

Stockpiling Forages: Which Ones and How To!

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During the growing season, pasture is generally the most economical source of nutrients for ruminants. When the daily routine of pasture feeding and barn feeding/manure handling systems are considered, most graziers would like to increase the number of days per year that animals are on pasture. To achieve this goal, one can either start grazing earlier in the spring (hard to do), or continue grazing later in the fall (easier to do). Thus, the grazier needs to develop a system to accumulate forage during the growing season for use in fall and winter when forage growth has stopped.

Basic Principles of Stockpiling Forages

Stockpiling, or deferred grazing, refers to the accumulation of forage in the field for grazing during periods of slow (or no) growth. Many farmers practice stockpiling without thinking much about it when they graze aftermath growth on hayfields in the fall. In rotational grazing systems, the grazier may select specific paddocks to be withdrawn from grazing in summer to accumulate forage for fall grazing. In many systems, the paddocks to be stockpiled will vary from year to year. In some cases, stockpiled forage may be left over the winter to be grazed by stock in early spring.

When designing a stockpiling system, many questions need to be considered. A few such questions are discussed below.

1) What is the best time to initiate the stockpiling process?

Depending on geographic location, stockpiling can be initiated anytime between early summer and late August. In general, earlier stockpile initiation dates result in greater stockpile yields in the fall. Initiation date may also affect forage quality. Very early or very late initiation dates tend to result in relatively low or high forage quality, respectively.

2) Is the yield or quality of stockpiled forage affected by previous cutting or grazing management?

A study done in Missouri showed no difference in fall stockpile yield or quality when paddocks were cut 2, 3 or 5 times prior to stockpile initiation on August 9. By alternating between cutting, grazing, and stockpile management, graziers may realize benefits in areas such as manure distribution and parasite control.

3) Which fields or paddocks should be used for stockpiling?

In general, fields with good fertility and moisture holding capacity will produce greater stockpile yields. It is wise to vary the stockpiled paddocks from one year to the next. Other points regarding field selection are discussed in the "tips" section below.

4) Will a fertilizer application be worthwhile?

Moderate applications of N fertilizer (around 50 kg/ha) will increase both the yield and the crude protein content of stockpiled forage. Some studies have shown a slight drop in energy content from N application. The response to N tends to be greater with earlier initiation dates.

5) When is the best time to utilize the stockpiled forage?

As long as the snow is not too deep or the ground too soft, livestock can graze the stockpiled forage. In general, dry matter yields tend to decline once hard frosts occur. Crude protein of stockpiled forage generally declines over the winter, while energy levels decline slowly or remain constant. The livestock production system can be adapted to maximize use of the stockpiled forage.

Stockpiling Research in Northern Ontario

A research project was initiated at two sites in northern Ontario in 1993. New Liskeard (47°31' N) is located about 300 miles north of Toronto near the Ontario-Quebec border, while Emo (48°40' N) is located about 160 miles north-west of Duluth on the Ontario-Minnesota border. Emo is about 650 miles west of New Liskeard, as the crow flies.

We examined the effect of management system, fall harvest date, and grass species on stockpiled forage yield and quality. The various treatments are shown in Table 1.

Table 1. Factors examined in forage stockpiling study.

Management System	Fall Cutting Date	Grass Species
Early Initiation: 1 cut early July	September 1	Reed Canary Smooth Brome
	October 1	Orchard Tall Fescue
Late Initiation: 1 cut mid June 1 cut late July	November 1	Meadow Brome

Forage dry matter yields varied between sites. At New Liskeard, stockpile yields were much greater with early as compared to late initiation. Under early initiation, forage yield was constant from September 1 to October 1, then declined by November 1 (Table 2). Under late initiation, yields increased from September 1 to October 1 and remained constant until November 1 (Table 2). Forage yields did not vary much among the 5 grass species under early initiation, but under late initiation tall fescue and meadow brome grass outyielded all other species (Table 2).

At Emo, forage yields did not differ between management systems, but yields declined dramatically between October 1 and November 1 (Table 2). Tall fescue was the highest yielding species under both management systems and orchardgrass was the lowest yielding (Table 2).

Table 2. Yield (kg/ha) of stockpiled forage at New Liskeard and Emo.

	New Liskeard Early	New Liskeard Late	Emo
Sept.01	6053	1597	2060
Oct.01	6196	2270	2399
Nov.01	5361	2144	1264
Reed Canary	6038	1067	2061
Smooth Brome	5912	1230	1966
Orchard	5307	1761	1549
Tall Fescue	6226	3041	2358
Meadow Brome	5867	2920	1971

Forage quality was higher at Emo than at New Liskeard due to the presence of trefoil in the stands at Emo. Quality tended to be poorer under early initiation, although the differences were relatively small (Table 3). At both sites, crude protein content declined with later fall harvest dates (Table 3). Tall fescue had relatively low crude protein at both sites, while meadow brome grass was also low at New Liskeard. Acid detergent fibre values were constant between September and October 1, but increased slightly from October 1 to November 1 (Table 3). Tall fescue had significantly lower ADF values at New Liskeard but was similar to the other species at Emo (Table 3). The trends in NDF values were similar to those for ADF (Table 3).

