

PLANT MATERIALS TECHNICAL NOTE

CUT HAY IN THE AFTERNOON TO IMPROVE FORAGE QUALITY

by

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It has been known for a long time that plants accumulate sugars in leaves during the day because the rate of photosynthetic production of sugar is faster than its export to other parts of the plant and faster than its conversion to structural cellulose and lignin carbohydrates. Hay producers can use this knowledge to increase the nutritive value of hay simply by mowing hay in the afternoon hours rather than the morning hours. Recent studies show the total non-structural carbohydrates (sugars and starch) are significantly greater in alfalfa mowed after noon than when mowed in the morning, with peak content at 4:00 p.m. (see Figure 1).

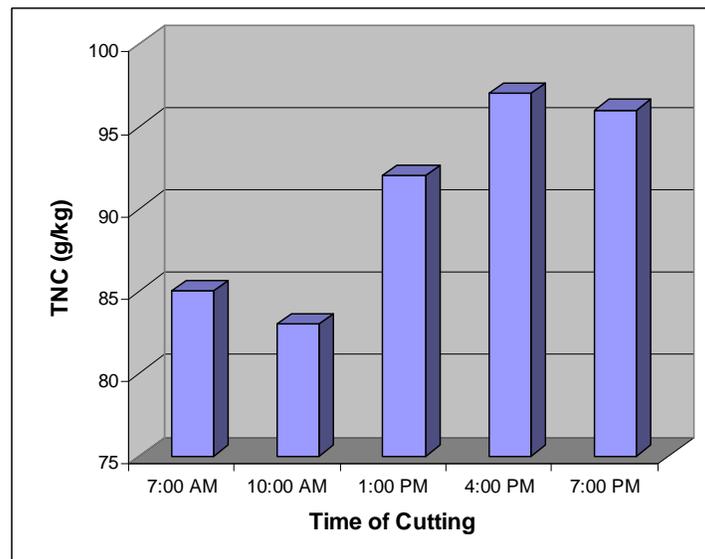


Figure 1. This graph shows a significant increase in the amount of total non-structural carbohydrates (TNC grams per kilogram of hay) of alfalfa harvested in the afternoon compared to alfalfa harvested in the morning (the data is from Burns, et al. 2007). Non-structural carbohydrates are predominantly easily digested sugars that provide energy to livestock for growth and reproduction.

In addition, the concentration of structural carbohydrates in alfalfa hay measured by neutral detergent fiber decreases over the course of the daylight hours (see Figure 2). These carbohydrates are not easily digested by livestock and do not add to the nutritive value of hay.

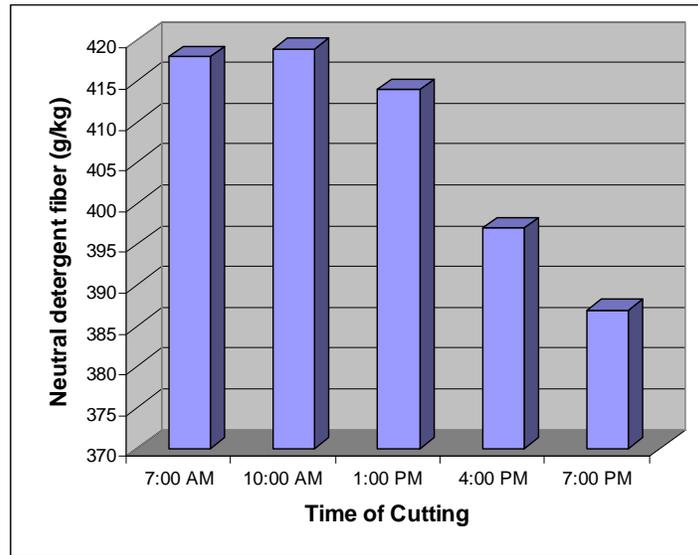


Figure 2. This graph shows the neutral detergent fiber content (grams per kilogram of hay) of alfalfa cut at different times of the day and fed to cattle, sheep, or goats (the data is from Burns, et al. 2007). Neutral detergent fiber is a measure of the cellulose and lignins that provide rigidity to plant cells and structural support for the plant.

