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THE EFFECT OF FRESH CUT® BRAND PLUS HAY PRESERVATIVE IN REDUCING HEAT UNITS GENERATED IN STORAGE OF HAY BALED AT HIGH MOISTURE

KEY CONCLUSIONS

- *A premium hay additive like Fresh Cut® brand Plus hay preservative can effectively treat first and fifth cutting hay at moisture levels up to 27%. Climatic conditions at those times of the year typically are unfavorable for adequate dry-down of hay above that moisture level.*

INTRODUCTION

There is a combination of the moisture, product used and the application rate at which a forage preservative will limit the heat generated in a hay bale during storage and reduce the amount of heat-damaged protein produced during storage. The net effect is an increase in the nutritive value of the hay and improved visual appearance of the bales.

OBJECTIVES

To compare three commercial forage preservatives in the reduction of heat units produced in individual bales during storage in an open-sided pole barn with conditions associated with first (May) and fifth (October) cuttings which are characterized with minimal conditions suitable for drying cut forage raked into windrows.

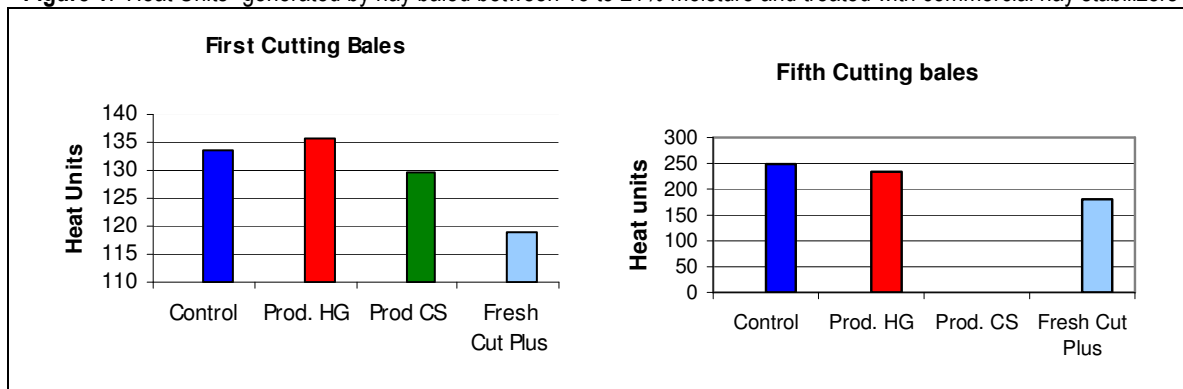
WHAT ARE HEAT UNITS?

Heat produced in bales of hay while curing is a dynamic process. The temperatures reached inside the bales mimic the daily cycles of the environment. However, in bales that overheat, the maximum and minimum temperatures inside the bales are higher than the average temperature of daily cycles of the environment. In forage making, a Heat Unit is the above average energy available to cause non-enzymatic browning commonly known as caramelization or Maillard Reaction in forages. Heat Units (HU) are calculated by the formula: $HU = ((\text{daily max } T - \text{daily min } T)/2)$.

RESULTS AND DISCUSSION

In first cutting alfalfa hay, treatment with Fresh Cut® Plus significantly ($P < 0.05$) reduced Heat Units compared to the untreated control as well as to the other commercial products by an average of 14 units. Fifth cutting bales produced more Heat Units during storage than first cutting bales, but the comparisons were similar. Fresh Cut® Plus also significantly ($P < 0.05$) reduced Heat Units produced over the untreated control and product HG on an average of 60 units. See Figure 1.

Figure 1. Heat Units¹ generated by hay baled between 18 to 21% moisture and treated with commercial hay stabilizers²



¹Daily heat units produced during storage were calculated using the formula: (maximum daily temperature minus minimum daily temperature) divided by 2.

²Commercial products were applied at the label recommended rates. Product CS was not used in fifth cut.

