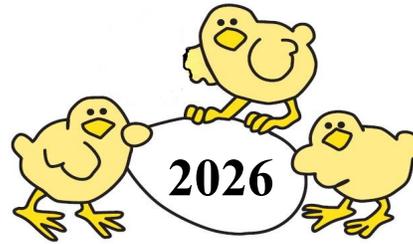


POULTRY

Allen County 4-H

Due June 4 in the Extension Office



Level 3 – Grades 9 & up

What you will do in this project:

- Enroll in the 4-H program by January 15.
- Complete the project by answering at least two of the activities in this activity sheet and turning it into the Extension Office **by June 8** or earlier. This activity sheet consists of activities, and a record sheet.
- Attend County 4-H Poultry workshops when offered.
- Refer to the Allen County 4-H Rules Book for a complete listing of all regulations concerning this project.
- You can exhibit in all 10 Classes that are offered, no more than 2 pens per class.
- You may exhibit a Poultry Education poster in addition to the birds.
- **All birds must be in your possession by May 15 with the exception of broilers that are hatched at the end of May.**
- Complete FairEntry online by published deadline.
- To exhibit beef cattle, dairy cattle, swine, sheep, meat goats, dairy goats, poultry and rabbits, 4-H members must be certified through the Youth for the Quality Care of Animals program. This is an annual program that can be completed via online modules or in-person trainings. For more information about in-person trainings in your county, please contact your County Extension Office. More information about YQCA is available at <http://yqca.org/>. **Attach a copy of YQCA card.**

Management Tips:

- Provide clean, freshwater to your birds at all times. In the winter, warm (but not hot) water will be needed. Birds on average will drink 1-2 cups a day. Check their water at least twice a day – more often on hot days.
- One chicken eats about 2 pounds of feed each week. 12 chickens eating two pounds a week would eat 24 pounds week. (12 birds x 2 lbs = 24 lbs)
- A feed ration of at least 16% protein for the mature chicken is needed.
- Put at least a 4 inch layer of bedding on the floor for your birds and keep dry. Spread fresh bedding on the top. Clean area completely at least once a year with a solution of 2 tablespoons of chlorine bleach into 2 gallons of boiling water. Scrub with a broom. Ventilate well to dry.
- Birds should be washed before bringing to the fair with a solution of warm water and 2 table spoons of chlorine bleach in a five gallon bucket.

4-H Member: _____ 4-H Club: _____

Grade in School (January 1, 2026) _____ Years in this project _____

Signature of 4-H Member verifying that you have completed these activities:

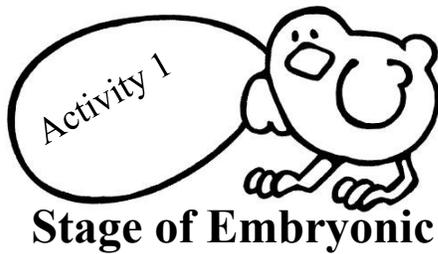
Signature of Parent that you have reviewed this information:

4-H Animal Care:

The Indiana 4-H program strongly supports positive animal care and strongly opposes animal abuse. 4-H is also dedicated to the mission of developing youth and volunteers through “Learning by Doing” programs.

4-H livestock projects teach life skills such as acquiring knowledge, making decisions, and applying leadership skills.

- When working and caring for animals, it is important to insure that appropriate safety measures are in place for both the animals and the persons who care for them. Therefore, there is no substitute for knowledge, common sense, and experience.
- Animal handlers should study and learn to anticipate an animal’s reaction and try and avoid problem situations. It is most important that 4-H members understand an animal’s behavior so one can “outsmart” not “out-muscle” an animal. Foremost in the 4-H’er mind should always be safety of the handler and the animal. Moving animals is more of an art than a science. Movement of animals requires planning and knowledge to accomplish it with the least amount of time, effort and stress to the animal.
- An animal’s good health is often directly related to the environmental factors associated with its living space. The presence of predators, dust, odors, pests, temperature, and humidity has a direct effect on an animal’s well-being.
- Animals react favorably to daily care and comfortable housing. Consideration should also be given to specific animal needs such as size of their housing space, lighting, and ventilation. The best facilities and equipment cannot and should not be a substitute for daily observation and careful attention to signs of illness, injury, and/or unusual behavior.
- Frequent consultation with your veterinarian is a must. Reasonable attention must always be given to the use of drugs and their approved withdrawal times.



