STEM CAREER ADVENTURES

Livestock Nutritionist: Formulating Rations

Adventure Description:

In this adventure, you will think like a livestock nutritionist and balance rations for cattle on a feedlot.

Activity

Step One: Background Information on Livestock Nutritionists, Feedlots, and Rations (10-15 minutes)

- Explain to students that livestock nutritionists study the nutrition requirements of livestock animals. Animals have different nutrition requirements based on factors like age, gender, and reproductive status. Livestock nutritionists also analyze the nutritive values of animal feed products. Then, they use this information to create improved feeds for livestock. These feeds can help the cattle beat sicknesses and diseases, help them gain weight, maintain a certain weight, or lose weight.
- Tell students that livestock nutritionists are very important to the beef industry in the United States. Show Handout: The Beef Industry. Discuss the different segments of the beef industry and how livestock nutritionists are important to feedlots.
- Extra Time? Discuss humane animal handling and harvesting techniques in the beef industry with students. The United States government has implemented a very rigorous array of techniques for treating food animals humanely, spearheaded by Dr. Temple Grandin of Colorado State University. Her handling techniques have reduced the stress placed on animals, improved meat quality, and improved efficiency. Have students look at her website for more information: https://www.grandinlivestockhandlingsystems.com/
- Next, explain to students that livestock nutritionists perform feed analysis on different ingredients that are used in livestock feed to formulate rations. A ration is a carefully selected mixture of feed ingredients that meets an animal's requirements for energy and other nutrients. Show Handout: Rations.
    - Discuss animal Total Digestible Nutrient (TDN) and crude protein (CP) values.
    - Discuss balancing a ration and why livestock nutritionists perform ration balancing.
    - Discuss how a ration can be balanced according to the goal of the producer. At a feedlot, the goal is to ensure that animals grow as quickly as possible. Livestock nutritionists balance rations high in energy and protein to accomplish this goal.

Step Two: Balancing a Starter Ration (20 minutes)

- Explain to students that they will first learn how to balance a starter ration for a group of feedlot cattle.
- Tell students that this starter ration will be the first ration that is fed to the animals when they arrive at the feedlot. This ration will get the animal's digestive system used to eating large amounts of corn.
- Provide students with Handout: Balancing a Ration.
- Walk through the steps together as a class. Write the math on a whiteboard if possible.

Please contact Allison Bischoff, Director of Teacher Support, at allison@rozzylearningcompany.com or 314-272-2560 with questions.

STEM CAREER ADVENTURES

Livestock Nutritionist: Formulating Rations

Step Three: Balancing Grower and Finisher Rations (20 minutes)

- Explain to students that they will now balance the grower and finisher rations for the cattle at the feedlot.
- Tell students that the grower ration is the ration that is used to help the cattle gain weight quickly, and the finisher ration helps them pack on a little bit of fat at the end of their stay at the feedlot. Provide students Handout: Balancing Grower Rations and Handout: Balance Finisher Rations.
- Have students balance the grower and finisher ration.
  - Teacher Note: Students can work independently, in pairs, or in small groups.
  - See Handout: Teacher Key for detailed steps for each ration.

Step Four: Creating Device Software (15 minutes)

- Explain to students that they will now a prototype of a device that can be used to mix and weigh rations in a feedlot.
- Provide students with Handout: Creating a Device to Mix Feed. Discuss how a device is needed that combines physical hardware with a software system that directs the hardware to mix feed. That way, the feed mixing process can become more efficient, and no errors will be made. This will help the feedlot save money on feed costs. The hardware for the device will connect to an app that will calculate the total weights needed for each ingredient in the ration, after the initial balancing of the ration by the livestock nutritionist.
- Provide students with Handout: Creating Device Software. Explain to students that they will be creating the wireframe for the device app. Have students work on their app wireframe for 15 minutes.

Step Five: Creating Device Hardware (20–25 minutes)

- Explain to students that now they will be creating the physical components, or hardware, of the feed mixing device. Provide students with the following materials:
  - Handout: Creating Device Hardware
  - Art supplies and building materials
- As students are working, discuss the following:
  - Do you think a diagnostic page can extend the life of a device?
  - How will your device ensure that each ingredient is weighed properly before mixing?

Please contact Allison Bischoff, Director of Teacher Support, at allison@rozzylearningcompany.com or 314-272-2560 with questions.

STEM CAREER ADVENTURES

Livestock Nutritionist: Formulating Rations

Materials List

Provided online:

- Handout: The Beef Industry
- Handout: Rations
- Handout: Balancing a Ration
- Handout: Balancing Grower Rations
- Handout: Balance Finisher Rations
- Handout: Teacher Key
- Handout: Creating a Device to Mix Feed
- Handout: Creating Device Software
- Handout: Creating Device Hardware

Not provided (Each group needs):

- Calculator
- Art and Building supplies

Please contact Allison Bischoff, Director of Teacher Support, at allison@rozzylearningcompany.com or 314-272-2560 with questions.