Bars with different superscripts are different ($P < 0.05$)

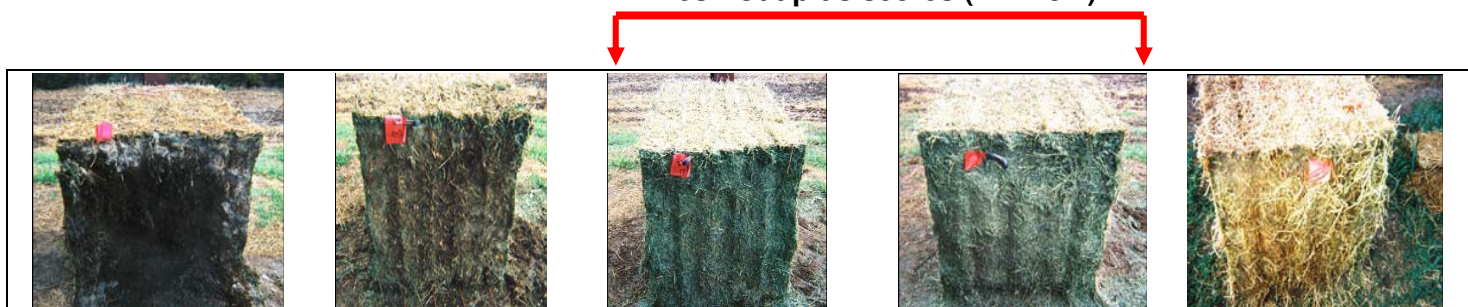
WHAT DOES THIS MEAN FOR A HAY PRODUCER OR BUYER?

After twenty-one days in storage, bales from each treatment were cut in half, and each bale was evaluated using a visual scoring method described below. The target is to be between a score of 2 and 3 that would be a bale with moderate heat damage.

Fresh Cut® Plus maintained a visual green color score of 3.2 to 2.2, indicating minimal heat damage caused by baling and storing hay at moisture content between 18 and 22%. From these results, a hay producer can feel confident that he/she has an alternative in Fresh Cut® Plus when baling hay at moistures between 18 to 22% due to marketing strategies or due to unfavorable hay making conditions knowing that the heat damage will be minimal and visual appearance will be appealing to a customer or an animal.

Crude protein digestibility was measured after incubation in rumen fluid for 12 hours. NDF digestibility was measured after incubation in rumen fluid for 48 hours. Values given in table were measured during evaluation and should not be interpreted as guaranteed analysis.

Fresh Cut plus scores (2.2 – 3.2)



Visual Score FIVE	Visual Score FOUR	Visual Score THREE	Visual Score TWO	Visual Score ONE
Extensive heat damage	Moderate heat damage	Good green coloring low heat damage	Moderate drying Damage	Extensive drying damage
HU > 350	HU > 250	HU ~ 150	HU ~ 120	HU < 100
Crude Protein 19.5%	Crude Protein 18.6%	Crude Protein 20.9%	Crude Protein 20.7%	Crude Protein 20.9%
CP digestibility: 58.0%	CP digestibility: 62.3%	CP digestibility: 72.6%	CP digestibility: 69.3%	CP digestibility: 67.6%
NDF: 44.8%	NDF: 42.6%	NDF: 34.3%	NDF: 35.7%	NDF: 35.4%
NDF digestibility: 22.2%	NDF digestibility: 25.8%	NDF digestibility: 33.6%	NDF digestibility: 36.9%	NDF digestibility: 24.9%

SUMMARY

Drying hay below 20% moisture reduces the incidences of heat damage. However, due to climatic conditions associated with first and fifth cuttings in the Midwest, there may be insufficient Heat Units to effect good drying. It appears from these data that if a producer is making hay at a moisture content of between 18 and 22%, there are effective hay additives like Fresh Cut® Plus that increase the probability of achieving hay with green color and reduced heat damage, thus adding value to the stored crop.