Making the Science Connection

Activity stations for educational field trips

EOARC
A Vision for Rangeland & Pasture Research

THE ACTIVITIES

OSU Oregon State University

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ARS

This is how we do it...

This guidebook details the various activities from a field trip in which all the second graders from the Burns/Hines School District visited the Eastern Oregon Agricultural Research Center in Burns, Oregon for a morning.

We have been involved with these types of field trips and other types of interactions for several years. We want to share some of our experiences, along with our successes and suggestions, about how to produce the best possible positive science learning experience for the students.

The program we've established with the local school district is a yearly field trip out to our research center. We usually have between 5-8 different activities planned and presented by our scientists and technicians. Each year we have some activities that were the same as the year before and we also usually have one or two new activities. The students leave the field trip excited about science and agriculture and remember much of what they experienced and learned for many years. Second grade teacher Peggy Armstrong said, "We have students who are now in high school who have gone on this [field trip] and they still occasionally come back to Slater [Grade School], and they say, 'remember when…' and they remember most of that field trip."

Young students get most excited and engaged in activities that allow them to "get their hands dirty". They will respond better if your activities allow them to wear gloves, put on goggles, build a "mountain" and "make it rain", feel the "electrical charge" in the soil, tell you what dirt smells like, find "treasure" using a GPS, stick their hand in a cow, carry water from the "roots" of a plant up the stem to the "leaves", make and test hypotheses or be a "crazy" cow or a "calm" cow. The point is to craft your message in a way that will connect with your audience.

Please use the activity information as you see fit. Feel free to copy the activities word-for-word or use them as a springboard to create your own variations. Most of all, we hope this information will help encourage and facilitate the sharing of your work with the rising generation of scientists.

"Soil Erosion"

presented by ARS Rangeland Scientist Dr. Chad Boyd

Learning Objectives—the students will:

1. know what soil is and where it comes from,
2. learn why we need soil, and
3. be able to answer the question, "what is erosion?"

Description:

Activity to understand and see firsthand the effects of soil erosion.

Materials Needed:

- soil
- perforated pop cans
- plastic tubs
- graduated cylinders
- turkey basters
- water
- grass plants
- apples
- a faucet or washbasin for washing hands
- assistants

"It's critical to have more than just yourself in a lab like this… have a group leader, an adult, assigned to each of the groups."
-Chad Boyd

This activity demonstrates how erosion occurs and what we can do as stewards of the land to prevent erosion from occurring.

Begin with a general discussion of soil and its importance: "What is soil?" and "Why is soil important?" (what we eat, from plants to animals, comes from the soil, what we wear and where we live also ultimately come from the soil).

Apple demonstration to show Earth's surface and our limited supply of soil:

Introduction

What are some of our important natural resources? (Students may provide such answers as oil, water, air, coal, trees, animals, gold, etc.) All of those are important natural resources but we often forget to mention one of our most important resources: **soil**.

Directions

Imagine the apple is the planet Earth. (Cut the apple into quarters.) Oceans occupy three quarters of our earth. (Ask the students if they know what percentage that is - 75%. Set three of the four quarters aside.)

That leaves just one quarter (25%) of our earth as land area. (Take this quarter and cut it in half.) Of the remaining two one-eighth sections of land, one represents the land that is not suitable for farming. This includes deserts, swamps, mountains and the Arctic and Antarctic regions. (Set one of the eighths aside.)

The other one-eighth represents where man can live and grow crops. (Slice this one-eighth section lengthwise into four equal parts.) Now I have four 1/32nds of an apple. The first of these represents land too wet for food production. It isn't swampland but it may flood during growing season. Another section represents land that is too rocky and poor for growing food. A third 1/32nd represents areas that are too hot. (Set three of the 1/32nd sections aside.

The last section represents the area of the world developed by man and used for farming. (Carefully peel the last 1/32 section.) This small bit of peeling represents all of the soil of our earth on which humans depend for food.

Like water and air, soil is a very important resource.

Follow-up activity

Have students point out, on a map or globe, areas where crops can and can't grow.

The Experiment

1. Explain experiment - building mountains:
   What is soil erosion?
   Emphasize that one of the mechanisms of soil erosion is when we have rainfall on a hillside and the water moves down the slope...this is bad.
   Ask the students if they have any ideas for how to prevent that erosion.
   Ask if plants might play a part in decreasing soil erosion.

