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Research Article

Study on Rice Husk Incubation for Ducklings Production in Sunamganj District of Bangladesh

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ABSTRACT

The present study was carried out to know the hatchability and profitability of ducklings production through rice husk incubator (RHI) among nine farmers of different groups (small, medium and large) in Sunamganj District of Bangladesh. The small, medium, and large farmer groups having the capacity to produce Day Old Ducklings (DODs) from 1500-2000 DODs, 2001-3000 DODs, and >3000 DODs per month respectively. Average fertility among small, medium, and large groups was 86.85±1.38, 83.7±2.06, and 85±1.10% respectively. Average hatchability among small, medium, and large groups was 66.20±2.49, 67.59±2.55, and 65.83±2.97% respectively. There was no effect of farmer groups on fertility and hatchability. Average embryonic death among small, medium and large groups was 24±3.12, 19.54±1.89, and 22.63±2.63% respectively. Average profitability among small, medium and large groups was 68.64±18.75, 71.5±11.3, and 29.66±12.6% respectively. Profitability was significantly higher in small and medium groups than large farmer group.

Key words: Artificial incubation, Duck egg, Hatching

INTRODUCTION

Bangladesh possesses enormous area of wetlands including rivers and streams, fresh water lakes and marshes, haors, baors, beels, water storage reservoirs, fish ponds, flooded cultivated fields and estuarine systems with extensive mangrove swamps (Bahauddin and Uddin, 2012). Traditional artificial incubation techniques have evolved over thousands of years in many parts of the world. One such technique, developed for hatching duck eggs in China, is the parched (heated) rice technique. It is based on the use of heated paddy rice and embryo-generated heat. It is still used in China and Bali, Indonesia, with hatchability results of up to 80 percent (Smith, 1990). The objectives of artificial incubation are met equally well using either parched rice or rice husks, and a hatchability of 65 to 75 percent is common. By candling the eggs between days 5 and 7, infertile eggs can be detected as "clears" (as the light is not obscured by the growing embryo). These eggs are still suitable for sale for human consumption, which improves the economic viability of this system. As duck egg shells are less brittle than chicken eggs, the system was never adopted for chicken eggs in China. The original Chinese system used 80 duck eggs per bundle. However, with extra care, and fewer eggs per bundle (25 to 30 compared with 40 duck eggs), chicken egg incubation was found to be equally successful in Bangladesh when adapted there in the 1980s. Incubation of eggs by rice husk incubator with the help of kerosene lamp without electricity is called rice husk incubation. Due to rising market of eggs and meet the demand of day old ducklings is increasing day by day. Commercial poultry rearing is becoming popular instead of small scale family poultry. So, people are more interested to artificial incubation than natural incubation due to high demand of day old ducklings in haor area. Some farmers of Sunamgonj area are practicing this incubation system where power and capital is not sufficient. In order to incubate eggs at larger amount farmers develop a traditional method for thousands of years without using electricity that is very much interesting, low costing and easily applicable for this area in contrast to modern incubation and natural incubation system. There are two systems of incubation are practicing in farmers level are rice husk incubation and sand incubation. Among rice husk and sand incubation

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system, rice husk incubation is very much practiced because it can be applied according to farmers demand. In sand incubation technique only 1200 to 1500 eggs can be hatched at a time. Rice husk incubation techniques have a lot of prospects in haor area due to following reasons. For operating the business lower investment is needed. Cylinder, eggs, hatching tray etc. are needed that is easy accessible to manage with little bit price. Here hard labor is the main thing. Materials can be managed easily and eggs can be collected with debit. Due to high price of eggs and meat demand of day old ducklings is increasing day by day. It is becoming an industry. So, various people all over the country are becoming in this profession.

The LGED, Sunamganj implementing a project called Community Based Resource Management Project (CBRMP) to change the livelihoods of marginal and extreme poor farmer of various upazila of sunamganj area. The success of this type of project depends on proper care and incubation of the hatching eggs. The artificial parched rice husk incubation process is started in some parts of Bangladesh. The incubation generally performed from January to June. Very few study so far been done their performance, particularly on the hatchability, fertility, profitability of duck eggs and as such the present study was carried out to know the production of ducklings through rice husk incubation and to analyze the profitability percentage from ducklings.

MATERIALS AND METHODS

Equipments and accessories for Rice Husk Incubator

A. Principle equipments: a) Incubation Cylinder, b) Turning Case, c) Turning Box, d) Hatching Bed, e) Kerosene lamp, f) Colored Cloth, g) Rice Husk, h) Jute Cloth, i) Tray, j) Mat and k) Gunny Bags

B. Accessories: a) Torch Light, b) Clinical Thermometer, c) Gauge, d) Sand Paper, e) Kerosene lamp (Kupi), f) Calculator, g) Secure Pan, h) Aluminum Pot, i) Savlon, j) Egg Tray, k) Wire Net, l) Sign Pen, m) Register Book, n) Digital Weight Machine, and o) Mercury Pen

Study area

The research work was carried out at Sunamganj sadar, Dirai, Jamalganj and Doarabajar upazila of Sunamganj district.

