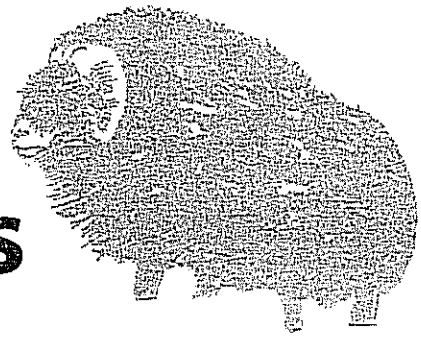
Muskox Maneuvers



Objectives

Students will evaluate the effectiveness of some adaptations in predator and prey relationships.

Method

Students simulate muskoxen and wolves in a physical activity.

Materials

Two different colors of rag flags to use as tails (similar to what is used to play flag football); as many flags as there are wolves and calves

Background

NOTE: Although this activity does not illustrate all the complexities of predator and prey relationships, it does illustrate broad concepts.

Grade Level: 5–8

Subject Areas: Science, Expressive Arts, Environmental Education

Duration: one 20- to 45-minute session

Group Size: 15 to 50; procedures are based on 33 students

Setting: outdoors

Conceptual Framework Topic Reference: CAIIA, CAIIA1b

Key Terms: adaptation, predator, prey, defense, limiting factors, reintroduction

Appendices: Outdoors, Simulations

The muskox is a large, shaggy herbivore called "omingmak" or "the bearded one" by the Inuit. A male muskox weighs between 600 and 800 pounds at maturity and mature females weigh between 400 and 500 pounds. A young muskox may weigh only about 22–31 pounds at birth. These animals inhabit Arctic regions of Alaska, Greenland, and Canada where their long, thick fur protects them from -50° F temperatures and high winds.

Muskoxen often are found in herds of 20 to 30. Both sexes vigorously defend the young, usually forming a line or circle around them, while facing the threatening predator. Such a circle renders the animals relatively safe against natural predators, particularly wolves.

In Alaska, the original muskox population disappeared by 1865, primarily due to over-hunting. Wildlife managers established a reintroduction project to return muskoxen to their original range in Alaska during the 1930's. Thirty-four muskoxen were captured in Greenland and released on Nunivak Island between 1935–1936. The success of this effort is visible in Alaska today, where more than 7,400 muskoxen cover much of their historical range.

In this activity, the roles of bulls and cows are differentiated in ways not typical of actual muskoxen. Again, both sexes vigorously defend the young. They both have stout, pointed horns that help them do this.

The major purpose of this activity is for students to recognize adaptation and limiting factors in a predator and prey relationship.

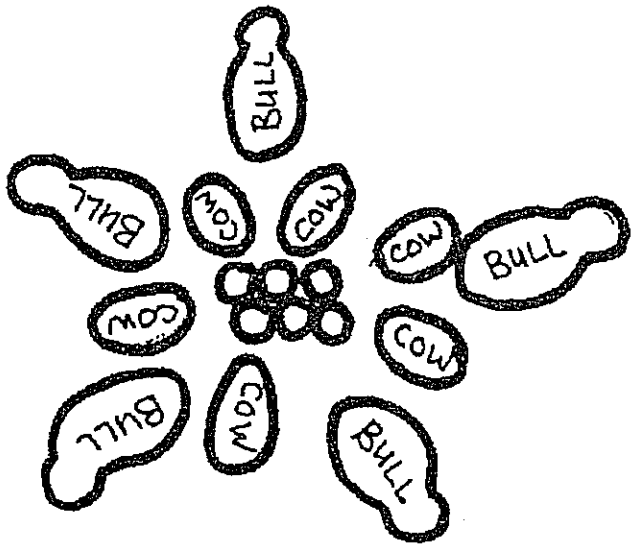
Procedure

NOTE: This activity is best done outdoors in an open, grassy area; however, it is possible to do the activity indoors—even in a room—if tables, chairs, and desks can be moved to create a large space in which students can freely move, including "tag-like" running.

NOTE: Use the following chart as an initial guide for dividing the class into groups. Educators can vary the proportions in later rounds to respond to what happens in the simulations.

Total Players	Wolves	Bulls	Cows and Calves
15–18	2	3	Equal number or one more cow than calf
19–28	2	4	Equal number or one more cow than calf
29–35	3	6	Equal number or one more cow than calf
36–45	4	8	Equal number or one more cow than calf
46–50	5	10	Equal number or one more cow than calf

1. Divide the class into four groups. (For example, a group of 33 students would break down into 3 wolves, 6 bulls, 12 cows, and 12 calves.) Each will have a distinctive role.
2. Give the wolves and calves the appropriate flag, and have each one wear the flag so it is hanging out of a back pocket or looped over a belt in the back. The flags need to be visible and easily removable.
3. Next, tell the students the following information: Muskoxen are herbivores (plant-eaters) and often graze peacefully in meadows. While grazing, they spread out. Calves typically do not stray too far from their mothers, but the animals do not always stay clustered—except when predators appear. As the activity begins, the students representing muskoxen are grazing peacefully and the wolves are out of sight of the herd.
4. Show students that these are the behaviors each animal should exhibit:



Cows: As soon as grazing begins, the cows should choose a lead cow to watch for predators. The cows should pick a signal that the lead cow will use to communicate to the rest of the herd that predators (wolves) are approaching. When the lead cow signals that predators are near, all the cows move to form a circle around the calves to protect the calves from the wolves. With the calves in the center of a circle, the cows stand with their backs to the calves, facing outward to watch the wolves. The cows can move very little. Mostly, they stay firmly in one place, moving their upper bodies to block the wolves from reaching the calves. The cows cannot touch the wolves with their hands or feet.

