

Developing Grazing Systems for Beef Producers

Summary sheet (up to two pages)

Project number	6110019017		
Start date	01/10/2015	End date	28/02/2018

Project aim and objectives
<p>To highlight the potential of grass and grazed forage for beef cattle production and provide practical guidance on how current grazing management can be improved.</p> <ol style="list-style-type: none"> 1. Develop a network of four English beef producers who are already maximising the use of grass and forage to use as mentors, case studies and for events 2. Identify four beef producers who wish to improve their grazing management and support them through the process (over two grazing seasons), including the measurements that need to be taken, documenting the steps they have taken and collating the costs and benefits of the changes. <ol style="list-style-type: none"> a. Spring and autumn suckler cows and calves, and growing cattle systems will be covered b. Rotational grazing, well-managed set stocking, early turnout and extended grazing will be covered 3. Review tools developed in other countries to understand what supportive material is required in England 4. Understand the barriers to beef producers implementing different grazing systems 5. Develop a blueprint for managing grass for beef cattle using kg DM per ha that have been tested on the farms involved in the project 6. Identify key performance indicators related to grass management

Lead partner	RSK ADAS Ltd
Scientific partners	Harper Adams University
Industry partners	Rumenco and NRM Laboratories
Government sponsor	

Has your project featured in any of the following?	
Events	Press articles
On-farm events were held on both improver and mentor farms throughout the project. Improver events were held in both years and mentor events once over the two years.	<ul style="list-style-type: none"> • Farmers Guardian - 26th August 2016. p 113-115. Beef farm harnessing new paddock system – report on Graham Parks • A short interview was conducted for Radio 4 Farming Today programme featuring Matt House and Charlie Morgan – June 2016 • Forager – Spring 2017 – Making beef stack up – article focussing on Matt House's system • Farmers Weekly – 9 February 2018 – Grassland and turnout feature – Beef farmer adopts dairy mindset to overhaul grazing. Article focussing on Matt House
Conference presentations, papers or posters	Scientific papers
<ul style="list-style-type: none"> • Grassland and Muck event – May 2017 Sarah Pick and Matt House took part in the grass forum. • A paper has been prepared for the 27th European Grassland Federation (EGF) Meeting in Ireland – June 2018. 	
Other	

A study tour to Ireland was completed in November 2015 attended by improver and mentor farmers – a link to the AHDB report is below

<http://beefandlamb.ahdb.org.uk/wp/wp-content/uploads/2015/12/Study-tour-report-Dec-15.pdf>

Grazing club articles were produced throughout the first year of the project and can be found on the AHDB website

<http://beefandlamb.ahdb.org.uk/returns/grazing-club/project-reports/>

Additional information on the project farmers can also been found in the grazing club section of the website:

<http://beefandlamb.ahdb.org.uk/returns/grazing-club/beef-grazing-special/>

Full Report

Q1: Financial reporting –

	Yes	No	N/a
Was the project expenditure in line with the agreed budget?	Yes		
Was the agreed split of the project budget between activities appropriate?	Yes		
If you answered no to any of the questions above please provide further details:			

Q2: Milestones – were the agreed milestones completed on time?

Project milestones	Proposed completion date	Actual completion date
1. Receipt of report from 1 st steering group meeting	31 December 2015	6 October 2015
2. Review of grassland tools	28 February 2016	26 February 2016
3. Progress report 1	30 May 2016	7 June 2016
4. Progress report 2	31 August 2016	2 September 2016
5. Progress report 3	28 February 2017	31 March 2017
6. Progress report 4	31 August 2017	31 August 2017
7. Completion of final report	28 February 2018	4 May 2018
<p>IF ANY OF THE MILESTONES ABOVE ARE INCOMPLETE/DELAYED, PLEASE PROVIDE FURTHER DETAILS:</p> <p>Progress report 3 was pushed back to 31/03/17 because of delays in spring farm visits due in part to ADAS time commitments.</p> <p>Completion of final report put back initially to end of March following the final steering group meeting and then end of April in discussion with AHDB project officer. Actual completion date 4 May 2018</p>		

Q3: Results – what did the work find?

1. Introduction

The potential for beef cattle to achieve high growth rates off grass and grazed forages is well known but is rarely achieved on English farms. Maintaining quality and quantity going into the summer is a key focus area, as is earlier turnout. Unlike other ruminant sectors, very few beef producers measure and record grass growth. However, there is growing interest amongst producers in extending the grazing season, achieving higher weight gains from grass and exploring the potential benefits of rotational grazing. The aim of this project was to highlight the potential of grass and forage for beef cattle production and provide practical guidance to producers on how to improve their current grazing management.

Three targets often associated with areas of poor performance and profitability in beef enterprises were identified at the start, as project goals:

- 20% reduction in number of days cattle were housed,
- 20% increase in stocking rate across the grazing platform, and
- 10% increase in cattle growth rate from grazing and silage/forage.

2. Methodology

2.1 On-farm activity

The project identified four grassland mentors who were already maximising grass and forage use and paired them with four English beef producers who wanted to significantly improve their grazing management (improvers). Mentors provided informal advice and support to their improver farms and farm visits between the mentor and improver farmers took place over the life of the project. In addition, two grassland consultants worked with two pairs each to identify specific targets and guide the activities carried out on each farm. The project started in autumn 2015 and tracked the progress of the farmers over two grazing seasons (2016-17). Of the four improver farms recruited, three completed two grazing seasons whilst the fourth joined in the second year (replacing another farm) and therefore completed only one year on the project. The project was supported by a steering group comprising the grassland consultants, AHDB project staff, ADAS and Harper Adams University.

Consultant visits to the improver farms were carried out approximately quarterly with the first visit taking place in autumn 2015. At the first visit the focus was on collecting soil and forage samples to inform the development of a nutrient management plan for each farm and to help plan winter feed rations. In addition, visits to collect Stocktake data (now Farmbench) were carried out by AHDB Beef & Lamb staff to enable full enterprise costings to be calculated for the 2015 to 2017 production years.

The second consultant visit took place in spring 2016 and focussed on finalising grazing and fertilizer plans for the coming season. This involved going through the nutrient management plan and working through the calculations necessary to create a rotational grazing platform for each of the farms. A farm walk across the grazing platform was then carried out accompanied by the mentor farmers to capture their suggestions for the improver farms. Setting up the farms onto the Agrinet software and entering grass covers into the program was discussed at this meeting as was any additional infrastructure requirements including fencing, water and cattle handling/weighing equipment.

Each of the farms completed a questionnaire designed to collect basic information on their beef and grassland enterprises, current grassland practice and specific targets for the project. In addition, the questionnaire aimed to gather information on barriers to uptake of improved grassland management and captured opinions on the potential ease of implementation and impact on profitability of the chosen farm targets. This data was compared with the view of the farmers at the end of the two years.

Subsequent consultant visits were carried out approximately quarterly and focussed on reviewing progress to date and planning future activities. Areas covered included grass management (including achieving the correct grass covers and rotation length, managing grass surpluses and shortages and spring/autumn budgets), planning for out-wintering (where applicable) and monitoring animal performance on the grazing platform.