2. Break into groups, set up experiments:
   Help the students set up two slopes inside the plastic tubs, one with plants and one without; then make it rain using the perforated pop cans (small holes cut in the bottom of the cans).

   Helpful Hint: for this part of the activity, it may be helpful to break the students into three groups: one group to build the "mountain", a second group to plant the "mountain" and a third group for the rain-makers. It's also a good idea to limit the amount of "rain" so it doesn't become a muddy lake inside the plastic tubs. Make sure everyone gets to do something.

   Once they're done making it rain, help the students use the turkey basters to transfer the runoff from the plastic tubs to the graduated cylinders (this is something everyone likes to participate in) and then ask them to go wash up and sit back down.

3. Hypotheses and data - What did we learn? Discuss the outcome of the experiment:

   With any luck, the hill-slope with the plants will have much less runoff collected than the hill-slope that was not covered in plants. Hold up the two cylinders and ask the students to tell you the color of the water in each one. Discuss how the "mountain" that lost less water had the plants and therefore plants must have a reducing impact on soil erosion.

   Helpful Hint: make sure to lead the students through the discussion using questions rather than simply telling them what happened. This will keep them involved and interested and will help them remember what they're learning.

   If there is time left over, review the concepts/questions, what is soil, why is soil important, what is soil erosion and what is the impact of plants on hill-slope erosion?

"Using Soil to Clean Water"

presented by ARS Plant Physiologist Dr. Jeremy James

Description:

This activity is designed to demonstrate how soil can act like a magnet by using positive and negative charged dyes mixed with water.

Materials Needed:

- methylene blue dye (+)
- eosin red dye (-)
- soil
- graduated cylinders
- latex gloves
- goggles

"Use words that are simple that they understand. Try to reinforce the concepts multiple times. And keep the kids involved as much as possible."
-Jeremy James

Learning Objectives—the students will:

1. understand negative and positive charges by using magnets,
2. understand that soil is made up of particles with negative charges so when positively charged particles are in the soil, they are attracted to the negative particles and held in the soil,
3. discuss how this knowledge can be applied to real life situations, and
4. define and discuss "hypothesis".

This activity allows students to explore the electrochemical properties of soil. Soils tend to have a negative charge and because of that, they have an ability to bind organic dyes or chemicals that have different charges. Positively charged organic dyes (methylene blue) will get bound by the soil while the negatively charged dye (eosin red) will not. Using these dyes allows the students to see that the soil actually binds.

Introductory comments can be centered around magnets using the Brio trains (trains with magnets on each end that hold the cars together) for students to understand negative and positive charges. Lead the students through a discussion and demonstration of how opposites attract and what happens when you try to connect a positive end with a negative end...or positive to positive? ...negative to negative?

Explain how soil can be like a magnet. Because soils tend to have a negative charge, they will bind with chemicals and other substances that have a positive charge while they will not bind with chemicals or other substances that have a negative charge.

Helpful Hint: it's important to test this experiment prior to presenting it to make sure it actually works. Different types of soils vary in their infiltration rates and electrical charge and may not bind as well with the dyes. It's also important to determine the amount of soil to put into the cylinders relative to the amount of

dye you'll be using. Also, it may take several minutes for the solution to bind and/or filter through the soil, so prepare some examples ahead of time.

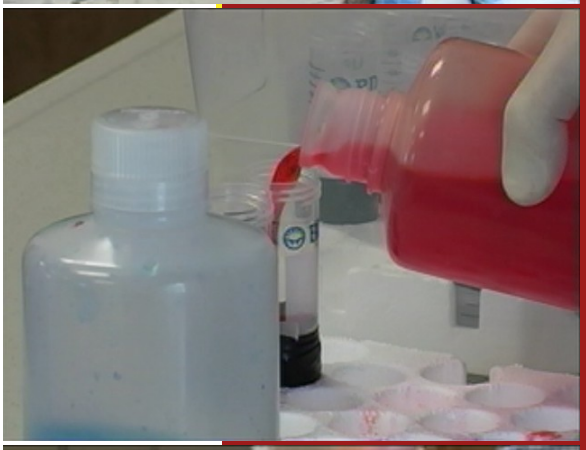
Discuss what a hypothesis is and determine the hypothesis before conducting the experiment: Will the positively charged dye filter through or will it bind to the soil particles? Will the negatively charged dye filter through or will it bind to the soil particles? Come to a consensus on the hypothesis and write it down on a whiteboard, easel or chalkboard, if available.

