

# Over The Wire

A Beef Cattle E-Letter for Area Cattle Producers

## Preventing Hay Fires

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### *A Literal Hot Topic!*

The haying season is coming to a close here in North Central Idaho and growers have reported to me that the yield was very good. This haying season was full of short drying periods and many rain storms. A lot of hay was rained on and some hay was baled in a frantic hurry to beat the rain. With these conditions, some hay may have been baled too wet. Therefore, I think it is important to discuss a hot topic; hay fires. I don't even want to bring it up, but we need to look at what causes hay fires and how to prevent them.

### *Why Does My Hay Get Hot and Catch Fire?*

To begin with, let's hope like heck that you don't ever have a hay fire. The economic loss can be devastating. So what actually causes hay to heat and possibly burn? I think we all know the answer to that question. The number one cause of hay fires is hay being baled at too high of moisture content. But what really takes place that causes the hay to heat and burn?

Forage crops that are freshly cut continue to respire and give off heat until they have dried or cured. This heat may provide an ideal environment for microorganisms to grow which in turn adds to the production of heat.

When the forage is allowed to dry to the proper



moisture content prior to baling, producers don't have to worry about these microorganisms continuing to grow and generating heat. As the hay cures, respiration slows and will stop, in turn the hay temperature settles in at the surrounding ambient air temperature.

Problems occur when the forage is baled too wet, which intensifies respiration and microorganism growth, resulting in heat being generated and when it gets too high, spontaneous combustion occurs.

### *What is the Proper Moisture Content for Baling Hay?*

Most all of the literature indicates that when the forage is baled in large square and large round bales the recommended moisture level is 15 to 18%. With small square bales, the moisture level can be slightly higher but no more than 20%.

## Should the Hay Temperature Be Monitored?

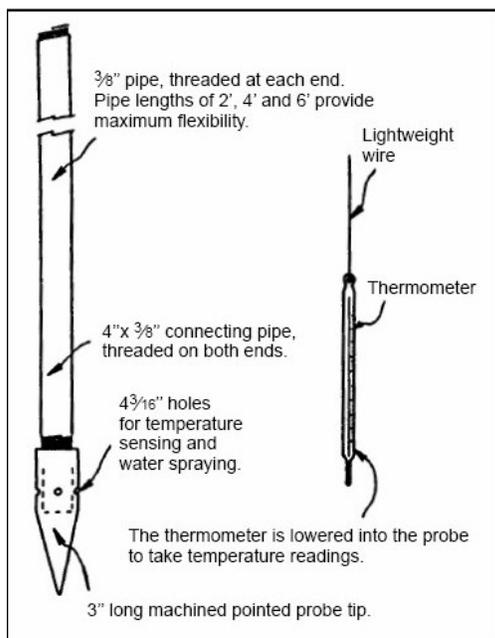
Yes, especially if the hay was baled a little too wet. I would definitely recommend that producers make an investment in a moisture tester for determining forage moisture content and a thermometer and bale probe for measuring bale or stack temperature. These two items are inexpensive compared to burning a stack and barn up in a hay fire.

In a publication entitled, Hay Fires: Prevention and Control, written by Timothy G. Prather from the University of Tennessee Extension Service, there was a diagram that outlined how to make a homemade probe for checking stack temperature. The probe can be made out of 3/8" pipe that has threads on each end. The length of the pipe can be whatever you want. A pointed tip will have to be made to fit on the end of the pipe to allow for easier penetration into the stack or bale.

To allow the air to enter the pipe, 3/8" holes will need to be drilled into the pipe near the end that goes into hay. On the tip, drill 4—3/16" holes.

The probe can be shoved into the bale or stack and then a thermometer, attached to a wire, can be lowered into the pipe and left for 10 to 15 minutes, so that the temperature can be determined. Diagram 1. below provides a picture of the probe:

Diagram 1. Probe and Thermometer



Prather also indicated that if a producer doesn't have a probe and thermometer, an approximate temperature of the stack or bale can be determined by inserting a 3/8" to 1/2" metal rod into the hay. The rod should be left in the hay for 10 to 15 minutes. The rod can then be removed and tested for temperature with your bare hand.

