W1402

Forage Explorers

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INTRODUCTION

This comic strip was designed to introduce children to the importance of forages, plants that provide food for livestock, and how the plants support healthy ecosystems and sustainable farming. This resource can be used in a variety of educational settings, including classrooms, 4-H clubs, after school programs, summer camps and agricultural fairs. Here are a few suggested ways to make most of the comic:

Suggested Uses:

- **Read-Aloud Activity:** Read the comic strip together as a group. Pause to discuss the actions and choices of the characters and connect them to a real-life farming practice.
- **Guided Discussion:** Use the included learning outcomes and questions to guide small-group discussions or journaling prompts.
- **Extension Activities:** Pair the comic with simple hands-on activities such as:
  - Forage Field Observations (Plant Detectives!)
  - Beef and Your Body: Nutrition Explorers
  - Soil Science: Build a Mini Soil Test Kit
  - From Pasture to Plate: Food Systems Map
  - Quality Counts! Forage Match-Up Game
  - “What’s in the Grass?” Poster Project

  More details can be found at the end of the publication.
- **Cross-Curricular Integration:** Tie in topics from science (ecosystems, plant biology), geography (where certain forages grow) or social studies (the role of farmers and ranchers in communities).
- **Reflections and Self-Assessment:** Encourage students to check in with the learning goals after each story to see what they’ve learned or still wonder about.

Tips for Success: Keep learning fun and interactive! Encourage kids to ask questions, share personal experiences, and explore their environment.

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OVERALL LEARNING OUTCOMES

Comic Interaction Outcomes:

- Understand what forage is and why it's important to animals like cows, goats and sheep.
- Learn about different types of plants that animals eat.
- Discover how farmers take care of pastures to keep animals and the land healthy.
- Be able to explain why forages are helpful for both animals and people.
- Think about how we can use land wisely to grow healthy food for everyone.

Comic 1: *The Importance of Grasslands*
Learning Outcomes:

1. I can explain that grasslands cover a big part of the Earth and are important for nature and people.
2. I can name ways grasslands help the planet, like giving food to animals, storing carbon and protecting the soil.
3. I can describe how grasslands help keep the land healthy for animals, plants and people.

Comic 2: *Types of Forages*
Learning Outcomes:

1. I can tell the difference between grasses and legumes and know both are important for animals.
2. I can sort forages into cool-season and warm-season types based on when they grow best.
3. I can explain what annual and perennial plants are and give examples of each.

Comic 3: *Plant Nutrients*
Learning Outcomes

1. I can name some nutrients plants need to grow, like nitrogen, phosphorus and potassium.
2. I can explain that plants take up nutrients from the soil through their roots.
3. I can describe why there needs to be enough nutrients in the soil for healthy forage plants.

Comic 4: *Soil Fertility*
Learning Outcomes:

1. I can explain that soil is the foundation of forage systems and helps plants grow.
2. I can name the three primary nutrients: nitrogen (N), phosphorus (P) and potassium (K).
3. I can describe why soil needs more than just N, P and K and that healthy soil supports strong plants.

Comic 5: *Beef as a Protein Source*
Learning Outcomes:

1. I can explain that beef is a good source of protein and helps our bodies grow strong.
2. I can name some of the 10 essential nutrients and vitamins found on beef, like iron and B12.
3. I can understand that just 3 ounces of beef gives us about half of the protein we need each day.

