

Modified Chick Brooding Technology Based on Cotton-Plate-as-Cage (Mulugeta Brooder) for Small Scale Poultry Farming

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Abstract: An experiment trial was conducted to examine the effect of modified cotton plate-as-cage (Mulugeta Brooder) chicks brooder technology to retain day old chicks natural body heat on farm (beneficiaries) site trial, Gondar, Ethiopia, on one hundred fifty day-old (commercial Cobb broilers) chicks with the aim of producing a modified cotton plate-as-cage (Mulugeta Brooder) chicks brooder (to reduce cotton wastage, in the meantime providing body heat retaining) which is applicable in small scale poultry farming areas on the basis of survival of chicks. The one hundred fifty Cobb broiler day-old chicks were randomly divided in to three groups: first one group (G1 with fifty (n=50)) broiler chicks under modified cotton plate-as-cage (Mulugeta Brooder) candidate brooder, second group (G2 with (n=50)) was brooded under pot-charcoal brooder with 500 gm charcoal (positive control), the third group (G3 with (n=50)) under no supportive brooder (negative control). Chicks were supervised constantly for 24 hours for 15 days and mortality and survival rates of chicks were recorded. The candidate cotton plate as-cage brooder (Mulugeta Brooder) showed higher level of chicks' survival. Mortality rate was only 4 (2.67 percent) in modified cotton plate-as-cage brooder (Mulugeta Brooder) which is less than 12(8 percent) negative control. Modified (Mulugeta Brooder) technology was not only better in survival rates of chicks, but also, has solved the cotton wastage which was uncovered with cloth-sheet and served for long time. Moreover, breast nature makes day old chicks to have their own places which possibly reducing the trampling effect, due to crowding. In conclusion modified cotton plate-as-cage brooder was not only environmentally friendly, but, also does not require extra energy source. The study revealed that higher level of chicks' survival in case of cotton plate-as-cage chicks brooder as compared to negative control brooder.

Key words: Brooder • Broilers • Chicks • Cotton Plate-As-Cage (Mulugeta Brooder) • Ethiopia • Gondar

INTRODUCTION

Brooder is used to imitate the warmth and protection like a mother hen gives her chickens. Mortality rate was 100 percent in negative control brooder Gondar, Ethiopia, Mulugeta Ayalew [1]. Cotton plate chicks brooder technology was not only environmentally friendly, but, also does not require extra energy source [1]. The study revealed that higher level of chicks' survival in case of cotton plate chicks brooder as compared to conventional electrical brooder [1]. In some African countries, a large proportion of village poultry mortality was due to nocturnal predators because of lack of proper housing setup [2] and is attractive in the context of poverty alleviation and quality protein supply particularly in the developing world. It has a high reproduction rate per unit

time, requires a very low capital investment and space, hence, poultry can be kept even by landless families [3].

In Ethiopia, chickens play an important role in the case of diet and economy of the country [4]. Currently, substantial increase in the demand for milk and meat due to increasing, income, human population and urbanization [5] and poor performance of local chickens [6] are leading to a substantial increase in keeping and distributing improved breeds by extension workers [7]. Despite their high level of production, however, improved breeds are capital intensive; unaffordable by rural poor farmers. In this regard, poultry development strategy has been launched to assist rural poor farmers by supplying day-old-chickens of high-grade exotic breeds and results in emergence of a number of small scale poultry farms, particularly women in the country [6]. However, lack of

facilities including lack of temperature regulation impact the extension activity; about 60 % of the chickens hatched in the rural area of Ethiopia die during the first eight weeks (of age) and/or of their life [8]. The day-old chickens require external heating to survive and grow, as they have not yet developed feathers and cannot regulate their own body temperature. Modern brooder device like electric brooder is not applicable in rural areas, cold places and remote hilly regions of Ethiopia where there is no electricity while poultry farming is significantly increasing at present and in the years to come. To overcome these problems and the poultry extension plan to succeed, developing appropriate technology applicable to such areas is a must, not a necessity. Therefore, this investigation was carried out in order to evaluate cotton plate-as-cage chicken brooder applicable to small scale poultry farming using cotton-as-cage (Mulugeta Brooder) and to reduce trampling and crowding effects as well. Mulugeta Brooder has designed in such a way that, having breast like, to separate chicks to have their own space and serving as heat source like a cloth humans wear at colder time by determining survival of chickens.