Feeding trials show livestock can detect these differences. Steers, sheep, and goats fed alfalfa hay cut at different times during the day consumed more from the 4:00 p.m. hay than the 7:00 a.m. hay (see Figure 3).

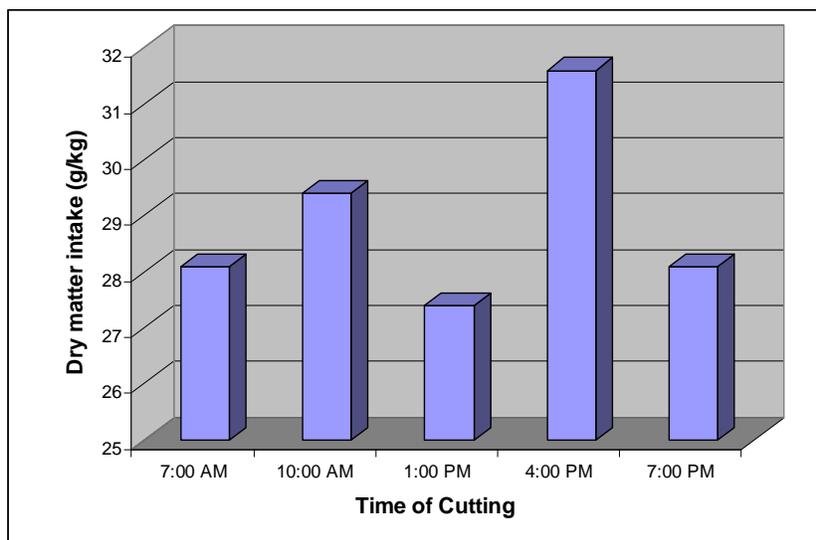


Figure 3. This graph shows the daily dry matter intake (grams of dry matter per kilogram of body weight) of steers fed alfalfa hay cut at different times during the day (the data is from feeding trials conducted by Burns, et al. 2007).

Manure samples from these animals showed they were able to assimilate more of the hay as measured by dry matter disappearance when the hay was cut at 4:00 p.m. or later than when cut earlier in the day (see Figure 4). This means animals can gain more weight per pound of hay consumed when the hay is cut later in the day compared to hay cut in the morning.

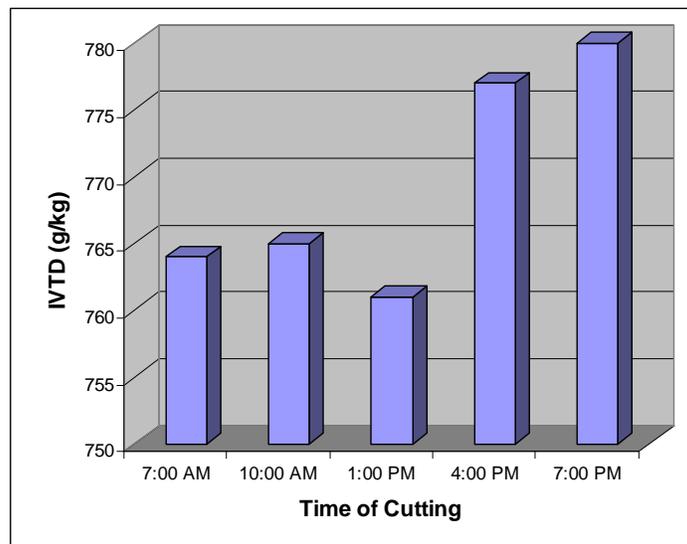


Figure 4. In vitro dry matter disappearance (IVDT g/kg) of alfalfa hay harvested at different times of the day and fed to steers, sheep, or goats (data from Burns, et al. 2007).

The results were the same regardless of whether the hay was the first, second, or third cutting. Total non-structural carbohydrate content of alfalfa hay was greater in the afternoon cutting than the morning cutting when it was harvested in July, August, and September (see Figure 5).

