

# Dunfermline Golf Club

Course Report  
March 2018

Paul Miller PhD

# Dunfermline Golf Club

## Report of Visit and Meeting of 16<sup>th</sup> March 2018

Those present were Jock McNeill, Kenny Duncan and Paul Miller. A discussion was held in the clubhouse about various aspects of previous visits, the progress being made on the golf course in terms of its condition, specifically greens, and the approach to be taken towards maintenance in 2018. The issues discussed include the condition of the greens and other turf areas, trees, the potential for further data collection, and the formation of a 'support group' of other greenkeepers using WhatsApp; all of these items will be dealt with in this report.

## The Golf Course

### Greens - Profiles

Following my visit in January I was expecting a very wet situation on the greens. In January they had been very wet and had lost a lot of condition, being very much in a mid-winter state and suffering from being wet in the surface and having lost colour and density. This was particularly apparent on areas suffering additional stress such as the right hand side of the 17<sup>th</sup> green, and the central area of the 9<sup>th</sup>. In early March this year we had suffered significant snowfall followed by a very wet weekend, and indeed the night before my visit had seen a further 7mm of rainfall. As such, the condition in which I found the greens was very encouraging – the surfaces were a lot drier than they had been in January, the associated firmness was also there, and it was clear that water is moving through the greens much better than has been the case. This is very encouraging.

In my first visit of May 2017 we had identified at least two issues in the physical make-up of the soil profile of the greens, namely an organic surface layer, a compacted layer lying between 40mm and 150mm, and natural soil below which was reasonably crumbly in structure. Several recommendations were made in dealing with these issues, including

physical removal of the organic matter through hollow coring and the Graden machine, verti-draining to break the 40mm – 150mm compaction, and the Air2G2 machine to break the 40mm to 150mm compaction and indeed any compaction that might lie deeper. A concerted effort has been made in this direction and the results are beginning to be seen in these drier and firmer surfaces, even following rain. We visited green numbers 2, 4, 5, 6, 7, 9, 12, 14, 16, 17 and 18, taking a hole cutter and / or the soil sampler tool to inspect the profiles. The profile of the 17<sup>th</sup> green is illustrated in figure 1, from which it can be seen that the soil is more crumbly than it was in May 2017, and that there has also been some valuable root growth since.



Something that I referred to in previous reports is the production of toxic and smelly gases when the soil is anaerobic (without oxygen), and that this was particularly noticeable in January 2018. Again on this current visit we sniffed the profiles to make an assessment of this phenomenon, and whilst there was some sourness to the smell it was much reduced, indicating some good air exchange and penetration of clean air into the soil. Again, a

further sign of a healthier soil in the making. It was always recognised that the process of improving the physical properties of the soil profile would be a medium term exercise and so whilst good progress has been made it is my view and recommendation that we need to continue with this approach, both on the surface organic matter and on the deeper compaction such that drier and firmer conditions continue to develop to a point at which we are satisfied with them, and at which we then go from an 'improvement' phase into a 'maintenance' one.

One thing that will help us towards this objective is to have an accurate measurement of the organic matter content of the top 20mm, 20 – 40mm and 40 – 60mm, and it is my understanding that there is a plan to have these measured in the late spring / early summer. These values will give us an accurate measurement of organic matter from which we can set a target and monitor progress over the subsequent period.

### **Greens – Surfaces**

As indicated above I felt that in January the greens surfaces had lost a lot of condition and in the particularly stressed areas the grass – specifically the *Poa annua* – had become very yellow and lost density and overall health. Although the conditions were not favourable for disease at that time my feeling is that the greens would have been vulnerable to it had conditions changed, and so this susceptibility could be a real point of vulnerability for the greens. On this occasion however I was pleased to see that the greens had recovered a lot of condition and were looking quite well. Kenny had recently applied the 11:5:5 + 8% Fe fertiliser (known as 'Cold Start') which had contributed to the pick-up in condition as seen on the greens, and with slightly milder temperatures for the week or so preceding my visit there had been some early-season growth which was welcomed. The result of this is that there was a good cover of grass on the greens – density and growth – and indeed quite a lot was being taken off by mowing. This gives the potential for dense and strong growing early season turf, and the greens can now be brought into summer condition by careful and attentive greenkeeping over the next six weeks to two months. However there is a risk of

generating too much early growth through fertiliser use as it can contribute to surface organic matter that is something that we are trying to reduce, and it can contribute to disease. As such I think there will be some possibility of refining the fertiliser programme in future seasons, as we get closer to the growing environment that we want.

