



## GrassCheck GB

### End of year report – Year 1: 2019

#### Project outline and aims

GrassCheck GB is a project run by AFBI, Rothamsted Research and CIEL, with sponsorship and involvement from several prominent industry partners. Support is received from the red meat levy boards in each GB region; AHDB Beef & Lamb, QMS and HCC. During year 1 GrassCheckGB was also sponsored by Germinial, Handley Enterprises Ltd, Sciantec Analytical and Waitrose & Partners. The project also involves data collection from a network of collaborative farms including Beef, Sheep and Dairy producers around GB.

The current project is running from 2019-2021 and aims to provide a detailed understanding of grass growth potential across GB, as well as identifying the actual variability in grass production and utilisation on commercial farms, to identify and better understand the key drivers behind these on-farm.

GrassCheck GB publishes a weekly bulletin containing grass growth and quality information for the last 7 days, alongside management notes to assist GB grassland farmers with management decisions throughout the grazing season.

A total of 50 commercial livestock farms spread around GB (Figure 1) are participating in the project, with a diverse mixture of production systems, land types and management styles, all providing grass and weather data from a broad spectra of GB farms. Farms are split into 4 geographic regions: South England (SE), North England (NE), Scotland and Wales.

As well as collecting weekly grass growth rate data through AgriNet Grass, a grassland management software for farms, all GrassCheckGB farms have internet-connected automated weather stations installed, monitoring on-farm weather conditions 24/7, and uploading detailed weather information to a cloud-based data storage system every 30 minutes.



Figure 1: GrassCheck GB Farm locations. Blue = Dairy farms, red = Beef & Sheep farms.

## Executive Summary

Highlights from the 2019 grazing season:

- On-farm grassland productivity from grazing pastures in the 2019 grazing season (March-October) averaged 11.012 t DM/ha across all GrassCheckGB farms, just over 1 t behind the long-term average of 12.175 t DM/ha.
- On average, dairy farm yields were highest at an average of 13.940 t DM/ha compared to 9.663 t DM/ha on average from Beef & Sheep farms
- Differences in regional yields recorded appeared largely linked to weather conditions experienced throughout the season, being lowest in the South of England (10.262 t DM/ha) where the most extreme dry conditions were recorded during the summer months, during which time average daily growth rates dropped as low as 22.1 kg DM/ha/d, followed by below-average growth in the autumn when very heavy rainfall was recorded (averaging 140% of expected rainfall from August-October). Average yields from grazing paddocks in the North of England, Wales and Scotland were 11.363, 11.125 and 11.298 t DM/ha respectively, where recorded grass growth rates were closer to the 2019 GB average throughout this season.
- Grass utilisation during 2019 was high across all farms, averaging 79%. Individual farm utilisation figures ranged from 47-99%. The highest figures represent farms that were consistently achieving residuals close to 1500 kg DM/ha, with close grazing management (including some sheep farms, for which grazing would target residuals <1500 kg DM/ha).
- GrassCheckGB produced 31 weekly bulletins covering April-October, published in the Farmers Guardian (circulation ~29.5K) and on Twitter, with >600 followers and an average of 16.8K impressions per month (April-October) from tweets published. The GrassCheckGB website recorded on average 239 unique visitors per month, with a total of 452 average visits per month.

## 2019 GB Grass Growth Summary

The 2019 grazing season began with exceptionally high growth rates, measuring well above the long-term average for March in all 4 regions across the GrassCheckGB project. The highest March grass growth rates were seen on GrassCheckGB dairy farms, reaching 38 kg DM/ha/d on the 22<sup>nd</sup> March, compared to 22.6 kg DM/ha/d on GrassCheck beef & sheep farms, and the long-term average of 15.7 kg DM/ha/d for the same week. Overall, growth peaked on GrassCheckGB Dairy farms on May 24<sup>th</sup>, at 77.8 kg DM/ha, and on beef & sheep farms on June 7<sup>th</sup> at 68.9 kg DM/ha. The long-term grass growth curve peaks at 73.9 kg DM/ha in the first week of June. The 2019 growth curves recorded for GrassCheckGB dairy and beef & sheep farms is shown in Figure 1, compared to long-term average figures.

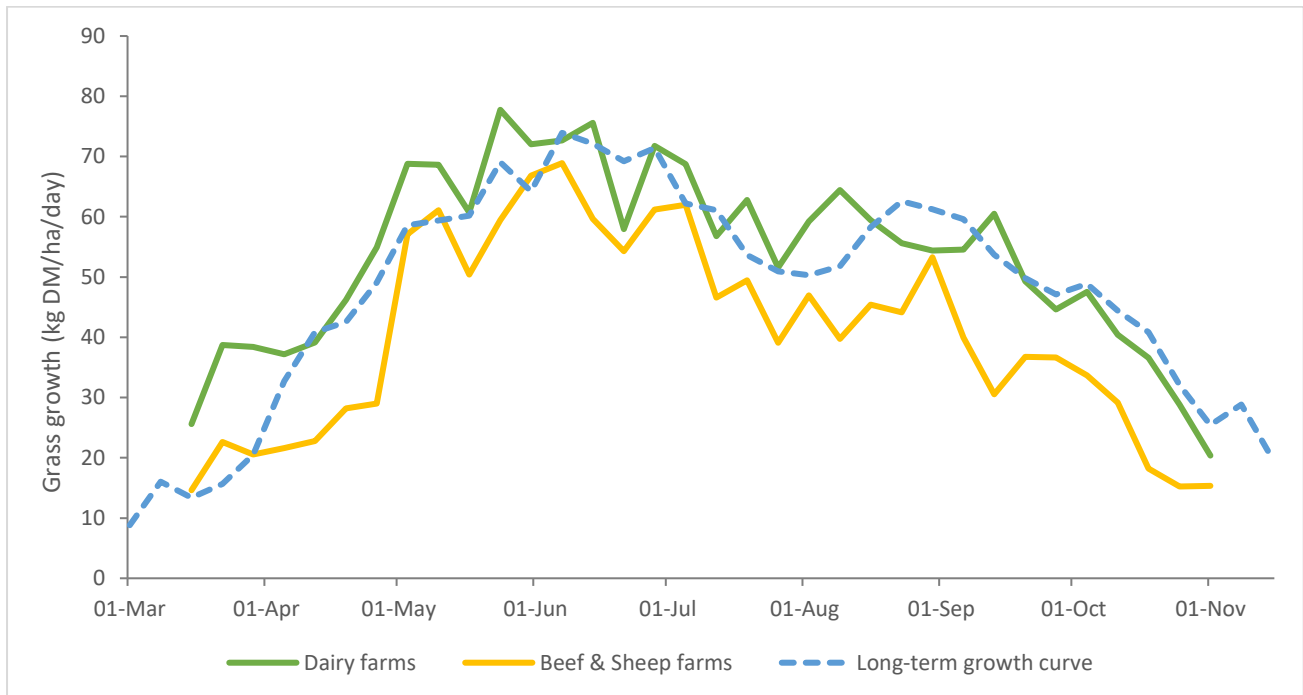
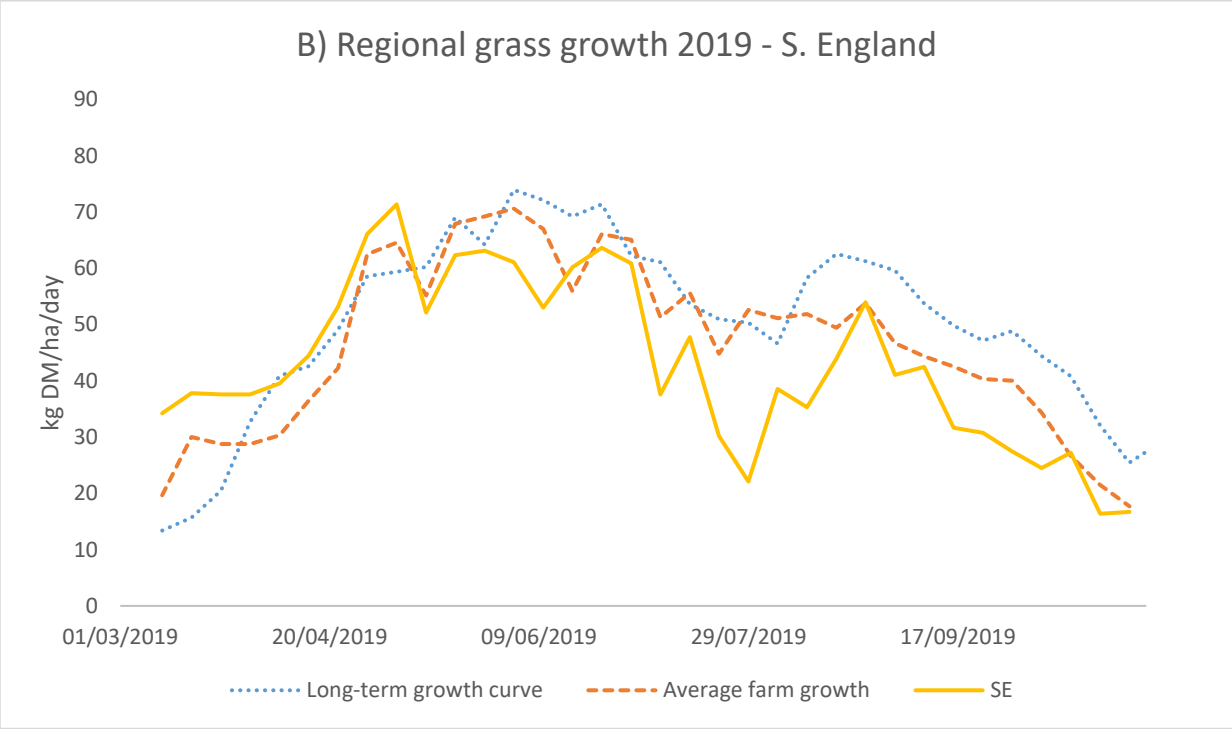
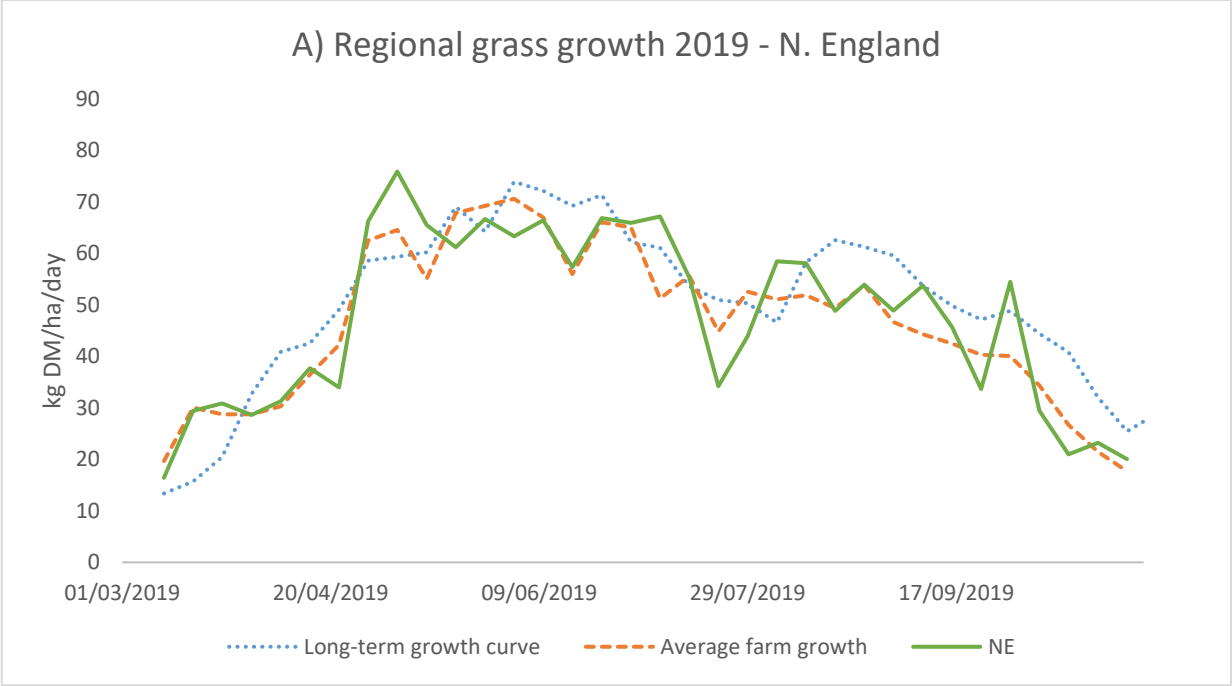


