Route	Remarks
BCRDV	01	Baby chicks Ranikhet disease	One drop	Eye	-
Gumbro vaccine	21-28	Gumbro	0.5 ml	I/M	-
RDV	28-35	Ranikhet disease	1.0 ml	I/M	-
	90-95	Ranikhet disease	1.0 ml	I/M	Booster dose was administered at 6 months interval
Fowl Cholera vaccine	40-45	Fowl Cholera	0.5 ml	S/C	-
	60-65	Fowl Cholera	0.5 ml	S/C	Booster dose

I/M=Intramuscular, S/C= Sub-cutaneous, BCRDV= Baby chicks Ranikhet disease vaccine, RDV= Ranikhet disease vaccine.

**Table 2: Comparison of mean body weight gain per day in different three breeds of chicken**

Age of the birds (weeks)	Average body weight gain of the birds (g/day)			Level of significance
	Fayoumi	Sonali	Indigenous	
4-6	5.42	5.25	4.93	NS
6-8	6.52	6.86	5.61	*
8-10	9.56	6.45	5.87	*
10-12	9.82	8.65	6.24	*
12-14	6.91	8.45	6.14	*
14-16	7.42	6.23	5.28	*
16-18	5.8	5.98	5.27	*
18-20	5.5	4.64	4.57	NS
20-22	5.26	4.9	4.16	NS

\* = Significant at 5 % level, NS=Not-significant.

**Table 3: Comparative performance of Sonali, Fayoumi and Indigenous chicken**

Chicken breeds	Initial weight at the age of 4 weeks (g)	Total birds supplied (no.)	Final weight at 18 weeks (126 days) of rearing (g)	Total weight gain at 126 days of rearing (g)	Weight gain (g/day)	Mortality (%)	Egg production up to 52 weeks of age (no.)
Fayoumi	121.5	100	994.5	821.52	6.52	42.82	56
Sonali	122.1	100	918.42	796.32	6.32	49.46	52
Indigenous	115.6	100	865.3	749.7	5.95	38.35	44

**Table 4: Egg qualities among the experimental chickens (Mean ± SE)**

Parameter	Fayoumi	Sonali	Indigenous	Level of Significance		
				F	P	Significance (<0.05)
EW (g)	48.01±1.02	43.96±1.56	39.15±1.53	4.71	0.048	*
YW (g)	15.314±0.237	14.047±0.365	13.23±0.281	8.47	0.013	*
SW (g)	5.177±0.142	4.521±0.192	3.15±0.122	7.56	0.018	*
SMW (g)	0.2250±0.031	0.14000±0.00966	0.101±0.001	7.00	0.024	*
ST (mm)	0.5961±0.098	0.5567±0.0173	0.344±0.023	2.18	0.068	NS
SI	0.77687±0.00914	0.8042±0.039	0.752±0.004	0.61	0.450	NS
YI	0.4936±0.0122	0.4315±0.0193	0.40±0.016	7.84	0.071	*
AI	0.10143±0.00719	0.09033±0.00466	0.074±0.006	1.55	0.239	NS
HU	86.34±2.08	83.65±1.31	79.09±1.79	1.11	0.315	NS

EW= Egg weight, YW= Yolk Weight, SW= Shell Weight, SMW= Shell Membrane Weight, ST= Shell thickness, SI= Shape Index, YI= Yolk Index, AI= Albumin Index, HU= Haugh Unit

**Table 5: Estimation of per hen cost of production and return of rearing indigenous Chickens, Fayoumi and Sonali in haor area, Bangladesh**

Item	Sonali	Fayoumi	Indigenous
Cost of chicks (Tk.)	60.00	60.00	60.00
Feed cost (Tk. 44/kg)	88.00	88.00	88.00

Medicine & vaccination	8.00	8.00	8.00
Miscellaneous	5.00	5.00	5.00
Total variable cost	161.00	161.00	161.00
Selling price of hen (Tk. 350/kg)	278.00	348.00	263.00
Selling price of egg (Tk. 9/egg)	468	504	396
Gross return (Tk.)	746.00	852.00	659.00
Gross margin (Tk.)	585.00	691.00	498.00

body weight might be due to management systems and environmental condition.

### 3.2. Age of sexual maturity and body weight

The average age of first egg laying were found at 158.5, 165.6 & 148.7 days and body weight were 796.32, 821.52 & 749.7g per bird for Sonali, Fayoumi and Indigenous chicken, respectively. This study was more or less similar as reported by [23] and who observed that the age and sexual maturity of Fayoumi chickens was 155.5 days and 1240 g, respectively. This study showed sexual maturity was earlier than the findings of [4] who observed the age of sexual maturity of fayoumi chicken was 225 days. The early sexual maturity might be due to the supplied of balanced feed and the duration of light also.

