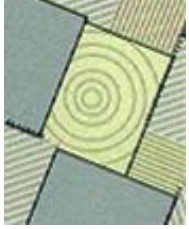
THE BRITISH SURVEY OF

Fertiliser Practice

FERTILISER USE ON FARM CROPS
FOR CROP YEAR 2018



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National Statistics Status
National Statistics status means that our statistics meet the highest standards of trustworthiness, quality and public value, and it is our responsibility to maintain compliance with these standards.

The continued designation of these statistics as National Statistics was confirmed in 2012 following a full assessment by the UK Statistics Authority against the Code of Practice for Statistics.

Since the last review of these statistics in 2012, we have continued to comply with the Code of Practice for Statistics, and have made improvements including:

- Incremental improvements to the sample selection to optimise coverage for key survey data items;
- Improvements to the wording of questions in light of feedback from interviewers; and
- Flexible use of the survey platform to collect additional data to meet needs of data users (Modular questions)

Further statistical analyses of the survey results are also available. For details and other enquiries please contact:

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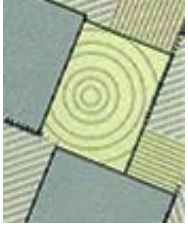
https://www.gov.uk/government/collections/fertiliser-usage



FOREWORD

The British Survey of Fertiliser Practice provides information on fertiliser and manure use on the major crops and grass grown in mainland Britain.

The 2018 Survey was funded by the Department for Environment, Food and Rural Affairs (Defra) and the Scottish Government. The Survey has the full support of the Farmers' Unions in England, Scotland and Wales.

The Survey is carried out annually and is based upon returns from a sample of farms. In 2018, the Survey was co-ordinated by Kynetec, who was responsible for the survey design, data collection, statistical analysis and quality control monitoring.

Data uses and comparison to the EU

The information in this publication is widely used by the UK government and the EU, industry and researchers and collects data on trends in usage and application rates of nitrogen, phosphate, potash, sulphur, organic manures and lime on agricultural crops and grassland in Great Britain.

The Survey data provide important evidence to assess greenhouse gas emissions from agriculture, informing the ammonia and greenhouse gas inventories and for the development of possible mitigation measures. Additionally, the data provide information on fertiliser use in NVZs (nitrate vulnerable zones) and for developing and assessing the impact of policy on water quality, particularly the Nitrates Directive (Council Directive 91/676/EEC). The data have also been used for indicators on nutrient balances, other indicators relating to environmental impacts and other cross cutting work looking at links between fertiliser use and productivity (benchmarking) and economic performance. Industry and government use the data to monitor best practice.

Information on all of these topics are available from the Gov.UK website and includes information on, greenhouse gas emissions, agriculture and climate change, NVZs and soil nutrient balances which are of particular relevance.

The data contribute to the meeting of certain legislative obligations at a national and EU level. Information on the use of fertilisers across the EU is available from the Eurostat website. It includes a summary report with a comparison of the usage and links to detailed data for the individual countries.

Other information

Defra also run other surveys which may be of relevance to fertiliser use and related practices through its Farm Practices Survey for England, which is available on the Defra website.

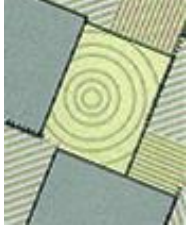
Contact information and feedback

Contact details are available at the front of this publication for feedback or for questions about the information provided.

Data revisions

See section A2.6 for details of revisions made in 2018.

June 2019



ACKNOWLEDGEMENTS

The sponsors gratefully acknowledge the co-operation of all farmers taking part in the 2018 British Survey of Fertiliser Practice.

We wish to thank all those involved for their assistance and support in the design, conduct and analysis of the Survey.

The agronomic interpretation of the Survey results benefited from advice from Chris Dawson (Chris Dawson and Associates), agronomic consultant to the Agricultural Industries Confederation (AIC).

Kate Benford[1]

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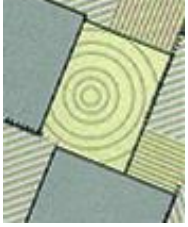

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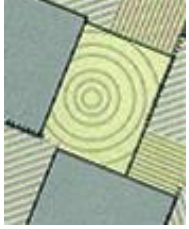

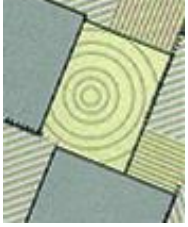

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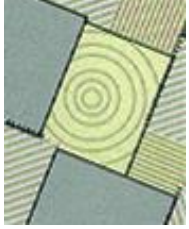
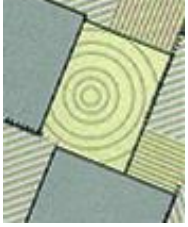
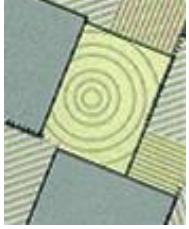






EXECUTIVE SUMMARY

The British Survey of Fertiliser Practice is an annual, nationally representative interview survey based on the selection of a random stratified sample of farms from mainland Britain. The main purpose of the survey is to estimate average application rates of nitrogen, phosphate and potash used for agricultural crops and grassland. The data provide important evidence to assess greenhouse gas emissions from agriculture and for developing possible mitigation measures. Information is also collected on applications of sulphur fertilisers, organic manures and lime.

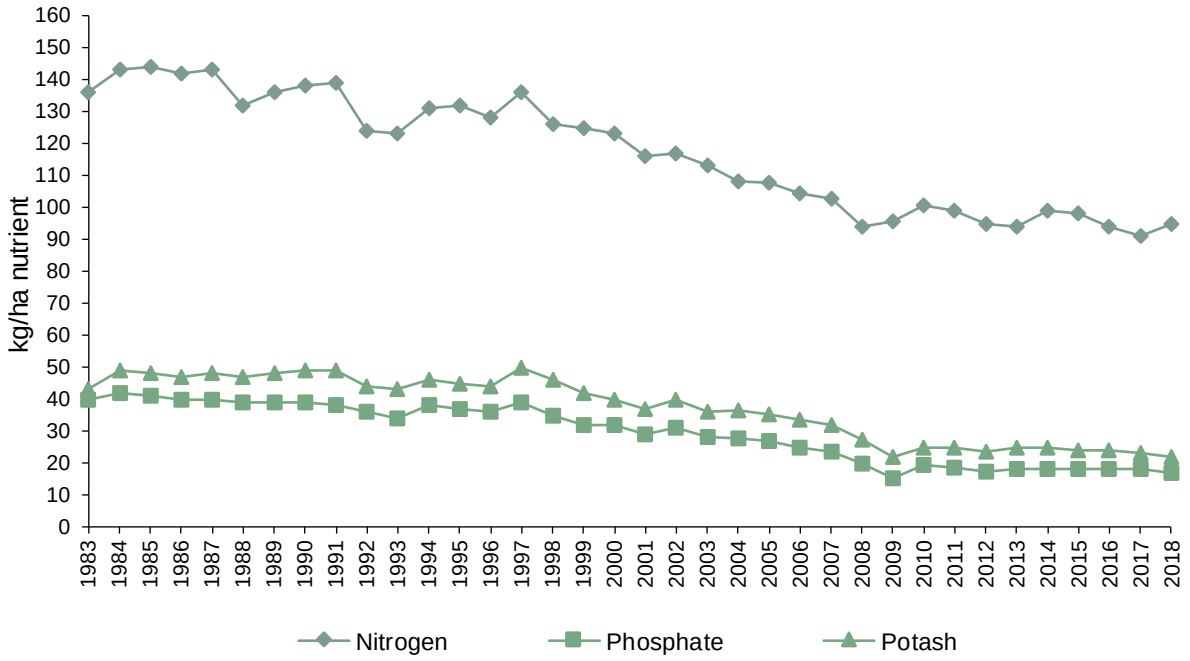
The main findings from the 2018 Survey on the use of the nutrients nitrogen, phosphorus, potassium and sulphur in Great Britain are summarised below (Table ES1).

Cropping patterns can influence fertiliser rates and dressing covers observed. In 2018 there was a 0.7% increase in the total area of tillage crops planted, with the areas of winter wheat and winter oilseed rape both up on the previous year. Conversely, the cropped areas of legumes and spring oilseed rape declined by 15% and 13% respectively. The weather is discussed more fully in Section A3.1 with a more detailed overview of the data in Section B and crop level information summarised in tables GB1.1-1.3 of Section C.

Table ES1 Nutrient dressing cover, current and five-year mean overall application rates for all crops and grass, Great Britain 2018

	All Tillage	All Grass	All Crops and Grass
Total Nitrogen - N			
Overall application rate, 2018 (kg/ha)	142	57	95
Mean overall application rate, 2014-2018 (kg/ha)	142	57	95
Crop area receiving dressing, 2018 (%)	91	59	74
Average field rate, 2018 (kg/ha)	155	96	129
Total Phosphate - P_2O_5			
Overall application rate, 2018 (kg/ha)	27	8	17
Mean overall application rate, 2014-2018 (kg/ha)	29	9	18
Crop area receiving dressing, 2018 (%)	48	38	42
Average field rate, 2018 (kg/ha)	57	22	40
Total Potash - K_2O			
Overall application rate, 2018 (kg/ha)	35	12	22
Mean overall application rate, 2014-2018 (kg/ha)	38	12	24
Crop area receiving dressing, 2018 (%)	47	40	43
Average field rate, 2018 (kg/ha)	74	29	51
Total Sulphur - SO_3			
Overall application rate, 2018 (kg/ha)	35	4	18
Mean overall application rate, 2014-2018 (kg/ha)	32	3	17
Crop area receiving dressing, 2018 (%)	62	12	34
Average field rate, 2018 (kg/ha)	57	37	53

Figure ES1 Overall fertiliser use (kg/ha) on all crops and grass, Great Britain 1983 - 2018

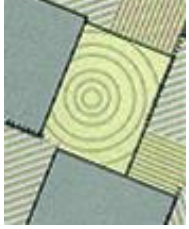


Nitrogen

- Nitrogen usually has a large immediate effect on crop growth, yield and quality. Most agricultural soils in Great Britain contain too little naturally occurring plant-available nitrogen to meet the needs of a crop so supplementary nitrogen applications must be made each year.
- The 4 kg/ha increase in total nitrogen use on all crops and grassland in 2018 resulted from a 5 kg/ha increase in the overall rate on tillage crops to 142 kg/ha and a 3 kg/ha increase on grass to 57 kg/ha. These changes reverse the declines recorded between 2016 and 2017, the rate on tillage crops in 2018 falling within the 140-150 kg/ha range for the majority of the 30 years of the survey.
- Nitrogen levels applied to grassland have been consistently lower than tillage crops. Whereas overall nitrogen rates on tillage have remained relatively constant, since 2000 the overall applications made to grass have seen a significant decline. However, this trend changed after 2009 and since then the overall nitrogen rate on grassland has remained relatively steady. The decline in cattle numbers is thought to have contributed to this reduction in the nitrogen rate on grassland, possibly in conjunction with some improvement in manure use efficiency. Please refer to table B2.1
- Overall application rates of nitrogen increased for the majority of the major tillage crops in 2018. The overall nitrogen rate on winter wheat and spring barley decreased by 1 kg/ha (to 186 kg/ha) and 1 kg/ha (to 101 kg/ha), respectively. The overall rate for winter barley decreased 6 kg/ha (to 143 kg/ha), whereas the overall application rate for total nitrogen on oilseed rape increased by 8 kg/ha to 188 kg/ha, relative to 2016 and 2017.

Phosphate and potash

- Phosphate and potash are applied in fertilisers and manures, particularly to replace the quantities removed in harvested crops. Most British soils can hold large quantities of these nutrients for crop uptake over several years. Consequently, the timing of maintenance application tends to be less time critical compared to nitrogen or sulphur.



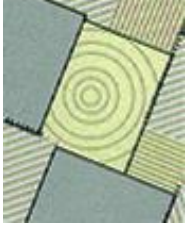
- Overall rates of phosphate and potash applied to tillage crops are about three times those used on grassland. However, there is greater use of applied manures on grassland (52% for grass <5 years old, 33% for grass of 5 years or more) than on tillage crops (27% cover) and grazed grassland also receives manure as it is grazed.
- Overall phosphate usage on tillage crops declined gradually between 1984 and 1996. Thereafter the decline in rates became more marked until 2009, after which there was some recovery and relative stability until 2018, when a 3 kg/ha decrease to 27 kg/ha was recorded. The overall rate of phosphate on grassland was highest in 1983, at 28 kg/ha, and remained relatively stable between 1984 and 1998. Overall application rates have declined more rapidly between 1999 and 2009, but remained relatively stable since then, with a rate of 8 kg/ha in 2018.
- Overall potash application rates on tillage crops declined slightly between 1983 and 1997, with the rates in the 60-68 kg/ha range. Like phosphate, overall application rates reduced at a greater rate after this time, dropping to their lowest levels of 33 kg/ha in 2009 when fertiliser prices were high. Between 2014 and 2018 overall potash application rates have been apparently stable in the range 35-40 kg/ha.
- Whilst the pattern of use of potash on grassland has been more variable, this has also shown a net decline between 1983 and 2008. Overall potash rates were relatively stable at 31-33 kg/ha during the mid-late 1980s but, since then, tended to decline, although have now achieved some stability in the range of 12-14 kg/ha since 2008.
- It is of note that in Scotland the phosphate and potash application rates on tillage land have largely been maintained, relative to the decline seen in England & Wales, and although there has been a slight reduction in dressing covers and overall rates since 2003, they are relatively stable again on tillage by 2018. However, there was a significant reduction in dressing cover and overall rate of phosphate and potash on grassland between 2004 and 2011, although more recent data indicate a return to stability.

Sulphur

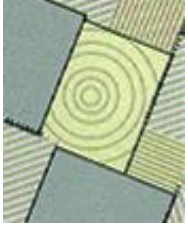
- Sulphur is an essential plant nutrient and is a component of most proteins as well as activating certain enzyme systems. In the past sulphur demand was satisfied through atmospheric deposition but this contribution is now hardly significant. Therefore, there is a need for sulphur application to crops and grass; with crops such as oilseed rape being particularly sensitive to sulphur deficiency. Elemental sulphur can also be used as a soil acidifier for potatoes which can offer some protection against scab although sulphur as a nutrient is usually applied in the sulphate form.
- The Survey has collected detailed information on sulphur (SO_3) fertiliser use since 1993, when only 3-6% of the cereal crop areas and 8% of the oilseed rape area received a sulphur application. By 1997, these proportions had increased markedly to 13-14% for cereals and 30% for oilseed rape. Dressing covers for sulphur generally remained static until 2002, and then increased steadily to 2007. Dressing covers reduced in 2008 and 2009 for all cereals except winter barley. In 2018, sulphur dressing covers in cereals were in the 56%-73% range.
- The 80% dressing cover for winter oilseed rape was 4% higher than observed in 2017, and 10% higher than observed in 2016.
- In 2018, 34% of all crops and grass received a dressing of sulphur; this figure was 62% for tillage crops, 5% higher than in 2017. On tillage crops the overall application rate for sulphur was 35 kg/ha, an increase of 4 kg/ha compared with mean use between 2013-2017 of 31 kg/ha. Applications on grass increased by 1 kg/ha in 2018 at 4 kg/ha, as did dressing cover by 2%, with 12% of grass receiving a sulphur dressing.

Organic manures

- Historically, the Survey has focussed on the application of manufactured fertilisers although in recent years (since 2007) it has also collected information on the use of organic manures. The nutrient levels in organic manures vary according to the type of manure but provide a valuable source of nitrogen, phosphorus and potassium. Where used, applications of manufactured fertiliser can usually be reduced.



- In 2018, around 68% of farms used organic manures on at least one field on the farm. Cattle manure from beef and dairy farms is by far the largest volume of manure type generated in Great Britain. In 2018, 59% of cattle manure and 89% of slurry applications were made to grassland, reflecting the practice of utilising the manure on the farm on which it is produced.
- Fields of winter-sown crops mainly receive a manure dressing in August and September, prior to drilling, whereas spring-sown and grass fields are dressed predominantly in spring and summer.



SECTION A

THE BRITISH SURVEY OF FERTILISER PRACTICE

A1 INTRODUCTION AND STRUCTURE OF THE REPORT

The British Survey of Fertiliser Practice (BSFP) is the primary source of data on organic and inorganic fertiliser use in Great Britain. The results from the Survey are used by the British fertiliser industry, by Government and by the wider agricultural and environmental community. It is essential that the claims made from the Survey are underpinned by an effective methodology. Section A2 describes this methodology, detailing measures undertaken to avoid bias and unreliability. National changes in relative cropping areas are discussed in Section A3.

Section B provides a commentary of recent changes in survey data and longer-term trends. It includes estimates of total fertiliser use which are given in Table B2.6. These data are derived from BSFP findings, confidential trade and sales data and HMRC import/export statistics. Section C presents the main tables of results from the Survey, grouped by geographic coverage. They include major crop groups, grassland, product types and farm types plus information on timing of applications. Figures for estimates of 'total', 'straight' and 'compound' nutrient rates are presented in separate tables. Section D provides an analysis of the application of organic manures and manufactured fertilisers. Section E contains more general information on farm practices such as spreader checking, record keeping and soil testing. Datasets for key data series are available via the Defra website.

A1.1 HISTORY

The survey has been in existence, in various forms, since 1942 for England & Wales. It was extended to Scotland in 1983. Historical data from 1942 to 1997 have been summarised in several reviews spanning this period.[2, 3, 4, 5]

The current methods of survey design and implementation are the result of adaptation of the original design from Rothamsted Experimental Station, undertaken by Edinburgh Data Library at the University of Edinburgh between 1992 and 1998. From 1999 until 2003 design and analysis was undertaken by the Rural Business Unit at the University of Cambridge and from 2004 by Kynetec (formerly GfK Kynetec), who also retained responsibility for conducting the fieldwork. Under government rules, the contract for the survey was retendered in 2018 and Kynetec were awarded the contract again.

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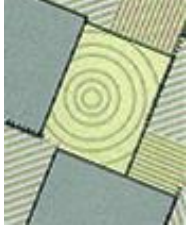
[2] Yates, F. and Boyd, D.A. (1965). Two decades of Surveys of Fertiliser Practice. *Outlook on Agriculture* **5**, 203-210.

[3] Church, B.M. and Lewis, D.A. (1977). Fertiliser use on farm crops, England and Wales: Information from the Survey of Fertiliser Practice, 1942-1976. *Outlook on Agriculture* **9**, 186-193.

[4] Chalmers, A.G., Kershaw, C.D. and Leech, P.K. (1990). Fertiliser use on farm crops in Great Britain: Results from the Survey of Fertiliser Practice, 1969-1988. *Outlook on Agriculture* **19**, 269-278.

[5] Chalmers, A.G., Renwick, A.W., Johnston, A.E. and Dawson, C.J. (1999). Design, development and use of a national survey of fertiliser applications. *Proceedings International Fertiliser Society* **437**.



A2 SURVEY METHODOLOGY

A2.1 SAMPLE

This survey is based on a sample of holdings in order to reduce burdens and manage resources. The Survey sample is selected from the population of agricultural holdings compiled using the June Agricultural Survey (a sample survey conducted annually which records information on farm size, cropping, stocking and employment). In each year, two samples are extracted from the June Survey, one for England & Wales and one for Scotland. Holdings less than 20 hectares in size are excluded from the BSFP sample. These smaller farms account for a significant proportion of the number of holdings but a much smaller proportion of the area of crops and grass. At Great Britain level, holdings below this size account for 7% of the total crop area and 13% of the total grass area. Further information is provided in Appendix 1.3. Using this threshold reduces the number of farms which need to be sampled so reducing burdens and costs without significant adverse impact on the quality of the data. The data for the medium and large farms will be representative of the very small farms which are excluded, meaning that the overall figures are representative of all farms. Standard errors are reported in Appendix 1.1.

In England & Wales, farms are classified into one of three types, cropping, livestock and horticulture. Farms are then further classified into four size groups. In Scotland, a similar number of size groups are used but farms are classified into only two types, mainly cropping and mainly livestock.

These higher-level farm types are based on groupings of the standard UK (and EU) farm classifications (called 'robust' types). Farms with a robust type of 'Other' (robust type 10) are not included in the sample. See A2.7 paragraph 9 for more details.

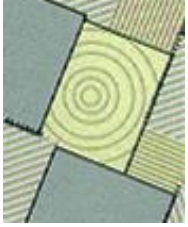
In 2018, the target sample size is 1500 farms a 15% increase (192 respondents) over the target in 2017. This sample size has been designed in order to achieve a statistically representative sample at the national level. The farms are allocated to each of the combinations of farm type and size in proportion to the total area of crops and grass recorded in the June Survey (the latest available data). The exception to this is that in England & Wales where the number of farms in the horticultural group are sampled at a higher rate to ensure sufficient numbers for a robust estimate to be made. See Tables A2.1 and A2.2 for the number of farms selected.

Three reserves are selected for each farm in the main sample. The reserves will be the nearest holding (using the County/Parish/Holding (CPH) number) and of the same farm type and size. The survey is voluntary. Each farm in the main sample is contacted; if for whatever reason a farm is not able to take part in the survey, the first reserve for that farm is then contacted. If this farm also refuses, then the second and if necessary, the third reserve is contacted. If all four farms refuse, then no farm is recruited into the survey.

This resulted in an achieved sample size of 1,303 holdings in 2018. This is a 12% increase on the sample size from last year. More information on response rates is given in Appendix 1, in Tables App 1.2 and App 1.3. It should be noted that the underlying sample design is constructed to measure manufactured fertiliser usage and may not wholly represent the population of farmers using organic manures so some of these data, especially where sample sizes are small, need to be treated with appropriate caution.

To help improve the survey response and to reduce the year-on-year variability, a core of respondents completes the survey each year. This was introduced in 2000 when approximately one third of the sample agreed to stay in the survey for a number of years. Between 2006 and 2007 a review of the panel structure was undertaken to ensure that the proportion of respondents who had participated on the panel for five consecutive years or more constituted no more than 20% of the total sample. In 2018, 60% of the panel had responded in the previous year, a lower percentage of continuing respondents relative to 2017 due to the increase in sample in 2018. The profile of the Survey panel in terms of farm size was 64% >200ha, 63% 100-200ha, 52% 50-100ha and 46% >20-50ha.

The sample responses are raised to be representative of the national population by using the inverse of the achieved sampling fraction (i.e. the number of holdings in the population divided by the achieved sample size in each strata) as the weight. The validity of the derived weights is assessed by calculating a weighted



crop area for the most extensively grown crops by this method and comparing this to the latest available crop area estimates from the June Survey. Standard errors are calculated for key results (major crops) using standard survey statistical methodology (Appendix 1).

Table A2.1 Derivation of the stratified random sample for the 2018 survey, England & Wales

	farm holdings in population in 2018	total crops and grass in 2018 (column %)	notional sampling fraction[1] (%)	target sample size	achieved sample size	achieved sample fraction[2] (%)
England & Wales						
Livestock & mixed						
(Robust types: specialist pigs, specialist poultry, dairy, cattle and sheep (LFA & lowland), mixed)						
crops & grass area						
20-50 ha	17,157	6.6	0.47	81	68	0.40
51-100 ha	14,693	12.1	1.02	149	123	0.84
101-200 ha	10,239	16.2	1.95	200	178	1.74
200+ ha	4,554	18.1	4.91	224	237	5.20
Total livestock & mixed	46,643	52.9	1.40	654	606	1.30
Crops						
(Robust types: cereals, general cropping)						
crops & grass area						
20-50 ha	7,887	3.0	0.47	37	29	0.37
51-100 ha	6,449	5.3	1.01	65	48	0.74
101-200 ha	5,895	9.7	2.03	120	93	1.58
200+ ha	5,900	27.5	5.75	339	291	4.93
Total crops	26,131	45.4	2.15	561	461	1.76
Horticulture						
(Robust type: horticulture)						
crops & grass area						
20-50 ha	776	0.3	0.79	6	7	0.90
51-100 ha	438	0.4	1.73	8	4	0.91
101-200 ha	224	0.4	3.35	7	5	2.23
200+ ha	128	0.6	10.78	14	10	7.81
Total horticulture	1,566	1.6	2.23	35	26	1.66
Total for England & Wales	74,340	100		1,250	1,093	1.47

[1] The *notional sampling fraction* is found by expressing the *target sample size* as a percentage of the *farm holdings in population in 2018*

[2] The *achieved sampling fraction* is found by expressing the *achieved sample size* as a percentage of the *farm holdings in population in 2018*

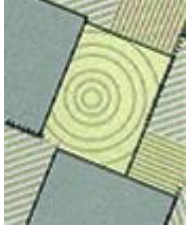


Table A2.2 Derivation of the stratified random sample for the 2018 survey, Scotland

	farm holdings in population in 2018	total crops and grass in 2018 (column %)	notional sampling fraction[1] (%)	target sample size	achieved sample size	achieved sample fraction[2] (%)
Scotland						
Cereal/general						
(Robust types: cereals, general cropping, horticulture)						
crops & grass area						
20-50 ha	746	1.4	0.48	4	4	0.54
51-100 ha	959	4.0	1.03	10	8	0.83
101-200 ha	1,007	8.1	2.02	20	20	1.99
200+ ha	601	11.8	4.92	30	26	4.33
Total cereal/general	3,313	25.4	1.91	63	58	1.75
Livestock & mixed						
(Robust types: specialist pigs, specialist poultry, dairy, cattle and sheep (LFA & lowland), mixed, general cropping;forage)						
crops & grass area						
20-50 ha	4,496	8.3	0.46	21	16	0.36
51-100 ha	3,717	15.1	1.01	38	31	0.83
101-200 ha	2,984	23.3	1.95	58	52	1.74
200+ ha	1,509	27.9	4.63	70	53	3.51
Total livestock & mixed	12,706	74.6	1.47	187	152	1.20
Total for Scotland	16,019	100		250	210	1.31

[1] The *notional sampling fraction* is found by expressing the *target sample size* as a percentage of the *farm holdings in population in 2018*

[2] The *achieved sampling fraction* is found by expressing the *achieved sample size* as a percentage of the *farm holdings in population in 2018*

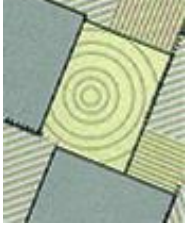
A2.2 DATA COLLECTION

Data collection was undertaken between July 2018 and March 2019 mainly through face to face interview with individual farmers. In addition to collecting information on the fertiliser use on each field, the recorder collected general information on the holding and the use of lime and organic manures and slurries.

