



Field Events and Livestock Data

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Document Description

This document is a user guide to the collection and management of field events and livestock data on the North Wyke Farm Platform (NWFP).

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FP_UG.Doc.001_Estab&Develop	Establishment and continued development of the NWFP
FP_UG.Doc.003_FieldSurveyData	User Guide to Field Survey Data

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1.1	27/02/2018	Information added regarding "triplet" field management system as an appendix. Stocking data for 2016 & 2017 added.
1.2	06/12/2018	Tense change from past to present throughout. Added in text and map describing field strips. Livestock details for 2018 added.



Preface

The North Wyke Farm Platform (NWFP) represents a large investment by BBSRC in the future, to not only study but also improve grassland livestock systems in a national and global research asset linked to real-world farming. It is a world-class facility and a key member of the Global Farm Platform network <http://www.globalfarmplatform.org/> which attracts researchers from different communities and disciplines seeking to develop sustainable ruminant production systems. It provides access to a range of in situ state-of-the-art instrumentation in hydrologically isolated (sub-) catchments to better address key issues in sustainable agriculture related to:

- Replacement of N fertiliser with N-fixation by legumes - achieving a reduction in energy and greenhouse gas emissions for both environmental and economic reasons.
- Using plants to manage soils and hydrology in green-engineering solutions to flooding.
- Efficient phosphorus cycling in grassland systems.
- Resilience of soil biota and their functions in land-use change.
- Impact of grassland management on carbon cycling and storage.
- Water resource use efficiency.
- Systems modelling to design optimal grassland production systems.

The NWFP provides three farming systems in farmlets, each consisting of five component catchments comprising approx. 21 ha in total per farmlet. Each farmlet is managed using alternative approaches to livestock production from grassland. Measurements on water, air and soil are also recorded. Much of this data has a fine-scale (15 minute) temporal resolution, such as water flow and water chemistry data measured at a flume for each of the 15 catchments, which can comprise either single or multiple fields. As a National Capability, the data collected are made publicly available.

The main farming systems or 'treatments' on the platform are currently:

- 1) Permanent pasture: improvement through use of inorganic fertilisers (Green farmlet).
- 2) Increased use of legumes: replacing nitrogen fertilisers with biological fixation using sown legume and grass mixtures (Blue farmlet).
- 3) Planned reseeded: regular renewal, providing opportunities for introducing innovative varieties with desirable traits. Currently, high sugar and deep rooting grasses are studied (Red farmlet).

See more at: <http://www.rothamsted.ac.uk/farmplatform>



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1 Introduction

The North Wyke Farm Platform (NWFP) was established during 2010 to 2011 and is a National Capability funded by the Biotechnology and Biological Sciences Research Council (BBSRC) to promote collaborative research, training and knowledge exchange on productivity and ecosystem responses to management practices of agricultural lowland grasslands in the UK. The platform uses state-of-the-art technology to capture data at appropriate scales of land management which can be used to model how agricultural grassland systems will respond to different management inputs and to help develop a better understanding of the underlying processes and mechanisms. The farm platform data portal (<https://nwfp.rothamsted.ac.uk/>) contains all the data we record on the management of the farmlets including details and metrics of the individual grazing animals to the management of the fields. This user guide is split into two main sections where we describe (a). the field events and common field operations that occur on the farm platform and (b). the grazing regimes and available animal data.

2 Field Events

2.1 Background

All agricultural operations that occur on farm platform 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 and silage making activities. If you need to know the management history of the farm platform fields, 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 Section 4.2 of the FP_UG.Doc.001_Estab&Develop document. The farmlets and their enterprises pre- and post-2015 are given in Appendix 1.



2.2 Common Field Operations

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

2.2.1 Fertiliser/ Lime Applications

All fields are maintained at target P index 2, K index 2- and pH around 6. Our Kverneland fertiliser spinner is equipped with GPS and weigh cells which ensures accurate applications and allows us to precisely record the quantities applied. The type of fertiliser used is recorded in the format: %N, %P₂O₅, %K₂O, %SO₃. We rectify low soil pH by using prilled lime products which are applied accurately with the same fertiliser spinner ([Figure 1](#)).

Figure 1. Inorganic fertilizer spreading using a Kverneland fertiliser spinner.





