Short Communication

Validation of non-electric chick brooding system in different areas of Bangladesh- A new device for rural poultry farmers

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Abstract

The experiment was conducted to validate an alternative chick brooding device developed for rural poultry farmers in 3 Technology Dissemination Area (TDA) of Poultry Technology Development and Dissemination Project (PTDDP) during winter. The device is a locally designed drum type non-electric chick brooder. A total of 8 poultry farmers in two groups (500 and 1000 chicks) used the specially designed brooder of different sizes. The size of the drum (Height, H- 40.64 × Diameter, D- 45.72) and (H-40.64 × D- 60.96) cm found suitable for 500 and 1000 chicks respectively. The diameter of the hover should double of diameter of the drum with 15 cm long down ward lid around the hover and two bottom outlets for each drum. Manufacturing cost and brooding cost were TK. 2250 and TK. 900 for 500 chicks and TK. 1750 and Tk.1350 for 1000 chicks respectively. The drum designed for 500 and 1000 chicks required 25 kg and 35 kg of saw dust in one time filling that could produce heat for 14 and 22 hours, respectively. Better growth performance as well as profitability was found in non-electric chick brooding groups than the brooding with electricity and diesel burner (locally known as Hericane). It may be concluded that the newly developed non electric chick brooding device could be suitable as an alternative chick brooding system for rural poultry farmers, especially in the areas where there is no electricity supply.

(**Key words:** Validation, non-electric, chick brooder)

Introduction

Proper brooding of day-old chicks is an important part of the successfull of poultry farming. Rural poultry farmers incur loses for chick mortality due to frequent failure of electricity supply, especially in winter. Moreover, many broiler farmers in rural areas could not rear broiler during December-January in each year and also during weather depression, because of too cold. Therefore, farmers avoid rearing of broiler during this period since they could not maintain brooding temperature. Consequently, market price of DOC is dropped during this period in every year. On the other hand, some of the poultry farmers uses diesel burner (local name Hericane), charcoal, pit coal, rice husk etc. for brooding of chicks in the areas having no electricity supplies as well as during cut of electricity. But, those practices found some difficulties like smoke emission, lower heat intensity and more health problems of the chicks. Some poultry breeding and marketing company in Bangladesh (CP, Bangladesh, 2010) also suggests non–electric brooding device with locally available pot called tin using charcoal. The system is helpful some extend but less availability of charcoal; smoke emission and shorter burning time make the brooding less efficient. To overcome this problem PTDDP has developed a non-electric device using saw dust as an alternative means of chick brooding system. The primary on-station and field trial shows that it would be feasible in

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rural condition to brood the chicks without electricity. Keeping those ideas in mind the present study was aimed to validate the developed chick brooding device in farmer's condition and to optimize the design and size of the device for chick brooding.

Materials and Methods

The experiment was conducted in 3 TDA (Technology Dissemination Area) locations of Poultry Technology Development and Dissemination Project (Dhamrai, Dhaka; Dinajpur Sadar and Noakhali Sadar Upazila). A total of 30 farmers were selected and imparted training on the use of the brooding device before field experiment. Among them a total of 12 interested poultry farmers were selected for experiment on the basis of their interest and capacity of rearing 500 and 1000 chicks. The experiment was conducted during November 2010 to March 2011. A total of 8 sets of special designed brooding devices were prepared having different sizes (e.g. Height x Diameter = 38cm x 38cm; 40.64cm x 40.64cm; 43.18cm x 45.72cm; 45.72cm x 60.96cm; 40.64cm x 45.72cm; 40.64cm x 60.96cm; 38cm x 45.72cm; 45.72cm x 45.72cm) with single and double lower outlet of the drum. The diameter of the hover is double of the drum diameter with 15cm lower lid around the hover.

Figure1. Non -electric chick brooding device at farmer's condition

Description of the brooder

- One side opened drum having 41cm height and 61cm diameter.
- Two outlets (side hole) having 5 cm diameter in the opposite side of the drum about 10 cm above from the bottom of the drum.
- A special designed hover or lid having the diameter double of the drum diameter with 15cm downward support around the hover.
- Drum is filled with sawdust putting a bamboo having 5 cm diameter, vertically in the middle of the drum and two more horizontally into the outlet of the drum.
- After compacting the sawdust 2 cm ash should be added top of the sawdust and make compact with sprinkle of water.
- Then both the bamboos are removed softly giving a "L" shape of hollow into the saw dust.
- Fire is put into the bottom of the hollow of sawdust with few drops of diesel or kerosene.
- Saw dust starts burning giving sufficient heat without smoke.
- Precautions should be taken from fire related incidents and very few smoke may be produce at starting which will disappear very soon.

