W 676

BEEF CATTLE ROUNDUP

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Beef Cattle Roundup

Skill Level
Beginner

Learner Outcomes
The learner will be able to:

- Build and test the effectiveness of a model to solve a real-world problem.
- Create a plan to move calves from a pasture to a barn.
- Apply knowledge of a real livestock working facility.

Educational Standard(s) Supported

4.ETS2.1	*4.ETS2.2*
5.ETS1.1	*5.ETS1.2*

Success Indicator
Learners will be successful if they:

- Demonstrate critical thinking about the components of the model and how they apply to a real livestock working facility.

Time Needed
30-45 minutes; can be adjusted as needed

Materials List
HEXBUG Nano Robots

Cardboard	Paper Straws
Index Cards	PVC Pipe
Tape	Craft Sticks
Blank Paper & Pencil	Scissors

Introduction to Content

This activity is designed to highlight STEM activities with traditional 4-H animal science youth using animal-related topics. It could also be used to engage non-traditional students in the 4-H animal science program who are interested in animals but do not have access to live animals.

Introduction to Methodology

In this activity, the leader is encouraged to not give too many instructions or directions. The goal is for youth to make discoveries for themselves without being told the right answer or the right way to accomplish a certain task. Their idea might fail the first time, and that is okay. This trial and error method allows students to learn through these failures, improve their ideas and make it better the next time.

Authors

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Terms and Concepts Introduction

Pasture: land covered with grass and other low plants suitable for grazing animals, especially cattle or sheep.

Setting the Stage and Opening Questions

Say, **"The term 'field of vision' is the area of space that one can see at a time. How many degrees do you think a person can see at a time?"** Invite students to guess until they get to the correct answer: 120 degrees. Tell students, **"Animals see their surroundings much differently from people. For example, cattle have an almost 300-degree field of vision. Because of this, they have poor depth perception, so they generally will not walk over a shadow. It is important to understand their point of balance (shoulder) and flight zone (personal space) to move cattle in a stress-free way. Narrow alleys, solid panels and avoiding loud noises, sudden movements and sharp turns are also important items to consider when building a livestock working facility. Today you will do the following:**

- **Identify key parts of building a fencing system for beef cattle**
- **Create a plan to move calves from a pasture to a barn**
- **Apply knowledge to a real livestock working facility**

Tips for Engagement

Feel free to tailor each activity to fit the species of interest of the targeted youth audience.

When doing the activity with youth, do not tell them an answer, but feel free to ask questions like: Does distance between your barriers matter? Why do you think it is getting stuck? What would make it move more smoothly?

Experience

Divide students into small groups of three or four. Each group will need their own playing surface, but all groups can share supplies. Each playing surface should be set up on a hard surface like a table. It should include a designated pasture area and a barn area. This can be elaborate with a toy barn and toy fences (see Figure 1 below), or this can be done simply using tape or other items from the supply list (see Figure 2 below). Regardless of the materials used, the distance from the pasture to the barn should be at least two feet.

Tell students, **"There is a group of weaned calves that you need to move from the pasture to the barn so you can vaccinate them. You will use the HEXBUGS as the calves. Take a few minutes to discuss what you know about cattle movement, and then sketch out your plan."**

Give students approximately 20-25 minutes to design their systems. Give few instructions during this time. The goal is for participants to work together and be creative using their own skills and background knowledge.

After the design session, it is time for the competition! Each group will explain their design, and then turn the calves loose. Record the number of calves and the time it takes for the calves to reach the barn. The group with the most calves in the barn in the least time is the winner.

Share

Give students the opportunity to reflect upon the activity by asking the following questions:

- **Did the number of turns in your system impact the time it took for the calves to make it to the barn?**
- **Did you have to add anything to your design to keep the calves contained?**
- **What worked the best at keeping the calves moving forward?**

Process

Ask students the following questions:

- **Did the amount of space between the fences matter when moving the calves?**
- **Why do you think farmers put up fences on their farms?**

Generalize

Tell students, **"Robots and computer systems are commonly used on farms. Robots are even being used to milk dairy cows! What other types of technology do we use with cattle? In what ways do you think robots and computer systems can be used in the future of animal agriculture? How can we use technology to design a way to move animals on our farms?"**

Apply

Instruct students to write down three things they learned from this activity that they can apply the next time they work with cattle.

