

# Mowing Height, Mowing Frequency, and Rolling Frequency Affect Putting Green Speed

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**Additional index words:** ball roll distance, Pelzmeter, turf quality, transition zone, USGA rootzone

Richards, J., D. Karcher, T. Nikolai, M. Richardson, A. Patton and J. Landreth. 2008. Mowing height, mowing frequency, and rolling frequency affect putting green speed. Arkansas Turfgrass Report 2007, Ark. Ag. Exp. Stn. Res. Ser. 557:52-56.



Photo by Doug Karcher

Bentgrass greens and tees in Seattle, Wash.

**Summary.** Rolling putting greens may allow turf managers to decrease mowing frequency or increase mowing height without losing green speed. An increase in mowing height would be beneficial in minimizing summer stress on creeping bentgrass putting greens in Arkansas and throughout the transition zone. The objective of this study was to determine the effects of mowing and rolling frequency and mowing height on turf quality and green speed (ball roll distance) on a sand-based

putting green. This study contained eight combinations of mowing and rolling treatments, which were applied over a six-week period. Turf quality was rated weekly and ball roll distance was measured twice weekly. Rolling treatments had a greater impact on increasing ball roll distance than reducing mowing height. Furthermore, mowing frequency could be reduced without a decrease in ball roll distance if turf was rolled on days when mowing was skipped.

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Light-weight rolling of putting greens is a cultural practice that dates back to over 100 years. However, in the 1920s rolling declined due to fears that putting green soils would compact, resulting in drainage and aeration problems (Piper and Oakley, 1921). The practice of rolling greens was mostly abandoned for the next 70 years. However, in the early 1990s, when the demand for faster greens grew, rolling putting greens re-emerged as a viable cultural practice (Nikolai, 2002). Most new putting greens are built according to either United States Golf Association (USGA) specifications (USGA, 1993) or with other techniques that include a predominantly sand rootzone, which makes them less susceptible to compaction than previous soil-based putting green rootzones. The technology of rollers has also improved significantly and new rollers are designed specifically for rolling golf course putting greens.

A recent greens rolling study concluded that most greens rollers increase green speed by over a foot on the day rolling is applied and retains over 6 inches of that increase the day after rolling (Nikolai, 2005). If greens rolling can improve green speeds for as long as 48 hours, daily mowing may not be necessary. This could reduce stress to the putting green surface, especially during hot, humid conditions. The objective of this research was to determine the optimal combination of mowing and rolling frequency and mowing height on a USGA putting green that results in the best overall quality and ball roll characteristics.

### Materials and Methods

This research was conducted at the University of Arkansas Agriculture Research and Extension Center in Fayetteville, Arkansas on a 5-yr old creeping bentgrass (*Agrostis stolonifera* cv. L-93) putting green that was constructed according to USGA specifications (USGA, 1993).

Fertilization, growth regulator and pesticide application, aerification, irrigation, and topdressing were uniform across the experimental area throughout the study and were consistent with typical golf course putting green management practices.

In this study, there were 8 different mowing and rolling treatments, each replicated three times for a total of 24 plots (4.5 by 18 ft). The treatments, which are summarized in Table 1, were chosen to compare the effects caused by different mowing heights, mowing frequencies, and rolling frequencies on putting green speed and turf quality. Treatment application began 28 Sept. 2007 and continued for six weeks. All mowing treatments were applied using a walk-behind greens mower (Toro Greensmaster 1600, Toro Company, Bloomington, MN). After the plots were mowed, rolling treatments were applied (Fig. 2) using a commercially available greens roller (RS48-11C Golf Roll 'n' Spike, Tru-Turf Rollers, Ernest Junction, Queensland, Australia). Rolling was applied as a single pass across appropriate plots. Putting green speed was evaluated by measuring ball roll distance with a Pelzometer (Nikolai, 2005). On each plot, three golf balls were rolled in opposite directions and the six resultant ball roll distances were averaged. Ball roll measurements were collected twice per week, once on a day in which all rolling treatments were applied and once on a day when only plots that were rolled 6 times per week were treated. Turf quality was measured weekly by rating each plot on a scale from 1-9, with 1 being poor and 9 being exceptional.

### Results and Discussion

Ball roll distance data were averaged over the five evaluation weeks, for the day of rolling and day after rolling (Fig. 1). There were no significant differences in ball roll distance between turf mowed at 1/8 inch and 5/32 inch when rolling was not applied. Decreasing the mowing height from 5/32 to 1/8 inch increased green speed by an average of 6 inches and, according to golfer perception surveys, golfers cannot detect differences in green speed of 6 inches or less on adjacent putting greens (Karcher et al., 2001).