Helpful Hint: find ways to make this a hands-on experience for the students.

- Let them run the trials with the magnets to test the positive and negative connectivity.
- Let them touch the soil to see if they can feel an electrical charge.
- If they are a little older, you may be able to let them pour the dyes into the cylinders as part of the experiment. Allow the student experimenters to put on gloves and goggles. Help them follow the procedure.
- Ask a lot of questions to let them tell you what they think will happen.
- Allow them to gather around and look carefully at the results...etc.

Discuss the results and the implications of different chemicals in the soil. Show the results to the students and ask them if the hypothesis was correct. Do they accept or reject the hypothesis.

If there is time remaining, relate the experiment results to what happens with groundwater contamination, nitrogen leaching into the soil. Ask the kids where their water comes from and why some water can get polluted...etc.



"Soil is Alive"

presented by ARS Soil Scientist Dr. Ann Kennedy

Learning Objectives—the students will:
recognize that there are living microscopic beneficial organisms that are important to healthy growing conditions for plants.

Description:

An experiment to demonstrate there are living microscopic organisms in the soil and the beneficial role they play in soil.

Materials Needed:

- soil
- petri dishes
- clay
- loam sand
- organic matter in plastic shoe boxes
- plants in pots
- tootsie rolls
- caramels

"I have a lot of fun with outreach activities. I feel like I learn a lot from these students as well as I feel like I give back to the community by helping teachers make science fun."
-Ann Kennedy

1. What do scientists do?
Begin by discussing what scientists do: ask questions, take guesses and make hypotheses, conduct experiments and try new things and see what happens and make observations, and draw conclusions and tell what is discovered.

2. What is soil made of?
Talk about things that make plants grow well to introduce the concept of organic matter and compare it to other soil fractions. Discuss that organic matter contains a lot of nutrients and holds water well and it makes a really good soil for plants to grow in. Stress the idea that soil with organic matter is darker than soils with little organic matter. To help the students make a connection with this concept, ask the students, "if you were a plant, would you rather grow in a tootsie roll soil or a caramel soil?" The tootsie roll is a good example of a dark, high-organic matter soil while the caramel is a good example of a lighter, low-organic matter soil.

Next, discuss whether soil is alive or dead. Soil is alive even when it is dry and dusty.

Helpful Hint: to give the students a visualization that soil is alive, it is helpful to prepare petri dishes with a dilution of soil to show the students the actual colonies of microorganisms. This can lead into a discussion of how microorganisms improve soil structure and release nutrients.

2. Does soil smell? Why does dirt smell like dirt?
Ask the students what soil/dirt smells like.

Helpful Hint: prepare more petri dishes with the organisms actinomycetes which give off a strong earthy smell. This way, they can smell the organisms and the soil and make the association of the similar smells. This is another way to provide hands-on activity for the students.

3. Does dirt move?
Talk about aggregates and how microbes help hold the soil together and make bigger aggregates and that can leave less dust in the air.

4. Why is soil organic matter important?
This discussion can include how roots grow in soil. If you have access to root boxes, this will provide another excellent visualization to the students because they'll be able to see and compare how well the roots grow in dark soils vs. lighter soils vs. clay or sand soils and layers.

Again, it is always helpful to review the concepts with the students. Remind them that organic is very important and the darker the soil the better the plant will grow because the organic matter holds onto nutrients and water and helps give the soil some structure for better plant growth.

More Helpful Hints: it may be helpful to think of this activity as several shorter activities that easily relate to each other. Try to make sure each of the students gets involved by encouraging each one to make at least one observation, or ask at least one question or make at least one guess or hypothesis during the activity. Don't just focus on the most verbal students. Make sure everyone knows that they have something to add no matter what it is.

Try to keep things short and simple but don't underestimate your audience. Students at every level are very bright. What makes the difference is often how the message is delivered. Tailor your message to the age group you'll be presenting to.

It's also good to be flexible and have more activities than what you may actually need.

The most important item or concept should be presented in several different ways and make sure you tell the students why it's important and why it's significant to them. Give examples of this, such as growing things in the garden.

Reinforce the activities by giving the students something they can take home with them. With this activity, give the students tootsie rolls and/or caramels and ask them to remember the different types of soils. You can also provide activity sheets or coloring sheets for them to take home and share with their family.