2.2.2 Organic Manures

The cattle and sheep are housed during the winter and bedded on purchased barley straw. The resulting farmyard manure (FYM) is returned to the farmlets. Up to and including the

Figure 2. Dedicated livestock buildings



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 midden were used for the cattle. Before this, the quantities of FYM applied in each farmlet were measured (see Data Portal, Field Events). 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 in 2015.

2.2.3 Silage Making

We conserve forage for winter livestock feed on the farm platform by making silage (see Section 3.3 below). Typically, the fields are mown before the cut grass is then left to wilt for approximately 24 hours, to reduce the moisture content, before it is rowed up for the forage harvester. The harvester picks up the grass, chops it into smaller pieces and adds a lactobacillus additive to improve the fermentation. This is then transported to clamps where it is rolled with a tractor to exclude as much air as possible and sealed tight under a plastic sheet. The bacteria go to work in anaerobic conditions lowering the pH within the clamp which preserves the silage for feeding to the livestock over the winter months. The dates the fields are mown and when the silage is picked up from the field are recorded in the database.



2.2.4 Reseeding Operations

It is intended that fields within the Red (Planned reseeding) farmlet will be periodically reseeded, whereas after the Blue (Increased use of legumes) farmlet fields were progressively reseeded in 2013 – 2015 (Table 1), it is intended that these will remain sufficiently productive that they will not require to be reseeded in the near future. 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. We drill either grass or grass and clover seed using an Einbock grass seeder (Figure 3) then 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 reseeding operations can be found on the website [here](#).

Figure 3. Drilling the seedbed using an Einbock grass seeder





Table 1. 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

2.3 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 a MS Access database using preconfigured forms and restricted data-fields to prevent transcription errors. Finally, the data are periodically checked against details of the operations requested by the FP operations manager before a query is run to export a dataset ready for upload to the portal.



3 Livestock Management

3.1 Cattle Details

A spring-calving suckler herd belonging to North Wyke is run as a separate enterprise grazing away from the NWFP. Until recently, a Hereford x Friesian herd provided predominantly Continental x calves ([Figure 4](#)).

Figure 4. Continental cross cattle



Calves graze with their mothers until weaning in autumn when the calves come onto the NWFP. They are housed and fed silage and, in addition, a small amount of concentrates may also be fed for a short period before and after weaning to facilitate the change in their diet. Protein supplements may also be offered to offset any low protein levels in silages.

Figure 5. Stabiliser cattle



In 2016, a decision was made to begin replacing the Hereford x Friesian dams and sires with pedigree Stabilisers™. The Stabiliser breed is a blend of British and Continental inputs including Hereford, Red Angus, Simmental and Gelbvieh. The first dams and sires were purchased in 2016 with their progeny first grazing the farm platform in 2017 ([Figure 5](#)).



3.1.1 2011-2012

In each baseline year (2011 and 2012) respectively there were 25 and 27 cattle per farmlet and in the 2012 grazing season, there were an additional five Continental x cattle per farmlet (born in August 2011) which were purchased and these also grazed the NWFP.

3.1.2 2013

In 2013 the suckler herd provided 20 weaned calves per farmlet. In addition, the five cattle per farmlet born in August 2011 were turned out to pasture again to graze. Also, five Hereford x Friesian steers per farmlet were purchased in May 2013 and these also joined the three herds (i.e. 30 in total per farmlet).

3.1.3 2014

In 2014 the suckler herd provided 17 Charolais cross (CHX) and 5 Hereford cross (HEX) calves and in addition there were 8 Belgian Blue x Friesian (BBX) calves on each farmlet (i.e. 30 calves in total per farmlet).

3.1.4 2015

In 2015 there were 24 Charolais cross (CHX) and 6 Hereford cross (HEX) suckler-reared calves on each of the farmlets. The CHX calves were either home-bred or purchased in suckler calf sales in autumn 2014.

3.1.5 2016

In 2016 there were 61 home bred Charolais cross (CHX) from 2 sires, 11 Hereford cross (HEX) from 1 sire and 18 Limousin (LIMX) cattle from unknown sires (These were from in-calf cows purchased as replacements in Feb 16.) 1 animal was turned back out to pasture (Blue) from the previous year as it didn't finish during the winter 15/16 period.