Official quantities of nitrogen, phosphate and potash fertiliser consumed annually in the UK since 1966 are shown in Table B2.6. These data are based on BSFP findings, HMRC import/export statistics and confidential trade and sales data which are contributed by AIC industry members who represent approximately 90% of the market. They are compiled by the Agricultural Industries Confederation in conjunction with Defra. Further information is provided in Section A2.5.

A2.3 DATA QUALITY ASSURANCE

Experienced and knowledgeable field staff are used to collect the required information. They make use of information from a variety of different records kept by farmers. Farm diaries are the most common method used on farm. Further information is provided in Section E. At data entry, any omitted responses, figures outside pre-agreed limits or other discrepancies are flagged for checking and followed up, often by contacting the survey respondent. Total crop areas reported under this survey are checked against information held in the June Survey. Additionally, 10% of interviews undertaken will be subject to a call back by an independent reviewer to check responses to individual questions as part of data quality assurance arrangements. The aggregated figures are checked for consistency and trend analysis against historic data and are subject to independent expert peer review.



A2.4 ACCURACY AND RELIABILITY OF THE INFORMATION

The use of sampling in this survey means that there will be certain limitations associated with the data. The sampling methodology used is described more fully in Section A2.1 but essentially uses a random stratified sampling strategy approach, with an element of a core panel, to obtain a representative sample. A response rate of 42% was achieved in 2018. Sampling errors arise because even with careful selection, the sample cannot be exactly representative of all the population. The size of the sampling error will depend on the size of the sample (the larger the sample the smaller the error) but also on the variance of the data. An indication of the extent to which the sample result deviates from the population can be obtained from measuring the standard error associated with the data.

A fuller description of this standard statistical measure with the sampling variation/standard errors for the main arable crops, all tillage crops and all grass are reported in Appendix 1, Table App1.1. These can be used to help judge whether apparent changes may be real or attributable to sampling variation alone. The standard errors are relatively small for the grouped 'all tillage' and 'all crops and grass', and for the main arable crops of wheat, oilseed rape and barley. The standard errors are higher for sugar beet and potatoes where sample sizes (crop area, number of respondents) are smaller.

Figures reported for some of the smaller crops, where the sample size is relatively low, need to be treated with appropriate caution. Sample size information is provided in the tables in Section C and help to provide an indication of reliability. For crops where the sample size is relatively small it is advisable to use data from several years and to assess trends over a longer period rather than just considering year on year changes.

For potatoes in particular, part of the reason for apparent fluctuations in estimates of nutrient application rates may be because fewer numbers of fields of potatoes are covered by the Survey than would be expected from a sample survey. This is because fields of potatoes on respondent's farms may be let out and grown by a third party, so it is not possible to record information in the Survey. Furthermore, fields of potatoes grown by a respondent, but not on his own farm, are not captured in the Survey.

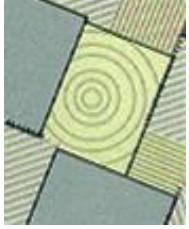
The statistics on the pattern of fertiliser practice reported for Great Britain largely reflect practice in England and Wales due to its greater area of total crops and grassland: about 9.69 million hectares in England and Wales and about 1.88 million hectares in Scotland. The estimates of the average field rates provide a better indication than overall application rates of actual usage levels and also of any annual variation in fertiliser practice on farms. The overall application rate considers both the average field rate and the proportion of the crop area treated, giving an overview of the crop in total. The definitions of the terms used are set out in Section A2.7 of this report.

Additionally, the survey design has been constructed to measure use of manufactured fertilisers, thus may not be wholly representative of manure use. Some of these data, especially where sample sizes are small, need to be treated with caution.

A2.5 METHODOLOGY FOR TOTAL FERTILISER USE

Official quantities of nitrogen, phosphate and potash fertiliser consumed annually in the UK since 1965 are shown in Table B2.6. These data are based on BSFP findings, HMRC import data and confidential trade and sales data which are contributed by AIC industry members who represent approximately 90% of the market. They are compiled by the Agricultural Industries Confederation with input and peer review by an expert group convened by the AIC and in liaison with Defra.

It would be possible to use BSFP data alone to estimate total fertiliser use by taking the average rate for each individual crop and multiplying by the June crop area estimate and summing these to give an overall usage. However, the relatively low coverage of the BSFP survey for some crops, means that the alternative approach of combining BSFP data with trade and sales data provides more robust total usage estimates than using BSFP data alone. This method also considers use on small farms (<20 ha) and use in Northern Ireland.



The AIC survey their relevant members (16 businesses) monthly to collect information on fertiliser deliveries. The BSFP fertiliser statistics published and used in the industry and agricultural sector are by fertiliser year (growing season, July to June), not by calendar year. They are available at the AIC website.

Individual returns are quality assured by trend analysis against historic data and also against the aggregate trend. Any omitted data or anomalous figures outside trend or other pre-defined limits are checked and followed up, usually by contacting the survey respondent.

The AIC also purchase monthly HMRC trade statistics on imports and exports of fertilisers; these data are actively used and scrutinised, and where appropriate challenged by the trade. Twice a year, in December and June, and on an annual basis, aggregated figures for total fertiliser deliveries for the main types of fertiliser are calculated, together with nutrient contents. These are assessed with the import and export figures to derive the base total fertiliser usage figures. The N:P:K ratio from the BSFP survey is compared with the AIC derived figures to confirm the nutrient quantities relative to each other. Further small adjustments may be made based on other confidential information on stocks or non-fertiliser use of imported urea.

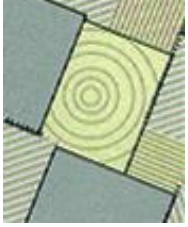
These AIC usage figures are compared to usage figures derived from BSFP and June crop area figures and the relationship between the ratios of N, P and K from both sets of data are checked and compared. Any inconsistencies or anomalies identified in the data are identified and followed up and any necessary corrections are made to ensure comparability and consistency across all data.

Each year the AIC figures are reviewed, and quality assured for credibility and consistency across sources by a group of experts contributing knowledge on production, use and trade. The final agreed aggregated total UK usage figures are subject to independent peer review and checked for consistency and trend analysis, considering known agronomic and market factors.

The total fertiliser use is then split by country. The figures for Northern Ireland are taken from their fertiliser survey and the remaining GB figures are split between England plus Wales and Scotland by applying the proportions derived from the BSFP data. The NI Survey provides data by quarter, amalgamated by calendar year.

A2.6 REVISIONS

The figures presented in this report are finalised. We will provide information on any further revisions we make to the report or the datasets if any inaccuracies or errors occur.



A2.7 DEFINITIONS OF TERMS

1. For the purpose of the Survey, the term **Great Britain** (or **Britain**) is defined to cover England (including the Isle of Wight), Wales (including Anglesey) and mainland Scotland.

2. The **survey year** ran from autumn 2017 to autumn 2018, corresponding to the 2018 season or harvest year. The recording period for fertiliser applications varied for different crop and grass groups on farms of not less than 20 hectares (ha) in size.

3. For the purposes of this survey, a **field** is defined as any single area of land measuring more than 0.2 ha (half an acre) which had a uniform cropping and fertiliser history from autumn 2017. For data collection and processing purposes, separate fields with identical cropping and fertiliser management on the same farm are blocked together as one 'field', to represent the total combined area of those fields. Areas within the same natural boundary receiving different treatments (crops and fertilisers) were recorded separately. Agricultural land which had been set-aside under the Basic Payment Scheme was recorded, but was not included in analyses unless it was used to grow an industrial crop. Fallow land other than set-aside has always been collected by the survey, but is not included in the calculations of this report.

4. In the report, **tillage** is defined as all crops except grass, forestry, glasshouse crops and uncropped land designated as 'set-aside' under the Basic Payment Scheme. **Grass** refers to all forms of grassland which may be grazed, conserved or grown for seed production; rough grazing is excluded.

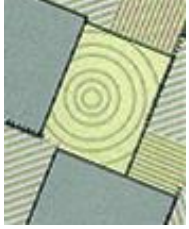
5. The abbreviation **N** is used for nitrogen; **P_2O_5** for phosphate; **K_2O** for potash, **SO_3** for sulphur and **FYM** for all types of organic manure e.g. slurries and solid manures. The phrase **total use** includes both straight (single nutrient) and compound (multi nutrient) products. Fertiliser products containing nitrogen and sulphur only are classified with straight nitrogen. Rates are expressed in terms of the equivalent nutrient content, taking into account the nutrient content in the product used. The nutrient content of the common fertiliser products including the dry matter content and nutrient content of various organic manures used are given in the Nutrient Management Guide (RB209) which is available at https://ahdb.org.uk/nutrient-management-guide-rb209.

6. For each fertiliser nutrient, the **average field rate** (of application) is defined as the sum of nutrient applied divided by the total area of those fields which received any dressing of the nutrient and is calculated based on the sown area rather than the total field area. Crop area without any application of the nutrient is excluded from the calculation of the average field rates of application. These field-specific application rates provide direct evidence on the level and variation in farming practice.

7. The term **dressing cover** is used to describe the proportion of crop area treated with any dressing of the fertiliser nutrient in question and is stated as a percentage.

8. The **overall application rate** is defined as the total quantity of nutrient used, in kilograms (kg), divided by the total extent of crop area, in hectares (ha) (including any areas without application of the nutrient). The application rate is calculated based on the sown area rather than the total field area.

   Any change in an overall application rate is due to a change in either the (actual) field rate of application used on farms, or to a change in the dressing cover, or to changes in both. Arithmetically, overall application rate is equivalent to the result of multiplying the average field rate of application by the proportion of crop area that receives any nutrient dressing. The overall application rate of a nutrient on a crop, by definition, cannot be greater than the average field rate of application.



9. The UK farm type system, which is based on the EU system, aggregates a wide range of defined farm types into ten 'robust' types:
   (1) Cereals
   (2) General Cropping
   (3) Horticulture
   (4) Specialist Pigs
   (5) Specialist Poultry
   (6) Dairy
   (7) Cattle and Sheep (LFA)
   (8) Cattle and Sheep (lowland)
   (9) Mixed
   (10) Other

   Prior to 2004, the UK agricultural departments amalgamated the robust types 'Specialist Pigs' and 'Specialist Poultry' as the single robust type 'Pigs and Poultry'. 2006 was the first year that the BSFP adopted the revised classification following analysis that showed this would not lead to under-representation of either of these farm types through marginalisation. The composition of 'robust' types is presented in greater detail in Appendix 3. The sampling framework outlined in Section A2.1 can be related to robust types as set out below.

   Revisions to the definitions of farm types can be found at the following link:

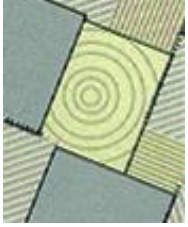
   https://www.gov.uk/structure-of-the-agricultural-industry-survey-notes-and-guidance

   Data presented in tables GB4.1 to GB4.5 are derived from the robust types shown below.

table number	*robust group in table title*	*robust type name*	*robust number*
GB4.1	cereal farms	Cereals	1
GB4.2	general cropping	General cropping and horticulture	2, 3
GB4.3	dairy farms	Dairy	6
GB4.4	other livestock	LFA and lowland grazing livestock	7, 8
GB4.5	mixed farms	Mixed	9

   These robust type groupings are also used in tables D2.3b, D3.2 and E1.2b. Due to the small number of specialist pigs and poultry farms interviewed in the survey, data collected from these robust types have not been presented in any of the tables listed above.

10. Regional analysis of the Survey data for England was classified in two ways in 2018. Table EW4.1a is based on the **Government Office Regions** (GORs) in common with other Defra surveys. Table EW4.1b is based on the former MAFF administrative regions, which were revised in 1996 to take account of changes to county boundaries and nomenclature resulting from the introduction of Unitary Local Authorities between April 1995 and April 1998. These revised regions, termed **BSFP regions**, have been the basis for regional analysis within the survey historically and are detailed in Appendix 2.



A2.8 TYPES OF FERTILISER

Of the 16 essential plant nutrients, the four key ones required in relatively large amounts for crops to achieve their optimal yield potential are nitrogen, phosphorus, potassium and sulphur. Where nutrients are not available in sufficient quantity in the soil, fertiliser products are applied to supply the nutrient needs of the plant. Plant roots take up the nutrients dissolved in the water in the soil. The nutrients must be in the correct chemical form so that they are in a suitable water-soluble form for plants to be able to use them.

There are two broad types of fertiliser. Manufactured fertilisers tend to be relatively concentrated and supply essential nutrients in a mineral form which are immediately available for plant use. The other type is organic fertilisers which can be plant or animal based such as manure, slurry, compost or poultry litter. They are in their natural form or have undergone minimal processing. They are usually less concentrated than manufactured fertilisers, and often the nutrients they contain may need further breaking down in the soil by bacteria and other soil organisms before they are in a form available to plants. The chemical composition can vary greatly, and they tend to be slower acting and less predictable in their action.

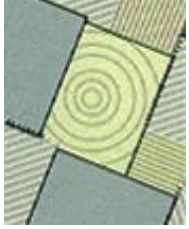
Nitrogen is important for building DNA and proteins in plants. It encourages growth of stems and leaves by promoting protein and chlorophyll. Provided there are adequate supplies of water and other nutrients, nitrogen usually has a large effect on crop growth, yield and quality. Whatever the source, to be usable by plants, it must be in the form of inorganic ammonium or nitrate ions. The main forms of inorganic nitrogen fertilisers are ammonium nitrate, urea, ammonium phosphates and ammonium sulphate.

Phosphorus is essential for photosynthesis and respiration. It promotes early root formation and growth and enhances seed and fruit production. It is also important for energy production and storage. In the context of fertilisers, it is measured and defined as P_2O_5. Phosphate fertilisers include ammonium phosphate and superphosphate. The majority of phosphorus in most soil is in essentially insoluble forms, and unavailable to plants. Phosphorus is very immobile in soil, and the forms that are created and their availability, are dependent on factors such as the soil pH, temperature and moisture. Plant roots take up nearly all phosphorus as either the primary or secondary orthophosphate anion ($H_2PO_4^-$ or HPO_4^{-2}, respectively). Generally, the maximum availability of phosphorus occurs in soils within a pH range of 6.0-7.0.

Potassium contributes to many plant functions apart from managing the water status, including shoot and root tip growth, cell extension, photosynthesis and the reduction of drought and disease stress. It is used in the process of building and transporting starches, sugars and proteins, so is important for grain and fruit yield. Potassium chloride (commonly called muriate of potash) is the most common form of potassium fertiliser used in agriculture. Other forms include potassium sulphate, potassium magnesium sulphate and potassium nitrate. In the context of fertilisers, it is measured and defined as K_2O. It is usually taken up from the soil in greater quantities than the other main fertilisers. Crops which are harvested green such as grass and green vegetables will remove relatively large quantities of potassium from the soil.

Sulphur is an essential plant nutrient. It is a component of most proteins and it activates certain enzyme systems. In the past sulphur demand was satisfied through atmospheric deposition. With the significant decline of sulphur from the atmosphere, there is a need for sulphur application to crops and grass and it is often applied together with nitrogen fertilisers. Crops such as oilseed rape are particularly sensitive to sulphur deficiency and consequently require a relatively high input of sulphur.

More details are provided in the Nutrient Management Guide (RB209). Agriculture and Horticulture Development Board (AHDB). https://ahdb.org.uk/nutrient-management-guide-rb209



A3 GENERAL TRENDS AND ISSUES

A3.1 CROP AREAS AND WEATHER CONDITIONS

Annual changes in relative cropping areas, as well as any changes in fertiliser practice for individual crops, may affect nutrient application rates when aggregated across the main crop groupings. Table A3.1 provides a summary of June Agricultural Survey estimates for areas of individual major crops, crop groupings and total tillage and grassland categories in 2016/17 and 2017/18 and illustrates percentage changes in relative cropping areas over the past five years. There were about 11 million hectares of managed agricultural land in Britain in 2018, of which just under 4.7 million hectares (42%) were cultivated for tillage cropping and the remainder, 6.6 million hectares, were grassland (excluding rough grazing).

The Basic Payment Scheme was introduced in 2015 and replaced the Single Farm Payment, (introduced in 2005 to replace all the previous main Common Agricultural Policy (CAP) payment schemes with a single payment.) To obtain this single payment, farmers must demonstrate compliance with a number of measures designed to protect the environment. One potential impact of cross-compliance, and of environmental schemes, is that margins of fields will remain un-cropped. In this report, as was the case for the last 10 years, all calculations of fertiliser rates have been made based on sown area rather than field size.

Table A3.1 Cropping and grassland areas ('000 ha) in Great Britain, 2017 – 2018

Crops	June 2017 '000s ha	June 2018 '000s ha	% change since 2017	% change since 2013	2018 crop areas as % of total tillage area
Wheat	1,783	1,790	0.4	-9.7	38.3
Barley – winter	416	388	-6.7	2.4	8.3
– spring	740	748	1.1	25.3	16.0
Total cereals[1]	*3,149*	*3,148*	*0.0*	*1.4*	*67.3*
Oilseed rape – total	*560*	*599*	*7.0*	*-20.6*	*12.8*
Oilseed rape – winter	553	592	7.1	-20.3	12.7
Oilseed rape – spring	8	7	-12.5	-41.7	0.1
Sugar beet	111	116	4.5	-3.3	2.5
Potatoes[2]	141	138	-1.8	-4.6	3.0
Linseed	26	25	-3.8	-10.7	0.5
Peas/beans[3]	233	199	-14.6	67.2	4.3
Maize/other fodder	273	304	11.4	37.6	6.5
Vegetables	116	116	0.2	-5.0	2.5
Total tillage[4]	*4,648*	*4,680*	*0.7*	*-0.1*	*100.0*
Bare fallow[5]	241	270	12.0	77.6	
Grassland					2018 grass areas as % of total grass area
Less than 5 years old	1,000	1,020	2.0	-16.6	15.5
5 years and older	5,474	5,551	1.4	7.7	84.5
Total grass[6]	*6,474*	*6,570*	*1.5*	*3.0*	*100.0*
Total crops and grass[7]	*11,122*	*11,250*	*1.1*	*1.7*	

[1] including minor cereals (oats, rye, triticale, mixed corn).
[2] early + maincrop potatoes.
[3] harvested dry for animal consumption or, for peas, human consumption.
[4] including other crops, but not fruit, protected cropping, ornamentals or bare fallow.
[5] Historically including set-aside.
[6] managed grassland, excluding rough grazing.
[7] total tillage + total grassland.
Source: Annual Defra/Scottish Government/Welsh Assembly Government (WAG) June Agricultural Survey data

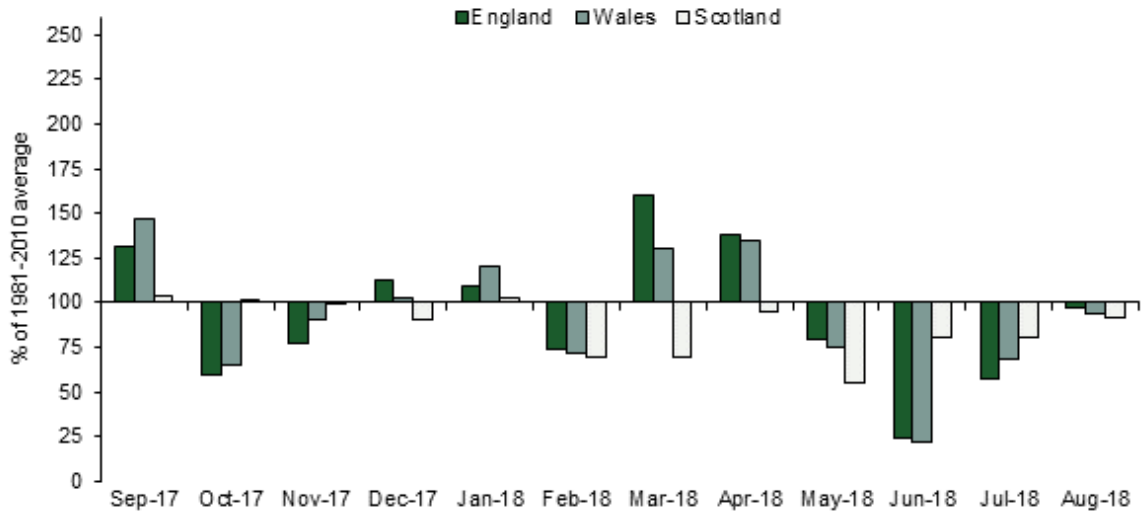
Comparing the 2017 and 2018 cropping years, there appears to be a continuing increase in the area of spring barley, but the overall cereal area is relatively constant. The sugar beet area has recovered some of its losses and the oilseed rape area increased in 2018 despite difficulty with pests on this crop. The forage maize area continues to increase, apparently due to it being used as a feedstock for anaerobic digestion biogas plants.

Unusual seasonal weather conditions can influence fertiliser usage in some years. For example:

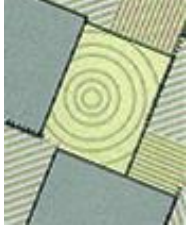
- A very wet (or very dry) autumn might delay the establishment of winter sown crops or alter the ratio of winter to spring sown crops, with their different fertiliser requirements.
- Prolonged wet weather can increase leached losses of some nutrients, particularly nitrogen and sulphur. Weather conditions also affect other aspects of soil chemistry and nutrient availability.
- Adverse weather conditions can disrupt planned activities, such as fertiliser spreading.
- Growing conditions determine plant growth and can therefore affect nutrient requirements.

The autumn of 2017 was rather unsettled. September was a wet month in England and Wales, with October and November drier, particularly in southern parts of the UK. October was warmer than average in all areas, with the first widespread frosts of the autumn coming at the end of the month. December 2017 saw temperatures close to average in most areas and January was warmer than average across England and Wales. February was a cold month with temperatures 1.3 degrees C below average. In December overall the UK had 99% of average rainfall rising to 110% in January. February was drier with 73% of average rainfall for the UK as a whole. The early part of spring was unsettled with short spells of wintry weather and some drier spells. May had a brief cold spell to start with, but in the end was one of the warmest on record. Below average temperatures for much of March and April meant a delayed start to the growing season, but late April warmth mean that the month was warmer than average overall. May was generally drier than average at 69% for the UK as a whole. Most of the summer was dominated by warm and sunny weather. Temperatures were well above average for most of the summer, falling closer to average in August. June and July were drier than average, with the UK at 71% of average rainfall in July, returning to 95% of average in August.

Figure A3.1 Monthly rainfall as a percentage of the long-term average[6]



[6] https://www.metoffice.gov.uk/climate/uk/summaries



SECTION B

COMMENTARY ON FERTILISER USE IN GREAT BRITAIN

This commentary refers to rates of application in mainland Britain of fertilisers containing nitrogen (N), phosphate (P_2O_5), potash (K_2O) and sulphur (SO_3) on tillage crops and grassland (excluding rough grazing). Section B1 of the report covers the five-year period 2014-18. Comments on longer term trends are made in Section B2.

The estimates of overall application rates from the survey relate to usage on farms during the 2017-18 growing season: they form a basis for estimating quantities of fertiliser used in Great Britain. The estimates of the average field rates provide a better indication than overall application rates of actual usage levels and also of any annual variation in fertiliser practice on farms. The overall application rate considers both the average field rate and the proportion of the crop area treated, giving an overview of the crop as a whole. The definitions of the terms used are set out in Section A of this report.

The statistics on the pattern of fertiliser practice reported for Great Britain largely reflect practice in England & Wales due to its greater area of total crops and grassland: about 9.7 million hectares in England & Wales and about 1.9 million hectares in Scotland. In what is otherwise a commentary on Britain as a whole, remarks on the separate regions are only made to highlight particular trends of interest. Readers interested in more detailed recent trends for individual crops in England & Wales or in Scotland can refer to tables presented in Section C. A summary of data from earlier years is available in Chalmers 2001[7] and historic data for the key data series are also available on the Defra web site.