2.2 Additional activities

A review of the current tools available to measure and manage grass was carried out based on those used in the UK, Republic of Ireland, mainland Europe, Australia and New Zealand. The review covered both hardware available for measuring or predicting grass growth at a field level and software that could be used as a decision support tool by farmers to manage grass. A standalone report was produced and submitted to AHDB Beef & Lamb in February 2016.

A study of the barriers to uptake of approaches to managing grass by beef farmers was also carried out. As discussed earlier this was carried out on the improver farms at the start of the project, with a follow up at the end of the two years to compare expected versus actual ease of implementation and impact on profitability of the targets set for each farm. A simplified questionnaire was designed to capture information from farmers attending the on-farm open days with a view to identifying the main barriers to uptake of improved grassland management. The responses from the questionnaires will assist in the development of KE materials to support beef producers in improving grassland management.

2.3 Knowledge exchange

Knowledge exchange activities were an integral part of this project with a range of activities planned. These included on-farm open days on both improver and mentor farms, and a series of articles for the AHDB Beef & Lamb grazing club newsletter. In addition the project featured in a range of press publications over the two years including Farmers Guardian, Farmers Weekly and Forager magazine.

On-farm open days: Open days were held on all four improver farms in both 2016 and 2017, with a further two mentor farm open days in each year. The events were fully booked with 25-30 producers attending. At each event there was a short presentation by the grassland consultant which was followed by a farm walk to visit the cattle on the grazing platform.

Grazing club articles: The project was promoted via the AHDB Beef & Lamb grazing club newsletter throughout 2016 with a range of topical articles featuring each of the farmers involved in the project. The articles provided an update on progress on the farms and specific areas covered included setting up a rotational grazing system, outwintering for suckler herds, practical implementation of a nutrient management plan and using an autumn grazing plan.

Blueprint for beef production: A blueprint for managing grass for beef cattle was developed alongside this report. This include targets for growth rates, stocking rates, cover targets and infrastructure requirements.

3. Results

3.1 Andrew Crow Case Study

Introduction to the farm:

Andrew Crow farms approximately 520ha at Cherrington Manor Farm, near Newport in Shropshire. It consists of 256ha of permanent pasture and 48ha of grass leys with the remaining ground used for arable crops. The farm was split into two distinctive blocks, 200ha of which was farmed on Wilderley Hill at 396m above sea level with an annual rainfall of 1524mm. The remainder was farmed at Cherrington, at a height of 61m above sea level and a rainfall of 813mm.

Being located in a Nitrate Vulnerable Zone (NVZ) and part of a ten-year Higher Level Stewardship Scheme restricts certain grazing practices and the ability to improve ground.

The suckler herd at the start of the project, was made up mostly of Stabilisers and included 93 spring-calving cows and 24 autumn-calving cows. The spring-calving herd was housed before Christmas and turned out after calving in April to Wilderley Hill. Autumn calving occurred outdoors with cows and calves being out-wintered. The autumn-born calves were housed at 12 months of age for finishing at 16 months on a diet of silage, barley and protein balancer. The majority of spring-born animals are still finished on grass at 18 months, after being out-wintered in their first year. Andrew aims to put a proportion of finished stock through the butchery part of his business - Cherrington Butchers.

The cattle were rotated slowly around the farm, utilising some of the poorer quality swards during the summer months. The finishing stock were more intensively grazed on the short term leys at Cherrington. Furthermore, if being out-wintered, cattle are strip grazed on forage rye, rape and stubble turnips.

The objectives set with agreement of Andrew were to:

- Introduce a rotational grazing platform for the finishing cattle.
- Ensure cattle are finished off grass before housing.
- Focus more closely on the out wintering of stock.

On-farm activities

The first activity during the winter of 2015 was to produce a nutrient management plan based on the soil analysis results. The soil pH across the farm was mixed with 17 of the 36 fields analysed needing lime. Magnesium levels were good to high (3-4) so it was suggested to use ground limestone. It was also noted that 22 fields were below target for phosphate and 9 fields were below target for potash and that these should be targeted with triple super phosphate and muriate of potash for several years to help raise the indices. The majority of the ground with lower results was at the hill ground at Wilderley. An assessment of the grassland took place at both Cherrington and Wilderley Hill. It was decided that due to the nature of the ground at Wilderley Hill that it wasn't practical to rotationally graze. Therefore the priority was to be given to the grass leys at Cherrington for the finishing cattle. Many of the fields were large in size so it was decided that Andrew would split the fields in two using a quick fencer to fence with pig netting and barbed wire. The fields would then be split again with temporary fencing.

The next focus was to look more closely at the out wintering of the stock and try and create a system where nutrients would be returned to the arable ground but where the cattle also performed well. During the winter cattle were out wintered on a combination of rape and turnips and fast grass. During the second season the farm went through quite a policy change. With a 10 mile TB pre-movement restriction coming in it became impractical to use the hill at Wilderley. Therefore the

decision was made to rent the hill out and bring the cattle back to Cherrington. New fencing and water were put in place to set up the paddock system which was based on 51, 2ha paddocks.

During the winter of 2017/18, it was proposed that fodder beet would be used as an out wintering crop to reduce the area used by the cattle but also to increase the yield per hectare. Both the spring born young stock and the spring calving cows grazed the beet during the winter with the aim of reducing the costs of production of the herd.

Comments

Andrew was very keen to move to a rotational grazing system as he wanted to fully utilise the cattle on the grass leys on the arable side of the business. He was also keen to rely more on the out wintering of cattle to reduce the costs of production on the farm. The recording of data such as the use of a plate meter and recording grass covers on Agrinet will be key to making decisions on the grazing platform as cattle numbers continue to increase. The farm system is complicated at times with the farm running an autumn and spring calving herd and the use of several different winter crops. The simplification of the system going forward will continue to drive efficiencies.

Figure 1. Cattle on the grazing platform at Cherrington Manor



Performance and Progress

During the first year of the project 41 steers were kept on a grazing platform of 8.91 hectares. During the 137 days at grass the cattle averaged 1.19kg/day and produced 613kg of live weight per hectare during this period. This was a good performance with the cattle growth rates peaking at 1.47kg/day. With the change of system and the movement of cows back to Cherrington it is difficult to compare systems. However from 2015 to 2017 cow numbers have increased to 191 cows compared to 129 (see

