



Grass and Alfalfa Stubble Height Issues

Perennial grass can be an excellent forage source for lactating dairy cows if managed correctly, but timing of spring grass harvest is critical to obtaining optimum forage quality. Recent studies with corn harvested for silage show that increasing the stubble height will improve the nutritive value of corn silage, and directly affects the grain-to-stover ratio in grain crops.

Raising the cutting height, which will leave more low nutritive value stem in the field, will improve nutritive value, but it is not clear if grass slightly past the optimum harvest window can be salvaged for lactating dairy feed by using a higher stubble height.

What Controls Mowing Height?

In alfalfa, mowing height is set to maximize yield while maintaining stand longevity. Mowing height may be raised in the spring to avoid cutting off plant crowns that may have heaved up from the soil surface. Grass is often mowed as low as possible, but rough and/or stony fields usually mean that grass is not mowed lower than a 4" stubble height. The acceptable range for NDF at harvest is relatively narrow. We looked at the feasibility of harvesting both grass and alfalfa at higher stubble heights to improve quality.

Grass Studies with Stubble Height

Reed canarygrass, orchardgrass and tall fescue stands were sampled in late May for three consecutive seasons in Ithaca, NY and Freeville, NY. Three N fertilizer application rates of 0, 100 and 200 lbs N/acre were also sampled for each grass species.

Grass samples were collected at a 4" stubble height, at a stage slightly beyond optimum quality for lactating dairy forage. Two inch segments were cut from the bottom of the plant (Fig. 1), with segments from 4-6", 6-8" and 8-10". Samples were analyzed for both yield and quality.



Figure 1. An orchardgrass sample slightly beyond optimum maturity, with 2" segments cut off from the bottom of the plant.

Yield and Quality of Total Forage

NDF averaged 58%, with very little impact of N fertilizer rates. As expected, CP increased from 13% up to 20% across N fertilization rates. With 100 lbs/acre of N fertilizer applied, spring yields across three seasons and two sites averaged 1.7 tons/acre for reed canarygrass, 1.8 tons/acre for tall fescue, and 1.9 tons/acre for orchardgrass (Table 1).

Table 1. Change in yield and quality per inch of stubble height. Fertilized with 100 lbs N/acre.

Species	Change per inch of stubble ht.				Cut 1 tons DM Yield
	CP	NDF	NDFD	Yield	
Orchardgrass	0.33	-0.28	0.34	-204	1.9
Reed canary	0.55	-0.57	0.66	-202	1.7
Tall fescue	0.37	-0.39	0.49	-283	1.8

Changes in stubble height

With 100 lbs N acre applied at spring green-up, the impact of leaving one additional inch of stubble out in the field is shown in Table 1. Reed canarygrass was slightly lower yielding and a few inches shorter in overall plant height than the other species. The impact on forage quality of increasing stubble height one inch

was significantly greater with reed canarygrass. Tall fescue, however, had significantly more yield loss per inch of stubble left in the field, and was shorter than orchardgrass.

For every inch of stubble left in the field above a 4" stubble height, yield decreased in orchardgrass, reed canarygrass and tall fescue by 5, 6 and 8%, respectively. Leaving one inch of stubble in the field decreased forage NDF by 0.4 percentage units on average. The tradeoff between a significant yield loss vs. a very small increase in quality is unacceptable.

This study was conducted on grass that was just slightly beyond the optimum quality stage. Grass that has fully headed out is poor quality from top to bottom. Raising the cutter bar would only decrease yield, with essentially no impact on forage quality.

Alfalfa Stubble Height

Figure 2 is based on an equation using stubble height and alfalfa maximum height, it does not rely on alfalfa stage of growth. Data for the equation was collected by sampling producer fields in NY in 2007 and 2008, cutting samples from fields at different stubble heights.

Pure alfalfa has a harvest target NDF of about 38%. Alfalfa matures at a slower rate than grasses, increasing in NDF approximately 0.75 percentage units/day. For every inch of stubble height left in the field, alfalfa NDF will decrease about one percentage unit (Fig. 2). So increasing the mowing height by 2 inches would move the optimum harvest date forward about 2.5 days.

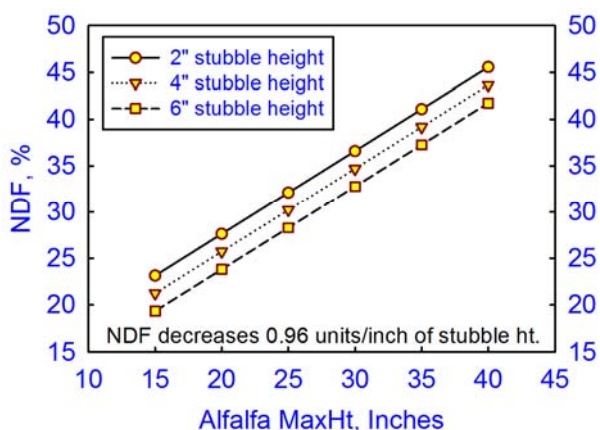


Figure 2. Effect of stubble height on NDF of harvested alfalfa.

Alfalfa-Grass Stands and Stubble Height

Grass NDF increases about 1 percentage unit/day. In a 50:50 alfalfa-grass stand, leaving one additional inch of stubble would result in forage quality similar to harvesting one day earlier, with substantial yield loss.

Summary

Leaving one additional inch of stubble in a grass field means leaving from 5 to 8% of the total yield in the field. This is accompanied by a very small improvement in the quality of the forage harvested. Raising the cutter bar will not solve the problem of a stand harvested beyond optimum forage quality. Although the quality improvement is slightly better with higher stubble height in alfalfa, raising the cutter bar to improve quality in an alfalfa-grass stand is not going to solve the problem of forage harvested too late.

Additional Resources

- 2011 Cornell Guide for Integrated Field Crops Management. Electronically accessible at: <http://ipmguidelines.org/Fieldcrops/>.
- Cherney, D.J.R., and J.H. Cherney. 2005. Forage yield and quality of temperate perennial grasses as influenced by stubble height. Online. Forage and Grazinglands doi:10.1094/FG-2005-0215-01-RS.
- Parsons, D., J.H. Cherney, and P.R. Peterson. 2009. Pre-harvest fiber concentration of alfalfa as influenced by stubble height. Agron. J. 101:769-774.

Disclaimer

This information sheet reflects the current (and past) authors' best effort to interpret a complex body of scientific research, and to translate this into practical management options. Following the guidance provided in this information sheet does not assure compliance with any applicable law, rule, regulation or standard, or the achievement of particular discharge levels from agricultural land.

For more information



Cornell University
Cooperative Extension

Grass Management Manual
<http://forages.org>

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