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   01377 240 118
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7. **Fieldcare South** – Scothern
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8. **ProCam Agriculture** – Wymondham
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ProCision

PRECISION FARMING SOLUTIONS

ProCision

Precision farming

Precision farming is the timely and relevant application of data, knowledge and technology to allow more accurate management of in-field variations.

In arable farming, it can be applied to soil nutrient levels, soil pH, soil type, weed pressure or pest density. Applied effectively, it can lead to improved crop performance and rotational benefits from more targeted use of fertilisers, lime, seed or agrochemicals.

Precision Farming also offers significant environmental benefits, due to more accurate placement of inputs within field boundaries and at the field margins.

Improved crop performance

Benefits for the environment

- Accurate field maps
- Enhanced record keeping
- Better rotational planning
- Timely matching of nutrients to crop requirements
- Correct and consistent soil pH
- Selective use of herbicides
- Control of plant populations
- Minimum over-use of inputs from overlaps
- Avoiding waste in tramlines or beyond field margins
- Reduced diesel use

GPS guidance systems offer a potential benefit over cost of at least £2/ha on a 500ha farm

Source: HGCA Research Review No. 71, May 2009

Failing to maintain P index 2 resulted in a yield penalty in winter wheat of 0.64t/ha (index 1) and 1.7t/ha (index 0).

Source: HGCA Critical P project, 2014

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ProCam ProCision

ProCision is ProCam's unique approach to precision farming.

In line with ProCam's inherent farmer-first philosophy, ProCision operates with the farm's dedicated ProCam agronomist at the heart of the process.

Involved from the collection of soil samples to the processing and interpretation of data, the ProCam agronomist can recognise the individual challenges and priorities of the field and farm. Reviewing all the various layers of data from a practical and results-driven standpoint, the ProCam agronomist ensures the best advice and most beneficial outcome for the farmer.

The ProCision approach is to apply precision farming only where it is likely to deliver a commercial benefit. Furthermore, ProCision is bespoke, with ProCam's in-house support team having the capability to write site-specific computations where necessary. Recommendations are also influenced by the ProCam 4Cast big data resource, which draws from over 500,000ha of information gathered across two decades.

With ProCision, data is managed through the Farmplan gatekeeper platform and data warehouse. This ensures a consistency of approach and avoids delays and errors from the double-entry of information.

ProCision

ProCision field and soil nutrient mapping

Field maps

Plotting the farm map, using existing field boundaries and applying – where appropriate – any other relevant knowledge, is an essential starting point for precision farming.

Maps can be created quickly and easily through ProCam's ProCision platform, using existing templates with standardised colour coding.

With basic details such as cropping, drainage and water course information, maps provide a valuable resource for farmers, irrespective of the next steps into precision farming.

Soil nutrient maps

Farms are ideally set up on a four-year service contract with fields allocated for sampling every four years. Soil sampling is a job for the ProCam agronomist or can be contracted out, with an average of 16 core samples required for each hectare block.

Laboratory analysis is most commonly carried out for P, K, Mg and soil pH. Results are imported directly into ProCam's ProCision platform to generate a farm report or more detailed field reports in a standard colour-coded format.

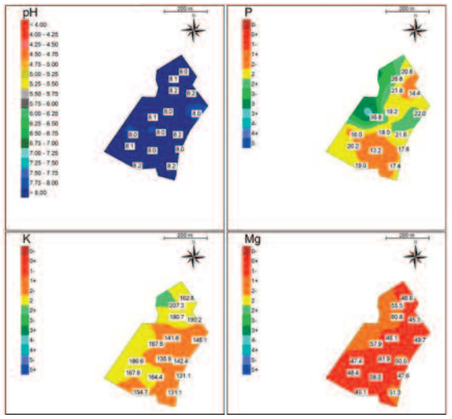
In-depth field reports are then reviewed in conjunction with cropping and yield information, plus other farm-specific details, such as inputs to be used. This gives the potential for ProCam to write bespoke computations – as opposed to using standard computations based on RB209 - for generating individual recommendations for the farm.

Variable rate computations are then used to generate application maps for export to the farm's precision farming equipment, giving the capability to apply nutrients and/or lime according to crop requirements.

Trace element samples can also be taken on a whole field basis to provide information to prompt consultation on micronutrients.

Customer benefits:

- Accurate crop-to-area field mapping
- Enhanced recording and management tools
- Identification of potential areas for improvement
- Improved crop yield / quality
- Optimum use of fertiliser inputs
- Accurate audit of fertiliser use
- Better for the environment



A single set of core samples can be used to generate field maps for phosphate (P), potassium (K), magnesium (Mg) and soil pH. The same samples can be used to establish trace element levels, where potential deficiencies are suspected.

ProCision

Guide to variable rate fertiliser applications

01 Sample locations

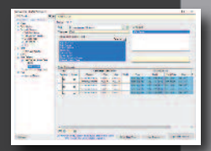
Plot out in advance on the ProCam ProCision secure data platform using existing boundaries. Use a standard 1ha grid pattern, or take account of farm or agronomist knowledge to take account of known variations (e.g. soil type).

