

# Artificial Hatching in Semi-Automatic Incubators

Solution Holder is **Adeniyi Adedirian** and can be contacted through **[a.adediran@cgiar.org](mailto:a.adediran@cgiar.org)**

## Summary

The number of chicks that can be produced by hens via natural incubation is limited to 10-12 chicks per hatch. Such a rate does not allow rapid scaling of new breeds and reliable supply of young birds needed to expand poultry farming. Artificial hatching in semi-automatic incubators makes it possible to rear day old chicks (DOCs) within 21 days. These incubators successfully hatch 85-90% of fertilized eggs, save space and lower production cost which are key factors in obtaining good profit for an enterprise. Further advantages of artificial hatching are that many chicks can be produced in a short period of time and that production can be planned when there is need or demand. The process also avoids spread of parasites and diseases. Improved supply of chicks allows for increased consumption of eggs and poultry meat, leading to greater incomes for chicken farmers.

## Technical Description

Artificial hatcheries mimic the process of incubation by a brooding hen but at a larger scale. Small incubators are designed to hold 50-150 eggs at a time. Semi-automated incubators heated with kerosene, or a battery-powered light bulb offer an alternative to grid electricity. In semi-automatic hatcheries, eggs must be turned manually but trays and traction rod can be used that allows you to rotate all of them at once. Fully automated incubators exist that turn eggs with rollers, but these are more expensive. Less sophisticated versions that do not require electricity have oil lamps as heating source and an insulated wooden box for hatching. Incubators may also be made from refashioned refrigerators. Many simple designs are available that use cardboard boxes and incandescent lights as heating sources.

## Uses

Small semi-automatic artificial hatching incubators are ideal for rural communities that are removed from commercial distribution networks, making it possible for them to access healthy chicks of improved breeds. Large fully automated incubators serve the needs of areas that have several industrial scale poultry farms.

## Composition

There are many commercial artificial incubators of varying capacities. Most depend on electricity, but some use gas or kerosene for heating. Semi-automatic incubators powered by electricity consist of temperature and humidity micro-controllers, low-speed axial fans, wet and dry bulb thermometers, hatching shelves and metal casing.

### Means of application

Fertile eggs must be collected carefully and stored properly until they are incubated. Eggs initially need a very controlled heat input to maintain the optimum temperature of 38°C. As the embryo grows (especially after 18 days), it produces more heat than it requires and may even need cooling. Moisture levels of 60% to 80% are important to stop excess moisture loss from the egg contents through the porous eggshell and membranes. Eggs must be turned three times a day for about 18 days. Hatchability will decrease if eggs are handled poorly or get too hot or too cold. The hatching incubator must be placed in a clean location where it can be securely operated. These eggs are inspected to be free from cracks and dirt and marked on one side with a marker to facilitate systematic turning of the eggs. Eggs are inspected against a light to determine their development stage, referred to as “candling”. Young chicks must be vaccinated against Newcastle Disease, can then be sold to brooder units. After each batch, remove the unhatched eggs, clean, and disinfect the incubator to prepare for the next cycle.

<b>Agroecologies</b>	All Agroecologies.
<b>Regions</b>	Africa South of Sahara.
<b>Developed in Countries</b>	Zimbabwe, Zambia, Uganda, Tanzania, South Sudan, Somalia, Sierra Leone, Senegal, Rwanda, Nigeria, Niger, Mozambique, Malawi, Madagascar, Kenya, Ivory Coast, Guinea, Ghana, Ethiopia, Democratic Republic of the Congo, Central African Republic, Burundi, Botswana, Benin.
<b>Available in</b>	Zimbabwe, Zambia, Uganda, Tanzania, South Sudan, Somalia, Sierra Leone, Senegal, Rwanda, Nigeria, Niger, Mozambique, Malawi, Madagascar, Kenya, Ivory Coast, Guinea, Ghana, Ethiopia, Democratic Republic of the Congo, Central African Republic, Burundi, Botswana, Benin.
<b>Solution Forms</b>	Equipment, Management.
<b>Solution Applications</b>	Livestock Production.
<b>Agricultural Commodities</b>	Poultry.

<b>Target Beneficiaries</b>	Agro-dealers, Commercial farmers, Small-scale farmers.
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## Commercialization

### Commercialization Category

Commercially available

### Startup Requirements

The prerequisites for successful chicken incubation are enthusiasm for the business, training in incubation operations, and identifying markets for the young birds. Sales often occurs through nearby agro-veterinary shops in conjunction with the sales of feed mash specifically intended for chicks (sometimes referred to a starter mash). It is important to produce improved breeds of poultry.

### Production Costs

Start-up and production costs include incubators costing as little as US \$100 depending on size and sophistication. A 64-egg manual solar unit costs \$150 and a fully automated 96 egg unit costs US \$200. Fertilized eggs cost between US \$0.15 and \$0.35 each, and vaccination offered at a cost of US \$0.05 to \$0.10 per chick. Labor costs are about US \$20 per batch for semi-automated operations.

### Customer Segmentation

As the demand for improved chicken breeds in rural and urban regions increases there is ample scope for retail of artificial egg incubators and starting a hatchery. The market for artificial incubators is differentiated according to size, application for farm or breeding, and power source.

### Potential Profitability

A hatchery generates revenue from selling chicks which are priced at US \$0.60 to \$0.85 each. Investing as little as US \$500 can start a hatchery business with a return on investment of 20% when cycles are well organized and input costs are kept in check. Factors like loan interest, depreciation, energy tariffs, vaccine costs, hatchability and technical broiler performances strongly influence the best size of hatchery operation and its profitability.

### Licensing Requirements

Due to the risk of spread of poultry diseases such as Fowl pox, Pullorum and Newcastle disease, quality control is critical in running a hatchery. National veterinary departments in most countries may have regulations and require licenses to approve the operation of a commercial chicken incubator business.

## **Innovation as Public Good**

The solution is a regional public good disseminated by the International Livestock Research Institute.

## **Solution Images**



*Digital semi-automatic egg incubator*



*Candling to determine egg development stage*

## Institutions



## Accompanying Solutions

[Flock Improvement of Meat and Layer Breeds](#)

[Dual-Purpose Chicken for Small-Scale Producers](#)