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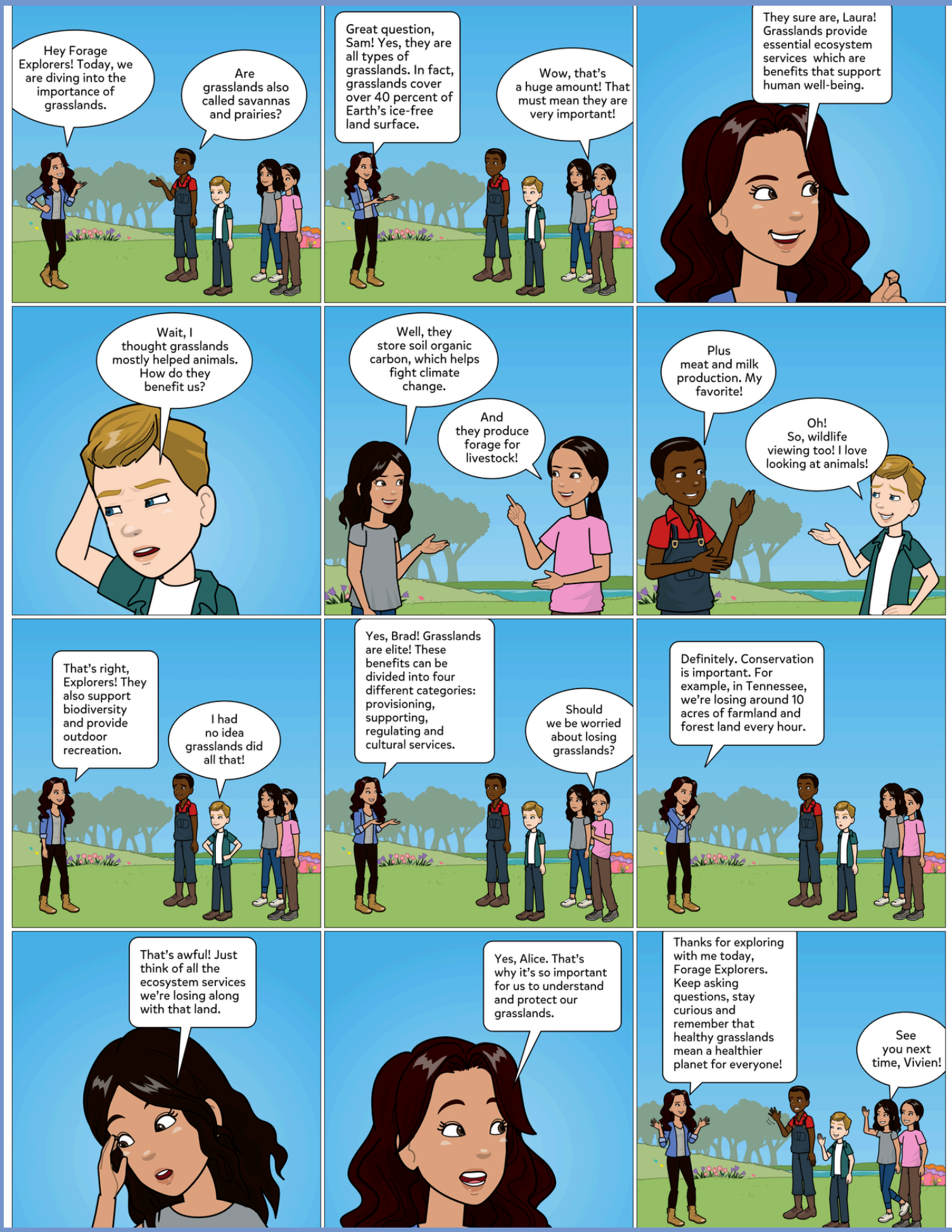
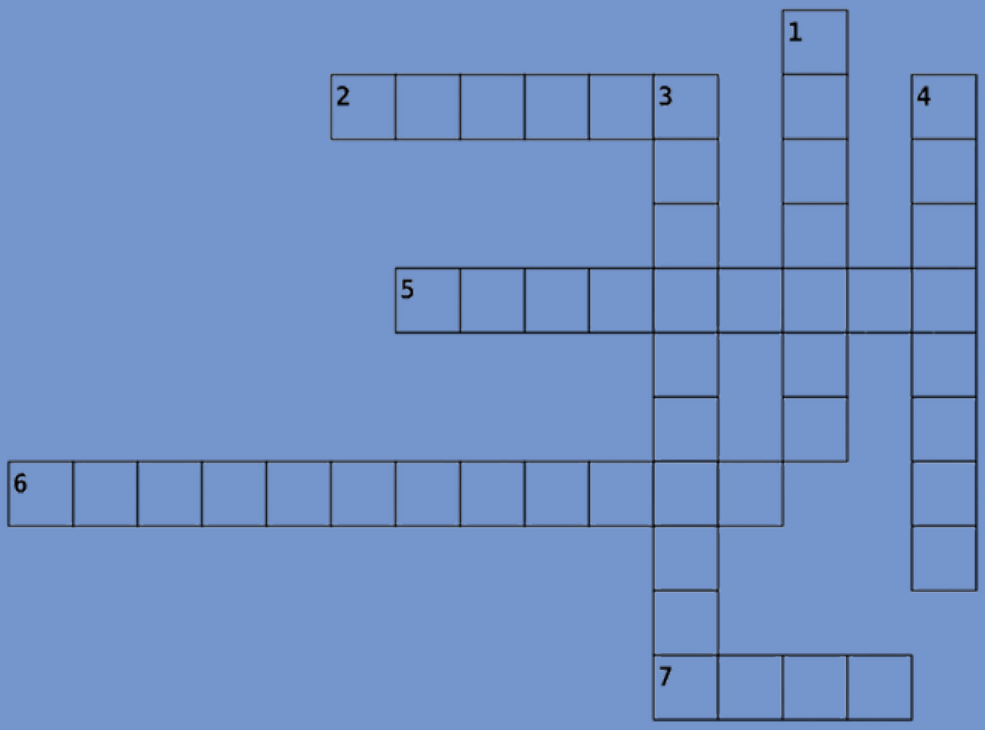
THE FORAGE EXPLORERS ARE ON A MISSION TO UNCOVER HOW GRASSES, SOIL AND GRAZING ALL CONNECT. READY TO JOIN THE HERD?


Hey Forage Explorers! Today, we are diving into the importance of grasslands.
Are grasslands also called savannas and prairies?
Great question, Sam! Yes, they are all types of grasslands. In fact, grasslands cover over 40 percent of Earth's ice-free land surface.
Wow, that's a huge amount! That must mean they are very important!
They sure are, Laura! Grasslands provide essential ecosystem services which are benefits that support human well-being.
Wait, I thought grasslands mostly helped animals. How do they benefit us?
Well, they store soil organic carbon, which helps fight climate change.
And they produce forage for livestock!
Plus meat and milk production. My favorite!
Oh! So, wildlife viewing too! I love looking at animals!
That's right, Explorers! They also support biodiversity and provide outdoor recreation.
I had no idea grasslands did all that!
Yes, Brad! Grasslands are elite! These benefits can be divided into four different categories: provisioning, supporting, regulating and cultural services.
Should we be worried about losing grasslands?
Definitely. Conservation is important. For example, in Tennessee, we're losing around 10 acres of farmland and forest land every hour.
That's awful! Just think of all the ecosystem services we're losing along with that land.
Yes, Alice. That's why it's so important for us to understand and protect our grasslands.
Thanks for exploring with me today, Forage Explorers. Keep asking questions, stay curious and remember that healthy grasslands mean a healthier planet for everyone!
See you next time, Vivien!