### **Greens – the 14<sup>th</sup>**

I have commented above about the improvements to the greens since my last visit, particularly in terms of dryness and firmness. This applies to all greens, however the 14<sup>th</sup> is not as strong as the others and so it is worth commenting separately on it. We have discussed the 14<sup>th</sup> green on previous visits and in reports: it sits in a low area that Kenny tells me was used for skating in cold winters a generation ago – so clearly a long-standing wet area in winters – and we can see through the hedge to the south that there is a lot of surface water in the adjacent fields. A survey of levels would tell us exactly the height differences in that area of land, however what is clear is that the water table is high and the green is struggling a bit more than the others. The photos overleaf give an indication of the surface condition of the 14<sup>th</sup> green, it showing a bit more moss and poorer condition than the others. We took a profile with the hole cutter from the 14<sup>th</sup> and this is shown below – as with the other greens there is an improvement in structure of the soil, and presumably a parallel improvement in the organic matter, this green having been treated no differently to the others in respect of coring, Graden etc. – and there is some encouraging root growth. With nothing obvious in the profile as such I conclude that the issue lies with the inability of water to get further through the soil and into the groundwater, given a high water table in this area. It is likely that in summer this will lower and we will see improved condition in the green, however it is not under our control and will I suspect be a source of on-going concern and perhaps be seen as a ‘weak link’ at Dunfermline Golf Club. We have discussed before about the long-term options for this green and whilst no conclusions can yet be drawn this needs to remain on the table for discussion.



Figure 1. The 14th Green

### **Greens – Moving Forwards**

My conclusion is that the greens are well placed for the time of year and that they provide a good starting point for now producing the surfaces that will take the Club through the season. Kenny and I spoke a fair bit about not now allowing these greens to go 'backwards' in terms of condition, which essentially means nurturing them through spring and into summer when full summer conditions can be expected. There is highly likely to be a period of increased disease pressure between now and summer, by which I mean night temperatures between 8 and 10° C and high humidity. We have discussed before the on-line support through e.g. Greencast that gives an assessment of disease pressure, and this may well also be a useful area where a WhatsApp discussion group can provide its members with useful support and information. We talked about the 2<sup>nd</sup> green specifically, which had been badly affected by disease last spring, and it would be good to keep them as free from disease as we can. Chemical use always remains an option, but the number of chemicals available to us is

reducing and so more cultural and 'good greenkeeping' solutions need to be found across the whole industry. Additionally it is an expensive exercise to spray fungicide – up to £1000 per application to 18 greens – and there is increasing public sensitivity to chemical use, so it is not the 'easy fix' that it once was. I sent information through the post that I had picked up at Harrogate about fungicides and the need to rotate the use of different active ingredients, and I hope it is of interest and value.

In addition to considerations about disease I'd say that this next few weeks is a period in which Kenny cannot miraculously produce summer conditions. The course needs to be allowed to 'wake up' from winter, to commence growth and build resilience, and that the maintenance operations of mowing, topdressing, rolling etc. are introduced slowly and judiciously as the conditions allow. Part of our strategy is about minimising stress to the plant – it is vulnerable at this time of year – and pushing it in the early season will not bring long-term benefit. As such I encourage patience from the members and that the Club allows Kenny to bring the course into summer condition on an appropriate schedule according to weather, growth and condition.

### **Longer-Term**

In the medium to long term it is my recommendation that we continue to work on the organic matter and the aeration of the soil to depth. I feel that we are seeing benefits and that the job is not yet done, although once we have the organic matter data we will be better placed to comment. This is really important to the long-term health and sustainability of the greens and, by that, of the Club. A variety of coring, Graden, verti-drain, Air2G2 and regular light aeration when possible will continue with this amendment of the soil and bring further improvements.

## Fertilisers

In my previous report I undertook to research and feed back on early season fertilisers and their uses. The most important nutrient in turf is nitrogen, which gives us density, colour and growth rate, and so it is widely used to stimulate growth when growth is needed. In addition to the nitrogen released naturally by the soil system there are several chemical compounds applied as fertilisers that release nitrogen into the soil in a form available to the plant – some of them do it quickly, and the growth response is dramatic but short-lived, others do it slowly giving a less dramatic impact that lasts longer. The trick in turf management is to use these appropriately for the time of year and to give the required growth. Given that a priority in early season is for growth, so-called ‘quick release’ nitrogen sources are often used in spring – these include ammonium nitrate and ammonium sulphate – and they are packaged in a range of proprietary products, a few of which I have listed in the table below.

