

COW MAGNETS



PLANNING THE EXPLORATION

Many people are not aware of cow magnets and how they are used. Comparing a cow's anatomy with that of humans (or any other animal that you are studying) can serve to link the study of magnetism with other areas of science.

Students use information about cow magnets that they acquire to complete a product of their choosing based upon their individual learning style. Any one of the "Assessments," or a combination, can be completed for this assignment. Background Information is provided for your use to guide the students. It is expected that students will perform their own research using the CD-ROM or print media. Contacting an Agricultural Extension Office, the Department of Agriculture, a farmer, or a university or college is another way of gathering data.

Pass the cow magnet around for everyone to observe and handle. Keep the magnet accessible so that students can continue to touch it and use it to inspire their work.

BACKGROUND INFORMATION

Ruminants have a 4-chambered stomach consisting of the rumen, reticulum, omasum, and abomasum. As a cow feeds, grass is passed to the rumen where it is broken down and turned into cud (small balls). The cud is returned to the cow's mouth where it is rechewed and passed to the reticulum. Then it passes on to the omasum and lastly to the abomasum where enzymes facilitate final digestion. The abomasum is sometimes called a "true stomach," because this is where real digestion occurs.

Dairy farmers realized that they had a problem related to digestion as cows ingested pieces of wire used to bale hay or from fences. The wire would pass along into the cow's second stomach and could puncture the animal's heart or other vital organs nearby. This condition was called "hardware disease" and before farmers used cow magnets, they lost many animals.

Cow magnets are put into the cow's throat, swallowed and are lodged in the reticulum, although they can sometimes stay in the first stomach. They do not harm the animal. The magnet attracts the pieces of metal wire (and any other metal objects) that they swallow and keep them from doing any damage. If the magnets get totally covered by debris and can no longer attract metals, the farmer must make a decision as to whether or not it is worthwhile to operate. If the animal is valuable, the farmer may decide to have the magnet removed and replaced. If, however, the animal is not valuable, the cow is simply replaced. Once the cow dies or is slaughtered, the cow magnet can be retrieved and reused.

FOR YOUR PLANBOOK

Suggested time: 1+ hours

Gear: CD-ROM, cow magnet, supplies for projects

National Science Content Standards: A, C, E, F, G

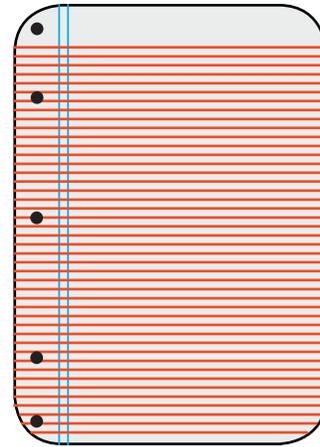
Sunshine State Standards Benchmarks: SC.C.2.3.1-3, SC.D.2.3.1-2, SC.F.1.3.1, 1.3.7, SC.G.1.3.4-5.2.3.4, SC.H.1.3.1-7, 3.3.1-4, 3.3.5-7

Sunshine State Standards Benchmarks -- Language Arts: LA.A.1.3.1-4, 2.3.1-8, LA.B.1.3.1-3, 2.3.1-4, LA.C.1.3.1-3, 2.3.1-2, 3.3.3, LA.D.2.3.1-7, LA.E.1.3.1-5, 2.3.1-8

Sunshine State Standards Benchmarks -- Social Studies: SS.A.1.3.1-3, 2.3.3, 4.3.3, 5.3.2, SS.D.2.3.1-3

Homework: It is intended that students will work on their chosen projects at home over a designated period of time based on the complexity of the project or the amount of time that you wish to devote to the Explorations.

Assessment: Listed below are areas to explore that relate to cow magnets. Ideally students will



generate ideas, plans for carrying out their ideas, and ways to present their findings to the class. All explorations require presentation to the class which could be done as a poster session, an oral report, role-playing “skit,” musical composition, artwork, computer-assisted presentation, or multimedia presentation.