3.1.6 2017

In 2017 homebred stabiliser cattle grazed the platform for the first time. There were 71 Charolais cross (CHX), 12 Limousin cross (LIMX) from purchased in-calf replacement cows and 6 Stabilisers.

3.1.7 2018

In 2018 all cattle used on the farm platform were homebred, sired by 4 different bulls (4 Stabiliser and 1 Charolais). The replacement of the Hereford x Friesian suckler herd with Stabilisers was well underway giving 26 pure bred Stabilisers, 24 Charolais X and 42 Stabiliser X.

3.2 Sheep Details

A March-lambing flock of Suffolk x Mule ewes, mainly crossed with Texel (TEX) or Charollais (CHA) rams (balanced between the three farmlets), provided the 50 ewes and their twin lambs which grazed each of the farmlets in 2011 and 2012 (Figure 5). Ewes lambing for the first time were crossed with Lleyn (LLE) rams. The policy on the NWFP is that the lambs are weaned in early July each year then moved to other fields on their respective farmlet which have been cut for silage in late May/early June.

Figure 6. A Suffolk x Mule ewe and her twin lambs grazing on the NWFP



For the 2011 to 2015 lambing, when the pregnant NWFP ewes were housed they re-joined a larger flock of approx. 360 ewes and were fed the same silage each year made from permanent pasture plus additional concentrates fed according to predicted litter size. Only Charollais (CHA) rams have been used since the 2014 lambing.

3.2.1 2011-2012

In 2011 and 2012 approximately 50 additional ewes (number accurately recorded) were drafted into each farmlet after weaning and so approximately 100 ewes grazed each farmlet until 21 December 2011 and 13 December 2012, when they were moved off the NWFP.



3.2.2 2013

In 2013 there were 10 ewes with singles and 40 ewes with twins allocated to each farmlet at lambing which, as above, had been sired by Texel (TEX), Charollais (CHA) or Lley (LLE) rams. Additional store lambs were purchased and added to each weaned lamb flock in July 2013. Up to 60 additional ewes per farmlet (number accurately recorded) were added after weaning and all the ewes grazed until 2 January 2014 when they were housed.

3.2.3 2014

In 2014 there were 10 ewes with singles and 40 ewes with twins allocated to each farmlet but, unlike the previous three years, only Charollais (CHA) rams had been used. After weaning these 50 ewes grazed each of the farmlets plus an additional 25 ewes per farmlet which were added in October 2014. The ewes grazed until 7 January 2015 when they were removed from the NWFP.

3.2.4 2015

At the 2015 lambing, 15 ewes with singles and 60 ewes with twins (i.e. 75 ewes per farmlet) were allocated for the remainder of their life to Green, Blue or Red farmlets. Older ewes were removed in August 2015 for sale as cull ewes and these were replaced by 15 shearlings in each farmlet. The latter brought each flock back to 75 ewes which went to the ram in October 2015 and had their first lambing in 2016. The ewes were removed from the NWFP on 30 December 2015 for housing.

Ewes were allocated to a farmlet for the remainder of their life during lambing 2015, therefore the number of lambs grazing the NWFP in 2016 and 2017 varied between farmlets because of differences in conception rates. Where possible fostering occurred at lambing time within the farmlet, but excess lambs (triplets that could not be fostered to a ewe with a single lamb) were removed from the NWFP. Ewes not in lamb were also removed for sale.

3.2.5 2016-2018

Culls and older ewes were removed from the NWFP in each Autumn of 2016-2018 and shearling ewes added in order that 75 ewes were present on each farmlet to go to the ram (CHA). The numbers of shearling ewes added varied between farmlets (2016: Green 24, Blue 18, Red 21, 2017: Green 28, Blue 22, Red 26, 2018: Green 16, Blue 29, Green 20) due to differences in death rates, culling rates and the number of ewes not in lamb. The number of lambs grazing each farmlet varied both between years and between farmlets, as it was dependant on ewe conception rates and lamb survival rates. Lambs were weighed and



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selected for slaughter approximately fortnightly post weaning with the aim of producing carcasses that met abattoir specifications (weight 16-21 kg, conformation E, U or R, fat class 2 or 3L).



