

TURFGRASS RESEARCH 2017



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Influence of Tall Fescue Baseball Infield Mowing Height on Ground Ball Speed

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Summary. Athletic field conditions have been shown to influence playability. Results of ball-roll speed studies can be used to predict success of infield hits. Field trials were conducted at Rocky Ford Turfgrass Research Center, Manhattan, KS, to determine the influence of tall fescue baseball infield mowing height on ground ball speed and batter on-base success. Mowing heights of 1, 2, and 3 inches resulted in 1.77, 2.08, and 1.88 s ground ball times, respectively.

Rationale. Tall fescue [*Schedonorus arundinaceus* (Schreb.)] is a drought-tolerant turfgrass species commonly used as a baseball infield playing surface. Cultural management practice studies on athletic surfaces have shown direct influences on playability. Minimal information exists on the influence of infield mowing height and ball-roll speed. Results of ball-roll speed studies can be used to predict success of infield hits.

Objectives. Determine the influence of tall fescue baseball infield mowing height on ground ball speed and batter on-base success.

Study Description. Research trials were initiated on November 21, 2016, at the Kansas State University Rocky Ford Research Center (RF) in Manhattan, KS, to determine the influence of tall fescue baseball infield mowing height on ground ball speed and batter on-base success. Research trials were conducted on a 100-foot-long simulated tall fescue infield. Two experimental runs were conducted on three different infield mowing height treatments: 1, 2, and 3 inches. Six individual replications of a simulated ground ball were applied to each infield condition and experimental run. Ground balls were applied with a pitching machine set to 70 MPH. Simulated ground balls were timed in seconds (s) from simulated pitched ball and

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bat contact (insertion into machine) to baseball fielder location (100-ft distance). Successful infield hits were calculated using constant athletic ability data and infield ball-roll data. Data were subjected to analysis of variance (ANOVA) in SAS 9.4 (SAS Institute Inc., Cary, NC) and means were separated according to Fisher's protected least significant difference (LSD) level at 0.05.

Results. Mowing heights of 1, 2, and 3 inches resulted in 1.77, 2.08, and 1.88 s ground ball times, respectively (Figure 1). Using ground ball speed results, researchers were able to predict that a simulated batter, if a ground ball was hit to the shortstop position (100-ft distance), it would result in an unsuccessful at-bat if a tall fescue infield was mown at 1 and 3 inches. A successful at-bat would occur if mown at 2 inches (Table and Figure 1).

Table 1. Total fielding team time(s), including mean ground ball speeds and player athletic ability values to predict at-bat success^a

A+B+C		D	
Total fielding team time (seconds)		Batter speed from home to first base (seconds) ^b	At-bat success (safe or out at first base) ^c
4.47	<	4.50	Out
4.70	>	4.50	Safe
4.58	>	4.50	Safe

^a Consistent player data were used from Major League Baseball for each model.

^b Time to first base starts at ball contact to include transition from swinging to running.

^c Successful/unsuccessful at-bat is only for described conditions in current research (ground ball to shortstop, thrown to first base).



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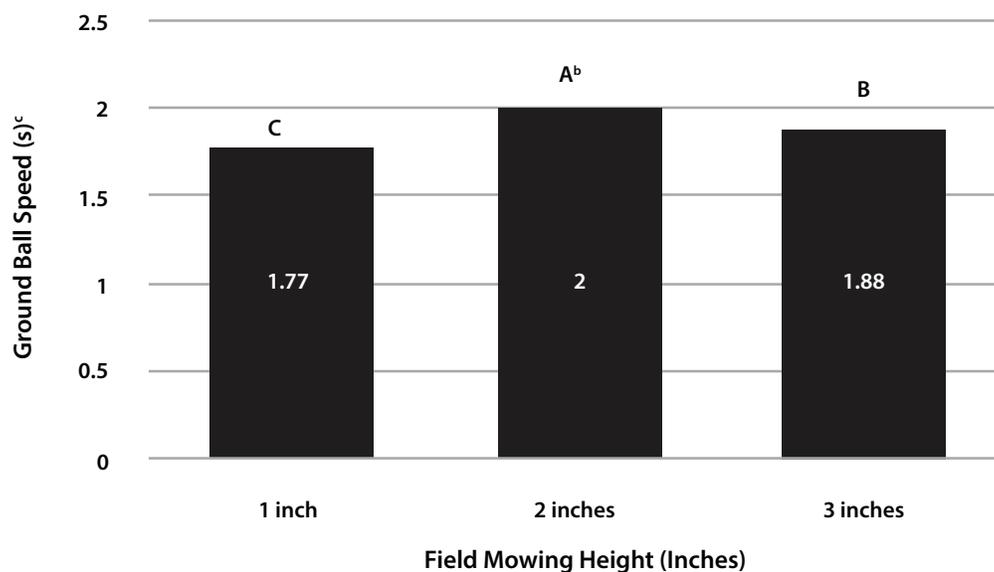


Figure 1. Influence of tall fescue (*Schedonorus arundinaceus* (Schreb.)) baseball infield mowing height on ground ball speed.^a

^a Trials were conducted at the Kansas State University Rocky Ford Turfgrass Research Station in Manhattan, KS, on November 21, 2016.

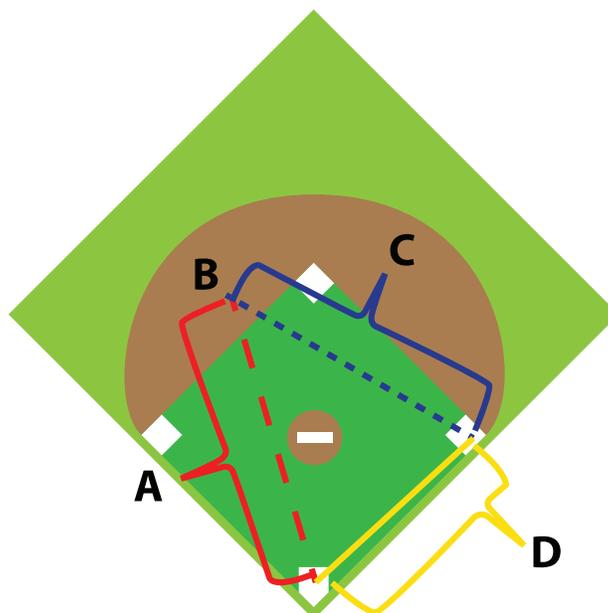
^b Means followed by the same letter are not significantly different according to Fisher's protected LSD at $\alpha = 0.05$.

^c Ground ball speed was determined for distance of 100 feet.

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*Simulated baseball infield
not to scale

Successful At-Bat^c

$$A + B + C > D$$



Unsuccessful At-Bat^c

$$A + B + C < D$$



	A	B	C	D
Infield mowing height, in.	Ground ball from home to shortstop, seconds	Shortstop catch to throw release, seconds ^a	Throw from shortstop to first-base, seconds ^a	Batter speed from home to first-base, seconds ^{ab}
1	1.77	0.7	2	4.5
2	2	0.7	2	4.5
3	1.88	0.7	2	4.5

Figure 2. Determination of batter on-base success as influenced by tall fescue (*Schedonorus arundinaceus* (Schreb.)) infield mowing height^a.

^a Consistent player data were used from Major League Baseball for each model.

^b Time to first base starts at ball contact to include transition from swinging to running.

^c Successful/unsuccessful at-bat is only for described conditions in the current research project and simulated baseball scenario.

