

Artificial Incubation

In choosing an incubator, one must decide on the kind and capacity of incubator to be used. There are several kinds of incubator such as electric, oil burning (hot air and hot water incubators) or both electric and oil burning.

Essential points to consider in an incubator

1. Heating arrangement of its chamber, the control of heat and ventilation.
2. Walls should be made of good insulating materials.
3. A good thermostat to regulate the heat.
4. A thermometer to register the degree of heat.
5. Easy to operate.

General Designs of Incubators

*Section-type- includes common kerosene incubators used in the farm with a tray of 100-150 eggs comprising one section and large incubators composed of many sections heated by central heating system.



- Cabinet-type – the egg trays are arranged in tiers close to each other so that the capacity in relation to the size of incubator and the floor space is tremendous. More or less a capacity of 12,000 eggs.

Features of Incubators

1. Egg chamber – comprises of egg trays where hatching eggs are placed during incubation. In big incubators with automatic turning device, the eggs are placed at an angle of about 30 degrees with the small end down. For small incubators where the turning of eggs are done by hand or wire, the eggs are placed flat on their sides and parallel to the width of the tray.
2. Thermostat – regulates automatically the temperature within certain limits. Most commonly used in small incubators is the small metal disc, shaped like a wafer filled with ether. When hot, the ether expands the disc which pushes a set of levers that operate the dampers. This regulate the heat by automatically raising or lowering the damper.

3. Humidity supplier – regulates humidity in the egg chamber during incubation which prevents rapid loss of moisture in the hatching eggs. This is supplied by water pans placed under the eggs.
4. Incubation thermometer – attached to the frame or pedestal. It is placed on the egg tray during incubation to maintain the right temperature and so that the bulb is in level with the top of the eggs.
5. Egg turner – turns the egg manually during incubation by pulling or pushing a U-curved wire under the eggs. In cabinet-type incubators, the turning is usually done by an automatic turning device that tilts gently the trays every hour or less.
6. Egg tray(s) – drawer-like tray with a 2-mesh wire bottom provided with a trap door which can be opened or closed. In cabinet incubators, the trays that are arranged in tiers do not have trap doors because the eggs are hatched and hardened on the trays.
7. Nursery tray – catches the chicks which hatch in the egg tray that may fall into the trap door. This is placed only on top of the water pan on the 18th day of incubation.
8. Water pan – Placed under the nursery tray directly on the floor which is made leakproof by soldering. It supplies humidity in the incubator.



9. Incubator Lamp – Source of heat. The kerosene serves as fuel and is placed in a secure box or housing made of galvanized iron outside the egg chamber. The chimney is made of metal.
10. Damper disc – This is the thin metal disc which hangs at the tip of a lever just on top of the boiler flue. When it's cold, the disc covers entirely the flue, thus conserving and increasing the heat inside the boiler. When the incubator is too hot, the damper disc rises allowing the escape of heat. Thus lowering the temperature inside the egg chamber.
11. Ventilation openings – holes at the bottom, sides and top of the incubator. The bottom and side holes are the inlets for fresh air. Those on top serve as outlets of gases and are closed wholly and partially by slip covers. These let off the obnoxious and hot gases which are usually opened full during hatching.
12. Boiler – a water tank or jacket which directly connects the water with the water pipes inside the egg chamber.
13. Boiler vent – exit of air from pipes and tank. After the expulsion of air from tank and pipes when they are filled with hot water, the vent is closed with a stopper.

Pointers in operating an incubator

1. To ensure the even distribution of heat in the egg chamber, level the machine if it is not self-ventilated by using a carpenter's level. Otherwise, use a shallow pan of water set on top of the incubator as a level
2. Disinfect the incubator before and after every hatch. With a "flit" spray, disinfect the interior with 2-3% solution of cresol, Lysol, or formaldehyde (formalin) diluted in water. Wipe the surface of the machine thoroughly and leave it open to dry and eliminate any fumes left.