Grasslands



Across

2. Food like grass or hay that animals eat.

5. A big open area with lots of grass and few trees where animals can graze.

6. Lots of different plants and animals living together in nature.

7. A part of the ground that holds carbon and helps plants grow.

Down

1. Living creatures like cows, goats, deer or birds.

3. All the living things and their environment working together in nature.

4. Animals that live freely in nature, not on farms.

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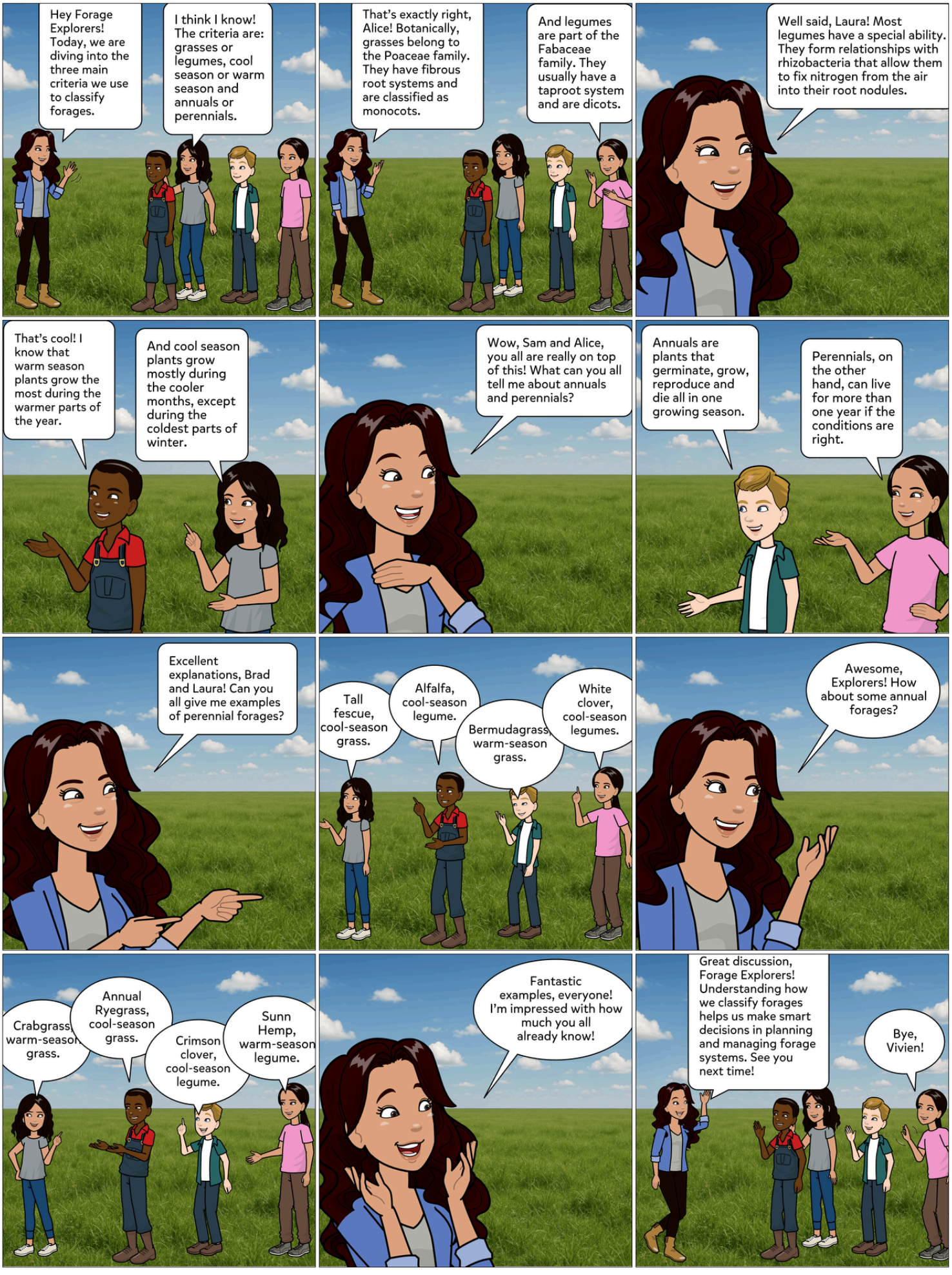
Hey Forage Explorers! Today, we are diving into the three main criteria we use to classify forages.
I think I know! The criteria are: grasses or legumes, cool season or warm season and annuals or perennials.
That's exactly right, Alice! Botanically, grasses belong to the Poaceae family. They have fibrous root systems and are classified as monocots.
And legumes are part of the Fabaceae family. They usually have a taproot system and are dicots.
Well said, Laura! Most legumes have a special ability. They form relationships with rhizobacteria that allow them to fix nitrogen from the air into their root nodules.
That's cool! I know that warm season plants grow the most during the warmer parts of the year.
And cool season plants grow mostly during the cooler months, except during the coldest parts of winter.
Wow, Sam and Alice, you all are really on top of this! What can you all tell me about annuals and perennials?
Annuals are plants that germinate, grow, reproduce and die all in one growing season.
Perennials, on the other hand, can live for more than one year if the conditions are right.
Excellent explanations, Brad and Laura! Can you all give me examples of perennial forages?
Tall fescue, cool-season grass.
Alfalfa, cool-season legume.
Bermudagrass, warm-season grass.
White clover, cool-season legumes.
Awesome, Explorers! How about some annual forages?
Crabgrass, warm-season grass.
Annual Ryegrass, cool-season grass.
Crimson clover, cool-season legume.
Sunn Hemp, warm-season legume.
Fantastic examples, everyone! I'm impressed with how much you all already know!
Great discussion, Forage Explorers! Understanding how we classify forages helps us make smart decisions in planning and managing forage systems. See you next time!
Bye, Vivien!