Shortly after the ovum has been released from the hen's ovary, it is picked up by the funnel or infundibulum. Sperm from the male are found in the folds of the infundibulum. Soon after the ovum is picked up by the infundibulum, many sperm contact the germinal disc, but only one unites with the germ. Thus fertilization occurs about 24 hours before the egg is laid. Since the fertilized germinal disc, or blastoderm, spends about 24 hours in the warmth of the hen's body (about 107° F) while the egg is being completed, certain stages of embryonic development occur

during that time. About three hours after fertilization the newly formed single cell divides and makes two cells. Then there are four, eight, sixteen, and more. Cell division continues until there are many cells grouped in a small, whitish spot visible on the upper surface of the egg yolk.

When the egg is laid and its temperature drops below about 80° F, cell development ceases. Cooling at ordinary temperatures will not kill the embryo, and it will begin to develop again when the egg is placed in the incubator. Keeping eggs at temperatures above about 80° F prior to incubation will cause a slow growth which leads to a weakening and eventual death of the embryo.

During incubation various processes occur. They are mainly respiration, excretion, nutrition, and protection. Extra embryonic membranes are membranes outside the embryo's body which make these functions possible. The extra embryonic membranes are the yolk sac, amnion, allantois, and chorion.

The yolk sac is a layer of tissue growing over the surface of the yolk. Its walls are lined with a special tissue which digests and absorbs the yolk material. The amnion is a transparent sac filled with a colorless fluid. The amnion and amniotic fluid provide protection from mechanical shock and permit the developing embryo to exercise.

Respiration by the embryo is made possible by the allantois. Blood vessels in the allantois bring oxygen to the embryo and take carbon dioxide away. The allantois also stores excretions, absorbs albumen used as food by the embryo, and absorbs calcium from the shell for the structural needs of the embryo. The allantois ceases to function when the chick punctures the air cell and starts to breathe on its own.

A fourth membrane, the chorion, surrounds both the amnion and yolk sac. Initially the chorion has no apparent function, but later the allantois fuses with it to form the allantoischorion membrane. None of these extra embryonic membranes become a part of the chick.

BEFORE EGG LAYING

Fertilization
Division and growth of living cells
Segregation of cells into groups of special function

BETWEEN LAYING AND INCUBATION

No growth; stage of inactive embryonic life

DURING INCUBATION

FIRST DAY:

16 hours - First sign of resemblance to a chick embryo
18 hours - Appearance of alimentary tract
20 hours - Appearance of vertebral column
21 hours - Beginning of formation of nervous system
22 hours - Beginning of formation of head
23 hours - Appearance of blood islands - vitelline circulation
24 hours - Beginning of formation of eye

SECOND DAY:

23 hours - Beginning of formation of heart
35 hours - Beginning of formation of ear
42 hours - Heart begins to beat

THIRD DAY:

50 hours - Beginning of formation of amnion
60 hours - Beginning of formation of nose
62 hours - Beginning of formation of legs
64 hours - Beginning of formation of wings
70 hours - Beginning of formation of allantois

FOURTH DAY:

Beginning of formation of tongue

FIFTH DAY:

Beginning of formation of reproductive organs and differentiation of sex

SIXTH DAY:

Beginning of formation of beak and eggtooth

EIGHTH DAY:

Beginning of formation of feathers

TENTH DAY:

Beginning of hardening of beak

THIRTEENTH DAY:

Appearance of scales and claws

FOURTEENTH DAY:

