



## Acidosis in Goats

By Jackie Nix

Acidosis (also known as lactic acidosis, rumen acidosis or grain overload) is a carbohydrate fermentation disorder of the rumen that can affect goats of all breeds and ages. As the name implies, acidosis results in the rumen pH becoming acidic. Acidosis is caused by the misfeeding of highly fermentable carbohydrates, underfeeding of effective fiber, poor management practices or a combination of the three. Acidosis is a disorder that varies in degrees of seriousness from a slight drop in feed intake to death. For simplicity sake, acidosis is commonly referred to in two forms, acute and subacute.

### **Acute Acidosis**

Acute acidosis is more serious than subacute acidosis, but luckily more rare. Acute acidosis is easily diagnosed, as oftentimes the most prevalent symptom will be sudden death. Other symptoms include a decrease or cessation of rumen movements, bloat, increased pulse and respiration rates, staggering, “star-gazing” (caused by an induced thiamine deficiency) founder and even coma. Animals with acute acidosis, if they survive, tend to be “poor doers” for the rest of their life due to permanent damage done to the linings of the rumen and intestines that inhibit nutrient absorption.

### **Subacute Acidosis**

Subacute acidosis occurs much more frequently but is more difficult to recognize. The primary result of subacute acidosis is reduced feed intake and an accompanying reduction in animal performance. Other symptoms include panting, diarrhea, reduced cud chewing and kicking at the belly or other signs of discomfort.

### **Treatment**

Cases of acute acidosis often require veterinary assistance. If you suspect acidosis, contact a veterinarian as soon as possible to avoid costly complications. Treatment usually includes drenching with a solution of sodium bicarbonate, administration of an antibiotic to suppress the lactic acid-producing bacteria and a change in feeding practices. If you have one animal with acute acidosis, the odds are good that the entire herd may be suffering from varying levels of subacute acidosis. Review your feeding program and management practices at this time to prevent future problems. In order to understand the causes of and therefore preventions for acidosis one should understand a bit about the ruminant digestion process.

### **Rumen Physiology**

The rumen (the first compartment of the ruminant stomach) is essentially a fermentation vat at the beginning of the ruminant digestive system. The rumen houses many species of

bacteria, protozoa and other microbes that feed on the rumen contents. Carbohydrates are the primary energy source for these microbes in the goats' diet. These come in two basic forms. The first is cell soluble carbohydrates (sugars and starches) and the second is the cell wall carbohydrates (pectin, cellulose, hemicellulose and lignin). The rumen microbes digest these carbohydrates converting them into volatile fatty acids, which are the main source of energy for the goat. The digestibilities of the two types of carbohydrates vary greatly according to several variables including: maturity and species of forages; source of carbohydrate (starch vs. cellulose); and the processing that has taken place (grinding of grain or chopping of forages).

Different groups of microbes digest the cell soluble carbohydrates (typically found in commercial feeds) than those that digest the cell wall carbohydrates (typically found in forages). To further complicate matters, each group of microbes thrives under different pH ranges. The starch- and sugar-consuming bacteria prefer a more acidic environment (pH range of 5.5 – 6.0) while the fiber-digesting bacteria prefer a more neutral environment (pH 6.0 – 6.8).

The type of diet influences the pH of the rumen. Forages (through the act of cud chewing) stimulate saliva production. The saliva of a goat contains bicarbonate, which buffers the rumen pH (makes it hard to become acidic). Also, the carbohydrates found in forages are more slowly digested than those found in grains and thus rapid pH drops do not occur. Conversely, starches found in grains are rapidly fermented resulting in a rapid production of acids. Due to the low fiber content of the grains, goats don't generate as much saliva and thus the acid levels rise unchecked. As the pH in the rumen decreases, the forage-digesting microbes are killed off, leaving the way clear for lactic acid-producing microbes to reproduce faster and thus produce even more acid, reducing the pH further.

Also, diets low in effective fiber (fiber must be a minimum length of 2 to 3 inches) will cause a decrease in rumen pH. This occurs for two reasons. First, if forage particle size is too short, the forages pass through the rumen too quickly to be effectively digested. Thus, the number of fiber-digesting microbes decreases and the number of starch-digesting microbes (especially lactic acid-producing bacteria) increases and as a result, pH lowers. Also, short fiber particles don't require cud chewing to further reduce particle size and therefore the goat produces less buffering saliva. Adding fats and oils to the diet can also reduce the rumen pH. Certain fats and oils can reduce fiber digestibility by killing fiber-digesting bacteria and/or coating of fiber particles.

