

Ruminants vs. Pseudo-ruminants vs. Equines

The Mouth

By: Lark Burnham, Ph.D., Ruminant Nutrition

In this installment, the mouth, including the lips, tongue, teeth and salivary glands, will be discussed. Although the mouth is often overlooked as part of the digestive tract, without it, the lower tract would be useless. The digestive process can only begin after food has been selected and processed by the mouth.

Although bovines, lamoids (alpacas and llamas), and equines may graze similar grasslands, they each have developed very different eating 'styles.' These differences allow herbivores of various species to coexist in the same physical space, or ecosystem.

Unlike pastures planted by man, native grasslands, contain a variety of plant species. Many of these plants exhibit mechanisms for self-protection, including physical (spikes, thorns or bark) and chemical (toxins unpleasant flavors, odors, and anti-

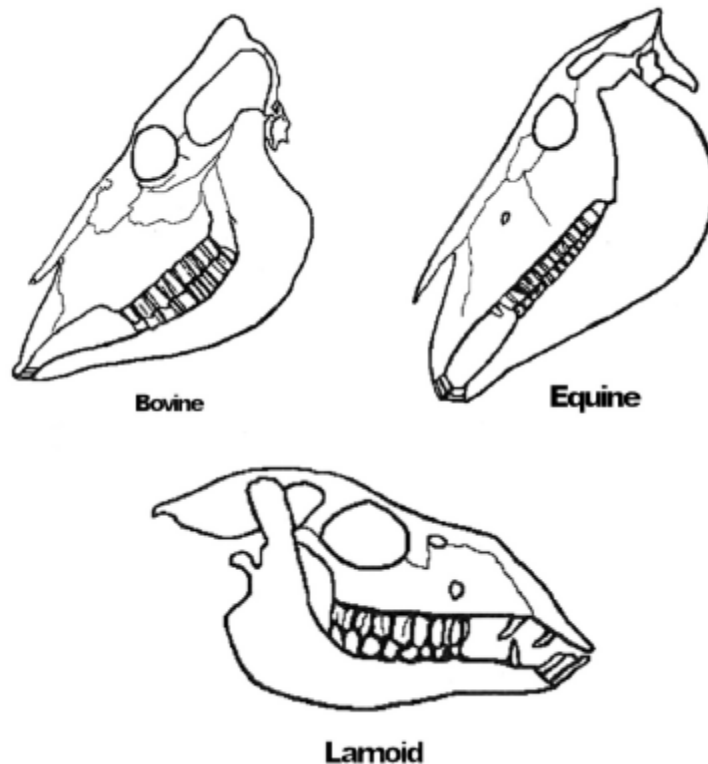
nutritional factors) barriers. To get around these defenses, some herbivores have evolved highly selective eating behaviors.

Selective herbivores, such as lamoids, tend to have narrow muzzles and prehensile upper lips that are split or cleft below the nose. Each half is highly discriminating and can operate independently of the other. Selective herbivores also have smaller tongues that generally do not protrude very far from the mouth.

Bovines, on the other hand, have wider muzzles and a long, prehensile tongue that allows them to consume vegetation by the mouthful. Equines are likewise less selective and depend on volume to meet their needs.

The appearance and type of teeth on the upper jaw or mandible is indicative of the amount of initial processing feed receives before traveling down the esophagus to the stomach. There are four types of teeth: chisel-like incisors at the front of the mouth, long, fang-like canines at the sides and the wide, flattened premolars and molars located toward the back.

Herbivores such as bovines and lamoids lack incisors on the upper jaw. Instead, they have



evolved a hardened area on the the front of the roof of their mouths known as the 'hard plate.' Vegetation is usually softened in the rumen before it can be effectively re-chewed against this non-boney surface.

Unlike ruminants and pseudo-ruminants, equines do not rely on regurgitation for additional roughage processing. Equines must masticate all consumed vegetation thoroughly before swallowing, because it only passes

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through the mouth once. In these herbivores, initial feed processing is accomplished by a full compliment of incisors and well-meshing molars and premolars.

Both lamoids and equines possess canines, but their presence is not related to eating. Llama and alpaca breeding males may often exhibit prominent fighting teeth or canines.

Proper jaw alignment is necessary for the effect utilization of premolars and molars. Regular use normally maintains even wear across molar surfaces, but jaw deformities can cause abnormal wear patterns. In these cases, tooth trimming may be required.

Although less apparent, the salivary glands are also integral to proper mastication and digestion in all herbivores. Saliva contains buffers which help reduce the acidity of regurgitated food, as well as amylase, an enzyme that breaks down starch. Chewing releases soluble cell contents, which include starch, while reducing cellulosic and lignified plant matter to easily-ferment able particles.

The initial ingestion and processing of vegetation is a carefully orchestrated process that involves the close cooperation of the lips, teeth, tongue and salivary glands. The degree of this initial processing depends on the nature of the stomach, which will be discussed in the next installment.

About the author:

Lark Burnham received a B.S. in Animal Science (1979), in KSU and a M.S. in non ruminant nutrition (1995) from Kansas State University, Manhattan, and a Ph.D Doctorate in ruminant nutrition (2004) from Texas Tech University, Lubbock. Her special interests are comparative nutrition, the role of the micro flora in all mammals, fiber digestion, and probiotics. Lark currently works for Natur's Way. Inc., Horton, KS, which produces MSE probiotics.

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