Embryo turns its head toward the blunt end of egg

SIXTEENTH DAY:

Scales, claws, and beak becoming firm and horny

SEVENTEENTH DAY:

Beak turns toward air cell

NINETEENTH DAY:

Yolk sac begins to enter body cavity

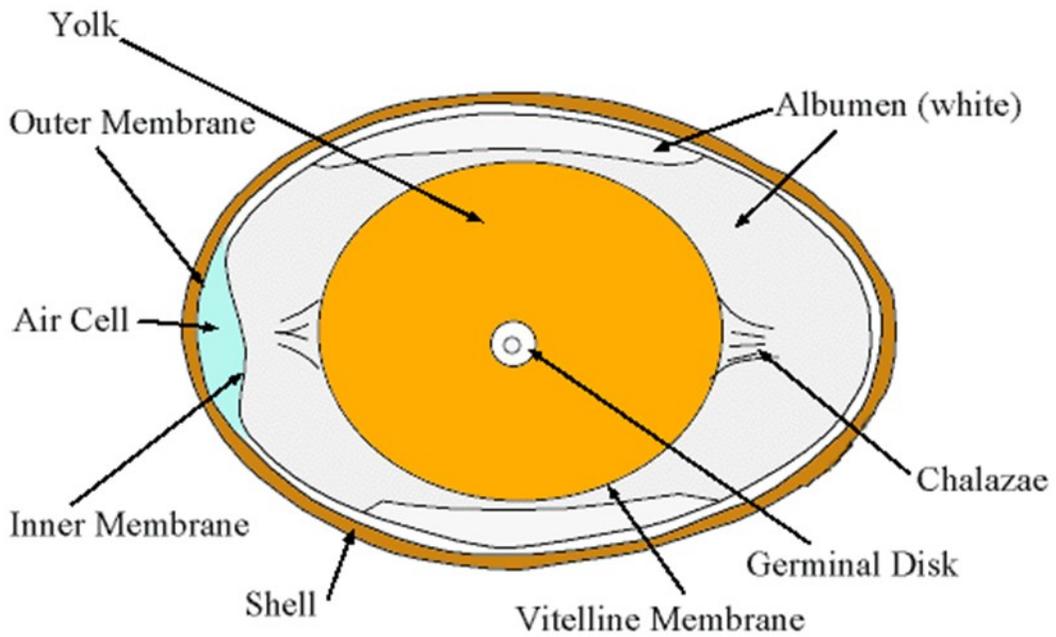
TWENTIETH DAY:

Yolk sac completely drawn into body cavity; embryo occupies practically all the space within the egg except the air cell

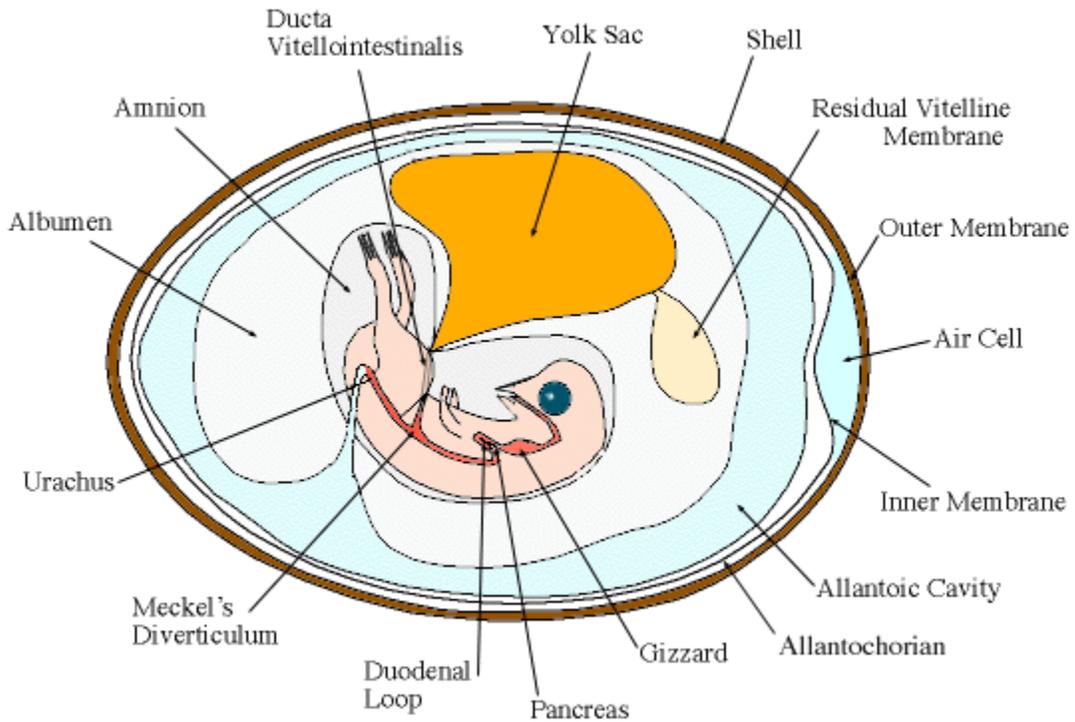
TWENTY-FIRST DAY:

Hatching of chick

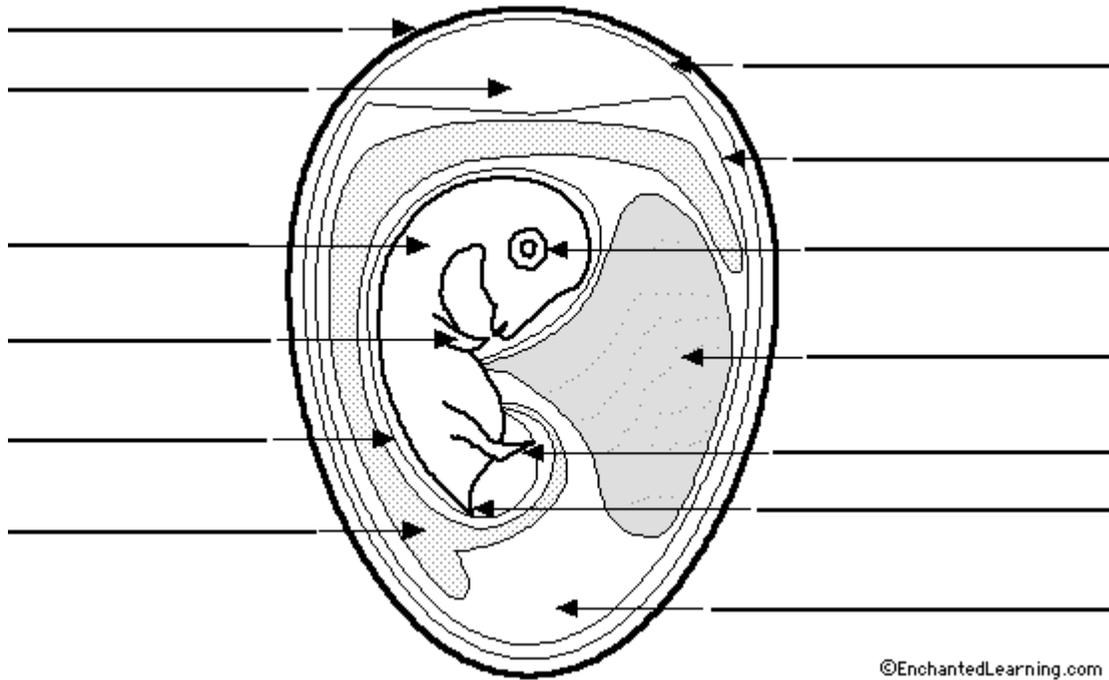
Unfertile Egg



Partially Developed



Use the Word bank below to label the correct parts of the egg embryo.