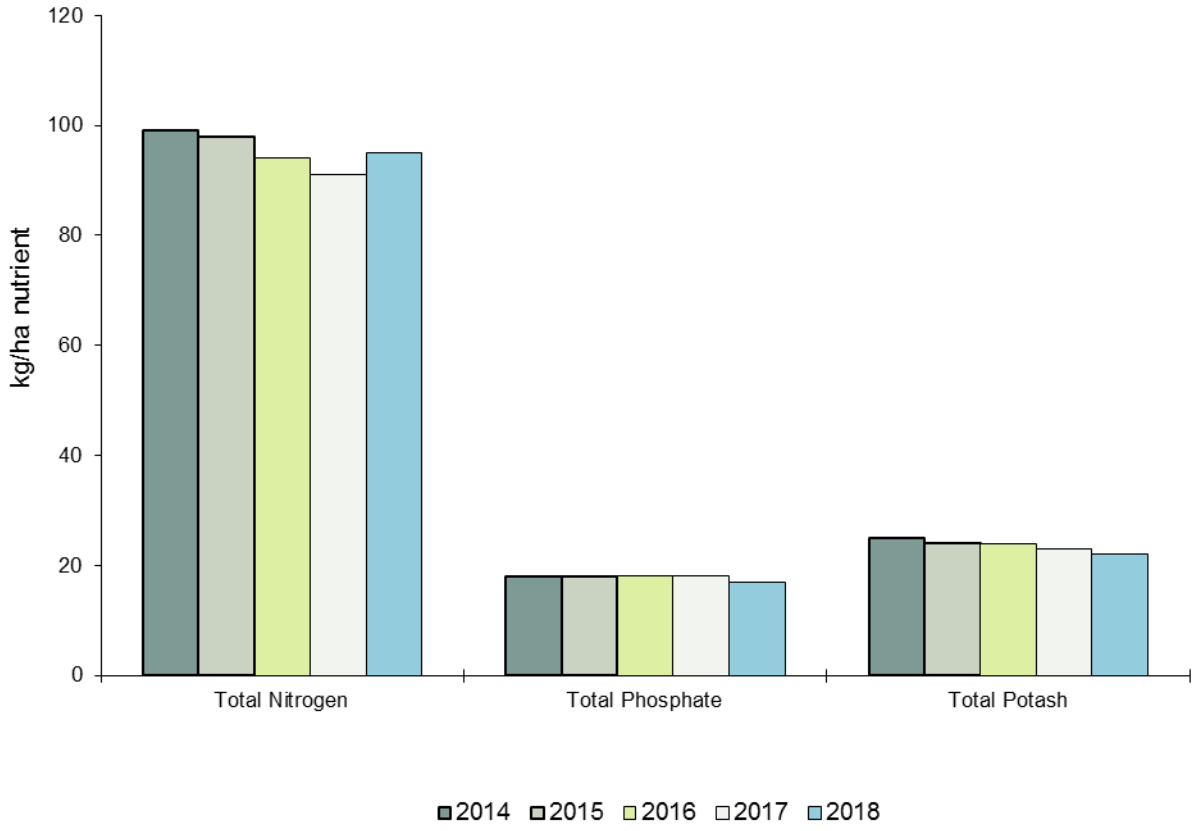
[7] Chalmers A. G. (2001) A Review of fertiliser, lime and organic manure use on farm crops in Great Britain from 1983 to 1997. *Soil Use and Management* **17**, 254-262.

B1 2018 RESULTS FOR GREAT BRITAIN AND CHANGES IN RECENT YEARS

B1.1 OVERVIEW OF FERTILISER USE ON ALL CROPS AND GRASS

Overall rates of total nitrogen, phosphate and potash in Great Britain over the last five years are illustrated in Figure B1.1. The 2018, overall rate of nitrogen for all crops and grass is 95 kg/ha, an increase of 4 kg/ha from 2017. Overall rates for phosphate and potash in 2018 were 17 kg/ha and 22 kg/ha, respectively. Application rates for straight and compound nitrogen applied on crops and grassland are also presented in Table B1.1.

Figure B1.1 Overall fertiliser use (kg/ha) on all crops and grass, Great Britain 2014 – 2018



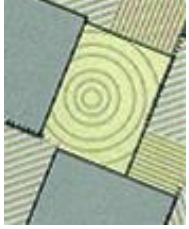
B1.1.1 Nitrogen

All crops and grassland

Table B1.1 Overall nitrogen use (kg/ha), Great Britain 2014 – 2018

Total nitrogen

	tillage crops	*grass*	*all crops and grass*
2014	146	60	99
2015	146	56	98
2016	141	56	94
2017	137	54	91
2018	142	57	95



Straight nitrogen

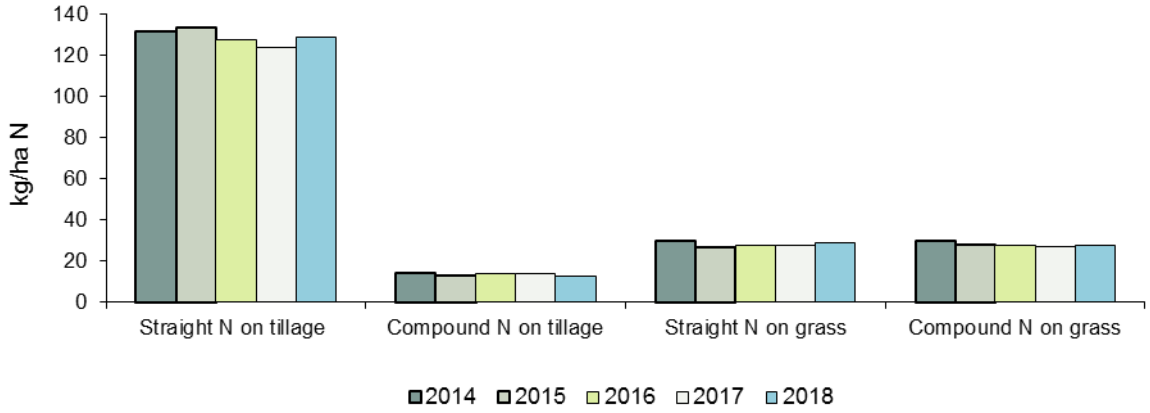
	tillage crops	*grass*	*all crops and grass*
2014	132	30	76
2015	134	27	77
2016	128	28	73
2017	124	28	70
2018	129	29	74

Compound nitrogen

	tillage crops	*grass*	*all crops and grass*
2014	14	30	23
2015	13	28	21
2016	14	28	21
2017	14	27	21
2018	13	28	21

Overall, the 4 kg/ha increase in the rate of nitrogen in 2018 (Figure B1.1) was caused by an average 5 kg/ha and 1 kg/ha increase in use on tillage crops and grass, respectively. When compared with 2017, identical increases in the rate of straight N occurred for tillage crops and grass (Figure B1.2). Whilst the rate of compound N also increased by 1 kg/ha on grass the overall rate of use on all crops and grass continues to be stable at 21-23 kg/ha over the five-year period, 2014-2018.

Figure B1.2 Overall straight and compound nitrogen use (kg/ha), Great Britain 2014 – 2018

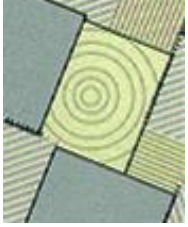


Tillage crops

Straight N continues to be the main source of nitrogen on tillage crops, with the proportion of tillage area receiving a straight nitrogen dressing at 84% in 2018. Compared with 2017, this represents a 3% increase in dressing cover. This, together with an increase 2 kg/ha increase in average field rate to 154 kg/ha, accounted for the 5 kg/ha increase in overall application rate in 2018.

There are a several reasons for the dominance of straight nitrogen over the use of nitrogen in compound fertilisers, with the principal one being the large area of winter-sown crops. As is shown in Table A3.1, about 59% of the tillage area is sown to winter cereals and winter oilseed rape. These crops will receive most of any necessary dressings of phosphate and potash in the seedbed or during the autumn and winter, leaving just the nitrogen (and sulphur) to be applied, usually as more than one dressing, during the busy spring period of active crop growth. The need for precise timing of nitrogen applications has also contributed to a separation of nitrogen applications from those of phosphate and potash for spring-sown crops, especially spring cereals and sugar beet. Thus, a continuing increase in the use of straight nitrogen now applies to most spring-sown crops for agronomic and environmental reasons, as well as for the optimisation of logistics and the efficient use of time in the spring. The exception is maincrop potatoes where compound nitrogen accounted for 87% of dressing cover in 2018.

In the context of this report and elsewhere, straight nitrogen includes nitrogen plus sulphur fertiliser products. The term “straight nitrogen” denotes a nitrogen-containing product without any associated phosphate or potash.



Grassland

In 2018, the overall N application rate on grass increased by 3 kg to 57 kg/ha. Whilst the proportion of grass receiving a dressing of straight N remain unchanged at 27% versus 2017, the average field rate increased by 3 kg/ha to 106 kg/ha. In contrast, the crop area dressed with compound N increased by 2% to 39% and the average field rate declined (by 1%) to 72 kg/ha. Overall this resulted in a small increase (of 1 kg/ha) to 28 kg/ha in the overall application rate compared with 2017.

B1.1.2 Phosphate, Potash and Sulphur

Phosphate

Table B1.2a shows overall phosphate applications for the past five years. Compared with 2017, the overall rate of use on tillage crops decreased to 27 kg/ha, resulting from a 2% decrease in the proportion receiving a dressing (to 48%) and a 2 kg/ha decrease in the average field rate (57 kg/ha). For grassland, whilst the overall rate was unchanged (8 kg/ha), the dressing cover increased by 1% to 38% and the field rate reduced to 22 kg/ha. The five year means for overall phosphate rates for tillage crops and grass were 29 kg/ha and 9 kg/ha, respectively.

Table B1.2a Overall phosphate and potash use (kg/ha), Great Britain 2014 – 2018

Total phosphate

	tillage crops	*grass*	*all crops and grass*
2014	29	10	18
2015	29	9	18
2016	29	9	18
2017	30	8	18
2018	27	8	17

Total potash

	tillage crops	*grass*	*all crops and grass*
2014	39	14	25
2015	38	12	24
2016	39	12	24
2017	37	12	23
2018	35	12	22

Potash

On tillage crops, a decline in the overall potash use was caused by 2% reduction to 48% in dressed cover, the average field rate remaining unchanged at 74 kg/ha. On grassland, dressing cover (38%) and overall rate of use (12 kg/ha) was unchanged (38%) whilst the average rate of use declined 2 kg/ha to 29 kg/ha. The five year means for overall potash rates for tillage crops and grass were 38 and 12 kg/ha, respectively.

Sulphur

Table B1.2b shows overall sulphur (SO_3) applications for the past five years. In 2018, the overall application rate of sulphur on tillage crops and grass crops increased by 1 kg/ha to 35 kg/ha and 4 kg/ha, respectively. For the third consecutive year, the proportion of the tillage area receiving a sulphur dressing also increased in 2018 by 5% to 62%. However, average field rates declined from 60 kg/ha to 57 kg/ha, increasing the overall rate by 1 kg/ha to 35 kg/ha. The overall rate of sulphur on grass increased slightly to 4 kg/ha. The low overall rate of sulphur on grass is caused by a combination of lower dressing cover percentages and average field rates on grass than on tillage crops.

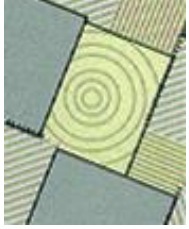


Table B1.2b Overall sulphur use (kg/ha SO_3), Great Britain 2014 – 2018

Total sulphur

	tillage crops	*grass*	*all crops and grass*
2014	31	4	16
2015	31	3	16
2016	31	3	16
2017	34	3	17
2018	35	4	18

B1.2 FERTILISER USE ON MAJOR TILLAGE CROPS

Overall and average field rates of fertiliser application for major tillage crops in Great Britain over the past five years are summarised in Tables B1.3a and B1.3b. Dressing cover percentages for the same period are shown in Table B1.4. More detailed statistics for 2018 are presented in Section C. Longer term trends in overall application rates of nitrogen, phosphate and potash since 1983 are summarised in Section B2.

Small apparent changes in fertiliser use on individual crops should be treated with caution as these estimates are based on a smaller number of farms and fields than the aggregate estimates for all tillage crops. Information on sampling errors, which help in judging whether apparent changes may be real or attributable to sampling variation alone, is given in Appendix 1.

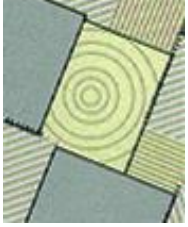


Table B1.3a Overall fertiliser use (kg/ha) on major tillage crops, Great Britain 2014 – 2018

Total nitrogen	winter wheat	spring barley	winter barley	maincrop potatoes [1]	oilseed rape [2]	sugar beet
2014	185	106	144	141	191	96
2015	190	105	147	157	193	98
2016	188	104	146	134	180	97
2017	185	100	149	136	180	92
2018	186	101	143	143	188	82

Straight nitrogen	winter wheat	spring barley	winter barley	maincrop potatoes [1]	oilseed rape [2]	sugar beet
2014	179	70	134	62	186	85
2015	184	72	139	56	185	88
2016	182	71	137	36	171	86
2017	177	70	140	39	170	83
2018	179	74	137	42	179	73

Compound nitrogen	winter wheat	spring barley	winter barley	maincrop potatoes [1]	oilseed rape [2]	sugar beet
2014	6	36	10	79	5	10
2015	6	33	8	102	8	10
2016	6	33	9	98	9	11
2017	6	30	8	97	10	10
2018	7	27	6	101	9	9

Total phosphate	winter wheat	spring barley	winter barley	maincrop potatoes [1]	oilseed rape [2]	sugar beet
2014	27	35	31	91	26	21
2015	28	32	30	111	30	23
2016	27	33	29	110	29	17
2017	29	32	30	114	33	17
2018	26	31	27	101	27	18

Total potash	winter wheat	spring barley	winter barley	maincrop potatoes [1]	oilseed rape [2]	sugar beet
2014	35	46	44	173	27	69
2015	34	44	41	186	31	64
2016	33	46	41	186	29	51
2017	36	43	40	206	31	46
2018	31	42	34	208	27	44

Total sulphur	winter wheat	spring barley	winter barley	maincrop potatoes [1,3]	oilseed rape [2]	sugar beet
2014	32	21	28		63	26
2015	34	21	29		60	26
2016	36	24	34		59	28
2017	40	24	40		64	39
2018	41	25	34		61	25

[1] Figures for maincrop potatoes include second earlies.
[2] Single crop grouping for the combined winter and spring oilseed rape areas.
[3] Sulphur rates on potatoes are not shown as some growers apply additional sulphur to acidify the soil for this crop. **These applications cannot be separated from those intended as a fertiliser nutrient.**

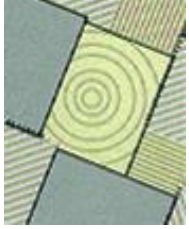


Table B1.3b Average field rates (kg/ha) on major tillage crops, Great Britain 2014 – 2018

Total nitrogen	*winter wheat*	*spring barley*	*winter barley*	*maincrop potatoes* [1]	*oilseed rape* [2]	*sugar beet*
2014	188	110	146	151	192	97
2015	193	107	149	166	193	100
2016	192	106	148	142	183	99
2017	188	103	152	136	181	96
2018	189	104	146	144	190	83

Straight nitrogen	*winter wheat*	*spring barley*	*winter barley*	*maincrop potatoes* [1]	*oilseed rape* [2]	*sugar beet*
2014	186	94	141	106	187	90
2015	189	95	144	118	186	96
2016	190	95	144	101	177	89
2017	184	93	147	91	174	88
2018	185	96	143	99	182	78

Compound nitrogen	*winter wheat*	*spring barley*	*winter barley*	*maincrop potatoes* [1]	*oilseed rape* [2]	*sugar beet*
2014	63	67	57	119	28	48
2015	58	65	58	144	35	47
2016	51	64	61	118	39	50
2017	80	56	67	119	34	42
2018	60	56	50	116	37	49

Total phosphate	*winter wheat*	*spring barley*	*winter barley*	*maincrop potatoes* [1]	*oilseed rape* [2]	*sugar beet*
2014	59	53	58	120	59	61
2015	64	48	55	145	63	59
2016	60	50	56	125	57	48
2017	64	49	60	130	58	40
2018	60	50	61	114	57	41

Total potash	*winter wheat*	*spring barley*	*winter barley*	*maincrop potatoes* [1]	*oilseed rape* [2]	*sugar beet*
2014	74	68	74	226	69	104
2015	73	62	68	230	70	98
2016	71	68	70	213	67	88
2017	75	62	74	226	64	78
2018	70	66	74	218	65	79

Total sulphur	*winter wheat*	*spring barley*	*winter barley*	*maincrop potatoes* [1,3]	*oilseed rape* [2]	*sugar beet*
2014	57	45	50		82	57
2015	55	44	56		83	62
2016	56	42	59		84	49
2017	58	44	60		84	74
2018	56	45	50		77	39

[1] Figures for maincrop potatoes include second earlies.
[2] Single crop grouping for the combined winter and spring oilseed rape areas.
[3] Sulphur rates on potatoes are not shown as some growers apply additional sulphur to acidify the soil for this crop. **These applications cannot be separated from those intended as a fertiliser nutrient.**

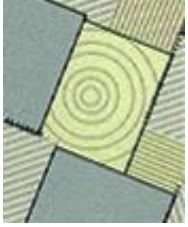


Table B1.4 Dressing cover (% area) on major tillage crops, Great Britain 2014 – 2018

Total nitrogen	*winter wheat*	*spring barley*	*winter barley*	*maincrop potatoes* [1]	*oilseed rape* [2]	*sugar beet*
2014	98	97	99	93	100	98
2015	99	98	99	95	100	98
2016	98	98	99	94	98	98
2017	99	97	98	100	100	96
2018	98	97	98	100	99	98

Straight nitrogen	*winter wheat*	*spring barley*	*winter barley*	*maincrop potatoes* [1]	*oilseed rape* [2]	*sugar beet*
2014	96	75	95	58	99	95
2015	98	75	97	47	99	92
2016	96	75	95	35	97	97
2017	96	75	95	43	98	94
2018	97	77	95	43	98	93

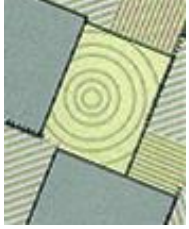
Compound nitrogen	*winter wheat*	*spring barley*	*winter barley*	*maincrop potatoes* [1]	*oilseed rape* [2]	*sugar beet*
2014	10	54	18	66	16	21
2015	10	51	13	70	23	21
2016	11	52	15	83	23	22
2017	10	54	12	82	28	23
2018	11	47	12	87	25	18

Total phosphate	*winter wheat*	*spring barley*	*winter barley*	*maincrop potatoes* [1]	*oilseed rape* [2]	*sugar beet*
2014	45	67	53	76	45	34
2015	44	67	54	76	47	40
2016	45	65	52	88	51	35
2017	46	66	50	88	57	43
2018	42	63	44	88	47	43

Total potash	*winter wheat*	*spring barley*	*winter barley*	*maincrop potatoes* [1]	*oilseed rape* [2]	*sugar beet*
2014	46	68	60	77	39	67
2015	46	70	60	81	44	65
2016	46	67	58	87	43	58
2017	47	70	54	91	48	59
2018	44	64	46	95	41	56

Total sulphur	*winter wheat*	*spring barley*	*winter barley*	*maincrop potatoes* [1]	*oilseed rape* [2]	*sugar beet*
2014	57	47	57	17	76	45
2015	62	48	52	23	73	42
2016	63	56	57	29	70	58
2017	69	55	66	20	76	53
2018	73	56	67	27	80	63

[1] Figures for maincrop potatoes include second earlies.
[2] Single crop grouping for the combined winter and spring oilseed rape areas.



B1.2.1 Nitrogen

In 2018, overall rates of total nitrogen (Table B1.3a) increased marginally for winter wheat and spring barley and by 7 kg/ha and 8 kg/ha for potatoes and oilseed rape, respectively and decreased by 7 kg/ha and 10 kg/ha for winter barley and sugar beet respectively, compared with 2017. Average field rates (Table B1.3b) generally followed a similar pattern. Rates for potatoes and sugar beet tend to be more variable than other arable crops; the standard errors for total nitrogen for the average field rate was 9.1 and 4.5 for potatoes and sugar beet, respectively (see Appendix 1.1.). For all major arable crops dressing cover approached 100% influencing overall nitrogen usage (Table B1.4).

Winter wheat

The field cropping information collected in the Survey enables separate estimates to be made of nitrogen fertiliser use on milling and non-milling (seed/feed) categories of winter wheat (Table B1.5). The difference between the rates applied to milling and non-milling wheats reflect differences in crop husbandry and nitrogen management practices.

Table B1.5 **Average field application rates (kg/ha) of nitrogen on cereals by market use, Great Britain 2014 – 2018**

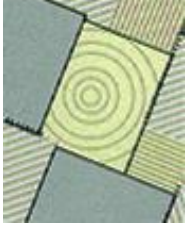
Total nitrogen

	winter wheat		*spring barley*		*winter barley*	
	milling	*non-milling*	*malting*	*non-malting*	*malting*	*non-malting*
2014	208	182	112	106	140	147
2015	213	184	112	101	136	153
2016	206	185	112	100	127	153
2017	204	179	108	97	134	157
2018	207	180	108	99	126	152

Nitrogen fertiliser requirements for winter wheat depend on the intended market end use (grain N levels), as well as upon soil type and the residual soil nitrogen fertility from previous cropping and manure practice Milling varieties are often grown as a second wheat and often receive extra nitrogen, either as a solid dressing or as late foliar urea spray, which is applied to improve the chances of achieving an adequate grain protein content for a milling premium. High yielding feed crops, rather than potentially lower yielding varieties of milling wheat, are often grown as a first winter wheat after a break crop, such as oilseed rape. This is to exploit the potential yield and residual soil nitrogen benefits from the crop rotation, and to avoid any risk of lower grain protein concentrations because of high yield diluting the grain nitrogen concentration for first wheat in the rotation. The average field application rate on milling wheat increased by 3 kg/ha to 207 kg/ha, similar to that recorded in 2016, and the rate on non-milling wheat by 1 kg/ha compared with 2017. The non-milling crop continues to dominate the wheat crop area (Table B1.6) with 66% of the crop year (5-year mean: 68%).

Table B1.6 **Percentage distribution (% crop area) of cereal crop areas by market use, Great Britain 2014 – 2018, as estimated from the Survey**

	winter wheat		*spring barley*		*winter barley*	
	milling	*non-milling*	*malting*	*non-malting*	*malting*	*non-malting*
2014	25	75	57	43	36	64
2015	30	70	55	45	23	77
2016	34	66	53	47	19	81
2017	36	64	54	46	22	78
2018	34	66	57	43	21	79



Spring barley

Overall use of total nitrogen on spring barley increased by 1 kg/ha to 101 kg/ha. By comparison, the five-year mean (2014-18) is 103 kg/ha. The rate of straight N increased by 4 kg/ha to 74 kg/ha whilst the overall application rate of compound N decreased by a further 3 kg/ha compared with 2017 to 27 kg/ha. The average field rate for straight N followed a similar pattern whereas the rate for compound N was identical to that in 2017 at 56 kg/ha. The percentage of the spring barley area receiving a dressing of straight N increased by 2% to 77%, whereas dressing cover with compound N decreased by 7% to 47% (Table B1.4).

Further analysis of the data by crop type (Table B1.5) shows the average rate applied to malting was unchanged at 108 kg/ha but increased by 2 kg/ha to 99 kg/ha for non-malting crops. In the case of the spring malting crop the five-year mean is 110 kg/ha, whilst for non-malting crops the mean is 100 kg/ha.

Estimated nitrogen rates on spring barley crops has been consistently slightly higher on malting than non-malting crops. This slightly higher use of nitrogen on malting than non-malting crops may seem anomalous, since lower rates of nitrogen are recommended for malting barley, under the same conditions of soil type and nitrogen fertility level, than for the feed varieties of barley. This recommendation is made to avoid the risk of high grain nitrogen content, which could adversely affect subsequent malt quality. However, malting crops are normally grown on soils with low nitrogen fertility and the average field rates of nitrogen reported for malting varieties in Table B1.5 are generally in the range recommended for mineral soil types with low nitrogen residues (70 - 120 kg/ha)[8]. Feed crops on the other hand are often grown within mixed rotations, which tend to have a higher soil nitrogen fertility, with consequently less need for nitrogen fertiliser.

The proportion of spring barley grown for malting has fluctuated during the last five years (Table B1.6). The mean for the period 2014-18 is 55%, with the lowest proportion recorded in 2013 at 51%.

Winter barley

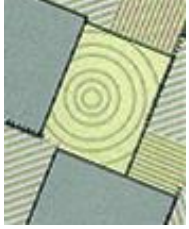
In the period 2002-08 overall total nitrogen use on winter barley decreased from year to year, down to 132 kg/ha in 2008. This rate then increased albeit with some fluctuations to 2017, but in 2018 the rate decreased by 6 kg/ha to 143 kg/ha. The rate of straight nitrogen, which is used on 95% of the winter barley crop area, decreased by 3 kg/ha to 137 kg/ha in 2018, equalling the five year (2014-18) mean, whilst the compound nitrogen rate decreased by 2 kg/ha to 6 kg/ha.

As with the spring sown crop, nitrogen requirements for winter barley depend on a range of agronomic factors, included the intended market for the grain. Average field rates of nitrogen on malting crops decreased by 8 kg/ha over 2017 to 126 kg/ha, or 7 kg/ha below the five-year mean of 133 kg/ha. For non-malting crops, the average field rate also decreased by 4 kg/ha to 152 kg/ha (Table B1.5), equalling the five-year average.

The higher application rates of nitrogen (five-year mean of +20 kg/ha) on non-malting, compared to malting winter barley crops, reflect typical agronomic practice, and the gap between malting and non-malting crops was comparable with previous years. The majority of winter barley crops (both feed and malting) are grown in England in arable rotations, usually after a previous cereal crop, when the soil nitrogen fertility status is low. Higher nitrogen rates are recommended for feed crops.

The proportion of crop area grown for malting was 21% in 2018, 1% lower than 2017, with the five-year mean calculated as 24%. (Table B1.6).

[8] Anon. (2018). Nutrient Management Guide (RB209). Agriculture and Horticulture Development Board (AHDB). https://ahdb.org.uk/nutrient-management-guide-rb209



Maincrop potatoes

Total nitrogen use on maincrop potatoes has fluctuated over the last five years. Part of the reason for recent apparent fluctuations in the estimates of nutrient application rates may be because proportionally fewer fields of potatoes are covered by the Survey. This is because fields of potatoes on respondent's farms may be let out and grown by a third party, so it is not possible to record information in the Survey. Furthermore, fields of potatoes grown by a respondent, but not on the farm being surveyed, are not captured in the Survey.

