



# North Wyke Farm Platform

## Field Events Data



## User Guide



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# The North Wyke Farm Platform: Field Events Data

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**Description:** The North Wyke Farm Platform (NWFP) was established in 2010 to study and improve grassland livestock production at the farm-scale. The NWFP uses a combination of environmental sensors, routine field and lab-based measurements, and detailed management records to monitor livestock and crop production, emissions to water, emissions to air, soil health, and biodiversity. The rich NWFP datasets help researchers to evaluate the effectiveness of different grassland (and arable) farming systems, which in turn, contributes to the development of sustainable, resilient and net zero land management strategies. This document serves as a user guide to the field events and common field operations that occur on the NWFP and is associated with other dedicated user guides that detail the collection, and quality control processing of all the datasets produced on the NWFP.

**Site:** North Wyke, Okehampton, Devon, UK. Geographic location: 50.76944, -3.90138; 50°46'10" N, 3°54'05" W.

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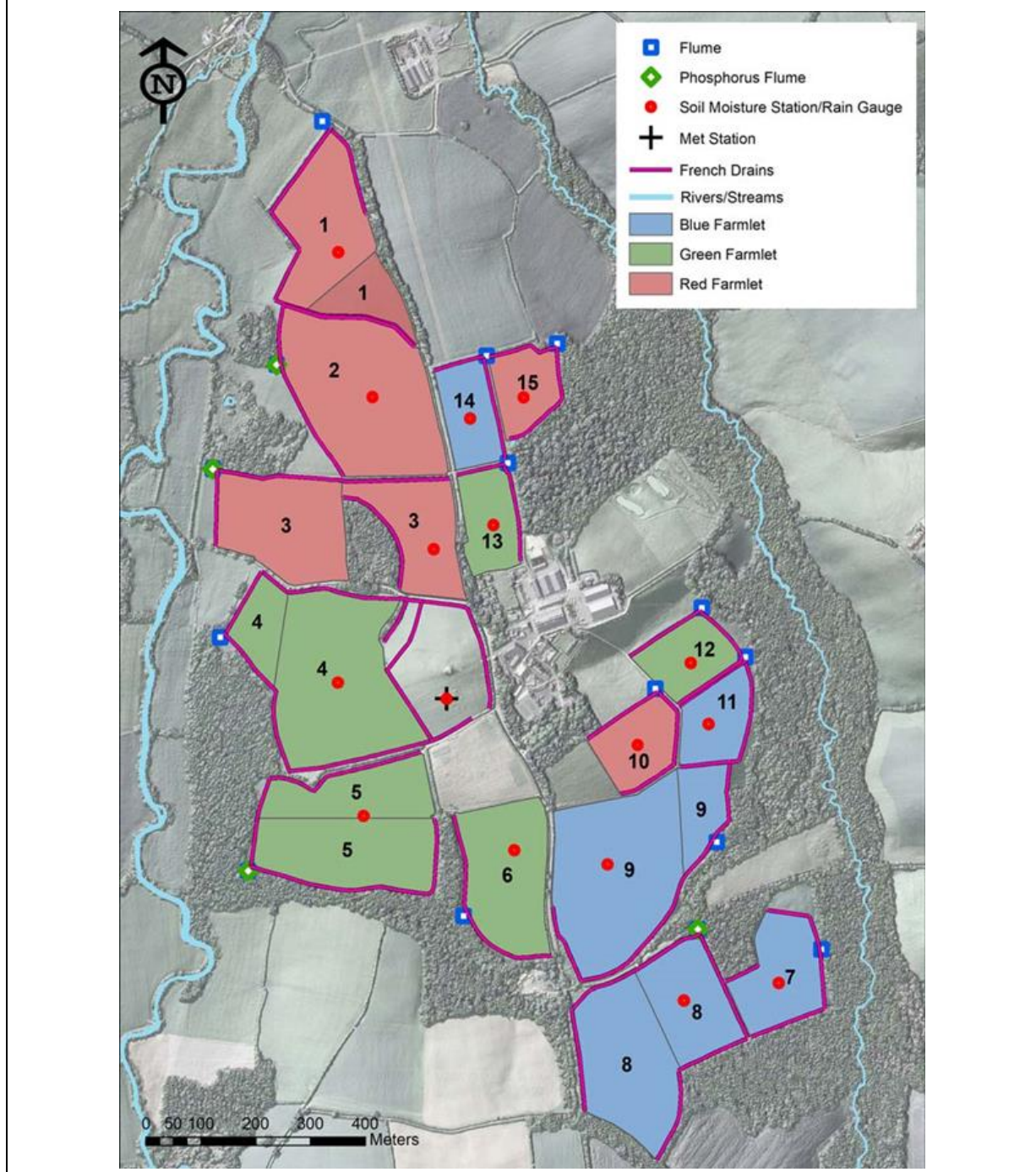
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# 1 Introduction

