Jackson County 4-H

Chick Quest Teacher Guide

Updated Guidebook 2025

Jackson County OSU Extension

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4-H ChickQuest Preparation Checklist

☒ Contact Maddie Allman, 4-H Educator in Jackson County, for schools in Jackson County, Ohio interested in ChickQuest programs in their classrooms.

☐ Schedule a meeting with Maddie Allman, 4-H Educator in Jackson County, to go over the 21-day curriculum, general care tips, and other valuable information. Email Maddie at **allman.68@osu.edu** to schedule a meeting.

☐ Read the rest of this guidebook, along with the ChickQuest Teacher Guide for the highest rate of hatch success.

☐ Set up the incubator and hatch station 48 hours in advance of receiving eggs to ensure that all equipment is working properly.

☐ Ensure you have a home for the hatched chicks BEFORE you receive the eggs. Connect with Maddie who may be able to assist in finding them a home after hatch.

Other Opportunities & Reminders:

☐ Stay up to date with local 4-H news by checking the Jackson County 4-H Calendar, subscribing to the monthly 4-H Newsletters, and going through the jackson.osu.edu website.

☐ *Optional*: Attend a FREE GrowNextGen ChickQuest training to learn more about ChickQuest programs. Learn more at **https://grownextgen.org/events**

☐ *Optional*: Subscribe to the GrowNextGen ChickQuest Newsletter to gain offers like free egg vouchers and more!

☐ Learn more about GrowNextGen Chickenology programs by attending a GrowNextGen training and visiting the GrowNextGen "ChickQuest alumni resources" page.

Project Description

4-H ChickQuest
From monitoring living eggs to observing chicks, these STEM activities pique curiosity, encourage collaboration and communication, and provide young scientists with unforgettable experiences.

During the ChickQuest program, students will hatch fertilized eggs. Students will learn about animal agriculture and egg production, life cycles, using scientific measurements and theories, marketing, engineering, and more.

4-H Poultry Exhibitors are encouraged to review the poultry resource list at https://ohio4h.org/poultryresources for the greatest success with their poultry projects. These resources may also benefit you as you navigate raising poultry in your classroom!

Meeting the Next Gen Science Standards

SCIENCE AND ENGINEERING PRACTICES

- Asking questions (for science) and defining problems (for engineering)
- Developing and using models
- Planning and carrying out investigations
- Analyzing and interpreting data
- Obtaining, evaluating, and communicating information

CROSSCUTTING CONCEPTS

- Patterns
- Cause and effect
- Systems and system models

DISCIPLINARY CORE IDEAS/CONTENT

- LS3A Inheritance of traits
- LS3B Variations of traits
- LS4B Natural selection
- LS2A Interdependent relationships in ecosystems

…. AND MORE!

Purchasing Your Birds

Meyer Hatchery

If you are unfamiliar with hatching chicks, **Meyer Hatchery** is a great place to start!

Meyer Hatchery is the official partner of GrowNextGen and Ohio 4-H to facilitate ChickQuest programs. Meyer Hatchery makes it easy!

You can either order your fertilized eggs yourself from Meyer Hatchery or have your local 4-H professional order them for you!

Meyer Hatchery gives educators options when hatching fertilized eggs. Educators have the option to select either an assortment of eggs at a lower price or select eggs by a certain breed for a higher price. When choosing a specific breed of chicken, it is important to understand the classification of those breeds. You can learn more about different breeds of chicken and their classifications at: https://blog.meyerhatchery.com/2019/07/the-6-different-classes-of-chickens/

Classifications for Breeds of Chicks (6)

- **American**
- **Asiatic**
- **Continental**
- **English**
- **Mediterranean**
- **All Other Standard Breeds**

IMPORTANT NOTE: You should prepare at least 5 months ahead of time for ChickQuest programming. Order your eggs as soon as you decide on doing the program (5 months ahead is recommended). You can choose your preferred delivery date so you can plan on when to expect your fertilized eggs!

If you order an assortment of fertilized eggs, there is an opportunity for multiple breeds of chicken to hatch. This might be a good learning opportunity for your students as they gain an understanding of different egg colors, breeding, and the importance of breed differentials, and more.

Order your chicks from Meyer Hatchery at **https://meyerhatchery.com/**. You can email **info@meyerhatchery.com** with any questions.

On Your Own

If you are familiar with raising and hatching chicks, and are interested in sourcing your own fertilized eggs, great! Here are some tips:

- Buy from a reliable source. A list of approved hatcheries is available from the Ohio Department of Agriculture. When purchasing chicks, purchase only from producers who participate in the National Poultry Improvement Plan (NPIP). This is a U.S. Department of Agriculture (USDA) program in which all breeders from NPIP flocks are tested for some of the important diseases of poultry. This assures you that the chicks you receive are not infected with diseases.

