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Evaluation of a Chick Brooding Technology Based on Cotton-Plate Material for Small Scale Poultry Farming

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Abstract: An experiment trial was conducted to examine the effect of cotton plate chicks brooder technology to retain day old chicks natural body heat at the University of Gondar teaching and research poultry farm, Ethiopia, on two hundred four day-old (commercial B102) chicks with the aim of producing an alternative chicks brooder which is applicable in small scale poultry farming areas on the basis of survival of chicks. The two hundred four day-old chicks were randomly divided into six groups: first four groups with four different levels of cotton plate each with equal number of (n=34) chicks placed under cotton plate candidate brooder, fifth group (n=34) was brooded under electrical brooder CE Complies with C.EE-EU ID06-2010/388 RAEE ITALY: (positive control) and the sixth group (n=34) was kept in brooder guard as negative control. Chicks were supervised constantly for 24 hours for 15 days and mortality of chicks was recorded. The candidate cotton plate brooder showed higher level of chicks survival. Mortality rate was 100 percent in negative control brooder. Cotton plate chicks brooder technology was not only environmentally friendly but does not require energy source. The study revealed that higher level of chicks' survival in case of cotton plate chicks brooder as compared to conventional electrical brooder.

Key words: Brooder · Chicks · Cotton · Plate · Ethiopia · Gondar

INTRODUCTION

In Ethiopia, chicken farming play an important role in nutritional security and economy of the country [1] and helps in poverty alleviation and quality protein supply. Currently, considerable increase in the demand for milk and meat due to increasing human population and urbanization [2] indicates scope for contribution of rursl level small scale poultry farming. Moreover poultry has a high reproduction rate per unit time, requires a very low capital investment and space, hence, poultry can be raised even by landless families [3].

Thepoor performance of local chicks [4] has lead to a substantial increase in keeping superior breeds [5]. Despite their high level of production superior breeds are capital intensive;and hence unaffordable by rural poor farmers. Keeping in view present scenario, poultry development strategy has been launched to assist rural poor farmers by supplying day-old-chicks of improved native cross which resulted in increasing number of small scale poultry farms in the country [4]. In some countries of African continent, a high mortality in rural areas was due to nocturnal predators and second most important factor is brooding management because of lack of proper brooder house [6].

Due to lack of temperature regulation about 60 % of the chicks hatched in the countryside area of Ethiopia die during the first eight weeks of age [7] as day-old chicks need external heating to regulate own body temperature. Brooder is used to imitate the warmth and protection like a hen gives to chicks during brooding stage.

As modern device is not practically applicable in rural areas, cold places and remote hilly regions of Ethiopia where there is no electricity and looking to increase in small scale poultry farming and its future scope. To overcome this problem and the poultry extension plan to succeed, developing appropriate technology applicable to such areas was very essential.

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An idea was conceived to develop cotton plate chicks brooder to prevent mortality during brooding phase which does not require energy source keeping in view the way the wild birds brood their chicks by providing develop nest just like brooder.

The cotton plate brooder helped not only to maintain body temperature but, also retained the heat of ground which was absorbed at day light hours from the sun. Therefore, this investigation was carried out in order to evaluate cotton plate chicks brooder, which can be utilized for small scale poultry farming.

MATERIALS AND METHODS

Study Area and Experimental Animals: Experimental study was conducted from 14th to 28th February, 2012 at the University of Gondar teaching and research poultry farm, Ethiopia. The mean annual rainfall and mean average temperature of 1172mm and 19.7°C is recorded, respectively; In the area where the teaching and research poultry farm is located, the area has altitude of 2220 meters above sea level [8]. The range of temperature is 10 to 27°C was recorded by during the period of experiment. Two hundred and four commercial B102 strain day-old chicks were devided in six groups and used for the experiment.

Preparation of Test Chicks Brooder: Locally made cotton-plate brooder was used in the present experiment to brood chicks, (Figure 1). A total of 750gml cotton was utilized for the four different levels. To built Cotton plate brooder a mixture of 1000gm of wheat powder with 500gm sugar was used as gum. In the inner part of the plate 55cm diameter cotton was applied in and the plate was placed 10cm high from the floor so that it allows chicks to move movement free. (Figure 2). For all the treatment rice bran was used as litter with 5cm to 7cm thick thickness. A 2, 3, 4 and 5cm thickness of cotton was used for four different treatments having a lip of plate 64, 74, 55 and 70cm diameter respectively. Under each treatment 34 numbers of chicks were allotted randomly.

The cotton plate brooder was placed at the centre of brooding space. A commercial electrical brooder was used as positive control, which supplies heat 48°C at edge at 45cm from the height of ground and 44°C at the floor over the litter.