Figure 1: GrassCheckGB grass growth curve from March to October 2019, average growth estimated weekly across all GrassCheckGB dairy farms, beef & sheep farms, and long-term average weekly grass growth rates for GB.

Average grass growth was also summarised weekly on a regional basis, and regional growth curves, including growth data from all farms within each region (regardless of production system, but adjusted to account for any unbalance between numbers of beef & sheep or dairy farms present), is shown below in Figures 2A-D. Overall, between March and October 2019 the highest average grass yield from GrassCheckGB weekly growth rate summary figures was recorded from the NE, at 11.363 t DM/ha. Farms in Scotland recorded average grass production of 11.298 t DM/ha, closely followed by Welsh farms, growing an average of 11.125 t DM/ha from grazing land. Farms in SE recorded only 10.262 t DM/ha in 2019, largely owing to well below average grass growth in July and early August, and in the autumn also (Figure 2B). The overall GB average grass yield recorded from grazing paddocks for the 2019 season from March to October was 11.012 t DM/ha, about 1 t below the long-term average of 12.175 t DM/ha.



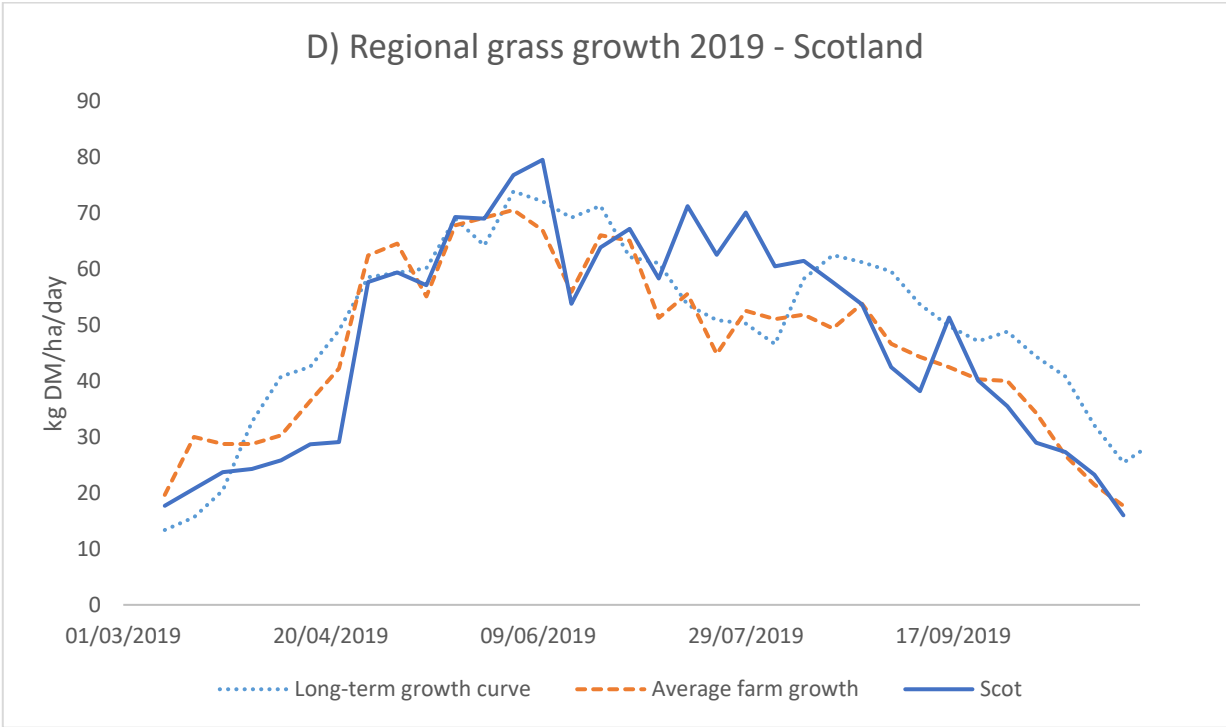
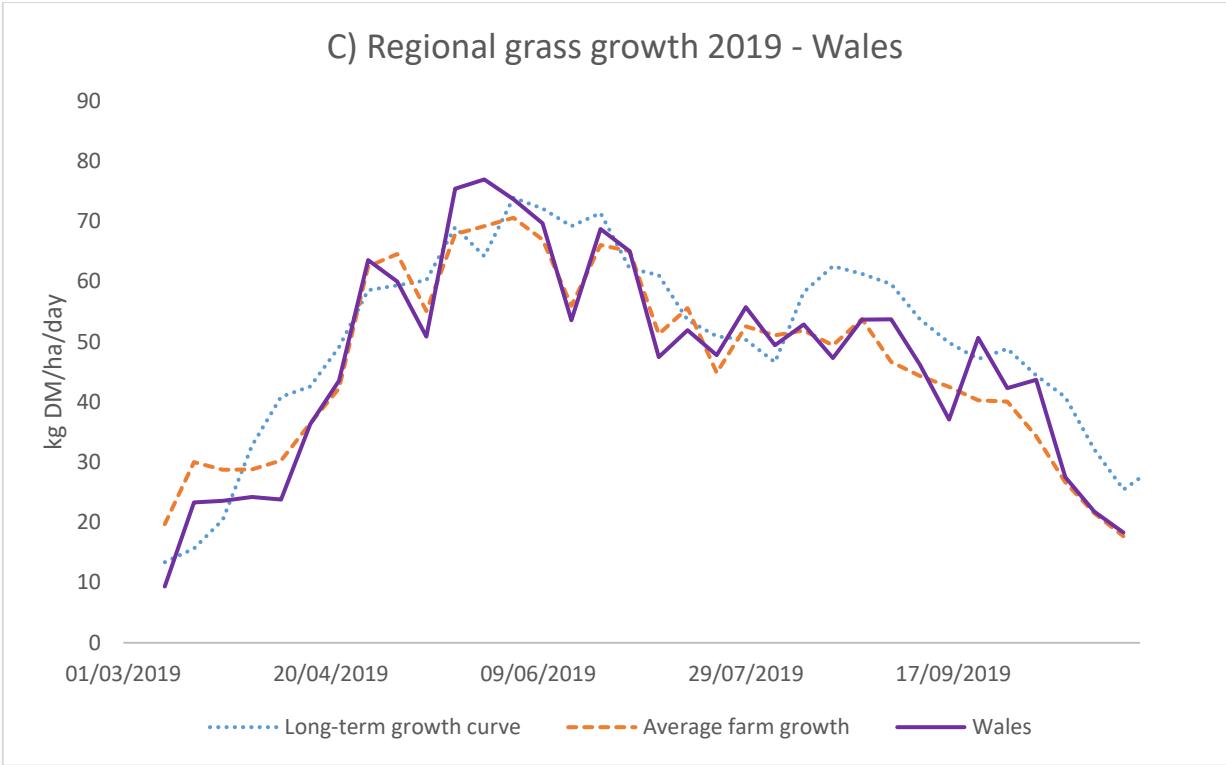


Figure 2: Regional average grass growth recorded weekly in March-October 2019, compared to the average for all GrassCheckGB farms and to the long-term average. A) Northern England (NE), B) Southern England (SE), C) Wales, D) Scotland.