For Oil Burning Incubators



1. Clean the lamp and fill the container with $\frac{3}{4}$ kerosene. Level new wick with a pair of scissors. However, if the wick has already been used, just scrape off the burnt end with the back of a knife or finger wrapped in rag. Wipe off any oil present on the wick holder. Work the wick up and down through the holder until it slides freely.
2. For hot water incubators, fill the tank with hot distilled water or rain water and tilt the incubator to remove bubbles. Rain or distilled water is recommended because it does not produce sediments neither does it corrode the piping. Drain the water after every hatch unless during successive hatchings.
3. Light the lamp starting with a clear medium flame. Make sure it does not produce smoke. Otherwise, check the wick if it was properly trimmed and kerosene is of good quality.
4. Put a thermometer and observe the temperature for a few hours. Check the incubator thermometer with a clinical thermometer at least once a year or before the hatching season. In places with a climate like Manila,, the most favorable time for hatching is the middle of October to the end of March. Do this by placing both instruments in warm water, stirring while slowly adding hot water. See if the two thermometers have the same temperature of 103 F. Otherwise, correct and mark the thermometers accordingly.

For Electric Incubators

With electric incubators, it is advisable to ask a company representative to test the incubator to understand how the electric thermostatic control for every compartment in which the big incubators are divided.

- No further test should be made after the 14th day. Likewise, cooling should be avoided after the 17th. The eggs in the incubator should not be disturbed until the hatch is complete.

Humidity is an important factor in incubators especially in self-ventilated factor in incubators especially in self-ventilated electric incubators where air in the chamber completely changes in a short time. However, these have indicators that determines the humidity requirement for each machine.

In spite of the humidity indicators, the size of the air cell in the eggs at the time of testing is still the most reliable index to follow. Eggs will be over-dried if ventilators are kept wide open. On the other hand, closing them may keep the size of the air cell small towards hatching time.

Table 1. Ages of egg with corresponding size of air cell.

Age of egg	Size of Air Cell
Newly laid White Leghorn egg	3 mm deep, 1 cm wide
7 th day	6 mm deep 2 cm wide
14 th day	1 cm deep, 2.5 cm wide
18 th day	1.5 cm deep, 3 cm wide

General instructions in egg incubation

- In ordinary incubators, put eggs on the trays lengthwise but do not overfill them.
- For electric incubators, follow the manufacturer's instructions. Place the thermometer and put the center of its bulb on the same level as the topside of the eggs.



- Record the temperature every 6 am, 12 noon, and 6 pm. Ordinary, the thermometer should be placed between the second and third rows of eggs. Keep the temperature of 101 F until the 3rd week. When eggs are hatching, temperature may rise to 103 F without doing any harm.
- Keep the temperature at 100 F to 104 F only.
- Do not turn the eggs during the first 48 hours. With clean hands, turn the eggs in the morning and afternoon from the 2nd up to the 28th day when the first chick usually pips.
- The latest incubators in the market come with turning device therefore, there is no need to open the incubators.



- The old method of turning was to shuffle the eggs with the palm of the hand. Each turn should measure not less than 90 degrees or $\frac{1}{4}$ of a circle.
- Carefully open and close the incubator's door so the eggs will be jolted. Do not add eggs in the incubator.
- Correct ventilation makes the embryos stronger. While cooling, keep the incubator closed. The first cooling period should be about 10 minutes then gradually increased to 15 minutes as the incubation progresses.
- The fertility and vitality tests can be done during the day in a dark room with the aid of sunlight, lamplight or flashlight or at night with a lamplight or flashlight.
- Test the fertility of the eggs from the 5th to the 7th day. Fertile eggs have a moving dark dot about the size of a monggo bean with red veins radiating from it.
- Remove dead germ eggs which show blood clots or blood rings and infertile eggs which look transparent through the tester.

