

Conceptual activity: pronghorn adaptations

Instructions for teacher/leader of activity: Have the students work through section 1 individually or in small groups, then discuss answers as a class. Do the same for section 2.

Target age group: Middle school, high school

Background on this activity: Pronghorn are highly adapted to succeed in their environment. In this activity, you will think about specific adaptations that pronghorn have, how they might have evolved, and how they help them be successful.

1. **Adaptation for speed and predator evasion.** Pronghorn can sprint at speeds up to 60 miles per hour, and can run for miles at up to 45 miles per hour. Many physical adaptations have allowed pronghorn to evolve this ability to evade predators at high speeds. Below is a list of physical characteristics that have evolved to allow pronghorn to run at top speeds. Decide whether you think each trait has been reduced or enhanced during this evolution and explain why.

a. Leg length

Enhanced – leg length has increased to help pronghorn take longer strides to run faster

b. Heart size

Enhanced – pronghorn have large hearts for their size compared to other ungulates to increase the amount of oxygenated blood that travels to the muscles while a pronghorn is sprinting

c. Lung size

Enhanced – pronghorn have large lungs for their size compared to other ungulates to increase the amount of air they can inhale, which increases the amount of oxygen they obtain in each breath

d. Body weight

Reduced – pronghorn are lightweight to reduce weight they have to carry when sprinting, making them faster and more efficient runners

e. Eye size

Enhanced – pronghorn have very large eyes that help them detect danger from great distances. This is especially helpful in the vast, open habitat that they live in where they are able to see things from a great distance

2. **Behavioral and physiological adaptations.** In addition to physical adaptations, pronghorn also have many behavioral adaptations that increase their chance of survival. Below is a list of behavioral and physiological adaptations that have evolved in pronghorn. Describe what you think are the advantages and/or disadvantages of each one.
- a. Living in social groups
 - Advantages – more individuals to be vigilant for predators, larger group size lowers individual predation risk, more individuals to search for higher quality food
 - Disadvantages – possibility of competition for resources (e.g., food), larger groups might attract more attention from predators, higher risk of disease
 - b. Seasonal migration
 - Advantages – find higher quality/quantity food, avoid harsh weather, reduced predation risk (this is currently disputed – but both sides of the argument are interesting – lower predation risk if you move out of the area predators are in – they are unlikely to follow because not built for long distance movements and most predators are territorial)
 - Disadvantages – high energy expenditure (for migration to be worth it, you have to consume more energy over the migration season than you expend while moving between ranges), higher predation risk (other side of argument – long distance migration increases the likelihood of running into a predator, many migration corridors have narrow spots where migrating animals are funneled into and are great for predators to hunt at), higher risk of human conflicts (crossing roads, coming across barriers to movement like fences, moving through degraded habitat)
 - c. Twinning (almost 100% of pronghorn give birth to twins – giving birth to a single fawn is rare, and giving birth to triplets is almost unheard of)
 - Advantages – two fawns means higher chance that one offspring will survive even if one fawn dies, it is thought that twinning evolved in pronghorn as part of their adaptation for speed – one fawn developing on each side of the body provides more balance than a single fawn would
 - Disadvantages – higher investment in two offspring than one; compromise between producing lots of offspring and providing parental care to increase likelihood of individual offspring survival
 - d. Hiding fawns (during the first few days after birth, pronghorn mothers hide their fawns in shrubs and grasses and the fawns lay flat and do not move until they hear their mother's individual call signaling them to stand up)
 - Advantages – hide fawns to reduce predator detection during most vulnerable stage in life when fawns cannot outrun predators
 - Disadvantages – harder to defend fawn if predator finds it (while mother keeps fawn in sight, delay to get back to fawn to defend from predator)

- e. Rumination (pronghorn are ruminants, meaning that they have a four-chambered stomach, including one chamber that contains microbes to help break down plant material)

Advantages – ability to consume high cellulose / high fiber plant material that non-ruminants would not be able to digest (more food options), microbes produce vitamins (K, B)

Disadvantages – lots of energy goes towards digestion, spend a lot of time “chewing their cud”, dependence on microorganisms for digestion (if microbial community become imbalanced in the rumen, can be bad news for the animal)

Resources:

Byers, J. A. 1997. American pronghorn: social adaptations and the ghosts of predators past. The University of Chicago Press, Chicago, IL, USA.

O’Gara, B. W. and J. D. Yoakum. 2004. *Pronghorn Ecology and Management*. University Press of Colorado, Boulder, CO, USA.