air cell - a space at the large end of the egg, between the inner and outer shell membranes.

albumin - the egg white. It provides protein and water for the embryo and protects it from microorganisms.

allantois - a sack that holds some of the embryo's waste. It is attached to the embryo near the legs.

amnion - a membrane that surrounds the embryo, protecting it from dehydration (losing water) and shock.

eggshell - the hard, protective coating of the egg. It is semi-permeable; it lets gas exchange occur, but keeps other substances from entering the egg. It is made of calcium carbonate.

embryo - the developing chick inside the egg.

eye - large and prominent on the head.

inner shell membrane - the thin membrane located between the outer shell membrane and the albumin.

leg - one of the lower limbs of the chick.

outer shell membrane - the thin membrane located just inside the shell.

tail - located at the far end (the posterior) of the embryo.

wing - one of the upper limbs of the chick.

yolk - the yellow part of the egg; it contains nourishment (food) for the embryo.

Share

What is the body temperature of a bird?

What are the extra embryonic membranes?

At what temperature does cell division cease?

What are the four functions of the allantois?

- 1.
- 2.
- 3.
- 4.

What occurs during development of day eighteen and twenty?

On what day do feathers begin to form?





Eggs are hard to beat for easy preparation, great versatility and delicious eating. Eggs are also one of nature's most nourishing foods, since they contain a wide array of necessary nutrients that both chicks and humans need.

Egg protein is of such high quality that it is often used as the standard by which other protein is measured. Egg protein contains all of the essential amino acids (building blocks of protein that the body needs but cannot make) in a pattern that closely matches the pattern the body needs.

That is why eggs are classified with meat in the basic food groups and why egg protein is called a complete protein.

Foods that supply significant amounts of one or more nutrients compared to the number of calories they supply are called nutrient dense. Eggs have a high nutrient density because they provide excellent protein and a wide range of vitamins and minerals in proportion to their calorie count. For example, one large egg provides 15 percent of the U.S. recommended Daily Allowance for protein; equals 1 ounce of lean meat, fish or poultry; contains varying amounts of vitamins (but no vitamin C) and minerals; and contains only 80 calories. An egg yolk is one of the few foods which contain vitamin D, the sunshine vitamin.

In addition to their nutritional qualities, eggs are used in cooking because of their varied functional properties. Examples of an egg's functional properties are:

1. **Foaming or leavening**-air bubbles are trapped in liquid egg white when it is beaten. The beaten white becomes foamy, increases six to eight times in volume, and stands in peaks. When the foam is heated, the tiny air cells expand and the egg protein coagulates around them, giving permanence to the foam. Egg white foam is responsible for the structure of souffles, angel food cakes, puffy omelets, and meringue. Fat inhibits the foaming of egg white, so be sure beaters and bowls are clean and there is not a trace of yolk in the whites.
2. **Thickening**-when eggs are added to pumpkin pies, custards and sauces, heating coagulates the protein, causing the mixture to become thicker.
3. **Coating**-eggs are added to batters that meat, French toast, and vegetables are dipped in prior to deep-fat frying. The egg increases the ability of the batter to stick to the food.
4. **Emulsification**-a component in an egg, called lecithin, helps to stabilize emulsions or mixtures of liquids, such as mayonnaise, salad dressings, and Hollandaise sauce, so the various ingredients do not separate.
5. **Garnishing**-eggs can be hard cooked and used as a garnish on salads. There are five basic methods for cooking eggs: baked (also known as shirred); cooked in the shell (eggs in their shells cooked in water) either hard-cooked or soft-cooked; fried; poached (eggs cooked out of the shell in hot water, milk, broth or liquid); and scrambled.

The basic principle of egg cooking is to use a medium to low temperature and time carefully. When eggs are cooked at too high a temperature, whites shrink and become tough and rubbery; yolks become tough, and their surface may turn gray-green. Eggs other than hard-cooked should be cooked until the whites are completely coagulated and the yolks start to thicken.