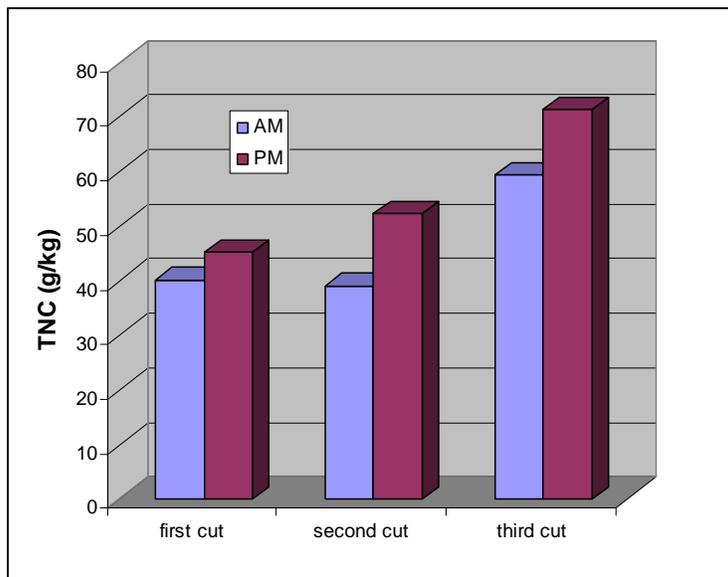


Figure 5. Total non-structural carbohydrate content (TNC g/kg) of alfalfa hay cut either at sunup (a.m.) or sundown (p.m.) from three cuttings during the season (July 8 and 9; August 13 and 14; or September 22 and 23) and fed to sheep (data from Fisher, et al. 2002).

Likewise, structural carbohydrate content was greater in the morning hay than the afternoon hay when it was cut in July, August, and September (see Figure 6).

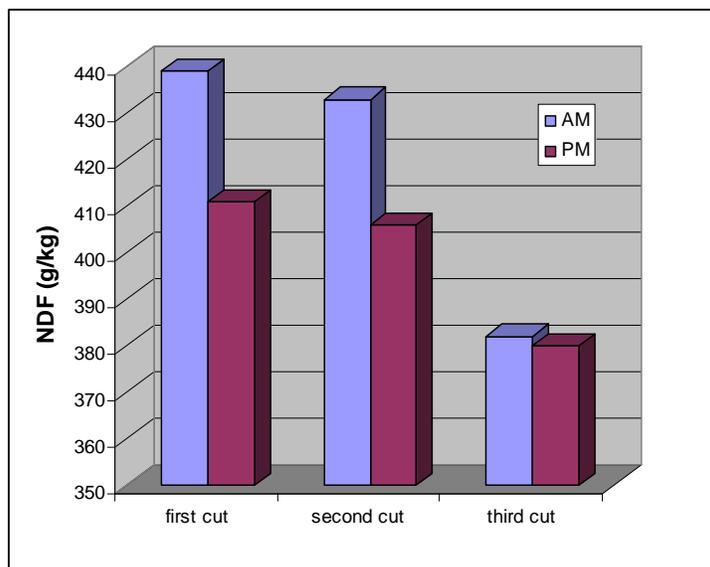


Figure 6. Neutral detergent fiber (NDF g/kg) content of alfalfa hay cut either at sunup or sundown and at three cuttings during the season (July 8 and 9; August 13 and 14, or September 22 and 23) and fed to sheep (data from Fisher, et al. 2002).

Identical results were found in studies with tall fescue and switchgrass hay, and most likely apply to all hay species. Similarly, sheep intake of ryegrass and white clover increased when grazed over the course of the day. Intake rates of ryegrass were 2.5 and 2.3 grams dry matter per minute at 7:30 a.m. and 11:30 a.m. respectively, and 3.2 grams dry matter per minute at 3:30 p.m. and 7:30 p.m. Intake rates of clover were 3.5 and 4.2 grams dry matter per minute at 7:30 a.m. and 11:30 a.m. respectively, compared to 4.7 and 5.5 grams dry matter per minute at 3:30 p.m. and 7:30 p.m. respectively. This has implications for forage harvest management.

With the cost of fuel and fertilizer increasing, producers can get more for their money by cutting hay in the afternoon. However, cutting hay at dusk or after dark may increase the risk of encountering wildlife. Cutting hay should cease at sunset when wildlife become vulnerable to harvest, or producers can reduce risks of wildlife encounters by cutting at slower speeds and using a flushing bar.

References

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