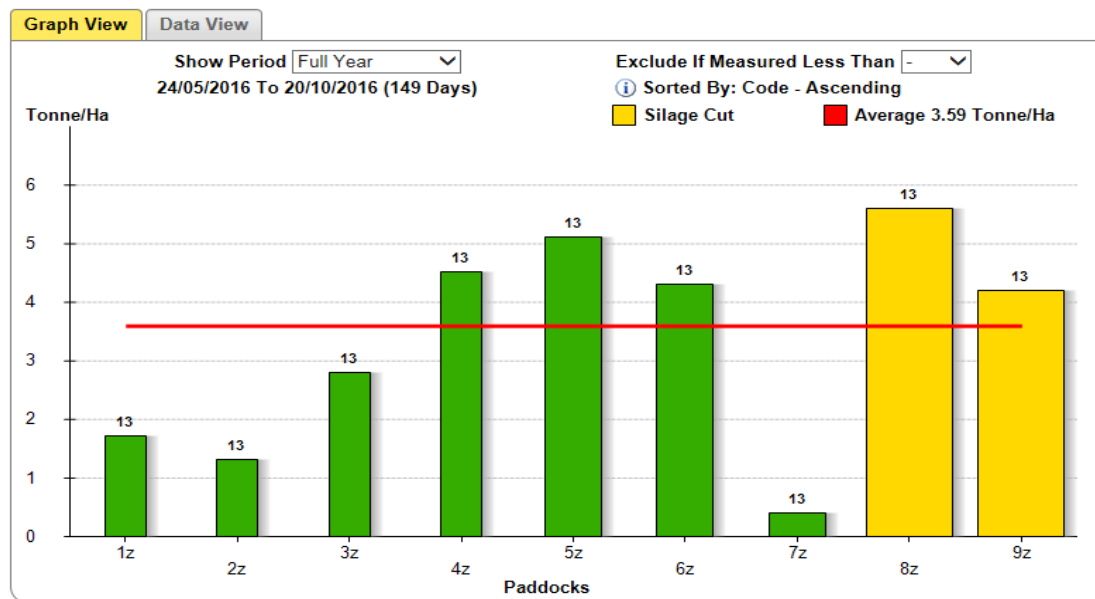
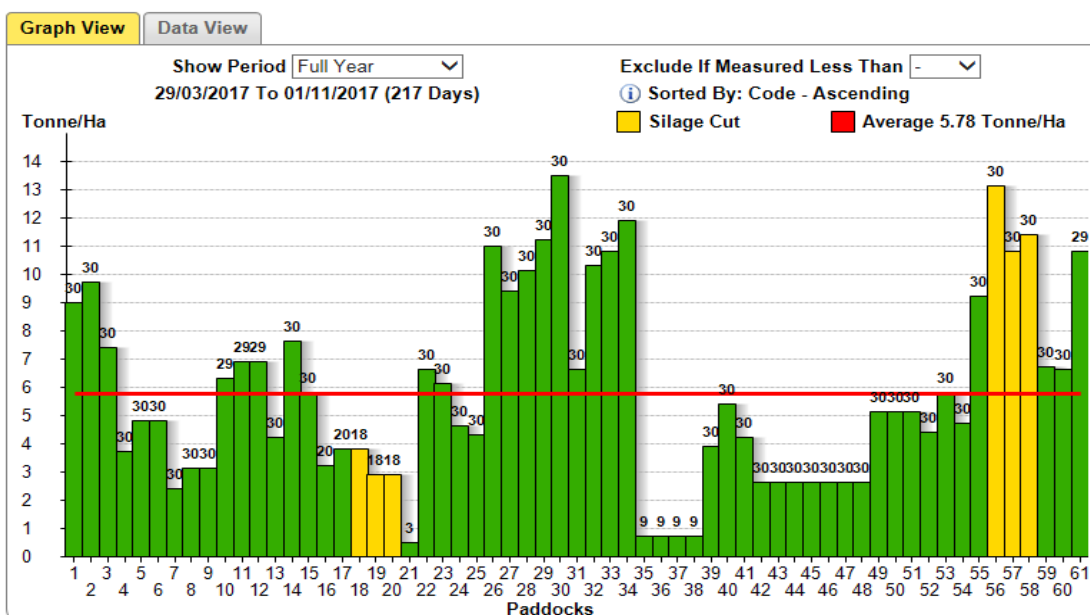
Table 1. below for suckler herd data). This has allowed livestock units/ha to increase to 2.44 in 2017 from 2.09 in 2016. Liveweight gain has also continued to increase as better quality grass is put in front of the cattle, with this increasing from 0.94kg/day to 1.12kg/day. Unfortunately both gross margin per cow and gross margin per ha reduced in 2017 due to a higher than normal barren rate and a poor calving which left a rearing rate of 77%. If the rearing rate was rectified gross margin per hectare would be expected to be in excess of £1,200/ha for the year.

Table 1. Suckler cow enterprise performance at Cherrington Manor

SUCKLER HERD PER COW TO BULL	2015	2016	2017
Cow performance			
Number of cows and heifers put to the bull	129	136	191
Calves reared per 100 cows and heifers put to bull	93	99	77
Calving period (first to last calf - weeks)	55	13	14
Calf performance			
Average age at weaning (days)	270	274	180
Average weight at weaning (kg/head)	295	305	242
Daily liveweight gain for weaned calves (kg/day)	0.94	0.97	1.12
Weaned calf weight produced per forage hectare (kg at 200 days) (kg/ha)		318	332
Feed and Forage			
Number of weeks housed	8	6	3
Stocking rate (LU/ha)		2.09	2.44
Total forage area allocated to enterprise (ha)		81	92
Inorganic nitrogen used (kg/ha)	58	0	194
Gross margin			
Gross Margin (£) per cow put to the bull	394.48	620.62	399.92
Gross Margin £ per allocated hectare	982.86	1036.00	832.32

Source: Stocktake/Farmbench data

The following charts have been exported from the Agrinet software and show the whole season grass yield at Cherrington Manor by paddock for the 2016 and 2017 seasons. As discussed earlier it is difficult to make direct comparisons between years because of the change in farming policy or this time. However, average recorded grass yields on the grazing platform have increased from 3.59tDM/ha (May-Oct, 149 days) in 2016 to 5.78 tDM/ha (Mar-Nov, 217 days) in 2017.

[Home](#) | [Download](#) | Year: 2016

[Home](#) | [Download](#) | Year: 2017


Source: Agrinet

3.2 Tim Phipps Case Study

Introduction to the farm

Tim Phipps farms at Bragborough Hall, Daventry having moved to the farm in 2012. The farm totals 788 acres (319ha), which includes 47acres (19ha) of rented ground. The farm sits at between 100 and 170m above sea level, and receives approximately 711mm of rainfall annually. The land has over 450 acres (182ha) being used in an arable rotation on a contract farming arrangement with the remaining ground being a mixture of permanent pasture and improved grass leys. The farm does have some restrictions with

the farm being in an NVZ. Furthermore the farm is also in the entry level Stewardship Scheme and the farm contains ridge and furrow.

At the start of the project the beef herd consisted of 78 suckler cows which are currently moving from Aberdeen Angus to Stabiliser cows and 31 replacement bulling heifers. All of the bull calves were (and continue to be) intensively finished at 13-14 months at a target carcass weight of 320-370kg on the Morrison's yearling Beef Scheme. All heifers are retained to increase breeding cow numbers with the aim in the future to sell breeding heifers at 15 months.

The farm aimed to grow 41 hectares of first cut silage and 18 hectares of second cut silage. The fertiliser policy included the application of 185kg/ha of 25:5:5 in Mid-March and Mid July.

All the cattle were housed through from November until April on straw before being turned out to grass where fields are grazed with cattle for 10 days before moving from field to field.

The objectives set with agreement of Tim were to:

- Introduce a rotational grazing platform for the land area.
- Increase the stocking rate on the grazed area
- To set up a simple system of paddocks to minimise workload

On-farm activities

Stage one activities during winter of 2015 were to produce a nutrient management plan based on the soil analysis results and the cattle numbers and subsequent land area required to carry them. The soil pH across the farm was generally good with just 5 of the 22 fields analysed needing lime. Magnesium levels were high (3-4) so it was suggested to use ground limestone. It was also noted that 5 fields were below target for phosphate and 2 fields were below target for potash and that these should be targeted with triple super phosphate and muriate of potash for several years to help raise the indices.

