Hay-box brooder: a milestone to increase rural households poultry production, Ethiopia

Source	Animal Production and Health Division (Animal Nutrition) in FAO
Keywords	Poultry, breeding, hay, chickens
Country of first practice	Ethiopia
ID and publishing year	8047 and 2014
Sustainable Development Goals	No poverty, zero hunger, decent work and economic growth and life on land

Summary

This practice describes how Hay-Boxes can be used to increase poultry production, including details on how to manage the Hay-Box.

Description

The brooder comprises of a simple square box made of four outer framing wooden boards, a door, small ventilation holes, a wooden or wire-mesh floor, a central nest, a roof (top cover) 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 2 cm thick.

Four small ventilation holes of 2.5 cm diameter are drilled at the upper side of each frame board (making it a total of 16 holes). A door of appropriate dimension, depending on the size of the box, is made at the centre of one of the four frame boards. The floor of the hay-box brooder should be made durable, smooth and easy to clean and disinfect.

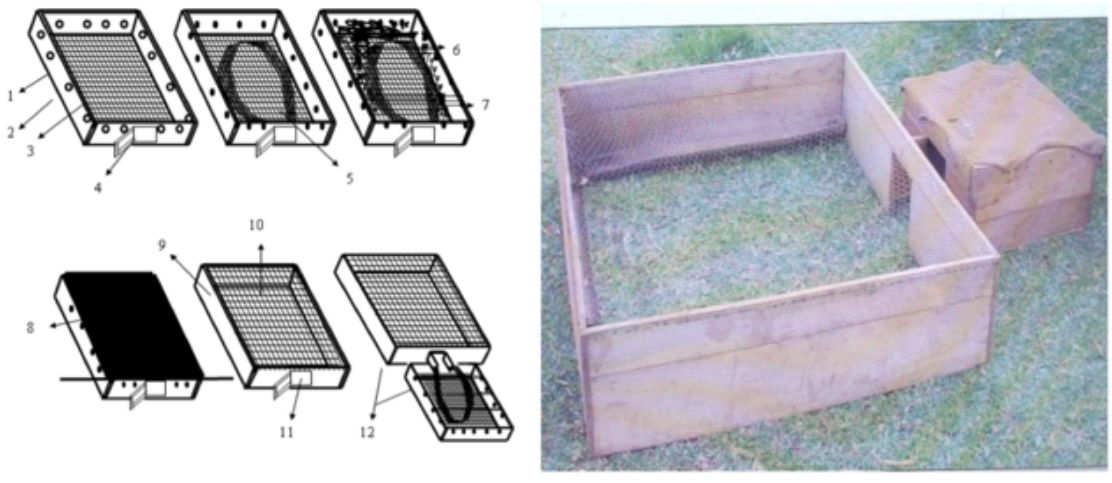
Cheap (soft) wood and / or half inch wire-mesh tightly stretched to prevent sagging could be used for the construction of the floor. The central nest is made up of a central circle of wire-mesh netting with an opening to the door that is arranged to lead directly into the run, leaving no open space between the nest and door. Insulation material (hay or straw) is stuffed very loosely into the space between the central nest and the sides of the box. Depending on climatic conditions the roof or top of the hay-box is made of either a single or double layered sack filled with an insulation material. The run is made of 4 wooden frame boards, each of them 30 cm high and 2 cm thick (similar in height and width to the frame boards of the hay-box brooder) covered by wire mesh.

1. Cost and size of the hay-box

Most of the observations made and the results of a series of on-station and on-farm trails indicate that for the hay-box chick brooding technology a capacity of 10 to 70 is the most appropriate size under the present ethiopian small holder conditions. It has been shown that the fabrication of hay-boxes for less than 10 chicks is expensive and urban dwellers and rural farmers participating in its introduction were reluctant to accept the offer of hay-box brooder of that size.

On the other side, retarded growth and high chick mortality were observed among chicks raised in hay-box brooders for more than 70 chicks.