### 3.3. Mortality

In this experiment, it was noticed that the mortality was the highest in Sonali chicken (49.6%) and the lowest in Indigenous chicken (38.35%) (Table 3). This finding agreed with the report of [13], where they recorded that the highest mortality in Sonali chicken (37.5%) and the lowest in Indigenous chicken (28.12%). In another research work of [14], observed that the highest mortality was in Sonali chicken (68.8%) and the lowest in Fayoumi chicken (57.7%) which is much higher than the present findings. The mortality rate of Sonali chicks in intensive & semi-intensive system of rearing was 9.2% and 5.6% [9], which is five times more of the present work of Sonali in scavenging system (49.6%). In scavenging system of rearing it was observed that more than 50% of chicks are died before they reach at the age of two months. Overall chick survival rate up to 8 weeks of age was 59.7 % in the scavenging rearing system in Uganda [15]. The liveability of scavenges chicks is 30% to 40 % of our Deshi chicks [17] and liveability of laying birds is more than chicks in every case like scavenging, semi-scavenging and intensive system of poultry rearing. Because the immune system is developed in laying hen and predators do not victimize the mature birds easily. In the present study, mortality differed between two breeds possibly might be due to their differences in genetic makeup. Inbreeding beyond 80% causes the pullets to die before the end of the first laying year [24]. But in Fayoumi chicks, which are produced by the flock mating system is not an intense inbreeding system. Without this, the genotype of Fayoumi in our country is well adopted in scavenging system for long time. For this reason, the

liveability of Fayoumi breed is better than the Sonali, though it is produced by inbreeding system. Sonali breed is also less alert, so it does not take easily feed from the scavenging area and more prone to be victimized by the predators [18]. The heritability value for the liveability is very low, 5-10% [19]. Several factors such as potentiality of infectious and non-infectious diseases, availability of predator, weather condition, feeding and hygienic management may significantly cause the mortality of poultry flocks [8, 20]. Above mentioned factors become significantly unfavorable for the poultry flocks rearing in scavenging system in haor area leads vulnerable for their liveability.

### 3.4. Egg quality

The internal quality of egg is very much important from the consumer point of view. There is several factors influences internal quality of egg such as variation of breed or variety as well as environmental factors such as nutrition, diseases etc. The average egg weight ranges from 39.15 to 48.01gm, yolk weight from 13.23 to 15.314g, shell weight from 3.15 to 5.177g, shell membrane weight from 0.101 to 0.2250g, shell thickness from 0.334 to 0.5961mm, shape index from 0.752 to 0.8042, yolk index from 0.40 to 0.4936, albumin index 0.074 to 0.101 and Haugh unit from 79.09 to 86.34 comparatively shows good egg quality for Fayoumi followed by Sonali and Indigenous (Table 4). This study has been observed that Fayoumi chicken has significantly higher value of egg weight (g.), shell weight (g.), shell membrane, yolk index followed by Sonali and Indigenous. The shell thickness, shape index, albumin index and Haugh unit (HU) has also higher value in Fayoumi followed by Sonali and Indigenous but it is not statistically significant. The shape index, egg weight, yolk weight, and yolk index of Sonali chicken nearly support the result of [10], however, shows dissimilarity with the results of shell thickness (mm) and Haugh unit. The egg weight, yolk weight, shell thickness and yolk weight of Fayoumi shows dissimilarity the results of [11].

### 3.5. Economic analysis

In this experiment, the total variable cost and gross return were calculated (Table 5). The total variable costs were included like cost of chickens, feeds, medicine and medication and other managements. The gross return included mostly the sale price of hens and their products. The total variable cost was Tk. 161 per hen in every breed of chickens. The gross returns were Tk. 746.00 for Sonali, Tk. 852.00 for Fayoumi and Tk. 659.00 for Indigenous chickens (Table 5). So, the highest gross margin was found (Tk. 691.00) in Fayoumi chicken followed by Sonali (Tk. 585.00) chicken and the lowest in Indigenous chicken (Tk. 498.00). Similar research work was done by [7] and they recorded that the highest gross margin was in Fayoumi (Tk. 172.94) chicken followed by Sonali (Tk. 157.74) chicken and the lowest in Indigenous chicken (Tk. 98.00).

#### 4. CONCLUSION

Fayoumi performs better in scavenging system of *haor* area in respect to weight gain, productive performance and egg quality than Sonali and indigenous chicken. Mortality is one of the significant obstacles for the performance of these poultry flocks. Diseases, victimization of predator, fluctuation of weather, least concern about management and preventive measures accelerate significant death of chicks as well as reduction the productivity. All these constraints if handle properly, rearing these poultry flocks in *haor* area may open an important potential enterprise for put up the socioeconomic status of rural and small scale poultry farmers.

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