This document is intended to be a user guide to the field operations and events data on the NWFP (Figure 1). These data include details and metrics of the management of the fields the field events and common field operations that occur on the NWFP. Information on the site characteristics and design and development of the NWFP can be found in the User Guide entitled 'NWFP\_UG\_Design\_Develop.pdf' available on the NWFP website.

Figure 1. Map of NWFP showing systems as of 2015-2019 (first system change period <sup>1</sup>).



<sup>1</sup> Green farmlet = permanent pasture, Blue farmlet = high sugar grass/clover; Red farmlet = high sugar grass, and later converted to arable in autumn 2019 (start of second system change period). In November 2017, phosphorus was measured at catchment or flume 3 in addition to flumes 2, 5, & 8. From autumn 2023 onwards phosphorus will be measured on all catchments. Numbers represent catchment number. Note some catchments consist of multiple fields.

## 2 Field Events

### 2.1 Background

All agricultural operations that occur on NWFP fields are recorded and available for download from the Data Portal. These events are most commonly tractor operations such as spreading inorganic fertilisers and organic manures, spraying agrochemicals, ploughing, drilling seeds silage making and harvesting activities. If the management history of the NWFP fields is required, then this is the dataset to download. From 2015 onwards, seven fields in each farmlet were created to facilitate the grouping of triplets of field enterprises (cattle grazing, sheep grazing, cutting). This was done by splitting Orchard Dean into Orchard Dean North; NW045 and Orchard Dean South; NW046 as described in the 'NWFP\_UG\_Design\_Develop' document. The farmlets and their enterprises pre- and post- 2015 are also described in this document. The triplet system ended in 2019, when the Red farmlet transitioned to an arable system.

## 3 Common Field Operations

This section contains information about the timing of applications to fields which are grazed or set aside for cutting/silage production or are under arable crops.

### 3.1 Fertiliser / Lime Applications

All fields are maintained at target P index 2, K index 2- and pH around 6. The inorganic fertiliser spinner is equipped with GPS and weigh cells which ensure accurate applications and allows precise recording of the quantities applied (Figure 2). The type of fertiliser used is recorded in the format: %N, %P<sub>2</sub>O<sub>5</sub>, %K<sub>2</sub>O, %SO<sub>3</sub>.

Figure 2. Inorganic fertilizer spreading using a fertiliser spinner.



Low soil pH is rectified by using prilled lime products which are applied accurately with the same fertiliser spinner. Standard lime is used where a large step change in soil pH is required, such as that for the grassland to arable conversion of the Red farmlet.

### 3.2 Organic Manures

The cattle are housed during the winter on purchased bedding material. The resulting farmyard manure (FYM) is returned to the farmlets. Up to and including the winter 2013/2014 the FYM was stored in a large single midden. From the winter 2014/2015 onwards three dedicated livestock buildings (Figure 2), each with their own dedicated FYM midden were used for the cattle. Before this, the quantities of FYM applied in each farmlet were measured (see Data Portal, Field Events).

Figure 3. Dedicated livestock buildings.



Since 2019, FYM from the permanently housed cattle (Brown farmlet or system) is no longer applied to the NWFP; previously this would have been applied to the Red farmlet which no longer receives FYM input since conversion to arable.

The sheep are also housed during the winter but up until 2018 were not kept separate from the rest of the farm sheep flock. Thus the FYM equivalent to that generated by 75 ewes for each farmlet (which were housed together

at the main North Wyke site) was moved to the dedicated farmlet middens. From 2019 onwards, the NWFP sheep are housed separately from the rest of the farm flock, and in their farmlet groups in the Orr Small Ruminant Facility. Since then, their manure is spread on the relevant farmlet system.

