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Pre-testing of New Brooder Technology (Mekete Bamboo Brooder) at Arbaminch Agricultural Research Center, Gamo Gofa Zone, SNNPR, Ethiopia

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ABSTRACT

This bamboo brooder technology was designed, produced and pretested as a creative innovation on its structure and convenience for traditional poultry producers who exist on rural areas of the country where there is no electric power. The data on this particular work was row materials, measurements of the brooder parts, construction challenges, and opportunities on the hand of local bamboo workers, in my opinion there will be many works in near future on modification of brooder design, size, component number, row material and comparative evaluation based on suggested areas and with other non-electric source brooders.

KEYWORDS: Brooder, bamboo

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I. INTRODUCTION

Poultry population in Ethiopia is estimated to be about 50.38 million. With regard to breed, 96.9 percent, 0 .54 percent and 2.56 percent of the total poultry were reported to be indigenous, hybrid and exotic, respectively (CSA, 2013). The majority of the national poultry population (41.7%) is baby chicks characterized by extremely high mortality. Due to lack of temperature regulation, about 60 % of the chicks hatched in the countryside of Ethiopia die during the first eight weeks of age, as day-old chicks need external heating to regulate own body temperature (Tadele and Ogle, 2001).

Chick brooding refers to the early periods of growth (0-8 weeks), when young chicks are unable to maintain their normal body temperature without the aid of supplementary heat. Unlike most other small animals, baby chicks are unable to live for any length of time without an additional source of heat other than their own bodies. Under natural condition, broody hens lay and brood their eggs until they hatch. After hatching she continues rearing the chicks through provision of the needed warmth and protection against predators.

Different artificial chick brooders exist of every conceivable type and size, heated by oil, coal, wood, water, gas and electricity. With the exception of the electric brooders, all other methods do not maintain constant brooding temperature, require foreign currency for importation and are expensive in size of less than 1000 chick capacity and not suitable for climate smart farming. However, it is difficult to adopt electric brooders by the Ethiopian rural household poultry producers owing to the unavailability of electric power and numbers of chicks to be raised (Solomon, 2007). It is by natural brooding that the indigenous baby chicks are raised all over rural Africa including Ethiopia.

The broody hen rearing and protecting few chicks ceases laying the egg during the entire incubation and brooding periods of up to 81 days (Getinet et al., 2013). Yet the success of the brooding process depends on the maternal instinct of the broody hen and the prevalence of predators such as birds of prey, pets and some wild animals, all of which are listed as the major causes of premature death of chicks (Solomon, 1999). Natural brooding as it is practiced in different parts of rural Ethiopia is characterized by high chick mortality. The average survival rate of baby chicks to an age of 3-months reared under natural brooding condition in Ethiopia is about 40 percent (Hoyle, 1992).

To solve these problems a number of technologies, techniques and management practices have been undertaken. Of these, introduction, evaluation and popularization of Mekete Bamboo Brooder is one way to increase the productivity of village chicken production system of the country. This technology utilizes simple and locally available materials and involves brooding of chicks by conserving their own metabolic heat to keep them warm. Under village conditions, the use of Mekete Bamboo Brooder has the advantages of providing protection against predator attack and reduces the risk of exposure to disease through confinement (Nigussie et al., 2003). Due to complexity of some local brooder technology design and expensiveness of raw materials, did not optimize the local framers financial capacity. Thus this proposal is prepared to solve such problem. The prototype picture is presented at the end of this work.

Objective

- To develop new brooder which is more convenient for local chickens for high productivity and involves brooding of chicks by conserving their own metabolic heat to keep them warm
- To develop new brooder technology that utilizes simple and locally available materials.

II. MATERIAL AND METHOD

The thought of the technology, designing, prototype development and materials type was produced by the inventor of the technology, Me, Mr. Mekete Manjura.