Make sure that the kids have fun because science is fun. Make sure you have a positive interaction with the students. This is the best way to help them learn and enjoy what they're doing.

Other concepts that could easily be worked into this activity include:

5. What are microbes in soil? – there are good and bad microbes
6. How can soil reduce weeds?

"GPS Candy Hunt"

presented by ARS Rangeland Scientist **Dr. Dave Ganskopp**

and ARS Range Technician **Kristen Munday**

Description:

Activity using Global Positioning System units to show their value in everyday real life situations.

Materials Needed:

- Garmin etrex handheld GPS unit
- candy

"I think it's great to have them out at a young age. It gets them excited about science. If they come out here, they can see what we're doing, see that it's an important aspect to our daily lives...I think it's really important to have them come out. I'm glad we get to do it every year."
-Kristen Munday

Learning Objectives—the students will:

1. know what a GPS system is,
2. learn how to operate a handheld GPS unit, and
3. learn how GPS is used by scientists in their research.

What is GPS?

Begin by discussing what a GPS unit is. Many of the students may be somewhat familiar with GPS if their parents have a GPS unit in their car or truck or they may have used them in hunting or hiking or other activities. Discuss what GPS stands for (Global Positioning System). This discussion can also include as much or as little information about satellites and how GPS units use satellites to determine position. You can also talk/ask about common uses for GPS units at this point or after the candy hunt. Let the students tell you some of the ways they've used GPS. Point out any other GPS uses that may not have been mentioned.

How to operate a handheld GPS unit.

It may be helpful to discuss the GPS units specifically and make sure the students understand they need to follow your directions as to the buttons they should push and not to treat the units as toys (or something along those lines). After the discussion about GPS and GPS units, hand out a unit to each student. We use the Garmin etrex handheld GPS unit. The Garmin units use 2 AA batteries to

If you use the Garmin etrex handheld GPS units:

Press the PWR button to turn on the power. The first screen will show you the satellites that are in the usable area at that time. You push the PAGE button on the right side of the unit until you reach the "MENU" page. On this page you can mark your location, navigate to waypoints, trace your route, show your tracks and the setup page. This page also shows the battery life, date and atomic time.

Go to the "Waypoint" page on choose the CANDY waypoint. Using the PAGE button go to the screen with the giant arrow and the little person. This page will show you which direction you need to go toward to reach the location of the candy treasures.

function and are fairly simple to operate and understand.

Helpful Hint: this activity requires that you do a little leg-work prior to the field trip. Hide some candy in a location within walking distance (as far or as close as you feel comfortable) from where you begin your activity and set that location as a waypoint so that you'll be able to direct the students on how to actually find the candy using the GPS units.

After you hand out the GPS units, lead the students through a couple short instructions to help them become a little familiar with the GPS unit and the different screens and functions available. Students of most ages love this type of hands-on activity.

Then have them line up to familiarize them with the units' compass function. Have them go in the wrong direction first to show the numbers getting bigger as they get further from the candy. Then begin the treasure hunt. Tell them you've hidden some candy nearby and see if they can find it using the GPS units.

How do scientists use GPS units?

There are obviously many ways scientists use GPS units. If you have used GPS units in your research, use that as your example in this discussion.

At the EOARC in Burns, Dr. Dave Ganskopp and his team have most recently used them as GPS collars on cow/calf pairs to track the distance a calf traveled from it's mother based on time of day and as the calf gets older. They also track total distance a cow travels in a day, how far from water, elevation changes and patterns in travel. They can also track where the cows are spending their time to learn what they're eating or not eating at different times throughout the year.

GPS Fun Facts:

- GPS stands for Global Positioning System.
- The GPS units use satellites that orbit the Earth.
- There are more than 24 satellites in orbit at one time.
- You need to have a connection to at least four satellites for the GPS to work correctly.
- GPS can be used for emergency vehicles, airplanes, military research, driving directions, hunting, hiking, treasure hunting and much more.

Description:

Use a Rumen-fistulated steer, a steer with a "window" into his rumen, to talk and learn about digestion.

Materials Needed:

- steer with rumen fistula
- latex gloves
- step stool

"I think agriculture is very important and if we don't let people know about agriculture - why we do what we do, why it's important, where our food comes from - it's going to come back and bite us in the future. With kids, if you give them the information, they'll remember that and understand it.
-David Bohnert

"Holey Cow!"

presented by OSU Ruminant Nutritionist **Dr. David Bohnert**

Learning Objective—the students will:
understand why and how we do digestion studies - to help improve the utilization of forages and feed stuffs that are consumed by cattle in the west.

