CHAPTER 46

Extending the Grazing Season: Stockpile Grazing of Perennial Forages

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Calves grazing stockpiled regrowth of meadow bromegrass in late fall at Lacombe, Alberta.

Stockpiling grasses for fall and winter grazing

Grazing is the cheapest way to raise beef cattle and extending the grazing season can reduce the total annual feed cost compared to feeding conserved feed. Stockpiled forage is summer forage regrowth which is saved for use as fall and winter pasture. Stockpiled forages may replace part or all of the hay, straw or silage needed to winter cows.

On the southern Canadian prairie, late fall and winter grazing on native plains rough fescue (*Festuca hallii*) is a common practice especially in areas with limited snow cover. Quality of plains rough fescue remains high and grazing this grass while dormant actually helps the plant to survive (Bailey et al. 2010). A single-graze system in early summer allows the summer regrowth to 'cure on the stem' which makes the herbage more resistant to weathering, preserving quality, and allowing it to stand up through the snow so the cattle can easily find it.

In the Parkland area of western Canada, which is a transition zone between prairie and boreal forest, regrowth of perennial forages can provide excellent grazing for beef cows and calves in the late fall and early winter (Dick et al. 2008). The forage regrowth maintains a higher nutritional quality than mature first growth. To maximize pasture herbage, the regrowth period should be as long as possible, which means taking the first cut for hay or completing grazing by late June to early July. In this region, both smooth and meadow bromegrasses (*Bromus inermis* and *Bromus biebersteinii*) have ranked high for yield among many species tested over a range of summer and fall moisture conditions, but of the two, meadow bromegrass retains more leaves and stems over winter. Other cool season grasses such as orchardgrass (*Dactylis glomerata*) , quackgrass (*Elytrigia repens*) and timothy (*Phleum pretense*) are high yielding under good moisture conditions, but both orchardgrass and timothy lose more dry matter and quality over winter than meadow bromegrass. Unfortunately, the ever-present pasture species, creeping red fescue (*Festuca rubra*) and Kentucky bluegrass (*Poa pratensis*) have poor fall regrowth and therefore produce low stockpiled yields but both retain quality through the winter (Table 1.)

Over-winter leaf loss of stockpiled forage can range from less than 10% for Kentucky bluegrass and timothy to over 30% for smooth bromegrass and crested wheatgrass. Meadow bromegrass and orchardgrass may lose between 20-25% of original yield. Forage quality change is affected by soil moisture and nutrient conditions during the growth phase. Live green leaves have higher quality than dead leaves. Plants that have gone into dormancy due to dry conditions before killing frost will have a lower nutrient content and higher fibre content than plants that are still growing under good climatic conditions when killing frost hits.

Perennial forages store carbohydrate and protein in their crowns and roots during the fall regrowth period as the

plants acclimate for winter. Much of the stored nutrients may be mobilized out of the leaves and the leaves become depleted. However, the slow growth and metabolism under gradually declining fall temperatures may delay senescence and even allow some carbohydrate to accumulate in the green leaf material. Under these conditions, regrowth of tame grasses in the Parkland region remain green going into the winter and the green leaves may even survive a few degrees of frost, and if the leaves are covered in snow, they may even remain green and viable through much of the winter. Under such conditions, protein levels and digestibility remain adequate for grazing dry beef cows. Beef cows in late pregnancy grazing in very early spring require more energy than they did in winter to meet their nutritional requirements, and stockpiled meadow bromegrass and creeping red fescue may not have sufficient quality for these cows.