Frequently Asked Questions (FAQs)

1. What supplies do I need?

Maddie Allman, 4-H Educator in Jackson County, will bring you all the supplies you need to incubate and hatch your chicks. Basic supplies she will bring are:

- Hovabator Insulated Egg Incubator w/ egg turner
- A large, heavy-duty plastic tote
- Heat lamp
- Pine shavings
- Feeder & waterer
- Chick crumbles
- 1 ChickQuest student logbook
- 1 ChickQuest teacher guide

Recommended supplies not provided include:

- Heat lamp stand/holder
- Dr. Naylor's Blu-Kote Antiseptic Spray
- Supplies for individual lessons in designated curriculum
- Classroom set of ChickQuest student logbooks (25)

2. What do I do with the chicks after they hatch?

It is your responsibility to find a safe home for your chicks after they have hatched.

- You are **NOT** permitted to send home chicks with your students.
    - UNLESS a parent/guardian has expressed interest and has agreed to take **ALL** hatched chicks home to care for them properly, and you have been in constant communication and agreement with that parent/guardian regarding their ownership.
    - It is recommended that you get this agreement in writing!

If you give your local 4-H professional enough heads up, they might be able to assist you with the process of finding your chicks a home.

IMPORTANT NOTE: Chicks should not be split up and given to different homes. Within 24 hours after hatch, the group of chicks will have an established "pecking order." Removing chicks from the flock would disrupt this important hierarchy and would ultimately cause loss of life within the flock.

3. How much of the curriculum do I teach, versus how much does 4-H teach?

Your local 4-H professional can visit your classroom, help you set up your incubator, and go through some of the lessons. For the most part, the instruction is up to you! ChickQuest is a 21+ day program. Your 4-H professional can lead some activities throughout that time, but most of the instruction is your responsibility.

It is also a good idea to invite guest speakers to join you in your classroom. There are multiple lessons where guest speakers would fit well into the curriculum!

4. How do I set up the incubator? I don't want to do it wrong!

Your local 4-H professional can visit your classroom, help you set up your incubator, and explain care instructions. You can also watch this video by GrowNextGen at https://grownextgen.org/events/chickquest-alumni to learn more about setting up your incubator!

- **Hovabator Set Up:**
    - Fill up the water tray: You may have to experiment with the amount of water that you place in the tray. Depending on the environment in your school, the amount of water needed to reach to correct humidity level could be different. *(Usually, filling up the first section of the tray is enough water)*.

    - Place the plastic or wire tray on top of the water tray. This is where the egg turner will rest.

- **Egg Turner Set Up:**
    - Place the egg turner inside the incubator (on top of both the water tray and wire tray in the bottom) where the cord exits the incubator through the indentation in the back.

    - Place eggs "pointy side down" inside the egg turner. Give the eggs as much room between each other as possible.

Ensure that BOTH the incubator and egg turner are plugged in. There should be two cords plugged in to the wall outlet.

On **Day 18**, gently remove the Egg Turner and place the eggs onto the wire tray in the bottom of the incubator. Give the eggs as much room between each other as possible. Increase the humidity level by 5% by adding more water to the tray in the bottom of the incubator. *(Usually, filling up the first two sections of the tray is enough water to increase the humidity)*. Again, watch the humidity closely to ensure it is increasing (but not by too much).

5. ***I've been candling my eggs regularly and noticed that one stopped developing. What do I do?***

This will more than likely happen. Remove the egg from the incubator as soon as you notice that it is no longer developing. Eggs that are no longer developing are noticeably behind in development from the other eggs. Failure to remove the non-developing egg will result in catastrophe. The egg will rot at a much faster rate in the incubator due to the high temperature and humidity. This will not only stink up your entire classroom (and probably the entire hallway) but kill all the other developing chicks inside the incubator. Discard the non-developing egg outside the classroom and explain to the students why there is one less egg in the incubator.

6. ***I can't get the incubator to work correctly. The temperature and humidity are constantly off.***

You might need to re-calibrate the incubator. You can learn to re-calibrate your incubator by watching this video: https://www.youtube.com/watch?v=CV1V_C6GgQs

Tips, Tricks & VERY Important Notes

When you receive your eggs…

DO NOT WASH THE EGGS. In the United States, all eggs intended for consumption are washed by the producer. The eggs you have received are eggs intended to hatch, so they have not been washed. When hens lay their eggs, the *"bloom secretion"* covers the egg for an added layer of protection. Because an egg's shell is porous, the bloom secretion is integral for preventing germs and debris from entering the egg. Incubated eggs are not washed, so when handling the eggs, please remember to wash your hands before AND after touching them.

Set eggs in the incubator on a **Tuesday** to ensure that they hatch during the week. You can store your eggs in the refrigerator for a few days before setting them out. Eggs have the best hatch rate when stored for no more than 7 days before beginning to incubate.

