Grazier's Notebook

Wisconsin TEAM Forage

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Stockpiling Pasture

by ***Laura Paine[1] and Ken Barnett[2]***

Introduction

The concept of stockpiling is simple. Rather than cutting, drying, and storing hay to feed in winter, you grow pasture forage until frost and let the animals harvest their own feed as late into winter as weather conditions allow. Most classes of livestock can graze through up to 8 inches of snow and are comfortable in much colder temperatures than many people imagine. However, like everything in pasture management, it's more complicated in practice. Successful stockpiling is a result of planning, timing, and luck.

There are two main reasons given for stockpiling. The first and most obvious one is that it replaces mechanically harvested, stored feed with the cheapest feed we can produce – pasture. It should save money.

The other reason is that it can improve pasture utilization the following season by staggering spring and early summer grass growth. Fifty percent or more of pasture growth occurs during the 'spring flush'. Making hay off some acres is the most common way to deal with this overabundance. The idea behind stockpiling is that winter grazing of some paddocks can help stage paddocks to accumulate forage at different rates in spring.

Successful Stockpiling

There are three primary factors in stockpiling success: fall moisture, fall nitrogen availability, and winter weather conditions. Clearly, there is some risk involved, since we have no control over two of the three factors. In comparison, when you make hay for winter feeding, you have the greater cost of mechanical harvest, but somewhat less weather risk, especially if you can store the hay under cover.

The right amounts of nitrogen and moisture will maximize the amount and quality of stockpiled forage going into winter. A mid-August application of 50 pounds nitrogen per acre will satisfy the nitrogen requirement, but timely rainfall is equally important.

[1] Grazing and Organic Agriculture Specialist
W DATCP Division of Agricultural Development
PO Box 8911
Madison, WI 53708
608-224-5120
laura.paine@datcp.state.wi.us

[2] Extension Educator
University of Wisconsin-Extension
126 Larkspur Lane
Wausau, WI 54401
715-355-4561
ken.barnett@ces.uwex.edu

Under typical Wisconsin conditions an acre of stockpiled pasture will yield between one-half and one ton of forage after frost.

Once the forage has been stockpiled, its availability and quality depend on snow cover and temperature conditions throughout the winter. The longer it is out there in the field, the more quality and quantity will decline. Stockpiling for spring is a much more questionable proposition than for fall.

What does the research tell us?

Beyond these general principles, what else should we know? Luckily, we have a very comprehensive study conducted in 1996 and 1997 in Wisconsin at Arlington, Lancaster, and Marshfield. The study looked at seven grass species, three harvest dates, and four nitrogen treatments at three sites in Wisconsin. The seven grass species were late orchardgrass, early orchardgrass, quackgrass, reed canarygrass, smooth bromegrass, tall fescue, and timothy.

There were three harvest dates. The first harvest was taken just after the first killing frost (October). The second harvest was taken in early-winter (December). The third harvest was taken in early spring prior to the greenup (March).

There were four nitrogen treatments. The first two treatments were either 0 or 60 pounds nitrogen per acre on August 1. The third treatment was 90 pounds nitrogen per acre after first spring cut and 60 pounds nitrogen per acre on August 1. The fourth treatment was 40 pounds nitrogen per acre applied before spring cut, 50 pounds nitrogen per acre after spring cut, and 60 pounds nitrogen per acre on August 1.

Harvest Dates

The first sets of plots were harvested after the first killing frost in October. Across all sites and all species, the N-fertilized stockpiled pasture yielded 1.24 tons of dry matter per acre (t/a). The non-fertilized plots averaged a yield of 0.72 t/a.

Averaged across all sites, grass species, and nitrogen treatments, yields from stockpiled plots harvested in December (0.95 t/a) and March (0.80 t/a) were lower than the October harvest. Between October and March, there was an approximate 50% loss in dry matter through decomposition and leaching of carbohydrates.

Nitrogen Effects

Sixty pounds nitrogen per acre on August 1 increased fall yield of the stockpiled forage by nearly 75% over unfertilized plots at all sites averaged across harvest dates and grass species. Nitrogen treatments which included spring and summer nitrogen applications affected summer yields, but had no beneficial effect on fall forage regrowth. So, if you’re going to stockpile, nitrogen applied in August is essential for good fall growth.

