A GREEN SECTION RESEARCH PROJECT

# Influence of Mowing Procedures On Roll Speed of Putting Greens

by R. E. ENGEL, A. M. RADKO, and J. RICHARD TROUT*

SINCE PUTTING IS a major factor in the golfer's score, the speed and quality of the greens becomes of great concern to the game. More than any other characteristic, mowing procedures are the focus of attention when considering why a green putts well or poorly. Recently, the GREEN SECTION RECORD[3] listed speed standards for several tournament courses. The practice outlined in this article embarked the golf course superintendent and green committee into an era of more specific evaluation of putting green speed. The purpose of this study was to determine variations in speed and the influence of several mowing factors on green speed.

Green speed was measured on an assortment of golf courses from six states (largely northeastern United States). The primary source of courses was those visited for various other purposes during the test period, along with a few chosen randomly. Also, six courses where USGA competitions were scheduled were included.

The common turf conditions at the time of speed readings on non-tournament courses were: measurements taken within four hours of mowing, essentially on a dry surface and generally on a sunny day without severe heat.

All greens were classified as creeping bentgrass type with varied amounts of annual bluegrass. The height of cut was based on the growers classification. The reported cutting height of 3/16 inch was predominant. The height of grass on three of the courses was listed at 1/4 inch.

The Stimpmeter was used for all speed readings. The ball-roll distance from the chosen spot on the green was averaged with the distance the ball rolled on return toward the original spot. Readings were taken on adjacent mower strips with and against the mower direction. The data were analyzed to determine variability among greens as well as among golf courses.

TABLE 1 SHOWS differences in green speed between courses which ranged from a low of 75 inches to a high of 111 inches. The least significant difference (LSD) at .05 is 12 inches. This range in green speed attests to the fact that there is much variation in green speeds between courses despite modern, sophisticated maintenance practices. Four of the courses with reported settings of 3/16 inch cut did not differ appreciably in green speed from the average speed of the courses with mowers reported at 1/4 inch. This could be due to several factors, including differences in bench setting vs. actual field cut.[1] The green speed of the 18 greens of tournament courses ranged from 96 to 109 inches with an LSD at .05 of 3 inches. (Table 1).

The differences in speed of greens on a given course are of greater concern

**FIGURE 1**
**Mower Direction Effects on Roll of a Golf Ball at Two Heights of Cut on Bentgrass-type Putting Greens**

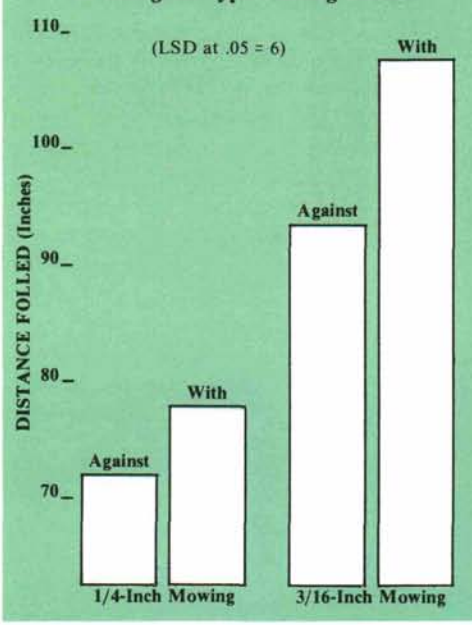
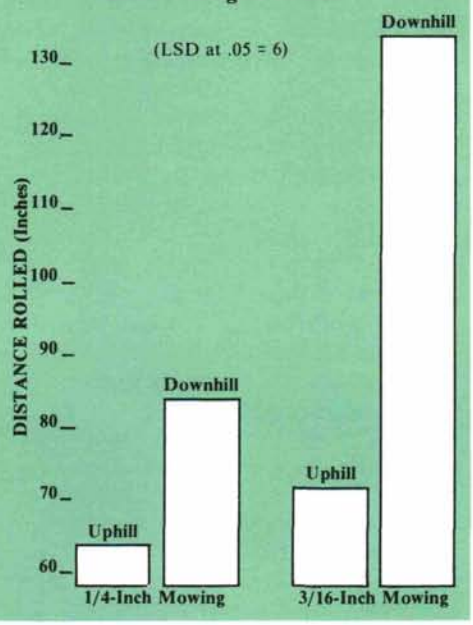



**FIGURE 2**
**Uphill and Downhill Slope Effects on Roll of a Golf Ball at Two Heights of Cut**



than variation in green speed between different courses. Average speed readings between the three greens ranged from 5 to 25 inches on the courses studied (Table 2). Courses with the larger variation force the golfer to attempt adjustment during his round of golf. The six tournament courses (Table 2) had green speed ranges varying from 8 to 15 inches for each group of 18 greens. The standard deviation among greens of the tournament courses was 4.3 inches vs. 8.4 inches for the non-tournament courses. This shows that double-mowing and adjustments in other management practices can add significantly to the uniformity of putting surfaces on any given course.