An assessment of the grassland took place to give an idea of what could be used for silage and what needed to be grazed as it was ridge and furrow. It was important for Tim to make grazing of the ridge and furrow the priority as if covers got ahead of the cattle he would not be able to take a cut of silage of this ground and the quality could be lost quickly. Much of the ridge and furrow ground only contained around 30-40% sown species, so it was hoped that by grazing the ground more intensively these species would increase in the permanent pasture.

It was also clear during the first spring that Tim was drastically understocked and was wasting grass. It was agreed that ground should be let out on a summer let to utilise some of that ground. With the income from the let ground Tim was able to put permanent electric fencing around the boundary of the grazing block and also purchase water troughs and temporary electric fences. The new paddocks were initially split into 22 paddocks of 1 to 2 hectares. However Tim was reluctant to split many of the 2 hectare blocks into smaller areas.

During the second season Tim came to his own conclusion that many of the 2ha blocks had to be split into 1ha blocks to allow the cows to graze out the swards in 2-3 days and maintain quality through the remainder of the season. As cattle numbers increased the area of the grazing platform increased to 68.5ha and 48 paddocks.

Comments

Tim was very keen to learn and to implement a rotational grazing system on his farm. The ridge and furrow ground is now being fully utilised by the suckler cows and growth rates have been maintained from the more intensive grazing of the area. Like many farmers, Tim takes a cautious approach when considering new management techniques. Building on what he has trialled during this project, and with a little more confidence stocking rates could be pushed to even higher levels. Tim appreciates that the cattle were previously being housed for too long over the winter and the cows are now being put back out to grass after weaning with them being kept out into December. The calving date of Mid-March does restrict putting the cows out earlier and ideally calving date should be brought forward each year. Individual cow performance indicates Tim has very good stockman skills and with the expected increase in cow numbers over the next couple of years it is likely that Tim will hit £1,000/ha gross margin.

Performance and Progress

Since the start of the project Tim has increased cow numbers from 78 cows and 31 bulling heifers to 130 cows plus bulling heifers (Table 2. Below). This has inevitably increased numbers on the grazing area and has increased the stocking rate from 0.70 livestock units per hectare in 2015 to 1.56 per hectare in 2017. With Tim already calving down 159 cows plus 45 bulling heifers in spring 2018 the stocking rate will continue to increase with a target of 200 cows calving down in future years. Over the project individual cow gross margins have increased from £429/cow in 2015 to £536 in 2017, with the gross margin per hectare increasing from £187 to £662 a hectare over the same period. Whilst individual calf performance has remained broadly similar over the 2015-17 period (ranging from 1.30 to 1.35kg/day) output per hectare has improved from 124 kg/ha in 2015 to 323kg/ha in 2017.

Table 2. Suckler cow enterprise performance Bragborough Hall

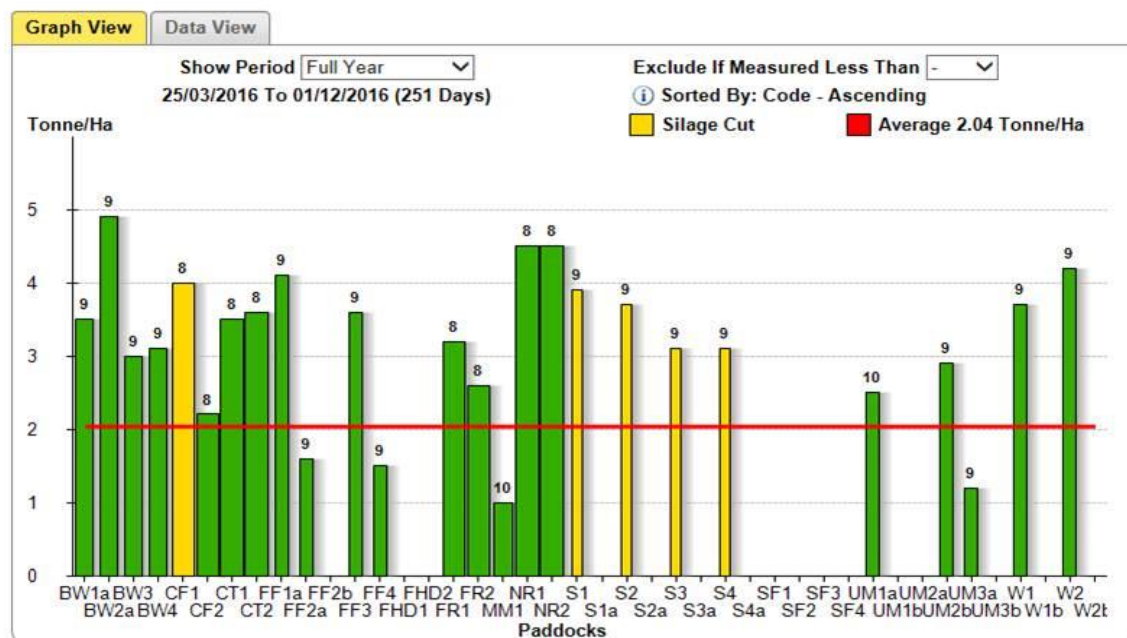
	Pre-project baseline	Year 1	Year 2
SUCKLER HERD PER COW TO BULL	2015	2016	2017
Cow performance			
Number of cows and heifers put to the bull	82	108	130
Calves reared per 100 cows and heifers put to bull	95	92	99
Calving period (first to last calf - weeks)	11.4	11	16
Calf performance			
Average age at weaning (days)	200	200	200
Average weight at weaning (kg/head)	301	309	304
Daily liveweight gain for weaned calves (kg/day)	1.30	1.35	1.32
Weaned calf weight produced per forage hectare (kg at 200 days) (kg/ha)	124	258	323
Feed and Forage			
Number of weeks housed	20	17	17
Stocking rate (LU/ha)	0.70	1.32	1.56
Total forage area allocated to enterprise (ha)		102	105
Inorganic nitrogen used (kg/ha)	27	50	54
Gross margin			
Gross Margin (£) per cow put to the bull	429.10	374.15	535.92
Gross Margin £ per allocated hectare	186.69	398.09	661.81