In 2018, the overall rate of nitrogen increased by 7 kg to 143 kg/ha, slightly above the five-year mean of 142 kg/ha (Table B1.3a). This increase resulted from a change in the average field rates of straight N which increased 8 kg/ha to 99 kg/ha, dressing cover being unchanged at 43% of crop area (Table B1.3b, B1.4), compared to the previous year. Overall rates for compound N increased by 4 kg/ha to 101 kg/ha, whereas average rates decreased 3 kg/ha to 116 kg/ha and the dressed area increased by 5% to 87% (5-year mean 78%) compared with 2017.

Oilseed rape

In 2018, overall total nitrogen and average field rate use on oilseed rape, as a combined category for both the autumn and spring sown crop, increased by 8 kg/ha (to 188 kg/ha) and 3 kg/ha (to 37 kg/ha), respectively; five-year means of 186 kg/ha and 188 kg/ha, respectively (Table B1.3a, B1.3b). Whilst crop area dressed with straight N remain unchanged, and decreased by 3% for compound N (Table B1.4), the changes in overall N of 9 kg/ha (to 190 kg/ha) was caused by increases in average field rates for straight N and compound N of 8 kg/ha and 3 kg/ha, respectively (Table B1.3b).

A more detailed breakdown of the data for oilseed rape (Table B1.7) shows that the average field rate of nitrogen on winter oilseed rape increased by 10 kg/ha to 191 kg/ha. Compared with the previous year, the rate for the spring crop decreased by a further 25 kg/ha to 91 kg/ha. In a normal year spring rape represents only about 1-2% of the total oilseed rape area, so the average field rate for total nitrogen on these spring-sown crops should be treated with extreme caution.

Table B1.7 Average field application rates of nitrogen (kg/ha) on winter and spring oilseed rape, Great Britain 2014 – 2018

Total nitrogen (kg/ha)

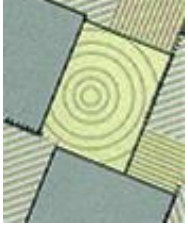
	winter oilseed rape	*spring oilseed rape**
2014	192	154
2015	193	115
2016	184	132
2017	181	116
2018	191	91

* Spring oilseed rape data are more variable due to smaller crop area

.

Sugar beet

The overall nitrogen use on sugar beet decreased by 10 kg/ha in 2018 to 82 kg/ha, considerably below the five-year mean (93 kg/ha). Use of straight N, by far the most widely used form of nitrogen in this crop (five-year mean: 94% of the dressed area), was down 10 kg/ha to 73 kg/ha (Table B1.3a, B1.4). The average field rate of straight N decreased to 78 kg/ha, whereas the average rate of the less used compound N increased by 7 kg/ha to 49 kg/ha (Table B1.3b) similar to that recorded in 2016.



B1.2.2 Phosphate and Potash

Phosphate

In 2018, the overall rate of phosphate decreased on all the major crops, especially potatoes (Table B1.3a). Except spring barley, winter barley and sugar beet, where the average field rate increased by 1 kg/ha, average field rates for other crops decreased by 1 to 16 kg/ha, the latter for maincrop potatoes (Table B1.3b). In 2018, the overall phosphate rate declined 3 kg/ha to 27 kg/ha (Table B1.2a), below the 2014-18 five-year average (29 kg/ha). Despite slight falls in 2018, the evidence still generally suggests that a declining trend in overall usage of phosphate (and potash), noted since the late 1990s, may have ceased (Table B1.2a, Figure B2.4).

Potash

Overall, potash use on tillage crops decreased in 2018 by 2 kg/ha, to 35 kg/ha. Whilst this is below the 2014-2018 five-year average of 38 kg/ha (Table B1.2a) the decline was due not to a change in the average application rate which remained at 74 kg/ha for all tillage, but to a fall in the proportion of the crop area receiving a dressing from 50% to 47% (Section C, GB1.1). For major tillage crops, the overall rate of potash decreased by 1 to 6 kg/ha (Table B1.3a) as did the dressed area (Table B1.4). The decrease in overall potash use in winter wheat and oilseed rape is linked to a decline in average field rates in these crops (Table B1.3b). For winter barley the average field rate was unchanged compared to 2017 and increased by 1 and 4 kg/ha for sugar beet and spring barley, respectively. As noted for nitrogen, part of the reason for recent apparent fluctuations in nutrient application rates for potatoes may be because of the many fields which are grown by third parties and are not recorded, thereby reducing the robustness of the estimates.

B1.2.3 Sulphur

The Survey has collected detailed information on sulphur fertiliser use since 1993, when only 3-6% of the cereal crop area and 8% of the oilseed rape area received an application of sulphur. By 1997, the proportions of these crop areas which were treated with sulphur had increased markedly to 13-14% for cereals and 30% for oilseed rape. Dressing covers for sulphur then generally remained fairly static until 2002 when the areas increased steadily until 2007. 2008 saw reductions in dressing covers for cereals at 35%-43%, a pattern that continued in 2009, except in winter barley where sulphur dressing cover increased to 45%. In 2018, sulphur dressing covers on cereals were lower than the previous year in the 43-53% range (Table B1.8). The average field rates for tillage crops were also lower than in 2017.

Table B1.8 Dressing cover (% area) and average application rate (kg/ha SO_3) of sulphur on cereals and oilseed rape, Great Britain 2014 – 2018

Dressing cover (%)

	winter wheat	*winter barley*	*spring barley*	*oilseed rape*	*all tillage*
2014	57	57	47	76	51
2015	62	52	48	73	52
2016	63	57	56	70	54
2017	69	66	55	76	57
2018	73	67	56	80	62

Average field rate (kg/ha SO_3)

	winter wheat	*winter barley*	*spring barley*	*oilseed rape*	*all tillage*
2014	57	50	45	82	60
2015	55	56	44	83	59
2016	56	59	42	84	58
2017	58	60	44	84	60
2018	56	50	45	77	57

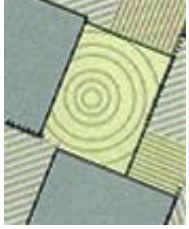


Table B1.9 shows the proportion of major tillage crops receiving a sulphur dressing in England & Wales compared with Scotland. Historically, a higher proportion of cereal and oilseed rape crops were treated with sulphur in Scotland than in England & Wales. This may have been due to the greater awareness of the risk of sulphur deficiency in Scotland due to historically extremely low levels of atmospheric sulphur deposition, compared to most other areas of Britain. Dressing covers are now much more closely aligned, although cover in Scotland still tends to be greater than in England and Wales. Spring barley might appear to be an exception, with this possibly being due to the manure which is more commonly applied to this crop in Scotland being assumed to satisfy the sulphur demand. 43% of Scottish spring barley received manure in 2018 compared with 21% in England and Wales.

Table B1.9 Dressing cover (% area) of sulphur on cereals and oilseed rape by region, 2014 – 2018

		winter wheat	*winter barley*	*spring barley*	*oilseed rape*
England & Wales	*2014*	56	58	50	77
	2015	61	51	53	82
	2016	65	56	57	71
	2017	69	66	59	77
	2018	72	66	58	79
Scotland*	*2014*	61	46	43	69
	2015	65	58	41	72
	2016	49	63	54	59
	2017	68	64	49	66
	2018	79	80	53	88

* Greater variability in the Scottish data may be due to smaller sample sizes.

B1.3 FERTILISER USE ON GRASSLAND

Overall fertiliser usage on grassland in Great Britain in the last five years, as previously shown (Tables B1.1 and B1.2), is summarised again in Table B1.10. The corresponding estimates of dressing cover and average field rates for each nutrient are shown in Table B1.11.

Table B1.10 Overall fertiliser use (kg/ha) on grassland, Great Britain 2014 – 2018

	straight nitrogen	*compound nitrogen*	*total nitrogen*	*total phosphate*	*total potash*	*total sulphur*
2014	30	30	60	10	14	4
2015	27	28	56	9	12	3
2016	28	28	56	9	12	3
2017	28	27	54	8	12	3
2018	29	28	57	8	12	4

In 2018, dressing cover for total nitrogen on grass increased by 3% to 59% (Table B1.11). The long-term trend has been for declining dressing cover for total nitrogen and the proportion receiving a dressing is the same as the previous low level reported in 2009. As in previous years, a higher proportion of grass received compound N as opposed to straight N, but the average field rate for compound N was 68% of the straight N rate of 106 kg/ha.

The overall application rates for phosphate and potash were unchanged at 8 kg/ha and 12 kg/ha, respectively (Table B1.10).

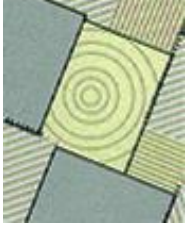


Table B1.11 Dressing cover (%) and average application rate (kg/ha) of fertiliser on grassland, Great Britain 2014 – 2018

Dressing cover (%)

	straight nitrogen	*compound nitrogen*	*total nitrogen*	*total phosphate*	*total potash*	*total sulphur*
2014	29	41	62	41	43	11
2015	27	41	60	41	42	10
2016	27	39	58	38	39	9
2017	27	37	56	37	38	10
2018	27	39	59	38	40	12

Average field rate (kg/ha)

	straight nitrogen	*compound nitrogen*	*total nitrogen*	*total phosphate*	*total potash*	*total sulphur*
2014	104	72	96	24	32	33
2015	100	70	93	22	30	31
2016	105	71	97	23	31	35
2017	103	73	97	23	31	35
2018	106	72	96	22	29	37

The proportion of the grass area receiving a straight nitrogen dressing was the same as in 2015 at 27% and the compound N dressing cover increased by 2% to 39% in 2018 (Table B1.11). The dressing cover percentage of phosphate and potash on grass increased by 1% and 2% to 38% and 40%, respectively. The five-year means are 39% and 40%, respectively. The sulphur dressing cover increased to a high of 12%.

In 2018, the average field rates for phosphate and potash both declined by 1 kg/ha and 2 kg/ha to 22 kg/ha and 29 kg/ha, respectively while the sulphur rate rose by 2 kg/ha to 37 kg/ha, the highest rate yet recorded and 3 kg/ha above the 5-year average rate.

B1.3.1 Nitrogen

Cutting and grazing management

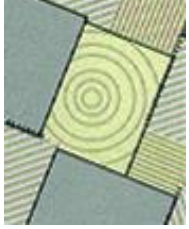
Fertiliser requirements for grassland vary according to the type of livestock enterprise, intensity of production and the associated cutting and grazing regimes used for sward management. Fertiliser use on dairy, other livestock and mixed farms in Great Britain in 2018 are presented in Section C. The Survey estimates of annual distributions of the total grassland area between grazing and cutting management regimes since 2014 are summarised in Table B1.12. These should not be taken as authoritative national estimates of grassland utilisation, as the Survey is designed to estimate fertiliser application rates, not to derive accurate crop areas, although these may still be the best available estimates of grassland utilisation by area.

Table B1.12 Grassland utilisation (% of grass area), Great Britain 2014 – 2018

	grazed [1]	*silage* [2]	*hay* [2]
2014	88	29	11
2015	90	29	11
2016	92	28	9
2017	93	29	10
2018	93	31	10

Nearly all grassland is grazed at some stage during the season (Table B1.12) and the proportion in 2018 is slightly above the five-year mean of 91%.

[1] May also be cut
[2] May also be grazed



Fertiliser usage for the different cutting and grazing categories is presented in Table B1.13. The differences in average field rates for nitrogen illustrate the influence of grassland management practice on fertiliser inputs with rates being lowest generally in grass cut for hay, higher in grass which is grazed and higher still in grass cut for silage.

Table B1.13 Nitrogen application rates (kg/ha) by grassland utilisation, Great Britain 2014 – 2018

Total nitrogen

	overall application rate				*average field rate*		
	grazed [1]	*silage* [2]	*hay* [2]		*grazed* [1]	*silage* [2]	*hay* [2]
2014	54	104	44	*2014*	90	124	76
2015	51	100	37	*2015*	87	121	75
2016	52	103	38	*2016*	93	127	75
2017	52	100	44	*2017*	94	126	83
2018	53	104	50	*2018*	91	126	79

Straight nitrogen

	overall application rate				*average field rate*		
	grazed [1]	*silage* [2]	*hay* [2]		*grazed* [1]	*silage* [2]	*hay* [2]
2014	26	52	22	*2014*	98	119	79
2015	24	49	17	*2015*	95	114	76
2016	26	53	20	*2016*	102	119	93
2017	26	51	27	*2017*	100	120	91
2018	25	55	18	*2018*	100	125	84

Compound nitrogen

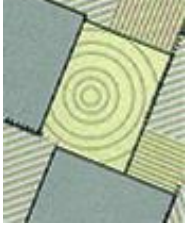
	overall application rate				*average field rate*		
	grazed [1]	*silage* [2]	*hay* [2]		*grazed* [1]	*silage* [2]	*hay* [2]
2014	28	52	22	*2014*	70	94	64
2015	26	51	21	*2015*	67	91	64
2016	26	50	18	*2016*	69	95	55
2017	26	49	17	*2017*	71	96	64
2018	28	48	33	*2018*	71	95	72

In 2018, the overall total nitrogen rates increased for all grass categories; grazed by 1 kg/ha to 53 kg/ha, silage by 4 kg/ha to 104 kg/ha, and hay by 6 kg/ha to 50 kg/ha. Rates reported on grass cut for hay need to be treated with caution due to the relatively small numbers of grass fields being managed this way (Table B1.13).

The average field rates of straight nitrogen were unchanged for grazed, increased by 5 kg/ha for silage and decreased by 7 kg/ha for hay in 2018. The five-year means for overall straight nitrogen rate are 25, 52 and 21 kg/ha for grazed grass, silage and hay, respectively. In contrast, compound nitrogen average rates remained static for grazed grass, decreased by 1 kg/ha for silage and increased by 8 kg/ha for hay. The five year means for the overall compound nitrogen rate are 27, 50 and 22 kg/ha for grazed grass, silage and hay, respectively.

The fall in nitrogen use over the long term on grassland until 2008 is likely to be related in part to decreases in ruminant livestock numbers which may have reduced herbage production requirements. Since that date, the rate of nitrogen application to grassland has remained relatively constant, with the 2018 overall nitrogen rate being 57 kg/ha, the same as the 10-year average.

[1] May also be cut
[2] May also be grazed



B1.3.2 Phosphate and Potash

Phosphate and potash requirements for grassland depend, as for nitrogen, on the system of sward management with overall application and field rates for both phosphate and potash being higher in grass cut for silage.

Table B1.14 Phosphate and potash use (kg/ha) by grassland utilisation, Great Britain 2014 – 2018

Total phosphate

	overall application rate			*average field rate*		
	grazed [1]	*silage* [2]	*hay* [2]	*grazed* [1]	*silage* [2]	*hay* [2]
2014	9	15	9	23	28	27
2015	8	15	8	21	27	23
2016	8	14	8	22	28	23
2017	8	14	8	23	28	27
2018	8	14	11	22	28	23

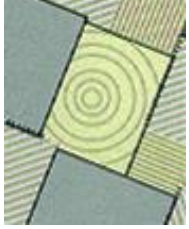
Total potash

	overall application rate			*average field rate*		
	grazed [1]	*silage* [2]	*hay* [2]	*grazed* [1]	*silage* [2]	*hay* [2]
2014	12	26	14	29	44	36
2015	11	25	11	27	42	33
2016	11	24	9	29	46	27
2017	11	23	8	29	43	29
2018	11	23	14	28	41	31

In 2018, the overall phosphate rate was unchanged for grazed and silage but increased by 3% for hay. The corresponding five-year means for grazed grass, silage and hay were 8, 14 and 9 kg/ha, respectively. The average field rate for silage was unchanged in 2018, decreased by 1% for grazed and by 4% for hay. Overall, the long-term decline in application rates on grazed grass appears to have levelled out.

Overall potash rates in 2018 remained static for grazed grass (11 kg/ha since 2015) and silage but increased by 6 kg/ha to 14 kg/ha on grass cut for hay. The average field rate of potash decreased by 1 kg/ha and 2 kg/ha on grazed grass and silage, respectively and again increased by 2 kg/ha on grass cut for hay.

[1] May also be cut
[2] May also be grazed



B1.3.3 Sulphur

In 2018, 12% of the total grassland area received a sulphur dressing (mean 10% for 2014-18 period). Of this, a higher proportion of grassland cut for silage is treated with sulphur compared to grazed grass or grass cut for hay (Table B1.15). Estimated dressing covers have fluctuated slightly in the past five years, with between 2 and 3% increases for all grass categories in 2018.

The significant proportion of heavier textured soil types which occur in the main grassland farming areas, together with assumed inputs of sulphur from slurry applications to silage fields, are among possible influences on the consistently low level of sulphur fertiliser use on grassland.

Table B1.15 Sulphur use on grassland, Great Britain 2014 – 2018

Dressing cover (%)

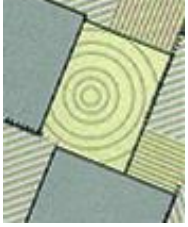
	grazed [1]	*silage* [2]	*hay* [2]	*all grass*
2014	10	18	11	11
2015	9	17	6	10
2016	9	16	5	9
2017	9	16	9	10
2018	11	19	12	12

Average application rate per year (kg/ha SO_3)

	grazed [1]	*silage* [2]	*hay* [2]	*all grass*
2014	32	34	28	33
2015	30	34	37	31
2016	35	37	41	35
2017	33	41	42	35
2018	37	41	29	37

Estimated average field rates of sulphur application peaked for grazed and silage grass in 2007 at 45 kg/ha and 47 kg/ha, respectively and for hay in 2008 at 47 kg/ha. In 2018, compared to 2017 values, average field rates increased for grazed by 4 kg/ha, remained static for grass cut for silage and decreased by 13 kg/ha for hay to 29 kg/ha. The five-year means are 33, 37 and 35 kg/ha SO_3 for grazed, silage and hay grassland, respectively (Table B1.15). Note that the average application rates in Table B1.15 are annual totals, not rates per cut.

[1] May also be cut
[2] May also be grazed



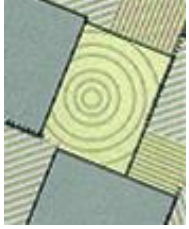
B2 LONGER TERM TRENDS FOR GREAT BRITAIN

B2.1 NITROGEN USE

The British Survey of Fertiliser Practice commenced as an integrated British survey in 1992. Before then, the annual Survey of Fertiliser Practice had been completed separately for England & Wales and for Scotland. Some survey statistics from those earlier surveys have since been collated to report an aggregated series for nutrient use in Great Britain since 1983, when the survey in Scotland started.

Table B2.1 **Total overall nitrogen application rates (kg/ha), England & Wales 1978 - 2018 and Scotland and Great Britain 1983 – 2018**

	tillage crops			*grass*			*all crops and grass*		
	England & Wales	*Scotland*	*Great Britain*	*England & Wales*	*Scotland*	*Great Britain*	*England & Wales*	*Scotland*	*Great Britain*
1978	105	-	-	113	-	-	114	-	-
1979	113	-	-	117	-	-	121	-	-
1980	121	-	-	119	-	-	120	-	-
1981	135	-	-	125	-	-	130	-	-
1982	141	-	-	123	-	-	132	-	-
1983	154	113	149	125	131	126	139	124	136
1984	162	121	157	132	127	131	147	125	143
1985	161	131	157	131	130	131	146	130	144
1986	156	119	152	135	120	132	146	120	142
1987	160	139	157	133	116	130	147	125	143
1988	149	125	146	116	132	119	133	129	132
1989	150	128	147	127	111	124	139	118	136
1990	149	131	147	132	116	129	141	122	138
1991	154	128	151	133	111	129	143	117	139
1992	147	125	145	104	111	106	126	116	125
1993	137	130	137	112	114	112	124	119	124
1994	149	128	147	117	112	116	133	118	130
1995	151	140	149	119	114	118	134	124	132
1996	148	122	145	118	100	115	133	108	128
1997	151	134	149	123	124	123	137	128	136
1998	146	131	144	107	119	109	127	124	126
1999	143	126	141	108	117	110	126	121	125
2000	154	135	149	95	110	99	124	118	123
2001	144	147	145	90	113	94	114	127	116
2002	153	143	150	85	105	89	116	119	117
2003	152	135	149	79	102	83	112	114	113
2004	150	133	148	73	93	77	108	107	108
2005	149	132	147	72	84	75	109	102	108
2006	145	119	142	69	86	72	106	98	104
2007	148	119	144	64	72	65	106	89	103
2008	141	109	137	52	66	55	97	81	94
2009	140	111	137	54	69	57	98	84	95
2010	149	113	145	62	64	63	105	80	101
2011	150	119	146	57	59	57	103	79	99
2012	147	121	144	54	60	55	98	79	95
2013	138	124	136	57	68	59	95	87	94
2014	149	127	146	58	67	60	101	87	99
2015	149	130	146	53	67	56	100	89	98
2016	145	118	141	53	69	56	96	86	94
2017	141	118	137	51	68	54	92	86	91
2018	145	118	142	54	67	57	97	85	95



The aggregated data for Great Britain follow a similar pattern to that observed for England & Wales because a large proportion of both the tillage and grassland areas in Britain are in England & Wales. Overall total nitrogen rates for tillage crops and grassland in England & Wales since 1974 and in Scotland and Great Britain since 1983 are summarised in Table B2.1. The data for Great Britain are presented graphically in Figure B2.1. Overall, nitrogen use has been consistently higher on tillage crops than on grassland ever since the British survey started.

Apart from a dip in 1992-93 due to major changes in the CAP, the overall rate of total nitrogen on tillage land stayed within the range 140-150 kg/ha with some wider fluctuations caused by factors such as changes in the crop mix and area or changes in nitrogen applications to specific crops (see Figure B2.3). The estimate for 2018 falls inside this range, with the overall rate of nitrogen on tillage crops for Great Britain being 142 kg/ha. The low rate recorded in 2013 was related to the weather and subsequent cropping patterns for that year.

Nitrogen levels applied to grassland have always been lower than tillage crops. From 1983 until 1999, the difference was fairly constant, averaging 27 kg/ha. Since 2000, the overall applications made to grass fell consistently relative to those made to tillage crops, but during the last five years the average difference in overall nitrogen rate has remained relatively constant at 86 kg/ha. The recent decline in cattle numbers is thought to have contributed to this reduction in the nitrogen rate on grassland, possibly in conjunction with some improvement in manure use efficiency, encouraged by a higher nitrogen fertiliser price.

Data on straight and compound nitrogen for Great Britain are not available for the period 1983-91 when the survey in Scotland was separate from the one in England & Wales. Figure B2.2 shows the overall rates of straight and compound nitrogen on tillage crops and grassland. Most of the total nitrogen fertiliser used on tillage crops each year has been applied in straight form. On grassland, since 2009, the overall rates of straight and compound nitrogen have been similar.