When you receive your eggs from the **mail**, set one end of the egg carton on a book (un-level) for 12 hours, and then switch to the other end for another 12 hours (you can do this when you get to school in the morning, and then switch the eggs before you leave for home at the end of the day – they will be fine all night). This will allow the cool eggs to warm slowly to room temperature before placing in the incubator and settle the eggs from shipment. Abrupt warming cause moisture condensation on the eggshell which can lead to disease and reduced hatches.

DO NOT mark on the eggshells with anything but a graphite pencil. Eggshells are extremely absorbent, and by marking on the eggshells with permanent markers, pens, etc., your chicks may absorb those harsh chemicals which can cause them not to hatch. Graphite is the only safe substance used to mark eggs.

While you incubate your eggs…

DO NOT CLEAN YOUR CLASSROOM. It is important that you communicate with janitorial staff and administration about your ChickQuest project. It is pertinent that no chemicals, aerosols, essential oils, harsh hand sanitizers, etc. enter your classroom. If used, these chemicals will absorb into the incubator and kill your chicks. Wet wipes are fine to use on desks & hands, but please keep chemicals away from the incubator.

- Set up your incubator and let it run for at least two full days (48 hours) before placing the eggs inside. It is a good idea to complete Lesson 1 during this time.

- Usually filling up the water tray in the bottom of the incubator once or twice a week is an adequate amount of moisture for hatch. This should be closely monitored.

- **Your incubator settings:**
  - **Days 1-18:**
    - **Temperature: 99.5°**
    - **Humidity: 60%**
    - **Eggs in egg turner**
  - **Days 19-21:**
    - **Temperature: 99.5°**
    - **Humidity: 65%**
    - **Egg turner removed; eggs gently placed on their sides on top of the tray.**

IMPORTANT NOTE: If your incubator's humidity is too high, the chick will drown inside its egg. Too low? The chick will dry up. Keeping the incubator away from direct sunlight, doors, drafts, and out of line from high traffic areas will help stablilize the environment within.

- If you observe a sudden change in the incubator environment (humidity or temperature is too low/high), adjust the settings to bring the environment back to normal. If the humidity/temperature is too high, let some air out by pulling the red plug on the top of the incubator. If the temperature/humidity is too low, do not open the incubator. Instead, adjust the settings and look for potential causes of the problem (drafts, windows, air vents, etc.).

Hatching your chicks...

- Under no circumstances should you open the incubator during hatch or help a chick hatch from its egg. Opening the incubator once the hatching process begins will kill your chicks. The humidity and pressure changes resulting from opening the incubator will result in the chicks being suctioned to the inside of their eggs and they will die.

- Do not open the incubator for **24 hours** after the last chick has hatched. The chicks have received all the nutrients they need to survive from their albumen. You should leave the chicks in the incubator until they are completely dry and fluffy.

- Once the 24 hours is up, and chicks are completely dry and fluffy, you may open the incubator, discard the shells, and move the chicks to the brooder.
  - It is recommended that as you move chicks from the incubator to their new home in the brooder, you quickly dip their beaks in water to hydrate them.

Brooding your chicks…

- Clean the incubator with hot water only. Let the incubator sanitize in the sun. DO NOT use chemical cleaners and antiseptics in the incubator.

- Use **Pine Shavings** and newspaper only for bedding in the brooder box. Any other wood shavings or chips are hard on their lungs and can make them uncomfortable.

- Check the temperature of the brooder box regularly. A temperature guide is below.

- Chicks are noisy, stinky, and distracting! You probably won't want to have them in your classroom long after hatch. Make sure you have arrangements made for a new home for your chicks once they hatch!

In general…

- Utilize the GrowNextGen and Meyer Hatchery websites! They are AMAZING resources that will help you explain the poultry industry to your students. GrowNextGen has educational videos & virtual field trips specifically filmed for your students.

    - GrowNextGen: https://grownextgen.org/events/chickquest-alumni
    - Meyer Hatchery: https://meyerhatchery.com/
    - Meyer Hatchery's Informational Blog: https://blog.meyerhatchery.com/

- Ask for help!
    - Here is a list of contact information for you to use if you ever have any questions!

      Maddie Allman, Jackson County 4-H Educator
      Allman.68@osu.edu | (740) 286-5044

      Josh Winters, Jackson County Agricultural & Natural Resource Educator
      Winters.249@osu.edu | (740) 286-5044

      Meyer Hatchery
      info@meyerhatchery.com | (419) 945-2651

      GrowNextGen (Education Projects) – visit: https://grownextgen.org/leaders
      Sally Ewan
      sally@educationprojects.org | (614) 806-2989
      Heather Bryan
      heather@educationprojects.org

Caring for Your Chicks After Hatch

Getting Started

Preparation and Brooding

The term *brooding* refers to the period immediately after hatch when special care and attention must be given to chicks to ensure health and survival.

The term *rearing* refers to the remainder of life after brooding until maturity.