3.3 Grazing and Cutting Management

From 2011 onwards the NWFP fields are continuously stocked [Allen, 2011] and any grass which not required for grazing is conserved as silage for winter feed for the cattle and sheep (Figure 5). The calves are allocated to the Green, Blue or Red farmlets at turnout each year. The cattle and sheep are fed silage made from permanent pasture, but whilst the quantities harvested from each farmlet are measured (see Data Portal, Field Surveys) the material is combined and ensiled in the same clamps. The forage harvested in 2014, after the reseeding programme had commenced, was ensiled in separate dedicated Green, Blue and Red clamps and this is the case from then onwards. When there are additional cuts later in the season, these are made into big-bales which were identifiable as belonging to the Green, Blue or Red farmlets.

Figure 7. Forage harvesting, ensiling, round baling and feeding of silage

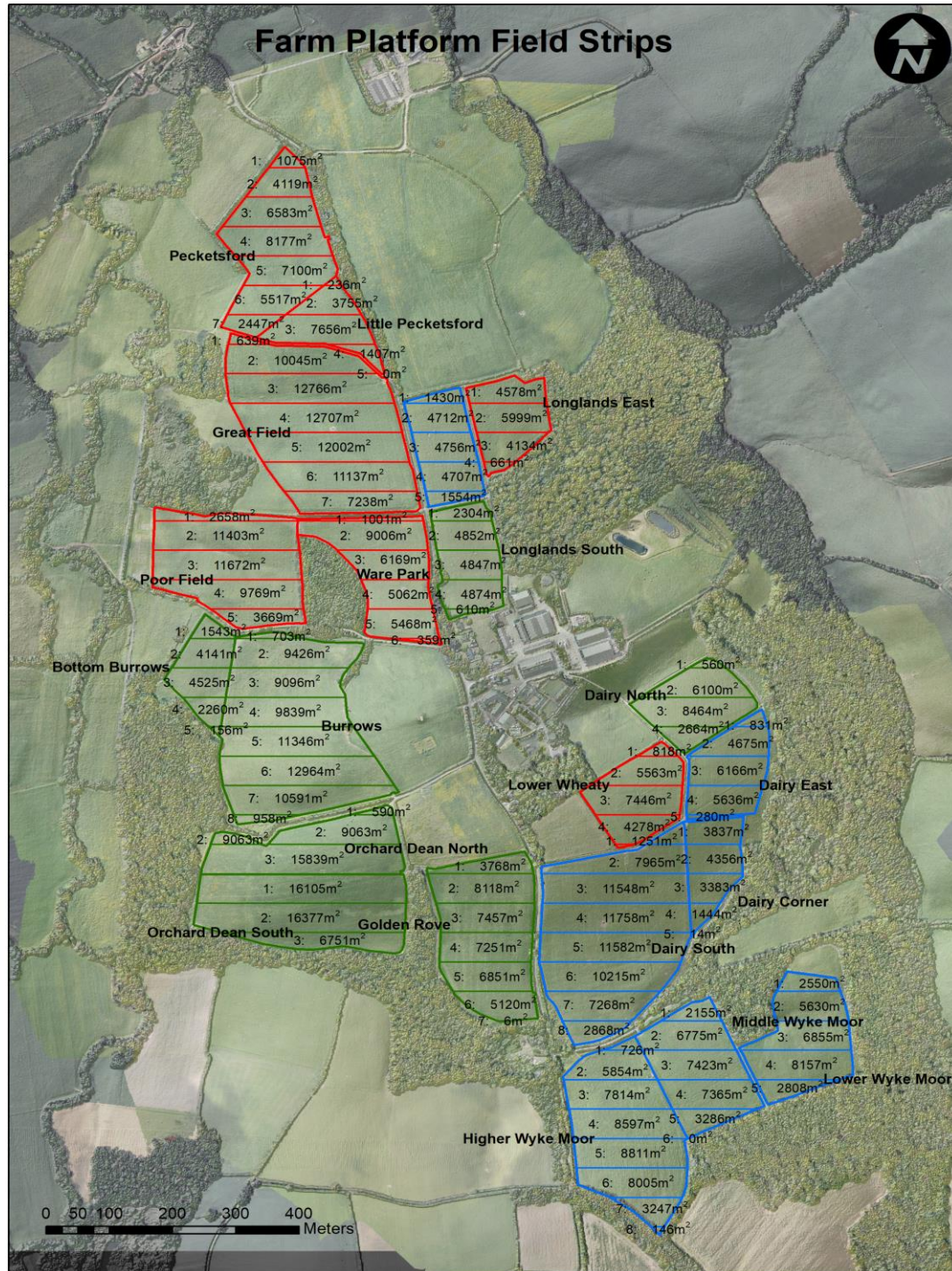


Within each NWFP field, virtual fence lines have been identified using GPS, which allow for the fields to be temporarily split up into sections using movable fences. This is to facilitate



management of areas used for grazing and silage production. In the data portal these areas are identified as field strips and are illustrated in Figure 8.

Figure 8. Map of NWFP showing field strip demarcations and areas.



3.4 Livestock Data

This section gives the cattle and sheep data that are available for download from the Data Portal. 'If in the Animal Location File, the location is stated as a number (without NW field designation), it means that the animal was grazing the entire catchment. In this case, the number is the catchment number.'

3.4.1 Cattle Data

- Cattle Basic Data includes: Official Tag, Management Tag, Breed, Sex, Date of Birth, Sire/Birth Dam/Rearing Dam tags, Farmlet, Grazing year.
- Cattle Location Data: for each animal – the date it moved into a new field and the identifier of the field moved to. From this can be generated Animal Location Counts for each catchment.
