

## 2008 MFRP Study Brief: Effect of Moisture & Bale Wrapping on Temperature & Forage Quality in Horse-Quality Hay

*by Krishona Martinson and Craig Sheaffer, University of Minnesota*

Since 2000, there have been over 900 livestock and poultry barn fires in Minnesota, resulting in over \$26 million in damages (Minnesota Fire Incident Reporting System). A number of these fires have been caused by spontaneous combustion of hay that was baled too wet. Moisture level at baling is a significant factor leading to the possibility of hay fires. Research has studied the relationship between forage moisture levels and the resulting bale temperature in small and large square bale dairy-quality hay, but not in horse-quality grass hay. Most guidelines currently used in the equine community are extrapolated from dairy research results. However, horses are highly sensitive to mold. Guidelines for hay moisture at baling established for cattle may be too high for mold-sensitive horses. Ingesting moldy hay can result in both short- and long-term respiratory problems, specifically heaves and colic. Moldy hay also can cause human respiratory distress in addition to labor and financial burdens related to replacing and disposing of the moldy hay.

Previous research suggests that forage needs to be dried to <17% moisture for quality horse hay. In Sweden, researchers have begun wrapping round bales in plastic at ~35% moisture for horse use. Wrapping bales at this moisture level results in minimal fermentation and has been preliminarily shown to be safe for horse feed in Sweden. Even though bale wrapping is an accepted means of forage processing for cattle, it has not been accepted or researched extensively in the horse community in the United States. Bale wrapping may be a strategy to provide high quality horse hay.

The objectives of this research:

1. Determine the relationship between moisture at baling and temperature of round baled horse quality grass hay.
2. Determine the relationship between moisture at baling and forage quality, including presence and identification of mold.
3. Determine if forage quality of wrapped hay is equivalent to unwrapped hay quality and if wrapped hay can be safely fed to horses.

### CONCLUSION

Moisture at baling of orchardgrass round bales had a significant effect on bale temperature over time. The <17% moisture bales reached a high temperature of 128°F at 7 days after baling; the 20-25% moisture bales reached a high temperature of 145°F at 11 days after baling; the 30-35% moisture unwrapped bales reached the high temperature of 188°F at 11 days after baling; and the 30-35% moisture wrapped bales reached a high temperature of 97°F at 1 day after baling. All bales appeared to reach a more consistent temperature 14-28 days after baling.

Within the different moisture ranges, hay quality remained similar over time for the 30-35% moisture wrapped bales. Some differences in quality over time were seen in the <17% moisture bales, and the 20-25% moisture bales. The most changes in hay quality over time were recorded with the 30-35% moisture unwrapped bales.

There was a trend of less mold at the higher temperature ranges in the unwrapped hay. Due to mold and yeast populations, only the 30-35% moisture wrapped bales can be considered horse quality hay. Wrapping hay had a positive effect on maintaining forage quality and reducing temperature and mold compared to not wrapping hay. Additional data are needed, including establishing a moisture threshold that results in a minimal amount of mold and yeast.