The Book Planter
Ag in the Classroom
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April 2022: *Barn Savers*
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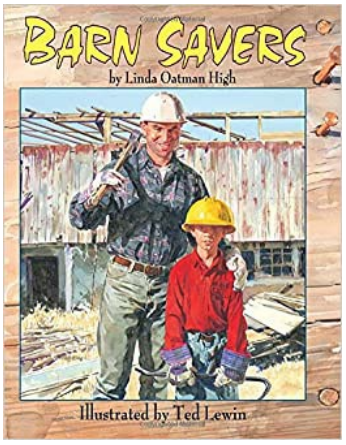


The barn is old. The boards are beaten. A hundred years of wind and rain have taken their toll. When you step inside, you can smell the hay and horses. It's a beautiful place, this barn, in its rugged way. But now it's time for the barn to come down. Fortunately, the barn will not be crushed by the blade of a bulldozer. It will be dismantled slowly, piece by piece, by the barn savers. The barn savers, a father and son, take care to save everything--the joists, the rafters, the flooring, the roofing. In this way, the barn will never be gone. Somewhere parts of it may live for another hundred years. This is the hope of the barn savers. This story quietly celebrates something beautiful and something old, as a father and son bring down a barn with hard work and respect, and the illustrations pay homage to the old barn in all its gray and weathered glory.

Did You Know?[1]

- Most barns have 10,000 feet or more of boards and used building materials.[1]
- Reclaimed wood can be used a great number of ways—from birdhouses to gazebos, fireplace mantles to flooring, wall and ceiling covers to furniture.[1]
- North Carolina has about 18.1 million acres of timberland covering about 58% of the state's total land area.[2]
- Common businesses from the forest sector include forestry and logging operations, sawmills, furniture mills, and pulp and paper industries.[2]

Barn Saver Discussion Questions

1. Who are the main characters of the story?
2. Why do you think the boy and his father leave so early in the morning?
3. Why do they wear hard hats? What other types of measures do they take to stay safe while breaking down the old barn?
4. Why does the father see value in the old barn?
5. Why does the boy keep the weather vane?
6. What are barn savers?

Interest Approach – Engagement[4]

1. Project a picture of a local barn or the Traditional Barn photo (see links) onto a large screen. Ask students to identify what it is and the purpose of the building.
2. Make a list on the board of the students' ideas about how a barn is used.
3. Ask students what color they think of when they think of barns. Answers may vary. Ask students why they think so many barns are red? Explain that, a long time ago, red paint was the cheapest paint. Red paint contained rust, which gave

the paint its red color and helped to prevent moss from growing on a wooden barn. Clarify that we see many different colored barns today, but some people still choose to paint them the traditional red color.

4. Explain to the students that they will be exploring the many purposes that barns can serve. (Refer to the **Background Agricultural Connections**—attached to this Activity Sheet.)

Activity 1: Types of Barns[4]

1. Continue the discussion from the **Interest Approach** that barns serve many purposes for farmers. Barns can be used to shelter livestock, to produce a specific farm product, to store farm products and equipment, or for a combination of purposes.
2. Read the book, *Barn Savers* with the students. After reading, ask students to think of what the materials from the old barn could be repurposed for.
3. Explain to students that sometimes materials can be used to build new barns, or in houses.
4. Explain to students that one type of barn is a livestock barn. Livestock barns shelter animals and protect them from predators, diseases, bad weather, and extreme temperatures. Livestock barns are engineered to meet the needs of specific livestock—dairy cows, beef, cattle, turkeys, chickens, sheep, pigs, etc. Access to feed, water, lighting, and fresh air, as well as waste management and sanitation, must be taken into consideration when designing a barn for the livestock.
5. Have each student choose two types of livestock barns from the list below:
    a. Poultry barn
    b. Dairy barn
    c. Pig barn
    d. Horse barn
    e. Sheep barn
6. Create six centers around the classroom. Each center should have a computer, laptop, smart phone, or tablet that is set up to show one of the following videos (see **Links** section for full links):
    a. Poultry barn
    b. Dairy barn
    c. Pig barn
    d. Horse barn
    e. Sheep barn
7. Provide each student with two *Barn Video Viewing Guides* (see **Links** section for full link), one for each type of barn they chose. Explain to the students that they are going to view videos that provide information about the two different types of barns they chose. They will use their viewing guides to record their notes about the barns.

