



Racing Surfaces
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Predicting Horse Performance on Turf Using Three Commercially Available Monitoring Tools

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Introduction

To accommodate differences in climate conditions and usage, there is variation in grass type, soil conditions and maintenance procedures between turf racetracks across North America and in Europe. On average turf tracks in North America are more heavily used than those in Europe, and the softer turf that is common in Europe likely could not withstand the racing frequency experienced in North America. However, horses will commonly travel to and race on different turf surfaces. Therefore, a standard rating method would be useful to help owners and trainers understand the surface on which a horse is training and racing.

In order to assess the usability of different turf rating methods, this report considers the influence of track conditions measured with three turf evaluation devices on race performance. While the top priority of the Racing Surfaces Testing Laboratory is the safety of the horse and rider, performance data is more readily tested. Over a period of one month, the pace of the winning horse or fastest work time was compared to measurements taken by three devices: a time domain reflectometry moisture meter, a penetrometer similar to those used in France and Australia, and a Going Stick, a device used by British Horse Racing that has also been adopted in a number of other countries. In this bulletin, the relationship between turf track condition measurements and horse performance for a semi-arid coastal climate is explored.

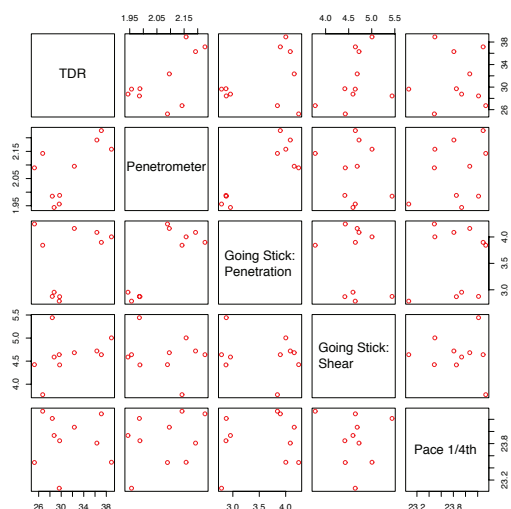


Figure 1 (shown above) is a multiple regression graph of the daily averages of the data.

Measurements

Moisture content, shear strength, and penetration resistance measurements were taken over a period of 23 days on a North American turf Thoroughbred racetrack.

Measurements were taken with three devices. The Going Stick measures both penetration resistance and shear strength by plunging a probe into the surface and then rotating about the base. The Time Domain Reflectometry (TDR) probe measures moisture content. The device consists of two spikes that are pushed into the surface and the moisture content is measured based on the transit time of the electromagnetic wave over the length of the spikes. The penetrometer measures penetration resistance. This device consists of a weight dropped onto a 1-cm² rod, which penetrates into the surface. The depth of penetration is read off of the shaft.

All data collection began in the chute of the turf track. Data locations were spaced evenly in the chute and around the oval. The locations consisted of three individual data points taken at 3 ft, 7 ft, and 12 ft from the rail. With 51

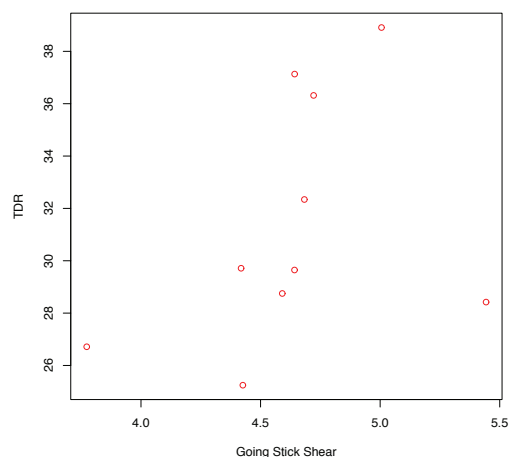


Figure 2 (shown above) is the portion of the grid graph that shows TDR on the Y-axis and shear on the X-axis.

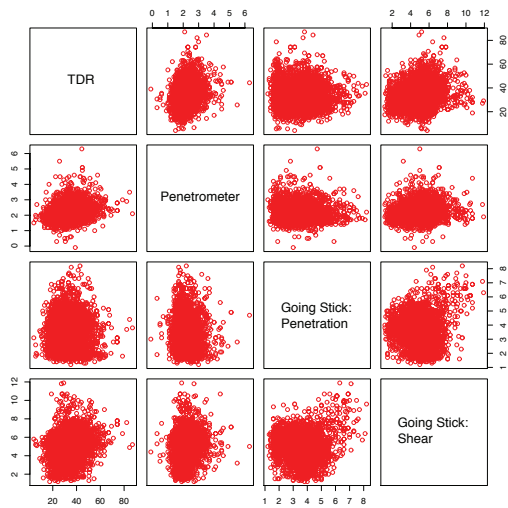


Figure 3 (shown above) is a multiple regression graph of the data.

locations around the track, a total of 153 data points were measured daily with each device. Each device was used with a consistent technique to minimize variation in the data collection. The Going Stick was pushed into the surface by a foot on the device and then pulled back to a 45 degree angle. The TDR probe was pushed into the surface with the one hand and then the data collection button was pressed. The penetrometer data was collected by pushing the plate onto the surface by foot and then triggering the weight to fall. Over the same period, the winning sprint times for all races 8.5 furlongs or shorter were recorded, as well as the fast work times for each day with the pace of each horse determined.

Statistical Analysis

Using these measurements and times, a correlation matrix was built using the averages of the measurements and times for each day. This showed that there was no correlation between the pace and the measurements. In addition, the test showed that there was no correlation among any of the measurement variables. A multiple regression was also run on the data. In this test, the pace was the dependent variable and the various measurements were independent variables. This test showed no linear or quadratic relationship between any of the variables and the pace.

Matrix graphs provided a visual check for these findings. Figure 1 is a matrix of graphs based on average values for each day. Each individual graph is the intersection of the two variables of interest. Figure 2 is an enlarged version of the graph located at the intersection of TDR moisture data and Going Stick shear strength data. The graphs below the diagonal are duplicates of those above the diagonal. Figure 3 is a grid of graphs that displays all of the measurement data. From these graphs no relationship is evident between the measurements. The data points form blotches with no discernible connection or dependence.

Conclusion

Based on the statistical analyses, horse performance cannot be predicted from these measurements of track conditions. While track conditions impact horse performance, most of these changes are related to moisture content. With data collected over 23 days from a racetrack in a semi-arid region with no rainfall, there is no evidence of a link between track condition and horse performance. It is likely that this result would not apply to areas with regular rainfall, but in this particular case, the predictions of performance are not supported.

This technical bulletin is based on the white paper "Racing Surfaces," available at the Racing Surfaces Testing Laboratory website: racingsurfaces.org/white_papers and at the Jockey Club website: grayson-jockeyclub.org/resources/White_Paper_final.pdf

*The white paper and report are the result of efforts by The Racing Surfaces Committee that was formed at the inaugural **Welfare and Safety of the Racehorse Summit** in 2006.*

This Racing Surfaces Testing Laboratory Technical Bulletin for Track Surface Education is one in a series of papers directed toward a general audience with a common interest in developing consistent and reliable track surfaces. This and subsequent bulletins can be found at the Racing Surfaces Testing Laboratory website: racingsurfaces.org/bulletins

Racing Surfaces Testing Laboratory encourages the distribution and use of these bulletins. For further information, contact:

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