- On the 14th day. Test the eggs' vitality. A strong egg has cloudy appearance and shows red veins all throughout.
- In every test, observe the space or air cell at the larger end of the egg. If the air cell is large, place a pan of water or moist sand below the incubator.
- If the air space is small, it shows that there is too much moisture inside the incubator. Therefore, the cooling time should be longer and the ventilators should be opened to reduce excess moisture more easily, should not be disturbed until the hatch is complete.
- Cover the glass door with paper or cloth to darken the interior of the machine. This will also keep the chicks from picking one another's toes or droppings.

Oftentimes, some eggs are left unhatched in the incubator and some chicks can be heard pipping inside. Chicks that are left in the shell 24 hours after the hatching period are weak. Immediately open such eggs and raise these chicks.

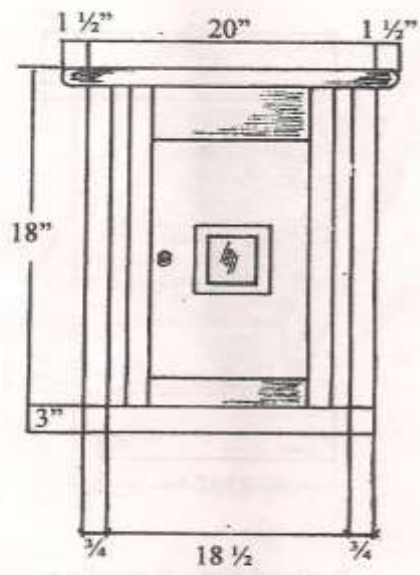
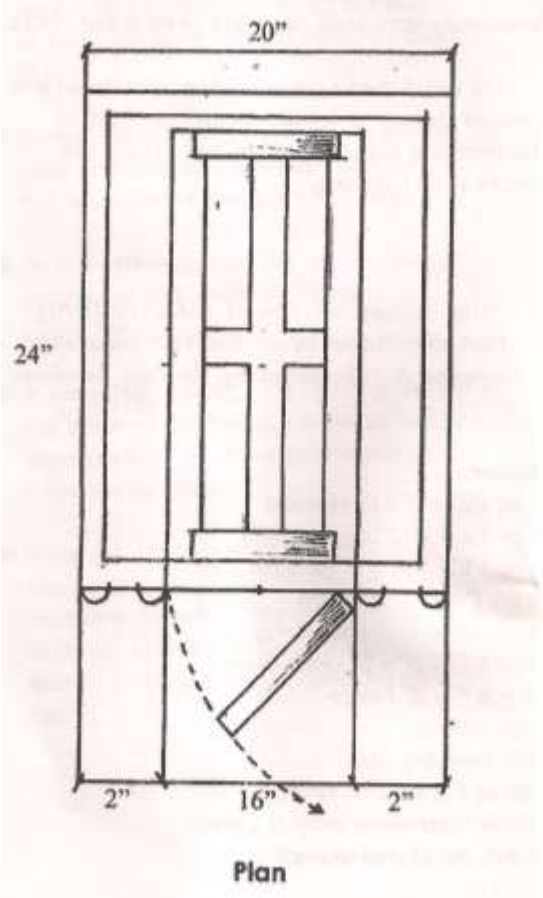
The unhatched eggs should be hard-boiled and passed through a grinder for chicken feed. Exterminate ants that crawl and attack the chicks while hatching.

