

4-H Embryology



Gaston County



Why 4-H in the classroom?

- Hands-on science project
- Part of the National Science Content Standards and Standard Course of Study for NC
- Fun, hands-on activity for students

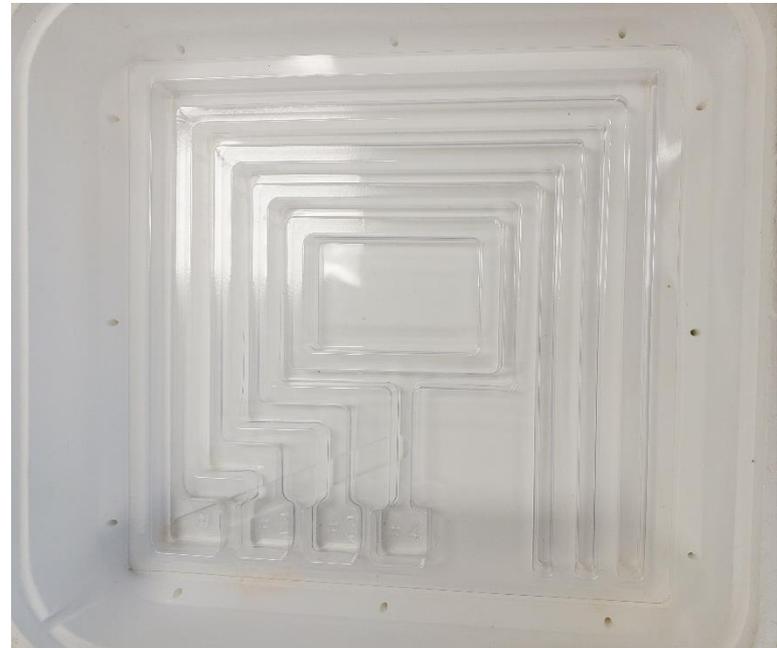
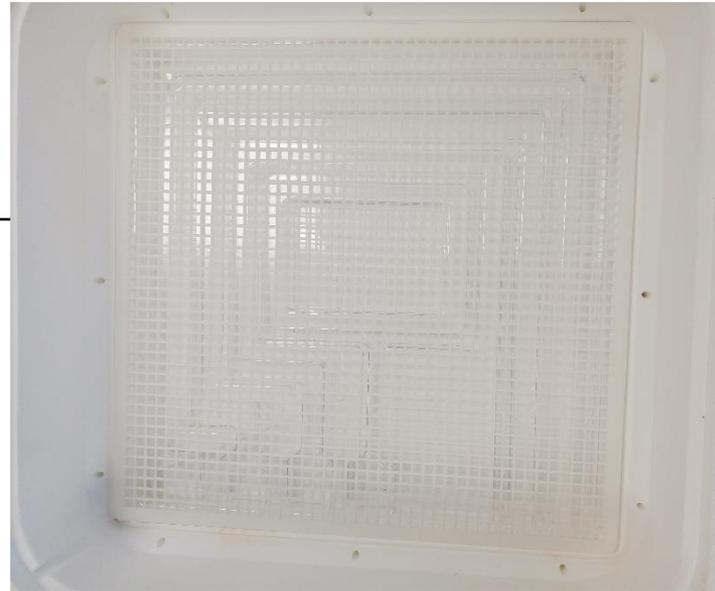


The Details:

- We supply almost all necessities!
- Quail require ~23 days to hatch
- **Pickup incubators and eggs on the afternoon of Wednesday, Sept 20th**
- Allow the incubator to operate for at least a day to stabilize before setting eggs
- **Set the eggs on the late afternoon of Friday, Sept 22nd**
- Eggs hopefully hatch on Sunday evening or Monday morning of the week of Oct 15th/16th
- Quail go to a local farm here in Gaston County