III. NEW BROODER TECHNOLOGY DESIGNING AND MODEL BROODER CONSTRUCTION

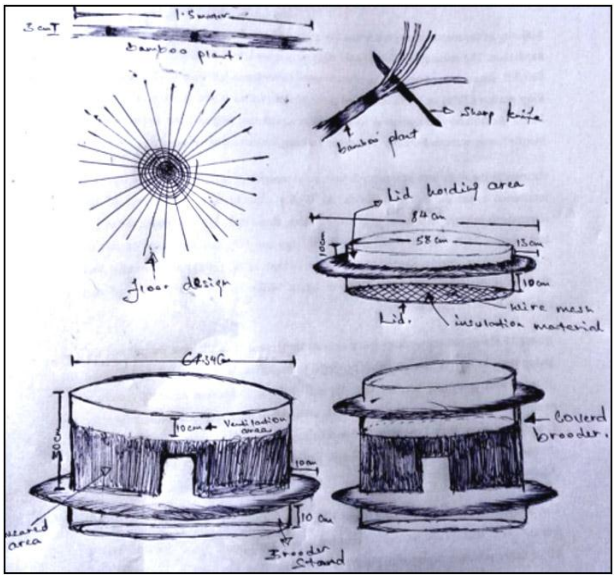
The newly designed Brooder (Mekete Brooder) has a round shape Unlike other brooders, this Brooder does not require coal, oil, or electricity for heating. The brooder made of a simple bamboo material in round form which is covered by mud or cattle dung up to 25cm of its height, a door, small ventilation holes on the bamboo wall, a bamboo made floor, a central nest, a roof (top cover) and wire mesh enclosing a chick run. The walls of the brooder could be made of bamboo in round form, each being 30 cm high. 5cm at the top of the wall is not covered by mud or cattle dung. A door of appropriate dimension, depending on the size of the box, is made at any part of the wall. The floor of Mekete bamboo brooder should be made durable, smooth and easy to clean and disinfect.

The advantages and significance of the Mekete Bamboo chick brooding technology compared to natural brooding are the better performance in terms of number of chicks raised at a time and their survival rate, earlier start of egg laying by the hen and protection of chicks from predators such as birds of prey, pets and wild animals. It also better fits a market oriented production system, since batches of up to 50 chicks could be reared at a time. Compared to electric brooders the advantages and significance of the hay- box chick brooding technology are that:

- It is as productive as the electric brooder in any size of $\leq$ 50 chicks.
- No artificial heat is employed in the Mekete Bamboo Brooder and hence brooding costs are saved.
- It is portable and exposes the chicks to natural vegetation.
- It is simple and could successfully be operated and managed without high level specialized training.
- It can be modified by local skills to the local situation of climate and available type of construction materials.

The construction and management of the Mekete Bamboo Brooder have been well conceived, operationalized and monitored.

