

Agriculture is an essential industry that we all rely on to provide us with food. Eggs are a very popular part of our daily diets and our Manitoba egg farmers work hard every day to make sure we have eggs to enjoy!

Agriculture in the Classroom - Manitoba invites your students to learn more about this vital industry, explore the journey of eggs from raw to end product, the physical and chemical changes, and how eggs provide nutrients that help us to maintain a healthy body.

Students will:

- Explore the production of eggs on a MB egg farm
- Identify the steps in the journey of eggs from farm to table
- Create and observe chemical changes through a 'Naked Egg' experiment
- Describe how eggs provide nutrients that help us maintain a healthy body

GRADE 5 ACTIVITIES – CURRICULUM OUTCOMES

Curriculum Outcomes Grade 5 Science		Activities		
		#1: The Journey of the Egg	#2: The Naked Egg	#3: Egg Nutrition
5-2-02	Identify characteristics and properties that allow substances to be distinguished from one another. Examples: texture, hardness, flexibility, strength, buoyancy, solubility, colour, mass/weight for the same volume.	✓		
5-2-14	Research and describe how raw materials are transformed into useful products. Examples: food processing.	✓		
5-1-03	Describe the types of nutrients in foods and their function in maintaining a healthy body. Include: carbohydrates, proteins, fats, vitamins, minerals.			✓
5-2-01	Use appropriate vocabulary related to their investigations of properties of, and changes in, substances.		✓	
5-2-03	Investigate to determine how characteristics and properties of substances may change when they interact with one other.		✓	
5-2-09	Explore to identify reversible and non-reversible changes that can be made to substances.		✓	
5-2-10	Recognize that a physical change alters the characteristics of a substance without producing a new substance, and that a chemical change produces a new substance with distinct characteristics and properties.		✓	
5-2-11	Observe examples of changes in substances, classify them as physical or chemical changes, and justify the designation.		✓	

AGRICULTURAL CONNECTIONS: LET'S LEARN ABOUT EGGS!

Eggs are produced by hens (female chickens) on farms. Hens begin laying eggs when they are 19 weeks old and a laying hen will produce 350 eggs a year, which is almost 1 egg per day. Chickens are domestic fowl, as are turkeys, ducks, and geese. All species of poultry lay eggs. Chicken eggs are most commonly consumed in Canada.

Eggs come in various shell colors, although there is no nutritional difference between different colored eggs. The shell color depends upon the skin colour of chicken which can be seen on their ear lobe. The hen's feathers may be a different colour than her skin as well. Eggs can be white, tan, brown, or even a light shade of green. Chickens can be raised on a large or small scale. A few chickens can be raised in a backyard to provide eggs for a family or a regulated farm can produce many eggs for distribution to stores. Eggs that are purchased from a store come from a regulated farm. Chickens live in 4 different types of housing systems: conventional, enriched, free run and free range. They have a special diet made up of many grains, including ground up corn, wheat and soybean meal plus calcium bits and different vitamins.

Though eggs can be prepared in various ways for breakfast, they are also important and commonly used in other foods. Eggs help bind ingredients together, act as a leavening agent, and can also help to thicken soups and sauces.

Eggs that are produced for the purpose of eating will never develop into a chick because the eggs are not fertilized by a rooster and they are never incubated (kept warm). On a farm, eggs are collected each day. The eggs then go to a grading station where they are washed, checked for cracks and abnormalities, sized, graded, and then packaged. The contents of an egg can be seen by a method called candling (holding it up to a light). If an egg has an abnormal shape or appearance, it is discarded, and the remaining eggs are packaged into cartons. The eggs leave the grading station in refrigerated trucks which deliver them to retail grocery stores to be sold to consumers.

In Canada, using an electronic sensor, eggs are divided into three grades: Grades A, B and C. In order to be classified as a Canada Grade A egg, it must have an uncracked shell, a perfectly round and centred yolk, a firm white, and a small air cell. Only those eggs that meet all of these rigorous standards are then weighed and sent to the appropriate area for packaging. Canada Grade A eggs are sold at retail stores for consumer purchase. Canada Grade B eggs may be used in baking or in the production of processed egg products. Canada Grade C eggs tend to be used for the production of processed egg products.

Depending on the weight of the egg, it will automatically be packaged as either peewee, small, medium, large, extra large or jumbo. Egg size depends on the age of the hen; generally, the younger the hen, the smaller the egg. Eggs in a carton may not be the exact same size, but they are within a specific weight range.

