



INCUBATING EDUCATION

Louisiana 4-H Embryology



Incubating Education Facilitators Guide

GETTING STARTED

- Choose equipment best suited for your situation
- Forecast plan hatch day
- Source high-quality fertile eggs
- Manage temperature and humidity
- Enjoy hatching
- Place chicks in happy, educated homes

AT A GLANCE

- Choose an area of the classroom with minimal temperature change - not directly under a vent or next to a window or doorway.
- Incubate only species requiring the same incubation length in at the same time.
- Placing eggs on a Tuesday or Wednesday is helpful so that chicks will hatch during the school week.
- Use an automatic egg turner
 - Eggs must be set with the large end up.
- Keep a daily record of incubator data.
 - Consistent temperature and humidity are critical.
- Check the temperature and humidity daily: Temp – 99-102° F and Humidity 40-50%.
 - Do not open the incubator often.
- Turn the eggs three or five times a day for the first 18 days.
 - The large end of the egg should always be higher than the small end.
- You can verify that the chicks are developing by candling eggs or holding the egg up to a bright light.
 - Do not candle eggs too often.
- On day 18, before the eggs are to hatch, remove eggs from the automatic egg turner and remove the turner.
 - Lay the eggs on their side and increase the temperature about 101°.
- Chicks should stay in the incubator approximately 24 hours after they hatch or until they are completely dry, and strong enough to stand on their own.
- When the chicks hatch, place them in a large box and cover the bottom with small gravel, sawdust, a thin layer of dirt, etc.
 - Use a light or heat lamp to keep them warm.
- Clean out the incubator with warm water and a mild anti-bacterial soap when incubation is complete and all eggs have hatched or been removed.
 - Refer to manufactures instructions for cleaning guidelines.

INCUBATORS AND EQUIPMENT

Hatching chicks in class is NOT necessary for the use of the Incubating Education curriculum. However, in-class hatching increases student interest and engagement substantially.

Resources to supplement with if not hatching in class:

- [Chicken Embryo Development Animated](#)
- [Nebraska Extension Live Egg Cam](#) with scheduled dates for Live incubation and hatching stream
- [The Poultry Site Embryonic Development Day by Day](#)

Incubators come in many types and kinds, and we suggest using what works for YOUR classroom.

- Many local 4-H offices have incubators for check-out or can work with you to make sure you get the best fit for you and your situation.

Below are some suggested equipment links we suggest:

Circulated Air Incubators with Viewing Windows:

- <https://incubatorwarehouse.com/little-giant-incubator-9300-circulated-air.html>
- <https://incubatorwarehouse.com/incuview-advanced-combo-kit.html>
- <https://incubatorwarehouse.com/brinsea-mini-advanced-combo.html>

Automatic Egg Turners:

- <https://incubatorwarehouse.com/egg-incubator-accessories/hova-bator-egg-turner-chicken.html>

Candlers:

- <https://incubatorwarehouse.com/egg-incubator-accessories/incu-bright-egg-candler.html>
- <https://incubatorwarehouse.com/egg-incubator-accessories/brinsea-ovaview-egg-candler.html>
- <https://www.enasco.com/p/OvaScope-Egg-Scope%2BC29805?searchText=incubator>

Kits:

- <https://incubatorwarehouse.com/hova-bator-advanced-combo-kit.html>
- <https://incubatorwarehouse.com/hova-bator-2370-ultimate-kit.html>

Thermometer and Hygrometers:

- <https://incubatorwarehouse.com/incubator-warehouse-digital-hygrometer.html>
- <https://incubatorwarehouse.com/incubator-thermometer-hygrometer.html>
- <https://incubatorwarehouse.com/incubator-remote-thermometer-hygrometer.html>

RECORD KEEPING

- Record keeping can be used to teach measurement skills, responsibility, and ownership.
- Keep a daily record of the incubator environment to support successful hatch rates.

TEMPERATURE AND HUMIDITY

- Choose an area of the classroom with minimal temperature change - not directly under a vent or next to a window or doorway.
- Prepare the incubator environment two to three days before placing the eggs.
- Consistent temperature & humidity are critical.
 - Check the temperature and humidity daily: Temp – 99-102° F and Humidity 40-50%.
 - Do not open the incubator very often.
- Keep a daily record of incubator data.
 - Check the incubator temperature and humidity at least twice a day.
 - The shell and shell membrane can dry out and become tough for the chicks to breakthrough when without proper humidity during incubation.
- Humidity should be around 40-45% for day 1-17
 - On day 18, when you remove eggs from egg turner, fill water troughs and keep incubator vent plugs in as necessary to increase humidity to 65%.
- Use water channels in the incubator to regulate humidity
 - More water = Higher humidity
 - Warm water is recommended, when adding water, to help keep maintain the temperature steady the incubator.
 - Do not pour water directly on the eggs.

IMPORTANT NOTE: Some teachers have found a higher temperature around 102°F can provide increased success of hatching rates. This may be due to students and teachers open the incubators to work with the eggs.

EGG SOURCING

- A successful incubation requires fresh, clean, fertile eggs.
- Eggs purchased in grocery stores are not fertile.
- Take care to avoid damage to the eggshell.
 - An cracked shell will prevent hatching. Cracked eggs should be discarded to prevent contamination of other eggs.
 - Do not wash with water. You may softly clean a shell without using water or discard extremely dirty eggs.
- Eggs can be acquired from many sources, but many sources may not supply high-quality, fertile eggs.
- Poor-quality eggs that reduce hatch rate, can cause disappointment and frustration for students and teachers.
- Your local 4-H agent can assist you in sourcing eggs locally.
 - If you do require a non-local source as a last option, you can mail order fertile eggs from sources such as:
 - [Texas A & M](#)
 - [Cackle Hatchery](#)
 - [Nasco](#)
- Place eggs in the incubator as soon as possible.
 - Eggs that are placed within six to eight days after being laid produce best hatch rates. After approximately nine days, viability begins to decline.
- Fertile eggs should be stored at 50°F–65°F and at 70% relative humidity.