Handling of day-old chicks has a direct relationship on the life-time production of the bird. Effective management begins before the day-olds arrive. Set up your brooder box between days 19-22 to ensure that everything is working properly.

The three factors to control are **environment, feed, and water**.

Environment

- Brooding houses should be isolated from other houses containing older birds. The producer should follow an “all-in, all-out” program, never mixing birds of different ages.
- Brooders must be set up in a draft-free environment.
- Heat lamps must be checked to ensure that they are working properly before the arrival of the chicks. This is a routine check to be carried out daily.
- Ventilation should be adequate to remove undesirable gases such as ammonia and provide clean air but not so much to remove heat or create drafts.
- The brooding area should be heated to 95-98° before the arrival of the chicks. Be careful to always check the temperature at the level of the chicks.
- A hatched chick cannot maintain a proper body temperature without your help. Exposing a chick to cool temperatures in the first three weeks of life makes the bird uncomfortable and less likely to eat the feed and drink the water needed for a good start.
- Turn the heat on at least one day before the birds arrive. The temperature ½ " below the litter surface should be at least 80ºF. Even if the air is the correct temperature, the birds can be chilled by the cold floor under them.
- Pine shavings are the ideal bedding choice for brooding and rearing your poultry. Meat birds need at least 1” of clean fresh bedding for each week of age. A 3-week-old bird should be on 3” of bedding.
- Bedding is used to conserve heat and must be leveled and compacted to prevent chick crowding.
- Bedding should not contain too much dust as it can cause your birds to have breathing problems.
- Cedar and hard-Wood chips should not be used as it will stain your birds and make them uncomfortable. Shavings and wood chips other than pine can be hard on their lungs.
- It is important to always keep your bedding clean and dry. Dirty bedding can cause health problems for your birds.
- Always remove any wet or caked bedding and replace it with dry shavings.

The following chart shows the average temperatures for brooding chicks as they mature week by week:

Age of Chicks (weeks)	Temperature
1	95 °
2	90 °
3	85 °
4	80 °

- Larger breed chicks are usually comfortable at a temperature of 65° by 21 days of age.
- For chicks you can decrease the brooder temperature by 5 degrees per week following the first week.

Recognizing Your Bird's Comfort

The behavior and sounds of the chicks will indicate their comfort level. Comfortable birds will form a circle under the lamp while cold birds will huddle and pile. If birds are too hot, they will crowd as far from the lamps as possible. Some birds will pant if the temperature is too high. You will have to watch for signs to show if they are too hot or too cold. Your birds will do a better job than a thermometer of telling you if they are comfortable. The diagrams below show how birds will move away or towards the heat lamp if they are hot or cold.

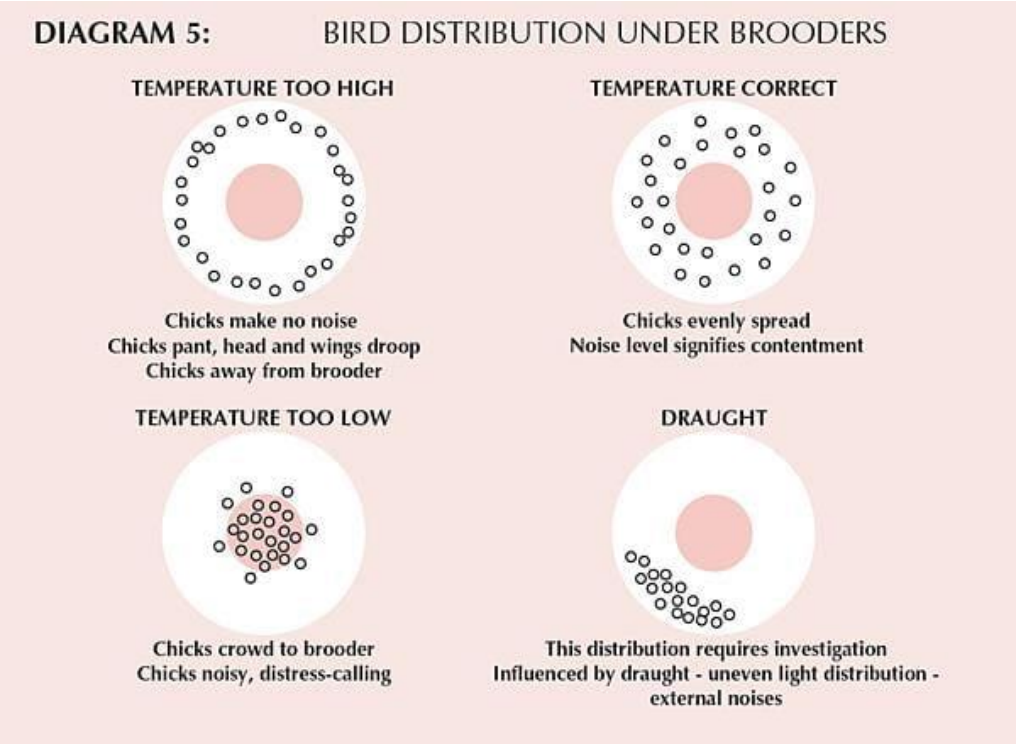

Diagram from Ross Broiler Management Manual, August 2, 2007. Reprinted with permission of Aviagen Incorporated, Aviagen Limited, Newbridge, Midlothian, Scotland, UK, and Huntsville, Alabama, USA.