Grasses Word Search

T Z Y Z B H S N W U K L E N G C T B J K
W F O G G F G V Y Z K Z H Q Y H G F A R
L X S G D G H R G Q Q M S T E M K O X M
U R Z H Z Z E W L R Y B Y Z L G I R D F
L I X B T Q D S A O A R P J X Q K A B A
Y S A K T C R S Y M H S R T H A U G O X
R A N Y F Z N A A J X X S Q S S C E R Y
J Z Z S J B V R L K R H H E B R R J S U
V F W L K E K G X H A W W U S W K O E V
K C A V B K V A D K F F H P V E X F V L
C Z H V R M F D C T W D I B R A A E A N
R P N D I R I U X G V W X V V R Q T E B
A A R V N D W M Q G M A C G R T N W L G
B B F R I L K R Y E G R A S S B H M Z V
G Q C I L A S E U M Q L T T A L L F X S
R H V Q P I T B E L C E J G L E S I Z H
A U P U Q N W D G P A G B B T O H F U A
S R M H S N J T O X G U D H H M Z V W F
S B M S C E G X K C J M X E G J U Y S L
N A W R T R M Z W X I E U K M W V T N A
V Z K C Y E B N T K L S A I N Y P K D F
J H D R V P R M B C F A N N U A L N R L
K I R F I L E Y S C T V Y X U T G P O A
V I B O R C H A R D G R A S S R Q H O R
C E E D R O D Z N Y T R O K U I K Y T G

1. grasses **2.** legumes **3.** root **4.** stem **5.** leaves **6.** annual **7.** perennial
8. bermudagrass **9.** alfalfa **10.** crabgrass **11.** ryegrass **12.** fescue
13. orchardgrass **14.** forage

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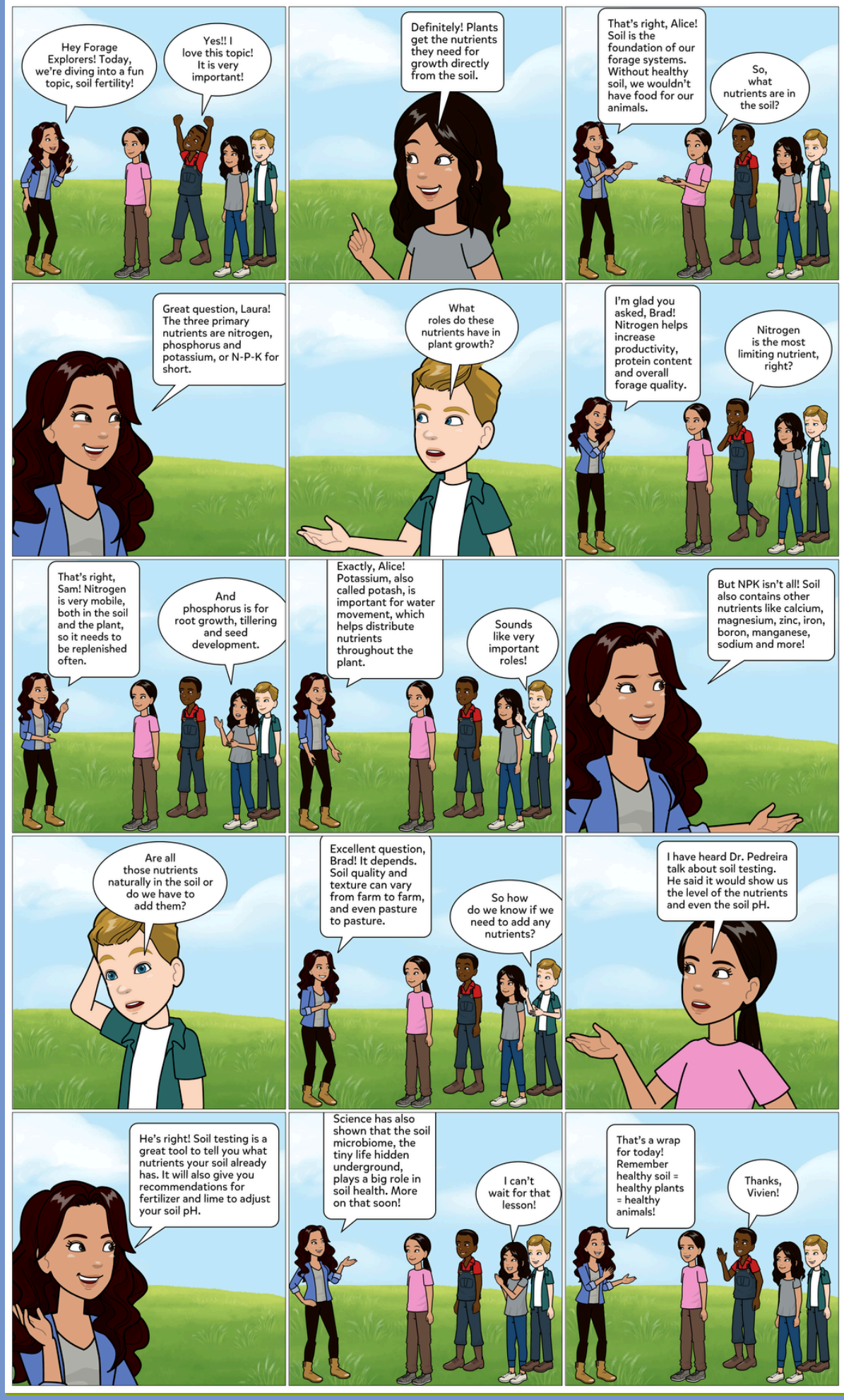
Hey Forage Explorers! Today, we're diving into a fun topic, soil fertility!
Yes!! I love this topic! It is very important!
Definitely! Plants get the nutrients they need for growth directly from the soil.
That's right, Alice! Soil is the foundation of our forage systems. Without healthy soil, we wouldn't have food for our animals.
So, what nutrients are in the soil?
Great question, Laura! The three primary nutrients are nitrogen, phosphorus and potassium, or N-P-K for short.
What roles do these nutrients have in plant growth?
I'm glad you asked, Brad! Nitrogen helps increase productivity, protein content and overall forage quality.
Nitrogen is the most limiting nutrient, right?
That's right, Sam! Nitrogen is very mobile, both in the soil and the plant, so it needs to be replenished often.
And phosphorus is for root growth, tillering and seed development.
Exactly, Alice! Potassium, also called potash, is important for water movement, which helps distribute nutrients throughout the plant.
Sounds like very important roles!
But NPK isn't all! Soil also contains other nutrients like calcium, magnesium, zinc, iron, boron, manganese, sodium and more!
Are all those nutrients naturally in the soil or do we have to add them?
Excellent question, Brad! It depends. Soil quality and texture can vary from farm to farm, and even pasture to pasture.
So how do we know if we need to add any nutrients?
I have heard Dr. Pedreira talk about soil testing. He said it would show us the level of the nutrients and even the soil pH.
He's right! Soil testing is a great tool to tell you what nutrients your soil already has. It will also give you recommendations for fertilizer and lime to adjust your soil pH.
Science has also shown that the soil microbiome, the tiny life hidden underground, plays a big role in soil health. More on that soon!
I can't wait for that lesson!
That's a wrap for today! Remember healthy soil = healthy plants = healthy animals!
Thanks, Vivien!