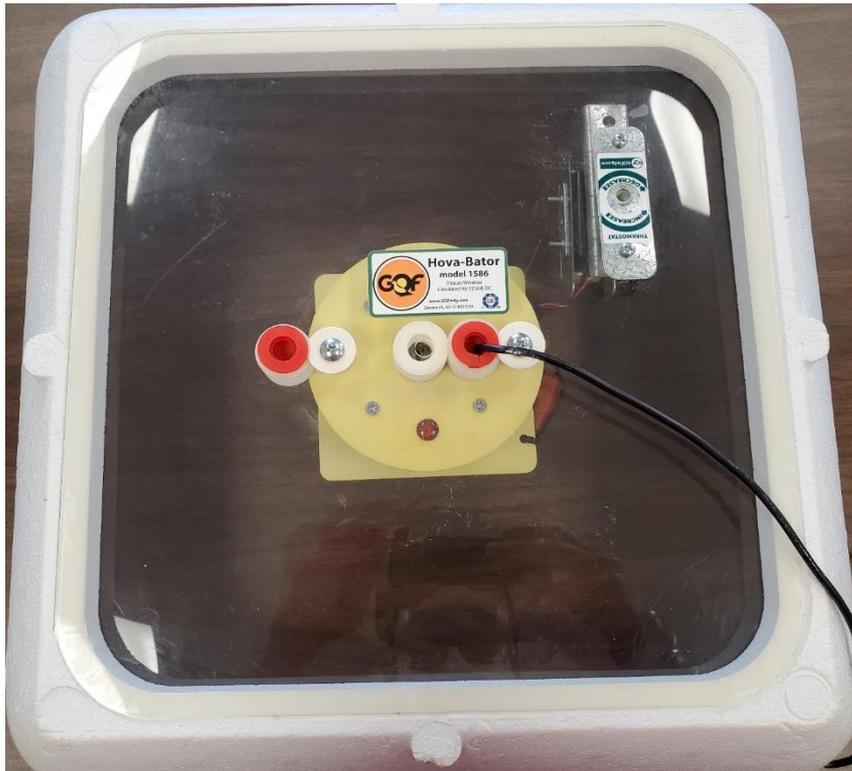
Incubators

- Model #1588



Incubators

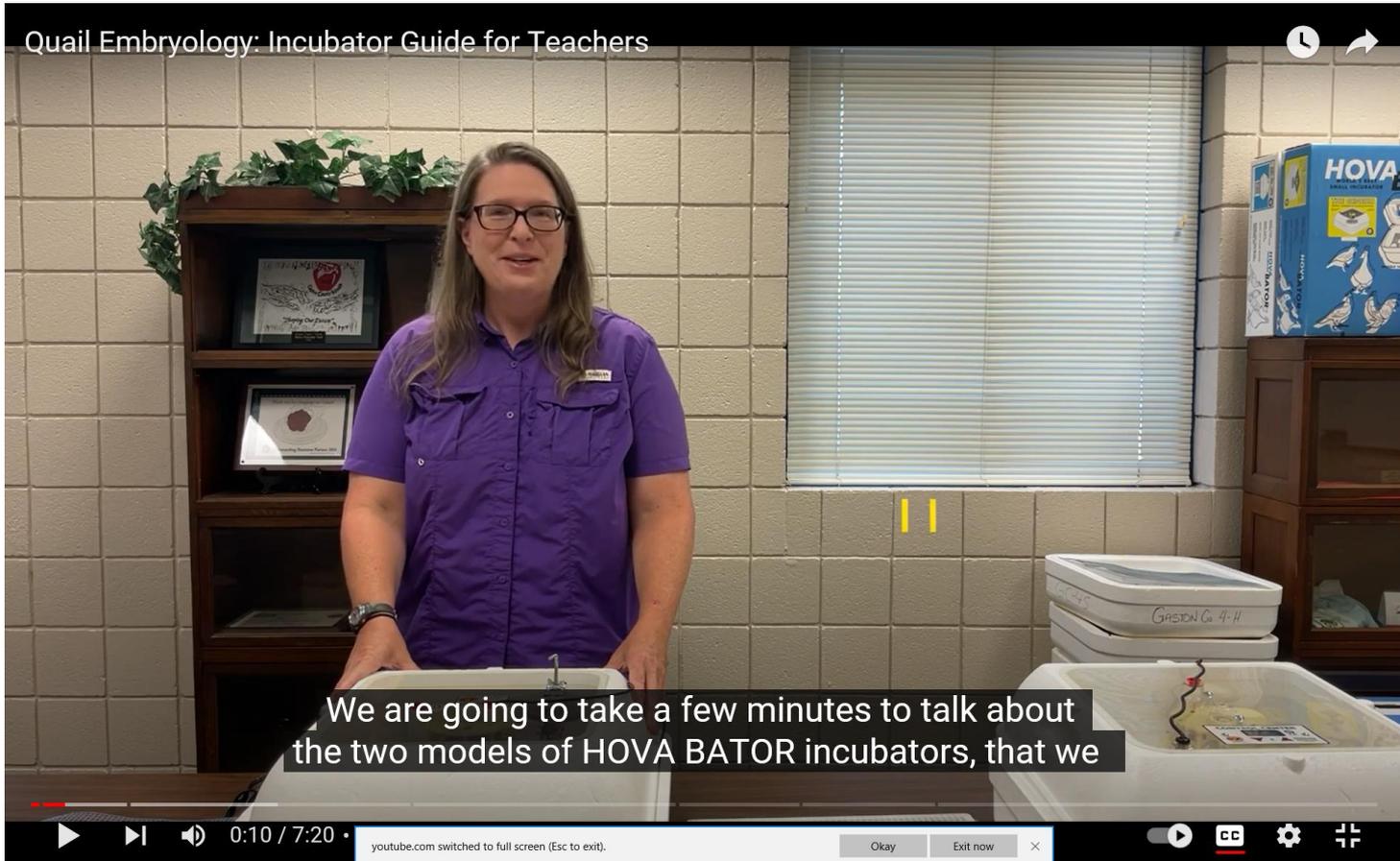
- Model #1586



YouTube Video

Incubator set up

Quail Embryology: Incubator Guide for Teachers

A woman with glasses and a purple short-sleeved button-down shirt stands in a room with a tiled wall. To her left is a wooden cabinet with framed certificates and a plant. To her right is a window with white blinds. In the foreground, there are several white plastic incubators. One in the foreground has a yellow label that says "GREEN Co 4-11". To the right, a blue box for "HOVA BATOR" is visible on a shelf. The video player interface at the bottom shows a progress bar at 0:10 / 7:20, a subtitle, and various control icons.

We are going to take a few minutes to talk about the two models of HOVA BATOR incubators, that we

0:10 / 7:20 • youtube.com switched to full screen (Esc to exit). Okay Exit now x

Pre-Hatch Planning

- Set up incubator
- Temperature: 99-101 degrees F
 - **Optimal temperature is ~99.5 - 100 degrees F**
 - Place thermometer in incubator
 - Check the temperature often