Feed and Water

- Fresh food and water should be available on arrival of the day-old chicks.
- Do not place them directly under the light source.
- It is recommended that water be introduced a few hours before feed so that chicks are hydrated enough to eat.

Guidelines for Feeding Your Chicks

- Chicks should be fed a medicated chick starter crumble.
- Feed should be provided continuously.

Medicated feeds

- Chicks require medicated feeds since they are susceptible to many diseases.
- Most starter feeds have a coccidiostat (Amprolium) added to the poultry ration to prevent coccidiosis. Medicated chick feed's primary purpose is to protect against coccidiosis, which can affect chicks who ingest soil or the droppings of other chickens. This can be a dangerous and deadly disease for babies who have yet to build up an immunity.
- Feed medicated chick starter to your chicks until they are 7 weeks of age. Amprolium is used to prevent coccidiosis, not treat it. Using medicated feed eliminates the need for the coccidiosis vaccine, as it negates the effect if used together.
- Always follow the manufacturer's recommendations for proper use of the feed.

You can learn more about livestock nutrition by using the Jackson County Sample Feed Kit – which includes samples of typical feed ingredients that youth can learn to identify and understand their use. Learn more at ohio4h.org/livestock.

Water

- Fresh water should be always available. The waterers need to be cleaned on a routine basis.
- It is helpful to dip the chicks' beaks into the water when you first place them into the brooder ring. This is to introduce them to drinking water. They will remember where their water source is after their introduction.
- Young chicks can easily drown so it is important to use chick waterers, not open trays.
- Water is the most important nutrient you can provide for your birds. If the water is not clean, your birds may not drink enough thus limiting their feed intake and their growth rate.
- It is important to watch for spilled water so that the chicks do not grow cold.

You can learn more about poultry nutrition by visiting https://ohio4h.org/poultryresources

Check out the "Feeding Chicks Intended for Consumption" article!

Biosecurity & Prevention

Biosecurity

Biosecurity is defined as "procedures intended to protect humans or animals against disease or harmful biological agents." Biosecurity is an important and necessary part of raising any livestock, especially poultry! A good sanitation program is essential to a successful coop.

- Thoroughly clean and disinfect the place in which the chicks are to be brooded at least 1 week before the chicks arrive.
- Thoroughly wash the brooding area with water and a good detergent. After the area has dried, disinfect the area with an approved disinfectant (Dr. Naylor's Blu-Kote Antiseptic Spray is recommended – but old-fashioned Dawn dish soap and water will do).
- Thoroughly wash and rinse all waterers and feeders and set them in the sun. **The sun is one of the best disinfectants available**, but it must strike all surfaces. Turn the equipment for complete coverage.
- Ensure that anyone handling or touching chicks or other equipment is properly washing their hands. Chickens carry salmonella in their stomachs, and it is important to sanitize any hands that have touched the chicks.
- During the brooding period, one of the messiest areas in the house will be around the waterers. Ensure to clean up any mess and caked bedding due to spillage.

Preventing Health Problems

- If your flock becomes sick, it is important to obtain an accurate diagnosis. The problem can be poor nutrition, poor management, or an infectious disease. You need to know the source of the problem to treat the birds properly and prevent future losses. Check your flock daily to spot diseases or parasites so you can start treatment right away.
- For more information about identifying and treating poultry diseases contact your local veterinarian.
- Feeders need to be cleaned frequently to remove caked feed. Never use moldy feed.
- Rinse your waterers daily and disinfect at least once per week using a brush to clean them out.
- Proper ventilation in the brooder and the coop will reduce moisture and disease organisms.
- Caked or wet litter should be removed as soon as it forms to keep the house clean and dry.

Teaching youth about biosecurity & prevention is just as important as any other lesson. It is encouraged to have youth reflect on what they know about the Flu or COVID-19. Have them discuss: What are diseases? How are they spread? Are there any sicknesses that humans can get from animals? What happens when chickens get sick? How can disease be prevented? What do farmers do to keep their animals safe?

Biosecurity & Prevention are top priorities in the poultry industry. It is important that youth learn about being biosecure for their own health and safety, as well as for others!

