

Effect of moisture content at baling on hay quality

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Moisture content of hay at baling is not the most important determinant for hay quality but is very important, nonetheless. The main factor affecting the nutritive value of hay is its maturity at cutting, the earlier the better and won't be discussed further in this article.

The most notable concern with baling hay too wet is the high risk of spontaneous combustion (fire) as witnessed all too often over the last twelve months. However, baling wet hay also results in a significant reduction in nutrient value along with losses in dry matter production, which are detrimental when feeding.

When first cut plants continue to respire or "breathe" substantially down to a moisture content of about 30% moisture content. During this process sugars in the plant are broken down into carbon dioxide + water vapour + heat and usually not detected in the windrow as the components escape detection. However this respiration and other microbial activity, mainly due to fungi, will continue down to very low moisture levels although at very reduced rates.

This particular heat is of little consequence except to provide proper growing conditions for bacteria, and will subside as the moisture content of the forage drops during the curing process. But, if hay is baled too wet, microbe populations flourish and exacerbate the heating process, resulting in hay that is lower in nutritive value and dry matter availability. Table 1 shows some USA results when hay was baled over a range of moisture contents.

Table 1. Dry Matter and quality loss (% of initial crop yield) at different hay storage moisture values¹.

Storage Moisture	Dry Matter Loss	Digestible Dry Matter Loss	Crude Protein Loss
11 to 20%	4.5%	6.2%	6.0%
20 to 25%	7.9%	11.8%	8.8%
25 to 34%	10.9%	13.5%	7.5%

¹ Taken from extension publication FO-07404-GO, 1999,

"Preserving the value of dry stored hay," University of Minnesota Extension Service.

The recommendations for maximum desired moisture contents for baling hay (Table 1) is a compromise between when this activity is almost stopped but moist enough to minimize leaf shattering, moulding and heating. Therefore when hay is baled some heating will occur, the heat part of the above equation now being felt as it is trapped somewhat in the bale. Large square bales hold more heat than rounds which both retain more core moisture than small squares.

Table 2. Recommended Moisture Contents (%) for Safe Storage of Hay

Type of Bale	Recommended moisture content* ranges for baling hay (%)
Small square bales	16 - 18
Large round bales	14 - 16
Large square bales	12 - 14

* Hay stored slightly above the maximum moisture content in each range will be reduced in quality and dry matter due to slight heating caused by plant respiration and possibly mould growth.

If baling hay with more than the recommended moisture contents, do not stack indoors for at least 30 days.

Baling above the recommended levels in Table 2 will result in less loss of leaf so increasing nutritive value and reduced DM losses. However, several new hay preservatives have recently become available on the Australian market and claim to reduce the dangers of baling wet hay. Most recommend their use on hays with moisture contents below about 25% moisture but I suggest that for large round bales, and especially for large rectangular bales, the moisture content should be below 20% moisture. This is due to their inherent large volume and/or high density which restricts the ability of heat to escape. Please read their instructions carefully as the use of the correct rate of application and ensuring adequate coverage of the forage being baled is essential to ensure the product can operate as stated.