 - About halfway through the temp will be increasing, so adjust accordingly
- Location, location, location: avoid high traffic areas, places where it might get bumped, excessive sunlight and drafts!

Pre-Hatch Planning

○ Humidity

- Add warm water to the appropriate trough(s)*
- Check water levels regularly (at least 2x per week) & refill as needed
- Surface area, NOT depth, effects humidity
- If doubtful, less is usually better, except for last 2-3 days before hatch*
- Humidity should be around 40-50% for first 14 days, then increase to ~60%.

**Refer to respective laminated model handout – Humidity & Hatching*



* After hatch pull red vent plugs to help dry chicks.

Maintaining Humidity

- Incubator contains a water pan
 - Fill required troughs
 - 2-3 days before hatching fill several of the troughs (*see manual handout*)
- Vital for chick health
 - Fresh supply of oxygen and removal of carbon dioxide
 - Prevents sticking to shell
 - Keeps amnion fluid consistent
 - Keeps shells from hardening, trapping chick at hatching
 - Aids in preventing crippled chicks

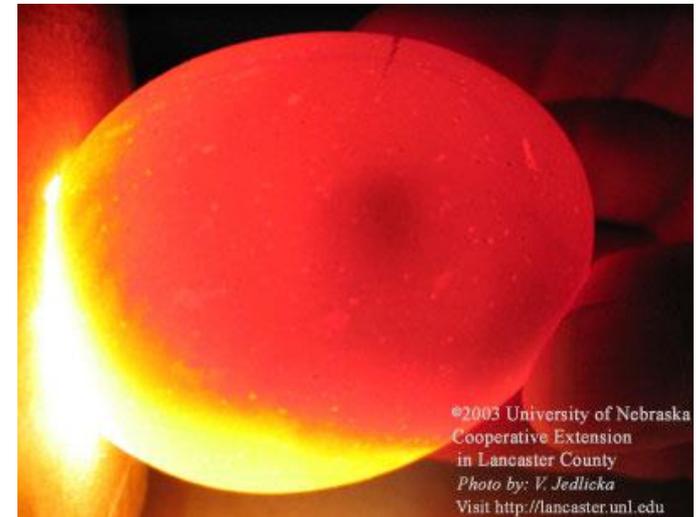
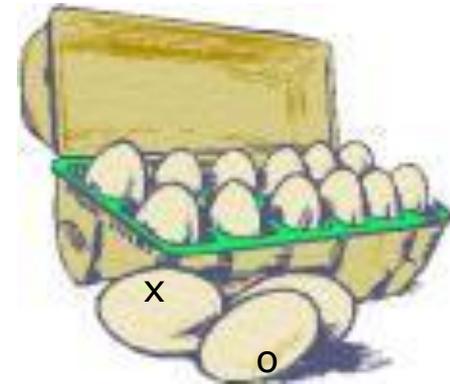