Additional Activities & Ideas

Before you begin: Lesson 0

Introduce students to science-like thinking & the ChickQuest curriculum. Prepares students for Lesson 1. Questions students should be able to answer include:

- What is a scientist? What tools do they use?
- What is data? How is it collected? What are the different ways that scientists measure data?
- What is a habitat? What is the difference between a chick's natural habitat vs. incubation?
- Why do we incubate chicks?
- Why do some hens lay different colored eggs? Why are the insides of some eggs (yolks) darker or lighter than others when cracked?
    - Meyer Hatchery's website has photos of many different breeds of chickens and the eggs they lay. Show the students photos of different breeds of chickens (or other birds) and have them guess the color and size of the egg they lay.
    - The color of the eggshell is determined by the breed of bird. The coloring of egg yolks is determined by what the hen eats (omegas, fats, keratins, etc.). There is little to no nutritional difference (Ties to Lesson 16).
- Visit information on disease prevention and biosecurity.
    - What is Salmonella? What other diseases can chickens carry?
    - How do we prevent disease in our flock?
    - How can we avoid getting sick?

Lesson 2

- Visit the GrowNext Gen ChickQuest Alumni Resources page for educational videos to help your students understand where eggs and chicks come from. **https://grownextgen.org/events/chickquest-alumni**.
    - What are the differences between the eggs in the incubator and the eggs we buy at the store to eat?
- What is a "double yolked" egg? How/Why does this happen? Will the chick inside survive? Why or why not?
- Potentially introduces youth to permeable and semi-permeable membranes.
- Talk about the importance of the egg turner here. Why are egg turners important? What do they mimic?

Lesson 3

- You can candle your eggs yourself or invite your local 4-H professional to come help!
    - Candling works best during days 7-9 and stops working around days 12-13. It is important to continue candling throughout the process to ensure development.

Lesson 4

- This lesson reinforces the idea that the students are scientists studying the eggs. In this lesson, it is a good idea to try and find eggs of different sizes for youth to study.
- Did you know that all or most recipes used in the United States are based on the use of large eggs? What would happen if you baked a box of brownie mix using a different sized egg? Which egg size would make the batter the runniest? A small, medium, large, XL, or Jumbo-sized egg?

Lesson 5

- Re-visit the topic of a "bloom secretion" here. Why are eggs that we eat washed vs. the eggs in the incubator?
- Introduces the concept of "porous membranes" and encourages youth to understand states of matter.
    - Use magnifying glasses to look at the porous shell.
    - Place the egg in food coloring – why does the egg dye? (Easter eggs could be fun here!)
    - Hard boil the egg: Look at the air bubbles – where are they coming from? From inside the egg. How are they escaping?
    - What happens if you put a cold egg in boiling water? Why does it crack? What happens when the egg whites and yolk escape? (States of Matter).
- Take mass of an egg before and after:
    - Boiling
    - Letting it set out on a table for a week
    - Sitting in water for a few days
- Place an egg in vinegar on Friday and let it dissolve over the weekend. When students return on Monday, the eggshell will be gone!
    - Students can then remove the egg from the vinegar and break the membrane. What happens?

Lesson 6

- Potential for educating youth about architecture and strong structural systems. Why are eggshells so strong? Arches.
    - The Roman Colosseum – why is it still standing after all these years? The Romans discovered that arches are the strongest structure.
    - Place the ends of the egg in the palms of your hands. Push as hard as you can. Can you break the egg? Why not?
- Why are eggs shaped the way that they are?
    - Can use pantyhose and playdough to simulate egg laying & shaping.
    - The air sack is on the round end of the egg, so that is why it is important to place the egg narrow end down.

Lesson 7

- Encourages non-fiction reading and research through a written report or presentation.
- Could encourage either group or individual work.
- Potentially uses presentations or posters.
- Introduces Venn Diagrams, Comparing and Contrasting, etc.
- Introduces biomes, nature, and the science behind habitats.
- Could connect to 4-H's *Monarchs on the Move* school curriculum.

Lesson 8

- Introduces the concept of "Dichotomous Keys."
- Provides an opportunity for creativity and artistic expression.
- English Language Arts competencies.

Lesson 9

- Opportunity for Farm to Table conversations
    - Identify things that come from a farm – everything!
- Provides an opportunity for classroom guest speakers.
- Encourages non-fiction reading and research through a written report or presentation.
- Could encourage either group or individual work.
- Potentially uses presentations or posters.

Lesson 10

- Have students design their own experiments here: What else can be done to tell the difference between eggs? What ways can we measure their differences?
    - Present their experiments to the class, or have the class participate in each experiment.
- Potential for engineering activity:
    - Egg floatation devices – build a boat for your egg so it will float in water! Test the difference between hard boiled eggs vs. uncooked eggs. Is there any difference? Did your boat sink? Why or why not?
    - Egg parachutes – create a parachute for your egg and drop it from a second story window or top of the staircase. Did it break? Why or why not?