02 Soil sampling

Carried out by ProCam agronomist or contracted out.

03 Import results

Lab results imported directly into ProCam ProCision data platform, automatically matching up with sample locations.



04 Farm report

Reports created quickly and easily, with a consistent colour scheme, to provide an overview of whole farm nutrient levels.

05 Field report

In depth reports for each field, detailing P, K, Mg and soil pH.

06 Variable rate computations

Required application rates calculated from cropping and yield information in the Fields Module. Standard computations based on RB 209 recommendations are available, or calculations can be customised for any criteria.

07 Variable rate prescriptions

Application maps created and reported to the farm.

08 Device export

Application files can be exported to most fertiliser spreader control units.

09 Variable rate application

Using farms own equipment or hire of ProCam Trimble Juno unit

ProCision soil texture mapping

The creation of field maps, as described on page 3, is an essential prerequisite to producing soil texture maps.

Generating soil texture maps (or zones) can involve various information sources. The optimum approach will depend on how much is known about the fields and other factors such as the availability of yield maps that may correlate well with soil texture.

On-going (year-on-year) collection of data allows continuous refinement of the model to provide more and more accurate field-level interpretation.

With field maps displaying varying soil textures or zones, farms can apply variable rate seeding to achieve optimum plant populations.

All mapping and seed rate calculations (variable or otherwise) are carried out within ProCam's ProCision platform.

Customer benefits:

- Optimum plant populations
- Improved field performance
- Options to improve grass weed and/or pest management

Guide to ProCision soil texture mapping

01 Create a 'base map' to identify zones, using one or a combination of:

On-farm knowledge and experience

Yield maps (where there is strong correlation with soil texture)

Electrical conductivity testing (EC)

02 Define establishment and over-winter survival rates to determine target plant population for each zone

Gather any on-farm knowledge

Inspect the soil in each zone

Takes samples for soil texture analysis

03 Calculate seed rate (seed per square metre) for each zone

Use establishment rate, target plant population and Thousand Grain Weight

Convert seed rate to kg/ha

Take account of other factors (e.g. slug pressure, high blackgrass infestation, weather conditions, etc.)

04 Monitor the crop

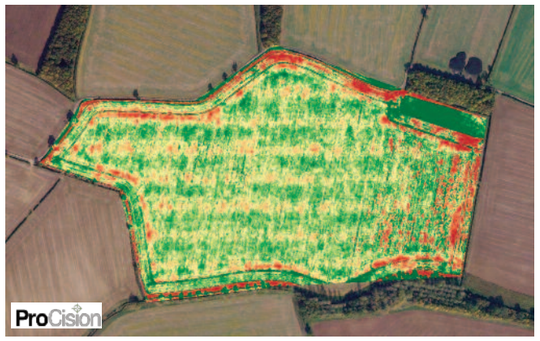
Record locations for repeat visits

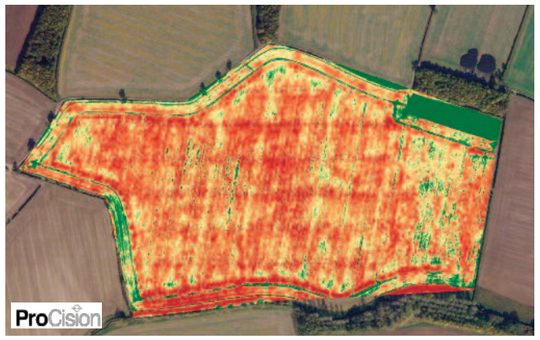
Count germination rates and over-winter survival for different soil types

Use crop information to refine and improve the model for the subsequent years

Pooling knowledge and data for bespoke recommendations

Soil risk assessments required for Basic Payment Scheme compliance can be created by the ProCam agronomist as part of the ProCision service.





Drone imagery identifying the presence of grass weeds before (left) and after a herbicide application can be used by a ProCam agronomist as part of the ProCision precision farming service.

ProCision variable rate seeding

Variable rate seeding is a precision farming tool that can be used to achieve optimum plant populations across varying soil types or conditions and can be used to help combat other challenges such as high grass weed burdens.

ProCam's ProCision approach is to use data from all relevant sources, throughout a season and in subsequent seasons, to build a reliable picture and create bespoke computations for each field within the farm.

For a challenge like blackgrass control, this allows seed rate prescriptions to be created as part of an integrated management approach, taking account of other factors such as variety choice, seed treatments, drilling date and place in the rotation.

Producing more from less

North Yorkshire arable farmer Graham Potter has revolutionised his farming system over the last seven years to create a business that he can run alone, sustainably.

He has converted to a no-till direct drilling system and adopted a range of precision farming applications that have together improved cropping performance whilst reducing costs of production on a farm with soils ranging from blown sand to heavy clay.