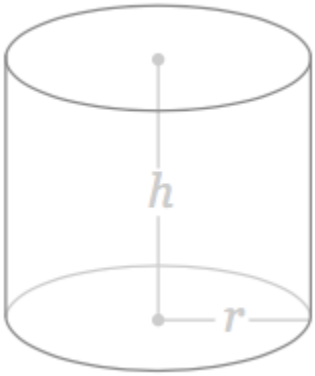
Activity 2: Hay Barn Engineering[4]

1. Show students the video Hay Making at the Joseph Decuis Farm (see **Links** section for full link). Students can view the entire process of harvesting, bailing,

and stacking the hay or only the process of stacking hay bales starting at minute 10:22 and ending at minute 13:02.

2. Lead a discussion about the benefits of storing hay bales inside the barn. Integrate the following points into the discussion. Storing hay in a barn:
    a. Maintains better hay quality
    b. Maximizes the nutritional value of hay
    c. Exposes the hay to less moisture and sunlight
    d. Decreases the likeliness of spoilage
    e. Decreases hay waste
    f. Cuts costs
3. Explain to the students that they will design and construct a model of a hay barn that will be used to store 4' x 4' round bales of hay. The tractor that will be used to stack the hay can only stack two bales high. The challenge is for the students to build a barn that maximizes the barn space to fit as much hay inside as possible. For the purposes of the models, 1 inch = 1 foot. During the engineering process, encourage students to measure the interior volume of their barns (length x width x height).
4. Explain to the students that farms are constrained by the amount of money they can spend on the building materials to build a barn. The students will also be constrained by the amount of materials they can use to build their barn model.
5. Allow students to work independently, as partners, or in small groups to design and construct their models. Provide each student, partnership, or group with the following materials:
    a. 50 wooden craft sticks
    b. 2 pieces of 9" x 12" construction paper
    c. Craft glue
    d. Tape
    e. Ruler
    f. Scissors
6. To encourage critical thinking, have students consider the following questions before and after the barn models are completed:
    a. How many sides does your barn have?
    b. Will you bring the hay through a side or end of the barn?
    c. Is your barn accessible to a tractor?
    d. Where is the best location for a barn?
    e. How many bales will you put in your barn?
    f. What type of materials would be used to build a real hay barn?
    g. Can your barn withstand strong winds, ice, and snow?
7. When the barn models are completed, determine which barn fits the most hay bales stacked two bales high.

Activity 3: How Much Hay?[4]



1. Have students calculate the approximate amount of hay that will fit inside their hay barn model.
2. First, students will need to find their barn volume (length x width x height).
3. Then they find the bale volume, which is the volume of a cylinder ($h \times \pi \times r^2$).
4. They would then take the barn volume divided by the bale volume to get an approximate amount of hay that will fit in the barn.

Activity 4: Which Animal Fits?[4]

1. Have students design a barn that meets the needs of a specific farm animal. Students should consider the following questions when designing their livestock barn:
    a. How will the animals access food?
    b. How will the animals access water?
    c. How will the animals access fresh air?
    d. How will the animals receive the appropriate amount of light?
    e. How will a proper temperature be maintained within the barn?
    f. How will the barn be kept clean and sanitary?

Links

- Traditional Barn Photo (**Interest Approach**) https://cdn.agclassroom.org/media/uploads/2019/03/14/barn3.jpg
- Poultry barn video (**Activity 1**) https://www.youtube.com/watch?v=f4UC1vd0h1g&list=PLUc5j2qzInzmCHkspr12ZKPJtoCMNB67i&index=2&frags=pl%2Cwn
- Dairy barn video (**Activity 1**) https://www.youtube.com/watch?v=uMyyJJhHFvA&t=20s
- Pig barn video (**Activity 1**) https://www.youtube.com/watch?time_continue=49&v=rAw7Fs_IAW4
- Horse barn video (**Activity 1**) https://www.youtube.com/watch?v=miEChXU_sXg&t=14s
- Sheep barn video (**Activity 1**) https://www.youtube.com/watch?v=9--CMj1o8ng
- *Barn Video Viewing Guides* (Activity 1) https://cdn.agclassroom.org/media/uploads/2019/03/14/Barn_Video_Viewing_Guide.pdf
- Hay Making at the Joseph Decuis Farm video (**Activity 2**) https://www.youtube.com/watch?v=Tu3XA2dLhF0