In addition to providing Manitobans with an abundance of nutritious, locally produced eggs, about 45% of egg production in our province is processed into dry and liquid products and shipped all over the world. The Manitoba Egg Industry contributes 115 million dollars annually to the provincial economy and is essential to the security and well-being of our province.

Eggs are an important part of our diet because they are an abundant source of protein. One large 70 calorie egg contains 6 grams of high-quality protein and 8 essential nutrients including choline (critical for fetal brain development and brain function) and vitamin D (critical for bone health). Eating 20-40 grams of protein, from foods like eggs, promotes muscle recovery following exercise and helps preserve muscle during aging. Egg yolks contain lutein and zeaxanthin, carotenoids that can support eye health as you age. Research shows that dietary cholesterol (say, from eggs) does not negatively impact blood cholesterol and may even increase "good" cholesterol.

Teachers: You can access this great resource for more egg knowledge: [The Extraordinary Egg](#)

FUN EGG FACTS FOR KIDS!

1. Chef hats traditionally have pleats equal to the number of ways that you can cook an egg.
2. Harriet, a hen from the United Kingdom, laid the world's largest egg in 2010. Her astonishing egg measured 9.1 inches in diameter.
3. It takes a hen between 24 and 26 hours to develop an egg. Once she lays an egg, the development of a new egg normally starts within 30 minutes.
4. Chickens don't produce one egg at a time. Instead, producing hens normally have several eggs in various stages of development.
5. Eggshell colors have nothing to do with flavor or nutritional value of the egg. Brown, white and even blue and green eggshells are simply indicative of the color of hen's skin.
6. The hen's diet determines the color of the yolk. The lighter the grain the lighter the yolk.
7. There are several reasons why we eat chicken eggs instead of duck or turkey eggs. Chickens lay more eggs, they need less nesting space and they don't have the strong mothering instincts of turkeys and ducks, which makes egg collection easier.
8. White eggs are more popular among regulated producers because chickens that lay white eggs tend to be smaller than their brown egg-laying cousins, therefore needing less food to produce the same number of eggs.
9. All of today's egg-laying hens are white Leghorns or brown Leghorns with different types of genetics in each breed.
10. Not all chickens create eggs equally. Some breeds lay eggs almost every day. Other breeds lay eggs every other day or once to twice per week.
11. Eating raw eggs won't help you build muscle. Only 51% of the proteins in raw eggs are digestible, while 91% of the proteins in cooked eggs are digestible.
12. Can't tell if that egg in the refrigerator is raw or hardboiled? Try spinning it! Raw eggs wobble as the liquid inside shifts, but hardboiled eggs spin smoothly.
13. Because older eggs have larger air cells, they're much easier to peel than fresh eggs.
14. Cloudy egg whites mean that the eggs are extremely fresh, while clear egg whites are an indicator of older eggs. Cloudiness of raw egg white is due to the natural presence of carbon dioxide that has not had time to escape through the shell and is an indication of a very fresh egg. As an egg ages, the carbon dioxide escapes, and the white becomes more transparent. Other colors in the egg white may be a sign of spoilage, so if it is not cloudy-white or clear, don't eat it!



GETTING STUDENTS TO START THINKING ABOUT EGGS

1. Write the words Breakfast, Lunch, and Dinner on the board. Ask the students to name as many ways they can think of to prepare eggs for the different mealtimes. Write a list of their ideas under each mealtime. Examples could include:
 - **Breakfast:** scrambled, poached, omelet, boiled, baked, over easy, over hard.
 - **Lunch:** frittata, quiche, egg salad, egg sandwich
 - **Dinner:** deviled eggs, Pad Thai, pasta salad
2. Explain to the students that they are going to explore where eggs come from, how they get to the grocery store, and how they can be part of a healthy diet.

*All activities can be done in groups or individually to follow your school's social distancing protocols.

ACTIVITY 1 – THE JOURNEY OF THE EGG

PROCEDURE:

1. First, watch this virtual tour 'Behind the Barn Door' with Harley Siemens, owner of Siemens Farms, an egg operation in Rosenort, Manitoba. (13 mins : 39 secs): <https://youtu.be/0QoKzleedmE>
2. Ask the students, "Why are biosecurity practices important?", "What were some things you learned about egg production that you didn't know before?"
3. Watch this second video titled 'The Journey of the Egg: Full Story' produced by the Egg Farmers of Canada. (9 mins : 18 secs)
 - https://www.youtube.com/watch?v=bBVYmVyZtBQ&feature=emb_logo
4. Ask the students, "What are the steps involved in getting eggs from the farm to the grocery store?"
5. Organize the students into groups of 6 OR provide 1 set of [Egg Production Cards](#) per student.
 - Ask the groups/students to place the cards in the order that show the steps it takes to get eggs from the farm to the supermarket.
6. Explain to the students that technology is used in every production step to increase efficiency and decrease costs. Ask the students to describe some of the technologies they noticed from the videos.
7. Assign each group/student one of the production steps below to explore. Provide [The Journey of the Egg Discovery Sheet](#) to each that corresponds with their production step:
 - Hens lay eggs
 - Eggs are washed
 - Eggs are checked for cracks
 - Eggs are sized
 - Eggs are graded
 - Eggs are packaged and shipped
8. Have each group/student read the information on their discovery sheet and create a poster or PowerPoint presentation to present to the class. Each presentation should include the following information:
 - Name of the production step.
 - What happens during this step.
 - Technology that is used during this step.
 - Interesting information about this step.
9. Allow each group/student time to share their poster with the class.

MATERIALS NEEDED:

- Projector screen to view online videos
- [Egg Production Cards](#), 1 set per student OR if able to work in groups, 1 set per group of 6 students
- [The Journey of the Egg Discovery Sheet](#), 1 per student
- Poster paper (1 per group) & art materials for drawing OR students can create a PowerPoint slide instead. Choose what works best for your class!

ACTIVITY 2 – THE NAKED EGG EXPERIMENT

HOW CAN YOU GET AN EGGSHELL OFF WITHOUT BREAKING THE EGG?

PROCEDURE:

1. Photocopy and hand out a [Naked Egg Student Activity Sheet](#) to each student along with the materials needed.
2. Have the students complete the Naked Egg Experiment, then accompanying questions and exploration activities.
3. Have fun!

MATERIALS NEEDED:

- Raw Eggs – 1 per student
- White Vinegar
- Glasses or clear jars (clean jelly, olive, or pickle jars work) – 1 per student
- Food Coloring (optional)
- [Naked Egg Activity Sheet](#), 1 per student

ACTIVITY 3 – EGG NUTRITION

PROCEDURE:

1. View the video 'How Eating an Egg Impacts Your Health' <https://www.youtube.com/watch?v=byNJ9A35lm0> (55 secs)
2. Pass out an [Egg Nutrition Activity Sheet](#) to each student.
3. Ask the students to cut out the text squares at the bottom of the activity sheet and use the information from the video to match the parts of the body with the square that describes how eggs can benefit that part of the body.
4. Re-watch the video, pausing when necessary, and check the matches before having the students glue the squares in place.

MATERIALS NEEDED:

- Projector screen to view online video
- [Egg Nutrition Activity Sheet](#), 1 per student
- [Egg Nutrition Teacher Answer Key](#)

*Teachers: refer to the [Egg Nutrition Teacher Answer Key](#) located in the 'Materials Needed' section

EXTENSION ACTIVITY

Eggy Math Worksheet – Click [here](#) to have your students test their egg math skills!

EGGY MATH - ANSWER KEY

1. **12**
2. $25,000,000 \text{ hens} \times 350 \text{ eggs/hen} = \mathbf{8,750,000,000}$ eggs
3. $8,750,000,000 \text{ eggs} \div 12 \text{ eggs} = 729,166,667 \text{ dozen}$ or **729,000,000** dozen (to the nearest million)
4. $8,750,000,000 \text{ eggs} \div 37,800,000 \text{ Canadians} = 231.481481 \text{ eggs}$ or **231 eggs** (to the nearest egg)

After conducting the above activities, review and summarize the following key concepts with your students:

- A female chicken, called a hen, is raised on a farm to produce eggs for us to eat.
- Eggs are produced on a farm, cleaned, sized, graded, and packaged at a grading station, transported to a grocery store, and then finally sold to a consumer.
- Eggs are an important part of our diet because they are a nutrient-dense source of protein. They also provide vitamins that keep our eyes, brain, muscles, bones, stomach, heart and blood healthy.
- Eggshells have a component to them that is similar to our own bones and teeth. They all contain calcium carbonate, a substance that makes them very hard. While humans evolved this hard enamel for biting and crunching, birds and other hard egg-laying species evolved to produce eggshells to protect their young as they develop from the embryonic stage. Both enamel and eggshells are relatively thin but contain calcium-based compounds for their structure: calcium carbonate for eggs and calcium phosphate for enamel. Because they share a similar composition, similar chemicals affect their structures in positive or negative ways. For example, fluoride – a staple in many dental practices – strengthens both enamel and eggshells and helps protect them from acids. Acids weaken and break down both substances.

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The above lessons/activities have been adapted from National Agriculture in the Classroom and AgScope.