### 3.3 Silage Making

During winter when the animals are housed, they are fed silage made from grass or a grass / clover mixture. Silage is made by preserving a green fodder crop (e.g., grass, maize, whole crop cereal) through bacterial fermentation to the point of acidification by packing it into a compact mound or 'clamp' and sealing out the air with plastic sheeting. The fermentation process and lowered pH helps conserve as much of nutritional value of the crop (e.g., sugars and proteins) as possible. Alternatively, the fodder crop may also be made into bales that are wrapped tightly in plastic to exclude air.

Typically on the NWFP, the pasture fields are mown, and the herbage is left to wilt for approximately 24 hours to reduce the moisture content, before being rowed up. A forage harvester picks up the herbage, chops it into small pieces and adds a lactobacillus additive to help improve the fermentation process. The treated herbage is blown into trailers for transport

to clamps where it is emptied out and rolled with a tractor to compact it and exclude as much air as possible before sealing it tight under a plastic sheet. The dates the fields are mown and when the silage is picked up from the field are recorded in the NWFP database. In 2020, a food grade preservative was used to prevent spoilage of the silage through overheating.

### 3.4 Reseeding and Arable Cropping Operations

Farmlet fields within the Red and Blue farmlets were progressively reseeded in 2013 – 2015 (see [Appendix A](#) for details). A typical sequence of operations is for the existing sward to be killed using herbicide before the field is ploughed. A fine, firm seed bed is then created with multiple passes with a power harrow and a roller. Grass or grass and clover seed is sown using a grass seeder ([Figure 4](#)).

*Figure 4. Drilling the seedbed using a grass seeder.*



The seedbed is rolled again to improve the contact between the seed and the soil. All these details, including the type and quantity of seed used is recorded. An animation of the timing of reseeded events of the farmlets can be found on the NWFP webpages.

In 2019, the Red farmlet underwent a grassland to arable conversion and details of the field operations are given in [Appendix B](#). In the first year of the conversion, the farmlets were drilled with a group 1 milling variety of winter wheat (var. Crusoe). In the following year, this was repeated but this time using a different variety, Skyfall. In the third year (2021), the farmlets were sown with oats as a break crop before a return to winter wheat (var. Crusoe) in 2022.

## 4 Data Records and Quality Control

Data entry forms are kept in all our tractors which are filled in by the drivers as they complete the operation. The required information includes details of the activity, start and end times, start and end tractor hours, the name of the operator, details of any product applied, and the quantity of any product applied. These data are transferred to an MS Access database using preconfigured forms and restricted data-fields to prevent transcription errors. The data are periodically cross-checked against details of the operations before a query is run to export a dataset ready for upload to the Data Portal.

## 5 Data Portal

The NWFP Data Portal (<https://nwfp.rothamsted.ac.uk/>) allows accessibility to the core NWFP datasets to not only Rothamsted Research but also the wider research community. The data are open access and free to download but users are required to register their interest.

For information on the latest version of the 15-minute datasets and the changes since the last version, please refer to the User Guide entitled 'NWFP\_UG\_QC.pdf' available on the NWFP website:

<http://resources.rothamsted.ac.uk/farm-platform-national-capability/data-portal-guides-and-information>.

In addition, the website offers a wealth of online, and regularly updated information to complement the data.



## 6 Citing the Data

If you choose to use any of datasets provided by the NWFP in a publication, please cite:

- Orr, R. J., Murray, P. J., Eyles, C. J., Blackwell, M. S. A., Cardenas, L. M., Collins, A. L., Dungait, J. A. J., Goulding, K. W. T., Griffith, B. A., Gurr, S. J., Harris, P., Hawkins, J. M. B., Misselbrook, T. H., Rawlings, C., Shepherd, A., Sint, H., Takahashi, T., Tozer, K. N., Whitmore, A. P., Wu, L. and Lee, M. R. F. (2016). *The North Wyke Farm Platform: effect of temperate grassland farming systems on soil moisture contents, runoff and associated water quality dynamics*. *European Journal of Soil Science*, 67, 4, 374-385. ([doi:10.1111/ejss.12350](https://doi.org/10.1111/ejss.12350)).