Sources

1. https://barngeek.com/recycling-facts
2. https://ncfieldfamily.org/farm/talking-timber-5-fun-facts-about-north-carolina-forestry/

3. https://www.ncpedia.org/barns
4. https://www.agclassroom.org/matrix/lesson/701/

K-5 Subject Areas

Reading, Writing, Speaking and Listening, Science, and Social Studies

NC Standard Course of Study

Reading

- **RL.K.1** With prompting and support, ask and answer questions about key details in a text.
- **RL.K.3** With prompting and support, identify characters, settings, and major events in a story.
- **RL.K.9** With prompting and support, compare and contrast the adventures and experiences of characters in familiar stories.
- **RL.1.1** Ask and answer questions about key details in a text.
- **RL.1.2** Retell stories, including key details, and demonstrate understanding of their central message or lesson.
- **RL.1.3** Describe characters, settings, and major events in a story, using key details.
- **RL.1.9** Compare and contrast the adventures and experiences of characters in stories.
- **RL.3.1** Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.
- **RL.3.3** Describe characters in a story and explain how their actions contribute to the sequence of events.
- **RL.4.3** Describe in depth a character, setting, or event in a story or drama, drawing on specific details in the text.
- **RI.K.1** With prompting and support, ask and answer questions about key details in a text.
- **RI.K.2** With prompting and support, identify the main topic and retell key details of a text.
- **RI.K.3** With prompting and support, describe the connection between two individuals, events, ideas, or pieces of information in a text.
- **RI.1.1** Ask and answer questions about key details in a text.
- **RI.1.2** Identify the main topic and retell key details of a text.
- **RI.3.1** Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.
- **RI.3.2** Determine the main idea of a text; recount the key details and explain how they support the main idea.
- **RI.4.1** Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.
- **RI.4.2** Determine the main idea of a text and explain how it is supported by key details; summarize the text.
- **RI.4.5** Describe the overall structure of events, ideas, concepts, or information in a text or part of a text.
- **RI.4.7** Interpret information presented visually, orally, or quantitatively and explain how the information contributes to an understanding of the text in which it appears.
- **RI.5.2** Determine two or more main ideas of a text and explain how they are supported by key details; summarize the text.
- **RI.5.7** Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question or to solve a problem efficiently.
- **RI.5.9** Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably

Writing

- **W.K.5** Participate in shared investigation of grade appropriate topics and writing projects.
- **W.K.6** With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.
- **W.1.5** Participate in shared research and writing projects.
- **W.1.6** With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.
- **W.2.5** Participate in shared research and writing projects.
- **W.2.6** Recall information from experiences or gather information from provided sources to answer a question.
- **W.3.2** Write informative /explanatory texts to examine a topic and convey ideas and information clearly.
- **W.3.5** Conduct short research projects that build knowledge about a topic.
- **W.3.6** Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories.
- **W.4.2** Write informative /explanatory texts to examine a topic and convey ideas and information clearly.
- **W.4.5** Conduct short research projects that build knowledge through investigation of different aspects of a topic.
- **W.5.2** Write informative /explanatory texts to examine a topic and convey ideas and information clearly.
- **W.5.5** Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic.

Speaking and Listening

- **SL.K.1** Participate in collaborative conversations with diverse partners about kindergarten topics and texts with peers and adults in small and larger groups.
- **SL.K.2** Confirm understanding of a text read aloud or information presented orally or through other media by asking and answering questions about key details and requesting clarification if something is not understood.
- **SL.K.3**. Ask and answer questions in order to seek help, get information, or clarify something that is not understood.

