A study was conducted to record the fertility and hatchability of Fayoumi and Sonali chicks at Chittagong District and Noakhali District from October 2005 to July 2006. The eggs were collected from the Regional Government Poultry Farm, Pahartali, Chittagong, and distributed to the selected farmers. Twelve eggs of each breed were supplied to each farmer. The chicks were hatched out from the eggs after 21 days of incubation period. The fertility of Fayoumi and Sonali chicks were found to be respectively 88.6% and 89.8%, which did not vary significantly ($\chi^2 = 0.21$, df = 1, $p > 0.05$). The fertility rate of Fayoumi in both Chittagong and Noakhali were similar 88.6% but in case of Sonali 92.4% and 87.1% respectively. And in both place did not differ significantly ($\chi^2 = 0$, df = 1, $p > 0.05$; $\chi^2 = 0.21$, df = 1, $p > 0.05$).Hatchability of the two breeds were respectively 86% and 87.5%, which also did not differ significantly ($\chi^2 = 0.03$, df = 1, $p > 0.05$). Hatchability of Fayoumi chicks was higher (87.1%) in Noakhali than that of Chittagong (84.9%) but that was not statistically different ($\chi^2 = 0.04$, df = 1, $p > 0.05$).Hatchability of Sonali was 90.2% and 84.9% in Chittagong and Noakhali respectively which did not differ significantly between two sites ($\chi^2 = 0.21$, df = 1, $p > 0.05$). So the fertility and hatchability of two breed were near to similar in case of both breed and both location and did not differ significantly.

**Key words:** Fertility, hatchability, Fayoumi, Sonali, Chittagong and Noakhali

**INTRODUCTION**

Family 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 (Farooq et al., 2004). Local scavenging chicks are dominant in poultry production in Bangladesh. Smallholder poultry farmers produce 78% eggs and 86% meat under scavenging system (Alam, 1995).Fayoumi, an ancient breed from the Egyptian City of Fayoumi for egg production, is well known poultry breed in Bangladesh. Now a day, 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. Sonali breed is a cross breed, which had been produced from the cross of Rhode Island Red (RIR) cocks and Fayoumi hens. It has specially been advocated in terms of their higher egg production rate and better adaptability in rural situation (Ahmed, 1997). Pure line of RIR cocks and Fayoumi hens has been used for the production of hatchable eggs to be used by broody hens. Fertility is very important parameter for the chicken. It is considered as the total actual reproductive capacity of females and males expressed by their ability when mated together to produce offspring. An egg is said to be infertile when it fails to show any evidence of developing embryo (Warren, 1953). The fertility is significantly higher in Deshi breed (90.96 to 93.12%) than that of the crosses of White Leg Horn (78.15%) and Rhode Island Red (86.40 %) (Kumar et al., 1976) and the fertility of Sonali is 84.4% (Islam et al., 2004).The ability of the embryo to successfully escape from the shell is called hatchability (Tarek, 1992). Good hatchability of eggs is to some extent heritable, but is determined by a complicated genetic constitution and the environment.
Table 1. Fertility of Fayoumi and Sonali chicks

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Total eggs</th>
<th>Fertile eggs</th>
<th>Fertility (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fayoumi (Chittagong)</td>
<td>132</td>
<td>117</td>
<td>88.6</td>
</tr>
<tr>
<td>Fayoumi (Noakhali)</td>
<td>132</td>
<td>117</td>
<td>88.6</td>
</tr>
<tr>
<td>Fayoumi (Combined)</td>
<td>264</td>
<td>234</td>
<td>88.6</td>
</tr>
<tr>
<td>Sonali (Chittagong)</td>
<td>132</td>
<td>122</td>
<td>92.4</td>
</tr>
<tr>
<td>Sonali (Noakhali)</td>
<td>132</td>
<td>115</td>
<td>87.1</td>
</tr>
<tr>
<td>Sonali (Combined)</td>
<td>264</td>
<td>237</td>
<td>89.8</td>
</tr>
</tbody>
</table>

Hatchability of egg is calculated on a percentage basis. The climate and fertile eggs represent the hatchability on the basis fertile eggs (Amber, 1994). The hatchability of RIR ♂ X Fayoumi ♀ (i.e., Sonali) was found to be 86.8% (Islam et al., 2003). The main objectives of this study were to detect the fertility and hatchability of Fayoumi and Sonali chicks.