### **Causes for Acidosis**

The most common cause is the overfeeding of grains and/or commercial feeds. This can occur from an animal accidentally getting into the feed bin or through routine overfeeding. Other, less common causes can be overloads of milk, apples, grapes, bread, sugar beets, or any other sources of sugar or starches. Additionally, feeding too little fiber (in the form of long forages) can lead to acidosis even if the diet is not excessive in starches or sugars. Management practices such as a rapid change in feed type or amount or changes in the frequency of feeding can also lead to acidosis.

## Prevention

*The key to prevention is a properly balanced diet and proper feed management practices.* First and foremost, feed goats a forage-based diet. These forages can be in the forms of natural browse and pasture or good-quality hay. Always provide forages on a free choice basis. Animals should never run out of forages or hay. If the hayrack is empty each day at feeding time, you are feeding too little. Increase the amount of hay so that a little is left over each day. Healthy goats should spend a significant portion of their time chewing their cud. If they are not, increase forage amounts.

Avoid too much grain or commercial feed. This is not to say that these feedstuffs are “bad” or shouldn’t be utilized at all. Correctly utilized, these feedstuffs can help to maximize production and maintain healthy animals. However, you need to know what you are doing in order to avoid problems. Grains and some commercial feeds contain high levels of rapidly fermentable carbohydrates and/or sugars (molasses) that can upset the delicate balance of rumen microflora and cause acidosis as explained above.

Novice goat owners who have not had their ration “balanced” by a professional should limit the amount of grain and/or commercial feed to less than half of the animals’ total daily diet. An average goat will eat roughly 3-4% of its bodyweight per day. Therefore, a 100 lb goat will eat about 3 to 4 lbs of total food per day (including forages). As a rough rule of thumb, a 100-lb. goat should receive a maximum of 1 to 1.5 lbs of grain or commercial feed per day to help avoid digestive problems. Please note that feed should be actually weighed at least once to get a good estimate on proper portions (don’t rely on fluid ounce readings on measuring cups since solids have different densities than liquids. Also, don’t rely on the listed weight on a coffee can since feeds and coffee have different densities.).

When introducing a new ration, gradually change the diet over a period of several weeks. NEVER make rapid changes to the diet of a ruminant. It will upset the microflora balance and could lead to acidosis. Also, when feeding grains or commercial feeds, it is best to split up the daily amount into 2 or 3 feedings per day rather than one “slug feeding” per day. This is especially important for animals that are receiving relatively large amounts of concentrates (over 25% of their daily diet). It is also key to always provide plenty of clean, fresh water. Lack of fresh water can lead goats to reduce feed intake. When they have access to clean water again they are more likely to overfeed. Check water tubs often for fecal contamination, debris (especially leaves in autumn), freezing (in winter) or any other factor that would reduce water intake.

Self-fed protein supplement blocks, such as the **Sweetlix® Meat Maker® Roughage Balancer Tub** or the **Sweetlix® Meat Maker® 20% Pressed Block**, can also help prevent conditions that can lead to acidosis when used as directed. Since goats have constant access to the blocks, they are able to consume small, regular meals that help to promote a healthy rumen environment. The hardness of the block prevents “slug feeding” and thus more dominant goats cannot eat more than their share (and be at risk for acidosis) like they can with grains or commercial feeds. Both Sweetlix® protein

supplements work well in conjunction with many popular goat feeds. The goats' licking action while eating the blocks helps promote saliva production (and thus buffering action) to help prevent acidosis.

### **Summary**

In conclusion, acidosis can be a problem in all types of goats. Acidosis is caused by improper feeding practices. As a rule, always provide good to excellent quality forages to goats on a free choice basis and always offer less than half the total diet in concentrates to help avoid acidosis. The **Sweetlix<sup>®</sup> Meat Maker Roughage<sup>®</sup> Balancer Tub** and the **Sweetlix<sup>®</sup> Meat Maker<sup>®</sup> 20% Pressed Block** offer many advantages to help avoid conditions that lead to acidosis. Please contact your local Sweetlix<sup>®</sup> dealer or visit [www.sweetlix.com](http://www.sweetlix.com) to learn more about this and other Sweetlix<sup>®</sup> supplement products for goats.

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