











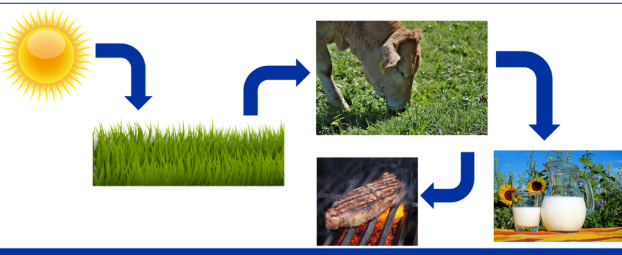
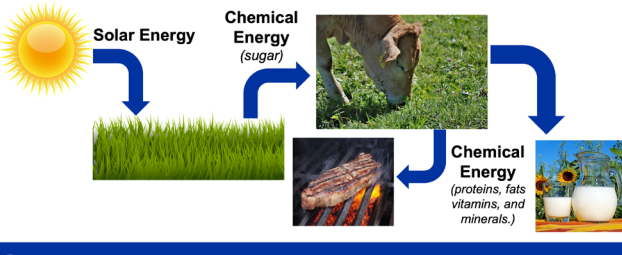


| Slide | Notes |
|---|--|
| <div data-bbox="126 254 326 289">  SOUTH DAKOTA STATE UNIVERSITY EXTENSION </div> <div data-bbox="289 254 326 289">  </div> <h1 data-bbox="134 321 443 415">Adopt-A-Cow: Beef</h1> <div data-bbox="134 464 302 520"> Lesson 4 Energy Transfer </div> <div data-bbox="126 569 496 594"> <small>SDSU Extension is an equal opportunity provider and employer in accordance with the nondiscrimination policies of South Dakota State University, the South Dakota Board of Regents and the United States Department of Agriculture. Learn more at sdstate.edu/eop. © 2020, South Dakota Board of Regents</small> </div>  | |
| <h2 data-bbox="155 659 378 695">Lesson 3 review</h2> <div data-bbox="126 716 740 926">    </div> <div data-bbox="126 961 331 989">  SOUTH DAKOTA STATE UNIVERSITY EXTENSION </div> <div data-bbox="737 974 745 984">2</div> | <p><i>*This slide contains animations during slide show mode. These animations/mouse clicks are noted by a number in italicized parenthesis. *</i></p> <p>What do you recall about what we learned during our last lesson?</p> <ol style="list-style-type: none"> <i>(1) In lesson 3, we learned about how ranchers care for their animals by providing them with their basic necessities: food, water and shelter.</i> <i>(2) We learned about how ranchers work with veterinarians to keep their animals healthy.</i> <i>(3) We talked about ways that ranchers identify their individual animals and utilize things like ear tags to keep track of them.</i> <i>(4) We learned about how vaccines are utilized to protect animals from getting sick.</i> <p>In today's lesson we are going to learn about the unique stomach that cattle have and how it plays a role in transferring energy from the sun into an energy that we can utilize to grow and be active.</p> |
| <h2 data-bbox="155 1255 427 1291">Notice and Wonder</h2> <div data-bbox="134 1312 740 1541">    </div> <div data-bbox="126 1556 331 1583">  SOUTH DAKOTA STATE UNIVERSITY EXTENSION </div> <div data-bbox="737 1568 745 1579">3</div> | <p>Allow students a few minutes to look at the picture and silently record what they notice and wonder about it.</p> <p>As a group make a list with student ideas about notices/wonders</p> <p>Some things may include kids playing and having fun. They may also notice that they are outside, there is sunshine, and grass in most pictures.</p> <p>Inquire: What is your favorite physical activity?</p> <p>How do you feel after playing/doing that for a very long time? <i>tired, thirsty, etc. Look for the words energy and hungry.</i></p> <p>Why do you think we get hungry after being physically active for a long time? <i>Hunger is our body's way of telling us that it needs nourishment, or food (chemical energy). We eat food to have energy for our body to work.</i></p> |