Pre-Hatch Planning

- Inform co-workers and custodial staff to avoid accidental unplugging of incubator
- Other issues that may arise that might complicate an efficient hatch rate:
 - Unplanned power outages
 - Fluctuation in temperatures when nobody is there
 - Weekends? Not able to turn eggs

When you receive the eggs

- Wash hands
- Mark eggs
 - With an "X" and a "O" on opposite sides
- Turn eggs
 - 2-3x per day
 - On weekdays not in school maybe ask principal/custodian to turn eggs
 - Weekends???
 - **After day 20 stop turning eggs**
- Red vent plugs
 - Maintain humidity around 40-50%
 - Pull plug after hatch to help dry
- Candling eggs periodically
 - Every few days
- **DO NOT** candle or turn eggs the last three days of incubation



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in Lancaster County
Photo by: V. Jedlicka
Visit <http://lancaster.unl.edu>

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Alternative Option for Weekends

- If you don't have access to the school:
 - Gently place your eggs into an egg carton
 - Remove the water from the bottom tray
 - Set the egg carton into the incubator
 - Place the lid back on the incubator
 - Head STRAIGHT home
 - Place lukewarm water in appropriate trays
 - Place eggs back in the incubator
 - Turn 2-3X times a day over weekend
- Reverse the process Monday morning

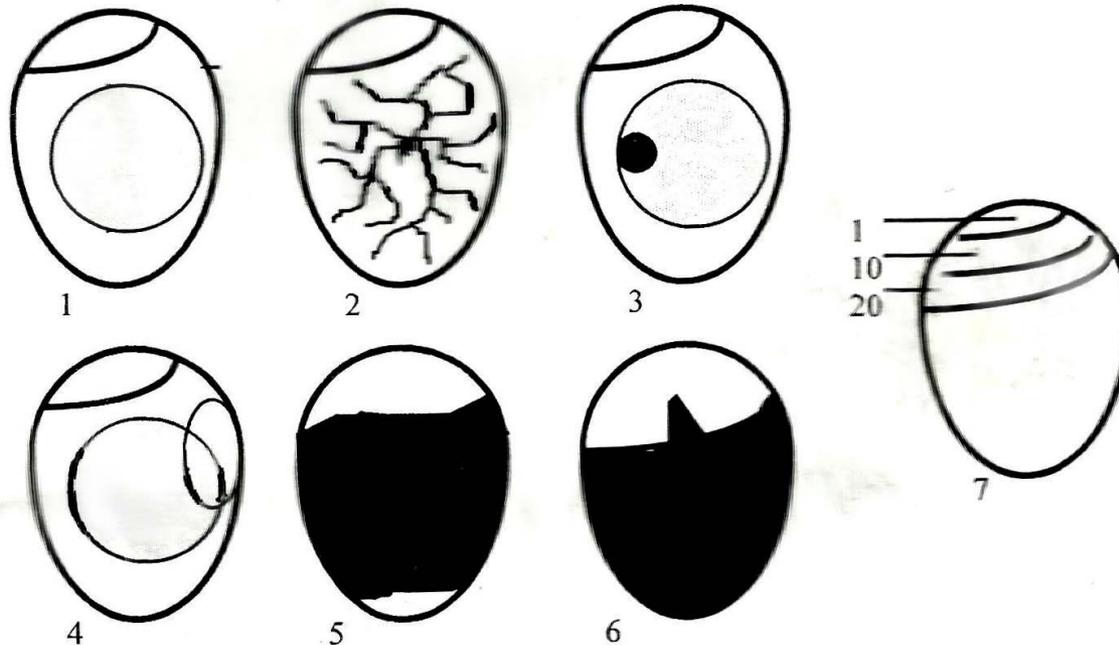
Process of Chick Development

- Day 4
 - Body parts have begun to form
 - Embryo visible
 - Circulatory system developing
- Day 7
 - Voluntary movement begins
 - Formation of internal organs
- Day 10
 - Egg tooth begins to form
 - Body parts can be clearly recognized
 - Wings beginning to develop