- **SL.K.4**. Speak audibly and express thoughts, feelings, and ideas clearly.
- **SL.K.5** Add drawings or other visual displays to descriptions as desired to provide additional detail.
- **SL.1.1** Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups.
- **SL.1.2** Ask and answer questions about key details in a text read aloud or information presented orally or through other media.
- **SL.1.3** Ask and answer questions about what a speaker says in order to gather additional information or clarify something that is not understood.
- **SL.1.4** Produce complete sentences to describe people, places, things, and events with relevant details, expressing ideas and feelings clearly.
- **SL.1.5** Add drawings or other visual displays to descriptions when appropriate to clarify ideas, thoughts, and feelings.
- **SL.2.1** Participate in collaborative conversations with diverse partners about grade 2 topics and texts with peers and adults in small and larger groups.
- **SL.2.2** Recount or describe key ideas or details from a text read aloud or information presented orally or through other media.
- **SL.2.3** Ask and answer questions about what a speaker says in order to clarify comprehension, gather additional information, or deepen understanding of a topic or issue.
- **SL.2.4** Tell a story or recount an experience with appropriate facts and relevant, descriptive details, speaking audibly in coherent and complete sentences.
- **SL.3.1** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 3 topics and texts, building on others' ideas and expressing their own clearly.
- **SL.3.2** Determine the main ideas and supporting details of a text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.
- **SL.3.3** Ask and answer questions about information from a speaker, offering appropriate elaboration and detail.
- **SL.3.4** Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly in complete sentences at an understandable pace
- **SL.4.1** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 4 topics and texts, building on others' ideas and expressing their own clearly.
- **SL.4.2** Paraphrase portions of a text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.
- **SL.4.3** Identify the reasons and evidence a speaker provides to support particular points.
- **SL.4.4** Report on a topic or text, tell a story, or recount an experience in an organized manner, using appropriate facts and relevant, descriptive details to support main ideas or themes; adjust speech as appropriate to formal and informal discourse.
- **SL.5.1** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 5 topics and texts, building on others' ideas and expressing their own clearly.
- **SL.5.2** Summarize a written text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.
- **SL.5.3** Summarize the points a speaker makes and explain how each claim is supported by reasons and evidence.
- **SL.5.4** Report on a topic or text or present an opinion, sequencing ideas logically and using appropriate facts and relevant, descriptive details to support main ideas or themes; adapt speech to a variety of contexts and tasks.

Science

- **K.L.1.2** Compare characteristics of living and nonliving things in terms of their structure and growth.
- **1.L.1.1** Recognize that plants and animals need air, water, light (plants only), space, food and shelter and that these may be found in their environment.
- **1.L.1.2** Give examples of how the needs of different plants and animals can be met by their environments in North Carolina or different places throughout the world.
- **1.L.1.3** Summarize ways that humans protect their environment and/or improve conditions for the growth of the plants and animals that live there (e.g., reuse or recycle products to avoid littering).
- **4.L.1.2** Explain how animals meet their needs by using behaviors in response to information received from the environment.
- **4.L.1.3** Explain how humans can adapt their behavior to live in changing habitats (e.g., recycling wastes, establishing rain gardens, planting trees and shrubs to prevent flooding and erosion).

Social Studies

- **K.B.1.1** Identify cultural practices in local communities and around the world.
- **1.G.2.1** Explain ways people change the environment (planting trees, recycling, cutting down trees, building homes, building streets, etc.).
- **1.G.2.2** Explain how people use natural resources in the community.
- **2.G.1** Understand how interaction between humans and the physical environment is impacted by movement and settlement.
- **EX.2.G.1** Use geographic representations and terms to describe surroundings.
- **EX.2.C&G.2** Understand expectations of participating in a group.
- **3.H.1.3** Exemplify the ideas that were significant in the development of local communities and regions.

- **4.E.1.3** Explain ways in which factors of production are influenced by the availability of resources in North Carolina.