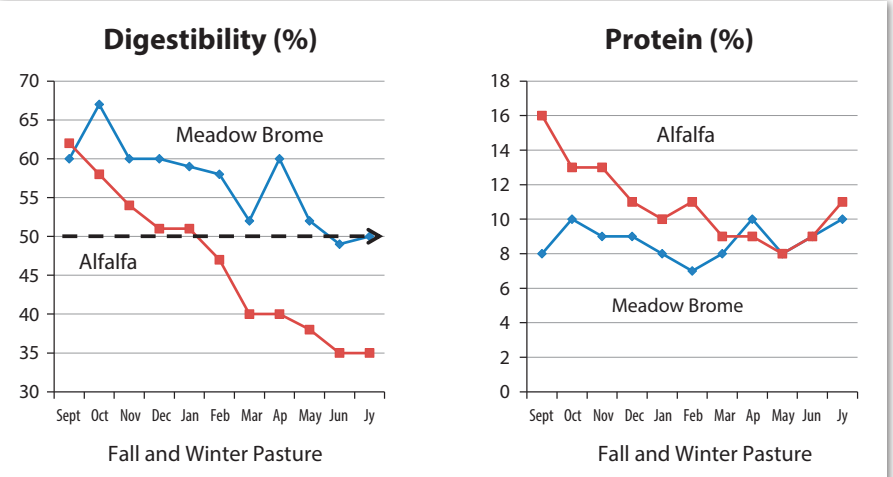

Figure 1. Digestibility and crude protein of stockpiled alfalfa and meadow brome over winter.

Our research in central Alberta has shown that creeping red fescue and to a lesser extent meadow bromegrass have relatively high concentrations of water soluble sugars in the fall. The sugars which are located in the leaf cells protect the leaves from freezing and desiccating during the winter and are used by the cells as energy to maintain physiological activity in leaves and growing points. However as sugars are consumed and depleted through the winter, leaf death occurs and when the leaves die, the cell membranes fail and cell contents leak out of the plant. Thus as winter proceeds, increasing numbers of leaves die, and sugar departs from the leaves either before death or leaches out after freezing and thawing or due to rain and snow melt. With lower sugar content, the remaining proportion of low-digestible fibre increases and overall digestibility decreases. Soluble protein is also lost but some protein is structural and remains as long as the leaves are not shed.

Since yield and quality of forage decline over the fall and winter, it is better to graze stockpiled forage in the fall than in winter (Fig. 1). In areas with high snow fall or in ice conditions the cows will have difficulty grazing all of the available forage regrowth leaving areas that are incompletely grazed, resulting in significant wastage and reduced animal grazing days per land area.

Role of legumes in extending the grazing season

Leaf loss limits the usefulness of most legumes for extending the grazing season. Legumes tend to lose their leaves quickly following hard frosts and with advancing maturity; the yield loss of alfalfa (*Medicago sativa or M. media*) between September 15 and October 15 in the Parkland region is approximately 10%. An exception amongst legumes is cicer milkvetch (*Astagalus cicer*) which has much better leaf retention than alfalfa and is much more suitable for grazing in the late fall. Cicer milkvetch retains quality into October so it can be grazed longer than alfalfa, and poses no danger for bloating. However if the cicer milkvetch becomes mature and sets seed, cows tend to avoid grazing the plant.

Forage yield for stockpile grazing

In order for cows to successfully graze through the snow, forage yield needs to be as high as possible. If grazing is planned for after snowfall, it is especially important that the forage mass be as high as possible to prevent loss due to snow depth and trampling. Therefore erect species are most suitable for cows to graze under snow. Forage yield for winter grazing should be higher than 2,000 kg/ha (1800 lb/ac). Our experience in central Alberta is that with a rest period starting July 15, meadow and smooth bromegrass, orchardgrass and alfalfa consistently produce more than the critical amount of herbage by mid-September. However, with a shorter rest period beginning August 1, only meadow bromegrass and alfalfa consistently produce adequate yields by mid-September (Table 2). The longer the rest period, the smaller the yield differences among species.

Longer rest periods are necessary as stand age increases and proportion of seeded species decreases; as bluegrass and creeping red fescue eventually dominate the stands regrowth capacity diminishes. Low soil fertility and limited summer rainfall also mandate a longer rest period. However, with an earlier start to the rest period there is a tendency for greater leaf loss and stemminess, especially with alfalfa. Thus there is a trade-off between yield and quality as the rest period lengthens.