Soil Fertility Word Search

I L F P J W U B I Q E Q T Z P K X V B U
D V J Y J S A Z U V L Z W W V C S J X S
U L I R G U A C J Q G G J U J A B Z B E
G A O F H L W B A I V W K A N L F N O P
M A G N E S I U M W D M Y Z K C H Q R K
T D U M M X C K L S H A X O H I S M O N
Q B S C A M V D H U V U Q A T U G O N B
H Q X Q N U B N L R E M Y O A M I M I V
U E P Y G Q P B W O Z P S A W T P R L L
T Z A V A L K N T H Q D O B S D O B O P
Z R O R N R E Q Z P X N Z U D V T T M N
N S I H E P V U T S N A P S K S A F P P
J R O V S H H A F O B N Z J F J S C C V
O F V D E F E L A H V U G W I D S Y H J
H S E J I P U I V P P T G H I A I W E F
T B M R K U K T I Z L R T A G R U Z C X
W T P V T F M Y F S R I D E L P M N E Z
O E U A D I K M Z I F E H T S E O Z S O
R X J X V I L J A H E N Y G G C H I H K
G G O H V Z M I R A A T G Q S D N N Y D
C J S B P J F I T C G S G F L X A C T D
R W X R A H P T P Y Q L T W D L Y V A U
E F C W E N N I T R O G E N O W O T N B

1. Soil **2.** Fertility **3.** Nutrients **4.** Nitrogen **5.** Phosphorus **6.** Potassium **7.** Calcium

8. Zinc **9.** Iron **10.** Boron **11.** Sodium **12.** Manganese **13.** Magnesium **14.** Growth

15. Quality

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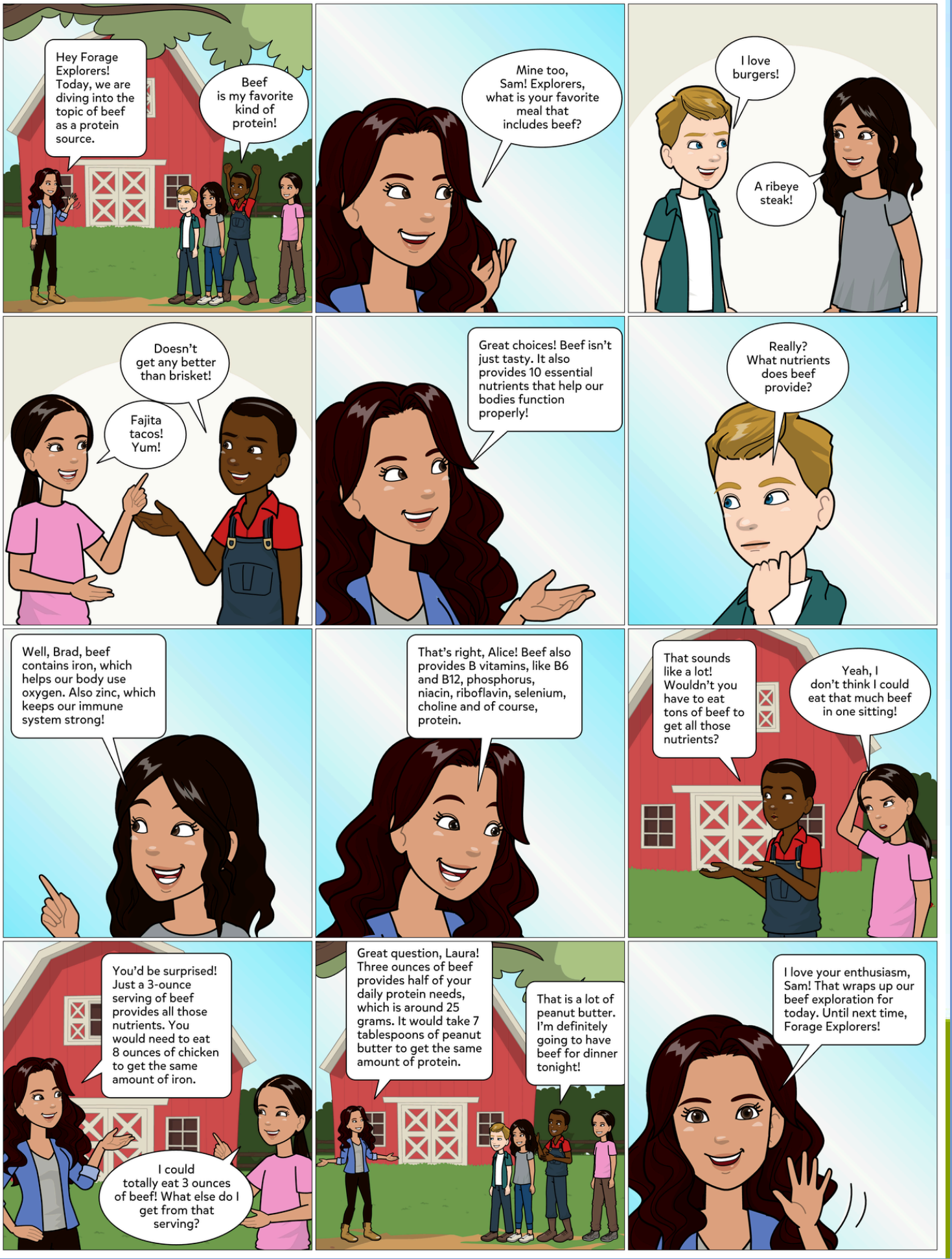
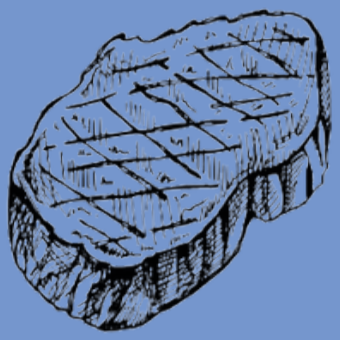