The Bureau of Animal Industry (BAI)

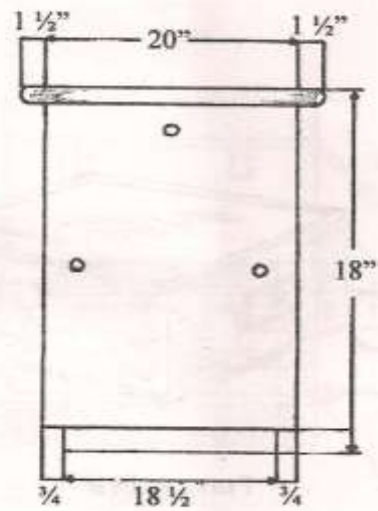
Portable Home-made Electric Incubator Designed & Fabricated by Timoteo Santiago

Materials:

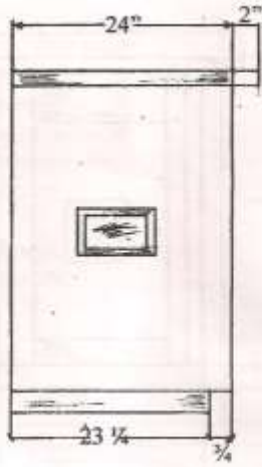
1 pc ½" x 4' x 8' plywood
1 Pc 1 x 4 x 12 tanguile S4S
1 pc 1 ½" x 2 x 12 tanguile S4S
1 mt 1" x 1" welded wire
1 mt ¼" x ¼" welded wire
1 pc 1/8" x 3" x 5" clear glass
2 pcs 1" x 2" hinges
1 pc handle
1 lb perstorp glue
½ kg 1" x 1 1/2" F. nails
1 liter clear gloss lacquer thinner
1 bot. denatured alcohol
100 gm shellac
½ mt #100 sanding paper
1 pc thermometer
1 set thermostat
4 pcs porcelain receptacle
6 mts #14 stranded wire
3 mts #32/16 cord
1 pc plug
1 roll electrical tape
4 pcs 50-watt bulb