Source: Stocktake/Farmbench data

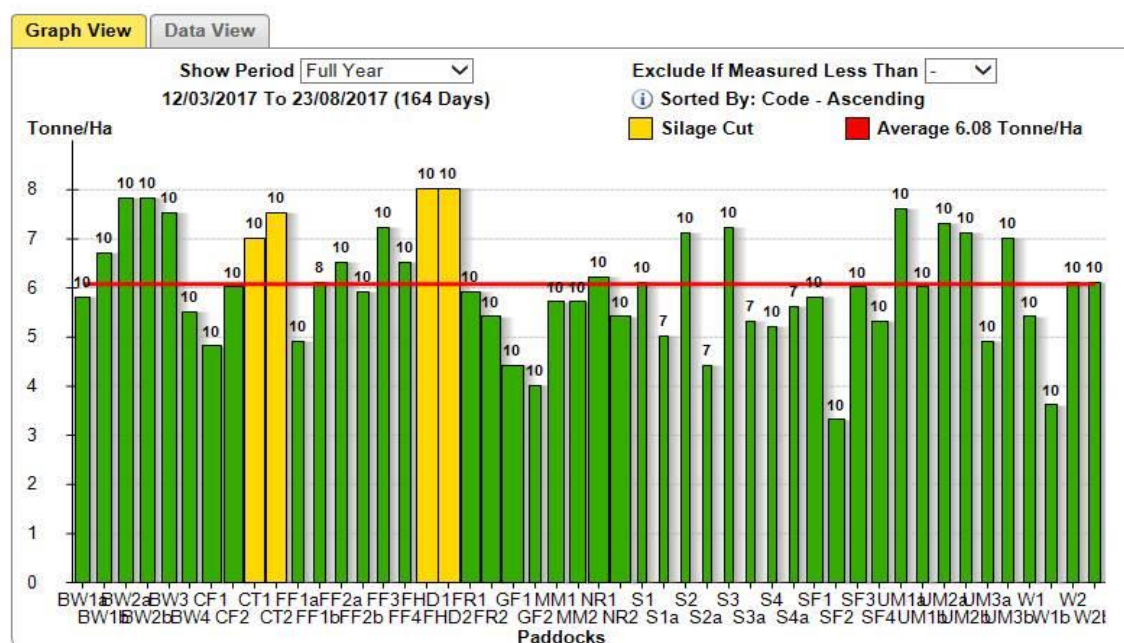
The following charts have been exported from the Agrinet software and show the whole season grass yield at Bragborough Hall by paddock for the 2016 and 2017 seasons. They demonstrate the big increase

in the number of paddocks being monitored in 2017 and show that average grass yields on the grazing platform have increased from 2.04tDM/ha (over 251 days) in 2016 to 6.08 tDM/ha (over 164 days) in 2017.

[Home](#) | [Download](#) | Year: 2016 ▾



[Home](#) | [Download](#) | Year: 2017 ▾



3.3 Matt House Case Study

Introduction to the farm:

Bowden Farm and Newleaze Farm is a rented holding covering 480 acres (194ha). It is sited 300ft (91m) above sea level and receives 794mm rainfall per annum. The farm is under ELS (Entry Level Stewardship)

and half of Bowden Farm is in a NVZ (Nitrate Vulnerable Zone). In autumn 2015 there was a contract farming agreement for 100 acres of wheat (40ha) and 100 acres of maize (40ha) with the remainder mostly long-term grassland.

Production activities in 2015/16 were as follows;

- Stock numbered 38 Aberdeen Angus cows, 41 in calf heifers (due March) and 54 heifers to bull in June.
- 60 acres of silage (24ha) was taken at first cut in mid-May, (not grazed since 1st December) and a second cut of 30 acres (12ha) was taken at the end of July. A further 60 acres (24ha) of hay was taken in June.
- Fertilizer use on grazing ground was 2cwt/acre (250kg/ha) of 34.5%N in March, 1cwt (125kg/ha) nitrogen end of April and 1cwt (125kg/ha) nitrogen early June.
- Cows were housed over a 3-4 month winter and turned out to graze when there was enough grass.
- Matt House had newly taken on the farm and had plans to increase cattle numbers for a viable beef enterprise.

The objectives set with the agreement of Matt were to:

- Introduce a rotational grazing platform for the land area.
- Introduce a rotational grazing plan.
- Ensure high liveweight gains are achieved at weaning for calf sales.

This farm case study provides an insight into the importance of developing a good relationship between farmer and consultant. Matt saw himself as a farmer willing to develop his business, but the process of adopting change and putting theory into practice can seem daunting/too challenging initially. However, this is a normal reaction; the project was able to ensure that Matt saw some 'quick wins', which helped him be convinced that changes for the longer term would also prove worthwhile.

On farm activities

Stage one activities during winter of 2015 were to produce a nutrient management plan based on the soil analysis results and the cattle numbers and the subsequent land area required to carry them. With high pH soils the effectiveness of some nutrients and especially trace elements had to be addressed and blood tests taken by the vets confirmed the need for trace element boluses for the cows. A soil physical and sward assessment was done identifying substandard swards in need of reseeding and ones that would improve significantly under good management.

By March 2016 the infrastructure had been purchased including electric fencing and additional water troughs and by May the farm boundary was ring fenced with electric and all paddocks bar new reseeds had been divided. Matt was registered with Agrinet grass measuring programme and learning to record sward measurements.

Matt's confidence quickly developed with the practice of measuring swards weekly and entering the data onto Agrinet. It gave him confidence in the quantity of grass available and the requirements of the livestock. It gave him sound guidance that silage could be taken off the platform and the only missing link was now a set of scales to weigh stock to assess the growth rates and performance to achieve the desired weaning weights. By better nutrient, grazing and cutting management the species ranking within

the swards were changing and notably clover content was improving and broad leaved weed species reducing.

Summary of 2016 investments and tasks undertaken.

- Nutrient plan developed and fertilizers purchased
- Infrastructure electric fenced and water tanks sited
- 22 paddocks created at 2ha (5 acres) for 71 cows
- Grazing of silage areas early season
- Three day stock movements based on Agrinet results
- Additional silage made and sold off grazing platform
- Cattle bolused and calves weighed often
- Further land to be reseeded and cease arable contract agreement
- Identified 45 acres of drier land for brassica crop following cereal for out-wintering
- Silage bales placed in rows on the 45 acres after feed requirement calculated
- Outwintered young stock on grass breaks.
- Creep feed @2kg/hd was advised for calves for Sept-November but declined
- Calves gained no weight in the autumn period

Comments

The performance from grass has opened the doors to further options. This is significant in terms of progress. Matt House is now in a position to make informed decisions of how he wishes to build his business. He has learned the capability of his land, identified areas suited to different tasks (out-wintering, silage, grazing). He has discovered limitations of expansion and addressed ways to alleviate this (use a contract rearer) to release land for cows. He has acknowledged the need to grow higher yielding crops like fodder beet to accommodate increased wintering pressure. He has recorded the performance and return on investment of new reseeds based on recommended list selection and he has learned that preparation and foresight to avoid difficult decisions is of great importance. Now he can decide if using sheds to over winter store cattle is a viable business venture compared with weaned calf sales.

Some of the sheds previously used for cattle are now housing other businesses and returning a rental income strengthening the farms resilience to further threats. These are significant changes to a business and all stem from a willingness to change, and being convinced of the value of erecting a single strand electric fence!