"We started by using GPS for more accurate tramlining and have progressed to variable rate P, K, N and lime and are now drilling at variable rates," he says. "We've even had a machine custom-made to allow variable depth sub-soiling.

"It's a constant learning process, but I am now in a much better position to farm profitably, knowing my fields and how to farm them far better than ever before."

Graham works collaboratively with ProCam to continually develop his precision farming methods, now using drone imagery to allow selective treatment of grass weeds and manganese deficiency and exploring the potential for variable rate spraying.

W. Potter & Sons

- **200ha, variable soil types (light sand to blue clay)**
- **Crop rotation**
  - Winter wheat (feed)
  - Second wheat (feed)
  - Cover crop
  - Spring barley / spring wheat / fodder beet
  - Oilseed rape (high erucic)
- **Precision farming**
  - Controlled traffic farming
  - Soil nutrient mapping for variable rate P, K, N and lime
  - Variable rate drilling
  - Variable depth sub-soiling
  - Variable rate slug pellet applications
  - Drone imagery for selective treatment of grass weeds and manganese deficiency

Variable rate seeding helps to achieve consistent plant populations across fields with a wide range of soil types.

Graham works collaboratively with ProCam to continually develop his precision farming methods

ProCision

ProCision variable rate soil nutrition

The advantages of maintaining optimum soil nutrient indices across a field, or consistent soil pH, are well documented and can be achieved through variable rate applications.

ProCam's ProCision approach takes account not only of soil analyses but also other relevant data that is available, such as yield maps, field drainage profiles, drone imagery, and even the type of inputs to be used.

Managed through ProCam's ProCision platform, data is used to create bespoke recommendations to ensure the best outcome for the farm.

Removing variables

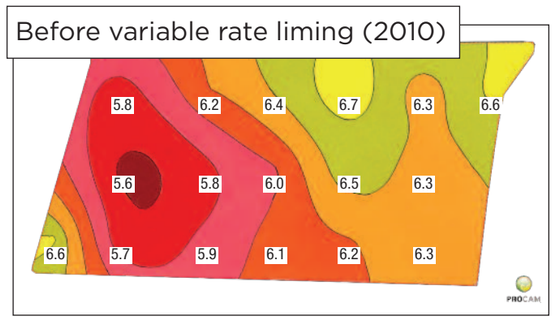
Precision farming is part of a progressive approach to crop production at 450ha Burgie Lodge Farms, near Invergordon, that aims to improve use of resources, remove variables in the system, and ultimately maximise enterprise performance.

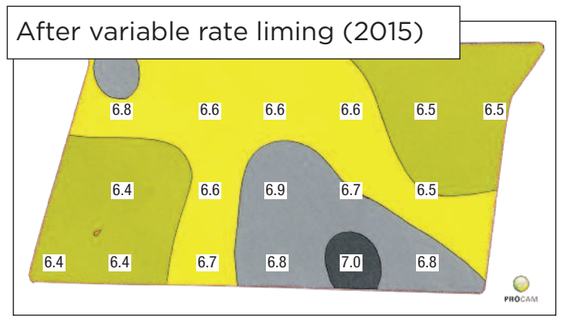
Currently, farmer John Batty is using an autosteer system when drilling and works with ProCam to achieve variable rate liming and variable rate application of liquid nitrogen. Drilling with variable seed rates is a potential next step, once the business can justify the required investment in yield monitoring technology.

"We have to look at anything we can economically do to improve performance, to reduce waste and improve the consistency of crop output," he says. "Soil sampling and mapping to facilitate the variable application of lime is a good example, apart from significantly reducing the lime spend compared to previous blanket applications. Over a period of 8 years of variable rate liming we've seen our soil pH profiles become far more even, so management is made easier and everything from plant establishment to final grain quality has the potential to be more consistent."

Burgie Lodge Farms Ltd

- **450ha, sandy loams over blue clay**
- **Crop rotation**
  - Spring malting barley
  - Winter feed wheat
  - Oilseed rape
  - Grass leys for silage cash crops, along with fallow, both as an entry for OSR
- **Precision farming**
  - Auto steer system for drilling / tramlining
  - Soil nutrient mapping for variable rate lime
  - Variable rate liquid nitrogen (N-Sensor)





Field maps generated through ProCam's ProCision service show the impact of variable rate liming on establishing optimum soil pH.

ProCision

Compatible with a broad range of on-farm technology and farm management software

ProCam ProCision application files can be exported to most precision farming devices and farm equipment and are not specific to any particular hardware.

ProCam can provide some rental equipment, such as the Trimble Juno unit, to facilitate some aspects of precision farming initiated through ProCam ProCision (subject to availability).

Farmplan gatekeeper

Gatekeeper is the UK's crop management and precision farming software of choice that provides a central system for crop traceability, performance reporting and precision farming. Growers and Agronomists can exchange cropping data, recommendations and precision farming plans bringing huge benefits and savings. Links to the industry's leading machinery manufacturers provides peace of mind and ensures that Gatekeeper is at the heart of the farm business.