HOT HAY: HOW HOT IS TOO HOT?

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Questions arise every year about heating in hay and the potential for hay and silo fires. Although the potential for spontaneous combustion in hay exists it is not common. While the risk of total loss from burning is minimal, there is still a great potential for nutritive loss in hay and silage due to excessive heating.

The first cut hay that producers harvested in the upper Midwest this season was more mature than most would have liked. The large stems of this more mature hay are more difficult to dry and may have led to some hay being baled at a higher moisture content that producers realize. You are encouraged to be alert to the risk of heating hay in storage, and to pay closer attention to stored hay this summer. It is recommended to bale hay at less than 20% moisture or at slightly higher moisture conditions you are using an effective mold inhibitor preservative. For hay-crop silage, chop and store forage at 55% to 70% moisture and pack well to exclude excess air. Proper harvest and storage management keeps heating to a minimum.

Nearly all hay and silage heats a little in storage. It is a natural process where respiration of nearly dry plant cells and spoilage bacterial, yeast and fungi use plant sugars and oxygen and generate heat. The respiration and heating also require a high humidity. Hay baled at 18% to 30% or more moisture and silage stored at about 50% or less provide the right mixture of air, moisture and sugars for respiration and heating.

How hot is too hot? When should you become really concerned?

If hay or silage feels warm or hot, use a thermometer to know what temperature range actually is of your hay or silage. The best way to check the temperature of hay or silage is to drive a pointed tube about eight to 10 feet into the hot hay or silage. Lower a thermometer into the tube. A chemistry lab thermometer with a 200 to 300 F scale works well. Leave the thermometer in the tube for 10 to 15 minutes before reading. Hay or silage may have "hot spots," so it is desirable to check in several locations. If the temperature is:

125 ^{0}F
This temperature is considered to be normal. You could probably not hold your arm in hay at this temperature for more than 30 seconds.

125-150 ^{0}F
This extra heat is generated by respiration of bacteria and spoilage fungi. At these temperatures chemical processes called the Maillard reaction causes hay to turn brown, protein digestibility decreases and the hay is said to be "caramelized."

150-175 ^{0}F
Check temperature daily. The caramelizing Maillard reaction continues. Consider reducing the volume of the warm

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hay by spreading the hay out. Caution! It may be dangerous to move hotter hay without fire department assistance.

175-190^{0}F
Check temperature every two to four hours. Alert the fire department of the situation and let work with them on your management strategy. Chemical reactions which occur at these high temperatures begin to dominate the continued rise in temperature. Avoid addition of extra oxygen into the hot hay pile. Hay or silage that reaches these temperatures are often nearly black and have a much lower feeding value.

190-210(+) ^{0}F
Have the fire department present when hay is being removed. Spontaneous ignition is possible.

Don't forget about stored hay. Hay, particularly in deep piles, can retain heat and continue heating slowly for weeks or months ! You may smell hot hay before you feel it.

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