Nobody wants to mess with a wet dog or a wet bale of hay. Moist conditions across most of Georgia have contributed to a less than ideal hay season. Baling wet hay can increase moldiness, heat damage crude protein, or occasionally result in hay fires. This article will discuss the cause of heat production, review methods to determine moisture content before baling, and offer possible solutions when curing weather is less than optimal.

**Why does wet hay heat?**

To understand solutions to heating and storage problems from wet hay, it is necessary to understand the cause of heating. When hay is baled at the proper moisture content, a limited amount of fungi can grow in the bale and the forage will continue to respire for a short period of time. These microorganisms and respiration increases the temperature of the bale slightly and removes a small amount of moisture and serve to stabilize the bale at around 15% moisture. When hay is baled too wet, the microorganisms have adequate moisture available to reproduce and thrive. These fungi digest sugars and cause an excessive amount of heat production which can breakdown protein or carmelize protein and sugars into a form that is unavailable to animals. In some cases heat builds up to a point that allows combustion and barn fires. Even if many of the harmful effects of heat in wet hay are avoided, spores produced by the mold increase hay dustiness and affects palatability.

**Determining moisture content in the windrow or bale**

To prevent excessive heating, large round bales should contain no more than 18% moisture at baling and small square bales should not exceed 20% moisture. Most experienced hay producers can roughly determine moisture content using a ‘twist’ test. This test is truly an art form that can only be gained through experience. Hay moisture content is estimated by how it “feels” in the windrow and how it responds when bundles are twisted. When hay snaps relatively easily when twisted and juice cannot be extracted from stems, it is normally ready for baling.

A moisture and/or temperature probe is the most convenient method to monitor bales. Moisture probes are not 100% accurate, so they should be used to determine ranges of moisture and not absolute values. We are examining a potential windrow sampling method which hopefully will allow standard moisture meters to be used in the windrow prior to baling. This method has been tested in alfalfa fields, but to our knowledge never for grass crops. Moisture meters are normally used to probe existing bales. Multiple probe readings should be taken within and among bales with most attention placed on the extreme readings. Hay temperatures under 120 degrees are considered safe. Protein breakdown begins to occur at 120 degrees and carmelization begins around 140 degrees. Potential for combustion begins between 150 and 180 degrees. A “snapshot” temperature or moisture reading can be misleading. Temperatures should be monitored over time. Peak temperature normally occurs 7-14 days after baling, but may occur as late as 3 weeks post baling. If in doubt, store hay outside and away from other dry hay stacks.
**Potential solutions for wet hay**

A partial solution or preventative measure to minimize the amount of wet hay baled is to simply use a mower/conditioner and tedder on hay fields. Conditioning and tedding hay increases drying rate and decreases risks of exposure to rainy weather.

Of course, there will always be situations where hay will be baled prematurely as rain storms approach. Many producers ask questions regarding hay preservatives that can be sprayed at the baler pickup. These preservatives are normally composed of propionic or acetic acid. These acids eliminate mold growth and ultimately prevent excessive bale heating. Acids can be used when hay moisture is at or below 30-35% moisture. Application rate varies based on the moisture content of the forage and the dilution of the acid. Check product labels closely to insure that adequate acid is applied. Propionic and acetic acid are corrosive to equipment and people alike, so handle these materials with care. Several brands of buffered organic acids like ammonium propionate are available which are less corrosive to equipment. Due to the expense of these preservatives (approximately $5-$10 per dry ton of hay), acid treatment should be used selectively to avoid rain damage or allow baling early or late in the day.

Baleage or round bale silage is another alternative to prevent heat damaged hay. High moisture hay is sealed in plastic wrap to minimize and prevent bale heating. The wet harvested forage ferments under these conditions and forms silage that is stable for as long as oxygen is excluded. If oxygen is allowed into the bale, heating and spoilage will occur. See the June Georgia Cattleman article “Pros and Cons of Baleage” for more information on this subject.

Ammoniation is another management tool that can be used to prevent heating and mold development. This chemical treatment also increases crude protein content and fiber digestibility of low quality hay. Anhydrous ammonia is most commonly used to ammoniate wet hay. Anhydrous ammonia should be applied to tropical grasses like bermudagrass at 3-4% of forage dry matter. Safety should always be a concern when handling anhydrous ammonia, so be sure to research proper handling techniques before beginning this process. Extension bulletins outlining all aspects of ammoniation are available at your local county extension office or at [www.georgiaforages.com](http://www.georgiaforages.com) in the Extension bulletin section.

**Summary**

High moisture content of hay normally results in some level of heat and mold production which can occasionally result in fire danger. If hay must be baled at a higher than optimal moisture content, use management tools listed above to prevent this heating and damage. If it is impossible to implement these techniques, wait for sunny baling weather. Rain damage will likely not be as severe as mold or heat damage and the risk of fire should be eliminated.