

FOOD CHAINS AND WEBS

All living things need energy to be born, to grow, and to act. Just as a car uses fuel to run, animals use fuel in the form of the food we eat to propel our thoughts and actions. Digesting food releases the energy that sustains animal life.

What is a food chain?

A food chain starts with the sun fueling plant life (photosynthesis), continues with animals obtaining fuel by eating plants, other animals, or both plants and animals, and ends with decomposition. Each link in the chain is food for the next link. For example, a grasshopper eats grass and is then eaten by a frog, who is then eaten by a snake, who is then eaten by a hawk, who, after death, is decomposed by bacteria. On the food chain, there are producers, consumers, and decomposers. Each level in a food chain is called a trophic level.

Who are producers, consumers and decomposers?

- Plants are called **producers** because they are able to use light energy from the Sun to produce food (sugar) from carbon dioxide and water.
- Animals are not producers because they cannot make their own food. They are called **consumers** because they must eat plants or other animals or both.

There are three groups of *consumers*:

1. Animals who eat ONLY PLANTS are called *herbivores* (or *primary consumers*).
2. Animals who eat OTHER ANIMALS are called *carnivores*.

Carnivores who eat herbivores are called *secondary consumers*.

Carnivores who eat other carnivores are called *tertiary consumers*. For example, orcas are tertiary consumers because they eat seals, who eat smaller fish.

3. Animals who eat BOTH animals and plants are called *omnivores*.
- **Decomposers** (bacteria and fungi) feed on decaying matter. They speed up the process of decay that releases mineral salts back into the food chain, where they are absorbed by plants as nutrients.

Is being a carnivore, herbivore, or omnivore a choice?

Humans are the only omnivores who have the ability to consciously choose to eat either animals or plants. Many omnivorous animals will choose to eat plants or animals based on availability. Some humans live in situations where they have no choice because either only plants or only other animals are available as fuel sources. Most humans have both sources available and can choose whether to eat plants, animals, or both.

Humans who have been educated about the environmental and health benefits of eating a plant-based diet often become vegetarians. A vegetarian is a person who chooses to be a herbivore. Eating lower on the food chain helps the environment because plants and other resources (such as water, energy, chemicals, and human resources) are not wasted by being first cycled through animals. Eating lower on the food chain is also beneficial to human health. Studies have proved that eating animal products is a major contributor to a long list of diseases, including cancer, heart disease, osteoporosis, and diabetes.

Why are there more herbivores than carnivores?

Only a fraction of the energy an herbivore obtains from eating plants is converted to new body mass. The rest is either lost as waste or used to carry out its life processes—to move, digest, grow, and reproduce, for example. When the herbivore is eaten by a carnivore, only a small amount of the total energy the herbivore absorbed is passed on to the carnivore.

This is the case at each link in the food chain. At each transfer of energy from one link to the next (from the insect to the frog, for example), a large amount of energy is lost. The higher up on the food chain the link is, the less energy there is to transfer to it. This is why eating lower on the food chain wastes less energy. For example, 20 times more land is ultimately required to obtain the protein needed to feed a carnivore as to feed an herbivore.

The higher up the food chain, the fewer the number of consumers. For example, to support populations of herbivores like giraffes you need many more trees and shrubs (giraffe food) than the number of giraffes, and to support a populations of lions, you need many more giraffes (lion's prey/food) than lions. Most food chains have no more than four or five links. There cannot be too many links in a food chain because the animals at the top of the chain would not have enough food (energy) to stay alive.

What is a food web?

Most animals are part of more than one food chain and eat more than one kind of food in order to meet their food and energy requirements. These interconnected food chains of many animals and plants form an interconnected food web. For example, trees produce acorns, which are food for many insects and mice. The insects are food for birds, skunks and opossums. The plentiful mice are food for weasels, snakes, and raccoons. With plenty of weasels, snakes, raccoons, and mice, there is ample food for hawks, owls, and foxes. If this were just one line of consuming and being consumed from mice to hawks, for example, it would be called a food chain. When there is crossover, such as insects eating both acorns and the leftovers on the mouse carcass after the hawk is done, it becomes a web. All of these animals are interconnected in a food web.

Resources

Website:

Kimball, John. "Food Chains." *Kimball's Biology Pages*. 2008.
<http://users.rcn.com/jkimball.ma.ultranet/BiologyPages/F/FoodChains.html> **OR** <http://tinyurl.com/dv89y>