MATERIALS AND METHODS

Study Area and Experimental Animals: Experimental study was conducted from 10 to 24 June, 2013 on farm trail (beneficiary site) by train them at Gondar town, Ethiopia. In the area where the community service project advised. Using the technologies of pot-charcoal and cotton-plate chicken brooders which were investigated, tested and both of them were published in the international journals [10] and [1] respectively. Mean annual rainfall and mean average temperature of the area 1172mm and 19.7°C are recorded, respectively; the area has altitude of 2220 meters above sea level [9]. However, range of temperature



Fig. 1: Cobb breed broilers ready for brooder trail

of 23 to 32°C was recorded by room temperature thermometer during the experiment. One hundred fifty Cobb breed broiler day-old chickens (Figure 1) were used for the experiment.

Preparation of Test Chicken Brooder: The cotton plate-as-cage (Mulugeta Brooder) having with 20 – 25 numbers of breasts like structure (as-cage) candidate brooder was used in the present experiment to brood chickens. The plate was made of locally available grasses and purchased from local plate maker people (Fig. 2). The cotton had 150 - 180gm amount utilized for one cotton plate as-cage brooder (Mulugeta Brooder). Cotton plate as-cage brooder (Mulugeta Brooder) had been built locally by one meter clothe sheet at 70 -75 cm diameter. In each of the plates of cotton which serve as the blanket wear and the plate had placed 10 to 15 cm high from the litter, allowing moving freely depending on the amount and thickness of the litter. Equally amount of five to seven cm rice bran thickness utilized as litter in all the trails. At night and colder time when the temperature drops chickens set on bind-up or crowded or tied-up together to with stand

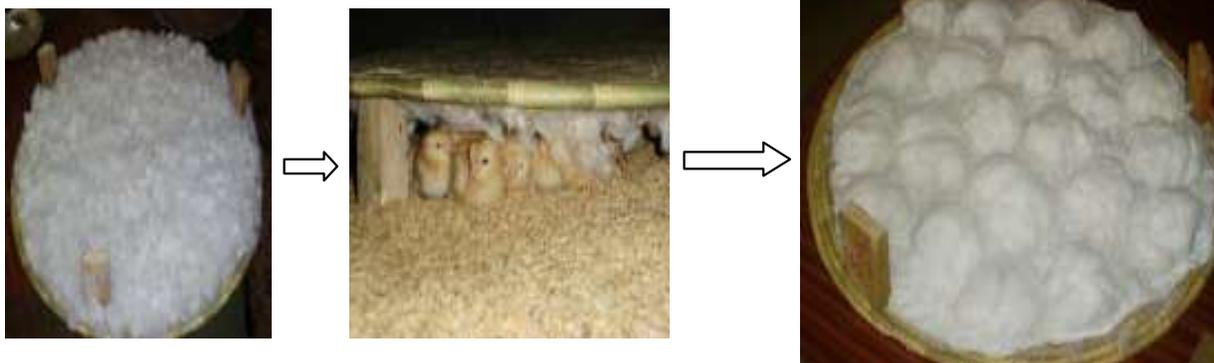


Fig. 2: Modified cotton plate as-cage (Mulugeta) brooder

the chilling or frightening or fear-provoking and set at the edge of the brooder guard at this time we used to place the cotton plate-as-cage brooder (Mulugeta Brooder) without disturbing them. At day light time and when the temperature was suitable the cotton plate-as-cage brooder (Mulugeta Brooder) had been situated at the center of brooder guard where test chickens were controlled. The cotton plate-as-cage (Mulugeta Brooder) was able to retain and maintain chickens their own body heat and warm the chickens' environment and also preventing drop of ground heat which were absorbed at day light hours when the environment was warm; otherwise they pile close to the heat source. A pot-charcoal brooder under 500gm charcoal amount brooder was used as positive control.

Experimental: The one hundred fifty day-old chickens were randomly assigned into three groups: (G1with(n=50)) brooded under cotton plate-as-cage (Mulugeta Brooder) candidate brooder,(G2 with (n=50)) were kept in pot-charcoal chicken brooder under 500 gm charcoal amount (positive control) (G3 with (n=50)) under no brooder support (negative control). In both brooders, brooder guard was used to control each group of the chickens were kept in pot-charcoal chicken brooder under 500 gm charcoal amount (positive control). All the three of chickens brooded under similar management conditions. Equal quantity of rice bran distributed with depth of 5 to

7 cm was used as litter in each of the brooder guards. Finally, chickens were strictly followed throughout 24 hours for 15 days and death/survival of chickens was recorded.

RESULTS

The death of the chickens was 12(8%), 1(0.67%) and 4(2.67%) negative control, Pot-charcoal under 500 gm charcoal (positive control) and Cotton –plate as-cage (Mulugeta Brooder) test brooder respectively. Under, negative control the death rates were relatively reduced from last year trial [1], because as indicated in the materials and methods part, test and/or trail of the experiment was conducted relatively under better environmental season and /or months (23 to 32 degree centigrade) of the year in Ethiopia,. However, Cotton plate-as-cage (Mulugeta Brooder) was shown better survival rate than the negative control. The aggregate death rate was higher during night time (Table 1).

The death/survival of the chickens was seriously followed throughout the 24hours for 15 days and highest number of death, were recorded on the fifth and six days of the experiment respectively (Table 2).

The cotton plate as-cage (Mulugeta Brooder) having three legs each 10-15 cm long (Figure 2) and at night time chickens were brooded in the cotton plate-as-cage (Mulugeta Brooder) (Figure 2).

Table 1: Number and time of chicks death, within 15 days of the brooding

Brooder used	No. of test chicks	Deaths (%)	Time of death (%)	
			Day	Night
G1 Cotton plate-as-cage (Mulugeta brooder)	50	4(2.67)	1 (0.67)	3 (2)
G2 Pot-charcoal with 500gm charcoal positive control	50	1(0.67)	-	1 (0.67)
G3 Negative control	50	12(8)	6 (4)	6 (4)
Total	150	17(11.333)	7(4.67)	10 (6.67)

Table 2: Number of death and survivals chicks in each of the 15 follow-up days

Brooders used	Chicks at the start	Follow up days														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Cotton plate-as-cage (Mulugeta Brooder)	50	50	49	49	49	48	47	47	47	46	46	46	46	46	46	46
Pot-charcoal with 500gm charcoal as positive control	50	50	49	49	49	49	49	49	49	49	49	49	49	49	49	49
Negative control	50	49	48	48	45	44	39	38	38	38	38	38	38	38	38	38
Total	150	149	146	146	143	141	135	134	134	133	133	133	133	133	133	133

DISCUSSION

The idea of cotton plate as-cage (Mulugeta chicken brooder) was started at the time where the tested cotton plate brooder trial was undertaken in 2012. Chicks picked the cotton with feathers and wastage of cottons had observed. Hence, as soon as, the cotton wastage observed, some design modification was thought and looking for the way of covering the cotton by simple, but indispensable, cloth sheet. This makes, not only avoiding the cotton wastage, but also, to have uniform distance from the litter. Making breast like structure, what is known as cotton-cage in this case, helping, in serving for long time, keeping body heat wastage, manageable and gives room for individual chick to avoid the trampling effect. Besides the cage nature of the cotton was very important in placing the cotton in cloth contact with the chicks body, hence, helps to retain their own body temperature, like a blanket humans wear at the colder times as well.