If this opportunity is available to you, this is consistently one of the students' favorite activities and one they remember the most.

Safety First
Students will be near the steer and offered to check the contents of his rumen one at a time. It's a good idea to greet the students a fair distance away from where you have the steer tied up. Discuss the nature of the activity and set ground rules for being around a large animal:

- Listen to presenter;
- Use quiet voices;
- Keep movements slow;
- Only one person at a time near the steer.

Pincushion
This steer is very tame, that was one of the critical considerations when the selection was made to insert the rumen fistula. But he's big and that can cause problems. It's important to always be alert and keep some space between the steer and the students. Also, have at least one other adult with you during the activity to help it move smoothly.

Why does the steer have a hole in his side?
A rumen fistula or rumen cannulated steer is used in order to determine digestibility, intake, diet selection, rumen fermentation variables and more in relation to ruminant nutrition and the nutrition of grazing animals. This answers the question that is often first on the students' minds, "Why does the steer have a hole in his side?"
This discussion can also include topics such as why beef production is important, why it's important that we determine their nutrition and nutritional management. Include questions about who likes hamburgers or steak or milk; who has leather shoes or

other items made from leather. This helps the students understand where these things come from and some various other aspects related to beef production that they may not be aware of.

Helpful Hint: find ways to relate the topics to the students. The more you can do this, the more they'll enjoy it and the better they'll remember it.

What is that smell?

The students (especially if they're younger) will almost certainly make comments about the smell from the rumen cannula. Address this head on and explain the smell is from the gasses produced by bacteria, protozoa, and fungi that live in his rumen that help digest the grasses the steer eats. The gasses are by-products of the microbes' digestion of the fiber in his stomach.

Helpful Hint: it may be somewhat difficult in this activity, and any others, to discuss the science without talking over the students' heads. Make sure you take the time beforehand to consider the age and educational level of your audience and think about ways to phrase things, or comparisons you can make to help them understand what you're talking about. Don't talk down to them or underestimate their intelligence but do phrase things in a way they can understand. Ask lots of questions to make sure they are following what you say.

What's inside?

Demonstrate the procedure, giving special attention to staying calm and being safe with the steer.

Ask to the students who would like to check the contents of the rumen, one at a time. Make sure to have the latex gloves available prior to the students coming up to the steer. Be specific about which of the students is next and keeping the rest under control. It's helpful to have another adult who's familiar with the steer there to assist with helping the students up onto the step stool, taking the gloves after they've reached into the rumen...etc.

Additional activities

If there's time remaining after all the students have put their hand in the cow, ask if any of the adults/parent volunteers would like to participate as well.

You can also quiz the students on how much the steer weighs, how many pounds of food stuff is inside the rumen, how many of them could fit inside the rumen, how many stomachs a cow has and any other fun facts about cows and livestock.

Description:

This is a plant activity highlighting different plant parts and their role in a plant's growth, illustrated in an activity that has the kids running in a relay.

Materials Needed:

- a large, flat, open area (preferably a grassy field)
- flagging to mark the relay track
- signs to mark the relay track
- sugar packets
- 10" balloons
- 2 large boxes
- 2 small boxes
- small plants

"[Once the relay starts,] I don't really worry about it being too orderly. Mainly, the idea...is to do less talking and more tiring the kids out and just giving them a chance to run around."
-Lori Ziegenhagen

"How a Plant Grows" Relay

presented by ARS Range Technician Lori Ziegenhagen

Learning Objectives—the students will:

1. learn the basic parts of a plant,
2. learn how food and water move through a plant, and
3. reinforce the information through a hands-on activity.

Plant Parts and How a Plant Grows
Students first each take a plant and then sit in a circle holding the plant to get directions. Have them touch the plants and take them out of the pots. This gets them focused and engaged in the activity.

Helpful Hint: find some inexpensive plants such as the small pansies or other flowers in the 6-packs from the store. Actually having the plants is much better than if you were to use pictures or graphics. If you allow the students to get their hands on a small plant, they will be more engaged and more focused, they will pay better attention and they will remember better what you teach them.