Figure 1. Construction design of the hay-box and run



The specifications for different size hay-box chick brooders in the range for 10-70 chicks of egg type breeds are shown in the following table.

2. How to manage the hay-box

Feed and water are always provided in the run and not in the brooder box. Very close attention is required during the first week of brooding and the chicks should be moved out of the box 4 to 5 times daily for feeding and watering in the run. Two to three hours after feeding and watering they should be gently pushed back into the box and the door closed behind them.

After the first week of brooding, the chicks will know their way about and will freely run in and out of the box, when the door of the box to the run is left open during daytime. Changing the position of the box and run frequently (for provision of fresh pasture) and closing of the chicks into the box at night are the major managerial practices required after the first week of brooding.

2.1 Brooding temperature and space

One of the critical requirements of successful chick brooding is regulation of brooding temperature and provision of adequate space. As chicks grow and mature, the need for supplemental heat is less important whereas, the need for adequate space becomes critical.

A brooding temperature of about 34 - 39° C is achieved in the hay-box brooders during the first week of brooding if the specified design and the dimension of the technology are maintained. The brooding temperature of the hay-box brooders could be reduced by at least 3° C weekly, to the desired level by reducing the amount of hay stuffed between the sides of the box and the central nest.

There is thus gradual increase in the available space with the proportional reduction of the amount of hay stuffed between the sides of the box and the central nest. The central nest will thus have to be enlarged and adjusted each time the insulation material is reduced.

2.2 Ventilation

The ventilation needs of the hay-box brooder depend on the climatic conditions and chick density and are ensured by the

Table 1. Specifications of the hay-boxes for 10 to 70 chicks

No chicks	Box dimension (cm)	Run dimension (cm)
10	30 x 26 x 26	30 x 56 x 56
20	30 x 37 x 37	30 x 80 x 80
30	30 x 45 x 45	30 x 98 x 98
40	30 x 52 x 52	30 x 113 x 113
60	30 x 63 x 63	30 x 139 x 139
70	30 x 68 x 68	30 x 150 x 150

Source: FAO 2014

16 small ventilation holes drilled on the top of the outer frame boards of the hay box-brooder. The omission or blockage of these ventilation holes results in high brooding temperature, suffocation and chick death.

The floor of the hay-box may also provide considerable additional air circulation depending on the type of constructional materials used. A wire-mesh floor would provide the best ventilation in addition to the continuous supply of fresh air through the sack covering the top.

2.3 Feed and water

Adequate commercial or homemade feed and clean water need to be available in the run permanently during daytime. Additionally the practice of thinly spreading of household scraps, green leafy materials and by-products of yellow vegetables such as carrots, mango, papaya etc into the chick run is advisable.

The consumption of very cold water early in the morning makes baby chicks uncomfortably cold and results in bunching, crowding and smothering in the run accompanied by high mortality. Therefore it is advisable to provide warm water in the run immediately after the chicks are moved out of the box early in the morning.

2.4 Parasitism

The hay-box brooding technology involves the use of fibrous and bulky dry organic substance (hay and straw) as insulation materials for the conservation of the metabolic heat of the chicks.

Unfortunately however, these insulation materials and the top covering sack may harbor external parasites such as lice, mites, and bed bugs. Heavy infestation by these blood sucking parasites could be encountered under rural household conditions resulting in stunted and retarded growth of chicks.

It is important therefore to change and renew the insulation materials and to clean the hay-box and the run with boiling water on a regular basis.

2.5 Ant attack

The technology offers safety against predators such as birds of prey, pets and wild animals. Unfortunately however, it could easily be attacked by ants which could result in total loss of chicks. Close attention (supervision) and fast reaction to sound signals are required in areas where there is high prevalence of ants such as south, west and southwest of Ethiopia.

3. Key components of the good practice in Ethiopia

The hay-box chick brooding technology utilizes simple and locally available materials. The major principles of this simple technique are brooding chicks by conserving the metabolic heat produced by the chicks and thus keeping them warm. It was assumed that the use of the hay-box brooder could alleviate the burden of the breeding and multiplication centres of the Ethiopian Ministry of Agriculture and develop the capacity and success of the national poultry extension services.