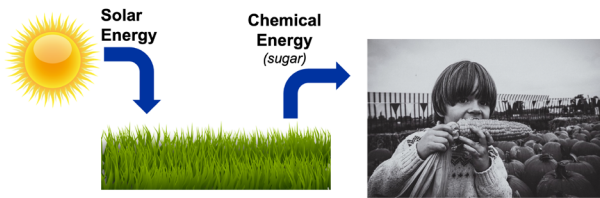
| Slide | Notes |
|---|--|
| <p>What is energy?</p>  <p><small>SOUTH DAKOTA STATE UNIVERSITY EXTENSION</small></p> | <p>We just noted that we can be low on energy and need food, a chemical energy, after being physically active; but what is Energy?</p> <p><i>Energy is the power used for a function.</i></p> <p>What examples of energy do you see in the picture? <i>Allow youth to answer and provide prompts and supplementation to discuss the following:</i> <i>Kids playing = Physical Energy</i> <i>Sun = Solar Energy provides heat and light for us as well as energy for grass to grow</i> <i>Noises = Sound Energy</i> <i>Grass = Chemical Energy (food for animals)</i></p> <p>What other types of energy can you think of? <i>Electrical Energy – lights in the classroom</i> <i>Chemical Energy – fuel for vehicles</i></p> |
| <p>What would you want to eat?</p>  <p><small>SOUTH DAKOTA STATE UNIVERSITY EXTENSION</small></p> | <p>We noted that there was grass, a form of chemical energy, in the photos. Grass has fiber and vitamins and is eaten by many animals for energy. Would eating grass satisfy your hunger?</p> <p>Why not? – <i>Not only would many of us not like the taste of grass, grass isn't easily digested by humans.</i></p> |
| <p>Balanced Diets</p>  <p><small>SOUTH DAKOTA STATE UNIVERSITY EXTENSION</small></p> | <p><i>*This slide contains animations during slide show mode. These animations/mouse clicks are noted by a number in italicized parenthesis.</i></p> <p>While we can't digest grass, there are a variety of foods that we can digest and give us a balanced diet. Those foods include:</p> <ol style="list-style-type: none"> <i>(1) Fruits and Vegetables</i> <i>(2) Proteins</i> <i>(3) Milk (Dairy Products)</i> <i>(4) and Grains (bread, rice, pasta)</i> <p>However, do you know where we get these nutritious foods from?</p> <p><i>Fruits and Vegetables grow from plants (like grass)</i> <i>Breads, rice, pasta are made from grains that grow on plants (like grass)</i> <i>Meat and dairy products come from the animals that eat the grass.</i></p> |

| Slide | Notes |
|---|---|
| <p>Meat + Dairy = Strong Muscle + Bone</p>  <p><small>SOUTH DAKOTA STATE UNIVERSITY EXTENSION</small></p> | <p>While all the foods are important for a balanced diet, we are going to look specifically at the proteins from meats and dairy products. Proteins can be found in plant-based foods as well; however, we will focus on animal-based proteins for today.</p> <p>Meats are known for the proteins that they provide, but they also contain a variety of vitamins and minerals that make sure our bodies run properly</p> <p>Dairy products, most known for the calcium they provide, provide proteins and a variety of minerals and vitamins.</p> <p>Proteins are chemical energy that are important for building bones, muscles, blood, and skin.</p> |
| <p>Energy Transfer</p>  <p><small>SOUTH DAKOTA STATE UNIVERSITY EXTENSION</small></p> | <p><i>*This slide contains animations during slide show mode. These animations/mouse clicks are noted by a number in italicized parenthesis.*</i></p> <p>(1) Our meats like steak and hamburger as well as our milk products come from cattle.</p> <p>(2) Cattle eat grass.</p> <p>(3) Grass utilizes the sun's energy to grow.</p> |
| <p>Let's follow the energy!</p>  <p><small>SOUTH DAKOTA STATE UNIVERSITY EXTENSION</small></p> | <p><i>*This slide contains animations during slide show mode. These animations/mouse clicks are noted by a number in italicized parenthesis.*</i></p> <p>Earlier we talked about there being different types of energy. Can anyone remember the different types we noted earlier?</p> <p>Physical or Mechanical Energy, Solar Energy, Sound Energy, Chemical Energy, Electrical Energy</p> <p>What type of energy comes from the sun?</p> <p>(1) <i>solar energy</i></p> <p>Plants utilize this solar energy during photosynthesis to convert water and carbon dioxide into nutrients. What type of energy are these nutrients?</p> <p>(2) <i>Chemical Energy</i></p> <p>This chemical energy is utilized for the production of plant materials. In grass this is used to create the cellulosic structure. Animals (in this case cattle) eat the grass. Their unique stomachs digest the cellulosic structure to obtain energy for life functions and growth. This energy powers the cow's body, but also builds muscle and creates milk.</p> <p>The milk and muscle can then be consumed by humans for energy sources to power our bodies.</p> <p>What type of energy does the milk and meat provide us?</p> <p>(3) <i>Chemical Energy</i></p> |

Slide

Notes

Can't we just simplify it?