The ADF values were converted to total digestible nutrient (TDN) values using equations for grass or grass-legume hay developed in Ontario. The yield of total digestible nutrients (TDN) from each treatment was calculated using the dry matter yield data above and the calculated TDN values. Tall fescue produced the highest TDN yield at both sites (Table 4). Orchard produced the lowest TDN yields at Emo and under the early initiation date at New Liskeard (Table 4). Under the late initiation date at New Liskeard, reed canary and smooth brome were poorer than

orchard, due to their low yields (Table 4). It should be noted that both these species did have good quality under the late initiation treatment. Meadow brome produced high TDN yields at New Liskeard under the late initiation due to its high yields and average quality (Table 4).

Table 3. Quality of stockpiled forages at New Liskeard (NL) and Emo.

	Crude Protein		ADF		NDF	
	NL	Emo	NL	Emo	NL	Emo
Early	10.7	14.6	38.9	31.7	59.7	45.8
Late	12.4	16.3	34.9	30.2	52.7	43.0
Sept.01	14.2	18.9	36	29.5	56.2	43.7
Oct.01	10.9	15.1	35.3	30.0	54.1	43.1
Nov.01	9.6	12.4	39.3	33.3	58.4	46.5
Reed Canary	12.7	16.3	36.5	30.2	53.8	43.1
Sm. Brome	12.3	16.6	36.8	30.5	55.8	42.7
Orchard	11.2	15.6	37.9	31.8	58.7	46
Tall Fescue	10.9	13.2	33.5	30.8	54.4	46.1
Mdw. Brome	10.7	15.6	39.7	31.4	58.5	44.1

Table 4. Yield of TDN (kg/ha) at New Liskeard and Emo.

	Early NL	Late NL	Emo
Reed Canary	3472	672	1350
Smooth Brome	3443	809	1282
Orchard	2696	1084	992
Tall Fescue	3918	1966	1530
Meadow Brome	3233	1718	1268

To date, this study has shown that early initiation dates can increase stockpile yield but have a slight negative effect on quality. Yield response to fall harvest date varied, but in two of three situations, dry matter losses occurred between October 1 and November 1. Forage quality declined in all cases between October 1 and November 1. Tall fescue appears to be an ideal species for stockpiling in this geographic area as its yield and quality tend to be average or above average relative to other species. Meadow brome may have a place for stock with lower nutritional requirements as it had high yields but poorer quality. Under our conditions it appears that orchard is a poor choice for stockpile grazing.

Practical Tips for Stockpile Grazing

It is often left up to the individual grazier to incorporate research findings into practical farming situations. While going through this planning process, graziers can also use their detailed knowledge of their own landbase to improve the stockpiling system. I have listed a few points to keep in mind:

- 1) Know what species and mixtures are in your pasture inventory. Use each existing species to its best advantage within your own farming system. Some species and/or mixtures on your farm are likely better for stockpiling than others. If you must reseed, consider the weak points in your system and fill that gap.
- 2) Know areas of high and low fertility on your farm. Areas with high residual N in the soil will give you more stockpiled forage for lower cost. Feed hay on the lower fertility areas after your stockpile has been used up. This will return nutrients to the low fertility areas.
- 3) Know which areas avoid frost in fall and thaw early in the spring. Smaller fields surrounded by forest often freeze later in the fall, thus maintaining better forage quality. Exposed knolls or south-facing slopes lose snow earlier and may allow some grazing prior to ground thaw in spring.
- 4) Plan how you will utilize your stockpiled forage. If possible, start using the stockpiled paddocks farthest away from your winter feeding area and finish close to your winter feeding area. In the event of an early snow or ice storm, you will have less distance to haul feed or get animals to shelter.
- 5) Make use of natural shelter for late fall grazing. Freezing rain and low wind chill values are common during early winter. By taking advantage of natural shelter, animal performance will be less affected by the elements.
- 6) Make use of "non-pasture" areas to allow for stockpile accumulation in late summer or to extend grazing in fall. Areas around buildings, ditches, or even front lawns can be used for grazing when forage is in short supply. Look around and see what you have available.
- 7) Ensure that your stockpiling program fits into the overall forage program on your farm. The fall and winter feeding period is only about 30% of the year, don't let it dictate the whole year, but let it complement the whole system.

Hopefully, you will find some new ideas here that will eventually be incorporated into your farming operations.