Performance and Progress

2017 activities-investments and results

- Cattle successfully out-wintered and returned to calve on the grazing platform
- 60% calved in first cycle
- More cattle (121) now on 26 paddocks (128 acres) increase of 20 acres
- More reseeded land into platform and improving yields
- Better silage quality but more importantly better calf growth rates

- Reducing nitrogen inputs on new leys as they are very responsive
- Italian ryegrass sown on winter grazing site, two cuts and deferred grazing
- Calf growth rate achieving 1.3kg/hd/day and decision taken to feed creep later
- More confidence in Agrinet and also the independent advice
- Farmer attitude completely different and hungry to improve more

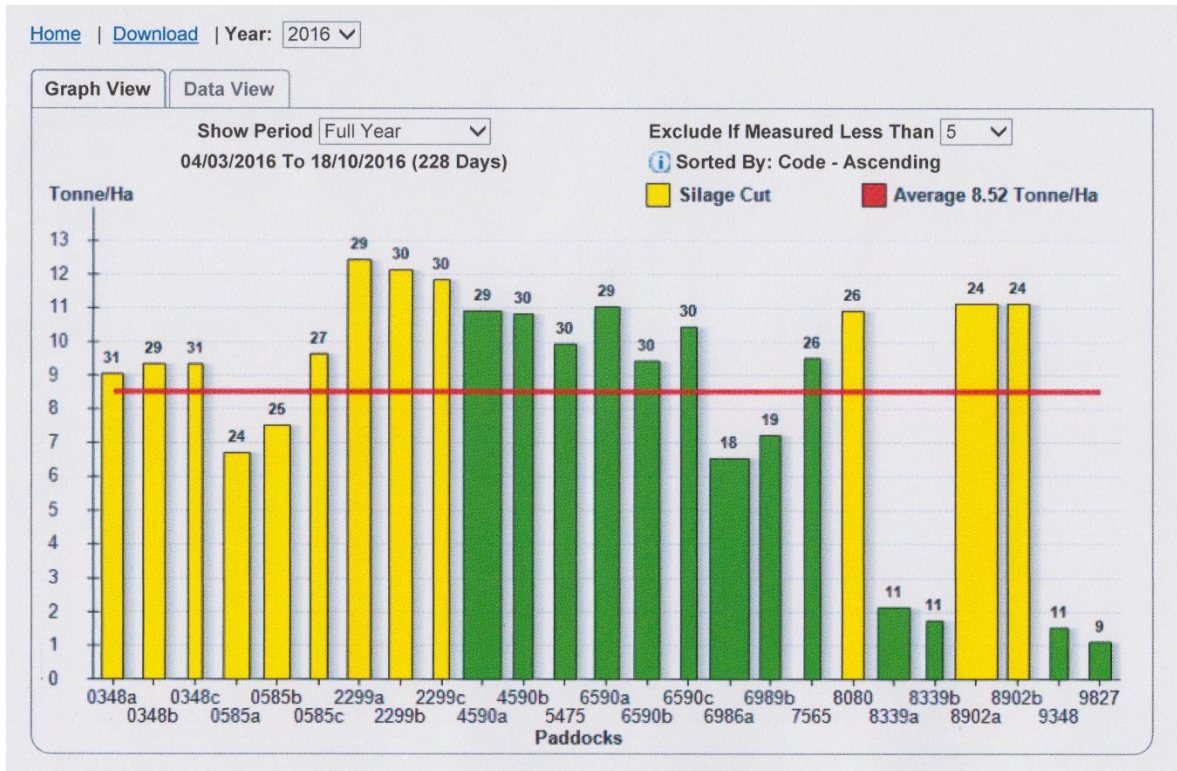
This progress is after only two seasons. The Farmbench data shown in Table 3 identifies the impact on gross margins both per cow but more so per hectare. The reduction in wintering costs moving to 100% out-wintering has probably been the biggest impact on margins. The recording of Key Performance Indicators has empowered the decisions made and has allowed them to be seen sooner and dealt with more quickly. 2018 has been a very difficult year so far with a very late spring and grass growth has been slow, but Matt knew how many days grazing he had ahead of the herd, he knew he could reduce demand by selling cull cows and a dozen store cattle kept over winter. He could measure any growth weekly and opt for strategic use of fertilizer as and when time arose instead of ordering more purchased feed as would have occurred under past systems. These points are significant when considering the resistance first experienced in the project to now when Matt is volunteering his opinion and sounding out advice on offer.

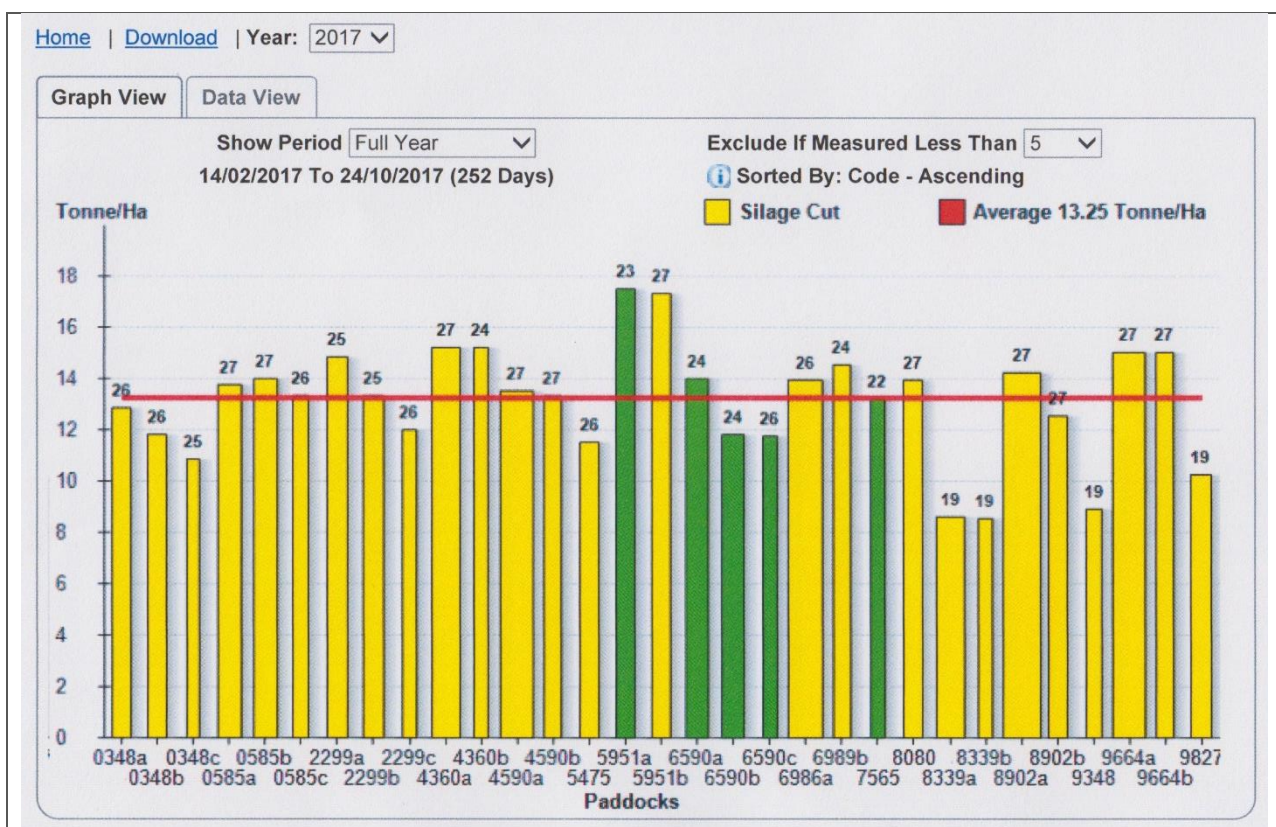
Table 3. Suckler cow enterprise performance Bowden Farm