MATERIALS AND METHODS

The research work was carried out to determine the fertility and hatchability of Fayoumi and Sonali chicks, which were reared under scavenging system. The experiment was conducted for a period of 10 months including 4 weeks adaptation period in farmers homestead in the Southern part of Bangladesh, Noakhali district and the Eastern part, Chittagong district between October 2005 and July 2006. Before starting of the experiments the author took a training class about experiment and made lottery for random distribution of the eggs of Fayoumi and (RIR male x Fayoumi female). Two study areas (Chittagong and Noakhali) were selected for the ecological effect on chicks. The area of Chittagong zone is more populated and here grow little amount of vegetables. The district is situated is the southeastern part of Bangladesh and between the slopes of hill and site of sea. This is the costal area, where mainly cultivate vegetables, sometimes rice in rainy season. For this reason the farmers have to give more extra feed to their chicks and also take more care to their chicks. Noakhali region is comparatively less populated than Chittagong region, which provide more scavenges area for the scavenging chicks. So the scavenging chicks take more feeds from their environment.

The collected eggs were selected on the base of some parameters like medium size and fresh and clean and average weight. The average weight of Fayoumi eggs were 40 gm and Sonali were 42 gm, which were found from the randomly take the weight of 50 eggs of each genotypes. Then the eggs were distributed to the selected farmers in Chittagong and Noakhali study area. After 21 days of incubation period, the chicks were hatched out from the eggs.

Fertility and hatchability of eggs were also determined based on fertile eggs and hatched out chicks. Infertile eggs were detected by candling method. The eggs, which failed to develop embryo, were regarded as infertile eggs. Candling to detect fertility was usually done after a week of incubation. Fertility has been detected by using the following formula.

\[
\text{Fertility} = \frac{\text{No. of fertile eggs}}{\text{No. of total eggs}} \times 100
\]

The term hatchability is used by poultry men hatchability on the basis of total set for incubation Hatchability was detected as the percentages of eggs hatched out. Then hatchability of the chicks has been calculated by using the following formulae.

\[
\text{Hatchability} = \frac{\text{No. of hatched out chicks}}{\text{No. of total eggs}} \times 100
\]

The collected data were analyzed by using the statistical program of computer, Microsoft word, Microsoft Excel, SPSS and ANOVA.

RESULTS AND DISCUSSION

Fertility and Hatchability

The overall fertility of Fayoumi and Sonali eggs at the study areas of Chittagong and Noakhali varied slightly (Table 1) and that did not differ significantly between two genotypes \(\chi^2 = 0.21, \text{df} = 1, p > 0.05\). Fertility of the Fayoumi eggs was same for the two sites \(\chi^2 = 0, \text{df} = 1, p > 0.05\), Table 2). The fertility rate for Sonali did not also vary much (Table 1) and it also did not differ significantly between two sites \(\chi^2 = 0.21, \text{df} = 1, p > 0.05\). Islam, et al. (2004) reported 84.8% the fertility of Sonali breed, which is slightly lower than that of the present, study (see Table1), whereas Islam, et al. (2003) found very nearly similar result (90.26%).

The fertility depends on various factors such as breed, season, pre-incubation holding period, lighting, level of nutrition, mating and time of mating (Singh, 1975; Silversides and Scott, 2001). According to Labdars et al. (1962) the fertility was found to be significantly higher in Deshi breeds (90.96 to 93.12%) than that of the crosses.
between Deshi and White Leg Horn (78.15%) and between Deshi and RIR (86.4%).

Fertility of crossbred Sonali (RIR ♂ x Fayoumi ♀) ranged from 83 to 94.4%, almost same as the result of Kicka et al. (1978), who obtained the highest fertility (92.3%) in (RIR♂ x Fayoumi ♀). RIR and Fayoumi are different breeds and a certain level of heterosis could be expected from their crosses. The heritability value of the fertility is 0.00 to .05 (Kinney et al., 1970), so the fertility mainly affect by the environment and a little bit by the genotypic makeup. The fertility rate of Fayoumi and Sonali did not vary much, not only between two breeds but also between two sites. This is due to the nutritional facilities as well as management procedures, although the weather conditions were same for all eggs from where the eggs were collected. So, the little difference was only possibly for the distributional radiometry. Temperature is a major factor for the production of the fertile eggs. It has been reported that fertility is affected badly during both hot and cold weather (Crawford, 1984). Usually farmers control temperature for the commercial production of fertile eggs. In this study eggs were collected from controlled temperature house of Pahartali Zonal Poultry Farm.