The materials used in making (Mulugeta chicken Brooder) were from local materials selected grasses for making plates and cottons which were cheap, accessible and affordable both in rural and urban areas as well. Chicks like humans do have naturally around 39 degree centigrade body heat. The need of brooding is necessary, at times where the environmental temperature is deteriorating from 26 degree centigrade and below. To maintain their body temperature, cotton plate as -cage (Mulugeta chicken Brooder) provides in maintaining their natural body temperature for small scale poultry farmers.

The recorded death rates of chicken in cotton plate as-cage chicken brooder (Mulugeta chicken Brooder) only 4(2.67%) in the test. Despite the fact that and negative control brooder 12(8%) chickens died due to lack of brooder.

The study using (Mulugeta chicken Brooder) as cotton cage shows 4(2.67%), death rates, is a great achievement than the positive control pot charcoal brooder under 500 gm 1(0.67%). In the tested brooder some of the chicks unable to know cotton cage is nearby and helps to brood. To alleviate this problem there is a need to develop sound like mother hen inside the cotton as-cage brooder to attract (mimic) chicks to come inside and get brooding. Mean while, (Mulugeta Brooder) is designed to brood chicks for small scale poultry farmers particularly for the house woman with no additional cost, as compared with pot-charcoal under 500gm charcoal amount (positive control) which demands extra cost for charcoal. The effect is astonishing that the technology is appropriate for the developing world who is going to run

poultry farming as business [15]. While the pot-charcoal chicken brooder technology serves, not only for small scale poultry farming, but also for large scale poultry farmers [15] and serves as stand by generator in the urban areas where electric power interruption is a problem as well. Even though, the amount of charcoal varies depending on the, the number of chickens, farmers can reduce cost and effect on forest by using 500gm charcoal amount and brood up to 50 or more chickens[15].

Similarly Awudu *et al.* reported that the “Awudu heater” (a heater runs on wood charcoal) is a simple indigenous contrivance equally efficient to electric heaters [11]. Abbey [12] described that charcoal briquettes give a stronger and more stable heat. However, Hassanuzzaman *et al.* reported that charcoal brooders did not perform well in generating heat necessary for brooding [13]. Cotton as-cage (Mulugeta chicken brooder) has improved the death rates as compared with the previous work [1], which was all chicken brooded 34(100%) death recorded [1].

The result in this study was higher in death rate when we compared with the work of Mulugeta Ayalew *et al.* [10] due to the trial was conducted at beneficiaries (on farm trail) site and was the first time to practice in this particular farmer and by-far more efficient chicken brooder, because with no any extra heat supply support.

The differences and similarities between the current and previous studies might be associated with free from any kind costs for additional heat supply and can be prepared easily any where in any areas of the rural and urban areas of Ethiopian who are going to have small scale poultry farms, Similarly using two box brooder, the study of Solomon [14], clearly showed that about 95, 88 and 80% of the hay-box groups distributed survived to an age of 2, 4 and 8 weeks respectively, the values of which were high by the Ethiopian standard.

Those cotton as-cage brooders lip has 70-75cm diameters due to this reason, death rates were 4(2.67%) which is better in death rate as compared with, the cotton plate brooder lip with a diameter of 55cm were 17.65%, this might be associated with the diameter of the brooder lip, as the diameter lip decreases the death rate increases as well [1].

Smothering of chickens usually occurs at night when the temperature drops and chickens require less heat as they get older [14]. Cotton plate as cage chicken brooder was not only environmentally friendly chicken brooder, but also non extra heat energy source demanding technology could have been utilized. In conclusion,

higher level of chickens' survival was observed in the cotton plate as-cage chicken brooder (Mulugeta chicken brooder) helps for small scale poultry farmers in raising their own poultry farm as source of nutrition, income and as business as well.