HATCH DAY PLANNING

- The date you place eggs in the incubator will determine when the chicks will hatch.
- Chicken eggs take 21 days to hatch.
- Avoid placing eggs that will hatch on weekends.
- Placing eggs on a Tuesday or Wednesday is helpful so that chicks will hatch during the school week.
- DO plan hatching days around school open houses, parent-teacher conferences, etc.
- Make this a big day of celebration for the whole school, parents, and community!

EGG PLACEMENT IN INCUBATOR

- Place eggs with the large end of the egg (containing the air cell) facing up.
- Once eggs have been placed, check the incubator frequently to ensure the incubator maintains proper temperature.

CANDLING

- “Candling” is the process of shining a bright light through the egg to observe embryo development.
- Candling allows you to see the inside of the egg.
- Carefully examine eggs for short periods of time (1-2 minutes) without harming the embryos’ development.
- The easiest way to candle eggs is through purchasing an egg candler
- Not all incubated eggs will hatch.
- 80 - 90% of incubated eggs will be fertile.
- Fertile eggs may be identified by candling.
- The presence of embryos can be confirmed after seven days of incubation.
- Embryos appear as a dark spot that becomes larger with incubation time.
- Remove eggs that are identified as infertile or dead to reduce disappointment and remove possible sources of contamination from the incubator.
- If you are anxious about determining these decisions, contact your local 4-H or agriculture agent for advice.
- Candling and Incubator Set-Up Video References:
 - [Nebraska Extension YouTube](#)
 - [Good Video Showing Fertile and Unfertile Eggs](#)
- White eggs are more easily candled than dark or speckled eggs.

HATCHING STAGE

- The hatching stage refers to the final two to three days of incubation.
- Allow the chicks to hatch themselves with no or minimal help.
- Going through the hatching process assists with building strength to survive.
- After day 18, do not turn the eggs.
- Remove the automatic egg turner
- Lay the eggs on cloth or rough paper (not newspaper) inside the incubator (optional).
- This will provide good surface to walk on.
- Do not obstruct airflow or contact the water or the heating element.
- Lower temperature and increase humidity
- Temperature 98-99°F and Humidity 60-65%
- Humidity can be increased by filling all water channels and/or adding a wet sponge or paper towels to increase humidity.
- Chicks will begin pipping (pecking through the shell) around day 2.
- Pipping can occur for many hours before the chick emerges from the shell.
- The hatching process requires great exertion on the part of the chick.
- After emerging from the shell, and recovering from exertion, the chicks will begin to dry, and move around.
- Do not worry about the time a chick takes to hatch, unless the process exceeds 24 hours.
- Once chicks successfully leave the shell, they should remain in the incubator for 24 hours.
- Leaving chicks in the warmth of the incubator gives them a chance to rest and dry.
- Increase the ventilation so that the chicks will have enough oxygen.
- Once all the chicks have hatched, lower the temperature to 95°F.
- Unhatched eggs by the end of the day 22 should be discarded.
- Weak or deformed chicks should be disposed of humanely.
- Chicks will not need feed right away.
- Before hatching, the chick absorbs the yolk of the egg, and stays nourished for the first two to three days of life.
- Place chicks in a cardboard box, a plastic tote, or a similar container as a brooder box when ready
- Round/oval containers can prevent chicks from crowding into corners.
- When the chicks hatch, place them in a large box and cover the bottom with small gravel, sawdust, a thin layer of dirt, etc.
- Provide a heat source such as a heat lamp with a heat bulb (recommended) or a desk lamp.
- Chicks should be kept at about 95°F for their first week of life.
- You can adjust the temperature by raising and lowering the lamp.
- Provide chicken feed and water in shallow containers.

CHICK PLACEMENT

- When seeking a forever home for your hatched chicks, make sure to be aware of city ordinances.
- Seek safe homes with educated owners.
- Provide new owners of chicks with educational information on proper raising and welfare of chicks and chickens.
- Some great resources to share:
 - [Backyard Poultry Welfare](#)
 - [eXtension](#)
 - [Successfully Raising a Small Flock](#)
 - [Purina Mills Chicken Education](#)
 - [Purina Mills Chicken Education Resource Library](#)
 - [Penn State Extension](#)

PARTNERSHIPS

- Your local 4-H and agriculture agent will be your #1 tool in a successful Incubating Education Experience. Agents can:
 - Help you source equipment
 - Help you source eggs and place chicks
 - Assist you in incubator set-up and hatch day planning
 - Develop community relationships to support your embryology unit
- Other great relationships to consider:
 - Local feed stores for a reduced price for feed and equipment or even donated items.
 - Community members with reliable experience hatching chicks

TROUBLESHOOTING AND TALKING TO YOUTH.

- Incubating eggs is not always easy.
 - Fertile eggs may fail to hatch for a many reasons.
 - Chicks may not survive due to poor diet of the hen or because of the humidity/temperature in an incubator, etc.
 - Eggs held too long (over 6–7 days) before incubation, or held in too warm and/or too dry can also decrease viability.
- Some chicks that hatch may have deformities and will not survive once fully hatched.
 - Some embryos and chicks are unable to complete development.
- Teachers, facilitators and parents should be prepared to discuss such topics with their students.
 - Some students may have not experienced death of any form prior to an egg failing to hatch.