Stockpiling shows potential for extending grazing season in eastern Canada

by Peter Goldsmith and Paul Peterson

Stockpile grazing has true potential of being a viable method of extending the grazing season for livestock producers in eastern Canada, according to the results of a collaborative research-demonstration project recently done at Macdonald Campus of McGill University in Ste. Anne-de-Bellevue, Quebec.

With the help of two commercial collaborators, Alpha Laval Agri and Maclaren Farms, a permanent site at the Macdonald Campus farm was established for pasture research in late 1995. Alpha Laval Agri designed and installed an electric fencing system and Maclaren Farms provided livestock. Macdonald Campus Departments of Plant Science, Agricultural Economics, and the Farm Management and Technology Program have since had the opportunity to use the site to provide a "hands-on" learning experience in grazing management for its students.

What is it?

Stockpiling involves the managed accumulation of pasture forage growth for use at a later date. Stockpiled forage provides livestock producers with pasture feed during fall months when forage growth is usually minimal, which will extend the grazing season until snow cover.

The procedure involves taking a final hay/haylage cutting, or removing grazing livestock from a forage field during middle to late summer and allowing regrowth to accumulate until fall. The accumulated forage is then grazed until permanent snow cover.

The timing of when the stockpile is initiated in a field has an impact on both the yield and quality of the fall pasture. Earlier initiation dates result in greater yields, but lower

forage quality since there are more growing degree days for the stockpiled growth to mature prior to the first hard frost.

In practice, the appropriate time to initiate stockpiling is determined by:

• the nutritional requirements of the livestock that will consume the stockpiled forage;

• the availability of pasture to set aside;

• the intended date of use;

• the average first killing frost date.

Yield of stockpiled forage generally accumulates until the first killing frost. After a frost, both yield and quality of the forage decline at varying rates depending upon the grass species stockpiled. Any cool-season grass species can be successfully stockpiled for fall grazing. However, tall fescue is considered the best, having the slowest rate of decline in yield and quality after freezing. Legumes are not recommended for fall stockpiling because both yield and quality decline rapidly after freezing.

Research from the University of Missouri indicates that the carrying capacity of stockpiled feed can be maximized by only making available enough forage to provide a week of feed at a time. This can be accomplished by strip-grazing which reduces trampling and improves the utilization of the stockpiled forage.

Some considerations

Stockpiling, as a management technique, focuses on improving the quality and expanding the quantity of a farm's forage pasture system. This management strategy enhances the farm's economic efficiency by improving the utilization of a farm's resources. With proper management of the stockpiled feed greater efficiencies are achieved without sacrificing animal performance.

Specifically, stockpiling enables livestock producers to:

• lower annual feed costs by extending the grazing season while still maintaining animal performance;

• decrease environmental impact from manure by shortening the typical winter confinement period;

• decrease manure handling, fertilizer and pesticide costs by more efficiently utilizing the pasture system;

• decrease variable and fixed equipment and infrastructure costs by reducing the housing period.

For the stockpiling project at the Macdonald Campus farm, researchers studied several aspects of the stockpiling management technique. For example:

• the pattern of yield and quality change in the pasture as fall progresses;

• the extent of utilization of the stockpiled forage;

• the intake and performance of the steers;

• the economics of stockpiling.

The project began in the Fall of 1995. Stockpiling was initiated with a hay cut in mid-summer. Then, nine crossbred steers averaging 400 kg were allowed to start grazing the stockpiled growth of mixed cool-season grasses, predominantly smooth bromegrass, on November 3. Strip grazing was imposed via electrical polytape and portable posts allowing the steers access to three to five days of grazing, approximately 0.4 ha, per strip. Steer diets consisted of only stockpiled forage, free-choice mineral and salt, water, and supplemented hay.

The steers remained on the project for 25 days until November 28. During this period, a limited amount of hay was made available on just 13 days because earlier than average snow cover somewhat limited the grazing availability of the stockpiled forage. The steers, however, were estimated to have obtained about 70% of their consumed forage from the stockpiled grass. The steers consumed a total of about 1600 lbs dry matter (DM) in hay during the period. Assuming a rate of intake of 2.5% of steer body weight in forage DM per day, nine steers would have consumed about 5200 lb DM during the 25 day trial, which means that 3600 lbs DM, or 70% of their diet, was consumed as stockpiled forage.

High rate of gain

Steers gained an average of 1.15 kg per day. This was a surprisingly high rate of gain and should be viewed as only a rough estimate of the potential of stockpiled forage to produce animal gain. Although animals were double weighed at the start and end of the experiment to reduce variability, weight gain data from a 25-day trial must be viewed with caution because of potential variation in rumen fill of the animals.

A model was developed using the results of the stockpiling demonstration to compare a fall pasture program with hay feeding. Before turning to the model it is important to recognize that this was a demonstration project and not a controlled experiment. The following model serves to raise important management issues concerning the application of stockpiling. The actual results, as noted above, should be viewed cautiously.