Cook and Keep Cool

- Bacteria love to grow in moist, protein-rich foods. Refrigeration slows bacterial growth, so it's important to refrigerate eggs and egg-containing foods. Your refrigerator should be at 40 °F or below. Use a thermometer to monitor.
- Salmonella is a common microbe found in and around food in large numbers it will make people sick.
- The temperatures for ideal rapid salmonella growth is between 40 – 140 °F .
- Remember the 2-Hour Rule: Don't leave perishables out at room temperature for more than two hours.
- Whether you like your breakfast eggs scrambled or fried, always cook eggs until the yolks and whites are firm.
- Tasting is tempting, but licking a spoon or tasting raw cookie dough from a mixing bowl can be risky. Bacteria could be lurking in the raw eggs.
- Cook cheesecakes, lasagna, baked pasta and egg dishes to an internal temperature of 160 °F. Use a food thermometer.
- Only use eggs that have been refrigerated, and discard eggs that are cracked or dirty.

Safe boiling procedures

When cooking, place a single layer of eggs in a saucepan. Add water to at least one inch above the eggs. Cover the pan, bring the water to a boil, and carefully remove the pan from the heat. Let the eggs stand (18 minutes for extra-large eggs, 15 minutes for large, 12 minutes for medium). Immediately run cold water over the eggs. When the eggs are cool enough to handle, place them in an uncovered container in the refrigerator where they can air-dry.

Share:

1. How often do you eat eggs? Why?
2. What egg cooking method do you use most/least? Why?
3. Why is an egg nutrient dense?
4. What is significant about the functional properties of eggs?
5. Name two ways to protect yourself from salmonella growing in your food?
 - 1.
 - 2.
6. How important are eggs in your diet? Why?
7. How important is food safety when using eggs compared to other foods?

Match the functional properties of eggs with the correct egg dish. Match all that apply.

Functional Property

Emulsification
Foaming
Thickening
Coating
Garnish

Egg Dish

Meringue
Angel food cake
Pumpkin pie
Custard
Soufflé
Meat batter
Mayonnaise
Salads



Lab to Coop

What is “biotechnology”? What are the pros and cons of this new technology? What are the goals of “poultry biotechnology”? Is it good for birds? Will it create a better chicken? Is it good for society? Will it create new drugs for human medicine? Is it a field of study for your major in college? Is it a potential career for consideration? In this activity you will research basic terminology in the field of biotechnology and consider how poultry fits into this new field and developing industry. The scientific and societal issues surrounding biotechnology are confusing and there are not necessarily obvious “right” or “wrong” answers. Just remember, the more you learn the more you will know about the world of biotechnology!

FOWL FACTS: Producing New Proteins

Imagine that the DNA of a chicken is successfully manipulated to encode a “new” or “recombinant” protein which the chicken then produces and deposits in large amounts in the egg yolk or albumen. Imagine that the new protein can be “harvested” from the yolk or albumen.

Consider: Is this good or bad?
 It is important to be knowledgeable and well-informed to make good decisions and have reasoned opinions.

- Suppose the new protein is useful in treating humans for a disease condition (i.e. cancer, diabetes, hemophilia).
- Suppose the new protein is an antibiotic to prevent disease in industry stocks of poultry.
- Suppose the new protein is good for one stock of chickens but turns out to be less beneficial for another.

Take Off!

Match the biotechnology terms with the definitions. Make a list of the resources you find and use. It is important to evaluate your sources. Are they good? Clear? Objective? Fair? Reliable? Accurate? Current? Examine company Internet web sites to learn about the role scientists envision for poultry biotechnology.