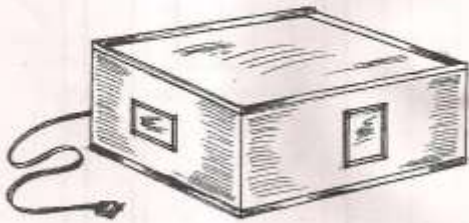
Front Elevation



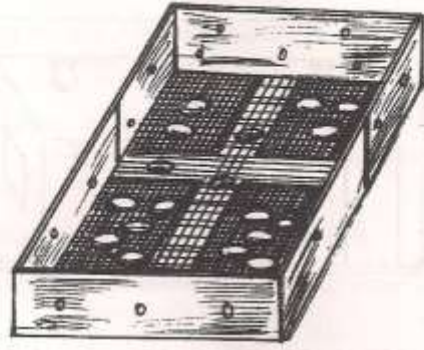
Rear Elevation



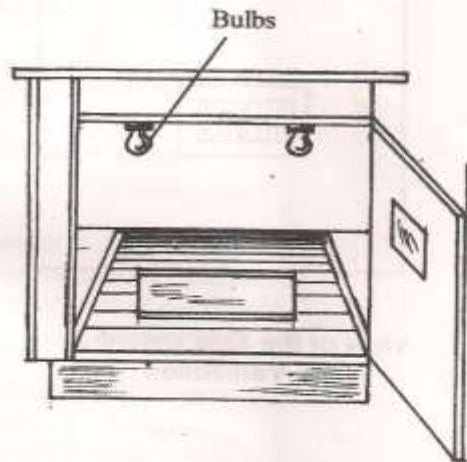
Typical Side Elevation



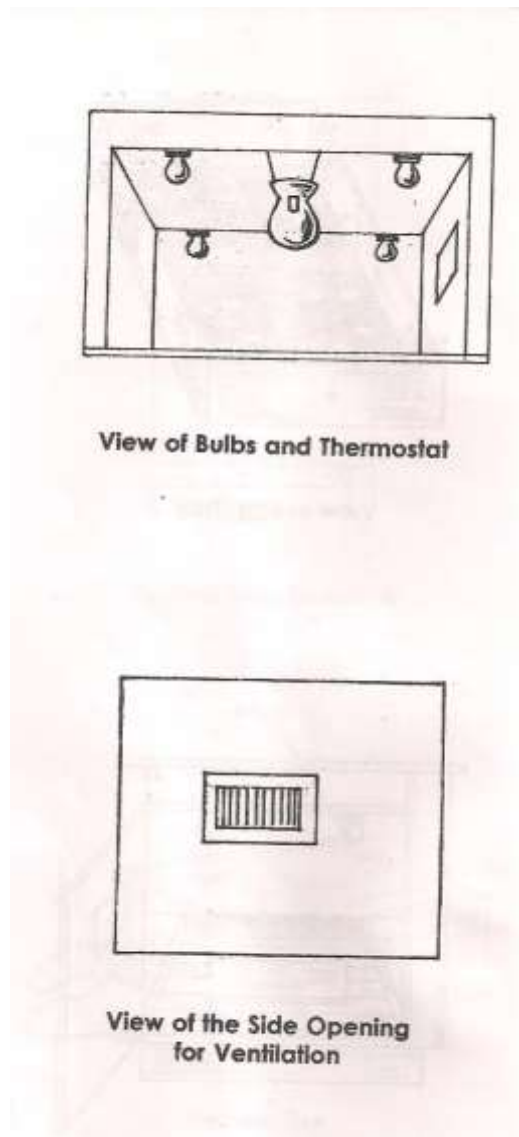
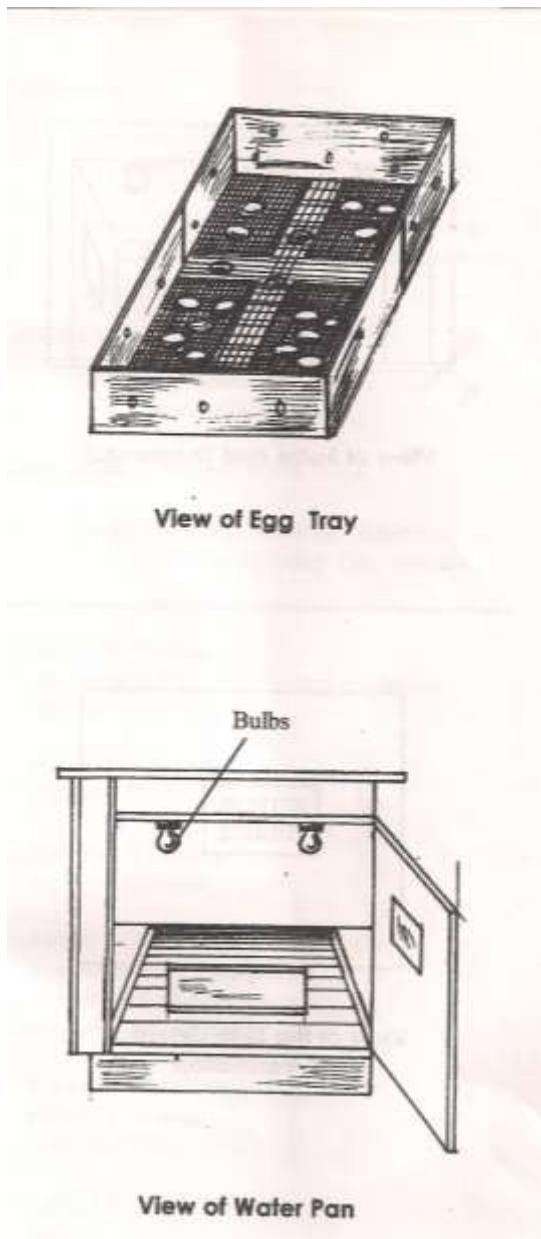
Perspective



View of Egg Tray



View of Water Pan



Reference

Bureau of animal Industry. Leaflet on Incubation. Quezon City. Undated
 Gapuz, Rufino B. Poultry Management in the Philippine Education Co. 1973

Picture of Incubator taken from

MARID Agribusiness Digest. Quezon City. March 2003.

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