To conduct this experiment, day old broiler and cockerel chicks were brooded in 500 and 1000 chicks group using the non electric brooder having a control group with electricity brooding in each. A traditional Hericane brooding also compared with the non-electric brooder. Open sided brooding house was used for brooding. Common management practices were followed during brooding of the chicks. A hard board having 91.44cm height was used as chick guard and desired temperature was adjusted either by extending the chick guard or removing the cover or lid of the drum or doing both. The same chicks, feeds and management were ensured in between the treatment and control groups. Besides, proper vaccination, care and management of the birds were provided by regular monitoring of the farms. Quantity of saw dust (kg/day), burning period (hour), cost of brooding (Tk./batch), temperature (^{0}C) generated in brooder, performance of the birds e.g. live weight (gm), feed intake (gm), mortality (%), FCR and gross profit (Taka) were recorded during the trial. Observations were made and recorded on the suitable height, diameter of the drum and lid to optimize the shape and size of the device. Simple statistical technique was followed for the analysis of the experimental data.

Results and Discussions

The drum type non-electric brooder having 40.64 cm heights found most effective than those of 38, 43.18 and 45.72cm height regarding distribution of heat inside the brooder. Similarly, double lower outlet of the drum gives more and uniform heat around the brooder than single outlet. However, more than desired temperature for brooding (>40^{0}C) was recorded and the suitable temperature was adjusted by observing the position of the chicks around the heat source. Table -1 represents the optimum shape- size and costing of the non-electric device for brooding of 500 and 1000 chicks in rural condition. Manufacturing cost of the device for 500 and 1000 chicks were TK. 2250 and Tk. 1750, respectively. The more cost for 500 chicks is due to the price of raw materials where plain sheet is used but, in case of 1000 chicks ready made after used drum could be purchased with lower price. However, smaller the size reduced the brooding cost. So, brooding cost for 500 and 1000 chicks were Tk. 900 and Tk. 1350, respectively. However, the costing may vary regarding the availability of raw materials.

The performance of the experimental birds from Table 2-3 revealed that the birds brooded with non-electric devices perform better than that of traditional brooding. The findings are agreed with Okeke (2000) who reported that using of solar energy for chick brooding in rural areas led to a pollution-free environment for chicks, improved feed conversion ratios and reduce mortality rate. He mentioned that alternative chick brooding

Table 1. Optimum size and costing of non-electric brooding device for brooding of 500 and 1000 chicks

No. of chicks	Drum height (cm)	Drum diameter (cm)	Lower out let		Hover diameter (cm)	Manufacturing cost (TK.)	Saw dust (kg)	Burning period (hour)	Brooding cost (Tk./batch)
			Number	diameter (cm)					
500	40.64	45.72	2	5	91.44	2250	25	14	900
1000	40.64	60.96	2	5	121.92	1750	35	22	1350

is free from fire hazards and allows higher profit margins than conventional kerosene stove brooders. He also added that farmers often lose their day-old chicks during the brooding period due to inadequate or non-existent power supplies. However, there is scant information regarding the use of non-electric brooder to compare the data.

brooding temperature which facilitates the chicks for better feed utilization.

On the other hand, in traditional brooding piling of chicks causes mortality during load shedding and chicks usually take less water and more feed to combat cold stress, which affects the feed efficiency as well as proper

Table 2. Performance of 500 broilers and 1000 cockerels brooded by non-electric drum type brooder