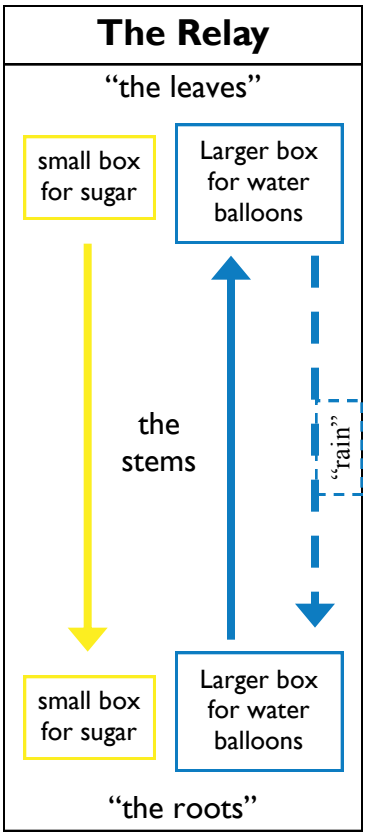
Ask the students to look at the plants and name the different parts of the plants. Don't just tell them the different parts. If they've missed some, give them hints so they can come up with it themselves. Make sure they name the roots, stems and leaves. You can also have them flip the plant over and remove the plants from the pots so that they can look at the roots in the soil. Once they've named all the basic parts, discuss what each of the different parts do which will lead smoothly into a discussion of how a plant grows. Again, don't just tell the students how a plant grows. Give them questions that help lead them tell you how a plant grows. Ask questions like, "What does a plant need to grow?" (water, sunlight, air, nutrients...etc.) "How does a plant get water/nutrients?" "What do the roots do?" "What does the stem do?" "What do the leaves do?" "How does a plant get it's food?...does it go to the grocery store?"...etc.

Make sure to cover at least these basics:

1) transporting water from roots to the stems and from the stems to the leaves;

2) then transporting sugar from the leaves to the stems and from the stems to the roots.

You can also discuss how the leaves use sunlight and air to produce food and grow. This usually takes about five minutes. With some groups, you may be able to spend more time discussing plant parts and how a plant grows but with younger groups, like 2nd graders, five minutes may be as long as you'll be able to keep them interested.



The Relay

Next, divide the class into three groups: Roots, Stems and Leaves. Roots hang out in the soil and pass water balloons to the stems. The stems run the water up the relay track to the leaves at the "air" end of the track. The leaves collect the water and give the stems sugar packets. The stems then run the sugar packets back down to the roots.

Helpful Hint: start out the relay in a slow and deliberate pace, explaining how each part of the relay relates to how a plant grows. Take your time to make sure the students are learning as they run back and forth.

We do this for a period of time. If the roots run out of water, we "make it rain" and tell the students to all grab some balloons up in the "air" and run them back to the "soil".

At this point we all rotate positions and each student gets to run. Make sure each student gets an opportunity to "be" the roots, stems and leaves. Continue to remind students of what each plant part is doing. Have fun and get into it!

The Water Balloons

The trick with the balloons is to get larger (10") balloons and only fill them with about 1 cup of water. Regular water balloons would quickly pop and soon you'd have a bunch of wet students running around in a water fight…you'd also run out of balloons pretty quick. The larger balloons will hold the small amount of water and almost never pop - even on grass!

Continue the relay for as long as time allows. If you want to review, simply stop the relay and orally quiz the students on what they've learned.

"Well-mannered Cows"

presented by OSU Extension Beef Specialist **Dr. Reinaldo Cooke**

Description:

This activity is set up to show how scientists determine what the behavior of a cow can tell a rancher about how she will perform.

Materials Needed:

- portable cow chute
- timers
- "human" cows - the students

"We have to make sure we can grab the students' attention. And the best way to do it is to make sure that they get involved with the exercise and can put their hands into the material and actually be a part of the exercises."
-Reinaldo Cooke

Learning Objectives—the students will:

1. be introduced to how a cow's behavior can be evaluated,
2. understand how this information can help livestock producers, and
3. reinforce the information through a hands-on activity.

*No animals are used in this activity.

Determining a Cow's Temperament

Introduce the subject of cattle behavior and how their behavior can be evaluated and what this tells a producer about the cow. Explain the importance of having well-mannered cows on the range because temperament is not only good for their own safety and that of the other cattle, it is also good for the safety of those people working with the cows. In addition, a cow's temperament has some production implications: less-calm or agitated cows generally have impaired production value. Ask the students which they would rather have, a calm cow or a "crazy" cow. Ask them "why".

