

The Importance of Calf Starter for Earlier Rumen Development in Dairy Calves

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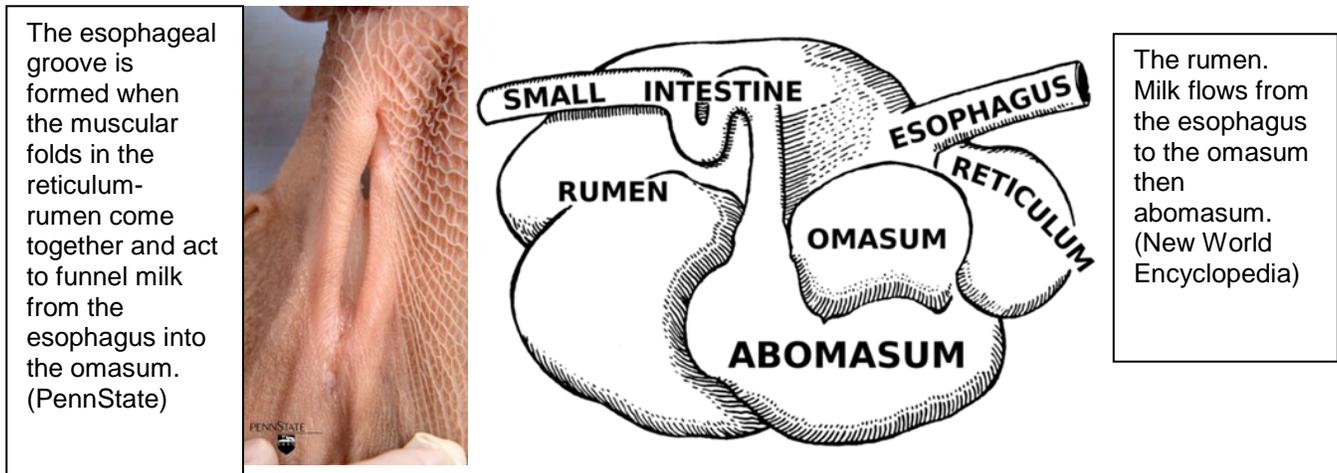


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When dairy calves are born, they are essentially monogastrics or simple stomached animals with a non-functioning rumen and reticulum. They rely on the nutrients supplied from milk for their nutrition. The cost per pound of gain for a young calf with this simple stomach is around \$2/day due to high labor costs associated with feeding milk. On the other hand, the cost per pound of gain for a weaned calf with a functioning rumen is around \$1/day due to the decreased labor costs associated with feeding forages and grain. Putting a calf on starter soon after birth will give them a good start toward a well-developed rumen.

Milk Diets

When milk is consumed by the calf, it empties directly into the omasum, not the rumen or reticulum, and then flows into the abomasum or the calf's true stomach. This is the result of closure of the esophageal groove. The esophageal groove is a muscle that creates a tube when the calf drinks milk that allows milk to bypass the rumen and enter the omasum and then abomasum.



The esophageal groove is stimulated by nerves which may be triggered by the taste of the milk, position of sucking, temperature of the milk, or other possible factors. Therefore, when a calf is on a solely milk or milk replacer diet, nothing enters the rumen. The milk goes directly to the omasum and then abomasum instead. This occurs regardless of how the milk is fed.

Rumen Development

For rumen development, the rumen microbes must have moisture, a fermentable substance, and heat to result in the development of the rumen papillae. Papillae are the finger-like projections on the surface of the rumen that absorb nutrients from the rumen contents.

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Without papillae, nutrients cannot be absorbed. These absorbed nutrients are used by the ruminant animal for maintenance and growth and milk production later in life. Because milk bypasses the rumen through the esophageal groove, calves need to be fed a fermentable substance and water that will go into the rumen. It is important to start feeding the fermentable substance and water early because the quicker the rumen papillae develop, the more nutrients can be absorbed, the faster the animal grows, and the sooner the calf can be weaned. If water is not provided separately from milk, rumen development will be reduced. There is no need to worry about heat for fermentation since it is provided by the body temperature of the calf.

The Importance of Grain

The rumen microbes provide nutrients to the calf by fermenting feedstuffs into volatile fatty acids (VFAs) which are absorbed by the papillae and used to make energy for the calf. There are three main VFAs: acetate, butyrate, and propionate. Much research has shown that of these three VFAs, butyrate is the most potent stimulator of rumen papillae development. Therefore, butyrate will allow for the quickest and best rumen development. Butyrate is made by the breakdown of concentrates by the rumen microbes. Therefore, grains must be fed for butyrate to be absorbed. Forages do not work as well since they are broken down to produce the VFA acetate, which will not result in rumen papillae development as quickly.



These pictures show the drastically increased papillae development in the rumen of calves the same age fed grain as opposed to those fed milk only or milk and hay. (Heinrichs)

Therefore, to get the most efficient growth of the rumen, calves should be fed concentrates.

Calf Starter Schedule

To develop the rumen papillae most efficiently, calves should be given water free choice and about 0.1 pounds or a small handful of calf starter along with the milk three days after birth. The calf must be given fresh starter every day because it may start to mold. The calf will only eat a small amount of starter for the first few weeks. Continue to slowly increase the starter until the calf is eating 1.5 to 2 pounds a day for three consecutive days. At this point, the calf can be weaned. This will typically occur around six weeks of age. Feeding this starter early is critical as it has been shown that a four week old calf fed starter has a more developed rumen than a twelve week old calf that did not receive starter. It is also important to feed a good quality calf starter. A good quality calf starter should contain 16 to 20% protein. It also needs to be made of highly palatable ingredients so the calf will want to eat it. Molasses is often used because it tastes good and will stick to the muzzle, so the calf will eat it. Also, a good quality calf starter has an easily digestible fiber source that will prevent parakeratosis, or a build-up of dead cells on papillae that block absorption of nutrients. Oats are commonly used as this fiber source. Finally, good calf starters contain a feed additive which helps prevent coccidiosis. Examples include Deccox®, Bovatec®, and Rumensin®. To earn the most money and grow calves the most efficiently, calves need to be fed a calf starter and water in the first few weeks of life.