Process of Chick Development

- Day 12
 - Feathers begin to develop
- Day 16
 - Body parts developing quickly
 - Hardening of beak and egg tooth
- Day 20
 - Calcification of bone
 - Body parts can be clearly recognized

Candling Eggs (based on chickens)



- 1) Clear when candled - probably infertile (or very early death) when candled at 8 days
- 2) Fertile with red blood vessels - after 8 days
- 3) Red or black staining - early death when candled at 8 days
- 4) Embryo with red blood 'ring' - early death when candled at 8 days
- 5) Dark outline with ill defined detail - late death (10-16 days)
- 6) Live embryo with bill in air sack - due to hatch in 24-48 hours
- 7) Normal development of the air pocket according to number of days

Hatching



- Hatching takes 23 days give or take 1-2 days
- Impacted by light, drafts and temperature
- May take several hours for chicks to hatch
- Don't help chicks hatch – struggle is necessary for survival
- Chicks will hatch from the large end of egg
- Pull red vent plug to help chicks dry

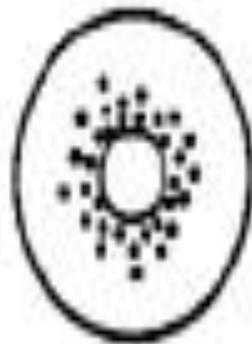
After Hatch



- Set up brooder box beforehand– round corners
- Wood shavings, NOT paper
- Light/heat source - brooder temperature ~95 to 100 degrees F
- Remove dry chicks as soon as possible to brooder box
- Feed provided – put in a shallow mason jar lid
- Water (use a shallow mason jar lid with marbles to prevent drowning)

Ideal Brooding Temperature

Brooding Units



Too Cold



Drafty



Too Hot

After Hatch

- Clean out incubators
- Box everything back up into original box, including laminated info sheet
- Return both live chicks, incubator, & egg carton tray to Extension office
- **NOTE: we will only accept chicks from Monday, October 16th through Thursday, October 19th**

Embryology Resources

<https://gaston.ces.ncsu.edu/>

The screenshot shows the website for the Gaston County Center. At the top, there are logos for NC Cooperative Extension, N.C. A&T State University, and NC State University. Navigation links include COUNTY CENTERS, TOPICS, CONTACT US, and GIVE NOW. A search bar is located in the top right corner. The main header features a large image of a yellow-throated vireo perched on a branch. Below the header, a red sidebar contains a menu with the following items: Events, Meet Our Staff, **Gaston County 4-H** (circled in blue), 4-H Embryology in the Classroom How to Enroll in 4-H 4-H Clubs..., Citizens Resource Center Information, Family & Consumer Science Program, Food Preservation Resources, Gaston County Volunteer Groups, Gaston Co. Extension & Community Association (ECA), Extension Master Food Volunteer Program, 2023 Gaston County Farmland Protection Plan, Food Preservation Resources, and Agriculture & Food. The main content area displays the breadcrumb trail: Home » Gaston County 4-H » 4-H Embryology in the Classroom. The article title is '4-H Embryology in the Classroom'. Below the title is a language selector: > en Español. To the right of the article title are four social sharing buttons: POST THIS PAGE, SHARE ON FACEBOOK, EMAIL THIS ARTICLE, and PRINT THIS ARTICLE. Below the article title is a photograph of a large group of small, fluffy quail chicks. The caption below the photo reads: 'Quail Chicks – courtesy of Henderson County.'

Embryology Resources

NCSU “Embryology” Page

<https://poultry4hyouth.ces.ncsu.edu/embryology/>

- Egg hatch guide
- Operating your incubator
- Incubation troubleshooting
- Cool virtual chicken video
- Quail embryo development
- Incubation troubleshooting
- Activities/Lesson plans
- Embryology video

Class project ideas

“University of Illinois Incubation & Embryology Activities”

<https://web.extension.illinois.edu/eggs/activities.html>

“Bobwhite Quail Embryo Development”

<https://ssl.acesag.auburn.edu/pubs/docs/A/ANR-1410/ANR-1410-archive.pdf>

Class project ideas/activities

- Record the number of times you turn the eggs each day
- Candling eggs to monitor development
- Egg Diagram
- Embryo Development
- Parts of the Egg
- Egg sizing & grading
- Unscramble the Scrambled Egg
- Word searches & crossword puzzles