- Cattle Weight Data includes: Official Tag, weights for each date that any animals have been weighed and/or assessed for body condition score [[Edmonson et al., 1989](#)].
- Cattle Sales Data includes: Official Tag, Date Sold, where Sold To, Final Live Weight and the date it was measured, Cold Carcase Weight, Conformation and Fat Class Score [[English Beef and Lamb Executive, 2012a](#)] and the Price received per kg of carcase.

3.4.2 Sheep Data

- Breeding Sheep Basic Data includes: Official Tag, Management Tag, Breed, Sex, Birth Year, Date of Birth, Sire/Birth Dam tags, Farmlet, Birth Litter Size.
- Breeding Sheep Location Data includes: for each animal – the date it moved into a new field and the identifier of the field moved to. From this can be generated Animal Location Counts for each catchment.
- Breeding Sheep Weight Data includes: Official Tag, weights for each date that any animals have been weighed and/or assessed for body condition score
- Lambs Basic Data includes: Official Tag, Management Tag, Breed, Sex, Date of Birth, Sire/Birth/Rearing Dam tags, Birth Litter Size, Rearing Litter Size, Farmlet, Grazing Year



- Lambs Location Data includes: for each animal – the date it moved into a new field and the identifier of the field moved to. From this can be generated Animal Location Counts for each catchment.
- Lambs Weight Data includes: Official Tag, weights for each date that any animals have been weighed
- Lambs Sales Data includes: Official Tag, Date Sold, where Sold To, Final Live Weight and the date it was measured, Cold Carcase Weight, Conformation and Fat Class Score [[English Beef and Lamb Executive, 2012b](#)] and the Price received per kg of carcase.

4 References

Allen VG, Batello C, Berretta EJ, Hodgson J, Kothmann M, Li X, Mclvor J, Milne J, Morris C, Peeters A and Sanderson M 2011. An international terminology for grazing lands and grazing animals. *Grass and Forage Science* 66, 2-28.

Edmonson A.J., Lean I.J., Weaver L.D., Farver T. and Webster G. (1989) A Body Condition Score for Holstein Dairy Cows. *J Dairy Sci.* **72**, 68-78.)