Technological design: The word “technology” for middle school students usually means computers or computer-like machines. However, technology is any development used for a practical purpose that makes a task more efficient or more effective. The cow magnet can be considered a technological advance because it saves farmers a great deal of money, saves the lives of cows, and solves a problem.

Have students research historical technological innovations and inventions that are sometimes overlooked when they study the cotton gin, the steamboat, electricity, etc. Brainstorm as a whole class seemingly simple technological designs that have made a difference in our

lives. Students could start with cow magnets if they wish. Interviewing farmers who use them, agricultural extension workers who have information about them, farm bureaus and farm agents could provide information not available in textbooks or reference material.

Other examples of “small” but important discoveries are the mechanical pen, the zipper, velcro, the compass, teflon, or tissues. Encourage students to look around and investigate something about which they are curious. Whether the students pursue the cow magnet as a technological invention or choose another invention or innovation, the research should reflect a variety of sources: web sites, print media, videos, etc. Students are only limited by their imaginations for these explorations!

Allow students to choose their method of research and presentation as well as whether they work individually or in groups. This is a chance to address all **learning styles** in your classroom by encouraging choice and

Exploration A: Cow Magnets

allowing students to design their own method of presentation.

Stomach stones: Cow magnets serve another purpose -- aiding digestion. Other animals, such as birds, swallow stones which lodge in their gizzards and further grind food into digestible pieces. Most middle schoolers are not aware of this phenomena. This is a natural connection to life science, comparative anatomy and animal behavior.

Additionally, there is some evidence that points to the fact that dinosaurs also ingested rocks to aid in digestion. This is another area for exploration that students may choose to pursue that would lead to research on geological time, connections of dinosaurs to modern birds, or fact versus fiction in movies and books.

Economic issues: The farmer must make a choice when a cow magnet “fills up.” Is it sound business practice to have a veterinarian perform a costly operation on the cow or is it a better decision to have the cow slaughtered? This type of decision is one that is made daily in the business world; a decision that requires determining how much something is “worth.” The concept of worth is one that will require discussion because it is different for each person. An animal lover will say that sacrificing the cow because of monetary reasons is inhumane; on the other hand, a practical businessman will say that the cow is no longer a good investment, so it is time to cut the losses.

Students could **debate** this issue in front of the class and bring in other topics of this sort. For example, should developers be forced to give up building plans because of a bird’s nest? Whose rights are violated when boaters are fined when they hit a manatee? Is the “cost” of technological development too great to bear (e.g., space junk or toxic waste)?

Careers: Farmers, veterinarians, Department of Agriculture employees, or farm bureau

agents would be the most obvious career connections for students to make.

Interviewing is one technique for students to use to collect information. First students will design an interview instrument by developing a set of questions. Then students will decide on a method to record the responses, for example, chart or graph, in writing, audiotape, or videotape.

Creative writing: Have students write a story dealing specifically with cow magnets. The story could be in the form of a cartoon or short story format that deals with the adventure of a cow with a magnet inside. It could be a science fiction story (tells a good story; deals with human nature; considers strange and unusual occurrences; and has science facts). Encourage students to present their stories in creative ways: as a play, cartoon, or computer presentation, for example.

Reading: James Herriot wrote a number of books about the experiences of a country veterinarian. The most famous of his collections are: All Creatures Great and Small, Every Living Thing, and All Things Bright and Beautiful. His stories are the basis for a long-running PBS series, All Creatures Great and Small that is available at local libraries.

“How We Were Tracked By A Tripod,” by John Christopher (found in Science Fiction Stories, edited by Edward Blishen, ISBN 1-85697-889-3) tells about boys followed by machines that tracked them by following metal plates that had been implanted in their heads.

Encourage students to find their own fiction and nonfiction reading material. Now that they know how magnets are used with other animals, they may wish to research how magnets are used in human medicine. For example, magnets are used by orthopedic surgeons to stimulate bone growth.

Notes: