



## **PEM and Molasses: The Real Story**

By Jackie Nix

Some goat producers are afraid to feed commercial molasses-based supplements due to a fear of inducing PEM (polioencephalomalacia) in their goats. While there are some valid concerns that must be addressed concerning use of molasses in a goat's diet, overall, commercial mineral and protein supplement products that contain molasses are safe for goats.

### **What is PEM?**

Polioencephalomalacia (PEM) is a noninfectious neurological disease of ruminants that results in softening of the gray matter of the brain. Blindness, muscular incoordination, circling, head pressing, spasms, and convulsions are all symptoms of this disease. The causes of this disease are not fully understood; however, there is strong evidence that point to the following as contributing causes:

1. *Thiamine deficiency.* The rumen microflora normally produce thiamine, along with all other B vitamins needed by the goat. Thiamine deficiency may be caused by thiaminases (enzymes that breakdown thiamine) found in plants such as bracken fern or by production of thiaminases by certain microbes in the rumen. Also, some sulfur-compounds are capable of destroying thiamine activity. Thiamine injections to animals showing signs of PEM often lead to recovery. However, low levels of thiamine do not always correlate with PEM development, nor do normal thiamine levels guarantee protection from PEM.
2. *Sulfur toxicity.* Sulfur is a necessary mineral for metabolism of rumen microorganisms and is a component of the vitamins thiamine and biotin. However when excessive amounts of sulfur are present (greater than the ability of the rumen microbes to utilize it), the excess sulfur is absorbed into the bloodstream as sulphides. Sulphides in the body can lead to necrosis of neural tissues. In addition, some sulfur-compounds can destroy thiamine activity. Many now believe that PEM development is more closely tied with sulfur excess than thiamine deficiency.
3. *Acidosis.* Acidosis is caused by rapid production and absorption of acids in the rumen when goats consume too much starch (primarily grain) or sugar in a short period of time. The rapid shift in bacterial populations (due to diet change as well as a shift in rumen pH) can promote the production of thiaminase. Acidosis can easily lead to PEM.

### **The Relationship Between Molasses and PEM**

Molasses is a by-product of sugar manufacturing. Most molasses used in livestock feeds is derived from either sugarcane or beets. Molasses is used in feedstuffs for many reasons. It is a good source of energy and trace minerals including sulfur and it helps to stimulate rumen activity. Molasses is used as an appetizer to encourage consumption. It also acts to reduce dust in feeds and as a carrier for vitamins and other nutrients. When properly managed, it is an excellent feed supplement.

Many stories of PEM in goats relating to molasses arise from producers feeding molasses-coated "sweet feeds" to goats. As stated above, when a goat's diet is rapidly changed to a diet high in either starches

(grains) or sugars (molasses) the rumen environment is disrupted and acidosis will result. Under these conditions, PEM can also occur. Pelleted sweet feeds are high in both starch and sugar and thus can easily promote acidosis if misfed.

The rumen is designed for relatively slow digestion of forages and other roughages. When rapid changes are made in ruminant diets problems **will** occur. A good rule of thumb in adapting goats from one diet to another is to use the 4-week system. For the first week feed 25% of the new feed and 75% of the old feed. The second week feed 50% old and 50% new. The third week, feed 75% new and 25% old and finally in the fourth week you can feed 100% of the new diet. This system allows adequate time for the rumen micro flora to adjust

Mineral and protein supplements make up a very small percentage of the total intake for a goat – 1 to 2% for minerals and less than 10% for protein blocks. Under normal circumstances, average goats can be expected to eat from 0.5 to 1 oz. of mineral supplement per day. Exact figures will vary according to the size and breed of the goat, the type of supplement, the nutritional status of the goat, etc. How much molasses does a goat receive under these circumstances? This will of course vary from manufacturer to manufacturer and product to product. But for the sake of argument, in the case of the Sweetlix 16:8 Meat Maker mineral, a goat consuming 0.5 oz. per day will receive 0.07 oz. of molasses products per day or less than 0.1% of the total dry matter daily intake. In the case of the Sweetlix 20% All Natural Protein Block for goats, consumption of 4 oz. of this product will result in consumption of 0.6 oz. of molasses products or 0.3 % of the total daily intake. These are well under the levels at which problems occur. In fact, low levels of molasses are actually useful in stimulating rumen function. Can pasture-fed goats offered commercial mineral or protein supplements containing molasses develop PEM? Yes. But the likelihood that the PEM is caused by the supplement is extremely slim.

In conclusion, the causes of PEM are not entirely known or understood. There is a loose connection between molasses consumption and development of PEM; however, this is most logically attributed to the development of acidosis or excess sulfur from diets high in molasses, such as those in which large amounts of sweet feed or free choice liquid molasses are fed. Goats on a forage-based diet receiving either commercial mineral or protein supplements in loose or block form containing molasses need not be concerned about the amount of molasses ingested. If you have any concerns or questions about the molasses content of a commercial supplement, contact a representative of the supplement manufacturer.

#### References:

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