Figure B2.1 Overall application rates (kg/ha) of total nitrogen on tillage crops and grassland, Great Britain 1983 – 2018

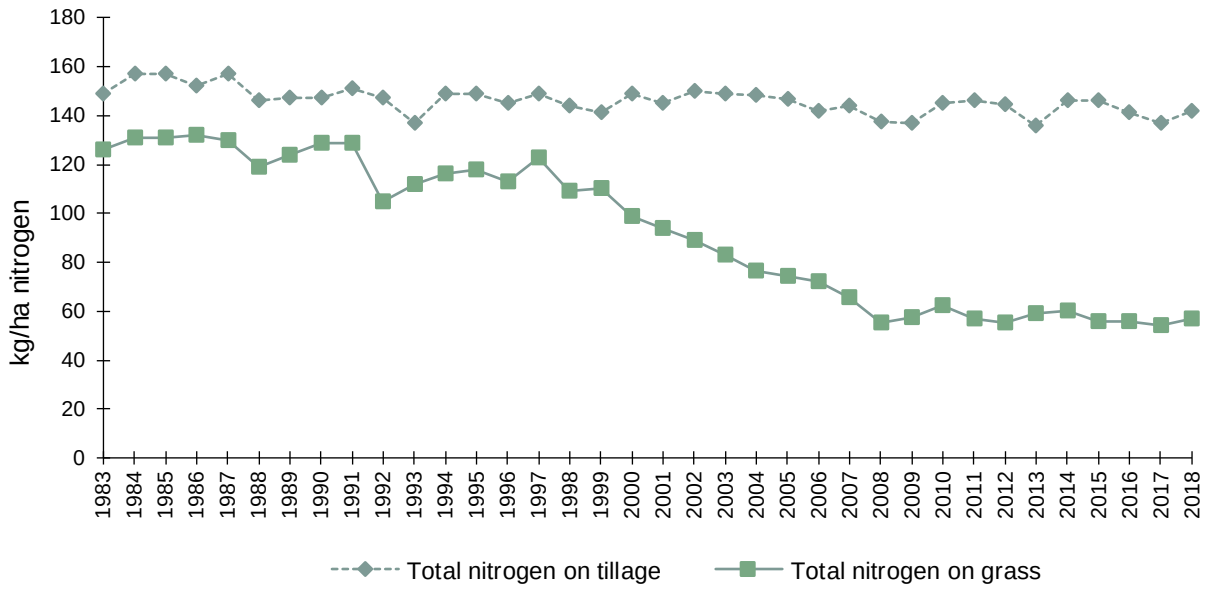
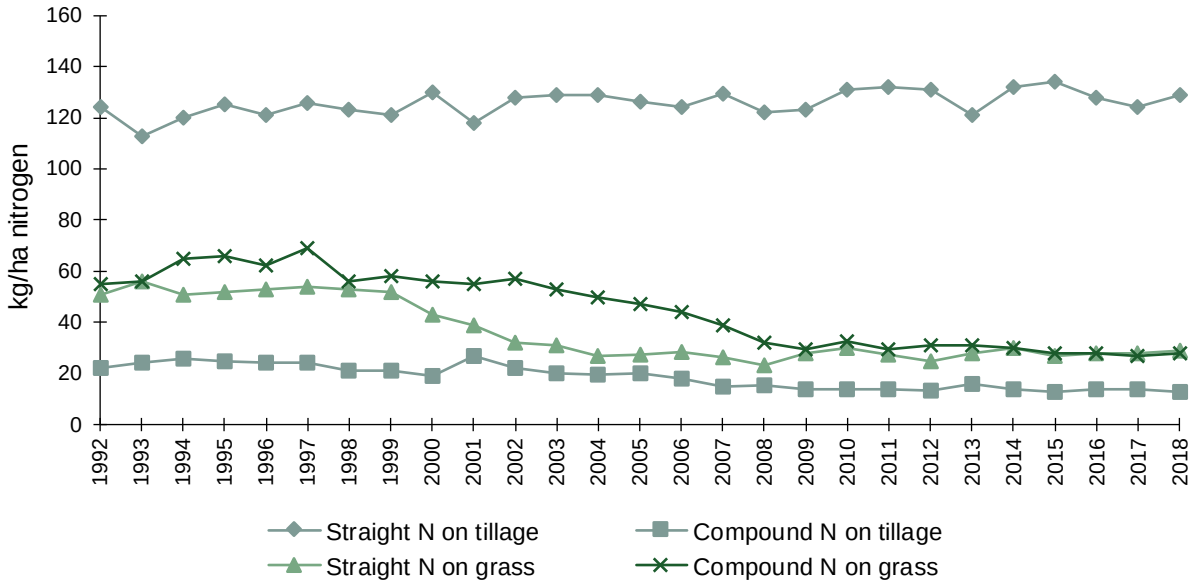


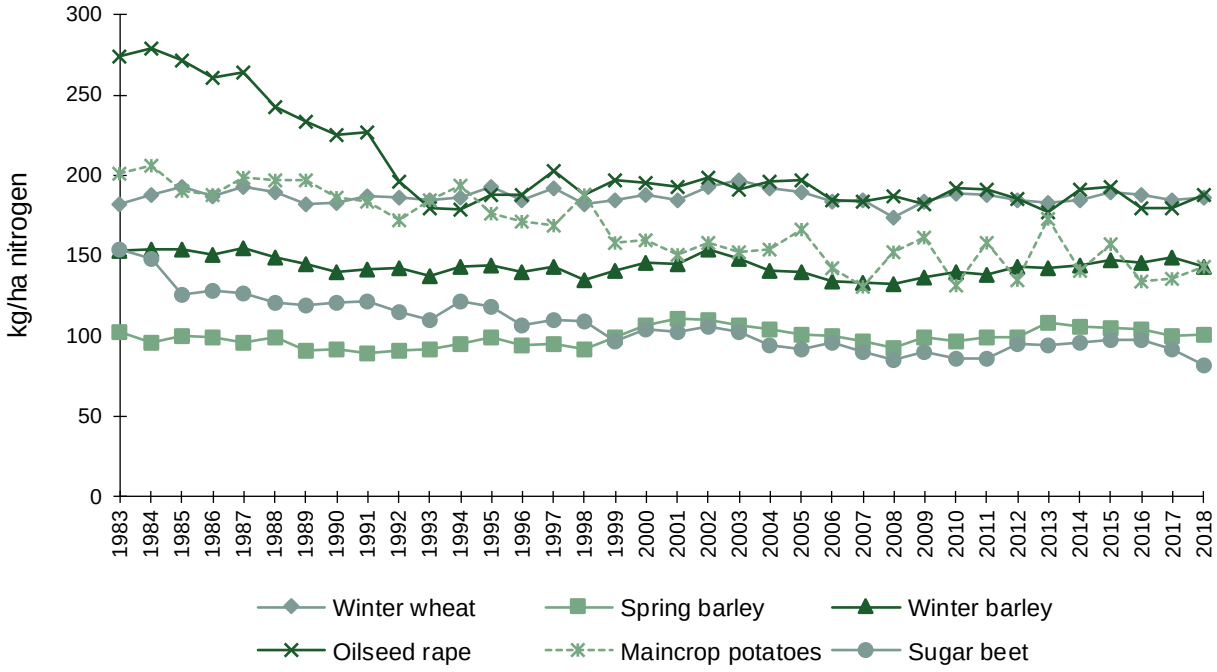
Figure B2.2 **Overall application rates (kg/ha) of straight and compound nitrogen on tillage crops and grassland, Great Britain 1992 – 2018**

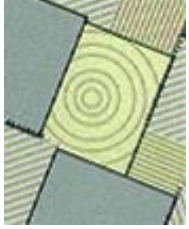


B2.1.1 Nitrogen use on major tillage crops

Overall application rates of total nitrogen on the main arable crops in Great Britain since 1983 are shown in Figure B2.3.

Figure B2.3 **Overall application rates (kg/ha) of total nitrogen on major arable crops, Great Britain 1983 – 2018**





B2.1.2 Autumn and winter applications of nitrogen fertiliser

The British Survey of Fertiliser Practice is able to monitor the extent to which recommended agronomic advice is adopted. By analysing the timing of fertiliser applications, it is possible to assess the extent to which autumn and winter nitrogen is applied. The standard advice is that autumn nitrogen is not required for winter cereals, as economic yield benefits are rare and such applications are vulnerable to leaching loss. The Great Britain values have remained below 10% of the crop area treated for both winter cereal crops since 2003, with the dressing cover being 5% or below for both in 2018. The area receiving autumn nitrogen is too low for data relating to average field application to be used. Autumn nitrogen at 30 kg/ha is recommended for winter oilseed rape, unless the soil has a high nitrogen fertility, as the crop normally requires more nitrogen than winter cereals during the autumn growth period.

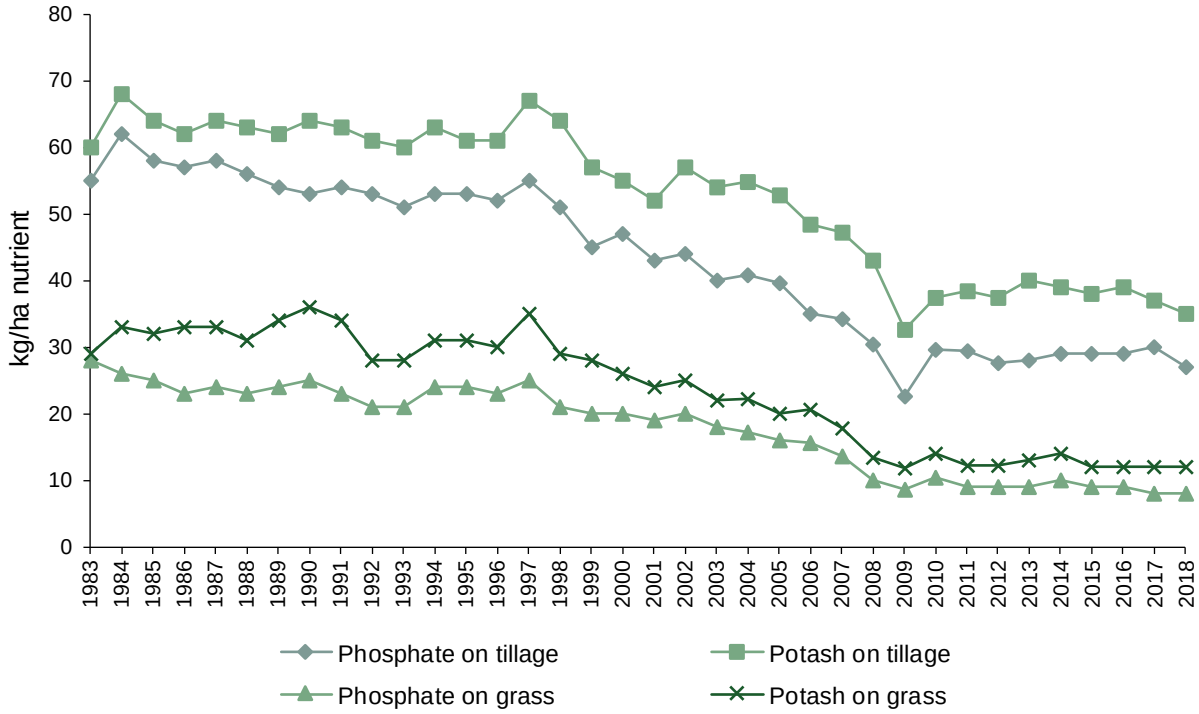
Table B2.2 **Dressing cover (% area) of autumn or winter-applied (August to January) nitrogen on winter cereals and winter oilseed rape and average application rate (kg/ha) for winter oilseed rape, England & Wales 1987 – 1998 and Great Britain 1999 – 2018**

	winter wheat	*winter barley*	*winter oilseed rape*	
	dressing cover	*dressing cover*	*dressing cover*	*application rate*
England & Wales				
1987	36	43	74	53
1988	28	31	64	45
1989	18	25	52	45
1990	10	16	45	42
1991	11	12	49	46
1992	8	10	50	44
1993	8	8	41	42
1994	12	16	44	39
1995	11	13	48	38
1996	11	12	51	37
1997	12	11	44	36
1998	7	12	34	38
Great Britain				
1999	6	10	35	43
2000	7	11	33	42
2001	7	14	43	43
2002	8	16	41	47
2003	5	9	42	39
2004	6	9	35	40
2005	4	9	42	40
2006	5	7	28	34
2007	3	5	27	41
2008	3	6	31	33
2009	2	3	26	31
2010	2	7	29	33
2011	2	3	35	29
2012	2	5	31	27
2013	2	4	32	28
2014	2	5	32	29
2015	2	3	38	32
2016	3	4	35	31
2017	3	3	42	30
2018	5	4	41	31

B2.2 PHOSPHATE AND POTASH USE

Annual overall rates of phosphate and potash on tillage crops and on grassland in Great Britain since 1983 are illustrated in Figure B2.4, using the data presented in Tables B2.3 and B2.4.

Figure B2.4 Overall application rates (kg/ha) phosphate and potash on tillage crops and grassland, Great Britain 1983 – 2018



Overall phosphate use on tillage crops declined gradually between 1984 and 1996, from 62 kg/ha to 52 kg/ha. Thereafter the decline in rates became more marked to 2010, with the dip in use in 2009 being caused by a major price increase for the nutrient. The data suggest that, since 2010, overall application rates of phosphate and potash have remained relatively constant. Overall phosphate rates on tillage crops have been consistently higher than those recorded on grass.

The overall rate of phosphate on grassland was highest in 1983, at 28 kg/ha, and then application remained relatively stable at 21-26 kg/ha between 1984 and 1998. Overall application rates have declined more rapidly in the period between 1999 and 2009, where the rates were 20 kg/ha and 9 kg/ha, respectively. Since then, the overall rates have remained stable at 8-10 kg/ha.

Overall potash use on tillage crops declined slightly between 1983 and 1997, with the rates in the 60-68 kg/ha range. Like phosphate, overall application rates reduced at a greater rate after this time to 33 kg/ha in 2009. The potash rate in 2009 was the lowest since 1983 and again was thought to be a reaction to the price of the nutrient. Since then, the overall rates of potash on tillage have been in the 35-40 kg/ha range.

Compared to tillage crops, the pattern of overall potash use on grassland has been more variable. A net decline was shown between 1983 and 2009, since then the rate has remained within the range of 12-14 kg/ha.

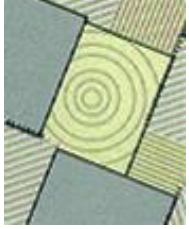


Table B2.3 Overall phosphate application rates (kg/ha), England & Wales 1970 - 2018 and Scotland and Great Britain 1983 – 2018

	tillage crops			*grass*			*all crops and grass*		
	England & Wales	*Scotland*	*Great Britain*	*England & Wales*	*Scotland*	*Great Britain*	*England & Wales*	*Scotland*	*Great Britain*
1970	56	-	-	32	-	-	-	-	-
1971	54	-	-	34	-	-	-	-	-
1972	56	-	-	34	-	-	-	-	-
1973	54	-	-	34	-	-	-	-	-
1974	51	-	-	27	-	-	39	-	-
1975	46	-	-	27	-	-	34	-	-
1976	50	-	-	29	-	-	38	-	-
1977	51	-	-	26	-	-	37	-	-
1978	49	-	-	28	-	-	39	-	-
1979	49	-	-	27	-	-	38	-	-
1980	49	-	-	27	-	-	37	-	-
1981	51	-	-	25	-	-	38	-	-
1982	55	-	-	24	-	-	39	-	-
1983	54	63	55	26	36	28	39	47	40
1984	61	68	62	25	33	26	42	48	42
1985	56	70	58	24	30	25	40	46	41
1986	56	63	57	22	27	23	40	42	40
1987	56	71	58	23	28	24	39	45	40
1988	54	65	56	21	31	23	38	45	39
1989	52	67	54	23	31	24	38	45	39
1990	51	68	53	24	28	25	38	43	39
1991	53	65	54	23	24	23	38	40	38
1992	51	67	54	19	30	22	35	43	38
1993	49	65	52	19	28	21	33	41	35
1994	51	69	53	23	28	24	37	43	38
1995	50	68	53	22	31	24	36	45	37
1996	51	65	52	22	26	23	36	40	36
1997	53	69	55	24	32	25	38	46	39
1998	49	66	51	20	27	21	34	43	35
1999	43	64	45	19	27	20	31	42	32
2000	44	60	47	18	30	20	31	42	32
2001	40	60	43	16	29	19	27	41	29
2002	41	62	44	18	26	20	29	39	31
2003	37	61	40	16	26	18	26	39	28
2004	38	63	41	15	27	17	25	40	28
2005	37	56	40	15	22	16	25	35	27
2006	32	53	35	14	22	16	23	33	25
2007	32	53	34	12	19	14	22	32	23
2008	28	50	30	9	16	10	18	28	20
2009	19	49	23	7	15	9	13	27	15
2010	27	50	30	9	16	10	18	27	19
2011	27	50	29	8	14	9	17	25	19
2012	25	50	28	8	14	9	16	25	17
2013	25	51	28	8	14	9	16	27	18
2014	26	50	29	8	15	10	17	26	18
2015	26	51	29	8	13	9	17	27	18
2016	26	50	29	7	14	9	16	27	18
2017	26	54	30	7	16	8	15	29	18
2018	24	50	27	7	13	8	15	26	17

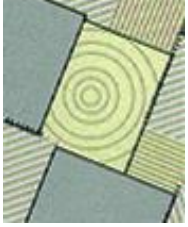
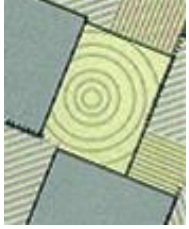


Table B2.4 Overall potash application rates (kg/ha), England & Wales 1970 - 2018 and Scotland and Great Britain 1983 – 2018

	tillage crops			*grass*			*all crops and grass*		
	England & Wales	*Scotland*	*Great Britain*	*England & Wales*	*Scotland*	*Great Britain*	*England & Wales*	*Scotland*	*Great Britain*
1970	61	-	-	26	-	-	-	-	-
1971	59	-	-	21	-	-	-	-	-
1972	63	-	-	20	-	-	-	-	-
1973	60	-	-	22	-	-	-	-	-
1974	56	-	-	20	-	-	36	-	-
1975	51	-	-	21	-	-	34	-	-
1976	56	-	-	23	-	-	37	-	-
1977	56	-	-	23	-	-	39	-	-
1978	56	-	-	25	-	-	41	-	-
1979	53	-	-	27	-	-	40	-	-
1980	54	-	-	26	-	-	40	-	-
1981	56	-	-	26	-	-	41	-	-
1982	61	-	-	28	-	-	44	-	-
1983	60	62	60	28	36	29	44	46	43
1984	68	67	68	33	35	33	50	49	49
1985	63	67	64	32	34	32	48	47	48
1986	62	61	62	33	30	33	48	43	47
1987	63	70	64	33	31	33	48	47	48
1988	63	66	63	30	34	31	47	47	47
1989	60	73	62	34	36	34	48	51	48
1990	62	74	64	36	35	36	49	50	49
1991	62	72	63	35	31	34	49	47	49
1992	59	72	63	26	34	28	43	48	45
1993	58	72	60	27	34	29	42	47	43
1994	62	74	63	31	31	31	46	46	46
1995	59	72	61	30	34	31	44	48	45
1996	59	73	61	31	28	30	45	44	44
1997	66	74	67	35	36	35	50	50	50
1998	63	73	64	28	36	29	45	51	46
1999	55	71	57	27	32	28	41	48	42
2000	54	67	55	24	33	26	39	47	40
2001	48	72	52	23	33	24	34	49	37
2002	55	72	57	24	30	25	38	46	40
2003	51	73	54	20	31	22	34	46	36
2004	52	72	55	21	30	22	35	46	37
2005	51	65	53	19	26	20	34	40	35
2006	46	68	48	19	28	21	32	42	33
2007	44	69	47	17	23	18	30	40	32
2008	40	67	43	12	20	13	26	37	27
2009	29	64	33	10	20	12	19	35	22
2010	33	67	38	13	19	14	23	35	25
2011	35	65	39	11	16	12	23	32	25
2012	34	68	37	11	17	12	22	33	23
2013	36	68	40	11	19	13	22	36	25
2014	35	67	39	12	20	14	23	35	25
2015	33	65	38	11	17	12	22	34	24
2016	34	68	39	10	20	12	21	36	24
2017	31	71	37	9	21	12	20	39	23
2018	29	73	35	10	18	12	19	38	22



Overall rates of phosphate and potash applied to tillage crops are approximately three times those used on grassland. However, there is greater use of applied manures on grassland (37% cover) than on tillage crops (27% cover) and grazed grassland also receives manure as it is grazed.

Dressing covers of phosphate and potash on tillage and grass for the period 2004-18 are presented in Tables B2.5a and B2.5b. On tillage crops the phosphate dressing cover has declined in all countries since 2004. However, the decline in England and Wales has been much higher (33% reduction) in comparison to Scotland where the reduction was 7% for the period. Despite this long-term trend dressing covers have been relatively stable in the last 5 years. On grass, phosphate dressing covers have also declined since 2004, but these too have stabilised in more recent years.

Potash dressing covers follow a similar pattern to phosphate, with a marked decline on tillage crops in England and Wales since 2004 followed by stabilisation during the last 5 years.

Table B2.5a Phosphate dressing covers (%), Great Britain 2004 – 2018

	tillage crops			*grass*			*all crops and grass*		
	England & Wales	*Scotland*	*Great Britain*	*England & Wales*	*Scotland*	*Great Britain*	*England & Wales*	*Scotland*	*Great Britain*
2004	61	93	65	55	77	59	58	83	61
2005	60	88	63	50	75	55	55	80	59
2006	52	89	57	52	75	56	52	79	57
2007	50	86	54	47	67	51	48	74	52
2008	46	88	52	37	61	42	42	71	47
2009	34	86	40	33	59	38	34	69	39
2010	45	87	50	37	64	43	41	71	46
2011	45	82	49	36	58	41	41	66	45
2012	42	87	47	37	57	41	39	67	44
2013	43	86	48	38	59	42	40	68	45
2014	44	85	49	36	61	41	40	69	45
2015	43	85	49	35	65	41	39	72	45
2016	44	85	49	32	63	38	37	70	43
2017	44	91	50	30	65	38	36	75	43
2018	41	87	48	33	57	38	37	68	42

Table B2.5b Potash dressing covers (%), Great Britain 2004 – 2018

	tillage crops			*grass*			*all crops and grass*		
	England & Wales	*Scotland*	*Great Britain*	*England & Wales*	*Scotland*	*Great Britain*	*England & Wales*	*Scotland*	*Great Britain*
2004	63	93	67	56	75	59	59	82	63
2005	61	90	65	51	71	55	56	78	60
2006	56	91	60	52	71	56	54	78	58
2007	54	90	58	47	65	51	51	74	54
2008	50	90	55	38	61	42	44	71	48
2009	37	88	43	34	61	39	35	71	41
2010	44	89	50	39	63	44	42	72	47
2011	46	84	50	38	57	42	42	66	46
2012	42	90	47	38	58	42	40	68	44
2013	46	87	51	39	59	43	42	69	47
2014	45	86	50	37	63	43	41	70	46
2015	45	88	50	35	65	42	40	73	46
2016	44	87	50	33	64	39	38	72	44
2017	44	91	50	31	66	38	37	75	43
2018	41	88	47	35	59	40	38	69	43

B2.2.1 Phosphate and Potash use on major tillage crops

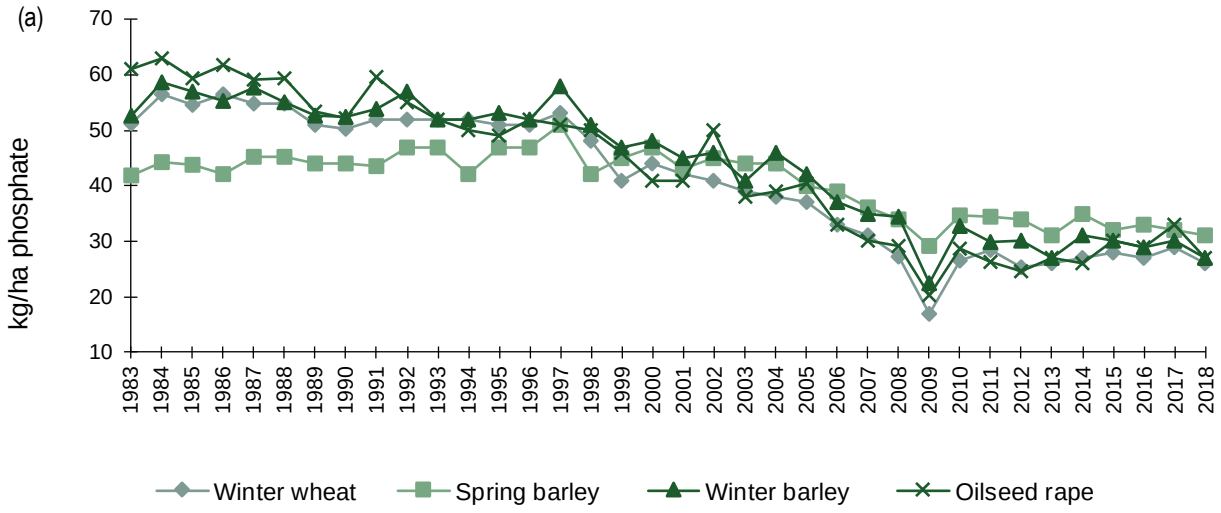
Overall application rates of phosphate and potash on the main arable crops in Great Britain since 1983 are shown in Figure B2.5.

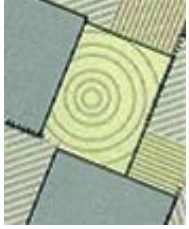
Phosphate use on most major tillage crops has shown a gradual net decline over the survey period. Overall application rates of phosphate have gradually declined on winter wheat and, less consistently, on winter barley since the mid-1980s (Figure B2.5(a)). By 1999, the overall phosphate rate had fallen below 50 kg/ha for both crops. From 2000 to 2007 rates were fairly stable in the 31-44 kg/ha range for winter wheat and 35-48 kg/ha for winter barley. The year 2009 saw more marked decreases in overall rates (-10 kg/ha for winter wheat and -13 kg/ha for winter barley). In 2010 overall phosphate rates recovered and have stabilised since then. Phosphate use on spring barley was stable between 1983 and 2004 in the range of 42-51 kg/ha. In 2005 the overall rate was 40 kg/ha, which had declined to 31 kg/ha by 2018.

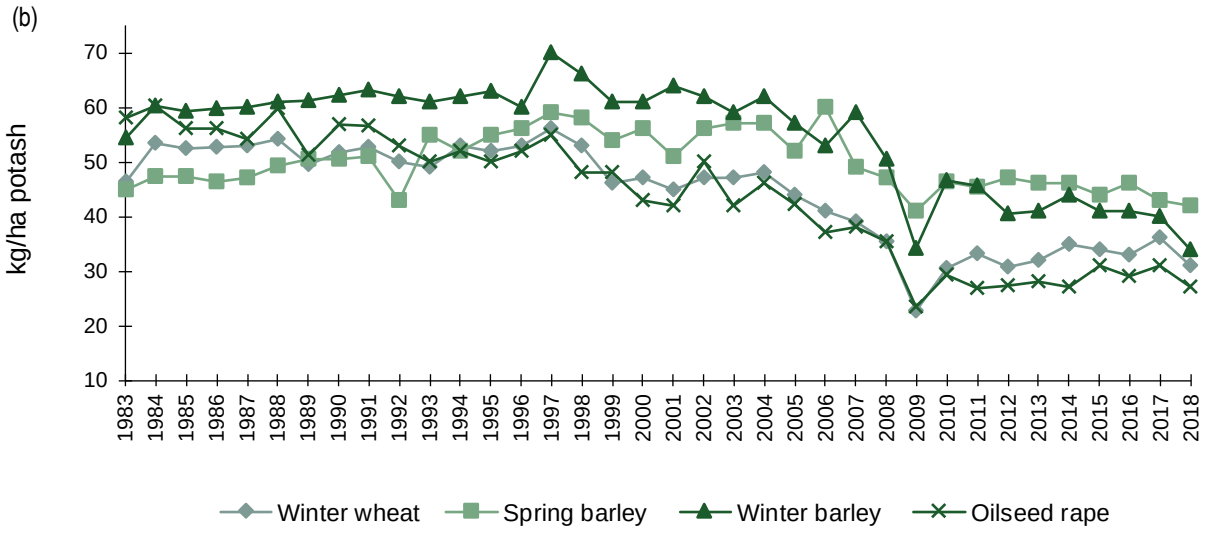
Overall phosphate use has also declined steadily on oilseed rape and sugar beet. Like other crops, the phosphate overall rate dipped in 2009, and to date the rate on sugar beet has not regained the rate reported in 2008, which was 31 kg/ha.