Lesson 11

- You can candle your eggs yourself or invite your local 4-H professional to come help!
    - Candling works best during days 7-9 and stops working around days 12-13. It is important to continue candling throughout the process to ensure development.
- If there are any non-viable eggs, you can either…
    - Throw them away outside your classroom.
    - Crack them open and see what's inside!
        - This is up to you and your comfort level, but it is a great opportunity for students to observe the life cycle and understand stages of development.
        - You can place the contents of the egg in a clear jar for students to look at, but not touch or smell.
        - Have them compare what's in the jar to the poster. Are there any differences? Around what day do you think the egg stopped developing? What do you think caused the egg to stop developing?

Lesson 12

- Invite a local Natural Resource Officer to bring in example nests and talk about the birds that made them.
    - This is a great opportunity for youth to learn about a potential career!
- Opportunity for Engineering: Have youth do research on what makes a nest a good habitat for eggs and have them build their own!
- Create a bird habitat for your school! Build a bird house and select a safe area outside the school for students to observe what may inhabit it.

Lesson 13-14

- Explain that the egg might fall from the chicken's bottom into the nest. How does the egg not crack?
- Engineering Activity: Create a plushy, safe nest for an egg to fall in. Have your students test their nests by dropping an egg into the nest from ~2 feet up.
    - What happened? Did your egg bounce out? Why or why not?

Lesson 15

- Make sure to grind the eggshells as finely as possible (a mortar and pestle works great!)
- Use the chalk only on outside surfaces (sidewalks/pavement) as it may scratch your chalkboard!
- What other things can be made using chicken by-products?

Lesson 16

- GREAT opportunity for navigating conversations surrounding biases and the importance of developing your own thoughts on things.
- Revisit farm to table conversations – it's important to know where your food comes from!
- Don't forget to re-visit disease prevention and biosecurity here as well. This is a great opportunity to talk about what the students know about antibiotic free vs. organics vs. non-GMO and other buzzwords in animal agriculture.
    - You might think these topics aren't age appropriate – but they are! Kids are smart and can grasp the concept of marketing if explained in their own terms. When they watch cartoons on TV, what kind of commercials play (toys). What about when they watch TV with their mom or dad? What commercials play then? (things adults like). It's that simple.

Lesson 17

- This is one of the most important lessons out of the whole curriculum, and I highly encourage you not to skip it. Did you know that the average age of the American farmer is 60+? The agricultural industry is quite literally dying. Introducing youth to careers in the ag industry is so very important to feed the ever-growing population of this world!
- Invite quest speakers in – Jackson County has its very own Agriculture & Natural Resource OSU Extension Educator that loves to speak to kids about his job!
    - There are lots of examples of positions related to agriculture listed in the books. Who is local to the area that could come share pieces of their jobs with your students?

Lesson 18

- Reminder: NEVER help a chick hatch from its shell, and do not open the incubator once chicks have started to hatch!! You cannot open the incubator for up to 24 hours after the final chick has hatched.
- Use the Meyer Hatchery "Day Old Chick Identification Tool to identify the breeds of your chicks once they have hatched!
    - https://meyerhatchery.zendesk.com/hc/en-us/articles/360009871752-Day-Old-Chick-Identification
- It is a good idea to think of ways to keep your students thinking about their chicks throughout the end of the school year. If you know the person receiving the chicks after they've hatched, have them follow up with you with photos of the chicks throughout their growth process!

Diagrams & Tools

Sexing your chicks

Congratulations, your chicks have hatched! “Is it a boy or a girl?” your students ask. There are lots of ways to find out, but here is a simple way to tell!

Let’s take another look at your chick’s feathers for a moment. The *sprout patterns* on newly hatched chicks’ wing tips can give us a glimpse into the future. While gently, yet securely holding your chick, spread out their little wing tips. Male chicks will exhibit a neat “all one length” feather sprout pattern, while the females wing tips will show an alternating pattern of long and short feather sprouts. This is known as “rapid-feathering.”

Figure 1. Example of female chick (middle) showcasing rapid feathering. Note the un-evenness of the feathers.

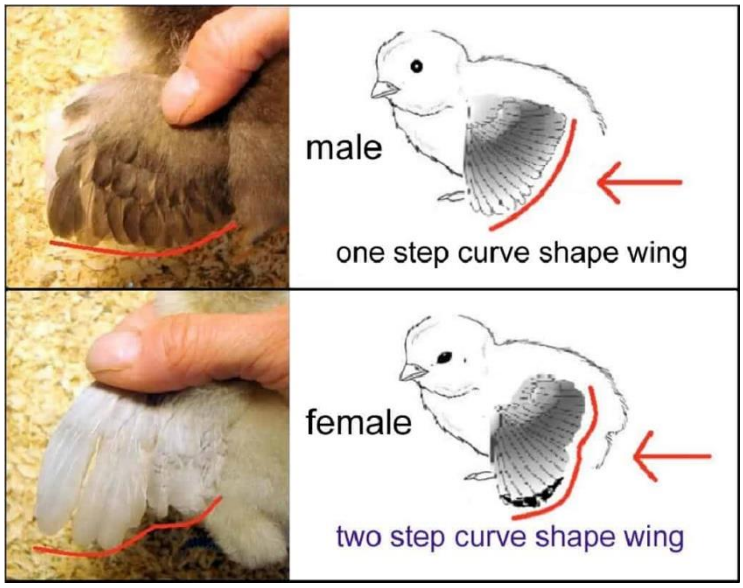

Figure 2. As chicks age by a few days, note differences in wing shape.

