# Amazing Grazing

## Grass growth measurements with remote sensing techniques

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## Background

Proper prediction of biomass and its nutritional value is considered essential for modern day grassland management on grass based dairy farms. As such, spectral imaging techniques could provide an alternative for labour intensive grass height measurements. To explore these perspectives, an experiment on multiple types of soil was set up.

## Methods

- The experiment ran from 2016 to 2018 and was carried out on a clay, sand and peat soil to achieve normal variation in hydrological conditions and mineralisation levels of nitrogen.
- A factorial combination of nitrogen fertilization (0, 180 and 360 kg $ha^{-1}$) and grass growth intervals were provided to create various yield levels. In total 24 plots per location (Figure 1).
- The number of final cuts per location was five (clay and peat) to six (sand) and covered the entire growing season.
- At the moment of the final cut, a day before harvest, light reflectance was measured in 2016 en 2017 with a calibrated Cropscan Multispectral Radiometer (MSR87, MSR16R)

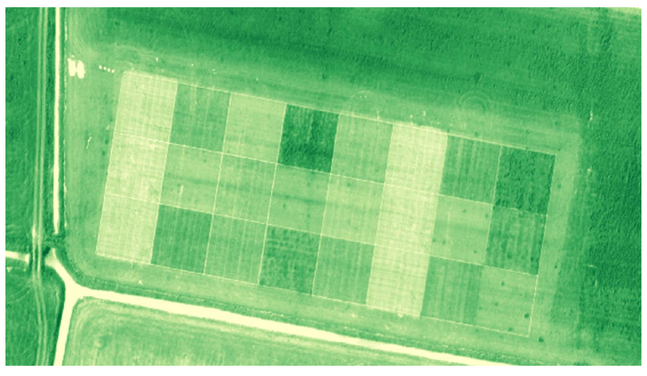

**Figure 1.** Drone image of experimental site on a Dutch clay soil

## Results

Between locations there was a level difference between the reflection percentages at the relative high wave lengths (Figure 2). The highest reflections were found at the peat location and the lowest reflections were found at the sand location.

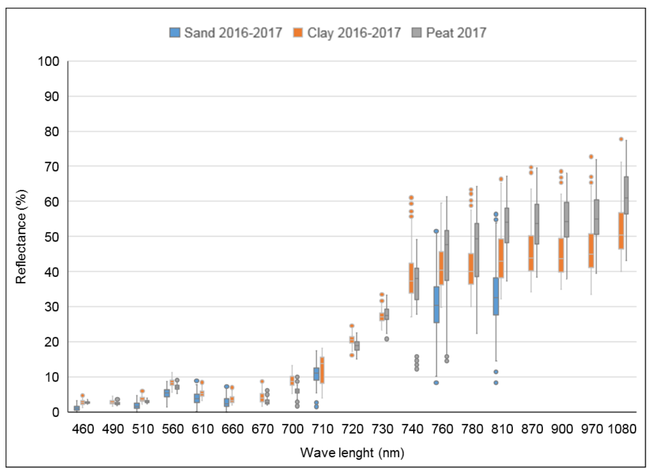


**Figure 2.** Percentage of light reflection per wave length per location

For all cuts of the clay location (2016) the most common vegetation indices were plotted against DM yield (Figure 3)

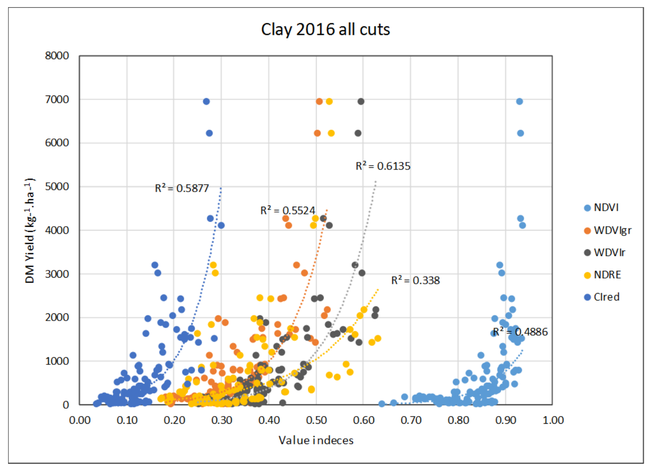


**Figure 3.** NDVI, WDVI green, WDVI red and NDRE plotted against DM yield for all cuts of the clay location in 2016

WDVI red was best related to DM yield. The difference in WDVI red and green was relatively small. An important improvement of the relationships could be realized by distinguishing different cuts (Figure 4).

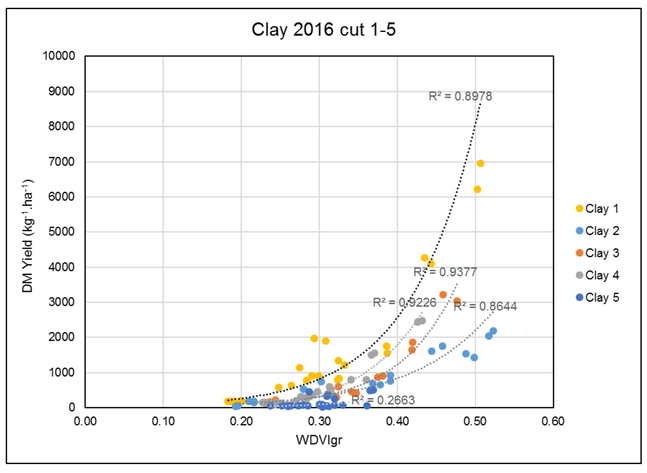


**Figure 4.** WDVI red plotted against DM yield per cut (1-5) for the clay location in 2016

Possible explanations of differences between cuts include a change in composition of biomass (N-content, DM content) and orientation of foliage triggered by grass length and flowering. Further analysis for obtaining more insight into this matter is expected in 2018.

## Conclusions

- Preliminary results showed that WDVI red was best related to DM yield.
- Correlations changed during the growing season and results varied per location.
- More insight into those matters is desired, as well as the impact of heterogeneity due to grazing.
- In the meantime, spectral imaging is helpful to get an insight into yield variation between grass plots and within grass plots under similar growing conditions.

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