Study period

From February to May, 2014.

Selection of the farmers

A total of nine farmers were selected randomly who are practicing traditionally parched rice husk incubator. Among these 3 were small (hatch, 1000-2000 DODs/month), 3 were medium (hatch, 2001-3000 DODs/month) and 3 were large (hatch, >3000 DODs/month) where five hatches were observed for each farmer. So, 9 farmers×5hatches = 45 hatches were observed. Here DODs = Day Old Ducklings.

Layout of the experiment

There are three groups of farmers i.e. small (T_1), medium (T_2) and large (T_3). Each group of farmers consists of three farmers. Different five hatches (R_1, R_2, R_3, R_4 and R_5) were counted for each farmer. So, for small group (3×5) =15, medium group (3×5) =15 and large group (3×5) =15 hatches were taken in account (Table 1).

Collection of Data and Record keeping

At the time of interview, the researcher asked question systematically and explained the questions wherever it is found necessary. To attain accuracy and reliability of data, care was taken in the period of data collection. Regular record keeping in a prescribed questionnaire from eggs collection to ducklings was strictly maintained on the record keeping apparatus.

Fertility

Fertility (%) = (No. of fertile eggs ÷ No. of eggs set) ×100

Hatchability

Hatchability (%) = (No. of chick hatched out ÷ No. of eggs set) ×100

Chronological steps for incubation of eggs

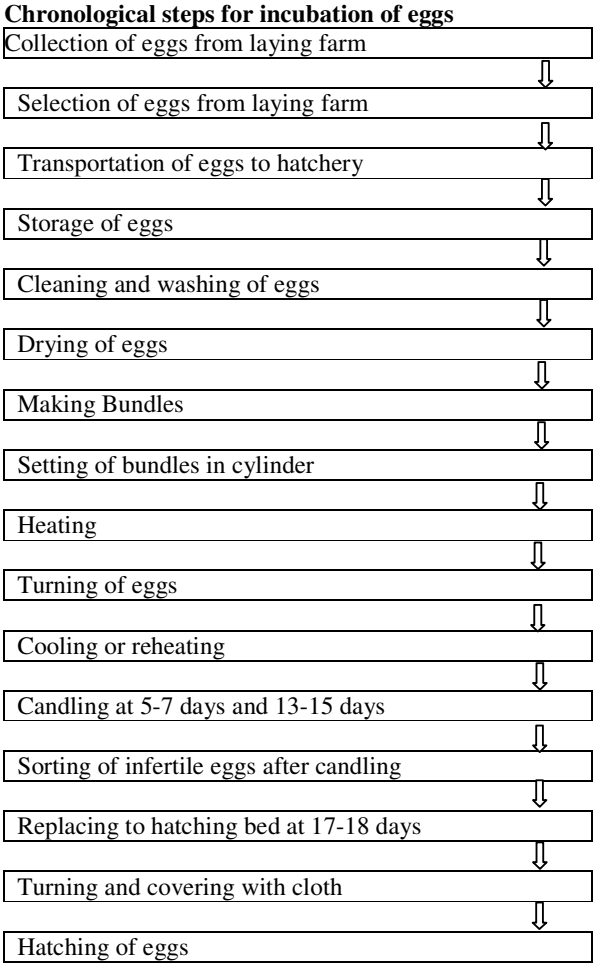

Table 1: Layout of the experiment

Replication	Treatment			
	T_1 (Small)	T_2 (Medium)	T_3 (Large)	Total
R_1	3	3	3	9
R_2	3	3	3	9
R_3	3	3	3	9
R_4	3	3	3	9
R_5	3	3	3	9
Total	15	15	15	45

Data analysis

The experiment was in Completely Randomized Design (CRD). After collection of all data were analyzed by SAS (2008). DMRT, Level of significance are observed at 1% and 5%.