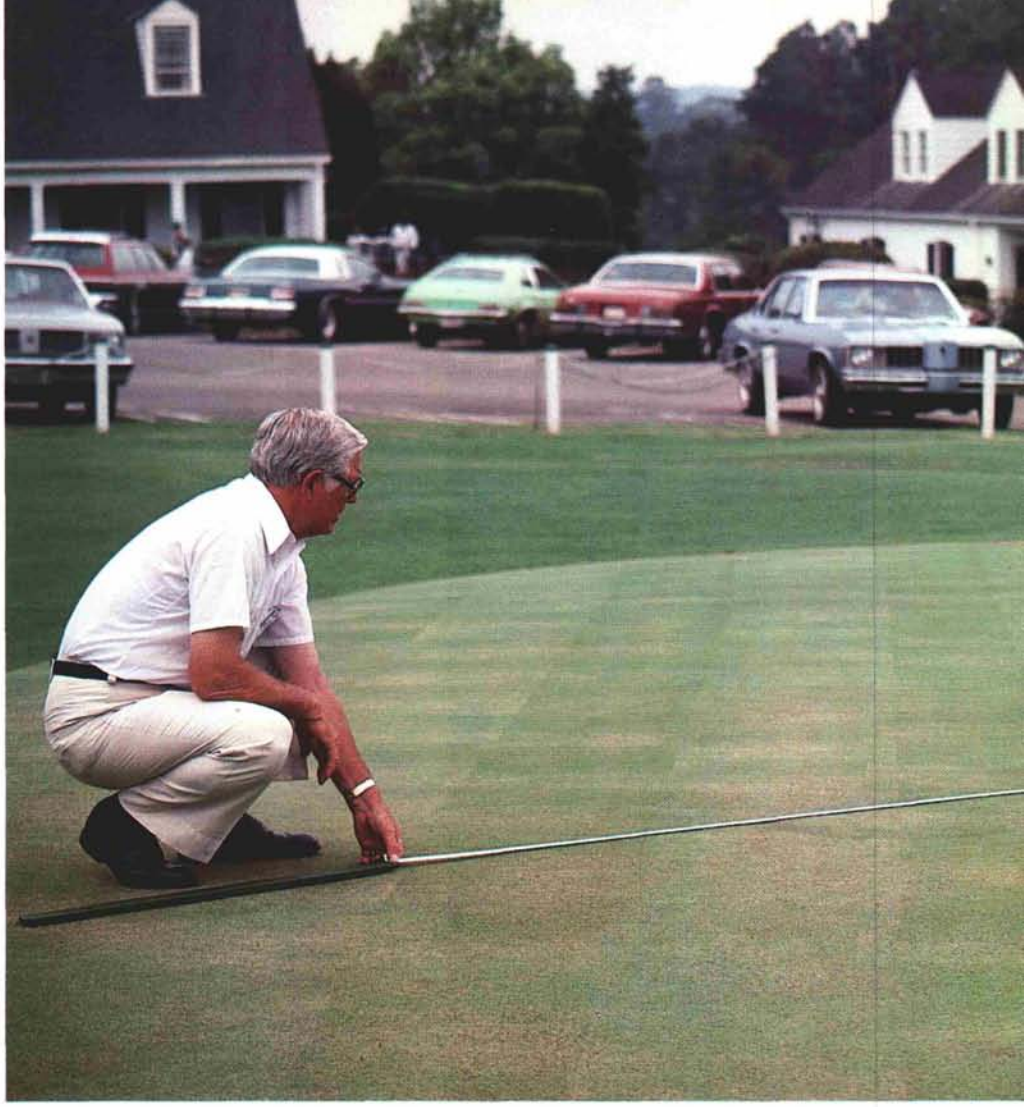
FIGURE 1 SHOWS 6- and 14-inch increases in green speed for the 1/4- and 3/16-inch cuts respectively, when the ball rolls with mower direction as compared with rolling against mower direction. Note this difference in speed approaches those that occur between golf courses and between greens on a course. Fortunately, a majority of the putts do not occur with and against the mower grain.