Rolling the turf three times per week resulted in an increase in ball roll distance of approximately 1 foot on the day of rolling and 9 to 10 inches on the day after rolling, compared to non-rolled plots at a given mowing height (Fig. 1). Plots that were rolled six times per week had an

increase in green speed over those rolled three times per week; however, this difference was not significant at the 1/8-inch mowing height on days when all plots were rolled. Conversely, at the 5/32-inch mowing height, plots that were rolled six times per week had ball roll distances one ft. longer than plots rolled three times per week on days that all plots were rolled. Furthermore, on days when rolling was only applied to plots rolled six times per week, those plots had ball roll distances of 1.5 ft. greater than plots rolled three times per week at both mowing heights.

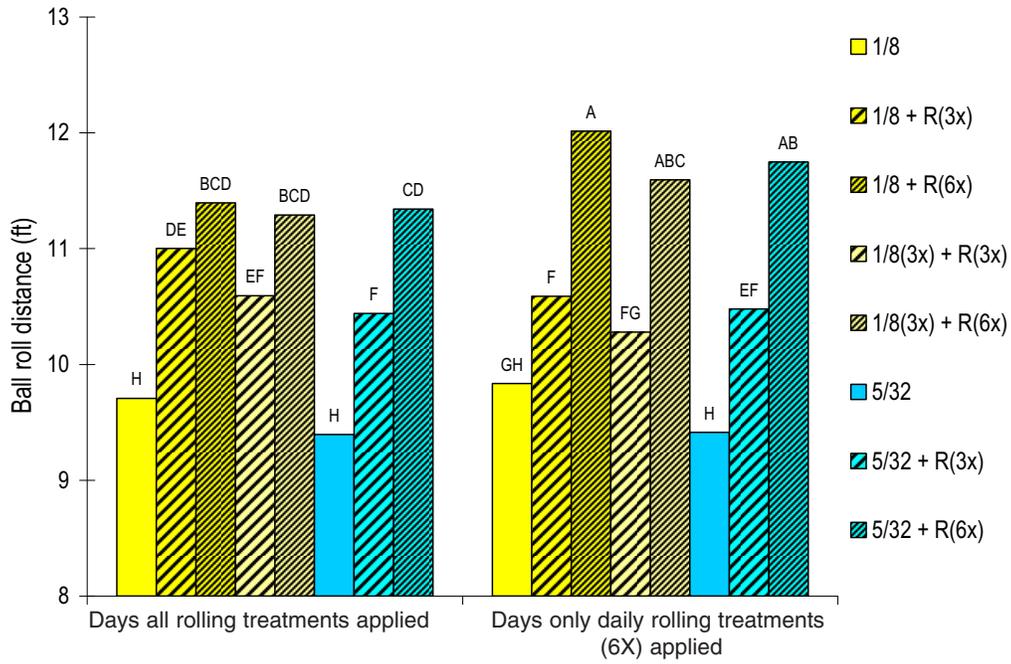
At the 1/8-inch mowing height, decreasing mowing frequency to 3 times per week actually increased ball roll distance (+ 1 ft.) when plots were rolled on alternate days and by approximately 1.5 ft. when plots were rolled every day. Throughout the 5-week study, there were little to no quality differences among treatments (data not shown). It is important to note that this study was performed during the fall, coinciding with ideal growing conditions for creeping bentgrass. The study will be repeated during the summer of 2008 to determine if daily rolling treatments negatively impact turf quality during periods of summer stress in the transition zone.

In summary, rolling treatments were more effective at increasing putting green speed than reducing the mowing height in this study. In fact, with rolling, ball roll distances were increased even when mowing frequency was reduced to

every other day. Therefore, those managing putting greens in the transition zone may be able to mow less frequently during hot, humid periods to minimize turf stress and produce healthier putting green turf, without sacrificing green speed.

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**Fig. 1. Ball roll distance as affected by mowing height and mowing and rolling frequency. Bars sharing a letter are not significantly different according to Fisher's LSD ( $\alpha = 0.05$ ).**



**Fig. 2. Tru-Turf roller that was used to apply treatments.**

**Table 1. Summary of mowing and rolling treatments.**

Mowing height	Mowing frequency	Rolling frequency	Treatment ID
inches	days/wk	days/wk	
1/8	6	0	1/8
1/8	6	3	1/8 + R(3x)
1/8	6	6	1/8 + R(6x)
1/8	3	3	1/8(3x) + R(3x)
1/8	3	6	1/8(3x) + R(6x)
5/32	6	0	5/32
5/32	6	3	5/32 + R(3x)
5/32	6	6	5/32 + R(6x)