Product	Nitrogen Sources	Comments
Coldstart 11:5:5 + 8% Fe	Ammonium Urea	These are quick release N sources with Iron for addition ‘green-up’.
Fineturf G 6:0:18 + MgO + Fe	Nitrate Ammonium	Very quick release N with added Magnesium and Iron for additional ‘green-up’.
Award Nutri-Pro	Ammonium Urea Organic ‘Extras’	Same N sources as ‘Cold Start’ but with additional ingredients intended to stimulate the soil.

All of these fertilisers give a quick green-up and kick start growth, but are really only suitable for early season given the programme we are pursuing. Iron (Fe) and Magnesium (Mg) are often used to stimulate colour, and so have a real value. The ‘Extras’ in the Award Nutri-Pro are unlikely to do any harm but I remain unconvinced about the value of these things in cold soils, and if a lot of money or reputation was at stake I’d ask to see the research! In summer these quick-release materials are often considered less desirable as they create a lot of growth that requires constant cutting and which accumulates on the surface as thatch, contributing to soft and slow greens, and, if we’re not careful, into a downward spiral of



organic matter accumulation and further reliance on quick-release materials to 'paint over' the weaknesses that can develop from that unhealthy situation. There is definitely now an industry-wide move to slower-release materials including coated urea and methylene urea in the summer months as these give a more even growth, do not accumulate organic matter to the same extent, and allow improved surfaces because they produce a bit less grass. It is these materials that are in the fertiliser programme recommended by Blair Young, and which I support as being entirely appropriate for Dunfermline Golf Club.

A further aspect of fertiliser application is the total amount of nitrogen applied to the turf. This is expressed as kg N / hectare /year, and there are 'target' ranges that are applied to different types of golf course, their physical locations and their turf quality objectives e.g. a links course will have a different expectation of N inputs than a parkland one. This all requires knowledge of a combination of percentage N in the product and the application rate, and is underpinned by knowing accurately the areas in m<sup>2</sup> of the greens and tees, the proper calibration of the spreader or sprayer, and its use by a competent operator. I feel we have a gap in our knowledge at Dunfermline Golf Club of this fundamental information (areas and accurate application rates) and I'd like to plug that and ensure that the kg N being applied is suitable for our needs. I'll come back to this later in the report when commenting about information and data management.

## **Tees and Fairways**

We did not focus a lot of attention on tees and fairways on this visit, concentrating as we did on the greens. My observations about tees are that in some areas they have struggled to fully recover over the winter. There are several potential reasons for this which can range from the extent of the wear and damage from 2017, the original construction materials and methods, the proximity of quite dense stands of trees – in addition to the shading problems of trees there are the impacts of roots drawing nutrition and moisture from the tees and leaving them unable to withstand the pressures placed on them – and the maintenance they receive. There is nothing that can be done now about construction, or to last season's wear patterns,

however there are clearly things that we might do with trees and maintenance. We spent a fair bit of time at the 9<sup>th</sup> tee talking about this and it is my understanding that the subject of trees is under review and that there are on-going discussions and plans being formulated for e.g. the conifers and poplars around that tee, and the row of conifers shading the 8<sup>th</sup> tee. In terms of tees maintenance there are things that we can do: I'd welcome more aeration on tees to relieve compaction, and I don't think there is any harm in ensuring they get sufficient fertiliser to aid recovery from wear. There could be an increase in organic matter on the surface if we weren't careful with this, however the impact is less than on greens and it can be managed through scarification and aeration. If we wanted to make a further analysis of soil conditions then that is something that is fairly straightforward and we could then formulate specific plans, however I am reluctant at this stage to recommend doing so unless we have the means to follow it through – at present it feels like the greens should be the priority and we can pay more attention to tees if we want to in the future. As I said above I'd focus on the basics at present – aeration when possible and appropriate use of fertilisers – and addressing the shading and tree issues where they exist.

As with a previous visit I was pleased to see the on-going programme of aeration work to fairways, keeping them as dry as possible and meaning that they can remain firm and support good growth and good golf in the season. Extensive fairways maintenance can become very costly and so I feel that the emphasis on mowing, aeration and weed control as required is the right way to continue with them. As growth comes over the next few weeks and the greenkeepers are able again to define fairways through mowing the golf course will take on its classic parkland summer appearance that will be enjoyed and appreciated by everyone concerned.