The overall hatchability rate was 86.0% in Fayoumi, which was lower than Sonali (87.5%), that did not vary significantly ($\chi^2 = 0.03$, df = 1, p > 0.05). Hatchability of Fayoumi chicks was higher (87.1%) in Noakhali than that of Chittagong (84.9%) but that was not statistically different ($\chi^2 = 0.04$, df = 1, p > 0.05). Hatchability of Sonali was 90.2% and 84.9% in Chittagong and Noakhali respectively which did not differ significantly between two sites ($\chi^2 = 0.21$, df = 1, p > 0.05, Table 2). Barua (1992) found the hatchability (87.5%) of Fayoumi ♂ x RIR ♀ in the rural condition of Bangladesh, while same as the present study of Sonali (RIR ♂ x Fayoumi ♀), but very slight higher than Fayoumi (see Table 2). Hatchability rate of fertile eggs of different crosses are found to be different; the highest was 90.29% in Hilly ♂ x Fayoumi ♀ (Khan, 2003) and lowest was 72.2% in the cross of Fayoumi ♂ x RIR ♀ (Haque et al., 1999).

Hatchability of fertile eggs may be influenced by several factors such as genetic factor, care of hatching eggs, storage temperature, moisture, age of broody birds, quality of eggs, seasons, nutrition, etc. (Gringer, 1964; Kingan and Bulluian, 1964; Kamphues et al., 2001). Hatchability of eggs is to some extent heritable, but determined by a complicated genetic constitution. Factors that can cause the developing embryo to fail to get out of the shell are varied in nature (Cowan and Michine, 1978). Either or both the sire and dam may be responsible for the failure. The average shape of eggs was oval and sizes were 40 gm for Fayoumi and 42 gm for the Sonali which gave better hatchability rate (see Table 2). It is well accepted that heritability for the hatchability ranges from 0.10 to 0.15 indicates the trait is mainly affected by the environment (Rahman, 1995). In case of our experiment the nutrition and the management environment for the production of eggs was same and the weather condition was different. So, the differences of the hatchability for the experiment did not vary much.

Both high and very low moisture contents in the weather badly affect the hatchability, but moderate moisture content of the air enhances better result (Das et al., 2005). The hatchability rate was little better in Chittagong than Noakhali because the moisture content of the air is moderate in Chittagong. RIR and Fayoumi are different breeds and a certain level of heterosis could be expected from their cross. So the hatchability rate was little better for the Sonali than Fayoumi. The hatchability also increases when the eggs are incubated by the broody hens, which was followed in this study. Hatchability of fertile eggs is influenced by genetic factors, storage temperature, care of hatching eggs and age of birds, quality of eggs, season, nutrition, pre-incubation warming and humidity (Frands and Poul, 1996; Doyon et al., 1986). Barua (1992) found the hatchability of the Fayoumi, RIR and Fayoumi ♀ x Rhode Island Red ♂ chickens under rural condition were 75%, 80% and 87.50% respectively. Rahman (2003) obtained the hatchability of Deshi ♂ x RIR ♀ under rural condition was 71.5 %. Indigenous chickens have the hatchability 84-87%. (Sazzad, 1986; Huque and Stem, 1993)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Total eggs</th>
<th>Hatched out chicks</th>
<th>Hatchability (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fayoumi (Chittagong)</td>
<td>132</td>
<td>112</td>
<td>84.9</td>
</tr>
<tr>
<td>Fayoumi (Noakhali)</td>
<td>132</td>
<td>115</td>
<td>87.1</td>
</tr>
<tr>
<td>Fayoumi (Combined)</td>
<td>264</td>
<td>227</td>
<td>86.0</td>
</tr>
<tr>
<td>Sonali (Chittagong)</td>
<td>132</td>
<td>119</td>
<td>90.2</td>
</tr>
<tr>
<td>Sonali (Noakhali)</td>
<td>132</td>
<td>112</td>
<td>84.9</td>
</tr>
<tr>
<td>Sonali (Combined)</td>
<td>264</td>
<td>231</td>
<td>87.5</td>
</tr>
</tbody>
</table>

CONCLUSION

The research work observed with fertility, hatchability. Forty-eight farmers (24 from each Upazila) were selected, those who were rearing chickens under scavenging condition and as well as who had ready broody hens. Twelve eggs of each breed were supplied to 24 farmers in each Upazila. After 21 days of incubation period, the chicks were hatched out and reared under
scavenging system. The fertility (89.8%) and hatchability (87.5%) of Sonali eggs were better than that of Fayoumi (88.6% and 87.1% respectively). This fertility and hatchability rate is better for both Fayoumi breed and Sonali breed incases of Bangladesh.

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