RESULTS AND DISCUSSION

Fertility and hatchability of duck eggs

From Table 2 it was observed that average no. of egg set among small, medium, and large groups was 1256.47±19.93, 1727.07±49.74, and 4560.67±424.53 respectively. Average no. of infertile egg among small, medium, and large groups was 165.13±16.73, 282.53± 39.84, and 693.2±109.69 respectively. Infertility among small, medium, and large groups was 13.13±1.29, 16.22± 2.10, and 15±1.20% respectively. Fertility among small, medium, and large groups was 86.85±1.38, 83.7±2.06, and 85±1.10% respectively. Average embryonic death among small, medium, and large groups was 261.13± 32.81, 283.733±33.08, and 953.4±262.44 respectively. Percentage of embryonic death among small, medium, and large groups was 24±3.12, 19.54±1.89, and 22.63± 2.63% respectively. Average hatchability among small, medium, and large groups was 66.20±2.49, 67.59±2.55, and 65.83±2.97% respectively. Mortality % among small, medium, and large groups was 0.38±0.07, 0.70±0.13, and 0.25±0.02% respectively. This study revealed that infertility, fertility, embryonic death and hatchability percentage had no significant effect among small, medium and large group of farmers. But average no. of egg set, average no. of infertile eggs, average no. of embryonic death, and mortality percentage had significant effect among three groups. Mortality percentage is lower in large group than medium and small group of farmer.

Infertility among small, medium, and large groups was 13.13±1.29, 16.22±2.10, and 15±1.20% respectively which was similar with the findings of Khalekuzzaman *et al.* (2006). Fertility among small, medium, and large groups was 86.85±1.38, 83.7±2.06, and 85±1.10% respectively which was similar with the findings of Khalekuzzaman *et al.* (2006). A Study on Duckling Production through Rice Husk Method in RFLDC Noakhali area (2012), revealed that the fertility of eggs was highest in Char Mohana CBO (76%) and lowest in Progoti CBO (47%), which was similar with the present study.

Embryonic death % had no significant effect among three groups. Highest was in small group (24±3.12) and lowest in medium group (19.54±1.89) which was similar with the findings of Khalekuzzaman *et al.* (2006), but more than the findings of Roy *et al.* (2004).

Hatchability % was found no significantly different among three different groups. Hatchability among small, medium, and large groups was 66.20±2.49, 67.59±2.55, and 65.83±2.97% respectively which were similar with the findings of Khalekuzzaman *et al.* (2006), Sumy *et al.* (2012), Khan and Farid (2011), Rota *et al.* (2010), and Dolberg *et al.* (2002). But, Hatchability % of present study was more than the findings of Chowdhury *et al.* (2002). However Hassan (2011), found hatchability (75-95%) in rice husk incubator, Rota *et al.,* (2010) found hatchability (87.5%) in rice husk incubator, and Pingel *et al*. (1992) found hatchability (70-80%) in rice husk incubator, Raha (2003) found hatchability (91%) in traditional method, which was higher than the present findings.

Cost in rice husk incubation

From Table 3 it was observed that egg purchase cost among small, medium, and large groups was 13821.13±219.18, 18997.73±547.13, and 50167.33± 4669.88 Tk. respectively. Expenditure in egg purchase had highly significant difference ($P<0.01$) among three groups. Large group was comparatively higher than the small and medium groups. Average gross cost per 100 eggs was Tk. 1150 which is more than the findings of Sumy *et al.* (2012) and Raha (2003). Average gross cost per 100 eggs was 1085 and 922.98 Tk. respectively for Sumy *et al.* (2012) and Raha (2003) in Bangladesh in rice husk method. Cost of kerosene among small, medium, and large groups was 276.42±4.38, 379.95±10.94, and 1003.35±93.4 Tk. respectively. Average kerosene cost in large group was comparatively higher than the medium and small group. Kerosene cost had significant difference ($P<0.01$) among three groups. Only large group used labor and the cost was Tk. 3354.73. Total cost among small, medium, and large groups was 14097.56±223.56, 19377.69±558.06, and 54525.41±5399.27 Tk. respectively. Average total expense was comparatively higher in large group than medium and small group. Total cost among three groups had highly significant ($P<0.01$) difference.

Profitability percentage of Rice Husk Incubation

From Table 4 it was observed that average no. of ducklings sale among small, medium, and large groups was 827±40.47, 1152.93±27.92, and 2906±131.42 respectively. Average no. of ducklings sale was higher in large group than medium and small group. Ducklings price/head among small, medium, and large groups was 26.87±0.93, 26.33±0.75, and 21.2±1.17 respectively. Large group sell ducklings comparatively lower price than medium and small group. Av. return from ducklings sale among small, medium, and large groups was 22199.13±1768.15, 30219.53±388.8, and 61939.4± 3270.55 Tk. Respectively. The average return from small group is comparatively lower than medium and large group of hatchery owner. Av. return from candled egg sale among small, medium, and large groups was 1651.33±167.27, 2825.33±398.44, and 6932±1096.85 Tk. respectively. Large group earn more from candled egg sale than medium and small group. Total income among small, medium, and large groups was 23850±1822.82, 33044.87±404.09, and 68871.4±2931.8 Tk. respectively. Large farmer group comparatively earn more than medium and small group. Av. Profit among small, medium, and large groups was 9752.91±1628.96, 13667.18±818.37, and 14345.99±6948.43 Tk. respectively. Profit was comparatively higher in large than medium and small group of farmer. Profitability % among small, medium, and large groups was 68.64±18.75, 71.5±11.3, and 29.66±12.6 Tk. respectively. The profitability % was higher in medium than small and large groups. Average no. of ducklings sale, Ducklings price/head, Av. return from ducklings sale, Av. return from candled egg sale, Total income, and Profitability % had significant effect among three different groups of farmer. But, Av. profit had no significant effect on different farmers group.

Table 2: Fertility and hatchability of duck eggs of different size of group

Variable	T_1 (Small) (Mean±SE)	T_2 (Medium) (Mean±SE)	T_3 (Large) (Mean±SE)	Level of significance
Av. no. of egg set	1256.47±19.93[b]	1727.07±49.74[b]	4560.67±424.53[a]	**
Av. no. of infertile eggs	165.13±16.73[b]	282.53±39.84[b]	693.2±109.69[a]	**
Infertility %	13.13±1.29	16.22±2.10	15±1.20	NS
Fertility %	86.85±1.38	83.7±2.06	85±1.10	NS
Av. no. embryonic death	261.13±32.81[b]	283.733±33.08[b]	953.4±262.44[a]	*
Embryonic death %	24±3.12	19.54±1.89	22.63±2.63	NS
Hatchability %	66.20±2.49	67.59±2.55	65.83±2.97	NS
Mortality %	0.38±0.07[b]	0.70±0.13[a]	0.25±0.02[b]	*

**P<0.01; *P<0.05; NS P>0.05; a, b, c means within a variable.

Table 3: Total cost of Rice Husk Incubation in different groups

Variable	T_1 (Small) (Mean±SE)	T_2 (Medium) (Mean±SE)	T_3 (Large) (Mean±SE)	Level of significance
Egg purchase cost (Tk.)	13821.13±219.18[b]	18997.73±547.13[b]	50167.33±4669.88[a]	**
Kerosene cost (Tk.)	276.42±4.38[b]	379.95±10.94[b]	1003.35±93.4[a]	**
Labor cost (Tk.)	-	-	3354.73	-
Total cost (Tk.)	14097.56±223.56[b]	19377.69±558.068[b]	54525.41±5399.27[a]	**

**P<0.01; *P<0.05; NS P>0.05; a, b, c means within a variable.

Table 4: Profitability percentage of Rice Husk Incubation of different size group

Variables	T_1 (Small) (Mean±SE)	T_2 (Medium) (Mean±SE)	T_3 (Large) (Mean±SE)	Level of significance
Av. no. of ducklings sale	827±40.47[c]	1152.93±27.92[b]	2906±131.42[a]	**
Ducklings price/head	26.87±0.93[a]	26.33±0.75[a]	21.2±1.17[b]	*
Av. return from ducklings sale	22199.13±1768.1 5[c]	30219.533±388.8[b]	61939.4±3270.55[a]	**
Av. return from candled egg sale	1651.33±167.27[b]	2825.33±398.44[b]	6932±1096.85[a]	**
Total income	23850.47±1822.82[c]	33044.87±404.09[b]	68871.4±2931.8[a]	**
Av. profit	9752.91±1628.96	13667.18±818.37	14345.99±6948.43	NS
Profitability %	68.64±18.75[a]	71.5±11.3[a]	29.66±12.6[b]	*

**P<0.01; *P<0.05; NS P>0.05; a, b, c means within a variable.

A study on duckling production through rice husk method in RFLDC Noakhali area (2012) found the net return of the rice husk technique was highest at Ashar Alo CBO (68%) and lowest in QCFS (6%) which was similar with the present findings. Sumy *et al.* (2012) found that Benefit Cost Ratio (BCR) for rice husk incubation technique was 1.72 which was similar with the present findings. Raha (2003) obtained the average net return Tk. 5.97 in Rice husk incubation method which was similar with the present findings. However, Rota et al (2010) reported Tk.1709 per batch (317 eggs) hatching for the similar method which was slightly higher than the present findings.

Conclusion

It is obviously true that duck is a part and parcel of livelihoods of the people of the water bodies areas (haor areas). Due to satisfactory hatchability percentage, increasing demand of day old ducklings, lower operational cost, and operation can be performed without electricity and easily accessible, the use of RHI is increasing day by day not only in haor area but also throughout the country. If the farmers have been supported with money and proper guideline, then it can be a better IGA (Income Generating Asset) for a lot of marginal farmers of haor as well as throughout the country.

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