Math

- **2.MD.1** Measure the length of objects using non-standard units.
- **2.MD.3** Order by length using non-standard units.
- **2.MD.5** Increase or decrease length by adding or subtracting units.
- **3.OA.3** Represent, interpret, and solve one-step problems involving multiplication and division.
- **3.OA.7** Demonstrate fluency with multiplication and division with factors, quotients and divisors up to and including 10.
- **3.OA.8** Solve two-step word problems using addition, subtraction, and multiplication, representing problems using equations with a symbol for the unknown number.
- **3.MD.2** Solve problems involving customary measurement.
- **3.MD.7** Relate area to the operations of multiplication and addition.
- **4.MD.3** Solve problems with area and perimeter.
- **5.MD.4** Recognize volume as an attribute of solid figures and measure volume by counting unit cubes, using cubic centimeter, cubic inches, cubic feet, and improvised units.
- **5.MD.5** Relate volume to the operations of multiplication and addition.

Background Agricultural Connections[3,4]

A barn is an agricultural building. There are many types of barns—poultry barns, dairy barns, pig barns, lambing barns, hay barns, etc.—and each type serves a specific purpose or function. Barns can be used to shelter livestock, to produce a specific farm product, to store farm products and equipment, or for a combination of purposes.

The specific use of a barn determines its design. Production barns are used to produce a specific farm product such as a dairy barn that houses a milking parlor. Storage barns are organized specific to the crops or equipment that will be stored there. Livestock barns shelter animals and protect them from predators, diseases, bad weather, and extreme temperatures. Livestock barns are engineered to meet the needs of specific livestock—dairy cows, beef cattle, turkeys, chickens, sheep, pigs, etc. Access to feed, water, lighting, and fresh air, as well as waste management and sanitation, must be taken into consideration when designing a barn for livestock. General purpose barns are constructed to be used for a combination of purposes.

A barn's purpose may change overtime. A barn that once housed livestock may now house farm equipment, such as tractors, combines, and hay bailers. A farmer may modify a barn to meet the needs of a changing farm. Modern barns utilize high-tech equipment, such as climate control, monitoring systems, robotic assistants, automated feed systems, and sensors, to increase farm efficiency and decrease costs.

There are many benefits to storing hay bales inside a barn. Storing hay in a barn maintains better hay quality, maximizes the nutritional value of the hay, exposes the hay to less moisture and sunlight, decreases the likeliness of spoilage, decreases hay waste, and cuts costs.

North Carolina Barns

The size of a barn usually indicates the size of a farm on which it stands. The hill country of Appalachia and western NC were earlier known for crib barns, the simplest barn structure of all—a pen or crib made of rough logs held together at the corners by notches. On larger farms in the same region, cantilevered double-crib barns with lofts overhanging the cribs (usually in the front and back) were common. The lofts were used for hay storage.

The barn most easily identified with North Carolina, having changed little over several decades, is the flue-cured tobacco barn. These square buildings typically measure from 16 to 20 feet per side, with a height of around 20 feet. Tobacco barns were at one time so numerous in the state that an observer counted 200 of them on a 60-mile stretch of Highway 86 from Hillsborough, NC to Danville, VA. These buildings were constructed in relation to roads, fields, and other farm buildings and were never placed near a house. The construction of one was a major social event, taking 12 to 15 men an entire day.

While earlier barns were constructed of pine logs, later builders were forced to try other materials because of the scarcity of good pine; their efforts generally proved unsatisfactory. Frame barns were poorly insulated and needed siding; sheet metal was used, but this wasted heat. Stucco did not allow moisture to escape and many buildings made of this material simply collapsed. By 1925, some coastal plains barns were being built of concrete, which provided a superior method of construction. In the Piedmont region; however, the newer frame barns could not compare to the high quality of older log tobacco barns.

Name_____ Date_____

Barn Video Viewing Guide

1. **What type of barn was featured in the video you viewed?** _____

2. **What type of animal lives in the barn?** _____

3. **What is the purpose of the barn?** _____

   _____

   _____

4. **Describe the design of the barn.** _____

   _____

   _____

5. **Describe the special features of the barn.** _____

   _____

   _____

6. **How does the barn meet the needs of the animals that live there?** _____

   _____

   _____