Hey Forage Explorers! Today, we are diving into the topic of beef as a protein source.
Beef is my favorite kind of protein!
Mine too, Sam! Explorers, what is your favorite meal that includes beef?
I love burgers!
A ribeye steak!
Doesn't get any better than brisket!
Fajita tacos! Yum!
Great choices! Beef isn't just tasty. It also provides 10 essential nutrients that help our bodies function properly!
Really? What nutrients does beef provide?
Well, Brad, beef contains iron, which helps our body use oxygen. Also zinc, which keeps our immune system strong!
That's right, Alice! Beef also provides B vitamins, like B6 and B12, phosphorus, niacin, riboflavin, selenium, choline and of course, protein.
That sounds like a lot! Wouldn't you have to eat tons of beef to get all those nutrients?
Yeah, I don't think I could eat that much beef in one sitting!
You'd be surprised! Just a 3-ounce serving of beef provides all those nutrients. You would need to eat 8 ounces of chicken to get the same amount of iron.
I could totally eat 3 ounces of beef! What else do I get from that serving?
Great question, Laura! Three ounces of beef provides half of your daily protein needs, which is around 25 grams. It would take 7 tablespoons of peanut butter to get the same amount of protein.
That is a lot of peanut butter. I'm definitely going to have beef for dinner tonight!
I love your enthusiasm, Sam! That wraps up our beef exploration for today. Until next time, Forage Explorers!

Beef as a Protein Source



Read the sentence and fill in the blanks with words from the box.

zinc	cattle	cuts	protein	ten
foundation	iron	eight	three	seven

Beef provides _____ essential nutrients that help our bodies function

_____ keeps our immune system strong.

_____ tablespoons of peanut butter provides the same amount of protein as three ounces of beef.

Beef provides all of the essential nutrients in just _____ ounces.

_____ helps our body use oxygen.

You would need to eat _____ ounces of chicken to get the same of iron that three ounces of beef provides.

_____ helps support strong, lean bodies.

Beef comes from _____ .

Rib, loin, and brisket are all _____ of beef.

Forage systems are the _____ of beef production.