Experimental Protocol: The two hundred four day-old chicks were randomly assigned into six groups; The first four group at different levels each with (n=34) brooded under cotton plate candidate brooder, five group (n=34) brooded electrical brooder (CE Complies with C.EE-EU ID06-2010/388 RAEE ITALY; IT 08040000004688- produced by; IT 01555980133 Tansion; 230 Vac.+10/-15% - Freq; 50HZ.+ 0.5%- power; KW 0.25 (1,3A). Made in the year 2010- Modale CALDO BELLO CB1 positive control). For all brooders; brooder guard was used to control each group of chicks. The 34 chicks were kept only in brooder guard as negative control. For all the treatments standard management practice was followed.

Fig. 1: The cotton plate made indigenously

Fig. 2: Home made gum

Equal quantity of rice bran was used as litter material with thickness of 5-7cm in the inner circle of brooder guards. The chicks were continuously supervised throughout period of experiment and data pertaining to mortality /survival of chicks was recorded for each treatment.

RESULTS AND DISCUSIONS

From the observation it can be seen that the cotton plate was effective in brooding chicks on basis of survival and their behaviour during brooding.

The mortality rate were 34(100%), 17(50%), 4(11.77%), 4(11.77%), 6(17.65%), and 4(11.77%) in negative control, electric brooder, 2cm, 3cm, 4cm and 5cm cotton plate thickness test brooder, respectively.

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

					P-value		
						tabulated	
			Time of death				
Brooder used	No. of test chicks	Mortality (%)	Day (%)	Night (%)	computed	5%	1%
Negative control	34	34(100)	22(64.7)	12 (35.3)			
Positive control	34	17 (50)	6 (17.6)	11 (32.4)			
2 cm cotton thickness	34	4(11.77)	1 (3)	3 (8.77)			
3 cm cotton thickness	34	4(11.77)	1 (3)	3 (8.77)			
4 cm cotton thickness	34	6(17.65)	1(3)	5 (14.65)			
5 cm cotton thickness	34	4 (11.77)	2(5.885)	2 (5.885)			
Total	204	69(33.8)	33(16.18)	36 (17.62)	96.645	11.07	15.1

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

																	P-value		
		Follow up days																Tabulated	
	Chicks at																		
Brooder used	the start	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Computed	5%	1%
Negative control	34	34	33	32	2	22	20	17	13	6	2	1	0	0	0	0			
Positive control electric brooder	34	34	34	34	33	32	31	25	22	20	19	17	17	17	17	17			
2cm cotton thickness	34	34	34	34	34	34	34	33	32	32	31	31	31	30	30	30			
3cm cotton thickness	34	34	34	34	34	34	34	33	32	32	32	32	32	31	30	30			
4cm cotton thickness	34	34	34	34	34	33	33	32	29	29	29	29	28	28	28	28			
5cm cotton thickness	34	34	34	34	34	34	34	33	33	33	33	32	31	30	30	30			
Total	204	204	203	202	197	189	186	173	161	152	144	142	139	136	135	135	0.768	7.81	11.34

The mortality rate was higher in in this study as compared to the reports of Ayalew *et al*. [9] due to the record lowest temperature during the period under experiment in the year. The chicks under the cotton plate brooder were moving freely and there was no hurdling as the brooder was efficient in maintaining required temperature. A promising result without additional heat supply, by-far more efficient technology without a significant death rate, as compared to conventionally used electric brooder indicates its that it can be used for brooding purpose in Ethiopia. Awudu *et al*. [10] reported that the "Awudu heater" (a heater runs on wood charcoal) is a simple indigenous set-up equally efficient to electric heaters. Abbey [11] described that charcoal briquettes provide a stronger and more stable heat. However, Hassanuzzaman *et al.* [12]. reported that charcoal brooders are not efficient in generating heat necessary for brooding.

Under electrical brooder having rectangular shape of 35cm length by 25cm width (positive control) 17(50%) of the chicks died and all the chicks 34(100%) without brooder (negative control) were dead (Table 1). The highest number of death, 13(18.8%) and 12 (17.4%) were recorded on the six and seventh days of the experiment respectively (Table 2). The (chi-square = x^2) computed value for the six groups was 96.64 which was greater than the tabulated value of at n-1 d.f., 6-1 = 5 d.f., at P-value of 5%, 11.07 and at P-value of 1%, 15.09 indicating the significant difference between the thickness of cotton plate brooder as far as mortality is concerned. The same holds true for the number of chick's death.