SOUTH DAKOTA STATE UNIVERSITY EXTENSION

You may be wondering can't we just simplify it and get our food straight from the grass.

While humans can eat some of the same foods that cows do, like corn, we cannot eat grass. Our bodies don't digest cellulosic materials like cows do. Cows are a member of a group of animals called ruminants. Cows have a multi-chambered stomach and can regurgitate or bring their food back into their mouths after swallowing it to chew it some more.



Let's learn go to SDSU where we can look a bit deeper at the cow's stomach and how they function to digest grasses and other foods that are hard for our body to digest. They utilize the energy they get from these foods to produce milk and muscle (meat).

Video Review: What were some of the things that you learned in the video? -

Cows have specialized stomach with 4 compartments: Reticulum, Omasum, Abomasum, and Rumen

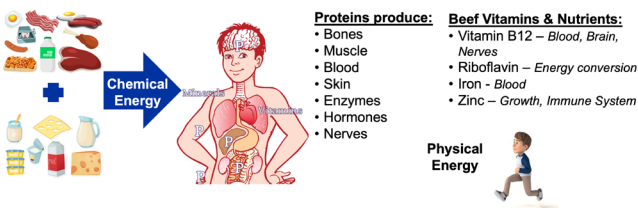
This special stomach allows them to digest foods that we can't

214, the cow in the video has a canula that allows researchers to observe her digestion as she grows/ages – she is 9 years old and has had several calves

Think back to Lesson 1 when cattle first came to the Dakota Territory, this specialized stomach allows cattle to utilize something that was abundant in the territory. What was it?

Grass

Milk and Meat – Chemical Energy



SOUTH DAKOTA STATE UNIVERSITY EXTENSION

This slide contains animations during slide show mode. These animations/mouse clicks are noted by a number in italicized parenthesis.

Not only are we not able to easily digest the grass, if we were to eat grass rather than milk and meat we would be missing out on some great nutrients

(1) Through a variety of metabolic processes, the proteins we consume from cattle build and produce:

- Bones
- Muscle
- Blood
- Skin
- Enzymes
- Hormones
- Nerves

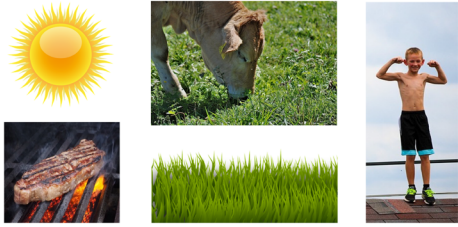

(2) Additionally, the meat (beef) provides essential vitamins and minerals and are important for our body to thrive.

(3) With strong bones and muscles and the ability to convert food (carbohydrates) into fuel we are able to participate in our favorite activities – Kinetic Energy.



**SOUTH DAKOTA STATE
UNIVERSITY EXTENSION**



| Slide | Notes |
|--|---|
| <div data-bbox="151 174 402 216">Energy in Action!</div> <div data-bbox="203 237 657 462">  </div> <div data-bbox="121 478 329 508">  SOUTH DAKOTA STATE UNIVERSITY EXTENSION </div> <div data-bbox="734 493 743 504">13</div> | <p>Let's put the transfer of energy into action through a relay game.</p> <ol style="list-style-type: none"> Divide the class into groups of five. For smaller groups select one or more members to complete the relay twice. Each group should form a single line across from where their group's cards are placed face down. One at a time, individuals from each team will run to grab a card and return to their group. When the group has all their cards, they will work to put the cards into the appropriate energy transfer order. The first team done then needs to describe the process indicating how energy is transferred from the sun to them. To make this more physically challenging, you may have the youth do jumping jacks, jump rope, shoot a hoop, or other activity before they can access their cards. Additionally, an obstacle course can be placed between the team and their cards. |

SDSU Extension is an equal opportunity provider and employer in accordance with the nondiscrimination policies of South Dakota State University, the South Dakota Board of Regents and the United States Department of Agriculture.

Learn more at extension.sdstate.edu.

© 2025, South Dakota Board of Regents



**SOUTH DAKOTA STATE
UNIVERSITY EXTENSION**