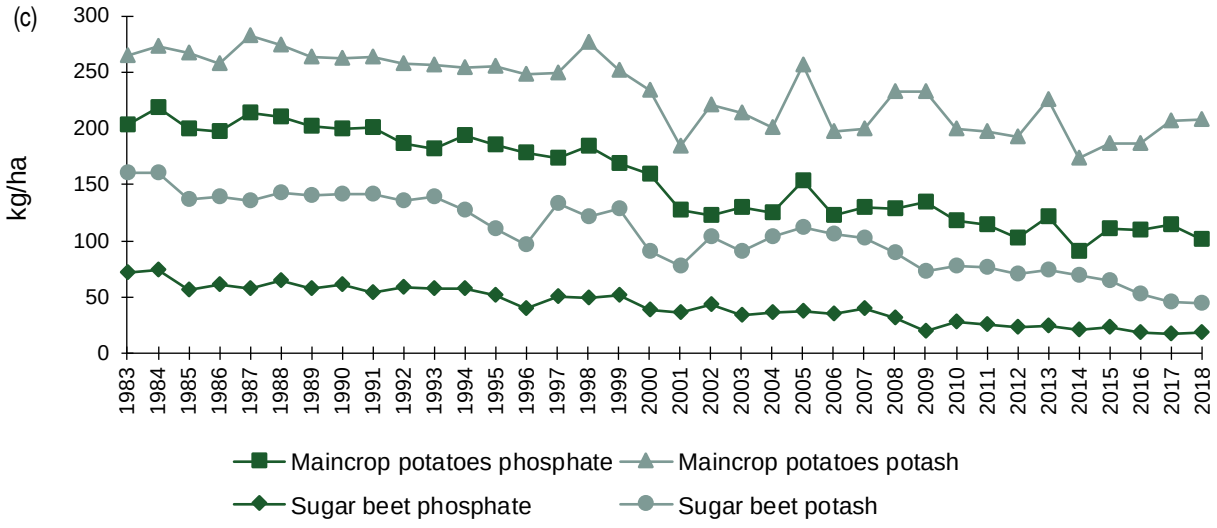
On winter wheat, the overall potash rates were consistent between 1983 and 2005, in the range 44-56 kg/ha. Thereafter the rate declined, with a 2009 dip to 23 kg/ha, with modest recoveries since that point. For barley the rates were in the range of 49-61 kg/ha between 1983 and 2008. The rates in 2009 were 41 kg/ha for spring barley and 34 kg/ha for winter barley. In the years since 2009 the overall potash rates have been in the range 40-47 kg/ha. Overall potash rates have fluctuated more on oilseed rape, sugar beet and on potatoes than on the cereal crops. They do follow the general pattern of a dip in rates in 2009, and subsequent stabilisation.

Figure B2.5 **Overall application rates (kg/ha) of (a) phosphate and (b) potash on major arable crops, and (c) phosphate and potash on sugar beet and potatoes Great Britain 1983 – 2018**





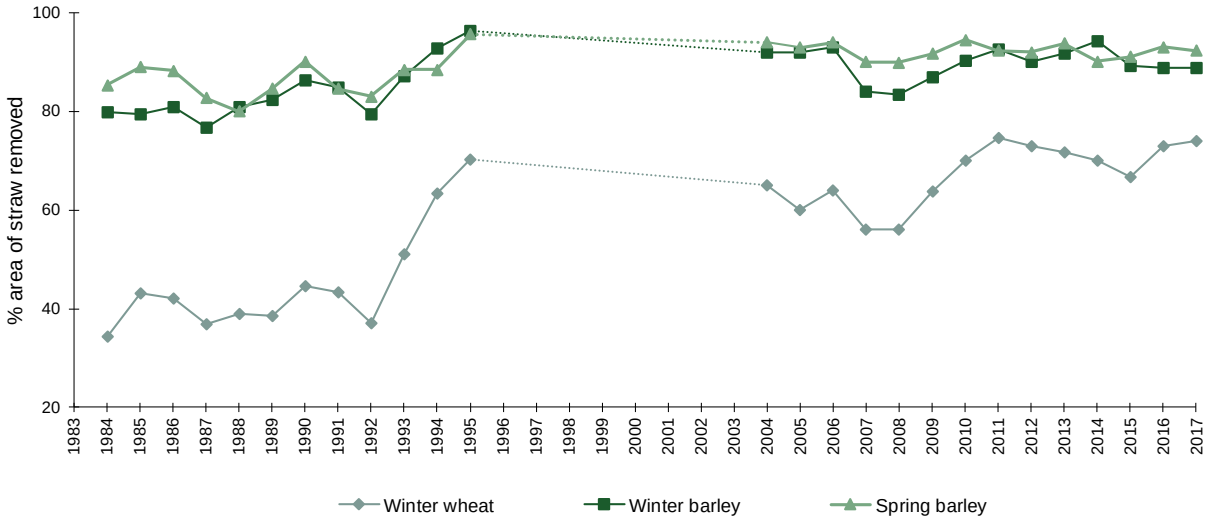

(b)
kg/ha potash
70
60
50
40
30
20
10
1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
Winter wheat
Spring barley
Winter barley
Oilseed rape


(c)
kg/ha
300
250
200
150
100
50
0
1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
Maincrop potatoes phosphate
Maincrop potatoes potash
Sugar beet phosphate
Sugar beet potash

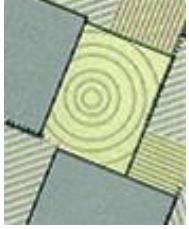
B2.3 STRAW REMOVAL

Estimates of the percentage of straw removed from wheat and barley fields are shown in Figure B2.6. Wheat and barley straw contains a significant quantity of nutrients, especially potassium. The removal of straw from the field after harvest also removes these nutrients, which would otherwise be returned to the soil when the straw is incorporated. These straws contain on average 1.2-1.5 kg P_2O_5 (phosphate) per tonne, and 9.5-12.5 kg K_2O (potash) per tonne, and it is estimated that for every tonne of cereal grain harvested 0.5 tonnes of straw can be baled and removed from the field. Thus, the removal of wheat or barley straw will increase the removal of phosphate by about 10% more than if the grain alone were removed, while the amount of potash removed would be approximately doubled. Data collected as part of the 2018 survey related to the fate of the straw from the 2017 harvest so is reported against 2017. In 2017, 74% of the winter wheat straw was removed from the fields, with the percentages for winter and spring barley much higher at 89 and 92%, respectively.

Figure B2.6 Percentage of straw removed from wheat and barley fields, England & Wales harvest years 1985 – 1995, Great Britain harvest years 2004 - 2017



Data for the period 1984-95 were sourced from MAFF/Defra straw disposal surveys, those for the period 2004-17 from this survey. No data are available for the period 1996-2003. The straw burning ban was introduced in 1993. This resulted in a significant increase in the percentage of straw removed, up to 70% and 96% for wheat and barley respectively, for the 1995 harvest.

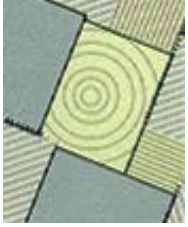


B2.4 TOTAL QUANTITIES OF NITROGEN, PHOSPHATE AND POTASH, UK

Table B2.6 Quantities of major nutrients used, United Kingdom 1966-2018

Harvest year	Nitrogen kt N				Phosphate kt P_2O_5				Potash kt K_2O			
	England & Wales	Scotland	N. Ireland	UK	England & Wales	Scotland	N. Ireland	UK	England & Wales	Scotland	N. Ireland	UK
1966	491	76	23	590	332	81	22	435	335	61	18	413
1967	573	85	27	685	359	79	23	460	354	61	19	434
1968	625	93	29	748	367	81	21	469	362	62	18	441
1969	639	108	35	781	362	84	22	467	363	65	19	447
1970	653	108	34	796	366	81	23	470	356	63	20	438
1971	732	119	43	894	397	84	24	504	373	65	21	459
1972	751	120	48	919	371	76	24	470	336	60	19	416
1973	759	132	56	947	373	85	25	482	333	63	21	417
1974	784	139	57	980	357	72	21	449	347	55	19	421
1975	788	143	54	984	306	69	18	393	302	59	16	377
1976	851	144	65	1,059	315	69	19	404	322	59	17	398
1977	879	146	68	1,093	316	69	21	406	330	59	20	409
1978	924	156	75	1,155	316	72	22	410	328	64	20	412
1979	941	160	85	1,186	321	73	22	416	333	65	21	419
1980	1,031	156	81	1,268	342	75	24	440	361	65	22	447
1981	1,100	159	76	1,335	344	73	24	441	367	66	21	454
1982	1,180	160	76	1,416	357	65	24	446	394	67	22	483
1983	1,227	161	82	1,470	359	65	24	448	409	68	23	500
1984	1,316	183	89	1,588	391	69	28	488	457	73	29	559
1985	1,298	186	96	1,580	375	71	23	469	441	72	28	541
1986	1,297	176	99	1,572	341	65	28	434	415	66	29	510
1987	1,370	193	111	1,674	340	65	27	432	429	70	29	528
1988	1,251	180	94	1,525	341	70	24	435	419	76	29	524
1989	1,223	193	98	1,514	334	65	26	425	420	74	29	523
1990	1,275	194	113	1,582	323	63	28	414	409	73	33	515
1991	1,224	193	98	1,515	321	61	24	406	393	71	28	492
1992	1,105	166	94	1,365	295	55	21	371	351	64	26	441
1993	968	142	109	1,219	286	50	24	360	344	57	29	430
1994	986	133	129	1,248	312	51	28	391	361	59	38	458
1995	1,064	156	128	1,348	325	53	27	405	378	64	34	476
1996	1,048	157	128	1,333	302	62	30	394	370	65	36	471
1997	1,156	172	112	1,440	325	63	24	412	405	65	31	501
1998	1,111	158	106	1,375	308	56	19	383	397	64	26	487
1999	1,015	152	117	1,284	274	50	23	347	365	59	27	451
2000	1,005	150	113	1,268	237	59	21	317	322	61	26	409
2001	876	180	106	1,162	201	57	21	279	274	69	26	369
2002	915	187	95	1,197	209	55	19	283	297	70	24	391
2003	853	170	108	1,131	203	60	19	282	283	66	26	375
2004	875	150	100	1,125	205	57	16	278	288	65	22	375
2005	834	150	77	1,061	192	55	12	259	267	67	18	352
2006	780	153	70	1,003	173	51	11	235	243	66	16	325
2007	802	126	80	1,008	169	46	9	224	241	59	17	317
2008	800	127	74	1,001	160	49	6	215	244	68	13	325
2009	767	124	57	948	91	34	4	129	148	52	8	208
2010	813	127	76	1,016	134	44	6	184	182	57	12	251
2011	824	124	74	1,022	145	42	5	192	213	59	11	283
2012	809	125	66	1,000	140	43	5	188	193	56	10	259
2013	781	139	79	999	141	46	7	194	194	60	13	267
2014	838	151	71	1,060	146	48	7	201	206	65	13	284
2015	819	155	75	1,049	142	48	6	196	196	64	12	272
2016	801	155	71	1,026	139	51	7	197	188	69	13	270
2017	806	157	78	1,041	133	54	8	195	185	77	14	276
2018e	*804*	*147*	*82*	*1,033*	*131*	*48*	*9*	*188*	*174*	*72*	*16*	*262*

Note: Years are harvest (e.g. 2018 refers to the 2017/18 cropping year) rather than calendar years. Data for 2018 are estimates.

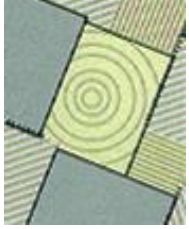


Quantities of nitrogen, phosphate and potash used in the UK since 1966 are shown in Table B2.6. These data are based on BSFP findings and trade and sales data. They are compiled by the Agricultural Industries Confederation in conjunction with Defra using the methodology described in Section A2.5. They are the official figures for fertiliser usage.

Total nitrogen use in the UK increased from 590,000 tonnes in 1966 up to 1,674,000 tonnes in 1987 before declining gradually to 1,001,000 tonnes in 2008. The drop in 2009 was related to high fertiliser prices. Between 2010 and 2018 nitrogen use has remained relatively stable. From the peak in 1987, nitrogen use since has fallen by approximately 40%.

Phosphate use in the UK has fallen since the mid-1980s but since 2007 this decline has slowed, and total phosphate use has been more stable between 2010 and 2018, between 184,000 – 201,000 tonnes. However, use is still approximately half that compared to use between 1965 and 1985. The low use of 129,000 tonnes in 2009 was price related.

Potash use in the UK was highest in the mid-1980s through to 1999, after which there has been a more sustained decline. Potash use between 2010 and 2018 has been between 251,000 – 286,000 tonnes, which is around half that used at its peak. The low use of 208,000 tonnes in 2009 was price related.



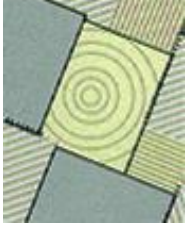
SECTION C – TABLES

CONTENTS

GREAT BRITAIN TABLES 2018

ENGLAND AND WALES TABLES 2018

Note: 1. Row percentages may not sum to exactly to 100 due to rounding.
2. No estimates are shown for crops with fewer than 5 fields in the sample. Nevertheless, some estimates are based on very few fields in the sample and should be treated with great caution.
3. FYM refers to any form of organic manure applied.



SCOTLAND TABLES 2018

Note: 1. Row percentages may not sum to exactly to 100 due to rounding.
2. No estimates are shown for crops with fewer than 5 fields in the sample. Nevertheless, some estimates are based on very few fields in the sample and should be treated with great caution.
3. FYM refers to any form of organic manure applied.

Table GB1.1 Total fertiliser use, Great Britain 2018

	Crop area receiving dressing (%)					Average field rate (kg/ha)				Overall application rate (kg/ha)				Fields in sample
	N	P_2O_5	K_2O	SO_3	FYM	N	P_2O_5	K_2O	SO_3	N	P_2O_5	K_2O	SO_3	
Spring wheat	91	42	28	48	25	146	57	49	53	133	24	14	26	64
Winter wheat	98	42	44	73	25	189	60	70	56	186	26	31	41	1199
Spring barley	97	63	64	56	30	104	50	66	45	101	31	42	25	690
Winter barley	98	44	46	67	23	146	61	74	50	143	27	34	34	457
Oats	84	45	46	48	21	108	52	76	46	91	24	35	22	207
Rye/triticale/Durum wheat	89	52	52	59	34	117	58	90	50	104	30	47	29	19
Potatoes (seed or earlies)	100	100	86	41	4	114	136	215	-	114	136	185	-	8
Potatoes (maincrop)[1]	100	88	95	27	32	144	114	218	-	143	101	208	-	57
Sugar beet	98	43	56	63	46	83	41	79	39	82	18	44	25	80
Spring oilseed rape	-	-	-	-	-	-	-	-	-	-	-	-	-	4
Winter oilseed rape	99	47	41	80	24	191	57	65	77	189	27	27	61	473
Linseed	97	31	15	73	3	80	52	37	39	78	16	5	28	22
Forage maize	92	58	24	21	88	66	58	66	36	61	34	16	8	153
Rootcrops for stockfeed	71	47	64	38	57	91	74	85	62	65	34	54	23	45
Leafy forage crops	77	72	74	19	41	76	33	50	21	59	23	37	4	37
Arable silage/other fodder crops	42	15	14	17	45	100	52	48	58	42	8	7	10	89
Peas - human consumption	2	26	14	4	2	-	89	95	-	-	23	14	-	33
Peas - animal consumption	2	21	32	16	5	-	37	61	-	-	8	20	-	26
Beans - animal consumption	1	29	33	4	2	-	60	67	60	-	17	22	2	163
Vegetables (brassicae)	96	61	60	4	4	92	80	142	-	89	49	85	-	15
Vegetables (other)	62	81	75	17	11	137	76	169	76	85	62	127	13	34
Soft Fruit	91	63	91	36	0	140	-	126	-	127	-	114	-	9
Top Fruit	94	91	98	15	0	74	13	59	-	70	12	58	-	15
Other tillage	31	16	23	32	18	73	32	116	42	23	5	27	14	51
All tillage	91	48	47	62	27	155	57	74	57	142	27	35	35	3950
Grass under 5 years old	80	44	50	21	52	126	30	44	39	101	13	22	8	981
Grass 5 years and over	55	36	38	9	33	85	20	25	37	47	7	9	3	2196
All grass	59	38	40	12	37	96	22	29	37	57	8	12	4	3177
All crops and grass	74	42	43	34	32	129	40	51	53	95	17	22	18	7127

Source: British Survey of Fertiliser Practice 2018

[1] Sulphur rates on potatoes are not shown as some growers apply additional sulphur to acidify the soil for this crop. **These applications cannot be separated from those intended as a fertiliser nutrient.**

Table GB1.2 Use of straight fertiliser, Great Britain 2018

	Crop area receiving dressing (%)			Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O	
Spring wheat	91	17	8	139	53	46	126	9	4	64
Winter wheat	97	14	15	185	65	74	179	9	11	1199
Spring barley	77	7	10	96	56	74	74	4	7	690
Winter barley	95	12	14	143	69	75	137	8	11	457
Oats	74	8	6	101	65	78	74	5	5	207
Rye/triticale/Durum wheat	81	3	3	110	-	-	90	-	-	19
Potatoes (seed or earlies)	26	0	0	-	-	-	-	-	-	8
Potatoes (maincrop)	43	4	34	99	-	219	42	-	74	57
Sugar beet	93	6	21	78	-	84	73	-	18	80
Spring oilseed rape	-	-	-	-	-	-	-	-	-	4
Winter oilseed rape	98	11	18	182	61	67	179	7	12	473
Linseed	97	16	11	78	-	-	76	-	-	22
Forage maize	60	6	7	74	95	109	44	5	8	153
Rootcrops for stockfeed	31	5	13	108	-	134	34	-	17	45
Leafy forage crops	24	0	0	52	-	-	12	-	-	37
Arable silage/other fodder crops	37	4	2	102	83	-	38	3	-	89
Peas - human consumption	0	21	9	-	100	-	-	21	-	33
Peas - animal consumption	0	13	25	-	-	-	-	-	-	26
Beans - animal consumption	1	14	19	-	63	72	-	9	13	163
Vegetables (brassicae)	79	2	0	82	-	-	65	-	-	15
Vegetables (other)	27	11	12	77	-	81	21	-	9	34
Soft Fruit	64	0	28	-	-	-	-	-	-	9
Top Fruit	63	14	21	100	-	-	62	-	-	15
Other tillage	25	7	17	82	-	140	21	-	24	51
All tillage	84	11	14	154	63	79	129	7	11	3950
Grass under 5 years old	46	1	3	123	59	85	57	1	3	981
Grass 5 years and over	23	0	1	98	74	81	22	0	0	2196
All grass	27	0	1	106	68	84	29	0	1	3177
All crops and grass	53	5	7	140	64	79	74	3	5	7127

Source: British Survey of Fertiliser Practice 2018

Table GB1.3 Use of compound fertiliser, Great Britain 2018

	Crop area receiving dressing (%)			Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O	
Spring wheat	14	25	19	51	58	51	7	14	10	64
Winter wheat	11	29	29	60	57	67	7	16	20	1199
Spring barley	47	57	55	56	49	64	27	27	35	690
Winter barley	12	32	32	50	58	72	6	19	24	457
Oats	27	38	41	59	48	73	16	18	30	207
Rye/triticale/Durum wheat	8	49	49	-	60	90	-	29	44	19
Potatoes (seed or earlies)	100	100	86	101	136	215	101	136	185	8
Potatoes (maincrop)	87	84	77	116	116	174	101	98	134	57
Sugar beet	18	37	36	49	39	73	9	15	26	80
Spring oilseed rape	-	-	-	-	-	-	-	-	-	4
Winter oilseed rape	25	36	24	37	56	61	9	20	15	473
Linseed	15	16	4	-	-	-	-	-	-	22
Forage maize	54	53	16	30	53	47	16	28	8	153
Rootcrops for stockfeed	43	42	53	72	75	70	31	31	37	45
Leafy forage crops	74	72	74	63	33	50	46	23	37	37
Arable silage/other fodder crops	6	11	12	65	42	47	4	5	6	89
Peas - human consumption	2	5	5	-	-	-	-	-	-	33
Peas - animal consumption	2	7	7	-	50	61	-	4	4	26
Beans - animal consumption	1	15	15	-	57	61	-	9	9	163
Vegetables (brassicae)	60	59	60	40	82	142	24	49	85	15
Vegetables (other)	51	73	63	126	77	185	64	57	117	34
Soft Fruit	63	63	63	-	-	-	-	-	-	9
Top Fruit	74	77	77	10	10	27	7	8	21	15
Other tillage	8	9	6	25	33	52	2	3	3	51
All tillage	23	37	34	55	55	70	13	20	24	3950
Grass under 5 years old	46	43	47	95	29	41	44	12	19	981
Grass 5 years and over	37	36	37	66	20	24	24	7	9	2196
All grass	39	37	39	72	22	28	28	8	11	3177
All crops and grass	32	37	37	67	36	45	21	14	17	7127

Source: British Survey of Fertiliser Practice 2018

Table GB1.4 Use of lime, Great Britain 2018

	Crop area receiving dressing (%)						Average application rate (tonnes of product/ha)						Fields in sample	
	Limestone (ground, screened)	Chalk	Magnesian limestone	Sugar beet lime	Other	All	Limestone (ground, screened)	Chalk	Magnesian limestone	Sugar beet lime	Other	All	Fields limed	
Spring wheat	-	-	-	-	-	-	-	-	-	-	-	-	2	64
Winter wheat	3.1	1.1	1.3	-	0.5	6.0	4.5	4.3	5.1	-	0.9	4.3	74	1199
Spring barley	7.7	0.0	1.3	-	1.7	10.6	4.0	5.0	5.3	-	0.7	3.6	87	690
Winter barley	7.0	0.9	-	-	0.4	8.3	3.6	3.5	-	-	0.5	3.5	39	457
Oats	2.2	1.1	-	-	0.5	3.8	3.6	12.5	-	-	1.2	5.8	15	207
Rye/triticale/Durum wheat	-	-	-	-	-	-	-	-	-	-	-	-	1	19
Potatoes (seed or earlies)	-	-	-	-	-	-	-	-	-	-	-	-	0	8
Potatoes (maincrop)	-	-	-	-	-	-	-	-	-	-	-	-	0	57
Sugar beet	10.9	1.4	1.5	12.8	1.2	27.8	4.4	5.0	5.0	7.8	0.3	5.9	23	80
Spring oilseed rape	-	-	-	-	-	-	-	-	-	-	-	-	0	4
Winter oilseed rape	4.6	0.4	0.7	0.2	-	6.0	4.6	4.8	3.7	5.0	-	4.5	37	473
Linseed	-	-	-	-	-	-	-	-	-	-	-	-	2	22
Forage maize	8.4	1.1	1.0	0.2	-	10.6	3.2	5.0	5.4	3.8	-	3.6	17	153
Rootcrops for stockfeed	11.0	-	3.2	-	-	14.2	4.4	-	5.0	-	-	4.5	8	45
Leafy forage crops	20.0	-	-	-	-	20.0	4.4	-	-	-	-	4.4	10	37
Arable silage/other fodder crops	5.0	0.7	-	-	1.3	7.0	5.0	5.0	-	-	0.3	4.2	9	89
Peas - human consumption	-	-	-	-	-	-	-	-	-	-	-	-	0	33
Peas - animal consumption	-	-	-	-	-	-	-	-	-	-	-	-	0	26
Beans - animal consumption	-	-	-	-	-	-	-	-	-	-	-	-	4	163
Vegetables (brassicae)	-	-	-	-	-	-	-	-	-	-	-	-	4	15
Vegetables (other)	-	-	-	-	-	-	-	-	-	-	-	-	1	34
Soft Fruit	-	-	-	-	-	-	-	-	-	-	-	-	0	9
Top Fruit	-	-	-	-	-	-	-	-	-	-	-	-	2	15
Other tillage	-	-	-	-	-	-	-	-	-	-	-	-	1	51
All tillage	4.8	0.7	0.9	0.3	0.6	7.4	4.1	4.8	4.9	7.4	0.7	4.1	336	3950
Grass under 5 years old	5.9	-	0.6	-	0.7	7.3	3.9	-	3.3	12.0	1.4	3.6	86	981
Grass 5 years and over	2.0	0.1	0.3	-	0.5	2.9	4.3	3.2	10.2	-	1.7	4.4	93	2196
All grass	2.8	-	0.4	-	0.6	3.7	4.1	3.2	8.1	12.0	1.6	4.1	179	3177
All crops and grass	3.7	0.3	0.6	0.1	0.6	5.4	4.1	4.7	5.9	7.5	1.2	4.1	515	7127

Source: British Survey of Fertiliser Practice 2018

Table GB2.1 Average fertiliser practice by grassland utilisation, Great Britain 2018

	Crop area receiving dressing (%)				Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
	N	P_2O_5	K_2O	FYM	N	P_2O_5	K_2O	N	P_2O_5	K_2O	
Grazed not mown	48	32	33	20	73	18	19	35	6	6	1451
Grazed mown	76	49	53	62	112	26	37	85	13	20	1410
All grazings	58	38	40	35	91	22	28	53	8	11	2861
Cut for silage - grazed	82	52	58	71	120	27	39	99	14	22	1054
Cut for silage - not grazed	85	35	41	72	151	31	55	129	11	23	203
All cut for silage	83	49	55	71	126	28	41	104	14	23	1257
Cut for hay - grazed	62	45	45	38	79	23	30	49	10	13	403
Cut for hay - not grazed	75	53	53	35	80	24	39	60	13	21	76
All cut for hay	64	46	46	38	79	23	31	50	11	14	479
All mowings	77	47	52	63	117	27	39	90	12	20	1676
All grass	59	38	40	37	96	22	29	57	8	12	3177

Source: British Survey of Fertiliser Practice 2018

Table GB3.0 Product use by month of application, Great Britain 2018

(a) Product use

row %	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Straight N	1	0	0	0	0	3	26	41	22	4	2	1
Straight P	11	10	14	1	1	11	15	22	10	0	0	2
Straight K	5	5	5	4	3	12	21	32	11	1	0	1
Straight S	0	0	0	0	0	7	33	51	8	0	0	0
Compounds	5	4	2	0	1	1	15	35	18	8	4	7
All fertilisers	2	2	1	0	0	3	22	38	20	5	3	3

(b) Nutrient use

row %	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Nitrogen	1	0	0	0	0	2	23	41	22	6	3	2
Phosphate	8	8	5	1	1	4	16	31	14	3	2	7
Potash	5	7	3	1	1	5	18	33	15	5	3	5
Sulphur	0	0	0	0	0	6	39	36	13	2	1	1
Total	2	2	1	0	0	3	23	38	19	5	3	3

Note: All fertilisers includes other straight fertilisers (e.g. trace elements)

'Product' refers to the total tonnage of the products used by the farmers in the survey year 2018.