[English Beef and Lamb Executive \(2012a\) Marketing prime beef cattle for better returns, EBLEX Beef manual 2, Stoneleigh Park, Kenilworth UK.](#)

[English Beef and Lamb Executive \(2012b\) Marketing prime lamb for better returns, EBLEX Sheep manual 1, Stoneleigh Park, Kenilworth UK.](#)



5 Appendix 1

5.1 The “Triplet Management System”

The triplet system for management of the farmlets is shown in Figures 7 & 8 and fully came into operation during 2016. The rationale for this system is to be able to make comparisons between farmlet enterprise management on an as equivalent areal basis as possible. Prior to 2016, due to the reseeding phases, this was not always possible. As an example of difficulties that could arise - in 2013, the Green cattle were allocated to Burrows and Blue cattle to Dairy South (6.38 and 6.44 ha respectively; both ‘C’ triplets). The closest match in area in the Red Farmlet (6.65 ha; ‘C’ triplet) was Great Field. However, that was due to be resown following cutting for silage. Instead, the alternative Poor Field/Ware Park (‘B1/B2’ triplet) was used. The sheep were allocated to the small fields (‘A and D’ triplets) with the smallest (‘E’ triplet) as spare. The weaned lambs were allocated to the ‘F’ triplet. Such issues do now not arise (as of 2016) as presented in Figures 7 & 8.

Figure 9. An example of the triplet system for management of the farmlets.

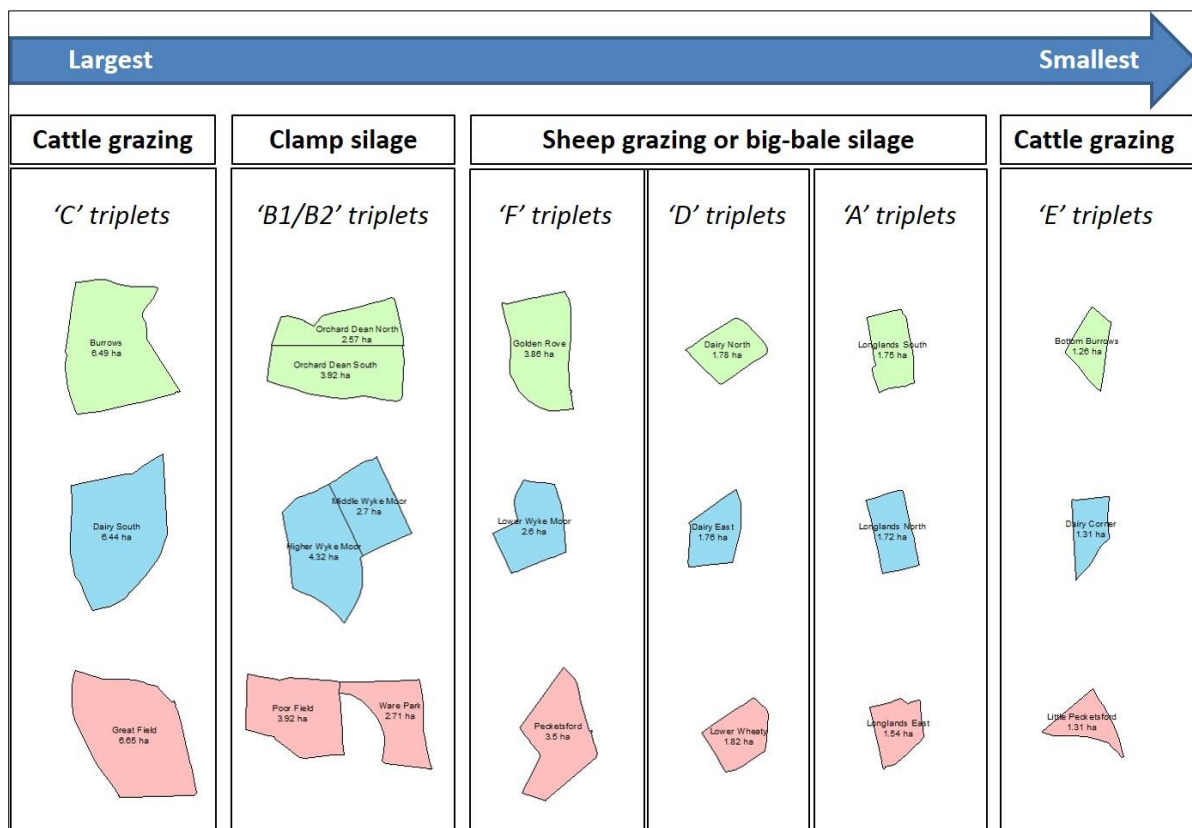




Figure 10 Map of NWFP showing 'triplet' management of the farmlets.

