



PENN STATE

CENTER FOR SPORTS SURFACE RESEARCH

From the Field: Proper shoes are the biggest ingredient to good traction

By Tom Serensits, Penn State's Center for Sports Surface Research

Welcome to the first edition of From the Field - A Guide to Athletic Field Safety and Care.

Throughout this series, we will focus on a sometimes overlooked but critical component affecting the safety and performance for athletes of all ages – the playing surface.

Our goal is provide you with simple, helpful tips about playing conditions that maximize both safety and performance.

A certain level of traction is required for running, changing direction and other movements on a football field.

But is there such a thing as too much traction? And, if so, what roles do shoes and the field surface play?

Most researchers and medical professionals agree that too much traction can exist. Specifically, rotational traction has been linked to risk of injury to knees, ankles and other parts of the lower extremities.

Rotational traction affects the ability of an athlete's shoe to release from the surface during changes of direction. If rotational traction is high, there is a greater chance that a shoe will stick in the surface as the athlete continues to move, which can increase the potential for non-contact injuries to knees and ankles.

Penn State's Center for Sports Surface Research has been measuring traction on synthetic and natural turf, including NFL fields, for more than a decade by using a traction tester called Pennfoot.

While aggressive cleat patterns – including edge-cleat designs, which consists of the majority of cleats surrounding the periphery of the sole – may be preferred by athletes because of a perceived increased grip on the surface, research has shown that athletes wearing these types of patterns suffered more knee injuries than athletes wearing shoes with a more even distribution of cleats over the entire sole.

The shape of the cleats also affects rotational traction. Research has shown higher levels of rotational traction with shoes containing blade style – square or rectangular – cleats compared to stud style or rounded cleats (see references below).

The Center for Sports Surface Research is in the process of compiling a database of various cleat types and will publish the list at its website: <http://ssrc.psu.edu>.

Traction measurements with mechanical devices that attempt to mimic human movement, such as Pennfoot, provide an opportunity to compare characteristics of playing surfaces and shoes.

However, safe and unsafe thresholds have not yet been established, so while traction data allows for comparisons, it does not make determinations. The complex movements and subtle adjustments made by an athlete are not included when measuring traction using mechanical tests.

This data is being used by athletic trainers and equipment managers with the goal of reducing injury risk by providing athletes with shoes that produce lower levels of rotational traction.

There is more research to be done before definitive traction safety levels are established. What is becoming clearer, however, is that shoe selection plays a large role in the risk of knee and ankle injuries.

References:

- Lambson, R.B., B.S. Barnhill, and R.W. Higgins. 1996. Football cleat design and its effect on anterior cruciate ligament injuries. A three-year prospective study. *Am. J. Sports Med* 24(2): 155–159
- Smeets, K., P. Jacobs, R. Hertogs, J.-P. Luyckx, B. Innocenti, K. Corten, J. Ekstrand, and J. Bellemans. 2012. Torsional injuries of the lower limb: an analysis of the frictional torque between different types of football turf and the shoe outsole. *Br J Sports Med*:46(15):1078-1083.

Youtube link: <http://www.youtube.com/watch?v=5jDJAAVCpJQ&feature=c4-feed&list=PL43g5JLasMpwCvHcHanMGql5wJkejCsp->