### **Data Management and Record Keeping**

This is something we have touched on before and which I would welcome becoming more of a priority at Dunfermline. As we have discussed previously there is a trend towards greater understanding of data and using it for decision-making in golf course management, and the

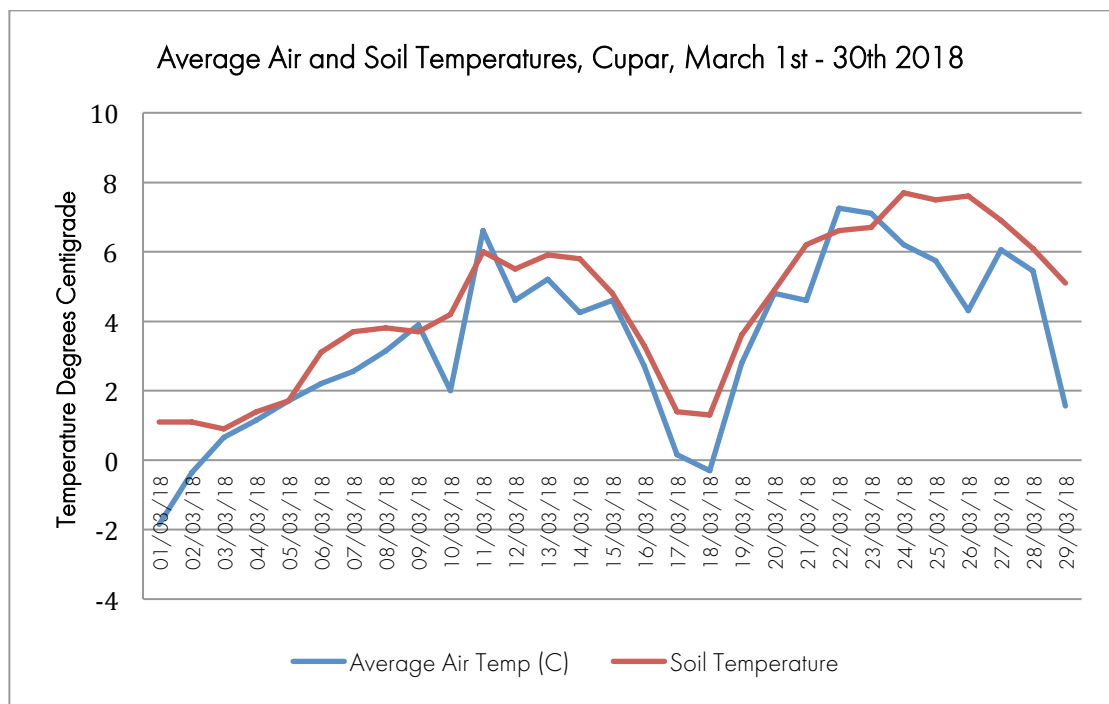
technology now exists to facilitate that at reasonable cost. One of the things I referred to previously is that this year I have been recording weather data (max and min temperature) and soil temperature for Cupar, and this is an example of where data helps us to understand what is going on. In recent years there has been a lot of work done by Mark Hunt of Headland Amenity on the concept of 'Growth Degree Days', which could also be referred to as 'Accumulated Heat Units', and which is, in essence, a way of understanding how much heat is in the soil/plant system and therefore when we can expect certain growing events to occur e.g. the flowering phase of *Poa annua*. Many experienced and professional greenkeepers are now very mindful of this as a monitoring tool and are using it to inform their decision-making as well as gaining insight into the growing environment and the turf response to it, and I encourage this as appropriate.

The thinking behind GDDs is that the average daily air temperature is monitored (daily max + daily min / 2). If the average air temperature is 6°C or below then the GDDs on that day is zero. If however the average is 7°C then 1 GDD is recorded, for 8°C we get 2, and so on. These GDDs accumulate during the month and year. Mark Hunt has recognised that *Poa annua* flowering occurs after approximately 100 GDDs have accumulated, which in many parts of the UK is around mid May, but can be variable according to latitude, altitude and so on. In the east of Scotland we often experience a cold easterly wind until the end of April, so it is difficult to accumulate GDDs, however by inference we can say that good growth is likely to be occurring by the time we have accumulated 70 or so GDDs, which in our part of the world could be as late as mid May.