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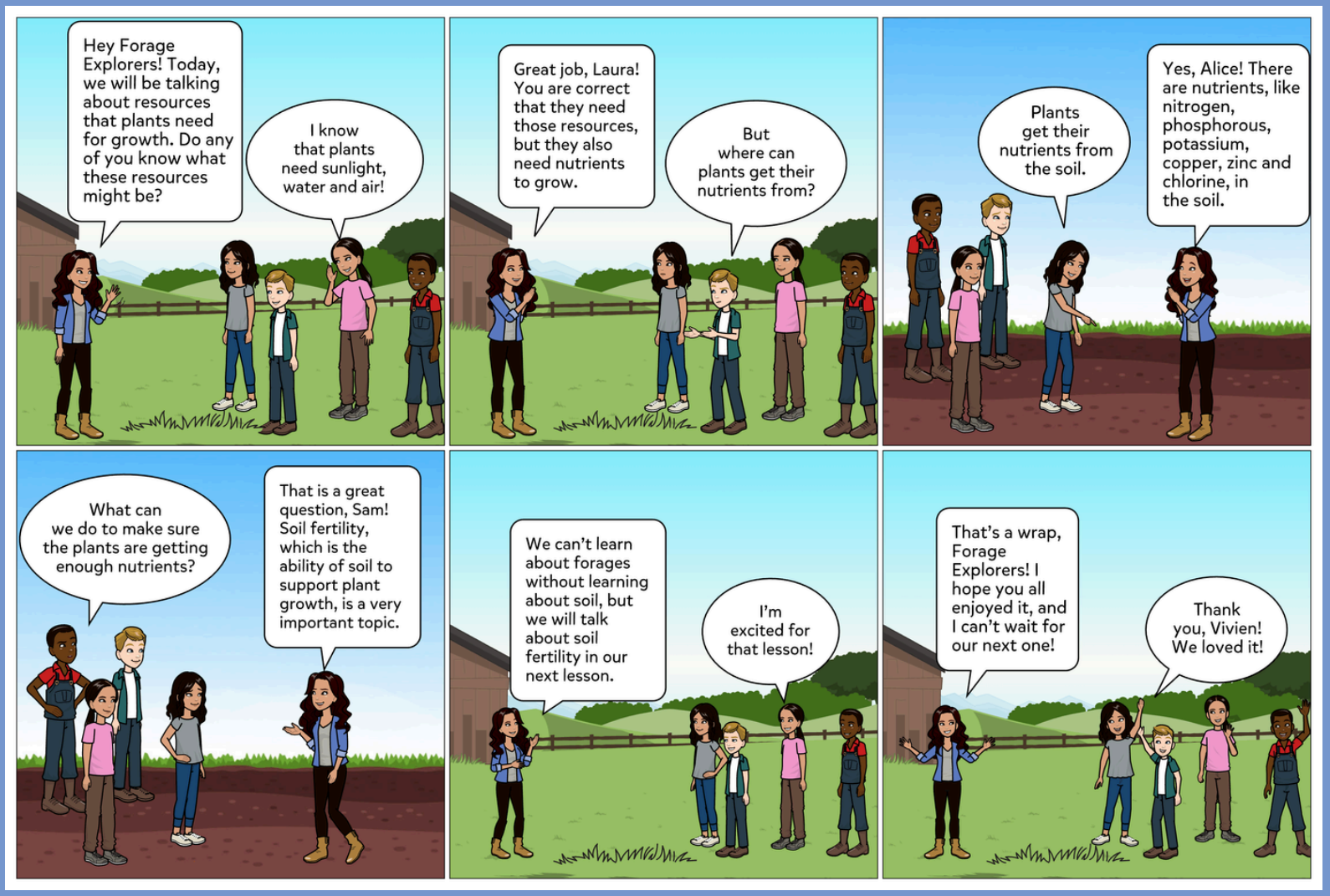
Hey Forage Explorers! Today, we will be talking about resources that plants need for growth. Do any of you know what these resources might be?
I know that plants need sunlight, water and air!
Great job, Laura! You are correct that they need those resources, but they also need nutrients to grow.
But where can plants get their nutrients from?
Plants get their nutrients from the soil.
Yes, Alice! There are nutrients, like nitrogen, phosphorous, potassium, copper, zinc and chlorine, in the soil.
What can we do to make sure the plants are getting enough nutrients?
That is a great question, Sam! Soil fertility, which is the ability of soil to support plant growth, is a very important topic.
We can't learn about forages without learning about soil, but we will talk about soil fertility in our next lesson.
I'm excited for that lesson!
That's a wrap, Forage Explorers! I hope you all enjoyed it, and I can't wait for our next one!
Thank you, Vivien! We loved it!

EXTENSION ACTIVITIES:

CONNECTING COMICS TO THE REAL WORLD

Forage Field Observations (Plant Detectives!)

Objective: Identify and describe local forages (grasses, legumes, etc.) and consider their value to livestock.

Instructions:

1. Head outside! (Schoolyard, Park, Pasture, etc.)
2. Have students sketch or photograph 3-5 different plants.
3. Use simple field guides or apps to identify them.

Discussion:

- Which plants might be useful for cows or goats? How can you tell?

Beef and Your Body: Nutrition Explorers

Objective: Learn about beef as a nutrient-rich protein and compare it to other protein sources.

Instructions:

1. Provide basic nutrition labels (ground beef, beans, chicken, tofu, etc.).
2. Have students compare the amount of protein, iron, zinc, vitamin B12, and fat.
3. Create a visual chart or poster: “What’s in my protein?”

Discussion:

- Why does your body need protein and iron?
- How does beef help our bodies grow and stay strong?
- What would happen if cows didn’t eat healthy forage?

Soil Science: Build a Mini Soil Kit

Objective: Understand how soil nutrients support plant growth to support healthy livestock.

Instructions:

1. Scoop soil from 2-3 locations (pasture, garden, etc.).
2. Compare characteristics like texture, smell, color, biological presence (worms, roots).
3. *Optional:* Use a basic classroom soil test kit.
4. Grow grass seeds in cups with different soil samples to compare growth.

Discussion:

- Why does healthy soil matter for forage plants?
- How do soil nutrients end up in the animals?
- What might a farmer do if the soil lacks a nutrient?

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EXTENSION ACTIVITIES:

CONNECTINGCOMICSTOTHEREALWORLD

Forage Field Observations (Plant Detectives!)

Objective: Visualize the journey from grass, to cow, to our plate.

Instructions:

1. Use images or draw each step:
    - Soil with nutrients
    - Growing forage plant
    - Cow grazing
    - A farmer with livestock
    - Safely processed beef
    - Grocery store/restaurant
    - Family meal
2. Ask students to order these steps from beginning to end.

Discussion:

- What happens at each step?
- Who is involved?
- What would go wrong of the grass wasn't healthy?

Quality Counts! Forage Match-Up

Objective: Learn that different forage qualities support different livestock needs.