Resources Used

Biotech Word	Definition
1. ___ DNA	a. U.S. Patent and Technology Office that allows patenting of new and unique microbes, plants, and animals, as well as new biotechnology methods
2. ___ cell culture	b. The entire hereditary material of a cell
3. ___ gamete	c. The manipulation (often genetic) and development of biological organisms by technological means to make products that benefit human beings
4. ___ gene	d. A cell with the potential to differentiate and become one or more other cell types
5. ___ transgenic	e. Strategic design (by molecular biology techniques) of the DNA of an organism
6. ___ restriction enzyme	f. Food that possesses medical or health benefits. Sometimes the food is designed to contain certain nutrients through genome manipulation
7. ___ GMO	g. Class of enzymes that cuts DNA at specific sites
8. ___ genome	h. A reproductive cell (egg or sperm)
9. ___ nutraceuticals	i. The in-vitro (in a test tube or vessel) propagation of cells from a living organism
10. ___ USPTO	j. The segment of DNA that codes for a protein
11. ___ biotechnology	k. Genetically modified organism
12. ___ genetic engineering	l. An organism whose gamete cells contain genetic material derived from another organism (other than the parents)
13. ___ stem cell	m. Deoxyribonucleic acids, chemical building blocks of genes



Crow about it

What terms did you already know?

What terms were completely new to you?

How do you learn best?

Incubate ideas

- How can you tell if a resource is good or poor?

- What are the advantages and disadvantages of using websites as sources of information?

Spread your wings

- Why is it important for you to recognize and understand how you learn new information?

- Do you expect to learn new things only as a youth or throughout your life?

Un-coop your knowledge

- When you want to learn about a new topic, what resources could you use to gain new information?

- How does biotechnology affect you, your friends, and your family?

ALLEN COUNTY 4-H POULTRY RECORD



Records serve as a way to measure your own success with a project. When answering these questions, you should be able to see where improvements can be made for next year and if you wish to continue with this project for another year.

Commercial					
Class	Breed	Date Purchased	Number Purchased	Cost of Birds	Number of Birds Dead/Lost
Broiler					
Turkey					
White Egg Layer (Over 6 Months)					
Colored Egg Layer (Over 6 Months)					
White Egg Pullet (Under 6 Months)					
Colored Egg Pullet (Under 6 Months)					

Exhibition					
Class	Breed	Date Purchased	Number Purchased	Cost of Birds	Number of Birds Dead/Lost
Standard Exhibition					
Waterfowl					
Clean Legged Bantams					
Feather Legged Bantams					

List the equipment/housing arrangements needed for your project. Include feeding equipment, bedding, housing, grooming tools, etc. that you use to care for your animal(s).

Item	Approximate Value

List the items you feed to your animals. Include type of feed, quantity, costs		
Type of Food	Amount Fed	Expense - Value of Feed

List veterinary expenses you had with this project (vaccinations, illness, health certificates, etc.)

List three new things you have learned about raising birds.

- a. _____
- b. _____
- c. _____

What resources did you use to gain more information about your animals? (List people, magazines, newsletters, web sites, etc.)

Did you give a demonstration in your local 4-H Club? Yes _____ No _____ If yes, list the date given, title of demonstration and number of people present.

List any tours, workshops, clinics, etc you participated in relating to this project.

**You may exhibit in all ten classes offered
Two Pen per Class.**

**Educational Poster exhibit is due and judged on designated date in exhibit building. Watch the
Clover Chronicle for this date.**

**** Copy of Receipt Showing date of purchase *MUST* be attached to these pages
for Broilers, Pullets and Turkeys.**

I understand that the 4-H Livestock Committee may assign a specific location or pen for my animal(s). I understand that I may be subject to additional pen fees due upon time of unloading for my animals.

I further understand that to exhibit at the Allen County Fair is a privilege and that I must adhere to all rules and regulations set forth by the Indiana Board of Animal Health for Exhibition, by the Purdue Extension Service 4-H Youth Development program and the Allen County 4-H Clubs, Incorporated.

4-H Member Signature: _____ Date: _____

____ Completed 4honline enrollment by January 15, 2025

____ Completed Fair Entry on line by June 4, 2025

____ Copy of YQCA Certificate attached