More Than Speed: An Essential Guide To Measuring Golf Green Performance

R&A / Sustainable Agronomy.

Measuring greens performance has become an integral part of agronomic assessment for the last 15 years in the UK and has developed globally with innovation of new practices and advancement in the tools and platforms we use. Even before then, golfers naturally ask **"from what background knowledge is a judgement of green quality and consistency made?"** On the same day that golfers think that the greens are too fast, others may think they are too slow. This subjective opinion can lead to counter arguments with commonly held beliefs on green speed split between "greens being faster in the morning just after they have been cut, or "green speed increasing through the day as greens dry out." Opinion can also be misjudged with other key characteristics such as firmness of surface and the smoothness and trueness of ball roll which are two further key qualities to be taken into account when assessing performance. Our Championship management work is a well-practiced process integrating daily and complete data collection to support the decision-making process what is the value of measuring green performance for individual clubs, and how best is this done? **The ultimate goal when measuring performance is to save time and money, optimising inputs for maximum output – green performance and consistency.**

Is Green Speed a Measure of Quality?

Rightly or wrongly golf courses seem to be subjectively judged on either being better or worse than the neighbouring course based solely on 'locker room' chat and 19th hole bar room debate comparing greens of one course to another, or how they played last weekend compared to today. These comparisons are commonly centred on the ball roll speed (green speed). Some golfers may consider green speed as one of the most important criteria by which players judge course performance.
Green speed is not the sole measure of quality though.

The Stimpmeter is the best known and most accessible and widely used tool for measuring green speed. Invented by Edward S Stimpson, the intention was to develop a tool which would accurately, objectively, and statistically gather valid measurements of putting green speed. The device was subsequently modified by USGA and introduced in 1978. **The Stimpmeter is a tool to aid uniformity between and within greens, and also to encourage each club to decide upon a speed its members are comfortable with.** Then using the data to work toward speed uniformity for all greens on the course. It has been said that the founding developers were always aware that their tool – the Stimpmeter - was in the 'wrong hands' when used by the golfer, or when the golfer is requesting the information – data which will generally hold little value to golfers outside of the elite game.

There are ethical dangers in promoting performance targets if misinterpreted. History tells us that publishing data ranges can lead to abuse such as in the case of Stimpmeter readings which may lead to inter-club comparisons. Research discussed this just a few years after its introduction as it was apparent that many **clubs were attempting tournament speeds for the entire season with speed dominating players expectations. This would often come with associated problems such as the decline in greens health and grass cover.**

Why Green Firmness is so Important

The industry waited another 30 years or so before tools such as a Clegg Impact Hammer made its way from being research equipment to a field testing tool measuring surface firmness – perhaps the most important characteristic of a reliable and resilient green and to challenge the best players in the world. Up until 2010, measurable firmness was probably not understood. **Golfers even today commonly criticise inconsistent or disappointingly slow green speeds but not giving consideration to the importance of firmness and the influence it has on green speed.** Whilst there may once have been a desire to replicate 'target golf' conditions and thus dictate agronomic practices which produce softer 'more receptive' surfaces, the consequences of reducing green speeds because of soft and unreliable surfaces was probably not considered. **Quite simply "fast greens on soft surfaces cannot be sustainably achieved.**

Player Feedback

My degree dissertation was titled 'Objective Data Assessing the Performance of Golf Greens as a Comparison to Golfers Perception of Playing Quality.' The study compared performance data (speed, firmness, smoothness) collected morning and afternoon against played feedback from three different handicap categories. The measurements gave an accurate measure of performance but it did not always agree with the players perception on playability. The low handicap players were more challenging in their assessment of morning to afternoon green speed (there's a shocker!), whereas the medium to higher handicap golfer placed more emphasis on smoothness. **What the study did see is that player feedback is likely to be inconsistent at best and largely inaccurate. Making maintenance decisions purely based on player feedback could lead you down the wrong path.**

Measuring Green Performance

The case for measuring and benchmarking performance against researched targets is undoubted. I spent more than a decade working with clubs where measuring soil profile (organic matter and soil moisture content) and surface performance (firmness, smoothness, trueness, and green speed) as part of agronomy reporting. This was a game changer and led the industry by driving informed decision-making.