Instructions:

1. Prepare flash cards showing:
    - Different forage types (legume, grass, hay, silage, poor pasture)
    - Different animals (growing calf, pregnant cow, bull, goat)
2. Students match animal flash cards to the forage flash card that best fits their needs.
3. *Optional:* Add challenges: How can the season change what we need to feed each animal?

Discussion:

- How do you decide what to feed animals?
- Why does high-quality forage matter for animal health?

"What's in the Grass?" Poster Project

Objective: Highlight that forage provides key nutrients to animals, and how it relates to human nutrition.

Instructions:

1. Have students create posters using the following prompts:
    - What's in a healthy forage? (protein, minerals, fibers)
    - How animals use those nutrients

Discussion:

- "Healthy soil → Healthy forage → Healthy animals → Healthy people"

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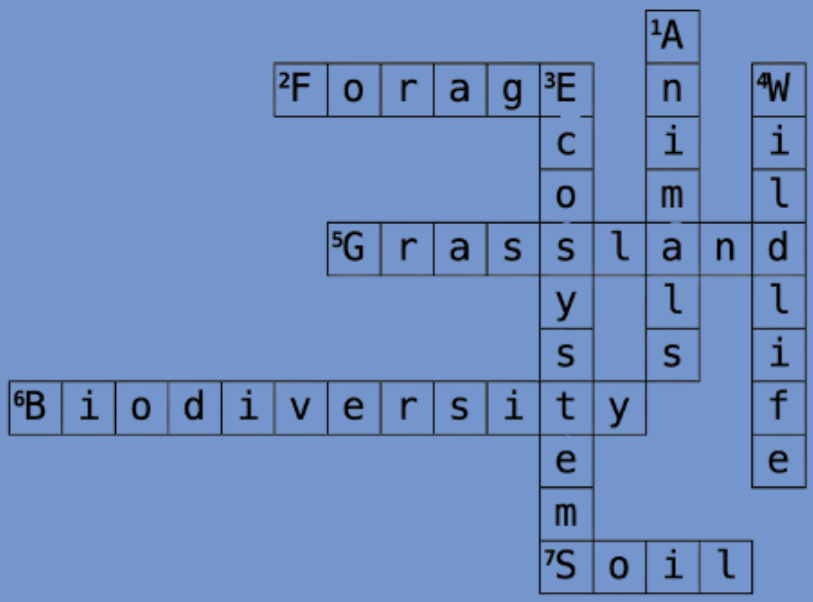
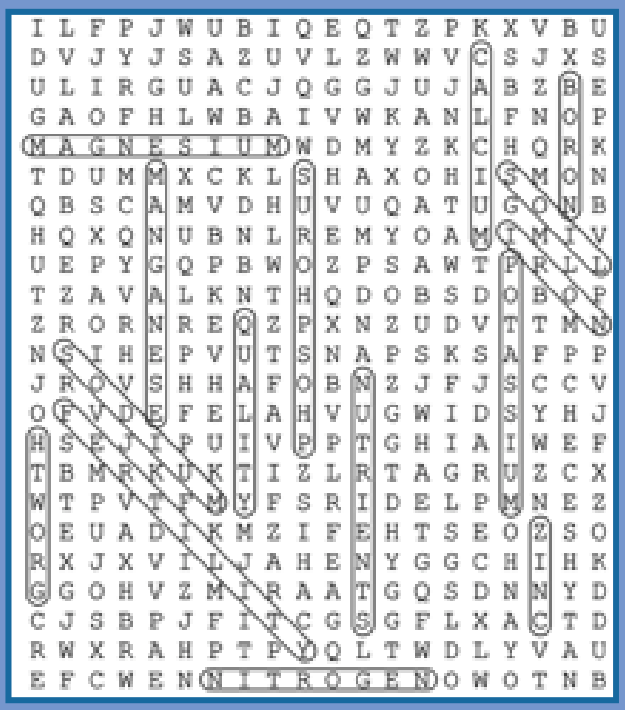
ACTIVITY ANSWER KEY

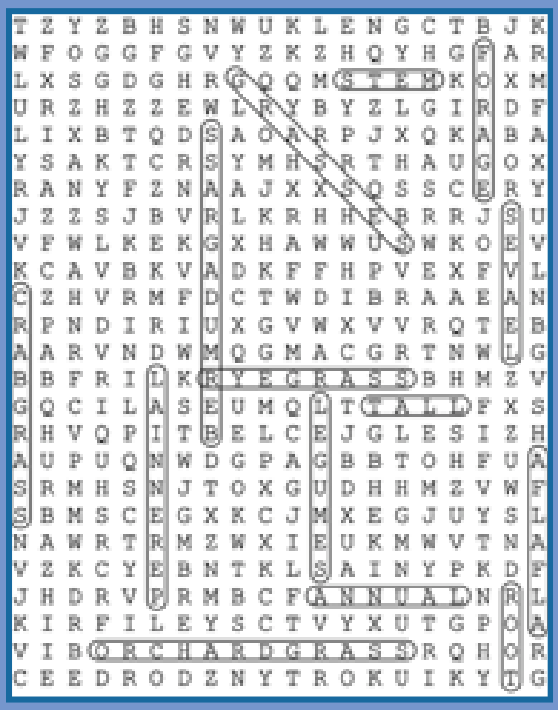
GRASSLANDS CROSSWORDS



SOIL FERTILITY WORD SEARCH



GRASSES WORD SEARCH



BEEF AS A PROTEIN SOURCE

1. Ten , 2. Zinc, 3. Seven, 4. Three, 5. Iron
6. Eight, 7. Protein, 8. Cattle, 9. Cuts, 10. Foundation

THANKS FOR JOINING THE FORAGE EXPLORERS!

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