Under village conditions using the hay-box brooder also has the advantage of providing protection to chicks against predator attack and reducing the risk of exposure to disease through confinement. Another potential benefit of this technique is that it could enable farmers to isolate chicks from their mother at a very early age and raise them separately so that the hens could resume egg laying in short period of time.

The hay-box brooder is a low-input technology that releases the mother hen from brooding so that it may return to laying early. 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 (Figures 1 and 2).

The advantages and significance of the hay-box 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 70 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 < 70 chicks;
- no artificial heat is employed in the hay-box 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; and
- it is applicable to different agro-ecological conditions and a wide range of changing circumstances.

Figure 2. Construction of the hay-box brooding technology at JUCAVM

4.2 Effectiveness and impact of hay-box brooder

Hay-box brooders maintain a temperature of 34 to 39° C during the first week of brooding, which can later be adjusted by reducing the amount of hay used for insulation as the chicks grow and depend

less on external heat. All the series of on station and on farm trials conducted at different locations all over Ethiopia clearly showed that batches of 10 to 70 day old chicks could successfully be reared with the use of the hay-box brooder except during the heavy rainy season in the months of June, July and August.

Figure 3. Construction of the hay-box brooding technology at JUCAVM

© FAO/TECA

With few exception most of the trials conducted in different parts of Ethiopia reported chick survival rates to an age of 3 months in the range of 85 percent to 95 percent. This is very high compared to the results from natural brooding as it is practiced in different parts of Ethiopia.

Figure 4. Training and distributions of hay-box brooders and related deliverables in Jimma

© FAO/TECA

Sponsored by FAO, the hay-box brooder is made available in Kenya and Tanzania and it is reported to have effectively helped poultry farmers solve the problem of high chick mortality rates within the first 8 weeks caused by disease, predation, harsh weather and physical injury. The cost for preparation of the brooder is just Ksh 100 (€ 1).

Figure 5. Training and distributions of hay-box brooders and related deliverables in Jimma

© FAO/TECA

Figure 6. Training and distributions of hay-box brooders and related deliverables in Jimma

© FAO/TECA

Figure 7. Training and distributions of hay-box brooders and related deliverables in Jimma

© FAO/TECA

Figure 8. Modified hay-box brooder and run, Machenko, Kenya

© FAO/TECA

Figure 9. Modified hay-box brooder and run, Machenko, Kenya

© FAO/TECA

4. Acceptability, repeatability and sustainability

The hay-box chick brooding technology is environment friendly because there is no toxic discharge and emission from the technology. The technology can be modified by local skills to the local situation with respect to climate and type of construction materials available (Figure 4) and is applicable (acceptable) to different agro-ecological conditions and a wide range of changing circumstances.

5. Seasonal variability

A significantly higher rate of mortality (as high as 40 percent) compared to electric brooding was recorded from the hay-box groups during the main rainy season which lasts in the Ethiopian high lands, from June to August. The use of hay-box chick brooding technology may be severely affected by heavy rains as the chicks will seldom move outside into the run for feeding, watering and foraging.

During the heavy rains, the chicks get wet and are chilled causing them to crowd and huddle together leading to smothering and death.

6. Rate of chick growth

The growth performance of chicks reared in the hay-box brooders is slower during the first 4 to 6 weeks of brooding than of those chicks reared by electric brooders. This could be attributed to the fact that the chicks in the hay-box brooders are only fed during daytime since they are closed in the box at night.

Contrary chicks in the electric brooders are fed to appetite both day and night. However, comparatively faster growth rate is obtained from the chicks reared in hay-box brooders after the first four weeks of brooding during which time they double their body weight and compensate the slow growth they experienced at the early phase of brooding. They also acclimatize faster than the chicks from electric brooder groups when they are transferred to the growers' houses.

7. Agro-ecological zones

- Tropics, warm

8. Objectives fulfilled by the project

- Woman-friendly;
- Resource use efficiently; and
- Pro-poor technology.