### Monthly grass growth performance

In all regions during March the grass yields recorded were above the long-term average, and highest in the SE which saw growth at 190% of the long-term average. The mild winter and spring conditions experienced in early 2019 (Met Office, 2019a, 2019b) will have contributed to increased grass growth in March and the preceding winter months. This trend continued into April in Scotland and SE, but yields fell slightly below the long-term average in NE and Wales. May and June yields were closer to the long-term average, but July saw all regions except NE saw yields drop significantly. Autumn grass yields from grazing paddocks again fell below the long-term average, and were consistently lowest in SE.

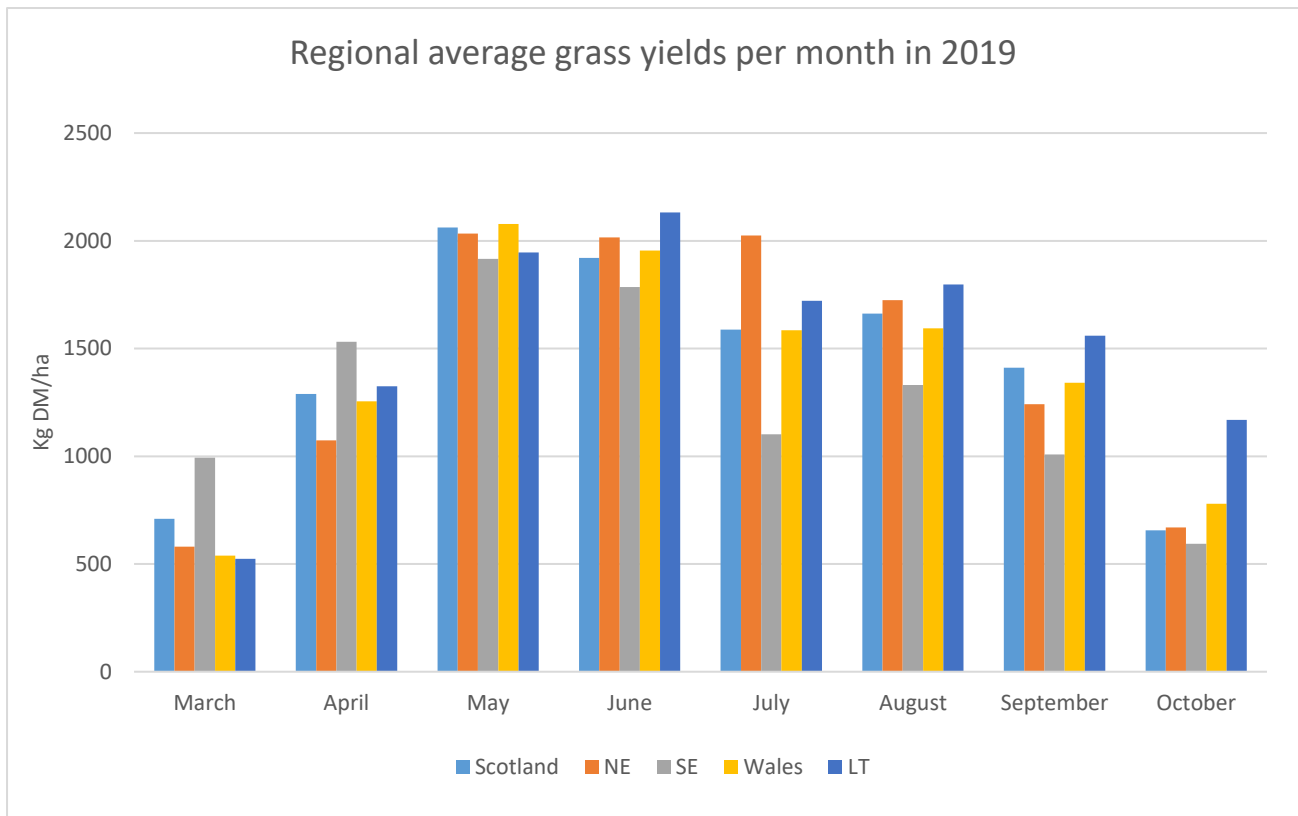


Figure 3: Regional average grass yields per month across GrassCheck GB farms, compared to the long-term average GB yield per month. Yields are calculated based on the grass growth data entered into AgriNet for each GrassCheck GB farm, and from the long-term GB grass growth rate. Regions shown are; Scotland, the north of England (NE), the south of England (SE), Wales, and the long-term (LT) GB average.

### Grass performance by sector

The GrassCheckGB grass growth curves published in each weekly bulletin were separated into growth rates on Dairy and Beef & Sheep farms (Figure 1). This was primarily to account for expected differences in the grass production intensities between these sectors, and because dairy systems are also largely located in areas with lowland, productive pastures rather than the more upland sites which are typical of many British Beef & Sheep farms. Values for the average total grass grown across GrassCheckGB Dairy and Beef & Sheep farms between March and October 2019 were 13.940 t DM/ha and 9.663 t DM/ha respectively, compared to the long-term GB average of 12.175 t DM/ha. Differences in the monthly grass grown between farms in each of these sectors is shown in Figure 4.

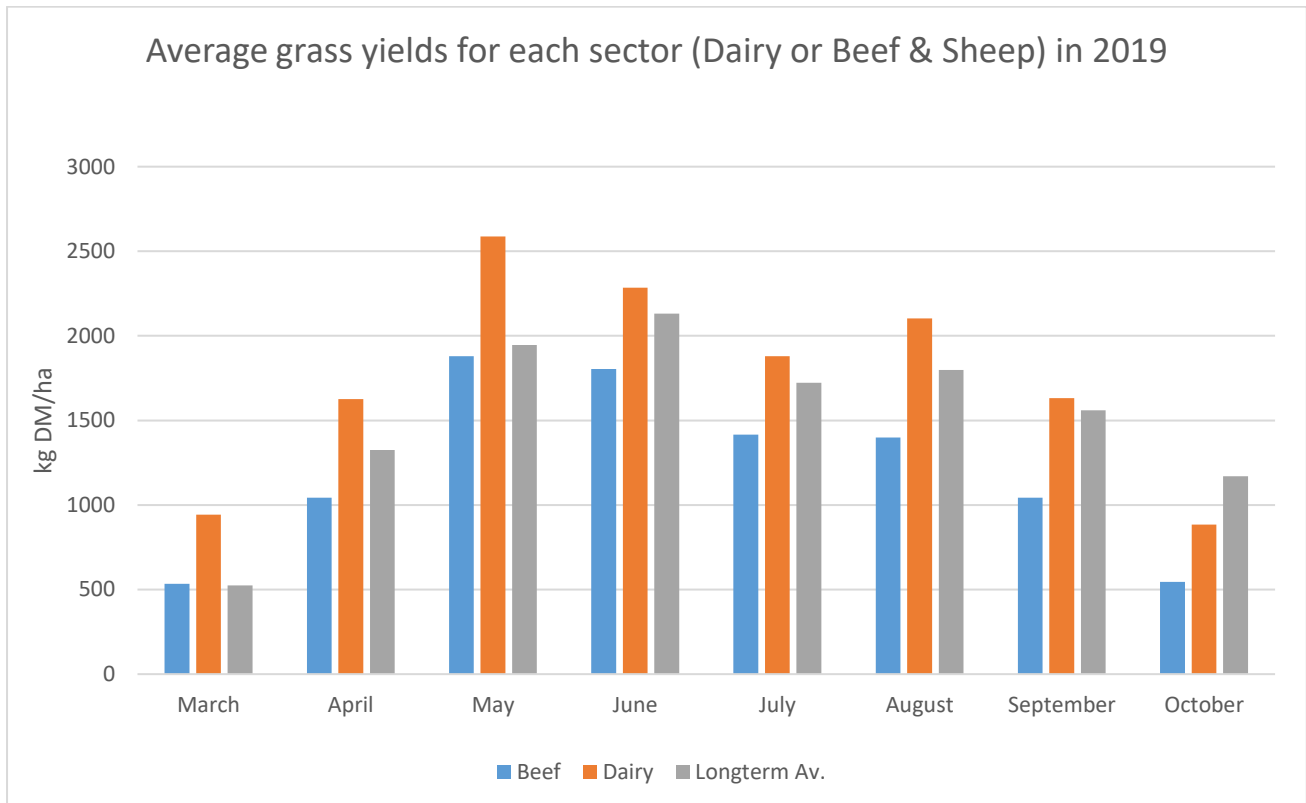


Figure 4: Average monthly grass yields recorded on GrassCheckGB farms in 2019 between March and October by production sector (Dairy or Beef & Sheep).

### Individual farm grass performance

Annual grass production across the grazing platforms on individual GrassCheckGB farms varied greatly. Total yields recorded on GrassCheckGB dairy farms ranged from 8.6-16.7 t DM/ha, and on beef & sheep farms from 5.2-14.1 t DM/ha. These values include only farms for which a complete dataset covering March-October was available. The variation in total grass production for grazing across all dairy farms is shown in figure 5, and for Beef & sheep farms in Figure 6. Faded columns on each of these graphs indicate values from farms which were excluded from the overall averages stated above for various reasons in order to ensure a fair comparison.

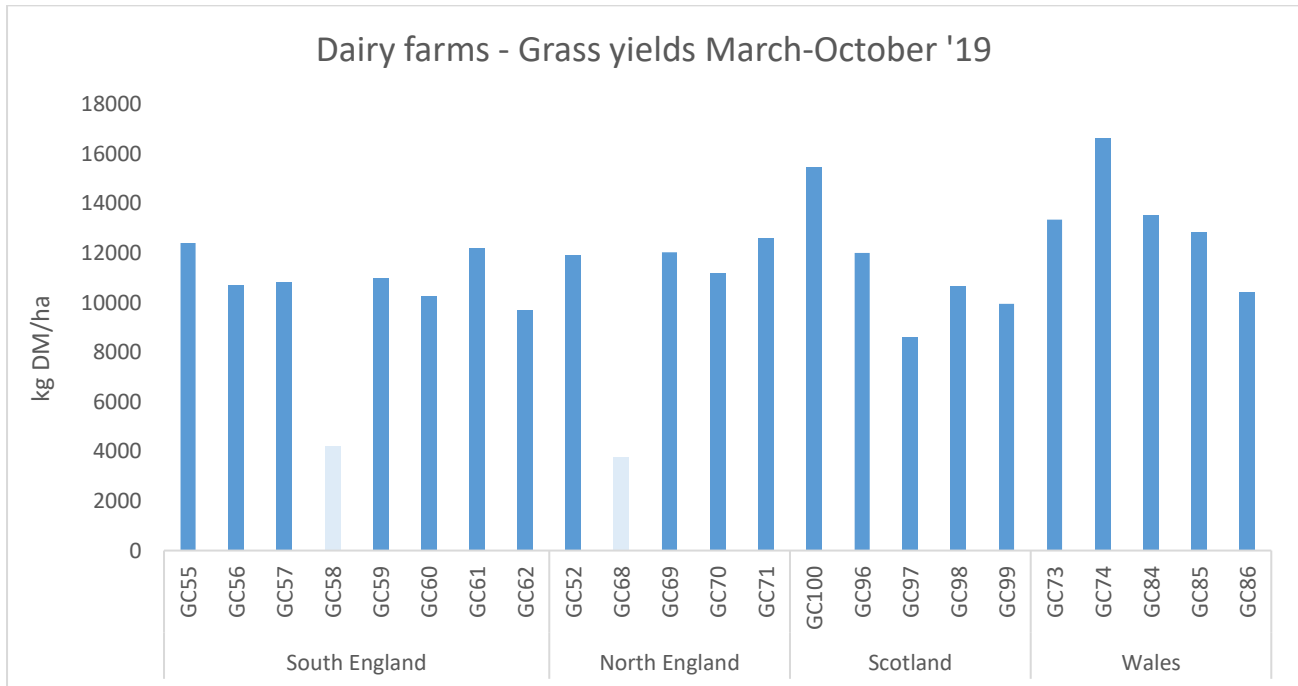


Figure 5: Total grass yields (from grazing) recorded for March-October 2019 on GrassCheckGB dairy farms.

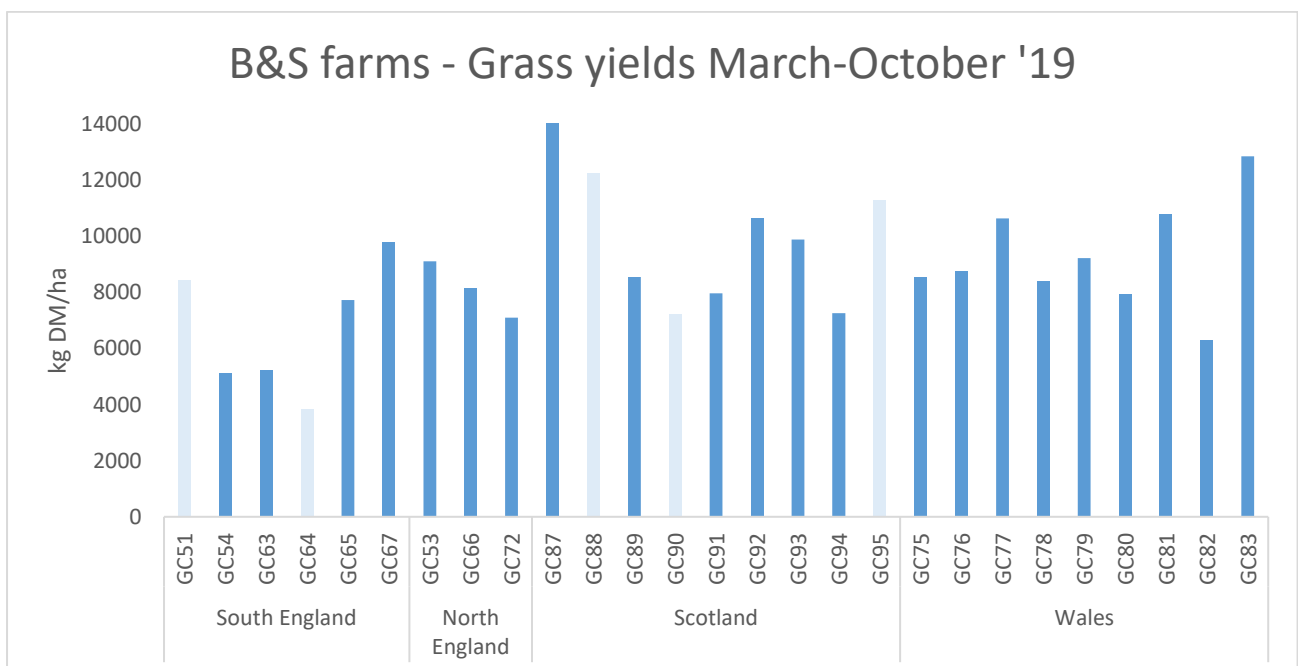


Figure 6: Total grass yields (from grazing) recorded for March-October 2019 on GrassCheckGB beef & sheep farms.



## Factors influencing grass yields

A multitude of factors are important to consider when assessing pasture performance. These include the age of grass leys, reseeded history and seed mix composition, paddock soil type and topography, nitrogen and other mineral fertiliser inputs, manure and slurry applications, soil nutrient status, testing history, pH and any degree of soil compaction, as well as the grazing management of each paddock throughout the season. The AgriNet farm management software through which GrassCheckGB grass performance data is obtained provides additional metrics available to farmers to aid them in making assessments of paddock performance across their grazing platform. The AgriNet 'best paddocks' function indicates the range of yields achieved across all paddocks (including silage production) where this data has been entered into AgriNet, and can highlight poor-performing areas. An example of the 'Best Paddocks' chart is shown below in Figure 7 from the Rothamsted Research GrassCheck51 account. In the supplementary individual reports provided to individual GrassCheckGB farmers they are advised to review this area of their AgriNet account and consider the performance shown for various fields across the platform alongside knowledge of paddock histories. Further discussion around this area at farmer meetings and through WhatsApp is encouraged.

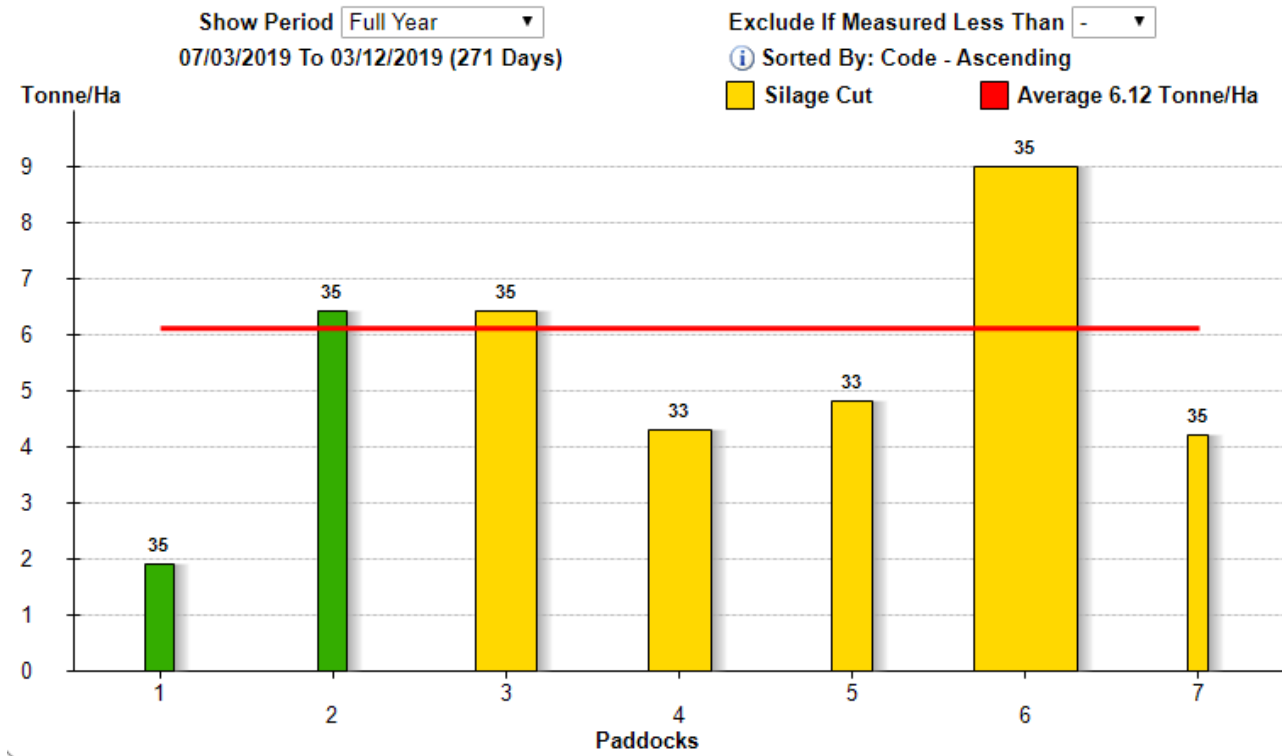


Figure 7: Example best paddocks card available in the AgriNet farm management software online platform. GrassCheck 51 (Rothamsted Research).

## Grass Utilisation on-farm

The average grass utilisation achieved by each GrassCheckGB farm where grazing events were recorded between March and October 2019 was calculated as the percentage of the offtake from the available grazing cover over 1500 kg DM/ha (representative of a 4 cm post-grazing residual) and is shown in Figure 8.

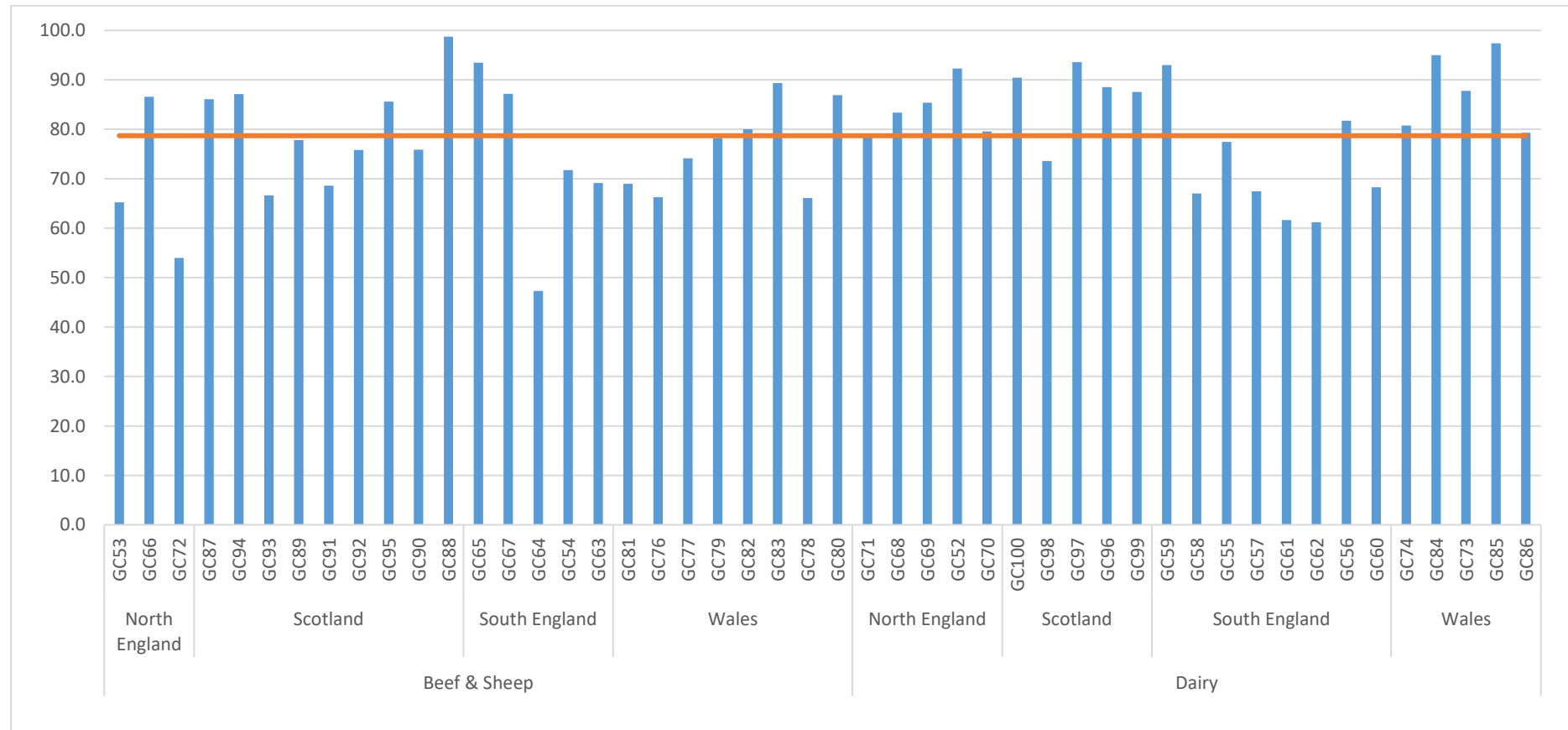


Figure 8: Average utilisation of available grass >1500 kg DM/ha across all GrassCheckGB farms, for all paddocks grazed during 2019

Average utilisation across all GrassCheckGB farms in 2019 was 78.7% of grass available above 1500 kg DM/ha. Individual farm figures ranged from 47.3-98.8%. The number of grazings recorded per paddock will have been influenced by both paddock size, stocking rate and the duration of grazing breaks, thus these

figures are likely to be more informative on an individual farm level when compared between years. The average number of grazings per paddock was calculated across GrassCheckGB farms at 4.7 grazings per paddock, with individual farm figures ranging from 1.0 - 9.6 grazings per paddock.

Several farms achieved a very high average grass utilisation of >90%, with these figures being achieved by farms which consistently achieved low post-grazing residuals near to the target 1500 kg DM/ha (Table 1). Whilst this 'target' is advised to maximise both the quality and quantity of grass re-growth through the grazing season, to ensure a balance between grass and animal productivity several farms (particularly dairy farms) will have set higher post-grazing residual targets for some or all stock. Conversely, with sheep grazing systems a lower target post-grazing residual may be appropriate. Assessment of grass utilisation should therefore be considered alongside individual farm targets, and this will be highlighted in feedback provided to individual farms. Some of the lower grass utilisation values were returned for farms that saw difficult grazing conditions due to drought or heavy rain at various points throughout the season, or were grazing particularly high pre-grazing covers, meaning clearing out paddocks to a 1500 kg DM/ha grazing residual will have been more challenging.

Table 1: Individual farm grass utilisation and grazing residual data. Values are presented as an average of all figures collected for all paddocks detailed in AgriNet for each individual farm throughout the March-October grazing season.

Type	Region	GC	Av. Utilisation	Av. Grazings per paddock	Av. Pre-grazing cover	Av. Post-grazing cover
Beef & Sheep	North England	GC53	65.3	1.8	2155	1712
		GC66	86.6	3.4	3100	1701
		GC72	54.0	5.8	2649	2008
	Scotland	GC87	86.1	5.5	3065	1663
		GC94	87.1	3.7	3059	1700
		GC93	66.6	6.4	2862	1970
		GC89	77.8	3.2	2538	1700
		GC91	68.6	3.0	2869	1838
		GC92	75.8	3.3	2952	1806
		GC95	85.6	1.0	4330	1930
		GC90	75.9	5.2	3496	1910
		GC88	98.8	2.9	3315	1521
		South England	GC65	93.5	3.1	3211
	GC67		87.2	2.9	3283	1700
	GC64		47.3	1.8	3012	2388
	GC54		71.8	2.4	3090	1872
	GC63		69.2	3.8	3262	2028
	Wales	GC81	69.0	4.2	3167	1946
		GC76	66.3	3.8	2610	1854
		GC77	74.1	2.8	2782	1816
		GC79	78.2	5.7	2167	1627
		GC82	80.0	2.7	2161	1604
		GC83	89.3	4.9	3353	1643
GC78		66.1	3.7	2571	1806	
	GC80	86.9	4.1	2977	1626	

Type	Region	GC	Av. Utilisation	Av. Grazings per paddock	Av. Pre-grazing cover	Av. Post-grazing cover
Dairy	North England	GC71	78.6	5.5	2954	1787
		GC68	83.4	2.6	3012	1694
		GC69	85.4	7.8	3020	1706
		GC52	92.3	6.1	2907	1559
		GC70	79.5	3.7	3458	2010
	Scotland	GC100	90.5	7.9	3097	1620
		GC98	73.6	5.7	3572	2016
		GC97	93.6	6.5	2827	1555
		GC96	88.5	7.8	2879	1651
		GC99	87.6	3.6	2978	1630
	South England	GC59	93.0	4.4	3196	1540
		GC58	68.4	3.8	2589	1687
		GC55	77.4	5.9	3266	1841
		GC57	67.4	2.2	2879	1843
		GC61	61.6	1.2	2692	1883
		GC62	61.2	8.3	2678	1935
		GC56	81.7	5.7	2581	1658
		GC60	68.3	3.3	4052	2255
	Wales	GC74	80.8	8.4	3724	1901
		GC84	95.0	9.6	2806	1522
		GC73	87.7	6.8	3043	1660
		GC85	97.4	7.6	2998	1504
		GC86	79.3	5.1	3297	1891

**On-farm nitrogen usage: Preliminary analysis**

From the 50 GrassCheckGB farms, 15 Beef and/or Sheep farms and 13 Dairy farms have provided fertiliser application data for 2019. Of these, 14/15 and 11/13 farms provided datasets which were useable for some preliminary analysis. An average of the N fertiliser applied across the grazing platform for grazing was obtained from AgriNet (Figure 9). The range of N input detailed for Beef & Sheep farms was 10.5-121.9 kg N/ha, and for Dairy farms was 20.4-276.1 kg N/ha.

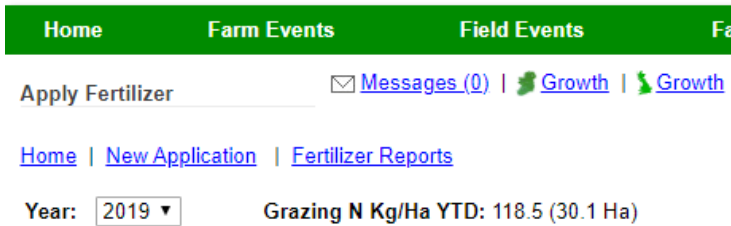


Figure 9: N fertiliser summary provided by AgriNet as N kg/ha applied to grazing paddocks.

The relationship between the seasonal (March-October) grass yield from each of these farms and the kg N/ha applied to the grazing platform (as detailed in AgriNet) is shown in figure 10. Data available for Beef & Sheep farms showed a negative N-response trend, with yield decreasing as N input increased. This response is contrary to what would be expected, and within the Dairy farm data a positive relationship is shown between N application rate and grass yield produced (Figure 10). With grass yields on GrassCheckGB Beef & Sheep farms which supplied fertiliser data ranging from 7,090-14,085 kg DM/ha, it is likely that some of the fertiliser data available for 2019 via AgriNet which indicated this negative trend was incomplete. Further data obtained over the coming years of the project will add to this analysis.

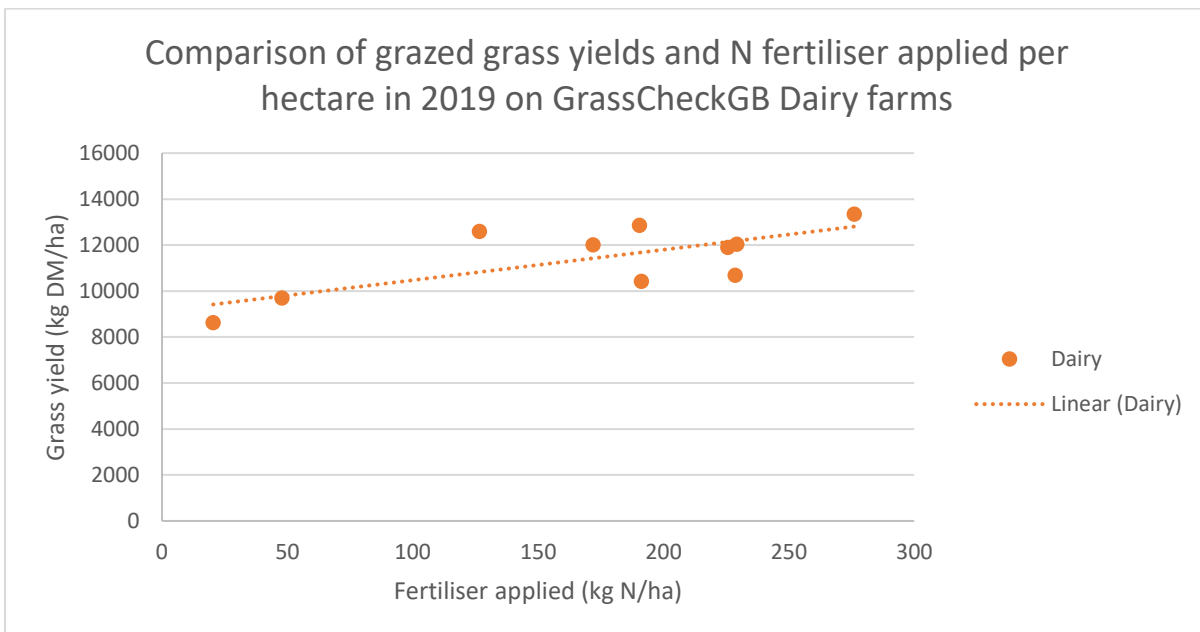


Figure 10: Comparison of grazed grass yields and N fertiliser applied per hectare in 2019 on GrassCheckGB Dairy farms.

## 2019 weather summary

Following an exceptionally warm winter, July saw weather records being broken for the highest UK temperature recorded (38.7 °C in Cambridge on July 25th). Across GrassCheck GB farms the highest temperature recorded 36.8 °C at GC66 in Nottinghamshire. Rainfall in 2019 was also variable, with GB seeing 152% of the long-term average amount of rain in June, with some areas receiving more than twice the expected June rainfall in the first half of the month, followed by dry and hot conditions which continued through July. The autumn months also saw significantly above-average rainfall in many areas, with much of England and parts of Wales experiencing flooding in October, although Scotland was drier than average. Mean monthly temperatures recorded by the MET Office were 0.5 °C below the long-term average (Met Office, 2019c), and regional average conditions recorded on GrassCheckGB farms compared to the 1981-2010 long term average data available from the Met Office for each region (Figure 11) is shown in Appendix 1.

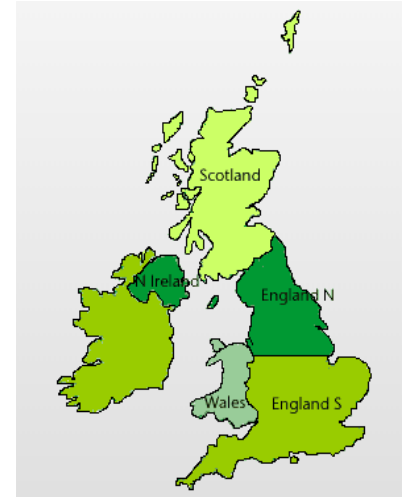


Figure 11: UK MET Office regional map.

The mid-summer heatwave and dry weather experienced in 2019 coincided with grass growth rates across the country dropping below the long-term average in July across Wales, Scotland and particularly for the south of England where grass yields were only 64% of the expected production for this month based on long-term average grass growth rates. Data from GrassCheckGB soil stations recorded extremely dry conditions on several farms during the heatwave, especially in the SE where regional average soil moisture readings were 96.1 cb in the month of July, well above the 60 CB threshold where negative impacts on grass growth rates may be seen. The average grass growth rate for July in the SE was just 39.7 kg DM/ha/d. Average monthly soil conditions alongside grass growth rates for each region are shown in Table 2. However, in the north of England less extreme temperatures and higher rainfall boosted grass growth to 118% of the long-term GB average for this month (Figure 3), and an average growth rate of 53.3 kg DM/ha/d.

Table 2: Average regional monthly soil temperature (ST, °C), soil moisture (SM, cb) and grass growth rates (kg DM/ha/d) recorded across GrassCheckGB farms in 2019.

Month	SE			NE			Scotland			Wales		
	SM	ST	GR	SM	ST	GR	SM	ST	GR	SM	ST	GR
Mar	7.5	84.5	36.6	5.1	7.6	25.6	*	*	20.7	5.0	8.2	18.8
Apr	27.5	47.1	48.2	28.2	10.2	39.6	14.9	11.2	33.1	16.1	9.9	38.3
May	73.3	31.9	62.2	51.3	11.5	67.3	31.5	11.2	63.8	44.7	12.5	65.8
Jun	46.6	83.8	59.5	25.1	14.2	63.5	15.8	13.4	68.6	21.5	14.5	66.4
Jul	96.1	43.8	39.7	67.4	16.9	53.3	32.2	16.0	65.9	73.4	17.2	53.6
Aug	51.7	72.0	43.0	15.6	16.4	54.8	12.7	15.6	58.3	26.0	16.7	50.8
Sep	57.5	103.0	34.7	54.5	13.8	47.3	11.5	13.1	41.5	18.1	14.4	46.0
Oct	5.4	122.9	21.2	7.1	10.4	23.4	5.7	9.3	23.9	6.4	11.0	27.8

\*Weather data was not available for Scottish farms in March prior to the installation of the GrassCheckGB weather stations.

The combination of cooler and wetter autumn conditions in 2019 coincided with below-average grass yields for the months of September and October, particularly in England (Figure 3).

### Associations between grass growth rates and on-farm weather data

GrassCheck GB added weather data to the weekly published bulletins from 13<sup>th</sup> May 2019. Management notes included with the weekly GrassCheckGB bulletins aimed to relate current weather trends to observed or likely impacts on grass performance across GB, where relevant.

Preliminary statistical analysis has revealed that multiple meteorological factors were associated with on-farm grass growth rates during 2019. Using univariate regression analysis, solar radiation, soil moisture and temperature, average and max/min air temperature and solar energy were significantly ( $P \leq 0.002$ ) associated with grass growth rates. However, in a multivariate analysis model considering all of these factors, only solar radiation and minimum air temperature remained as significant ( $P \leq 0.003$ ) factors associated with grass growth rates throughout the 2019 grazing season. Rainfall and evapotranspiration were not found to be significant at any point. Further data collected throughout the course of the GrassCheckGB project will strengthen the statistical analysis of these data, and improve understanding of the relationship between meteorological factors and grass growth performance on GB commercial farms.

Second-order regression analysis of weekly regional summary data generated throughout the season from May-October (following the final installation of all GrassCheckGB weather stations) returned a weak correlation of 0.16 between these two variables, but did indicate that average grass growth rates tended to decline once soil moisture readings rose above 60 cb (Figure 12). This finding supports the advisory information provided by the weather station manufacturers (Davis Instruments, USA) and aligns with previous experience of this equipment indicating that at soil moisture values  $>60$  cb a negative impact on grass growth rates may be seen. The magnitude of this impact increases as soil conditions continue to dry (and cb readings increase), such that at readings of  $>128$  cb growth rates could be  $<50\%$  of those expected at optimal soil conditions, and at readings above 147 cb growth rates are expected to have dropped to  $<10$  kg DM/ha/d.

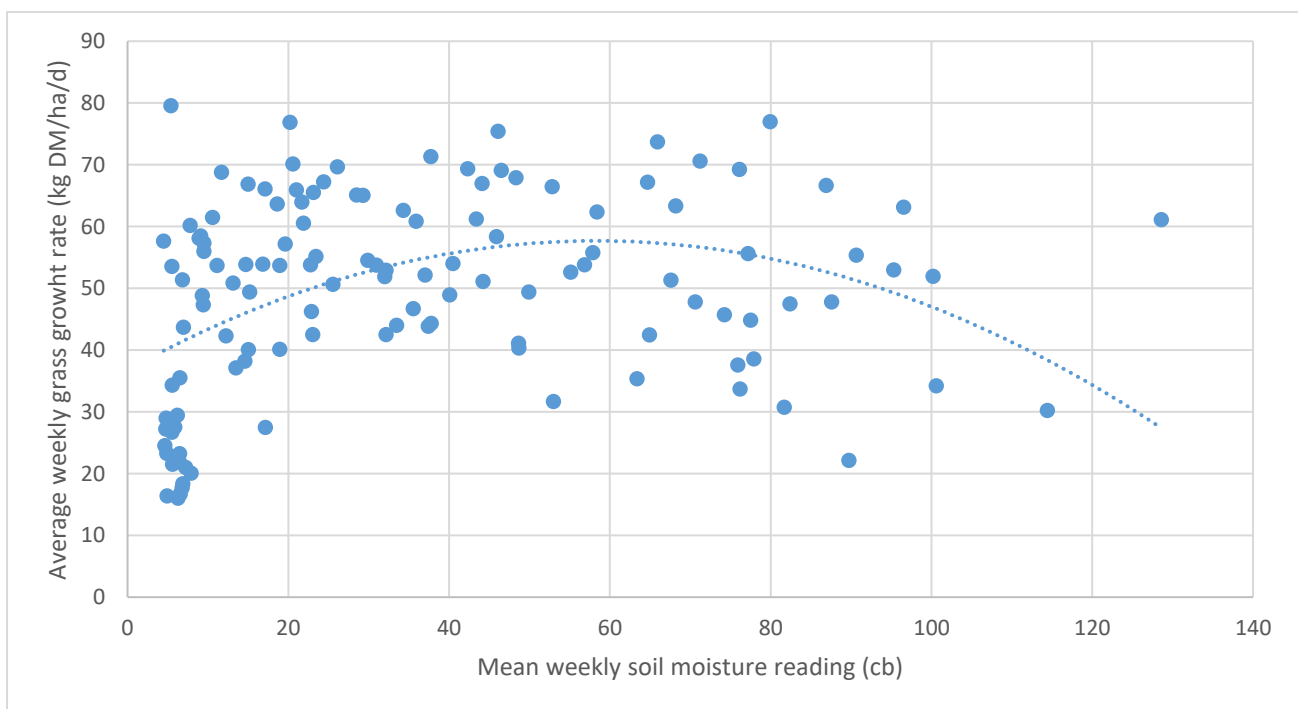


Figure 12: Second-order regression analysis of the relationship between recorded soil moisture readings (cb) and grass growth rates (kg DM/ha/d) from May-October 2019. Data obtained from weekly average values which were summarised from all farms in each of the 4 GrassCheckGB regions.

Following the prolonged dry weather experienced in SE, and the heatwave which affected all of GB in July, summary data from 29<sup>th</sup> July showed a significant dip to 22.1 kg DM/ha/d (28.2 kg below the LT average of 50.3 kg DM/ha for late July) in SE, occurring in line with minimal rainfall and very dry soil conditions. In the week preceding this low growth rate, average regional soil moisture readings were 114.4 cb. Readings higher than 60 cb have the potential to restrict grass growth and reduce maximum yield but this depends on local climate and rainfall amounts, land drainage, soil type, and management practices. Table 3 gives more information on soil moisture scores and their interpretation.

Table 3: GrassCheck soil moisture readings and interpretation.

<b>Soil moisture (cb)</b>	<b>Interpretation</b>
0 to 10	Saturated soil. Occurs for a day or two after irrigation or plentiful rainfall.
11 to 20	The soil is adequately wet, except for coarse sandy soils which will begin to dry out in this range due to their easily-draining nature.
21 to 60	Towards the upper end of this range irrigation or watering would now be advised to maintain optimum soil moisture content, except for heavy clay soils.
61 to 100	Grass growth could be restricted in this range as plants struggle to take up sufficient water from the soil. Heavy clay soils would benefit from irrigation/watering.
> 100	Soils are extremely dry and grass growth is likely to be significantly reduced at this point, impacting on yield potentials.

Regularly monitoring grass growth rates, soil temperature (in the shoulders of the season) and soil moisture readings alongside local weather forecasts (which are available in the WeatherLink App provided as a free download by Davis Instruments, USA) can provide information for on-farm decision support around grazing and grassland management throughout the season, and this information was communicated where relevant in GrassCheckGB weekly bulletins.



### Grass Quality summary

Throughout 2019 grass quality results were good overall, with metabolisable energy (ME) consistently averaging >11 MJ/kg DM. Grass dry matter (DM) was changeable (average weekly values ranged from 14.4-29.0%), largely affected by weather conditions around sampling. From early July the proportion of water soluble carbohydrates (WSC, %) was seen to decline as crude protein (CP, %) values rose, highlighting this common trade-off in the nutrient composition of grass samples. Throughout the year CP values averaged 19.5% overall, with all weekly averages being >13.8%, which should be sufficient to meet the protein requirements of most grazing stock.

The weekly variation in key grass quality parameters is shown in Figures 13 A-D. Statistical analysis (Table 3) was performed as an unbalanced ANOVA of all weekly submitted grass samples, with season of sampling (spring, summer or autumn) set as a blocking factor. Multiple comparisons were made for average values from each of the four regions using the Bonferroni correction. Significant differences ( $P < 0.001$ ) were seen with both WSC% and ME between regions and between farm type, with samples from SE having significantly lower ME and WSC% values. Comparisons between farm type identified Beef & Sheep farms as having significantly lower WSC% and ME values compared to dairy farms overall.

Table 3: Mean grass quality values for each region and each farm type recorded from GrassCheckGB farms throughout the 2019 grazing season (March-October).

	<b>Wales</b>	<b>South England</b>	<b>Scotland</b>	<b>North England</b>	<b>Sig.</b>	<b>SED</b>	<b>Dairy</b>	<b>Beef &amp; Sheep</b>	<b>Sig.</b>	<b>SED</b>
DM %	20.55	20.91	21.23	21.86	NS	0.5436	20.42	21.2	NS	0.3332
CP %	19.54	18.8	19.59	18.7	NS	0.5234	19.48	18.91	NS	0.3209
WSC %	16.74 <sup>b</sup>	14.81 <sup>a</sup>	17.03 <sup>b</sup>	18.21 <sup>b</sup>	<0.001	0.5815	16.66	15.58	<0.001	0.3564
ME (MJ/kg DM)	11.52 <sup>b</sup>	11.26 <sup>a</sup>	11.55 <sup>b</sup>	11.58 <sup>b</sup>	<0.001	0.0694	11.54	11.33	<0.001	0.0314

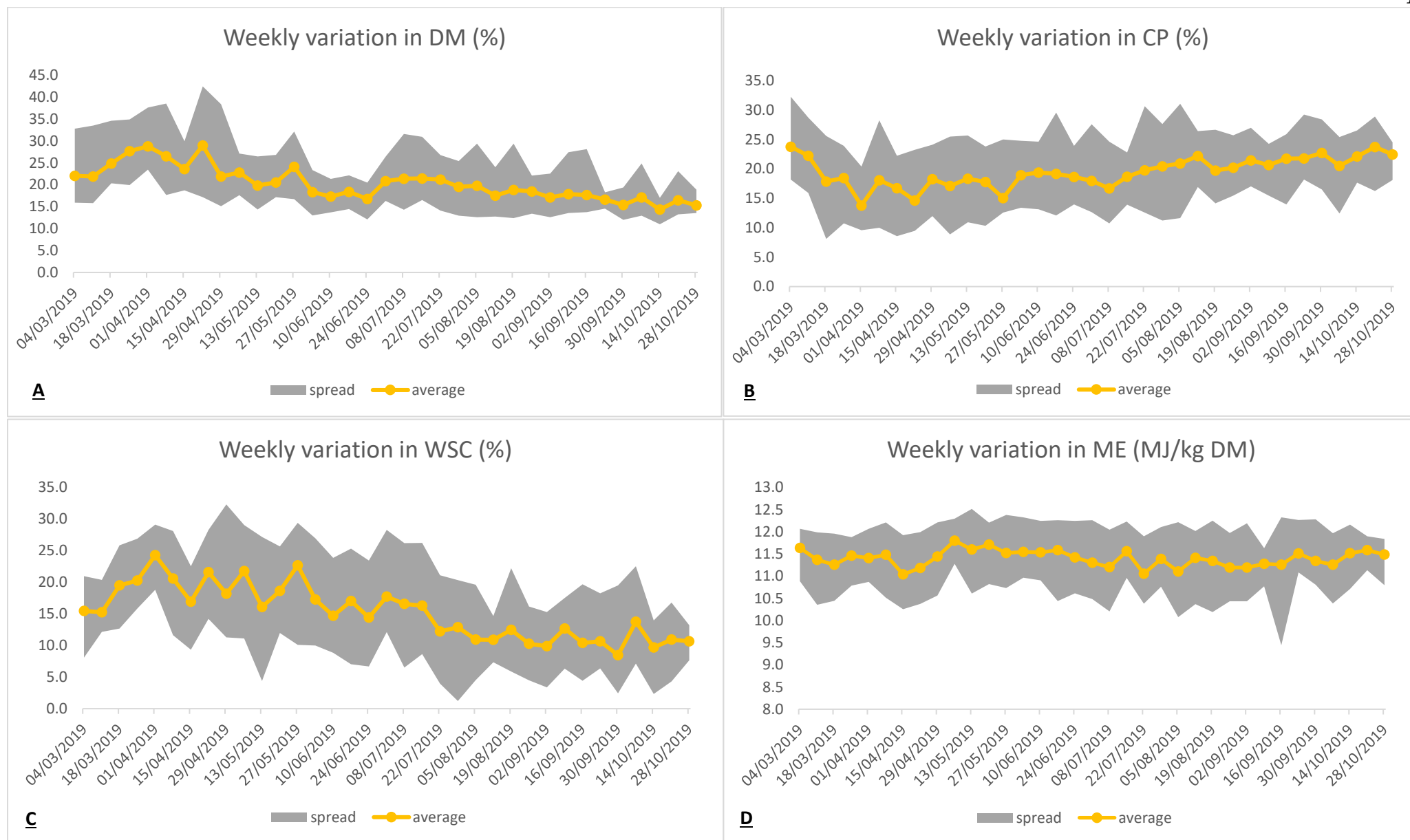


Figure 13 A-D: GrassCheck GB weekly grass quality results. A = % Dry Matter, B = % Crude Protein, C = % Water Soluble Carbohydrates (sugars), D = Metabolisable Energy (MJ/kg DM). Averages are shown as the yellow line and the difference between the highest and lowest values for samples received each week is shown by the shaded area.

## Knowledge Transfer activities

During 2019 GrassCheckGB produced 31 bulletins covering April-October 2019. These were published in the Farmers Guardian with a circulation of ~29.5K. The GrassCheckGB twitter page (@GrasscheckGB) also posted each weekly bulletin, achieving on average 16.8K impressions each month (April-October), as shown in Table 4, and on the GrassCheckGB website ([www.grasscheckgb.co.uk](http://www.grasscheckgb.co.uk)). The GrassCheckGB website recorded over 1,676 unique visitors, and 3,169 views in total during 2019. A summary of monthly website activity is detailed in Table 5. Bulletins detailed summary data for regional grass growth rates and relevant weather information (weekly rainfall and soil temperature in the shoulders of the season, soil moisture readings in the mid-season period) from GrassCheckGB commercial farms.

Table 4: Monthly analytics for the GrassCheckGB twitter account during 2019 (@GrasscheckGB)

Month	Tweets	Impressions	Profile visits	Mentions	New followers
February	0	836	6	1	95
March	0	264	245	19	58
April	2	10,100	674	34	171
May	6	21,100	599	56	95
June	4	18,900	215	13	32
July	4	16,500	194	8	30
August	3	12,900	176	27	31
September	5	17,000	145	21	28
October	5	20,900	142	19	35
November	0	4,012	32	18	16
December	0	996	5	2	4
<b>Average (April-October only)</b>	<b>4</b>	<b>16,771</b>	<b>306</b>	<b>25</b>	<b>60</b>

Through both the farming press and social media platforms the GrassCheckGB weekly bulletins reached a broad audience within the farming community. By providing relevant, timely information for grassland farmers GrassCheckGB facilitated clear knowledge transfer to support and inform grassland management decisions, assisting farmers in increasing grass production and utilisation in their grazing systems.

Table 5: Website visitor statistics for [www.grasscheckgb.co.uk](http://www.grasscheckgb.co.uk) during 2019.

Month	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19	Jul-19	Aug-19	Sep-19	Oct-19	Nov-19	Dec-19	Total
Unique visitors	0	0	1	37	397	409	209	12	307	304	0	0	1,676
Number of visits	0	0	5	93	723	1,097	293	13	494	451	0	0	3,169

## Conclusions

The 2019 grazing season saw very changeable weather conditions, with both extremely dry and extremely wet weather seen at times. Despite some challenging grazing conditions arising as a result of the changeable weather, on average GrassCheck GB farms have produced grass yields close to expected based on long-term average growth rates (11.012 t DM/ha, vs the long-term average of 12.175 t DM/ha). Differences were seen in the average yields grown on both a regional (NE 11.363 t DM/ha, Scotland: 11.298 t DM/ha, Wales: 11.125 t DM/ha, SE: 10.262 t DM/ha) and sector (Dairy: 13.940 t DM/ha, Beef & Sheep: 9.663 t DM/ha) basis.

Individual farm yields were wide ranging, and on farms inputting regular data these ranged from 5.2 to 16.7 t DM/ha. The highly variable weather conditions recorded throughout the 2019 season both between regions, and between individual farms, can explain much of this variation, but other factors contributing to higher or lower grass production between farms will be discussed in depth at the end of year meetings, or can be a discussion topic for the GrassCheck WhatsApp forums.

Further individualised supplementary results tables, including individual paddock performance in terms of grass utilisation, farm grass growth curves and monthly grass yields from the grazing platform, along with monthly weather summary data and full grass quality results for 2019 will be provided to each individual project farmers at end of year meetings during January 2020.

GrassCheckGB is very thankful for the support received from all the project sponsors during Year 1. Particular thanks are also extended to the great team of GrassCheckGB project farmers for their work in providing data in support of this project.

## Future work

Looking ahead to the 2020 season, additional commercial sponsorship was agreed at the end of 2019, and Datamars UK will be joining the GrassCheckGB project at the start of the second year. Discussions of any further potential project sponsorship opportunities will continue going forward.

GrassCheckGB will continue to collect grassland performance data through our network of project farmers. This data will help us to build a greater, more comprehensive picture of on-farm grass performance across the country under a wide range of conditions. Further analysis will include a more detailed investigation of the relationships between on-farm grass growth and fertiliser and manure/slurry applications. Early in 2020 animal production data from the 2019 grazing season (milk yields from dairy, average daily liveweight gain in finishing beef/lamb stock) will be collated from GrassCheckGB project farms. Animal performance data will be compared to farm grass growth, quality and utilisation figures to investigate any relationship between grass performance, grazing management and animal performance results. The results of this will be provided as feedback to individual farms.

We will continue to produce weekly bulletin publications throughout the growing season, summarising regional grass growth rates, trends in grass quality results, and weather and soil conditions. By providing timely feedback through these bulletins not only to GrassCheckGB project farmers, but to the wider GB farming community through the farming press (Farmers Guardian) and social and online media. The information and accompanying management notes contained in these bulletins will continue to support grassland farmers with grazing and grassland management decisions throughout the grazing season.

The bank of grass growth and on-farm weather data being collected through this project will also be used to assess the accuracy of grass growth predictions on a 7 and 14 day basis using the existing GrazeGro prediction model (Barrett et al., 2005) developed at AFBI. The work required to adapt this model to produce accurate and reliable grass growth forecasts on a regional basis for GB will be investigated.

**References**

Barrett, P.D., Laidlaw, A.S., Mayne, C.S., 2005. GrazeGro: A European herbage growth model to predict pasture production in perennial ryegrass swards for decision support. *Eur. J. Agron.* 23,

Met Office, 2019a. Seasonal summary: Winter 2018/2019.

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Report prepared by: K. Huson and D. McConnell, AFBI.

**Appendix 1:** Comparison between long-term average climate data (MET Office, average values for the period 1981-2010) and conditions recorded on GrassCheckGB farms in 2019.

A: England, South

Month	Average air temperature (°C)			Rainfall (mm)		
	England S - 1981-2010	2019	Difference (°C)	England S - 1981-2010	2019	Difference (%)
March	6.6	8.3	1.7	58	84.5	145.7
April	8.5	9.6	1.1	55.4	47.1	85.1
May	11.7	11.6	-0.1	57	31.9	56.0
June	14.5	14.4	-0.1	56.5	83.8	148.2
July	16.8	17.7	0.9	57.5	43.8	76.1
August	16.7	16.7	0.1	62.3	72.0	115.5
September	14.2	14.6	0.4	63.8	103.0	161.4
October	10.8	10.7	-0.1	87	122.9	141.2

B: England, North

Month	Average air temperature (°C)			Rainfall (mm)		
	England N - 1981-2010	2019	Difference (°C)	England N - 1981-2010	2019	Difference (%)
March	5.5	7.4	1.9	75.2	27.9	37.1
April	7.4	10.3	2.9	64.9	23.0	35.4
May	10.4	10.7	0.3	61	40.6	66.6
June	13.1	13.7	0.6	71.9	80.1	111.4
July	15.2	17.0	1.8	72.3	97.9	135.3
August	15.0	16.2	1.2	82.4	98.7	119.8
September	12.7	13.2	0.5	80.8	115.0	142.3
October	9.5	8.8	-0.7	100.6	98.5	97.9

C: Wales

Month	Average air temperature (°C)			Rainfall (mm)		
	Wales - 1981-2010	2019	Difference (°C)	Wales - 1981-2010	2019	Difference (%)
March	5.8	7.3	1.5	116.9	55.9	47.8
April	7.7	9.1	1.4	89.3	91.5	102.5
May	10.7	10.7	0.1	85.9	36.9	42.9
June	13.2	13.3	0.1	85.8	132.7	154.6
July	15.2	16.2	1.0	92.6	50.0	54.0
August	15.0	15.8	0.8	107.4	101.7	94.7
September	12.9	13.7	0.8	116.6	121.9	104.6
October	9.9	9.7	-0.1	169.6	133.7	78.8

## D: Scotland

Month	Average air temperature (°C)			Rainfall (mm)		Difference (%)
	Scotland - 1981-2010	2019	Difference (°C)	Scotland - 1981-2010	2019	
March	4.1	-	-	141	-	-
April	6.1	10.0	3.9	91.1	15.2	16.7
May	8.9	9.3	0.4	84.5	58.1	68.8
June	11.3	12.5	1.2	88.9	68.0	76.5
July	13.3	15.4	2.1	99.5	88.8	89.2
August	13.0	14.8	1.8	116.7	125.0	107.1
September	10.9	12.2	1.3	136	81.5	59.9
October	7.9	8.0	0.1	175.7	85.0	48.4