The (chi-square) between cotton-plates 0.768 is less than the tabulated value at n-1 d.f., 4-1 = 3 d.f., at P-value of 5%, 7.81, as well as P-value of 1%, 11.34, which shows no significant difference in the mortality between cotton brooder thickness. The same holds true for the number of chicks death.

The newly investigated cotton plate brooder fixed plate having three legs each 10cm long (Figure 3) was used (Figure 4). The electric brooder; rectangular shape raised 45cm from the ground (Figure5) did not supply sufficient heat in the outer areas (Figure 6). The electric brooder used in Gondar University poultry farm and popular in Ethiopia is Italy made relatively chipper than other types of conventional electric brooder; death rate was as high as 17(50%), due to power interruption, small size (35 by 25cm), lack of the umbrella nature did not accommodate large number of chicks, hence, out-layers exposed to the colder weather and suggested that, under the aforementioned electric brooder higher percentage of death might have occurred.

The difference between this and previous pot-charcoal brooder [9] studies is that the this brooder is costs less and can be prepared easily and uses no extra heat source.

Similarly using two box brooder, the study of Solomon [13], 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 brooders lip in each 60cm and above diameters death rates were 11.77%, but the cotton-plate brooder lip with a diameter of 55cm were 17.65%, this indicates the association with the diameter of the brooder lip.

Fig. 3: Full dimension of cotton plate brooder

Fig. 4: Chicks brooded inside cotton-plate

Fig. 5: Electric brooder full dimension

Fig. 6: Chicks getting heat from Electric brooder.

There was no significant difference between cotton thicknesses. Higher number of death of chicks, 36(52.2%) of the 69 total deaths of chicks occurred during the night compared to the death 33(47.8%) occurred during the day light hours; this indicated that external heat is more important for survival and growth of day-old chicks during the night cold hours. Smothering of chicks usually occurs at night when the temperature drops and chicks requires less heat as they get older [13]. Cotton plate chicks brooder was not only environmentally friendly

chicks brooder, but also non extra heat energy source demanding technology which can be used for small scale rural farming.

Similarly in Ethiopia, poultry production technology by using hay box brooder was introduced in a number of decades back, but due extension packaging defects, its rear-end was not appreciated [14].

CONCLUSION

Higher level of chicks survival recorded in the cotton plate chicks brooder compared to conventional electrical brooder. And looking to situation in areas where there is no electricity supply make the cotton plate chicks brooder can be advocated to achieve poultry extension plan in small scale poultry farming.

However, further experimental trial by measuring the diameter of cotton plate brooder lip and the materials to fix in to the plate and to avoid crowding effect and getting tied up during cooler times requires to be studied and a comparison trail between hay box and cotton plate brooder is suggested.

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REFERENCES

1. 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.
2. 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.
3. Mekonnen, S., T. Berehanu and A. Argaw, 2011. Introduction and evaluation of modified hay-box brooder, Fayoumi chicks and layers housing, addressing small-scalesemi-intensivepoultry farming at Beresa W atershade, Gurage Zone, Ethiopia. International Journal of Livestock Production, 2(8): 124-128.
4. Alemu, Y., 1995. Poultry Production in Ethiopia. World's Poultry Science J., 51: 197-201.
5. Alemu, Y. and D. Tadelle, 1997. Status of poultry research and development in Ethiopia. Research Bulletin No. 4. Debre Zeit Agricultural research centre, Alemaya University of Agriculture, pp: 63.
6. 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.
7. 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.
8. 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.
9. Ayalew, M., Sefinew Alemu, A. Getachew, G. Fasil, B. Malede, K. Hassen and S. Muluken, 2012. Introduction and Evaluation of Pot Charcoal Chicks Brooder Applicable to Remote and Rural Areas. American-Eurasian J. Agric. Environ. Sci., 12(2): 188-191, ISSN 1818-6769.
10. 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, Bonn. 5-7 October 2011.
11. Abbey, T.A., 2005. Field Notes; Using charcoal Briquettes to brood chicks in Uganda. Leisa Magazine, pp: 34.
12. Hassanuzzaman, M., U.M. Ahammad, M.S. Bulbul, A.M. Nurul, L. Alam 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.
13. Solomon, D., 2007. Suitability of hay-box brooding technology to rural household poultry production system. Jimma University College of Agriculture and Veterinary Medicine.
14. Simeamelak, M., B. Yohanse and A. Amare, 2011. Introduction and evaluation of modified hay-boxbrooder, Fayoumi chicks and layers housing, addressing small-scale semi-intensive poultry farming at Beresa W atershade, Gurage Zone, Ethiopi. Int. J. Livestock Prod. Available online athttp://www.academicjournals org/IJLP ISSN 2141-2448 ©2011. Academic J., 2(8): 124-12.