

CATTLE RANCH RIDDLE

student guide



CATTLE RANCH RIDDLE CHALLENGE

Identify a Challenge

According to the United Nations, it's estimated there will be nearly 10 billion people on Earth by 2050.¹ That's three billion more mouths to feed than exists today, which means more food will need to be raised and grown to meet the food demands of a growing population. People around the world consume beef, particularly in the United States, because it has 10 essential nutrients, such as protein and iron, that are important requirements in our diets.² Cattle ranching families have to balance maintaining a profitable business that complies with current regulations with producing a safe and affordable product for a growing population, while at the same time, caring for the land and environment.

Challenge Question

How can we, as cattle ranchers, raise beef cows in a way that balances production as well as economic, environmental, and societal needs?

This solution must address the following needs:

- Production as well as economic, environmental, and societal needs

Success will be determined by

- Construction of a model of a cattle ranch (either cow-calf or stocker/backgrounder) that addresses best practices in the following areas:
 - Beef cattle health/welfare
 - Land and environmental management
 - Beef cattle nutrition
 - Costs of production
- Grazing plan
- Producing and sharing a presentation that communicates knowledge gained
- Sharing progress and results on social media by tagging @ThePurplePlow



1. IDENTIFY

PURPOSE OF STEP

Define the need and how it affects life globally, nationally, and locally. Research and consider how others have approached solving the need including how people have addressed this need historically. Describe why this challenge needs a solution and determine constraints (e.g., time, space, resources, etc.).

STUDENT PROMPTS AND GUIDING QUESTIONS

- Why is ranching an important occupation?
- What would happen if we ran out of food?
- Why is it important for food sources to be sustainable?
- What are the benefits of eating meat, and in particular, beef?
- How do we balance having affordable beef and having responsibly run cattle ranches?
- What are cattle ranching families already doing to balance the production as well as economic, environmental, and societal needs?

SIGNS OF STEP COMPLETION

Present a description of the challenge to the facilitator. The description should include how this challenge affects communities globally, nationally, and locally. The description should also include ways in which others have addressed finding a solution and constraints to be considered (e.g., time, space, resources, etc.).



1. IDENTIFY REFLECTION

Important discoveries during this step:

Define the problem as it relates to you locally:

Plans for the next step (e.g., knowledge to gain, questions to answer, preparations to make, etc.):



2: IMAGINE

PURPOSE OF STEP

Brainstorm solutions to the challenge. List all of your ideas – don't hold back! Discuss and select the best possible solutions.

STUDENT PROMPTS AND GUIDING QUESTIONS

- How much room do cattle need?
- Where do cattle sleep?
- What do cows eat?
- How much water is needed on a ranch?
- Can well-managed pasture systems improve soil quality?
- How can cattle ranchers prevent soil erosion?
- How can wildlife and cattle coexist on a farm?
- What can cattle ranchers do to maintain a profitable business?
- How can cattle ranchers take care of their sick animals and what can they do to prevent diseases?
- What are ways to manage herd health?
- How much does it cost to operate a cattle ranching business?
- How can we provide for beef cattle welfare?

SIGNS OF STEP COMPLETION

Present a list of possible solutions to the identified challenge to the facilitator.



2: IMAGINE REFLECTION

Important discoveries during this step:

List your possible solutions:

Identify the solution(s) that you think will be achievable:

Plans for the next step (e.g., knowledge to gain, questions to answer, preparations to make, etc.):



3: DESIGN

PURPOSE OF STEP

Diagram the model and identify the materials needed to build the model. Write out the steps to take and describe the expected outcomes.

STUDENT PROMPTS AND GUIDING QUESTIONS

- Where is the cattle ranch located and how many acres or hectares is it?
- Where and what will the cows eat?
- How will all of the cow's nutrition requirements be met?
- Where can the cattle access water?
- If the water source for the cows is a stream or pond, how can that water resource be protected?
- Do the cows have a place to get out of the elements?
- Where will the fencing be and what will it be made of?
- Who will help you run your cattle ranch?
- How often will your cows rotate through different fields?

SIGNS OF STEP COMPLETION

Present a detailed diagram of the prototype as well as a written plan of how it will be built. Look for the following in the plan: a materials list with budget (if building a physical model), detailed directions, and expected outcomes.



3: DESIGN REFLECTION

Important discoveries during this step:

Justify your model design and the materials you will need:

Plans for the next step (e.g., knowledge to gain, questions to answer, preparations to make, etc.):



4: CREATE

PURPOSE OF STEP

Follow the design plan and build the model or prototype.

STUDENT PROMPTS AND GUIDING QUESTIONS

- Use all research, knowledge gained, and the design plan to create the model.
- Repeat any of the previous steps should issues arise during the building process
- Consider the parameters of the challenge and what needs to be accomplished for a successful challenge

SIGNS OF STEP COMPLETION

Build the model and share with the facilitator.



4: CREATE REFLECTION

Important discoveries during this step:

Describe any barriers you overcame in creating your model.

Plans for the next step (e.g., knowledge to gain, questions to answer, preparations to make, etc.):



5: TEST + IMPROVE

PURPOSE OF STEP

Test the design and collect qualitative and quantitative data. Discuss results and compare with the expected outcome. Seek areas of improvement and make changes where needed.

STUDENT PROMPTS AND GUIDING QUESTIONS

- How successful was your cattle ranch model in addressing the Cattle Ranch Riddle requirements?
- Were there any missing project components from your model?
- In what ways were local ingredients used to develop the menu?
- Were the sources of the one menu item ingredient identified accurately?
- Was the ranch budget calculated accurately?
- Based on their plan, would you feel comfortable buying beef from this ranch?
- What suggestions do you have for improvements to the model/plan?
- What changes will you make to your design based on feedback from your peer reviewers?

SIGNS OF STEP COMPLETION

Keep records of all test trials and share data with the facilitator. Entries should include both qualitative and quantitative data. Record any improvements made to the design prototype and the effect they had on the outcome.



5: TEST & IMPROVE REFLECTION

Important discoveries during this step:

Summarize the improvements you made to your model and the effect each had on outcomes.

Plans for the next step (e.g., knowledge to gain, questions to answer, preparations to make, etc.):



6: SHARE

PURPOSE OF STEP

Communicate what was learned throughout the challenge. Share the design process, data, and conclusions on how the model answers the challenge question.

STUDENT PROMPTS AND GUIDING QUESTIONS

- How is your design approach an appropriate, innovative solution that realistically responds to the precise design competition problem?
- How does your design address budgetary constraints, timeline issues or other challenges?
- Describe and/or demonstrate what you learned from this challenge.

SIGNS OF STEP COMPLETION

Present what was learned through the design process, including sharing how the prototype addresses the problem, key aspects of design, data, and end results.

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REFERENCES

¹United Nations, Department of Economic and Social Affairs. (2017, June 21). *World population projected to reach 9.8 billion in 2050, and 11.2 billion in 2100*. Retrieved from <https://www.un.org/development/desa/en/news/population/world-population-prospects-2017.html>

²Cattlemen's Beef Board and National Cattlemen's Beef Association. (2018). *The nutrients you need with a taste you love*. Retrieved from <https://www.beefitswhatsfordinner.com/nutrition/beef-nutrients>