In addition, if using data from the baseline period please cite:

- Takahashi, T., Harris, P., Blackwell, M. S. A., Cardenas, L. M., Collins, A. L., Dungait, J. A. J., Hawkins, J. M. B., Misselbrook, T. H., McAuliffe, G. A., McFadzean, J. N., Murray, P. J., Orr, R. J., Rivero, M. J., Wu, L. and Lee, M. R. F. (2018). *Roles of instrumented farm-scale trials in trade-off assessments of pasture-based ruminant production systems*. *Animal*, 12, 8, 1766-1776. ([doi:10.1017/S1751731118000502](https://doi.org/10.1017/S1751731118000502)).
- Orr, R. J., Griffith, B. A., Rivero, M. J. and Lee, M. R. F. (2019). *Livestock Performance for Sheep and Cattle Grazing Lowland Permanent Pasture: Benchmarking Potential of Forage-Based Systems*. 9, 2, 101-118. ([doi:10.3390/agronomy9020101](https://doi.org/10.3390/agronomy9020101)).

For the datasets used, please cite the latest version of the relevant User Guide PDF document(s), listed in the table below, that describe the establishment and development of the NWFP, and the various datasets produced in detail. The link to these can be downloaded from the NWFP website. Note that the User Guide entitled 'NWFP\_UG\_Design\_Develop.pdf' should be cited irrespective of the dataset used.

Data used	Main title of User Guide PDF document
All datasets	NWFP_UG_Design_Develop.pdf
15-minute time-series datasets (water, soil moisture, meteorology)	NWFP_UG_Hydrology&WaterQuality_Data.pdf NWFP_UG_SMS_Data.pdf NWFP_UG_MET_Data.pdf
Greenhouse gases	NWFP_UG_EC_GHG_Data.pdf NWFP_UG_GreenFeed_Data.pdf
Field surveys	NWFP_UG_FieldSurvey_Data.pdf
Livestock	NWFP_UG_Livestock_Data.pdf
Field events	NWFP_UG_FieldEvents_Data.pdf

Also, please include the following sentences in the acknowledgments section:

*“The North Wyke Farm Platform is a UK National Capability supported by the Biotechnology and Biological Sciences Research Council (BBS/E/RH/23NB0008).”*

*“We acknowledge the interests of the Ecological Continuity Trust (ECT), whose national network of LTEs includes the experiment on which this research was conducted.”*

## 7 Appendix

Appendix A. Reseeding schedule (2013 to 2015).

Farmlet	Catchment /Flume No.	Field No.	Field Name	Sowing Date	Sown With
Red	2	NW002	Great Field	30 July 2013	AberMagic
Red	15	NW019	Longlands East	7 August 2013	Prior
Blue	8	NW011	Middle Wyke Moor	31 July 2013	AberMagic/AberHerald
Blue	8	NW010	Higher Wyke Moor	31 July 2013	AberMagic/AberHerald
Blue	14	NW018	Longlands North	7 August 2013	Prior/AberHerald
Red	3	NW003	Poor Field	21 August 2014	AberMagic
Red	3	NW004	Ware Park	21 August 2014	AberMagic
Blue	9	NW013	Dairy South	22 August 2014	AberMagic/AberHerald
Blue	9	NW039	Dairy Corner	22 August 2014	AberMagic/AberHerald
Red	1	NW001	Pecketsford	11 August 2015	AberMagic
Red	1	NW038	Little Pecketsford	11 August 2015	AberMagic
Red	10	NW015	Lower Wheaty	11 August 2015	AberMagic
Blue	7	NW012	Lower Wyke Moor	7 August 2015	AberMagic/AberHerald
Blue	11	NW014	Dairy East	12 August 2015	AberMagic/AberHerald

Appendix B. Key operations and timings in the grassland to arable conversion of the Red farmlet catchments (2019-2022).

Date	Operation
26 August 2019	Spray off existing sward
09 September 2019	Ploughed & cultivated
02 October 2019	Drilled 1 <sup>st</sup> winter wheat seed (var. Crusoe)
01 September 2020	Harvest
September 2020	Ploughed and cultivated
16-18 October 2020	Drilled 2 <sup>nd</sup> winter wheat seed (var. Skyfall)
01 September 2021	Harvest
05-10 October 2021	Ploughed and cultivated
07-11 October 2021	Drilled winter oat seed (var. Mascani)
28 July 2022	Harvest
19-22 August 2022	Non-inversion tillage (min-till)
27-29 September 2022	Drilled winter wheat (var. Crusoe)