Turf Maintenance for Thoroughbred Horse Racing

A EUROPEAN OVERVIEW BY HUBERT CATRICE, CONSULTANT, BAILLY, FRANCE

American thoroughbred tracks train and race on all-weather dirt. Turf is often built in the inner part of the dirt oval, with little radius on the curves and strong banking, and is used for few races when the climate is favourable to the grass growth. In Europe, racing takes place on large turf courses, and training is on both turf and sand.

Assessment of American dirt – fast, good, slow, muddy, sticky, sloppy – cannot be related with terms such as hard, firm, soft, holding, and heaviness of turf. Comparisons in the scale of track speed are based on professional feeling and measurements with penetrometers or accelerometers.

The following overview of turf maintenance for thoroughbred horse racing details turf specificity, tries to define the qualities required and which basic parameters to integrate, and concludes with a discussion of future industry trends.

Specificity for Thoroughbreds

The objective of turf maintenance is to get maximum horse speed without injury or medication. This relates to the ability of the turf to resist the impact of hooves and the ability of the horses to resist a lack of turf flexibility.

Horse racing turf is a living form in constant change and is composed of:

1. Soil with physical, mineral, chemical and microbiological components,
2. Plants with stems, leaves, roots, and a layer of decomposing organic matter called thatch,
3. Water and air.

Since the main criteria for turf in the racing industry is speed, it is important that the hoof should find a point of resistance near the top of the racing surface able to support forces which are continually changing in intensity and direction. Furthermore, the influence of climatic conditions should cause the state of this surface to vary in such a way that the horse can demonstrate both its ability and muscular and skeletal solidity, which is necessary for breeding selection.

To understand the specificity of turf maintenance, we observe the contact between hoof and turf at the linear speed of the horse (between 60 to 70 km/h), that is to say a higher speed for the hoof.

During a race, a horse places all its weight alternatively on each leg. This represents a considerable energy output according to mass and speed. At the time of hoof impact, a sharp deceleration is produced and the shock is absorbed by a rapid deformations mechanism in the structure of the hoof, and then by muscular contractions, while turf divoting appears. The absorption phase of the impact ends according to the position of the fetlock held by the tendons tensed according to the resistance of the turf. The propulsion phase follows. All these phases result in the track being marked or damaged and rapidly repaired.

Turf Qualities

The local conditions and horsemens' wishes, along with the turf superintendent's knowledge, are combined to try to define physical and biological turf specifications such as:

1. Flexibility to soften the impact in conjunction with the hooves and to facilitate the movements of the joints and their coordination in the rocking movement of the foot.
2. Elasticity, resilience, and bounce to propel the horse without causing damage to its limbs.
3. Homogeneity so that the forces of resistance can be produced in a constant way and supply a standard point of resistance over the whole course.
4. A cushion to soften the impact and a sub-layer to respond in varying degrees to support and propel the limbs. A need to realize a compromise between the mechanical qualities of flexibility and the resilience of the turf.

The vocabulary uses concepts coming from turf experience but also from dirt tracks and is of a great variability. Authors such as Dr. J. B. Beard and Dr. Bob Sheard have started the introduction of scientific concepts to properly define the quality of turf.

Turf Parameters

The complexity of turf maintenance consists of integrating the external factors – climate, racing calendar, type of races – with plant and soil factors while taking into account qualities of the turf at the period of racing.

An optimum combination of the following parameters allows the superintendent to establish a turfcourse maintenance specifications and schedule.

Soil texture and structure

Shock absorption is realized by friction of fine mineral particles – sands (or materials with organic or of large granulars) – roots, shavings, and elasticity. A soil rich in organic elements absorbs shock by reversible deformations and is more elastic. The top layer must have crumbly characteristics over a depth which can be up to 7 cm. Beyond this, tendons and ligaments may be overtaxed.

Thatch and rootzone

The need on the horses' part is to benefit from the best conditions of shock absorption by the top layer and resistance from the sub-layer. A thatch level considered good for the horses is undesirable for the turfgrass.

The formation of this thatch is caused by several factors and maintenance operations: the choice of grass species and cultivars, height and type of mowing, collection of clippings, use of fertilizers, microbiological life, overseeding, climate and racing calendar, movable rails, repair after the races, intensity of rolling, in-depth irrigation, aeration and subsoiling.

Moisture and porosity

The optimal soil moisture control allows the axis of the horse limbs to remain in a plane perpendicular to the impact in any direction. This characteristic dictates turfgrass to be the best racing surface avoiding injuries and inflammatory problems.

Optimal soil moisture content maintains cohesion which produces elasticity – an intermediate state between viscosity caused by too much water which results in slippage, movement of the earth without compression, and plasticity in which reduction of porosity produces compression and compaction.

Knowing the drainage speed, potential evapotranspiration, rain forecast, and flexibility expected, the irrigation decision of "how much" and "when" balance between conflicting requirements – what is needed for the plant and maintaining watering just enough to provide the turf flexibility required for horse racing speed.

Future Trends

On racecourses without intensive use, traditional operations of turf maintenance require an important seasonal team of personnel, without heavy investment except in large turfgrass areas. This model can provide a good level of safety for centuries.

The general evolution of the racetrack industry is to expect an increasing return on investments. This is more conducive to projects and investment programs on "all weather" turfs allowing a more intensive use on small surfaces with standardization of the "track speed," and a reduced team of personnel using larger scale equipment and materials. Therefore, private companies develop systems for reinforced rootzone and soil moisture control to give permeability and sufficient air filled pore space.

Systems, registered trademarks, or special turf maintenance processes are realized using sand and synthetic fibres. Keeneland and Churchill Downs in Kentucky with subirrigation; Santa Anita in California; Hong Kong in Asia with Netlon; and Australia and Singapore with StrathAyr Turf Systems are good examples of such patented and public systems.

Horse racing authorities contract with organizations to develop research, trials, and consultancy, as the Ontario Jockey Club with the Guelph Turfgrass Institute for the construction of the new Woodbine turf track; the Jockey Club of Britain with the Sports Turf Research Institute of Bingley for the Nottingham racecourse; the Japan Racing Association with its Facilities Research Engineering Division; The University of Arizona Race Track Industry Program with the Racing Surfaces Association Symposium; and the New Zealand Racing Industry Board with the New Zealand Research Institute. This list is not exhaustive.

Also, the International Turfgrass Society, with its International Research Conference every four years, publishes in its proceedings the important research work of universities, organizations and many other companies around the world.

We must keep smiling! Those who continue to look for better, safer turf for horse racing still have a lot of work to do in this area: trials, research, cooperation, consultancy, education, engineering programs, turf maintenance, project management, information and communication. ♦

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