Golf clubs started to purchase soil moisture meters and take more notice of researched target ranges for green performance. But there was a danger too in becoming too data heavy and not understanding the cause and effect of the readings taken. We often ask course managers at interview whether they feel that greenkeeping and agronomy is an art or science? The reality is that it is a blend of both. Data is there to monitor change and inform the skilful implementation of maintenance by the turf manager. Bad data is worse than no data at all. The tools and protocols we use need to be robust and researched.

At The R&A, we use performance data to support our Championship agronomy and integrate where needed it into our Sustainable Agronomy Service work with private golf clubs. What we see however is that there is more value when course greenkeepers are collecting their own and more frequent data rather than just a moment in time. It is also important for the agronomist to have access to more data to assess any change or trends.

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The availability and cost of performance tools has been an obstacle for many though. Whilst most clubs have purchased soil moisture probes, and probably have access to a Stimpmeter, few had access to tools for measuring firmness (Clegg or TruFirm), and there was no commercially available and reliable tool for measuring smoothness and trueness. That is until now though as the USGA researched and developed the **GS3 ball - a universal tool for measuring green speed, smoothness, trueness, and firmness (drop test), working on the USGA Deacon app.**

Environmental Measurements

There are other measurable greenkeeping assessments which are growing in importance. Environmental data has developed with significant importance moving on from the simple catch can rain gauge. The technological advancement of weather stations – environmental monitoring stations – now interact with irrigation systems and greenkeeping software programmes, some of which have integrated AI and disease modelling programmes. Even basic measurements such as programmes which monitor daily and hourly soil and air temperature will inform statistics such as understanding Growth Potential (GP) and Growing Degree Day (GDD) – information which can help with understanding growth and the timing of fertiliser applications and other products.

Measuring Growth Rates

It possible to measure and record growth (greens clip yield – the volume of grass collected from mowing) and use the results to direct or confirm maintenance practices such as fertiliser application and/or mowing adjustments? All greenkeepers do this by simply asking "how much growth was collected in the grass boxes today?" Or, in simple terms, "how many empties did we do?" The problem is gathering this information with accuracy. Jim could be emptying half full boxes whereas Jill could be emptying when the boxes are full.

Recording measurements of clip yield is easy and not as time consuming as one would think. Clip yield volume will vary according to all environmental conditions, including soil moisture and light, as discussed and also through any changes to cultural maintenance i.e. brushing, grooming etc. All of these factors can be recorded and evaluated when analysing the results.

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The challenge is to reveal the influence of inputs (rainfall, irrigation, nutrition, Plant Growth Regulator) and use sward refinement options to control the output of greens performance and maintain turf health. I would expect that over time you will see moisture and temperature drive growth more than you'd imagine. Organic matter will reduce if you manage growth effectively and will be accurately controlled if you apply sand top dressing in accordance with clip yield. The information will also help you to manage costs and revise the timing of nutrient, PGR, sand top dressing and sward refinement strategies.

Top Tips:

- Data is for the greenkeepers and clubs management – not for the members.
- Measuring / checking soil moisture is one of the most important aspects of managing greens health.
- Consistency is the game and work within researched targets adapted to your site conditions and situation.
- It is vitally important that you differentiate between routine plans vs competition play when small regiments may be applied to increase green speed.
- Maintain performance within target ranges and not to exceed target.
- Do not consistently push the boundaries on minimum or maximum targets. Exceeding the limits will induce turfgrass stress and increase the level of disturbance which will favour annual meadow-grass.
- Don't just limit data to the main season months. Intermittent data such as green firmness and moisture content collected during winter months is equally valuable (green speed is not).