Figure1. Design of Mekete Bamboo Brooder



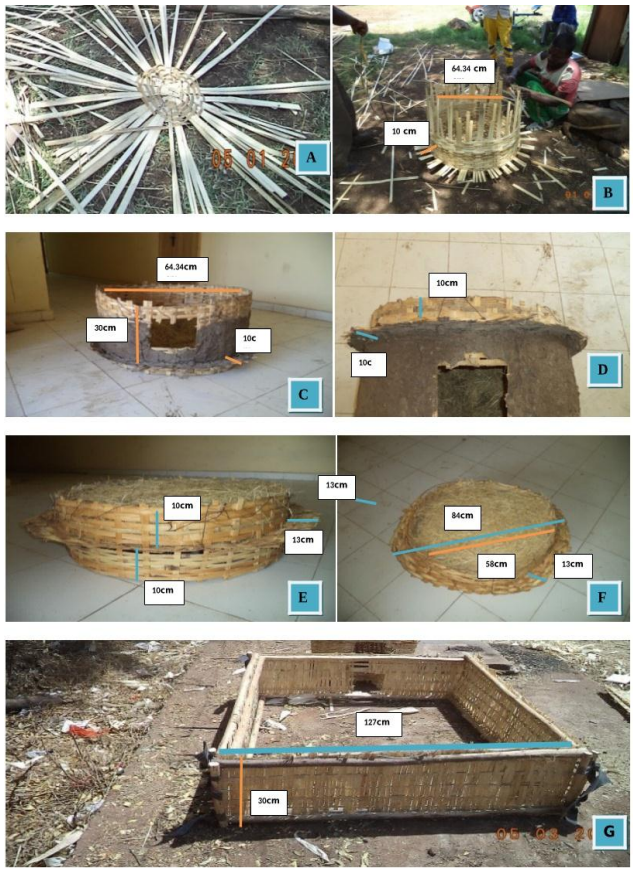
IV. MODEL BROODER CONSTRUCTION AND SPECIFICATION

Mekete bamboo brooder is not using any artificial heat like coal, oil, or electricity for heating. The brooder comprises of a simple square bamboo box made of eight outer framing wooden frame, four bamboo boards, a door, ventilation parts on the wall, a bamboo made floor, a central nest, a roof (top cover made of bamboo) and wire mesh enclosing a chick run (Figure 1). The walls of the brooder could be made of 4 outer framing boards, each being 30 cm high and 127 cm width. Free ventilation area of 10 cm height is left on the wall during mud or caw dang smearing time. A door of appropriate dimension, depending on the size of the box, is made at the center of one of the four frame boards. The floor of the brooder was made of bamboo and it is durable, smooth and easy to clean and disinfect.

Half inch wire-mesh tightly stretched on the central nest to prevent sagging and it keeps the hay to stay on the floor and wall for long time. Insulation material (hay or straw) is stuffed very loosely into the space between the central nest and the wall of the brooder. The roof or lid of the hay-box is made of bamboo and filled with an insulation material. The run is made of 8- wooden frame and 4 bamboo made board, each of them 30 cm high and 127 cm width (similar in height to the wall of the brooder) covered by wire mesh.

After detailed clarification and training the prototype and specification was given to local bamboo art professionals to produce the model brooder. This new brooder technology was designed, produced and pretested as the first innovation on its structure and convenience for rural areas of the country where there is no electric power. The data on this particular work was measurements of the brooder parts, construction challenges, and opportunities of the brooder on the hand of local bamboo workers, in my opinion there will be many works in near future on modification of brooder design, size, component number, row material and comparative evaluation based on suggested areas and with other non electric source brooders. This would increase small scale poultry production in general and egg productivity in particular. The brooder is easy to construct, use and modify with the use of locally available skills and materials (Photos A,B,C,D,E,F,G). The following pictures illustrate the model brooder.

Figure 2. Mekete bamboo brooder and run.



V. MEASUREMENTS OF EACH PART OF THE BROODER

A. How to made or prepare the floor part of the brooder ?

- Cut the bamboo diagonally by using sharp knife, into thin parts (because to make is suitable for this bamboo brooder building), see Figure A.

B. How to made or prepare the whole body of the brooder ?

- Floor of the brooder, which is away from the wall up to 10cm.
- Wall of the brooder, which is 30cm from the floor of the brooder.

C. Fully completed Mekete bamboo brooder

- The diameter of the brooder is 64.34cm. Floor of the brooder, which is away from the wall up to 10cm from the wall and inside the wall is 64.34cm diameter.
- The height of the wall is 30cm and the measuring starts from the floor of the brooder.
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- The wall is covered with mud or cattle dung up to 25 cm and the left 5cm is left for ventilation.
- There is run door, which is optimum for chicken entry.
- The central nest is made up of a central circle of wire-mesh netting with an opening to the door that is arranged to lead directly into the run, leaving no open space between the nest and door.
- Insulation material (hay or straw) is stuffed very loosely into the space between the central nest and the wall of brooder.
- The floor of the hay-box brooder should be made durable, smooth and easy to clean and disinfect.

D. The stand of brooder, which is 10cm and separated from the wall by the part of the floor, which is 10cm in opposite direction from the wall.

E. A lid, also known as a cover, is part of a brooder, and serves as the closure or seal, usually one that completely closes the brooder. It is filled with hay and has 13cm handling frame.

F. Lid of the brooder.

- The diameter of the cover is 84cm, but there is part which is made to enter in to the brooder during covering and it measured 58cm in diameter (which means 13cm is left outside of the brooder, it is handling frame).
- Depending on climatic conditions the roof or cover of the brooder is filled with an insulation material (hay or straw).
- Half inch wire-mesh tightly stretched to prevent sagging. And used to keep insulation material (hay or straw).

G. Day run frame.

- This is used to control the chickens from predators at the day time.
- The run is made of 4- wooden frame and bamboo made boards, each of them 30 cm high and 127 cm width.

Specific Materials to construct the brooder.

1. Bamboo plant, which is at least >3cm diameter thickness and 1.5mater length.
2. Hay, which is used to fill the lid. Which is used to control the body heat of the chickens by holding their body heat
3. Half inch wire-mesh, which is used to keep the hay at the cover and also used to keep hay at the central nest between the wall and the mesh.

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