Caesar Kleberg WILDLIFE Research Institute

Deer Associates eNews

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Amazing Insights from the Insides of a Deer

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You wouldn't dream of taking your truck to a mechanic who had no idea that your truck had a transmission, or visit a doctor who gave you a quizzical look when you inquired about the location of your appendix. Yet, I periodically come across deer biologists who have little knowledge of deer anatomy, and worse yet, seem to have little interest in learning. An extreme example of such ignorance is a recently heard pronouncement that deer have a gizzard. If the sad hilarity of that pronouncement is lost on you, type "gizzard" into your internet search engine.

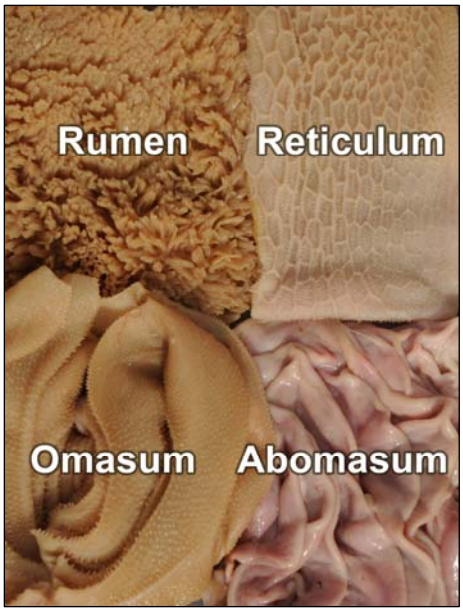
White-tailed deer are members of a diverse group of herbivores, along with cows, sheep, goats, and other deer species, called ruminants. They are so named because they have a rumen, which is one part of a complex digestive system that enables these animals to overcome a critical problem. The problem is that plants are exceedingly abundant, but no vertebrate animal has enzymes to effectively digest plants. Ruminants overcome this dilemma with the help of microbes.

To understand the role of microbes in a deer's digestive system, we can trace the path of a bite of lazy daisy. After being swallowed, our lazy daisy passes through the esophagus and enters the rumen and a smaller companion chamber called the reticulum. The rumen and reticulum are large sacs where food is held while microbes digest it. Hunters are familiar with these chambers because if cut while gutting a deer, lots of green goo and smelly gas come out. The green goo is food that is being digested and the smelly gas is from microbes fermenting the food.

The rumen can be recognized by the finger-like bumps, also called papilla, packed onto its inner surface. The papilla absorb useful products

produced by the microbes, particularly volatile fatty acids which the deer uses for energy. The reticulum is recognized by the reticulated pattern of folds on its inner surface.

Deer may not fully chew their food when foraging. Instead, they swallow it nearly whole, then rechew it later while bedded in a safe place. Chewing their cud, as this rechewing of food is popularly known, reduces foraging time because deer do not have to chew their food while foraging. Rechewing the bite of lazy daisy breaks it into more pieces so microbes are better able to digest it.



Once pieces of our lazy daisy have become sufficiently small, they pass out of the rumen-reticulum, and enter the omasum. This third chamber of the deer's stomach has large folds of tissue filling the cavity which absorb liquid and only allow small pieces of food to pass. Pieces of our lazy daisy leave the omasum and enter the abomasum, the fourth and final chamber of the stomach. The abomasum is similar to our stomach in that it produces acids and enzymes to initiate protein digestion.

Remaining pieces of our lazy daisy are not the only items to pass out of the rumen. Microbes also pass into the abomasum to be digested along with the remains of plant material. The microbes are made of protein and help protect the deer from deficiencies related to poor quality protein found in many plants. Microbes also make vitamins which the deer absorbs and uses. Although forage provides the raw material, deer largely exist on the microbes and their byproducts. In other words, deer do not digest plants- they digest microbes! This is a whole new way to view an herbivore.

Food and the remains of microbes leaving the abomasum enter the small intestine where digestive juices from the pancreas, liver, and the small intestine itself complete the digestive process. Absorption of nutrients into the blood stream is the other critical role of the small intestine. The small intestine is exceedingly long, although its length is not obvious because it is highly coiled.

At the junction of the small and large intestines our lazy daisy particles encounter a pouch called the cecum. Analogous to, but much larger than our appendix, the cecum houses additional microbes that can further digest some of the remaining plant particles. Any portions of our lazy daisy that do not enter the cecum proceed through the large intestine where water is absorbed. Near the end of the large intestine, undigested remains are formed into pellets, which are periodically voided, later to be noted by hunters investigating deer sign.

So, what can you learn while gutting a deer?

- Because deer do not fully chew their food when it is first consumed, some of the material in the rumen will be recognizable. Cut open the rumen (after you remove it from the deer's cavity) and look at the contents. You will be amazed with what you find and the contents will give you insight into what your deer are eating.

- Find the various chambers of the stomach. Their relative size will help you understand the deer's digestive strategy, the importance of microbes in that strategy, and why deer do well with some foods but not others. More on this in a later e-newsletter. A fringe benefit of being able to recognize each chamber is that you can amaze your friends the next time you eat a bowl of menudo!

- The abomasum supports parasitic worms. If there are many (i.e. dozens to hundreds) of these worms, you have an indication that something is amiss in your deer herd. Deer density may be too high or forage conditions may be poor, making the deer susceptible to parasites.

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