Helpful Hint: the students will listen better and learn more if you find a way to relate the activity to them. Ask them if any of them live on a ranch or farm with animals or if they have friends or extended family who live on a ranch or have animals; if they have pets, what is better, a "crazy" cat or a "calm" cat...a "crazy" dog or a "calm" dog...etc.

This exercise is designed to demonstrate one effective way to evaluate cattle temperament that is used at the Eastern Oregon Agricultural Research Center and by many producers. You can spend as much or as little time on this discussion as the students' attention permits. You can also discuss the benefits of well-mannered animals and disadvantages of "crazy" animals.

Next, have an adult, maybe a technician or other co-worker, enter the chute as a well-mannered cow and evaluate his/her temperament in the cow chute. With the "cow" in the chute, you can also discuss the various advantages and capabilities of having and using a cow chute. Then have the adult be a "crazy" cow and, again,

evaluate his/her temperament. Discuss the differences with the students and which would be better.

Human "Cows"

Have students participate as 'cows' to evaluate their behavior. Separate the students into two groups:

1) calm, well-mannered cows
2) "crazy", agitated or stirred up cows

Have one of the groups enter the cow chute and evaluate the students as they exit the chute.

Helpful Hint: it's essential to remember, when you do an activity of this nature, first and foremost, make sure that you pay attention to student safety. Before the students enter the chute, discuss safety and make sure the "crazy" cows aren't pushing and shoving each other while inside the chute. You may also want to prevent them from sticking their heads between the bars or doing other things that could lead to an injury.

If you want to, initiate a competition to see who can be the "calmest cow" or the "craziest cow". Provide a small prize, such as a piece of candy or a pencil or pen, for the "calmest" and "craziest cows". Do all of this allowing the students to play the part of the cows. Close the chute door behind them once they enter the chute and release them one by one as you open the front gates.

If there's time left over, you can swap roles and let the "crazy" cows be the "calm" cows and vice versa.

This is why we do it...

We are excited about our work and our science at EOARC and we want future generations to be excited and care about science and the role it has in everyone's lives. In order to do this, we must engage children in our work. One of the best ways to do this is to have learn-by-doing activities related to the science we do each and every day.

Our goal with this guide has been to share with you ideas we use for our Field Trip activity learning stations that you could incorporate at your location. We have some unique learning stations set up that are not an option at many locations, but by providing you with these details we hope to give you enough ideas to create some of your very own field trip activities. We hope that you can tell how excited not only our station is to host these field trips but also how much the children get out of them as well. Putting together field trips does take some organization but they are well worth the effort when the children go home excited about what they learned!

Just remember to follow these helpful hints and a fun and rewarding day is in store for all:

- Plan well and work closely with the teacher to craft a useful experience. Find out some of the curriculum the teacher has covered and see if you can reinforce some of the curriculum the children are learning.
- Make sure adult chaperones know their roles.
- Don't overplan – particularly for younger children, leave some unstructured time for the kids to play – this usually works well if you have an outside area. Note: unstructured time does not mean unsupervised time!
- Set clear ground rules for children and adults. Provide these to the teacher in advance if possible.
- Be sure and use name tags for everyone and that the children know the group leaders.
- Break the class into groups for more hands-on activities and to keep them moving between activities.

This guidebook is one element of a suite of products designed to provide information about our second grade field trip program at the Eastern Oregon Agricultural Research Center.

The other elements include, but are not limited to, a video "Making the Science Connection: A step-by-step guide for scientists hosting educational field trips", sample activity and coloring sheets, a sample handout for parents of students attending the field trip, and several handouts offering more details about the activities outlined in this guidebook.

We offer all of these materials free of charge.

For your copy of any or all of these materials or for more information, contact:

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Or visit:
http://oregonstate.edu/dept/eoarc/

Eastern Oregon Agricultural Research Center (EOARC) is a cooperative research effort between Oregon State University and USDA-Agricultural Research Service focusing on rangeland ecology and restoration of wildlands, environmentally compatible livestock systems, forage crops, and alternative livestock systems in the sagebrush-steppe of the Great Basin and inland coniferous forests of the Pacific Northwest. The Center's research program is unique in the integration of research about beef cattle, rangeland, wildlife, watershed, and forest management.