	Pre-project baseline	Year 1	Year 2
SUCKLER HERD PER COW TO BULL	2015	2016	2017
Cow performance			
Number of cows and heifers put to the bull	33	79	122
Calves reared per 100 cows and heifers put to bull	73	90	98
Calving period (first to last calf - weeks)	0	10	10
Calf performance			
Average age at weaning (days)	300	300	290
Average weight at weaning (kg/head)	333	332	335
Daily liveweight gain for weaned calves (kg/day)	0.98	0.97	1.02
Weaned calf weight produced per forage hectare (kg at 200 days) (kg/ha)	95	211	313
Feed and Forage			
Number of weeks housed	9	12	0
Stocking rate (LU/ha)	1.00	1.49	1.53
Total forage area allocated to enterprise (ha)		65	78
Inorganic nitrogen used (kg/ha)	56	76	76
Gross Margin			
Gross Margin (£) per cow put to the bull	159.60	425.18	535.88
Gross Margin £ per allocated hectare	88.72	513.06	838.53

Source: Stocktake/Farmbench data

Average grass yields obtained from Agrinet in 2016 (see charts below) showed that Matt achieved 8.5tDM/ha (over 228 days) in the first year of the project. This improved markedly in 2017 to average 13.2tDM/ha over a slightly longer season (252 days)





3.4 Bob and Liz Priest Case Study

Introduction to the farm

Bob and Liz Priest farm at Kingsford farm, Holsworthy Devon. They farm 192ha split over six sites. Altitude is 500ft (153m) above sea level and rainfall is between 50-55 inches (1270-1397mm) annually. The soils are mainly clay based although the grazing platform is situated on slightly lighter soil.

The farm has been registered organic since 2005. Whey sludge is used as a fertilizer option once in the spring in addition to the FYM and there is a rotation of brassica within the grass reseeding programme.

Stock numbers and type have evolved over time and by the end of 2018 there will be a pedigree herd of 60 Stabiliser Spring calving suckler cows and the aim is to sell high health status breeding females and finish the remaining cattle at 20-22 months (600kg).

There is a flock of 450 mule and mule cross ewes producing finished lambs and also they buy in store lambs late summer to finish over the winter months.

Bob and Liz are members of an AHDB Grazing Group and also members of AHDB Progressive Beef group and have attempted rotational grazing before but with limited success.

The Objectives:

- Improve and develop a successful rotational grazing system
- Monitor animal performance and growth rate aiming to achieve 400kg heifers at 14 months to bull. Finishing cattle 600kg by 18-20 months.

- Be more aware of selecting the best seed mixtures under an organic system

On-farm activities

Work commenced with the Priest family in December 2016 with the collection of baseline information which was all to hand. The limiting factor was to select areas suitable for rotational grazing with the farm having six sites on a 21 mile round trip.

By March 2017 an area of 33ha (82 acres) at Northcote Farm had been designated for the grazing platform. Ten fields at an average size of 8-11 acres (3.2-4.5ha) with well fenced boundaries and water supply were the ideal site. These fields could be subdivided into 1ha paddocks creating up to 33 paddocks with a water tank centrally positioned to feed four paddocks.

The choice of 1ha paddocks were governed by the size and number of cattle. There were two mobs. The first, 50 yearlings weighing an average of 300kg would clear a 1ha paddock in three days and therefore eight paddocks were needed to create a 24 day rotation. This was a trial effort as it was not known how much grass this organic unit could grow, but there were 33 paddocks available allowing room for error.

Mob 2 was made up of 17 (500kg) finishing cattle and 9 bulling heifers. Again calculations were made to accommodate these animals and although 3 days on a 1ha paddock was slightly too much grass these animals would grow and grass yields were still an unknown so eight further paddocks would be used as a separate rotation platform. This left extra paddocks for silage, or plan B if problems arose.

Liz registered for Agrinet and weekly measurements were taken. Cattle performance was recorded alongside the deadweight data provided (Table 4). Stock were turned out onto grazing area on the 5th April and 4.09ha were taken as silage in early May. With heifers being removed to the bull in June and 9 cattle sold as finished in July the mobs or paddocks needed adjustment.

Comments

Despite the farm only having participated in the project for one grazing season, results have been positive and farmer engagement has been excellent. Suggestions for further improvement include:

- Greater attention to sward measurements and continue recording for the whole season.
- Weigh all livestock when been removed for bulling.
- Compare 2018 performance to 2017 to create trends and identify areas for attention.
- New reseeds could be monitored for yield and quality even if they are not part of the grazing platform to fulfil third objective

Performance and progress

The land at Northcote produced 8tDM/ha from March to September (no measurements were taken after September) which is a good performance for organic ground. Cattle grazing continued into the autumn with 27 of the younger mob grazed until 3rd November, and 9 grazed until 10th December all gaining 0.93kg/hd/day. Four cattle stayed out until 23rd January before housing gaining 0.5kg/hd/day.

With the 2015 born mob, heifers reached 400kg bulling weight as required and the finishing cattle were sold off the grazing platform in four batches from mid July to mid November.

300 head of lambs were then grazed after cattle removed which maybe wasn't ideal. The silage quality of the early cut crop in May was 11-11.5ME and CP from 13-16% from two samples taken one off the face and one in the clamp.

Figure 2. Photographs of cattle and the grazing platform at Nortcotte farm



Table 4. Beef cattle enterprise performance Kingsford Farm

	Pre- project		Year 1
	2015	2016	2017
Cattle performance (per head)			
Number of cattle output	55	43	35
Feeding period (days)	614	538	574
Daily liveweight gain (kg/day)	0.49	0.58	0.60
Feed and Forage (per head)			
Number of weeks housed		26	21
Stocking rate (LU/ha)	1.10	1.16	0.68
Total forage area allocated to enterprise (ha)	n/a	20	31
Inorganic nitrogen used (kg/ha)	0	0	0
Gross Margin			
Gross Margin (£ per head)	427.80	363.56	717.55
Gross Margin (£ per allocated hectare)	383.95	787.55	812.90

Source: Stocktake/Farmbench data

3.5 Summary of progress across farm participants, emerging trends and comparisons

The following table pulls together some of the key performance data collected from the three suckler herd enterprises that have completed two years on the project. Figures have been drawn from the Farmbench data collected on farm and the overall percentage change between 2015 and 2017 has been calculated to indicate the direction and size of any changes over time. The data from Kingsford farm has not been included in the summary table as only one year of data is available (and relates to growing/finishing cattle), making direct comparisons more difficult.

The performance of the suckler beef enterprises can be compared to the project goals set at the start of the project that focused on days housed, stocking rate and growth rates.

- Days housed have reduced on all farms over the two years and two have exceeded the target reduction of 20%, the remaining farm achieving a reduction of 15%
- Overall stocking rates have increased each year across all farms exceeding the 20% target on two farms.
- Cattle growth rates in suckled calves improved by 19% on one farm but were maintained or achieved small increases on the other two sites.

Other notable changes over the two years of the project include:

- Cow numbers have expanded on all farms and this is expected to continue
- Calves reared per 100 cows maintained or improved on two farms
- Weaned calf weight produced per forage hectare has increased significantly on two farms largely due to the increased stocking rates.
- Gross margin per cow and per hectare have increased significantly on two farms.