'Nutrient' refers to the tonnage of each nutrient contained in the products used.

(e.g. 100 kg of a 20:10:10 compound contains 20 kg of N, 10 kg of P_2O_5 and 10 kg of K_2O, while 100 kg of ammonium nitrate (straight N) contains typically 34.5 kg of N).

Estimates of total nutrients are shown in Section B, Table B2.6.

Source: British Survey of Fertiliser Practice 2018

Table GB3.1 Product type as percentage of all product used by crop group, Great Britain 2018

column %	spring cereal	winter cereal	potatoes	sugar beet	oilseed rape	other tillage	all tillage	grass for grazing	grass for hay	grass for silage	grass not specified	all grass	all crops and grass
Ammonium Nitrate	36.1	45.6	6.5	24.9	41.8	21.4	39.8	29.1	23.7	30.4	8.7	30.6	37.4
Urea	8.3	10.7	3.3	7.1	14.6	4.0	10.1	4.3	3.4	4.9	6.6	4.7	8.7
Calcium Ammonium Nitrate (CAN)	1.3	1.7	0.5	3.5	1.5	2.2	1.6	2.3	0.9	2.0	2.3	2.1	1.8
Urea Ammonium Nitrate (UAN)	8.7	16.8	1.1	7.8	19.3	3.8	14.1	1.1	2.1	1.4	15.0	1.3	10.7
Other Straight N	1.5	1.4	2.5	2.4	2.1	1.8	1.6	0.7	0.5	0.5	0.0	0.8	1.4
Triple Superphosphate (TSP)	2.2	2.6	0.8	1.2	2.2	6.4	2.7	0.3	0.3	0.3	0.0	0.4	2.1
Other Straight P	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Muriate of Potash (MOP)	2.5	2.6	10.8	1.9	2.4	5.8	3.0	0.5	1.1	0.7	3.2	0.6	2.4
Other Straight K	0.3	0.5	0.0	12.9	0.5	2.6	0.8	0.0	0.0	0.4	0.0	0.3	0.7
PK	7.8	10.2	0.3	22.2	5.4	11.1	9.0	2.7	2.6	2.5	7.0	2.6	7.3
NK	2.0	1.2	1.6	4.8	1.0	3.1	1.5	6.5	4.0	8.5	2.9	6.4	2.8
Low N (<19% N)	16.5	4.0	69.4	3.6	7.4	26.8	10.5	3.9	9.6	3.9	36.9	4.3	8.9
High N (>=19% N)	12.6	2.4	3.1	2.5	1.0	7.3	4.3	48.2	51.8	44.3	17.3	45.7	15.4
Other	0.2	0.3	0.0	5.2	0.7	3.4	0.7	0.1	0.0	0.1	0.0	0.1	0.5
Total product ('000 tonnes)	**461**	**1582**	**65**	**51**	**464**	**135**	**2758**	**1066**	**123**	**684**	**8**	**1220**	**3978**

Source: British Survey of Fertiliser Practice 2018

Table GB3.2 Use of product type by crop group, Great Britain 2018

row %	spring cereal	winter cereal	potatoes	sugar beet	oilseed rape	other tillage	all tillage	grass for grazing	grass for hay	grass for silage	grass not specified	all grass	total product ('000 tonnes)
Ammonium Nitrate	13.9	64.1	0.3	1.1	17.9	2.6	73.2	80.8	7.0	60.6	0.6	26.8	1449
Urea	14.8	60.3	0.8	1.5	20.6	2.0	87.1	82.9	4.4	56.7	1.5	12.9	373
Calcium Ammonium Nitrate (CAN)	19.9	50.5	1.1	3.2	15.3	10.0	61.6	92.6	1.5	53.9	0.1	38.4	83
Urea Ammonium Nitrate (UAN)	8.1	69.0	0.2	1.0	20.5	1.1	97.5	90.4	11.4	75.4	7.6	2.5	467
Other Straight N	17.2	43.2	4.8	1.4	28.3	5.2	81.0	90.7	0.8	21.5	0.0	19.0	59
Triple Superphosphate (TSP)	12.9	62.2	0.4	1.0	13.5	10.0	95.2	77.3	2.1	41.6	0.0	4.8	78
Other Straight P	0.0	0.0	0.0	0.0	0.0	100.0	16.9	100.0	0.0	100.0	0.0	83.1	1
Muriate of Potash (MOP)	14.1	50.3	7.8	1.3	14.8	11.7	91.3	58.5	10.2	76.7	2.1	8.7	86
Other Straight K	2.7	32.2	0.0	35.6	11.9	17.5	85.7	18.0	0.0	100.0	0.0	14.3	22
PK	12.2	66.5	0.2	5.3	10.5	5.4	91.7	95.7	6.8	55.1	1.2	8.3	246
NK	26.0	49.6	3.7	3.6	9.7	7.4	39.6	90.5	6.5	80.4	1.1	60.4	113
Low N (<19% N)	39.4	19.0	16.6	0.8	12.0	12.2	89.3	84.6	20.8	51.2	4.4	10.7	302
High N (>=19% N)	49.6	27.3	2.3	1.4	5.3	14.1	12.7	91.8	13.1	50.5	0.2	87.3	680
Other	4.2	29.3	0.0	12.2	16.2	38.0	98.8	100.0	0.0	78.0	0.0	1.2	20
All Fertilisers	**16.7**	**57.3**	**2.3**	**1.9**	**16.8**	**4.9**	**69.3**	**87.3**	**10.0**	**56.1**	**0.6**	**30.7**	**3978**

Source: British Survey of Fertiliser Practice 2018

Table GB3.3 Product use by month of application, Great Britain 2018

row %	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	total product ('000 tonnes)
Ammonium Nitrate	0.0	2.0	23.8	39.9	23.8	5.6	2.5	1.7	0.6	0.1	0.0	0.0	1449
Urea	0.0	4.0	29.2	43.8	16.6	3.3	1.3	0.7	0.4	0.8	0.1	0.0	373
Calcium Ammonium Nitrate (CAN)	0.2	1.2	24.7	33.1	24.2	4.7	10.4	1.5	0.2	0.0	0.0	0.0	83
Urea Ammonium Nitrate (UAN)	0.0	5.8	30.0	43.5	18.4	1.1	0.1	0.4	0.4	0.3	0.0	0.0	467
Other Straight N	0.0	8.0	31.2	33.9	19.9	1.3	1.1	3.4	0.4	0.7	0.0	0.0	59
Triple Superphosphate (TSP)	1.2	11.2	15.2	22.3	10.3	0.0	0.0	1.5	11.9	10.5	14.4	1.3	78
Other Straight P	0.0	0.0	2.4	11.8	85.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1
Muriate of Potash (MOP)	1.2	12.5	22.1	33.7	12.0	1.2	0.4	0.8	2.5	6.5	6.1	1.1	86
Other Straight K	8.8	10.3	15.1	26.4	7.3	0.0	0.0	0.0	14.1	0.9	2.4	14.7	22
PK	2.2	5.4	15.6	12.9	6.4	0.7	0.1	13.1	18.2	16.2	7.8	1.5	246
NK	0.0	0.4	16.8	21.8	26.1	21.2	8.9	3.3	1.5	0.0	0.0	0.0	113
Low N (<19% N)	0.6	0.6	20.7	47.1	12.2	1.2	0.9	6.7	4.3	5.2	0.5	0.0	302
High N (>=19% N)	0.0	0.5	11.6	40.5	23.8	10.7	6.8	5.1	0.7	0.3	0.0	0.0	680
Other	0.0	6.0	27.9	43.3	7.0	3.6	0.0	0.5	0.8	0.3	1.4	9.3	20
All Fertilisers	**0.3**	**3.0**	**21.9**	**38.4**	**19.8**	**5.2**	**2.8**	**3.1**	**2.3**	**2.0**	**1.0**	**0.3**	**3978**

Source: British Survey of Fertiliser Practice 2018

Table GB4.1 Average fertiliser practice on cereal farms, Great Britain 2018

	Crop area receiving dressing (%)				Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
	N	P_2O_5	K_2O	FYM	N	P_2O_5	K_2O	N	P_2O_5	K_2O	
Spring wheat	91	50	27	16	152	67	42	139	34	12	29
Winter wheat	98	44	43	23	195	61	63	191	27	27	643
Spring barley	97	55	53	13	108	53	65	105	29	34	269
Winter barley	97	41	43	17	147	62	74	143	25	31	195
Oats	87	42	42	17	103	47	63	89	19	27	79
Rye/triticale/Durum wheat	100	38	38	51	114	-	-	114	-	-	7
Potatoes (seed or earlies)	-	-	-	-	-	-	-	-	-	-	1
Potatoes (maincrop)	100	94	100	24	118	103	239	118	98	239	11
Sugar beet	100	56	50	32	87	41	74	87	23	38	24
Spring oilseed rape	-	-	-	-	-	-	-	-	-	-	2
Winter oilseed rape	98	49	41	22	192	56	64	189	28	26	317
Linseed	97	32	13	3	78	54	-	76	18	-	17
Forage maize	91	51	20	75	71	58	112	65	30	23	18
Rootcrops for stockfeed	35	13	35	79	114	-	140	39	-	48	7
Leafy forage crops	100	79	79	12	74	-	-	74	-	-	5
Arable silage/other fodder crops	21	8	3	9	122	-	-	26	-	-	14
Peas - human consumption	0	18	18	3	-	-	-	-	-	-	14
Peas - animal consumption	0	24	27	5	-	-	32	-	-	9	17
Beans - animal consumption	0	29	35	1	-	60	63	-	18	22	106
Vegetables (brassicae)	-	-	-	-	-	-	-	-	-	-	2
Vegetables (other)	34	89	60	38	-	42	59	-	37	36	8
Soft Fruit	-	-	-	-	-	-	-	-	-	-	1
Top Fruit	-	-	-	-	-	-	-	-	-	-	0
Other tillage	45	31	23	14	87	31	106	39	10	24	22
All tillage	91	45	43	20	168	58	67	154	27	28	1808
Grass under 5 years old	76	28	32	11	124	34	62	94	10	20	104
Grass 5 years and over	42	12	14	5	82	30	48	34	4	7	290
All grass	48	15	17	6	94	31	53	45	5	9	394
All crops and grass	85	41	39	18	163	57	66	139	24	26	2202

The data in this table apply to farms in the 'cereals' robust group, as detailed in Appendix 3.

Source: British Survey of Fertiliser Practice 2018

Table GB4.2 Average fertiliser practice on general cropping and horticultural farms, Great Britain 2018

	Crop area receiving dressing (%)				Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
	N	P_2O_5	K_2O	FYM	N	P_2O_5	K_2O	N	P_2O_5	K_2O	
Spring wheat	96	18	18	29	140	43	68	135	8	12	18
Winter wheat	100	40	50	13	185	64	86	185	26	43	227
Spring barley	99	67	71	18	106	49	73	106	33	52	126
Winter barley	100	49	50	12	141	65	76	141	32	38	86
Oats	98	60	54	26	120	68	99	118	40	53	23
Rye/triticale/Durum wheat	-	-	-	-	-	-	-	-	-	-	4
Potatoes (seed or earlies)	-	-	-	-	-	-	-	-	-	-	3
Potatoes (maincrop)	100	87	92	30	149	109	195	149	94	180	34
Sugar beet	96	36	56	55	80	38	79	77	14	44	49
Spring oilseed rape	-	-	-	-	-	-	-	-	-	-	0
Winter oilseed rape	100	44	45	19	189	61	68	189	27	31	77
Linseed	-	-	-	-	-	-	-	-	-	-	4
Forage maize	98	55	9	60	68	-	-	67	-	-	12
Rootcrops for stockfeed	100	88	88	43	107	-	-	107	-	-	5
Leafy forage crops	-	-	-	-	-	-	-	-	-	-	2
Arable silage/other fodder crops	33	12	12	0	-	-	-	-	-	-	5
Peas - human consumption	4	31	12	1	-	85	-	-	26	-	19
Peas - animal consumption	0	9	44	0	-	-	-	-	-	-	5
Beans - animal consumption	0	31	38	0	-	56	88	-	18	33	28
Vegetables (brassicae)	100	59	57	0	101	95	-	101	56	-	7
Vegetables (other)	64	79	75	5	145	89	179	93	70	135	22
Soft Fruit	92	64	92	0	140	-	126	129	-	116	7
Top Fruit	95	92	99	0	74	13	59	70	12	58	13
Other tillage	24	10	39	15	77	-	124	19	-	48	14
All tillage	93	49	55	17	147	60	90	137	29	49	790
Grass under 5 years old	64	32	34	21	124	37	54	79	12	19	79
Grass 5 years and over	49	23	25	17	87	17	29	42	4	7	174
All grass	52	25	27	18	96	23	36	50	6	10	253
All crops and grass	82	42	47	18	138	54	81	113	23	38	1043

The data in this table apply to farms in the 'general cropping' and 'horticulture' robust groups, as detailed in Appendix 3.

Source: British Survey of Fertiliser Practice 2018

Table GB4.3 Average fertiliser practice on dairy farms, Great Britain 2018

	Crop area receiving dressing (%)				Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
	N	P_2O_5	K_2O	FYM	N	P_2O_5	K_2O	N	P_2O_5	K_2O	
Spring wheat	-	-	-	-	-	-	-	-	-	-	3
Winter wheat	92	24	25	43	174	52	60	161	13	15	66
Spring barley	80	53	55	88	86	38	41	69	20	23	43
Winter barley	90	28	35	58	155	59	70	139	17	25	20
Oats	54	14	14	39	131	-	-	71	-	-	9
Rye/triticale/Durum wheat	-	-	-	-	-	-	-	-	-	-	1
Potatoes (seed or earlies)	-	-	-	-	-	-	-	-	-	-	2
Potatoes (maincrop)	-	-	-	-	-	-	-	-	-	-	0
Sugar beet	-	-	-	-	-	-	-	-	-	-	1
Spring oilseed rape	-	-	-	-	-	-	-	-	-	-	0
Winter oilseed rape	89	45	45	80	-	-	-	-	-	-	5
Linseed	-	-	-	-	-	-	-	-	-	-	0
Forage maize	89	55	27	96	66	58	56	58	32	15	76
Rootcrops for stockfeed	82	0	51	62	-	-	-	-	-	-	5
Leafy forage crops	54	54	54	45	-	-	-	-	-	-	5
Arable silage/other fodder crops	53	17	18	80	103	34	37	55	6	7	32
Peas - human consumption	-	-	-	-	-	-	-	-	-	-	0
Peas - animal consumption	-	-	-	-	-	-	-	-	-	-	0
Beans - animal consumption	-	-	-	-	-	-	-	-	-	-	2
Vegetables (brassicae)	-	-	-	-	-	-	-	-	-	-	2
Vegetables (other)	-	-	-	-	-	-	-	-	-	-	1
Soft Fruit	-	-	-	-	-	-	-	-	-	-	0
Top Fruit	-	-	-	-	-	-	-	-	-	-	0
Other tillage	-	-	-	-	-	-	-	-	-	-	4
All tillage	84	40	32	72	114	52	56	95	20	18	277
Grass under 5 years old	90	36	41	77	148	26	43	133	9	18	221
Grass 5 years and over	81	37	40	63	127	22	32	103	8	13	282
All grass	84	36	41	68	135	23	36	114	8	15	503
All crops and grass	84	37	39	69	131	29	39	111	11	15	780

The data in this table apply to farms in the 'dairy' robust group, as detailed in Appendix 3.

Source: British Survey of Fertiliser Practice 2018

Table GB4.4 Average fertiliser practice on other livestock farms, Great Britain 2018

	Crop area receiving dressing (%)				Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
	N	P_2O_5	K_2O	FYM	N	P_2O_5	K_2O	N	P_2O_5	K_2O	
Spring wheat	70	84	84	46	134	22	45	94	19	38	8
Winter wheat	100	59	59	55	165	41	50	165	24	29	42
Spring barley	95	84	84	63	82	43	49	78	36	41	102
Winter barley	95	54	55	52	144	47	61	136	25	34	51
Oats	62	48	48	45	96	36	43	59	17	20	36
Rye/triticale/Durum wheat	-	-	-	-	-	-	-	-	-	-	2
Potatoes (seed or earlies)	-	-	-	-	-	-	-	-	-	-	0
Potatoes (maincrop)	-	-	-	-	-	-	-	-	-	-	1
Sugar beet	-	-	-	-	-	-	-	-	-	-	0
Spring oilseed rape	-	-	-	-	-	-	-	-	-	-	0
Winter oilseed rape	-	-	-	-	-	-	-	-	-	-	2
Linseed	-	-	-	-	-	-	-	-	-	-	0
Forage maize	100	87	29	98	66	47	-	66	41	-	19
Rootcrops for stockfeed	74	72	76	29	71	62	82	53	44	63	19
Leafy forage crops	74	71	74	48	83	30	50	61	21	37	22
Arable silage/other fodder crops	44	37	42	53	85	43	32	38	16	14	21
Peas - human consumption	-	-	-	-	-	-	-	-	-	-	0
Peas - animal consumption	-	-	-	-	-	-	-	-	-	-	0
Beans - animal consumption	-	-	-	-	-	-	-	-	-	-	2
Vegetables (brassicae)	-	-	-	-	-	-	-	-	-	-	2
Vegetables (other)	-	-	-	-	-	-	-	-	-	-	1
Soft Fruit	-	-	-	-	-	-	-	-	-	-	0
Top Fruit	-	-	-	-	-	-	-	-	-	-	0
Other tillage	-	-	-	-	-	-	-	-	-	-	1
All tillage	89	71	69	58	105	42	51	93	30	35	331
Grass under 5 years old	75	53	58	58	102	27	37	77	14	21	378
Grass 5 years and over	52	41	41	35	73	19	23	38	8	9	1175
All grass	55	42	43	38	78	20	25	43	9	11	1553
All crops and grass	57	44	45	39	80	22	27	46	10	12	1884

The data in this table apply to farms in the 'LFA grazing livestock' and 'lowland grazing livestock' robust groups, as detailed in Appendix 3.

Source: British Survey of Fertiliser Practice 2018

Table GB4.5 Average fertiliser practice on mixed farms, Great Britain 2018

	Crop area receiving dressing (%)				Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
	N	P_2O_5	K_2O	FYM	N	P_2O_5	K_2O	N	P_2O_5	K_2O	
Spring wheat	88	42	8	12	-	-	-	-	-	-	5
Winter wheat	96	43	44	45	177	55	75	169	23	33	196
Spring barley	97	70	74	51	109	51	72	106	36	53	143
Winter barley	99	51	53	40	151	60	77	150	30	41	97
Oats	79	49	55	16	111	54	91	88	26	50	59
Rye/triticale/Durum wheat	64	64	64	23	-	-	-	-	-	-	5
Potatoes (seed or earlies)	-	-	-	-	-	-	-	-	-	-	2
Potatoes (maincrop)	98	94	98	40	158	140	273	155	132	268	11
Sugar beet	100	61	83	22	107	-	-	107	-	-	5
Spring oilseed rape	-	-	-	-	-	-	-	-	-	-	2
Winter oilseed rape	100	38	37	41	185	64	64	185	24	24	65
Linseed	-	-	-	-	-	-	-	-	-	-	1
Forage maize	95	62	28	98	59	59	65	56	36	18	27
Rootcrops for stockfeed	94	40	71	87	88	-	43	83	-	30	9
Leafy forage crops	-	-	-	-	-	-	-	-	-	-	3
Arable silage/other fodder crops	60	18	18	70	-	55	74	-	10	13	15
Peas - human consumption	-	-	-	-	-	-	-	-	-	-	0
Peas - animal consumption	-	-	-	-	-	-	-	-	-	-	4
Beans - animal consumption	6	26	21	8	-	63	66	-	16	14	23
Vegetables (brassicae)	-	-	-	-	-	-	-	-	-	-	2
Vegetables (other)	-	-	-	-	-	-	-	-	-	-	2
Soft Fruit	-	-	-	-	-	-	-	-	-	-	1
Top Fruit	-	-	-	-	-	-	-	-	-	-	2
Other tillage	11	3	3	0	61	-	-	6	-	-	10
All tillage	91	52	53	44	143	57	81	130	29	43	689
Grass under 5 years old	80	47	59	31	133	37	53	106	17	31	193
Grass 5 years and over	52	36	37	18	78	22	26	40	8	10	269
All grass	60	39	44	22	100	27	37	60	11	16	462
All crops and grass	75	45	48	32	125	43	60	93	20	29	1151

The data in this table apply to farms in the 'mixed' robust group, as detailed in Appendix 3.

