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FOR IMMEDIATE RELEASE

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Careful With The Hay

The weather continues to be an issue for many farmers in the Tri-County Area. The issue is not the same for all of us, as some are extremely wet and some are in need of rain, with most somewhere in between. Most farmers are running behind in getting their hay in a bale, especially in the wettest areas, which seems to be a strip that runs through the southern part of Brown and Adams Counties. That particular area has seen as much as 7 inches of rain since Memorial Day Weekend. With that in mind, some may be trying to get things done a little too fast. I found some more information that might be helpful that was written by S. Ray Smith, Forage Extension Specialist and Jerry Swisher, Dairy Extension Agent, from Virginia Cooperative Extension.

Producers are challenged each year with small windows of opportunity in their efforts to bale and store hay at the proper moisture level while avoiding the risk of rain damage. Forage cut for hay must go from approximately 80% moisture to 20% moisture or less in order to be stable in storage as baled hay. As the cut forage dries down, both plant and microbial respiration (burning of oxygen) continues in the field.

All hay baled above 15% moisture will undergo some elevation in temperature the first couple of weeks in storage. Many producers refer to this elevation in hay temperature following baling as "sweating" or "going through a heat". This rise in temperature is caused by both plant and microbial respiration. Collins and other researchers from Kentucky report that a small amount of heating (130F) does not decrease hay quality and actually serves to dry down the hay by evaporating some of the moisture content.

Baling and storing hay high with moisture content (>20%) without taking steps to reduce or control microbial activity responsible for heat of respiration, may reduce nutritional quality. Soluble carbohydrates are the principal group of compounds utilized "burned off" during respiration. The decrease of soluble carbohydrates and other chemical components during microbial respiration results in an increase in acid detergent fiber (ADF) which lowers digestibility.

When hay undergoes significant heating during storage, hay color can change dramatically, for example, green to various shades of brown. The degree of color change (e.g. light brown to dark brown) is indicative of the severity of heat damage to the hay. This type of heat damage represents a chemical reaction that fuses plant sugar and amino acids into an indigestible compound and is called the Maillard reaction. This compound is also referred to as bound protein even though the sugars are rendered indigestible. The degree of heat damage can be quantified by conducting a chemical analysis for acid detergent insoluble nitrogen (ADIN).

Baling and storing hay too high in moisture content can result in spontaneous combustion or a hay fire. Hay stored at moisture levels sufficient to maintain high relative humidity of the air in the hay mass allows plant and microbial respiration to generate heat and elevates hay temperatures to 158F. The 158F temperature may be reached within a few days or it may take several weeks if the air is drier. Above 158F heat continues to be generated by oxidative chemical reactions.

When the temperature exceeds 175F, the thermal death of microbes takes place. The increase in temperatures due to the oxidative chemical reactions is basically responsible for greatly increasing the



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potential for a rapid increase in heat to combustion Temperatures of 448 to 527F. The amount of time required for heating up to combustion may vary from four to ten weeks; however, it could be earlier or later. The moisture content of the forage, bale density, climatic and storage conditions (e.g. size of stack, high moisture hay covered with dry hay) are all factors that influence the time until combustion.

Important Points and Recommendations

1. Small rectangular bales should be baled at 20% moisture or less to keep molding and heating to a minimum.
2. Since large round or rectangular bales retain internal heat much longer than conventional bales, they should be baled less than 18% moisture.
3. When baling above 20% moisture, propionic acid can be applied to reduce microbial activity and subsequent heating. Check for recommended application rates on the label.
4. Round bales should usually be left in the field for a few days/weeks (depending on moisture at baling) to allow heat to dissipate. When moist hay is stacked immediately after baling, the stack concentrates the heat, temperatures rise, quality losses occur, and the stage is set for a hay fire.
5. Check your hay regularly. Symptoms of heating include: slight caramel odor, strong burning odor, visible vapor, strong musty smell, and hay that feels hot to the hands.
6. Make a probe that can be driven or inserted into the hay mass to check the temperature. For example: take a 10 foot piece of pipe or electrical tubing. Attach a pointed dowel to one end and drill 6 to 10 1/2 inch diameter holes in the tube just above the dowel. Drive the probe into the hay stack and lower a thermometer on a string into the probe. The thermometer should be left for 0-15 minutes in several areas of the stack to ensure an accurate reading.
7. Watch for the following temperatures:
 - * 150 F (65 C) * Beginning of the danger zone. Check temperature daily.
 - * 160 F (70 C)* Dangerous. Measure temperature every four hours and inspect the mow.
 - * At 175 F (80 C)* Call the Fire Department. Wet hay down and remove it from the barn away from buildings and other dry hay.
 - * At 185 F (85 C)* Hot spots and pockets may be expected. Flames will likely develop when heating hay comes in contact with the air. Be extremely careful at this stage when moving hay.
 - * At 212 (100 C)*Critical. Temperature rises rapidly above this point. Hay will almost certainly ignite.

Take precautions and be extremely careful upon entering the barn. Pockets may have already burned out under the hay surface. Before entering a barn, place long planks on top of the hay. Do not attempt to walk on the hay mass itself. Always tie a rope around your waist and have a second person on the other end in a safe location to pull you out should the surface of the hay collapse into a fire pocket. This last recommendation may seem extreme, but precautions are essential when hay temperatures exceed 160F.

On another note, as we complete the baling of a field, it is important to get the roles of hay out of the field promptly to avoid damage to the regrowth. It does not have to be stored right away, as mentioned before, especially if it is marginally wet.

For hay being stored outside, keep these thoughts in mind. A row of round bales running north and south will get more exposure to the sun for drying out the top after a rain. Rows on high ground will reduce damage on the bottom from water running under the bales. Gravel or even raising a narrow strip, to set the bales on will allow the water to get away. Avoid placing bales under trees, as trees on protect from a sprinkle, but shade all summer long.

Dates to Remember

June 16	Nature Photography at 5:30 p.m. at Chatfield. Call 378-4424 ext. 125
June 30 – July 2	Festival of the Bells in Hillsboro
July 10-16	Adams County Fair