Species Response to Stockpiling

Species rankings were generally the same across all harvest sites and dates. Either tall fescue or early-maturing orchardgrass ranked highest in yield at each harvest date and site. The late-maturing orchardgrass usually ranked third. Yields (t/a) ranged across the species as follows: tall fescue, 1.41; early orchardgrass, 1.35; late orchardgrass, 1.24; timothy, 1.17; reed canarygrass, 1.09; smooth bromegrass, 0.96; and quackgrass, 0.95. These are yields cut at grazing height (3 to 4 inches). Actual animal intake, of course, will vary with management, livestock type, and pasture composition.

Forage Quality

Forage quality levels for this research were significantly lower than what is observed by farmers who routinely stockpile pasture. Nitrogen application resulted in an average crude protein (CP) increase of one percent across all grass species, but did not affect digestibility (DG) of the forage significantly. October forage quality with added nitrogen averaged 11.6% CP and 73% DG. Crude protein levels declined up to 2 percentage points between October and December, but did not decline consistently between December and March. Digestibility values declined an average of 3 percentage points between October and December, and another 5 percentage points between December and March.

Several graziers who have tested stockpiled forage report quality levels similar to what they observe in spring and early summer, with protein levels in the upper teens and low twenties and reasonably good Relative Forage Quality (RFQ) values. It is unclear why the study values were so much lower, although one can speculate that management or weather conditions may have contributed.

Best Species

Which species performed best for stockpiling? Tall fescue was the best. It is remarkably well adapted for stockpiling because of its more uniform distribution of growth over the season. It accumulates biomass well in late summer and fall, and its stiff, waxy leaves seem to hold up better than average over the winter. Early orchardgrass was next highest in yield and was higher in CP and similar in DG to tall fescue. The late orchardgrass usually ranked third.

Timothy and reed canarygrass both had average yields and average levels of CP. However, the digestibility of timothy was among the highest, while reed canarygrass had among the lowest digestibility levels.

Smooth bromegrass and quackgrass had the lowest yields and higher than average protein levels. Digestibility of smooth bromegrass was relatively high, while quackgrass DG was uniformly low.

Staggering Spring Growth?

Many people talk about the role of stockpiling in managing the spring flush. The theory is that stockpiling rather than grazing in the fall allows the plants to store root reserves which will then contribute to faster greenup and growth in spring. Because the forage is grazed after growth has stopped in fall, root reserves should remain intact the following spring to contribute to more vigorous growth. Non-stockpiled paddocks should green up more slowly because they've gone into the winter with no root reserves. This makes intuitive sense and it may actually occur under some circumstances, but this study did not provide evidence to support these assumptions.

At the Arlington site, the stockpiled pastures did not accumulate more forage in early spring compared to non-stockpiled pastures. Early spring yields were similar between stockpiled/winter-grazed and fall-grazed/non-stockpiled pastures. At Lancaster, the stockpiled/winter-grazed forage had lower early spring yields than the fall-grazed/non-stockpiled plots. Treading injury during winter grazing might have damaged crowns and negatively impacted spring regrowth. In this case, the stockpiled/winter-grazed paddocks greened up more slowly than the fall-grazed/non-stockpiled paddocks. So, while the mechanism is different, we've still achieved the desired result--staggered spring growth of paddocks to improve pasture utilization.

Putting it all together

With a little bit of nitrogen and little additional cost, you can get at least an additional fall grazing by stockpiling some of your paddocks. While stockpiled forage in this study was of relatively low quality compared to fresh pasture, many experienced graziers have been able to obtain higher quality levels with a combination of nitrogen fertilizer, good management, and a little bit of luck. For many graziers, especially seasonal dairymen, extending the season into December is quite feasible and very practical. Because of the continuing decline in dry matter and quality and the logistical challenges of grazing through snow and ice, it is questionable whether we should pursue stockpiling for feeding beyond early winter as the primary forage source for lactating dairy cows.

Stockpiling is one of several tools we have to help manage the grass farm's resource base. It is used most effectively on farms with more than one acre of pasture per animal unit (1 AU = 1000 pound of animal). How many additional acres do you need? A 1000 pound animal will need approximately 30 pounds of dry matter per day (3% of body weight) or about 900 pounds per month. For each additional month of grazing after frost, you'll need about 0.4 acres for that animal (1.2 t/a x 2000 lb = 2400 lb; 900 lb/month ÷ 2400 = 0.375 acres). For a herd of 100 dry dairy cows, you'll need about 50 additional acres. But, start small. As you learn what works with your system, on your soils, with your climate, you can expand your program. Would stockpiling work for you? There's one way to find out!

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