Fertility requirements for stockpiled forage regrowth

Grasses may require added N fertilizer to ensure optimum production for stockpiling, while legumes need to be well nodulated to fix nitrogen. Legumes use more P, K and S

Table 1. Changes in digestibility and yield of perennial forage regrowth from early fall until the following spring.

SPECIES	Harvest date			April yield as a % of Sept
	Sept. 15	*Oct.15*	*Apri115*	
	Digestibility (%)			
Alfalfa	59.3	56.4	34.8	52
Meadow bromegrass/alfalfa	61.6	56.0	45.6	62
Meadow bromegrass	64.8	57.9	50.5	78
Smooth bromegrass	58.3	55.3	37.3	60
Orchardgrass	61.2	57.2	42.7	78
Timothy	61.0	55.8	40.9	97
Crested wheatgrass	62.8	58.3	47.5	65
Kentucky bluegrass	59.1	52.8	44.0	90
Creeping red fescue	62.9	59.7	52.5	82
Ouackgrass	60.8	55.1	40.5	75

Table 2. Stockpiled yield of annual and perennial forages with rest periods beginning July 15 and August 1.

SPECIES	Rest period	
	8 wk (July 15 start)	**6 wk (Aug 1 start)**
	kg/ha (lb/ac)	*kg/ha (lb/ac)*
Winter-spring mixture[1]	5,645 (5,040)	no data
Algonquin alfalfa	3,925 (3,505)	2,950 (2,635)
Meadow bromegrass	4,900 (4,375)	2,560 (2,285)
Orchardgrass	3,655 (3,265)	1,925 (1,720)
Creeping red fescue	3,430 (3,065)	1,745 (1,560)
Swathed barley[2]	6,865 (6,130)	

Notes: All data from trials at Lacombe
1 Winter-spring mixture was oats mixed with winter triticale seeded early May. Rest period started July 1.
2 Barley seeded between May 7 and May 15.

than grasses. It is extremely important to do a soil test each year to assess soil nutrient status. If moisture for stockpiling is expected to be adequate for high yields, a split application of N fertilizer may be advantageous. Usually the first hay cut or first grazing accounts for more than 60-70% of the entire season's growth for perennial forages. Harvesting forage for hay will remove more nutrients from the soil than a multi-pass grazing system, resulting in the pasture needing more supplemental fertilizer to produce the desired yields.

Cattle producers need to evaluate the cost of fertilizer application versus the cost of renting additional pasture, including the cost of shrinkage, trucking and problems with distance management and maintenance. In the Parkland region of northeast Saskatchewan, fertilizing pastures on grey wooded soils with 90, 45 and 10 kg/ha of N, P, and S, respectively, (80, 40 and 9 lb/ac) on alternate years increased forage production by up to 2.5 times compared to no fertilizer. There was also a carry-over effect of about 1.5 times more forage in the second year compared to unfertilized pastures. In this region species such as smooth bromegrass, crested wheatgrass (*Agropyron cristatum* L.), intermediate wheatgrass (*Elytrigia intermedia* (Host) Nevski), meadow bromegrass, green needlegrass (*Stripa viridula* Trin.) and northern wheatgrass (*Elymus lanceolatur* (Scribn. and Smith)) all had similar forage yields under a two cut haying system. The forage from the regrowth after the first cut would be available for extending the grazing season (Bittman et al. 2000).

In conclusion, meadow bromegrass-alfalfa regrowth consistently provided a higher carrying capacity at a lower net cost than other pasture species for fall grazing in the Parkland of western Canada. In contrast, old naturalized pastures consisting of bluegrasses along with smooth brome and quackgrass often do not provide sufficient regrowth. Meadow bromegrass responds to rain after July while old stands do not respond as well as they lack tillers to regrow.

References available online at www.farmwest.com

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