

# *Farm Safety*

## *Fire Risk and Hay*



# ***Hay and Spontaneous Combustion***

***Heating of hay can cause spontaneous combustion resulting in the loss of entire bales or even a shed.***



## ***Causes of Spontaneous Combustion***

Spontaneous combustion occurs when microbes turn plant sugars into water and carbon dioxide. From there, a chemical reaction begins to produce flammable gas that can ignite if the temperature goes high enough.

The initial heating is due to respiration of the plant material and bacterial activity and can often raise the temperature to about 45°C. This heating may continue up to about 65-70°C when organisms (fungi, bacteria) which actually live at the higher temperatures become active and generate heat through digestion.

Most fires resulting from spontaneous combustion start between 2-7 weeks after storage. This is when you should regularly check your hay.

### ***The degree of heating depends on:***

- Type of crop
- Crop maturity and moisture content
- Bale density, volume and storage system of the feed
- Types of bacteria and fungi present
- External conditions, such as atmospheric temperature, humidity and wind

### ***Heating can result from:***

- Excess surface moisture (eg from rain) trapped inside the hay at baling
- Plants being too green (containing internal moisture) at the time of baling
- A combination of the above

## ***Signs of Spontaneous Combustion***

If you store hay in a shed, look for the following signs that your stack is heating up.

**Storing damp hay should be avoided.**

- Steam condensation on the steel roof
- Mould growth on and inside bales
- Acrid fumes and hot humid air at the top of the stack

These are all indicators of heat generation from inside the stack.




## **What to do if the stack is too hot**

Be very wary of walking across the top of a stack suspected of being very hot. It may be so hot and air deficient in the middle of the stack, that it has become extremely hot, leading to charred bales which can collapse inwards with the extra weight on top. The sudden access to air will often result in spontaneous combustion and lead to active flames and severe consequences. **If in doubt dial 111.**

### **Top Tips**

**To avoid losing your precious winter feed there are some measures that can be applied to reduce the risk of combustion.**

-  **Regularly check your hay between 2-7 weeks after baling. Never shed store damp hay.**
-  **Loosely stack hay bales where possible to allow heat to dissipate. Space the bales out so plenty of air can circulate.**
-  **Wrap baleage is not as susceptible to combustion.**
-  **To check if your hay is overheating, you can simply insert a steel metal rod for a couple of minutes or a commercially available temperature probe.**

**To gauge the temperature of the hay, insert a metal rod into the hay stack for at least a minute.**

**Use this as a guide:**



**It's over 70°C if it's too hot to handle and spontaneous combustion can occur.**

**The temperature is up to 70°C if you can touch the bar very briefly.**

**The temperature is up to 60°C if you can only touch the bar for a short time.**

**The temperature is less than 50°C if you can handle the rod without discomfort.**

## ***Effects of heating on hay quality***

Heating is undesirable, not only because there is a danger of fire from spontaneous combustion, but heating also impairs or severely reduces the nutrient content in the hay. Heating is likely to damage the nutrients whenever hay with a moisture content of more than 25% is stored.

<b><i>Moisture Content</i></b>	<b><i>Observation</i></b>
<b>50-60%</b>	<ul style="list-style-type: none"><li>• Little or no surface moisture</li><li>• Leaves are limp</li><li>• Juice shows on stems or leaves if rubbed or pressed too hard</li></ul>
<b>40-50%</b>	<ul style="list-style-type: none"><li>• No surface moisture</li><li>• Parts of the leaves are brittle</li><li>• Moisture may be seen in stems twisted in a bundle, but the hay is still tough</li></ul>
<b>30-40%</b>	<ul style="list-style-type: none"><li>• Leaves begin to rustle</li><li>• No sign of moisture unless rubbed very hard</li><li>• Moisture shows in stems scratched with a fingernail or less easily when twisted in hands</li></ul>
<b>25-30%</b>	<ul style="list-style-type: none"><li>• Hay rustles</li><li>• A bundle twisted in the hands snaps with difficulty</li><li>• Shows little signs of moistness</li><li>• Thick stems may show moisture if scraped or split open with a fingernail</li></ul>
<b>20-25%</b>	<ul style="list-style-type: none"><li>• Hay rustles readily</li><li>• Stems snap when twisted and leaves may shatter</li><li>• Difficult to see any moisture</li><li>• Leaves shatter readily</li></ul>
<b>15-20%</b>	<ul style="list-style-type: none"><li>• Hay fractures readily</li><li>• Bundles snap easily when twisted</li><li>• Difficult to see any moisture and leaves shatter readily</li></ul>

***IF YOU HAVE ANY CONCERNS – DIAL 111***