Table 5. Cross-farm summary of physical and financial performance

	2015	2016	2017	% change 2015 to 2017
Number of cows and heifers put to the bull				
Cherrington Manor	129	136	191	+48%
Bragborough Hall	82	108	130	+59%
Bowden Farms	33	79	122	+270%
Calves reared per 100 cows and heifers put to bull				
Cherrington Manor	93	99	77	-17%
Bragborough Hall	95	92	99	+4%
Bowden Farms	73	90	98	+34%
Daily liveweight gain for weaned calves (kg/day)				
Cherrington Manor	0.94	0.97	1.12	+19%
Bragborough Hall	1.30	1.35	1.32	+2%
Bowden Farms	0.98	0.97	1.02	+4%
Weaned calf weight produced per forage hectare (kg at 200 days) (kg/ha)				
Cherrington Manor	Not available	318	332	-
Bragborough Hall	124	258	323	+160%
Bowden Farms	95	211	313	+229%
Number of weeks housed				
Cherrington Manor	8	6	3	-63%
Bragborough Hall	20	17	17	-15%
Bowden Farms	9	12	0	-100%
Stocking rate (LU/ha) (on total allocated forage area)				
Cherrington Manor	Not available	2.09	2.44	-
Bragborough Hall	0.70	1.32	1.56	+123%
Bowden Farms	1.00	1.49	1.53	+53%

Gross Margin (£) per cow put to the bull				
Cherrington Manor	394.48	620.62	399.92	+1.4%
Bragborough Hall	429.10	374.15	535.92	+25%
Bowden Farms	159.60	425.18	535.88	+236%
Gross Margin £ per allocated hectare				
Cherrington Manor	982.86	1036.00	832.32	-15%
Bragborough Hall	186.69	398.09	661.81	+254%
Bowden Farms	88.72	513.06	838.53	+845%

The table below summarises the grass yields achieved on the three farms that have completed two years on the project. Average yield over the grazing season improved significantly across all farms from 4.7tDM/ha in 2016 to 8.4tDM/ha in 2017, an increase of 79%. The fourth farm run by Bob and Liz Priest joined in the second year of the project so have only one year of data available for 2017 and are therefore not included in the table below. However they achieved over 8tDM/ha between March and September 2017 (175 days) similar to the average cross site yield in 2017.

Table 6. Summary of grass yields

	2016		2017		
	Days monitored	Yield (tDM/ha)	Days monitored	Yield (tDM/ha)	% yield change 2016-17
Cherrington Manor	149	3.59	217	5.78	+61%
Bragborough Hall	251	2.04	164	6.08	+198%
Bowden Farms	228	8.52	252	13.25	+56%

Q4: Discussion – what do the results mean for levy payers?

This project recruited a range of beef producers covering both suckled calf and growing/finishing cattle enterprises. Improver farms received advice from grassland consultants and mentoring from farmers who were already managing their grass effectively. This model was effective in 'upskilling' the improver farmers all of which have seen benefits to their enterprises as a result of focussing on their grassland management. A two year extension to this project will continue to track the progress of the existing farmers and see them become mentors to some of the strategic beef farms who are interested in improving their grassland management. In both the project extension and the programme of work on the strategic farms knowledge exchange to the wider farming community will continue to be an important component.

This project has provided evidence of the potential of grass and forage for beef cattle production across a range of farms but has also highlighted that a willingness to change, both in terms of farmer attitude and commitment to make some initial investments are required for proposed management changes to be effective. The two biggest barriers to uptake of grassland techniques identified in the questionnaire of producers attending the farm open days were reported to be a lack of knowledge or experience of the techniques and concerns about the time involved, highlighting the need for appropriate KT materials.

Key production messages from this project that the industry should reflect on:

- The continual improvement in grassland management over the two grazing seasons has produced more grass which has been utilised at a higher rate.
- In return this has led to a higher stocking rate with growth rates of calves being at least maintained.
- This has led to an increase in live weight produced per ha which in return has boosted output and gross margin per hectare.
- The farms are well on their way to achieving a gross margin of £1,000 per hectare which compares very favourably with cereal gross margins.
- This, combined with the potential reduction in fixed costs due to a reduced housing period through extended grazing and out wintering, will help businesses adopting these practices make a profit before subsidies.
- With the potential reduction in farm support post Brexit it is vital farmers are able to farm profitably.

Results from this project should give confidence to levy payers that changes to their businesses can be made and performance and output improved. The project has demonstrated that there are some 'quick wins' achievable as well as longer term improvements arising from improved grassland management. Increasing the stocking rates on some land provides the opportunity to release other areas for investment, for example reseeding of land or development of alternative enterprises or just allow expansion of current enterprises. Improved grassland management can also allow a focus on cutting grass earlier to achieve higher quality silage and allow land to be put aside for winter stocking. Overall, this project helps levy payers consider choices for their future priorities and investment decisions for their beef production systems.

Q5: New knowledge – what key bit of new knowledge that has come out of this project so far?

This project has been able to demonstrate the potential for change on farms and how quickly this can be achieved. It is likely that beef farmers will not see the full benefit of improvements to their grassland management until they have been using rotational grazing for five years. Developing the system over this time period enables farmers to breed their own replacements to expand the herd and allows investment to increase the infrastructure required to implement the system on a whole farm basis. However, this project has also demonstrated how quickly the system can be developed and that significant efficiencies can be made early in the process.

An example from this project is the significant savings that can be made by reducing winter housing by out-wintering or extending the grazing season. Winter housing is the most expensive period in beef production and with high straw prices in winter 2017 any reductions in usage have a large and immediate effect.

The project has also highlighted how measuring grass covers has enabled farmers to see how much grass is produced each season and then quantified the impact improved management can have on increasing that production figure.

The project has also demonstrated the importance of farmer willingness and enthusiasm to make the leap to embrace the grassland management techniques and invest in the infrastructure required to realise the potential improvements.

Q6: Gaps in knowledge – what gaps in knowledge has this project currently identified?

This project has followed the progress of the improver farmers over two grazing seasons and significant improvements have been made but the timescale is insufficient to demonstrate the full potential of the farms. The two year extension will enable further improvements to be tracked including the rate of further improvements and provide a better view of the potential of the various beef systems. In particular all farms have steadily increased their stocking rates but it is not clear how much further they will be able to go so there is a need to understand what a realistic stocking rate would be for the various farms.

Other areas for consideration include:

- Understand the longer term environmental and economic impacts e.g. on soils, swards and livestock
- Suitability of breed types to the system and any limitations on output
- At a whole farm level understand how far the system can be pushed before there is an impact on labour requirements.
- Understand how intensification interacts on farm with income from agri-environment scheme payments
- What is the maximum live weight that can be produced per hectare
- What is the maximum gross margin per ha that is realistic

Q7: Additional deliverables – what activity is planned with the results from this project?

Activity	What is planned?	When likely to happen?
Events	On farm events will take place during the extension period on the farms.	One per farm in each of the two extension years
Press articles		
Conference presentations, papers or posters	See above: Paper to be presented at EGF conference in Ireland	June 2018
Scientific papers		
Other	A two year extension has been granted to track the progress of the improver farms. The improver farms will become the mentors for some of the AHDB strategic farms.	The extension started 1 March 2018 and will run to end of 2019 i.e two further grazing seasons
Other		