I have monitored GDDs for Cupar since the start of 2018, and to date (30<sup>th</sup> March) we have accumulated only 9.4 GDDs, the obvious point being that we remain cold and that with a cold weekend forecast we are unlikely to get strong growth for quite some time yet. An industry friend shared his data with me for his location in Epsom, Surrey, and up until 21<sup>st</sup> February at Epsom they had accumulated 36 GDDs, the point being that even in the UK there can be considerable variation and that we in Scotland will experience growth later than more southerly parts of the UK. Clearly this is outwith our control, but we must remain

mindful and patient of the fact that regardless of any actions we plan we are not the final arbiters of when growth will come – that is in the hands of the weather.

A further aspect of data gathering and management is being able to monitor soil temperatures. Root growth ceases below a soil temperature of 1°C and shoot growth below 5°C, with the optimum reached at 15 – 20°C. In terms of plant activity this means that there is a restricted response to any fertilisation, nutrient release and biological activity below these temperatures, and indeed in a recent tweet the fertiliser company ICL suggested that their 'Cold Start' product should be applied when soil temperatures reach 8°C. (In reality many greenkeepers do apply prior to this and get some response, although perhaps not optimum). The point is though, that growth depends upon soil temperature that in turn depends upon air temperature and sunlight and the amount of heat that is coming into the 'system'. In addition to counting GDDs I have been monitoring soil temperature in Cupar, which tend to track air temperatures albeit with a lag. I include below the graph of average air and soil temperature in Cupar for March 2018 to date, from which it can be seen that until average air temperatures climb then soil temperatures cannot do so either, and growth will be restricted.



This weather information is valuable in understanding what is going on and in communicating it to committees, golfers and others, and I'd encourage it. Other areas where routine data gathering would be useful is in moisture content of greens such that they are not over-irrigated (which excludes air and encourages 'soft' growth) and this can be obtained routinely using the Pogo.

I also mentioned above the 'hand in hand' activity to data gathering which is accurate record keeping. I feel that as we are working towards a more sustainable greens management programme then it will be important to monitor inputs and the reactions of the turf to them, and at present I don't know if there is a concise, easily understood record of what has been happening. For example, something we haven't done and which I don't feel we need to this season is any testing of soil nutrient levels, but I'd like to do so again next spring so that we can see if we have created any differences and if so in what direction the readings have shifted – this will only be decipherable if we know accurately what inputs and maintenance practices have occurred. I realise that this might require a change of practice and of working culture to some extent, but we also have to appreciate that the indoor and desk-work part of a golf course manager's job is every bit as valuable to the organisation as operating a mower or a verti-drain. Can I suggest that we look at this in a future meeting and develop systems to capture the information that we should be capturing?

### **Support / Networking Group**

In the early months of this year I approached several greenkeepers with a view to setting up a support group from golf courses with similarities to Dunfermline. Each of those I approached were keen to become part of such a group – they are Kenny Duncan from Dunfermline, Mark Laing from Aberdour Golf Club, James Lindsay from Stirling Golf Club, Graeme Ferguson from Duddingston Golf Club and Graeme Davidson from Murrayfield Golf Club. This group represents greenkeepers of varying levels of qualifications and experience, and each of the golf courses is situated on parkland more or less with a view of the Forth. Of course any such group is only as supportive as the activities of its members, and

so I urge Kenny (and the others) not to be reserved and to initiate chat whenever there is something worth saying, for example in relation to disease, or to the use of wetting agents, or fertiliser choice, especially when a change is being considered. I know that there will be a willingness to 'join in' so someone has to be bold enough to go first! I am happy to do this initially, but I'd like to find myself in a position where I can step back from that role when the group becomes self-sustaining.

## Summary

There is some real improvement to the surface condition of the greens and I feel that as they are at present they afford an excellent opportunity to present good conditions and provide a solid foundation for the season ahead. I'd recommend easing them into summer cutting heights and surface refinement as weather and growth allow, and exercising patience as this cold spring eases off and gives us some growth. I'd recommend the seasonal programme of light and regular topdressing, careful use of fertilisers (following the programme that has been recommended), regular use of wetting agents, and regular use of 'soil conditioner' e.g. seaweed liquids. Appropriate in-season aeration will also be a useful element of the programme, keeping the surfaces open and allowing water movement and air penetration.

For tees and fairways I'd encourage as much aeration as can be provided, and encouraging tees recovery with appropriate fertiliser use. The issue of trees is an on-going discussion but there are certainly some particular areas that will benefit from continued tree thinning and removal.

Paul Miller PhD

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