Figure 2 shows green speed differences that occur between the uphill and downhill roll. These readings were taken on the milder slopes of the greens. Note the 75 percent increase in green speed, or a distance of 59 inches, for the downhill vs. the uphill roll. Considering that these readings represent the level areas of the green, much greater differences in green speed awaited the golfer on the same greens.

Why does the green speed vary from course to course? Because of an assortment of reasons. Among these are variety or species of grass, differences in mowers, differences in interpretation of mower height, frequency of mowing, thickness of bedknife and growth of the grass as influenced by such factors as nutrients available to the grass, top-dressing program, soil moisture, wind exposure, site temperature and percentage of shade.

When the question is asked, why do greens on a given course differ, the same reasons apply except that mowing equipment is usually not a factor.

The difference in green speed with and against the mower direction was expected, but the amount of difference in speed was surprising. This was especially true for the closer height of cut of 3/16 inch. This result, along with other parts of the test results, like all research, answers some questions and raises others. More tests are needed to learn about factors that affect green speed. More information will help the golf course superintendent make helpful adjustments that are not too costly and time consuming.



The USGA's reporting of green speed distances has been interpreted as a step toward standardizing green speed. This is not so. The purpose of the Stimpmeter is to encourage each club to decide upon a speed its members are comfortable with, and then work toward speed uniformity for all greens on its course. Whether for regular membership play or for tournament play, with reasonable management adjustment, all greens on many individual golf courses would putt more uniformly during most of the playing season. The speeds designated for tournament and regular membership play have been defined by the USGA[2] as follows:

**USGA Green Speed Test Comparison Table**

| | Regular Membership Play | Tournament Conditions |
|---|---|---|
| Fast | 102″ | 126″ |
| Medium Fast | 90″ | 114″ |
| Medium | 78″ | 102″ |
| Medium Slow | 66″ | 90″ |
| Slow | 54″ | 78″ |

*Using the Stimpmeter, three golf balls are rolled in one direction and averaged, then the process is repeated in the opposite direction . . . then the average of the two directions provides the speed of the green.*

TABLE 1
**Differences in Green Speed (Roll Distance with the Stimpmeter) Of Putting Greens on Various Golf Courses with 1/4" or 3/16" Cut.**

| Golf Course | No. Greens Sampled | Golf Ball Roll (Inches) Distance |
|---|---|---|
| 70 | 3 | 82 |
| 74 | 3 | 75 |
| 75 | 3 | 96 |
| 43 | 3 | 111 |
| 65 | 3 | 95 |
| 66 | 3 | 81 |
| 67 | 2 | 85 |
| 68 | 1 | 92 |
| 69 | 3 | 92 |
| 71 | 3 | 91 |
| 72 | 3 | 86 |
| 73 | 2 | 83 |
| 77 | 3 | 106 |
| | LSD at .05 | 12 |
| **Tournament Courses** | | |
| 23 | 18 | 109 |
| 25 | 18 | 96 |
| 76 | 18 | 96 |
| 79 | 19 | 100 |
| 80 | 18 | 104 |
| 81 | 18 | 106 |
| | LSD at .05 | 3 |

TABLE 2
**Range of Differences in Green Speed for Individual Greens On Various Golf Courses.**

| Golf Course | No. Greens Sampled | Range in Difference Between Greens (Inches)* |
|---|---|---|
| 75 | 3 | 10 |
| 70 | 3 | 8 |
| 74 | 3 | 7 |
| 43 | 3 | 14 |
| 77 | 3 | 25 |
| 65 | 3 | 21 |
| 69 | 3 | 5 |
| 71 | 3 | 7 |
| 72 | 3 | 7 |
| 66 | 3 | 11 |
| | *Standard deviation among greens = 8.4 | |
| **Tournament Courses** | | |
| 23 | 18 | 11 |
| 81 | 18 | 8 |
| 80 | 18 | 8 |
| 79 | 19 | 10 |
| 25 | 18 | 15 |
| 76 | 18 | 9 |
| | *Standard deviation among greens = 4.3 | |

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[1]Hoos, D. D., and Faust, W. W. (1979). "Putting Greens — The Height of Cut." *USGA Green Section Record*, 17:1-4.

[2]Radko, A. M. (1977). "How Fast Are Your Greens?" *USGA Green Section Record*, 15:10-11.

[3]Thomas, Frank (1978). "The Stimpmeter and the Open." *USGA Green Section Record*, 16:7-9.