Calves: The calves depend totally upon the cows for protection. Each calf is to hold onto a cow with both hands on the cow's waist, and follow only the cow's lead. Calves cannot influence the cows' movement.

continued

Bulls: The bulls are the active defenders of the cows and the calves. As the predators near, the bulls form a circle around the cows, which in turn are forming a circle around the calves. The bulls form as tight a circle as they can around the cows and calves, never any farther than one step in front of the circle of cows. The bulls can move, however—but only in a clockwise direction around the circle of cows. The bulls do have use of their hands. As the wolves attack the herd, the bulls try to "kill" them by pulling the flags out of their back pockets, or wherever the flag is attached. When a bull kills a wolf, the wolf moves off to the side, "dead" but able to watch the remainder of the activity.

Wolves: Wolves begin the activity out of sight of the herd. They try to get as close as possible to the herd without being detected. Wolves typically work as a unit so they can attempt a strategy for surprising the herd in order to kill the calves for food. The wolves are mobile, able to move at any time in any direction. They can use any maneuver (except pushing and shoving) to break the herd's defenses. Once a wolf kills a calf—by pulling the calf's flag out of its pocket—temporarily stop the game and move the calf's carcass to the side, where it, too, can watch the remainder of the activity.

A Note About Sound Effects: Wolves can howl to communicate predetermined signals and to startle and confuse the muskoxen. The muskoxen can moo loudly.

5. Review these muskox maneuvers:

   The muskox herd grazes quietly. The wolves are out of sight of the herd. The wolves move to attack the herd. When the lead cow spots wolves, the herd begins its defense. The muskoxen form a circle, with calves in the center, cows facing out in a circle around the calves, and bulls in an outer circle, also facing the wolves. Each should behave appropriately, as described above.

6. Remember that the activity can conclude in several ways. For example,
   - All the wolves could be killed.
   - All the calves could be killed.
   - The wolves could give up in frustration after a period of time with no success in killing a calf.
   - The wolves could kill one or more calves, and the activity would conclude because you know that the wolves are going to eat the calf (or calves) and the herd will move on.

7. Once the excitement and enthusiasm have peaked, sit down with the students to discuss what happened and what the activity represents in terms of animal adaptation and predator and prey relationships. Ask the students to describe and evaluate the predatory behavior of the wolves and the various defense behaviors of the muskoxen. What would happen if the wolves could not get into the herd? What would happen if the wolves always got into the herd? Ask the students to distinguish between what would be actual, typical behaviors of muskoxen contrasted with their behaviors in this activity.

8. Ask the students to brainstorm or research other examples of predator and prey relationships. Describe and evaluate the strategies of the predators and the prey in each example. How effective are these behavioral adaptations in enhancing the survivability of the species involved?

Variation

As mentioned earlier, this activity differentiates the roles of bulls and cows in ways not typical of actual muskoxen. To more naturally model muskox behavior, alter the activity in the following way:

Widely scatter food tokens (poker chips, drinking straws) across the playing field. Instruct the muskoxen to walk around the playing area and pick up food tokens. This action will simulate dispersed feeding patterns. The muskoxen may not group together in a defensive posture until receiving the signal from the lead cow that a wolf is near. Allow both cows and bulls to reach for a wolf's flag. Cows still cannot use their hands or feet to block wolves. Permit bulls to move in either direction. In real life, both cows and bulls aggressively defend their young. Have students brainstorm for strategies to work as a herd to protect the young. Repeat the activity. How did the group strategy change the outcome?

Extensions

1. A few students can research and report back to the class with more details about the life and times of muskoxen and wolves—acquiring additional information about their survival needs, habitat, and behaviors.
2. Investigate predatory and defense behaviors of different species in different habitats. For example, selected species of plains, forest, desert, and ocean animals can be compared.

Aquatic Extension

Many fish species also have effective adaptations that serve to protect them from predator species. Have one student be a predator and the rest of the students be prey. This time, the predator is a tuna, and the prey are herring in a school of fish. (Educators can pick their own example of predator and prey. Just pick a prey species that forms a school of fish.) Pantomime the school of fish moving through waters with the predator trying to catch at least one prey for food to survive. In a large open area, have the students move as the school of fish. Have three or four students inside the school of fish wear a bright-colored cloth or tie that the predator will try to remove in order to have successfully caught its prey. The school of fish must keep moving. See if the school of fish can successfully move the length of the open area at least once without any fish being caught by the predator. The predator may move in any direction and may stop and start moving at any time. The prey must move generally together and may not stop.

Evaluation

Identify a prey species and its predator species. Describe how each is adapted to the other. How does the prey protect itself? How does the predator overcome this protection? Describe the overall effectiveness of each animal's adaptations.