Brooding method	Type of birds	birds No.	Rearing period (d)	Mortality (%) (Mean ± SE)	Body weight (kg) (Mean±SE)	Feed efficiency (Mean±SE)	brooding cost (Tk./batch)	Gross Profit (Tk.)
Non- electric drum type Brooder	Broiler	500	32	$2.28^{c}\pm0.07$	$1.7^{a}\pm0.03$	$1.65^{c}\pm0.03$	850	18355
Brooding with electricity	Do	500	33	$16.63^{a}\pm1.5$	$1.43^{b}\pm0.02$	$1.82^{b}\pm0.02$	1159	4990
Non- electric drum type Brooder	Cockerel	1000	50	$2.00^{c}\pm0.05$	$0.90^{c}\pm0.01$	$1.72^{c}\pm0.02$	1400	11300
Brooding with electricity	Do	1000	50	$10^{b}\pm2.05$	$0.80^{c}\pm0.01$	$2.10^{a}\pm0.06$	1900	7200

Superscripts in the same column differ significantly

Good feed efficiency, more live weight gain, less mortality as well as more profitability

growth of the chicks. But, in drum type brooding optimum brooding temperature for

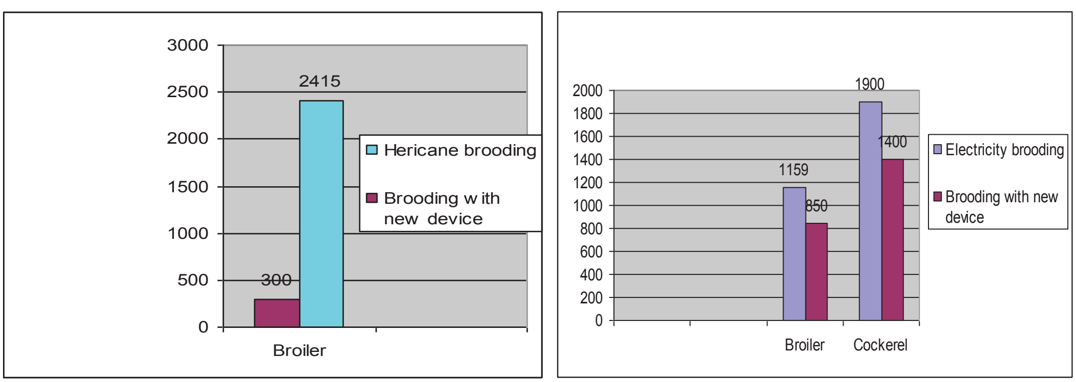

Figure 2. Brooding cost (Tk.) for different brooding system

found in the non-electric brooding groups than the chick brooding was done by electricity and Hericane. Good feed efficiency, less mortality in drum type brooder may be due to provide proper

all time allow the chicks taking optimum feed and water which helps the chicks for better feed efficiency and live weight gain. Moreover, less or no damp condition inside the brooder found for the drum type brooding

Table 3. Comparative performance of 1000 broilers reared by drum-type brooder and Hericane

Brooding method	birds No.	Rearing period (d)	Mortality (%) (Mean ±SE)	Feed intake (kg/bird) (Mean±SE)	live weight (kg/bird) (Mean ±SE)	Feed Efficiency (Mean±SE)	Brooding cost (Tk./batch)	Gross Profit (Tk.)
Drum type Brooder	1000	34	$5.7^{b}\pm0.31$	2.5±0.05	1.45±0.01	1.72±0.02	300	24297
Brooding with h*ericane*	1000	35	$10.25^{a}\pm0.23$	2.71±0.06	1.50±0.01	1.81±0.02	2415	14154

which may lead to cold, brooder pneumonia and other infectious diseases thus causes more chick and subsequent mortality in the traditional brooding system. Brooding cost also found less (Tk. 300 for 500 chicks and Tk. 500 for 1000 chicks) in drum type non-electric brooding than traditional electric brooding. The brooder was more cost effective in comparison to the traditional Hericane brooding (Table 3).

Advantages of using non-electric chick brooder

- ❖ Could be maintained proper brooding temperature
- ❖ No chick mortality for piling
- ❖ Improved chick health and feed Conversion Ratio
- ❖ Less disease during brooding like cold, brooder Pneumonia etc. and no filthy odor or damp condition in the brooder
- ❖ Homogenous growth and better productivity of birds

Conclusion

From the present study, it may be concluded that non-electric chick brooding device (H-40.64cmx D-60.96cm) with double layer outlet could be suitable for brooding of 1000 chicks. Therefore, it would be used as an alternative chick brooding system for the rural poultry farmers especially in the areas where there is no electricity supply.

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