Glossary

Abdomen—The underpart of the body from the point of the keel to the tail.

Amino Acids—Amino acids are building blocks of protein. For example, if a brick wall represented protein, each brick in the wall would be an amino acid.

Anticoccidial—A drug to prevent coccidiosis.

Axial feather—The short feather growing between the primaries and secondaries of the wing.

Bantam—A diminutive fowl—some being distinct breeds, others being miniatures of a large breed or variety, approximately one-fourth to one- fifth their size. Usually ornamental in character, some breeds have considerable merit as egg producers, a few as meat fowl.

Breast—The entire forward part of the body of live fowls from the juncture of the neck and body down to the rear point of the keel bone.

Brood—1. A distinct group or birds, usually of the same age, placed as a group. 2. The act of rearing chicks using heat and other management options.

Cock—A male fowl 1 year old or more. Cockerel—A male fowl less than 1 year old.

Condition—The state of a fowl regarding health, including cleanliness and brightness of plumage, head parts, legs, and feet.

Coverts—Those feathers that cover the base of the primary and secondary wing and main tail feathers.

Dubbed/dubbing—A term used to describe the close trimming of the comb, wattles, and earlobes of the male.

Earlobes—The fleshy patch of bare skin below and behind the ears, varying in size and shape with color, either red, white, blue or purple, according to the breed.

Enamel-white—The satin-like white surface color found in the earlobes of Mediterranean *breed*

Faking—A self-evident attempt to remove or conceal a disqualification or serious defect to create merit which does not naturally exist. Results in disqualification.

Hock—The joint between the lower thigh and shank, sometimes incorrectly referred to as the knee.

Keel—In chickens and turkeys as well as most birds, large bony protrusion on the midline of the breastbone; it resembles the keel of a boat, both as to shape and position.

Keelbone—The large bony protrusion on the midline of the breastbone or sternum.

Line-breeding—Mating of distantly related individual birds.

Plumage—The collective feather covering of the entire body of a fowl, including the head, neck, wings, tail, and, where specified for breed, the shanks, and toes.

Poult—The young of the domestic turkey before the sex can be determined.

Poultry—A general term applied to all domesticated fowl, including chickens, turkeys, and waterfowl.

Primary feathers—The long, stiff feathers of the wing, growing from the last segment of the wing. When at rest, these feathers are folded under and are completely hidden by the secondaries when the wing is properly folded; also known as “primary flight feathers.” These feathers are responsible for power during flight.

Pubic bones—The thin, terminal portion of the hip bones that form part of the pelvis. Considered important in evaluating productivity of the female fowl.

Pullet—For exhibition purposes, a female fowl less than 1 year old.

Secondary feathers—The long, stiff wing feathers growing from the middle wing segment. When the wing is folded, the exposed secondaries form a triangular area known as the “wing bay.” These “secondary flight feathers” are responsible for lift during flight.

Shank—The portion of the leg below the hock, exclusive of the foot and toes; the metatarsus.

Spur—A stiff, horny projection from the rear inner side of the shanks, rounded or pointed according to age, prominent in the male fowl, may be present in female fowl, increasing greatly in size with age.

Stern—The rear underpart of a fowl extending from the rear end of the keel bone to the ends of the pubic bones.

Sternum—The breastbone to which the ribs and keel are attached.

Strain—Fowl of any breed or variety that have been line-bred for a number of years and that reproduce uniform characteristics with marked regularity.

Stub—A short section of the stem of a feather, sometimes with a few short barbs attached. A disqualification when found on shanks or between the toes of clean-legged breeds

Uropygial gland—The oil or "preen" gland, the only skin gland in birds. A large gland opening on the back at the base of the tail feathers, secreting an oily fluid which the fowl applies to its feathers during preening. It is especially developed in waterfowl because the oil helps make the plumage shed water.

Variety—A subdivision of a breed, distinguished either by color, color and pattern, or comb.

Wattles—The thin, hanging growths of flesh at either side of the base of the beak and upper throat; usually much larger and longer in males than in females. Usually red in color, but purple in Sumatras and Birchen, and brown in Red Modern Games and Silkies. Should be fine and soft in texture, slightly concave in surface, regular in outline, and uniform in size.

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