Life Skill(s)

4th Grade
Gather relevant information for decision-making. (Hands)

5th Grade
As part of a group, identify and agree on a common task (set a goal). (Hands)

Communicate information learned from a specific project area to the larger 4-H club. (Head)

Supplemental Information

Educational Standards Met

4.ETS2.1 Use appropriate tools and measurements to build a model.

4.ETS2.2 Determine the effectiveness of multiple solutions to a design problem given the criteria and the constraints

5.ETS1.1 Research, test, re-test, and communicate a design to solve a problem

5.ETS1.2 Plan and carry out tests on one or more elements of a prototype in which variables are controlled and failure points are considered to identify which elements need to be improved. Apply the results of tests to redesign the prototype.

Figure 1: Elaborate playing surface.

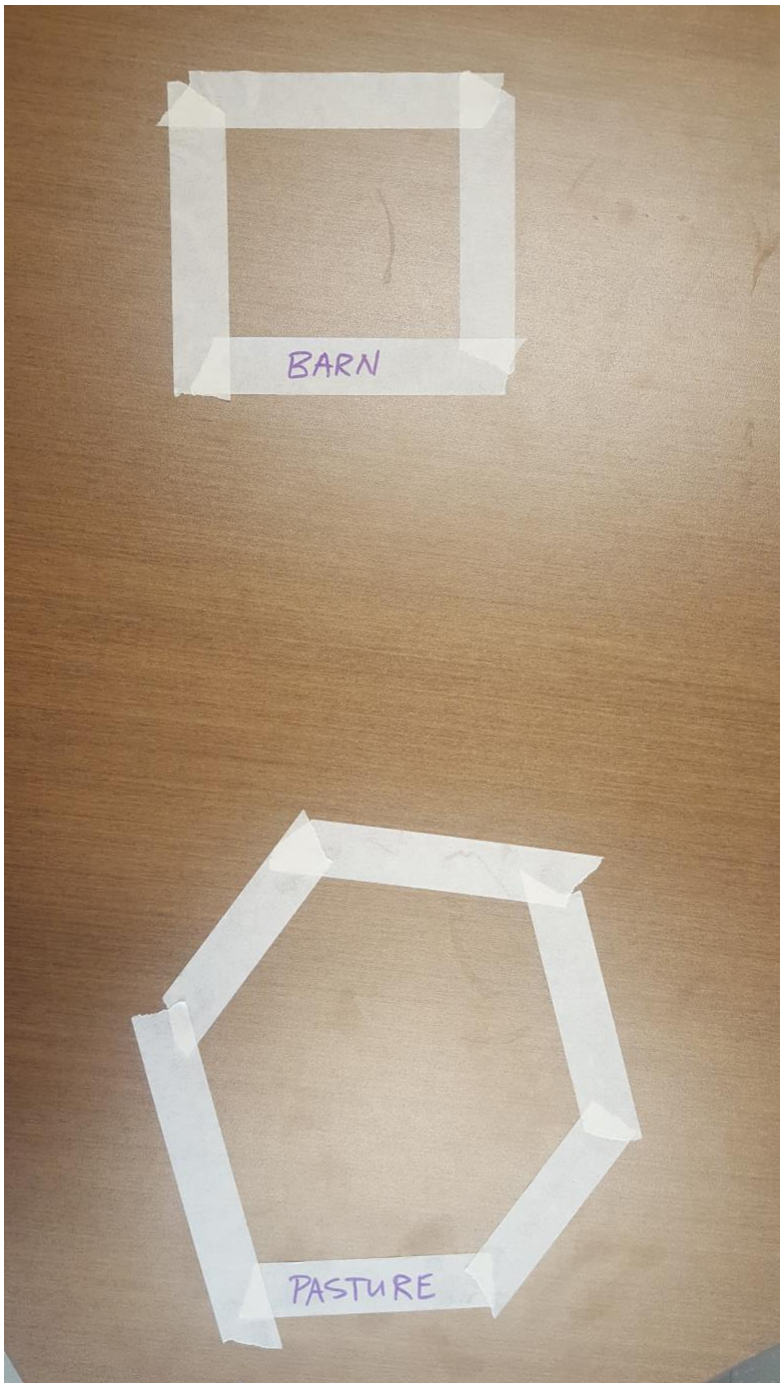

Figure 2: Simple playing surface.