Stockpiling involves a non-reversible decision, in this case on August 1, whether to set aside pasture land for accumulation and fall pasturing. The objective is to extend the grazing season, in this case beyond October 1. (Though the actual demonstration did not begin until November 3, for modeling purposes an extrapolation was performed and it is assumed to have begun on October 1.) From October 1 to December 14 (75 days) the herd would potentially need about 7.04 tonnes of dry matter (DM). It is assumed in the model that they could receive the DM in the form of hay or pasture. Hay costs were $48.93/tonnes - all results are on a dry matter basis (MAPAQ; McGill University). Pasture costs were $20.06/tonnes - costs of production include: seed, fertilizer, fencing, herbicides, harvest, labor, repairs, fuel, clipping, insurance, and interest. (MAPAQ; McGill University; Moore 1994; Elbehri and Ford, 1995). The difference in costs reflects not only the substitution of animal for mechanical harvesting, but the use of animal

distribution of manure fertilizer. The purpose of this model is to compare a hay system with a pasture system for meeting the herd's DM needs.

The cost of stockpiling is not simply a comparison of management-intensive grazing (MIG) versus hay feeding. There are two additional aspects to the stockpiling cost picture. They are related to snow fall and its potential to interrupt and/or terminate the stockpile feeding program. As mentioned above, the decision to stockpile is made ex-ante, well before consumption can take place. There is a risk that though forage will be set aside it would be unusable in the fall due to snow cover. Since the probability of snow cover increases between October 1 and December 14, hay supplementation becomes increasingly important over time.

Expense and risks

There are two types of snow cover that add risk and expense to stockpiling. The first type of snow is not permanent, but is sufficient (>5 cm.) to trigger supplemental hay feeding. In the McGill demonstration, hay accounted for 13.6% of the DM consumed by the herd (assuming grazing had started on October 1). These additional costs are reflected in column 3, "Hay", Figure 1.

The second additional cost to stockpiling results from holding feed, or the cash equivalent, as insurance in case fall pasturing is curtailed due to snow. This model assumes that insurance would be needed to feed the animals for the full 75 days (column 4, Figure 1). A less risk averse producer, for example, might only hold a 44-day reserve and take the chance that permanent snow cover will not occur before November 1.

Figure 1
Stockpiling Partial Budget
Recommended start date: October 1

Program Length (Days)	Pasture	Hay	Insurance	Pasture Total cost	Hay Only Program	Difference	%
10	$141.27	$0.35	$17.22	$158.85	$45.94	($112.90)	245.75%
20	$141.27	$0.72	$17.22	$159.21	$91.89	($67.33)	-73.27%
25	$141.27	$1.42	$17.22	$159.91	$114.86	($45.06)	-39.23%
30	$141.27	$1.66	$17.22	$160.16	$137.83	($22.23)	-16.20%
35	$141.27	$3.81	$17.22	$162.30	$160.80	($1.50)	-0.93%
40*	**$141.27**	**$4.29**	**$17.22**	**$162.78**	**$183.77**	**$20.99**	**11.42%**
45	$141.27	$8.91	$17.22	$167.40	$206.74	$39.34	19.03%
50	$141.27	$9.85	$17.22	$168.34	$229.71	$61.37	26.72%
55	$141.27	$20.90	$17.22	$179.39	$252.69	$73.29	29.01%
60	$141.27	$22.76	$17.22	$181.25	$275.66	$94.40	34.25%
65	$141.27	$48.51	$17.22	$207.00	$298.63	$91.62	30.68%
70	$141.27	$52.21	$17.22	$210.70	$321.60	$110.90	34.48%
75	$141.27	$111.04	$17.22	$269.53	$344.57	$75.04	21.78%

Source: McGill University Faculty of Agricultural and Environmental Sciences
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* = Break even

Hypothetically, if the demonstration had begun on October 1, but had been concluded only after 10 days, the cost of pasturing the herd would have been 276% or $113 greater than a 10 day hay-only program (Figure 1).

The reason the difference is so great is that so much of the pasture is not consumed. The breakeven point for a fall pasture system, based on the McGill demonstration is about 40 days (Figure 1). If stockpile feeding can extend at least until November 9, it is worth stockpiling. Benefits level off close to the 75th day because of the higher probability of at least some hay supplementation.

About two hectares of pasture were grazed during the trial. With less snow, utilization of the stockpiled forage could have been higher and the land area required much less.

However, to maintain high rates of forage intake, the steers were not forced to graze through snow. Analysis of the forage quality of the stockpiled grass is not yet available, but the leafy, green appearance of the pasture combined with the excellent animal performance suggest that the quality was quite good. Research elsewhere has demonstrated that cool-season grasses, and in particular tall fescue, experience only a slow rate of decline in yield and quality after the first hard frost.

This experiment has demonstrated the potential of stockpiling, even in a year with earlier than average snow cover. The technology likely has greatest potential if it is initiated in early October and utilized by weaned calves or dry cows. Future research efforts at Macdonald Campus will focus in these areas.

Livestock producers or others interested in more information on stockpiling or pasture management can call the QFA/Mac Infoline at 1-800-363-7869, or write to McGill University, Faculty of Agricultural and Environmental Sciences, Ste. Anne-de-Bellevue, PQ H9X 3V9.