Prather stated that if you can hold the rod in your hand without any pain, the temperature is below 130 degrees F. If you can hold it, but it is hot and uncomfortable, the temperature is between 130 and 160 degrees F. If the rod is too hot to touch and hold in your hand, the temperature is over 160 degrees F and you will probably have a stack fire soon.

## At What Temperature Should I Be Calling The Fire Department?

In 2004, Penn State University published a paper entitled, "Hay Storage Fires". In this paper they shared information on critical hay stack temperatures and the corresponding action needed by the owner of the hay. Below in Table 1. is an explanation of the temperatures and what a producer should do:

Table 1. Critical temps and actions to take.

Temperature	Condition and Action
125 Degrees F.	No action needed
150 Degrees F.	Temperature will most likely rise. Check temp twice daily. Move hay to allow for air circulation.
160 Degrees F.	Check temp every few hours. Move hay to allow for air circulation.
175-190 Degrees F.	Hot spots or fire pockets are likely. Call fire department. Stop all air movement around hay. Remove hot hay with assistance of fire department.
200 Degrees F. Or above	Fire is present at or near the probe. Inject water to cool hotspots before moving hay. Call fire department, they should be prepared for fire when hay contacts air.

## ***How Long Do I Need to Monitor?***

We have all heard the term, “sweating” when it comes to the elevation in temperature of the hay during the first couple of weeks in storage. Most hay will go through this sweat in the first 7 to 10 days. Usually the temperature will go down in the next 15 to 60 days, depending on surrounding air temperature, humidity, bale and stack density and the moisture content of the hay when baled.

According to William Woodward, Washington State University Extension Agronomist, hay fires generally occur within the first six weeks of baling.

It is important for hay owners to monitor the temperature of the stack for the first six weeks after baling.

If the temperature rises in the first week or two and stays under 125 degrees F., things are safe. If the temperature keeps going up or doesn't go down, follow the recommendations found in Table 1. on the second page of this letter.

## ***Summary:***

We know one thing for sure, hay fires are expensive. Burning up a hay stack can really hurt economically. So what can we do to prevent hay fires?

1. We all know that hay fires are caused by baling forage when it is too wet.
2. It is recommended that hay be baled at 15% to 18% moisture if baled in a large round or square bale. The small squares can be baled at up to 20% moisture. Avoid baling anything that is over 20% moisture.
3. Hay growers should invest in a forage moisture tester. Farm stores and supply magazines sell portable hand held testers and baler mounted testers. Cost ranges from \$300 to \$400. Pretty darn cheap compared to the cost of a lost stack and barn.
4. Hay owners should monitor the temperature of their haystacks. Build a homemade probe or use a solid rod and test with your bare hands.

Good luck and remember to contact fire professionals if you have concerns.

### ***Contact Information:***

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### ***References:***

*Harshman, W.C., Yoder, A.M., Hilton, J.W., and Murphy, D.J. Hay Storage Fires. Hazardous Occupations Safety Training in Agriculture Task Sheet 3.7.2. 2004.*

*Gay, S.W., Grisso, R., Smith, R., and Swisher, J.M. Hay Fire Prevention and Control. Virginia Tech Cooperative Extension Publication #442-105. May 1, 2009.*

*Prather, T.G., Hay Fires: Prevention and Control. University of Tennessee Agricultural Extension Service, Department of Plant and Soil Sciences publication.*

*Woodward, W.T.W. Spontaneous Combustion in Hay Stacks. Washington State University Extension Article, June 1, 2004.*

*Extinguishing Fires in Silos and Hay Mows, NRAES-18, 2000, Cooperative Extension NRAES, Ithaca, New York.*

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