The technology is for the developing countries in areas where there is no electricity supply make the cotton plate as-cage chicken brooder applicable to achieve poultry extension plan in small scale poultry farming. However, further experimental trial by developing mother hens like sound (mimic device) to initiate chicks to come and enter the cotton as-cage brooder at cold times of the year is suggested.

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REFERENCES

1. Mulugeta Ayalew and Muluken Simeneh, 2013. Evaluation of a Chick Brooding Technology Based on Cotton-Plate Material for Small Scale Poultry Farming. *Middle-East Journal of Scientific Research*, 14(7): 987-991, 2013, ISSN 1990-9233©IDOSI Publications, 2013, DOI: 10.5829/idosi.mejsr.2013.14.7.2197.
2. Dwinger, R.H., J.G. Bell and A. Permin, 2003. A program to improve family poultry production in Africa. B.P. 6268, Rabat-Institutes, Morocco.
3. Mekonnen, S., T. Berehanu and A. Argaw, 2011. Introduction and evaluation of modified hay-box brooder, Fayoumi chicken and layers housing, addressing small-scale semi-intensive poultry farming at Beresa Watershade, Gurage Zone, Ethiopia. *International Journal of Livestock Production*, 2(8): 124-128.
4. Solomon, D., 2004. Egg production performance of local and White Leghorn hens under intensive and rural household conditions of Ethiopia. *Jimma college of Agriculture*, pp: 1-13.
5. Azage, T., R. Tsehay, G. Alemu and H. Hizkias, 2001. Milk Recording and Herd Registration in Ethiopia. In *Proceedings of the 8th Annual Conference of the Ethiopian Society of Animal Production (ESAP)*, 24- 26 August 2000, Addis Ababa, Ethiopia, pp: 90-104.
6. Alemu, Y., 1995. Poultry Production in Ethiopia. *World's Poultry Science Journal*, 51: 197-201.
7. Alemu, Y. and D. Tadelde, 1997. Status of poultry research and development in Ethiopia. *Research Bulletin No.4. Debre Zeit Agricultural research centre, Alemaya University of Agriculture*, pp: 63.
8. Tadele, D. and B. Ogle, 2001. Village poultry production systems in the central highlands of Ethiopia. *Tropical Animal Health and Production*, 33(6): 521-537.
9. CSA, 2008. North Gondar zone finance and economic female animals visited the clinic than the males during the development department annual statistical bulletin, pp: 10-42.
10. Mulugeta Ayalew, Sefinew Alemu, Getachew Assefa, Fasil Getachew, Malede Berhan, Hassen Kebede and Muluken Simeneh, 2012. Introduction and Evaluation of Pot Charcoal Chicken Brooder Applicable to Remote and Rural Areas. *American-Eurasian J. Agric. and Environ. Sci.*, 12(2): 188-191.
11. Awudu, A., K.J. Korese, D. Tom-Dery and A.Z. Imoro, 2011. The Awudu Heater: An Appropriate Solution to Brooder House Thermal Environmental Control for Poultry Farmers. *Development on the margin. Tropentag, October 5-7, Bonn*.
12. Abbey, T.A., 2005. Field Notes: Using charcoal Briquettes to brood chicks in Uganda. *Leisa Magazine*, March, 2005, pp: 34.
13. Hassanuzzaman, M., U.M. Ahammad, M.S. Bulbul, A.M.M. Nurul, M.M.A. Alaml and M.A. Islam, 2004. A Comparative Study on the Efficiency of Locally Made Low Cost Brooders for Brooding Chicks. *Asian-Aust. J. Anim. Sci.*, 17(11): 1586-1590.
14. Solomon, D., 2007. Suitability of hay-box brooding technology to rural household poultry production system. *Jimma University College of Agriculture and Veterinary Medicine*.
15. Mulugeta Ayalew, 2013. Determination of the amount of charcoal used in pot charcoal chicken brooder by evaluating heat generating capacity by determining survival of chickens. *Indian Journal of Traditional Knowledge*, 12(1): 31-35.