Source: British Survey of Fertiliser Practice 2018

Table EW1.1 Total fertiliser use, England & Wales 2018

	Crop area receiving dressing (%)					Average field rate (kg/ha)				Overall application rate (kg/ha)				Fields in sample
	N	P_2O_5	K_2O	SO_3	FYM	N	P_2O_5	K_2O	SO_3	N	P_2O_5	K_2O	SO_3	
Spring wheat	91	42	27	51	19	149	60	50	55	135	25	13	28	59
Winter wheat	98	39	41	72	25	191	59	66	55	187	23	27	40	1120
Spring barley	95	45	46	58	21	106	47	57	48	101	21	26	28	516
Winter barley	97	39	42	66	23	146	61	72	50	142	24	30	33	408
Oats	85	36	37	51	22	106	51	63	43	90	19	24	22	166
Rye/triticale/Durum wheat	85	35	35	52	45	101	69	56	42	86	24	20	22	16
Potatoes (seed or earlies)	100	100	100	32	6	120	135	237	-	120	135	237	-	5
Potatoes (maincrop)[1]	100	86	98	20	35	133	107	208	-	132	92	203	-	46
Sugar beet	98	43	55	62	45	82	42	79	39	80	18	43	24	78
Spring oilseed rape	-	-	-	-	-	-	-	-	-	-	-	-	-	4
Winter oilseed rape	99	44	38	79	25	191	57	65	78	189	25	25	61	450
Linseed	97	31	15	73	3	80	52	37	39	78	16	5	28	22
Forage maize	92	58	23	22	88	66	58	66	36	61	34	15	8	152
Rootcrops for stockfeed	65	36	57	36	66	99	77	87	68	64	28	49	24	37
Leafy forage crops	52	42	42	22	68	39	22	28	-	20	9	12	-	16
Arable silage/other fodder crops	37	16	14	20	42	119	56	52	59	44	9	7	12	82
Vining peas (for human consumption)	3	38	21	5	2	-	89	95	-	-	34	20	-	23
Field peas (harvested dry)	2	21	32	16	5	-	37	61	-	-	8	20	-	26
Field beans (harvested dry)	1	29	33	4	2	-	60	67	60	-	17	22	2	158
Vegetables (brassicae)	96	61	61	2	4	93	82	142	-	89	50	87	-	14
Vegetable Other	59	80	73	11	12	150	80	159	95	88	64	116	11	31
Soft Fruit	98	68	98	39	0	140	-	126	-	137	-	123	-	7
Top Fruit	94	91	98	15	0	74	13	59	-	70	12	58	-	15
Other tillage	33	17	24	34	19	73	32	116		24	5	28	14	49
All tillage	91	41	41	62	26	160	57	71	58	145	24	29	36	3500
Grass less than five years old	78	38	44	20	54	126	29	43	40	99	11	19	8	762
Grass five years and over	52	32	33	10	33	87	20	25	39	45	6	8	4	1882
All grass	56	33	35	11	37	96	22	29	39	54	7	10	5	2644
All crops and grass	72	37	38	35	32	134	40	50	55	97	15	19	19	6144

Source: British Survey of Fertiliser Practice 2018

[1] Sulphur rates on potatoes are not shown as some growers apply additional sulphur to acidify the soil for this crop. **These applications cannot be separated from those intended as a fertiliser nutrient.**

Table EW1.2 Use of straight fertiliser, England & Wales 2018

	Crop area receiving dressing (%)			Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O	
Spring wheat	90	19	9	142	53	46	128	10	4	59
Winter wheat	97	14	15	188	65	73	182	9	11	1120
Spring barley	86	9	13	103	59	75	89	5	10	516
Winter barley	95	11	14	144	71	76	138	8	11	408
Oats	79	9	7	101	70	81	80	7	6	166
Rye/triticale/Durum wheat	84	4	4	102	-	-	85	-	-	16
Potatoes (seed or earlies)	6	0	0	-	-	-	-	-	-	5
Potatoes (maincrop)	40	3	32	86	-	210	34	-	68	46
Sugar beet	94	6	20	77	-	86	73	-	18	78
Spring oilseed rape	-	-	-	-	-	-	-	-	-	4
Winter oilseed rape	98	11	17	184	60	67	181	6	12	450
Linseed	97	16	11	78	-	-	76	-	-	22
Forage maize	60	6	7	74	95	109	45	5	8	152
Rootcrops for stockfeed	36	6	15	110	-	134	40	-	21	37
Leafy forage crops	10	0	0	-	-	-	-	-	-	16
Arable silage/other fodder crops	34	5	2	121	83	-	41	4	-	82
Peas - human consumption	0	30	14	-	100	-	-	31	-	23
Peas - animal consumption	0	13	25	-	-	-	-	-	-	26
Beans - animal consumption	1	14	19	-	63	72	-	9	13	158
Vegetables (brassicae)	79	0	0	82	-	-	65	-	-	14
Vegetables (other)	29	12	13	77	-	81	22	-	10	31
Soft Fruit	70	0	30	-	-	-	-	-	-	7
Top Fruit	63	14	21	100	-	-	62	-	-	15
Other tillage	27	8	18	82	-	140	22	-	25	49
All tillage	86	12	15	159	64	78	137	8	11	3500
Grass under 5 years old	51	1	4	126	59	78	64	1	3	762
Grass 5 years and over	24	0	1	101	69	83	25	0	1	1882
All grass	29	0	1	109	64	80	31	0	1	2644
All crops and grass	55	6	8	145	64	78	81	4	6	6144

Source: British Survey of Fertiliser Practice 2018

Table EW1.3 Use of compound fertiliser, England & Wales 2018

	Crop area receiving dressing (%)			Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O	
Spring wheat	13	24	18	52	65	53	7	15	9	59
Winter wheat	8	25	26	68	55	61	6	14	16	1120
Spring barley	23	36	33	53	43	49	12	16	16	516
Winter barley	9	28	28	53	56	69	5	16	19	408
Oats	17	27	31	61	44	57	10	12	18	166
Rye/triticale/Durum wheat	2	31	31	-	-	-	-	-	-	16
Potatoes (seed or earlies)	100	100	100	117	135	237	117	135	237	5
Potatoes (maincrop)	86	83	81	113	109	166	98	90	135	46
Sugar beet	17	37	36	42	39	71	7	15	25	78
Spring oilseed rape	-	-	-	-	-	-	-	-	-	4
Winter oilseed rape	22	34	22	34	56	60	8	19	13	450
Linseed	15	16	4	-	-	-	-	-	-	22
Forage maize	54	53	16	30	53	47	16	28	7	152
Rootcrops for stockfeed	32	30	43	77	79	66	25	24	29	37
Leafy forage crops	42	42	42	35	22	28	15	9	12	16
Arable silage/other fodder crops	4	11	12	65	45	52	3	5	6	82
Peas - human consumption	3	7	7	-	-	-	-	-	-	23
Peas - animal consumption	2	7	7	-	50	61	-	4	4	26
Beans - animal consumption	1	15	14	-	58	61	-	8	9	158
Vegetables (brassicae)	61	61	61	40	82	142	24	50	87	14
Vegetables (other)	47	71	60	140	82	176	66	58	106	31
Soft Fruit	68	68	68	-	-	-	-	-	-	7
Top Fruit	74	77	77	10	10	27	7	8	21	15
Other tillage	9	10	7	25	33	52	2	3	3	49
All tillage	16	30	27	54	54	65	9	16	17	3500
Grass under 5 years old	40	37	41	88	27	39	35	10	16	762
Grass 5 years and over	33	32	33	63	19	24	20	6	8	1882
All grass	34	32	34	68	21	27	23	7	9	2644
All crops and grass	25	31	31	64	36	42	16	11	13	6144

Source: British Survey of Fertiliser Practice 2018

Table EW1.4 Use of lime, England & Wales 2018

	Crop area receiving dressing (%)						Average application rate (tonnes of product/ha)						Fields in sample	
	Limestone (ground, screened)	Chalk	Magnesian limestone	Sugar beet lime	Other	All	Limestone (ground, screened)	Chalk	Magnesian limestone	Sugar beet lime	Other	All	Fields limed	
Spring wheat	-	-	-	-	-	-	-	-	-	-	-	-	2	59
Winter wheat	3.1	1.2	0.2	-	0.4	5.0	4.5	4.3	4.4	-	1.1	4.2	62	1120
Spring barley	4.9	0.0	-	-	0.3	5.2	4.4	5.0	-	-	0.4	4.2	41	516
Winter barley	6.3	1.0	-	-	0.4	7.7	3.8	3.5	-	-	0.5	3.6	31	408
Oats	1.7	1.4	-	-	0.5	3.6	4.4	12.5	-	-	0.8	7.0	9	166
Rye/triticale/Durum wheat	-	-	-	-	-	-	-	-	-	-	-	-	0	16
Potatoes (seed or earlies)	-	-	-	-	-	-	-	-	-	-	-	-	0	5
Potatoes (maincrop)	-	-	-	-	-	-	-	-	-	-	-	-	0	46
Sugar beet	11.2	1.4	1.5	13.2	-	27.3	4.4	5.0	5.0	7.8	-	6.1	22	78
Spring oilseed rape	-	-	-	-	-	-	-	-	-	-	-	-	0	4
Winter oilseed rape	4.2	0.4	0.5	0.2	-	5.4	4.6	4.8	4.2	5.0	-	4.6	33	450
Linseed	-	-	-	-	-	-	-	-	-	-	-	-	2	22
Forage maize	8.5	1.1	0.3	0.2	-	10.0	3.2	5.0	6.3	3.8	-	3.5	16	152
Rootcrops for stockfeed	11.8	-	3.8	-	-	15.6	4.6	-	5.0	-	-	4.7	7	37
Leafy forage crops	-	-	-	-	-	-	-	-	-	-	-	-	1	16
Arable silage/other fodder crops	4.3	0.8	-	-	1.5	6.6	5.1	5.0	-	-	0.3	4.0	7	82
Peas - human consumption	-	-	-	-	-	-	-	-	-	-	-	-	0	23
Peas - animal consumption	-	-	-	-	-	-	-	-	-	-	-	-	0	26
Beans - animal consumption	-	-	-	-	-	-	-	-	-	-	-	-	2	158
Vegetables (brassicae)	-	-	-	-	-	-	-	-	-	-	-	-	4	14
Vegetables (other)	-	-	-	-	-	-	-	-	-	-	-	-	1	31
Soft Fruit	-	-	-	-	-	-	-	-	-	-	-	-	0	7
Top Fruit	-	-	-	-	-	-	-	-	-	-	-	-	2	15
Other tillage	-	-	-	-	-	-	-	-	-	-	-	-	1	49
All tillage	4.0	0.8	0.3	0.3	0.3	5.8	4.3	4.8	4.0	7.4	0.8	4.3	243	3500
Grass under 5 years old	4.9	-	0.1	-	0.7	5.6	4.3	-	5.5	12.0	0.4	3.9	57	762
Grass 5 years and over	1.7	0.1	-	-	0.1	2.0	4.2	3.2	6.8	-	0.4	3.9	66	1882
All grass	2.3	0.1	0.1	-	0.2	2.6	4.2	3.2	6.4	12.0	0.4	3.9	123	2644
All crops and grass	3.1	0.4	0.1	0.2	0.3	4.1	4.3	4.7	4.5	7.5	0.6	4.2	366	6144

Source: British Survey of Fertiliser Practice 2018

Table EW1.5 Percentage of crop area by field application rate - Nitrogen, England & Wales 2018

	kg/ha																		Fields in
row %	0	<25	25-	50-	75-	100-	125-	150-	175-	200-	225-	250-	275-	300-	325-	350-	375-	400+	sample
Spring wheat	9	0	0	6	10	3	25	25	13	4	3	-	-	-	-	-	-	-	59
Winter wheat	2	0	1	2	3	8	10	14	14	20	15	6	3	2	-	-	-	-	1120
Spring barley	5	1	8	11	20	21	25	9	1	-	-	-	-	-	-	-	-	-	516
Winter barley	3	0	1	5	6	13	22	26	15	8	1	-	-	-	-	-	-	-	408
Oats	15	0	2	10	21	33	12	5	2	-	-	-	-	-	-	-	-	-	166
Rye/triticale/Durum wheat	15	0	3	37	16	4	0	26	-	-	-	-	-	-	-	-	-	-	16
Potatoes (seed or earlies)	0	0	0	29	0	0	64	0	6	-	-	-	-	-	-	-	-	-	5
Potatoes (maincrop)	0	5	1	2	35	9	4	13	13	7	8	1	-	-	-	-	-	-	46
Sugar beet	2	3	21	17	22	27	5	0	2	-	-	-	-	-	-	-	-	-	78
Spring oilseed rape	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
Winter oilseed rape	1	0	0	3	3	8	8	14	15	13	19	10	4	1	-	-	-	-	450
Linseed	3	0	11	18	53	7	8	-	-	-	-	-	-	-	-	-	-	-	22
Forage maize	8	23	13	23	16	9	9	1	-	-	-	-	-	-	-	-	-	-	152
Rootcrops for stockfeed	35	0	9	16	15	8	10	2	0	5	0	0	0	1	-	-	-	-	37
Leafy forage crops	48	22	7	17	6	-	-	-	-	-	-	-	-	-	-	-	-	-	16
Arable silage/other fodder crops	63	1	3	0	4	16	3	4	2	3	-	-	-	-	-	-	-	-	82
Peas - human consumption	97	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	23
Peas - animal consumption	98	0	0	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26
Beans - animal consumption	99	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	158
Vegetables (brassicae)	4	0	10	4	48	33	0	2	-	-	-	-	-	-	-	-	-	-	14
Vegetables (other)	41	5	2	3	7	0	2	4	22	14	-	-	-	-	-	-	-	-	31
Soft Fruit	2	0	29	0	0	30	0	0	0	0	39	-	-	-	-	-	-	-	7
Top Fruit	6	27	17	0	14	30	0	7	-	-	-	-	-	-	-	-	-	-	15
Other tillage	67	6	6	7	9	0	0	0	5	-	-	-	-	-	-	-	-	-	49
All tillage	9	1	3	5	8	11	12	12	10	11	9	4	2	1	-	-	-	-	3500
Grass under 5 years old	22	1	8	13	11	9	9	9	4	4	3	5	2	-	-	-	-	-	762
Grass 5 years and over	48	2	13	12	9	3	3	4	2	1	1	1	-	-	-	-	-	-	1882
All grass	44	2	12	13	9	5	4	5	2	2	1	2	-	-	-	-	-	-	2644
All crops and grass	28	2	8	9	8	8	8	8	6	6	5	3	1	-	-	-	-	-	6144

Source: British Survey of Fertiliser Practice 2018

Table EW1.6 Percentage of crop area by field application rate - Phosphate, England & Wales 2018

	kg/ha																		Fields in
row %	0	<25	25-	50-	75-	100-	125-	150-	175-	200-	225-	250-	275-	300-	325-	350-	375-	400+	sample
Spring wheat	58	8	6	12	11	5	-	-	-	-	-	-	-	-	-	-	-	-	59
Winter wheat	61	4	10	16	8	2	-	-	-	-	-	-	-	-	-	-	-	-	1120
Spring barley	55	9	14	15	4	2	-	-	-	-	-	-	-	-	-	-	-	-	516
Winter barley	61	2	10	16	9	2	-	-	-	-	-	-	-	-	-	-	-	-	408
Oats	64	6	13	13	2	3	-	-	-	-	-	-	-	-	-	-	-	-	166
Rye/triticale/Durum wheat	65	0	22	0	0	13	-	-	-	-	-	-	-	-	-	-	-	-	16
Potatoes (seed or earlies)	0	0	0	0	0	29	64	6	-	-	-	-	-	-	-	-	-	-	5
Potatoes (maincrop)	14	4	10	7	25	13	2	4	16	5	0	1	-	-	-	-	-	-	46
Sugar beet	57	10	16	13	4	-	-	-	-	-	-	-	-	-	-	-	-	-	78
Spring oilseed rape	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
Winter oilseed rape	56	4	13	16	9	2	-	-	-	-	-	-	-	-	-	-	-	-	450
Linseed	69	6	6	12	7	-	-	-	-	-	-	-	-	-	-	-	-	-	22
Forage maize	42	4	15	26	8	3	1	1	-	-	-	-	-	-	-	-	-	-	152
Rootcrops for stockfeed	64	0	7	9	15	5	-	-	-	-	-	-	-	-	-	-	-	-	37
Leafy forage crops	58	33	6	0	3	-	-	-	-	-	-	-	-	-	-	-	-	-	16
Arable silage/other fodder crops	84	2	5	5	1	2	-	-	-	-	-	-	-	-	-	-	-	-	82
Peas - human consumption	62	2	3	11	10	0	12	-	-	-	-	-	-	-	-	-	-	-	23
Peas - animal consumption	79	13	2	6	1	-	-	-	-	-	-	-	-	-	-	-	-	-	26
Beans - animal consumption	71	2	8	11	5	1	1	-	-	-	-	-	-	-	-	-	-	-	158
Vegetables (brassicae)	39	4	10	3	39	0	3	0	0	0	0	0	2	-	-	-	-	-	14
Vegetables (other)	20	2	16	29	0	29	0	0	0	0	0	2	1	-	-	-	-	-	31
Soft Fruit	32	0	29	39	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7
Top Fruit	9	69	23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15
Other tillage	83	4	13	0	0	1	-	-	-	-	-	-	-	-	-	-	-	-	49
All tillage	59	5	11	15	7	2	-	-	-	-	-	-	-	-	-	-	-	-	3500
Grass under 5 years old	62	18	14	5	1	-	-	-	-	-	-	-	-	-	-	-	-	-	762
Grass 5 years and over	68	22	9	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1882
All grass	67	21	10	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	2644
All crops and grass	63	14	10	8	4	1	-	-	-	-	-	-	-	-	-	-	-	-	6144

Source: British Survey of Fertiliser Practice 2018

Table EW1.7 Percentage of crop area by field application rate - Potash, England & Wales 2018

	kg/ha																		Fields in
row %	0	<25	25-	50-	75-	100-	125-	150-	175-	200-	225-	250-	275-	300-	325-	350-	375-	400+	sample
Spring wheat	73	3	15	2	7	1	-	-	-	-	-	-	-	-	-	-	-	-	59
Winter wheat	59	4	8	13	9	5	1	-	-	-	-	-	-	-	-	-	-	-	1120
Spring barley	54	7	11	11	11	4	-	-	-	-	-	-	-	-	-	-	-	-	516
Winter barley	58	1	7	13	14	6	-	-	-	-	-	-	-	-	-	-	-	-	408
Oats	63	5	7	15	4	4	2	-	-	-	-	-	-	-	-	-	-	-	166
Rye/triticale/Durum wheat	65	0	18	13	4	-	-	-	-	-	-	-	-	-	-	-	-	-	16
Potatoes (seed or earlies)	0	0	0	0	0	0	0	0	3	62	6	0	0	29	-	-	-	-	5
Potatoes (maincrop)	2	0	0	0	26	6	4	6	1	10	2	19	2	8	5	7	3	-	46
Sugar beet	45	1	15	12	14	7	3	3	-	-	-	-	-	-	-	-	-	-	78
Spring oilseed rape	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
Winter oilseed rape	62	2	10	13	9	3	0	1	-	-	-	-	-	-	-	-	-	-	450
Linseed	85	0	12	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	22
Forage maize	77	2	5	7	4	1	1	2	-	-	-	-	-	-	-	-	-	-	152
Rootcrops for stockfeed	43	8	13	5	12	5	1	6	2	0	3	-	-	-	-	-	-	-	37
Leafy forage crops	58	28	12	0	0	3	-	-	-	-	-	-	-	-	-	-	-	-	16
Arable silage/other fodder crops	86	2	5	4	3	-	-	-	-	-	-	-	-	-	-	-	-	-	82
Peas - human consumption	79	0	2	6	2	7	0	5	-	-	-	-	-	-	-	-	-	-	23
Peas - animal consumption	68	11	2	6	1	12	-	-	-	-	-	-	-	-	-	-	-	-	26
Beans - animal consumption	67	2	9	8	8	6	-	-	-	-	-	-	-	-	-	-	-	-	158
Vegetables (brassicae)	39	2	5	13	0	0	0	0	39	0	0	3	-	-	-	-	-	-	14
Vegetables (other)	27	3	0	21	4	5	0	3	0	0	32	5	-	-	-	-	-	-	31
Soft Fruit	2	0	29	0	0	30	0	0	39	-	-	-	-	-	-	-	-	-	7
Top Fruit	2	35	9	34	7	0	0	0	0	14	-	-	-	-	-	-	-	-	15
Other tillage	76	1	5	0	2	6	4	0	3	0	2	-	-	-	-	-	-	-	49
All tillage	59	4	9	12	9	4	1	-	-	-	-	-	-	-	-	-	-	-	3500
Grass under 5 years old	56	14	16	6	4	2	0	1	-	-	-	-	-	-	-	-	-	-	762
Grass 5 years and over	67	19	10	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1882
All grass	65	19	11	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-	2644
All crops and grass	62	12	10	7	5	2	-	-	-	-	-	-	-	-	-	-	-	-	6144

Source: British Survey of Fertiliser Practice 2018

Table EW2.1 Average fertiliser practice by grassland utilisation, England & Wales 2018

	Crop area receiving dressing (%)				Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
	N	P_2O_5	K_2O	FYM	N	P_2O_5	K_2O	N	P_2O_5	K_2O	
Grazed not mown	44	27	28	19	75	18	19	33	5	5	1169
Grazed mown	72	43	47	61	107	24	34	77	10	16	1184
All grazings	54	33	35	35	91	21	27	49	7	9	2353
Cut for silage - grazed	79	46	52	71	116	25	36	92	12	19	860
Cut for silage - not grazed	85	32	39	74	151	30	55	128	10	22	187
All cut for silage	80	43	49	72	123	26	39	99	11	19	1047
Cut for hay - grazed	60	43	42	39	76	22	29	45	9	12	365
Cut for hay - not grazed	73	50	50	38	81	25	40	59	12	20	69
All cut for hay	62	44	43	39	77	22	31	47	10	13	434
All mowings	74	42	46	63	114	25	37	85	10	17	1430
All grass	56	33	35	37	96	22	29	54	7	10	2644

Source: British Survey of Fertiliser Practice 2018

Table EW2.2 Percentage of grass area by field application rate - Nitrogen, England & Wales 2018

	kg/ha																		Fields in
row %	0	<25	25-	50-	75-	100-	125-	150-	175-	200-	225-	250-	275-	300-	325-	350-	375-	400+	sample
Grazed not mown	56	2	15	12	6	3	2	2	1	1	0	1	-	-	-	-	-	-	1169
Grazed mown	28	3	10	13	14	7	8	8	3	2	1	2	1	-	-	-	-	-	1184
All grazings	46	2	13	13	9	4	4	4	2	1	1	1	-	-	-	-	-	-	2353
Cut for silage - grazed	21	2	8	13	16	7	10	11	4	3	2	3	1	-	-	-	-	-	860
Cut for silage - not grazed	15	0	5	9	15	9	9	8	6	5	8	8	1	0	0	0	2	-	187
All cut for silage	20	2	7	12	15	8	10	10	4	3	3	4	1	-	-	-	-	-	1047
Cut for hay - grazed	40	4	14	15	15	4	3	4	1	0	1	-	-	-	-	-	-	-	365
Cut for hay - not grazed	27	3	11	32	10	9	1	6	0	0	0	0	2	-	-	-	-	-	69
All cut for hay	38	4	14	17	14	4	3	4	1	0	1	-	-	-	-	-	-	-	434
All mowings	26	2	9	13	14	7	8	8	4	3	2	3	1	-	-	-	-	-	1430
All grass	44	2	12	13	9	5	4	5	2	2	1	2	-	-	-	-	-	-	2644

Source: British Survey of Fertiliser Practice 2018

Table EW2.3 Percentage of grass area by field application rate - Phosphate, England & Wales 2018

	kg/ha																	Fields in
row %	0	<25	25-	50-	75-	100-	125-	150-	175-	200-	225-	250-	275-	300-	325-	350-	375-	400+	sample
Grazed not mown	73	20	5	0	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1169
Grazed mown	57	24	16	3	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1184
All grazings	67	22	9	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	2353
Cut for silage - grazed	54	24	19	3	1	-	-	-	-	-	-	-	-	-	-	-	-	-	860
Cut for silage - not grazed	68	15	11	5	1	-	-	-	-	-	-	-	-	-	-	-	-	-	187
All cut for silage	57	22	17	4	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1047
Cut for hay - grazed	57	22	19	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	365
Cut for hay - not grazed	50	27	21	0	1	-	-	-	-	-	-	-	-	-	-	-	-	-	69
All cut for hay	56	23	19	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	434
All mowings	58	23	15	3	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1430
All grass	67	21	10	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	2644

Source: British Survey of Fertiliser Practice 2018

Table EW2.4 Percentage of crop area by field application rate - Potash, England & Wales 2018

	kg/ha																	Fields in
row %	0	<25	25-	50-	75-	100-	125-	150-	175-	200-	225-	250-	275-	300-	325-	350-	375-	400+	sample
Grazed not mown	72	20	6	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1169
Grazed mown	53	18	19	6	2	1	-	-	-	-	-	-	-	-	-	-	-	-	1184
All grazings	65	19	11	3	1	-	-	-	-	-	-	-	-	-	-	-	-	-	2353
Cut for silage - grazed	48	19	22	7	3	1	0	1	-	-	-	-	-	-	-	-	-	-	860
Cut for silage - not grazed	61	9	13	4	9	2	0	2	-	-	-	-	-	-	-	-	-	-	187
All cut for silage	51	17	20	6	4	2	0	1	-	-	-	-	-	-	-	-	-	-	1047
Cut for hay - grazed	58	18	18	5	2	-	-	-	-	-	-	-	-	-	-	-	-	-	365
Cut for hay - not grazed	50	18	24	0	4	0	1	2	-	-	-	-	-	-	-	-	-	-	69
All cut for hay	57	18	19	4	2	-	-	-	-	-	-	-	-	-	-	-	-	-	434
All mowings	54	17	19	5	3	1	0	1	-	-	-	-	-	-	-	-	-	-	1430
All grass	65	19	11	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-	2644

Source: British Survey of Fertiliser Practice 2018

Table EW3.0 Product use by month of application, England & Wales 2018

(a) Product use

row %	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Straight N	1	0	0	0	0	3	27	41	20	4	2	1
Straight P	12	11	16	1	1	12	16	20	10	0	0	1
Straight K	5	6	6	4	2	13	22	29	9	1	0	1
Straight S	0	0	0	0	0	7	33	50	8	0	0	0
Compounds	6	5	2	0	1	2	17	29	18	6	4	9
All fertilisers	2	2	1	0	0	3	24	37	19	4	2	3

(b) Nutrient use

row %	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Nitrogen	1	0	0	0	0	3	25	40	21	5	3	2
Phosphate	10	9	7	1	1	6	18	23	14	2	1	8
Potash	6	7	5	1	1	6	21	26	15	4	2	6
Sulphur	0	0	0	0	1	7	42	34	12	2	1	1
Total	2	2	1	0	0	4	26	36	18	4	2	3

Note: All fertilisers includes other straight fertilisers (e.g. trace elements)

'Product' refers to the total tonnage of the products used by the farmers in the survey year 2018.

'Nutrient' refers to the tonnage of each nutrient contained in the products used.

(e.g. 100 kg of a 20:10:10 compound contains 20 kg of N, 10 kg of P_2O_5 and 10 kg of K_2O, while 100 kg of ammonium nitrate (straight N) contains typically 34.5 kg of N).

Estimates of total nutrients are shown in Section B, Table B2.6.

Source: British Survey of Fertiliser Practice 2018

Table EW3.1 Product type as percentage of all product used by crop group, England & Wales 2018

column %	spring cereal	winter cereal	potatoes	sugar beet	oilseed rape	other tillage	all tillage	grass for grazing	grass for hay	grass for silage	grass not specified	all grass	all crops and grass
Ammonium Nitrate	40.8	46.3	8.6	26.2	41.6	22.9	41.4	32.3	24.7	33.6	9.8	33.9	39.6
Urea	9.7	11.2	0.6	5.7	15.0	4.4	10.7	5.0	4.1	5.7	7.5	5.4	9.4
Calcium Ammonium Nitrate (CAN)	1.0	1.4	0.2	3.7	1.6	2.5	1.5	2.0	0.8	2.0	2.5	1.9	1.6
Urea Ammonium Nitrate (UAN)	11.7	17.6	0.3	8.2	20.1	4.3	15.5	1.5	2.5	1.7	16.8	1.6	12.1
Other Straight N	1.9	1.5	0.6	2.5	2.1	2.0	1.7	1.0	0.5	0.6	0.0	1.0	1.5
Triple Superphosphate (TSP)	2.8	2.7	0.8	1.3	2.2	7.2	2.9	0.4	0.4	0.4	0.0	0.4	2.3
Other Straight P	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Muriate of Potash (MOP)	3.1	2.6	11.4	2.0	2.4	6.6	3.2	0.5	1.3	0.7	3.6	0.7	2.6
Other Straight K	0.3	0.5	0.0	12.7	0.6	2.9	0.9	0.0	0.0	0.5	0.0	0.3	0.8
PK	8.5	9.6	0.5	23.2	5.7	11.8	9.0	2.9	3.0	2.7	7.9	2.7	7.4
NK	1.4	1.2	2.1	3.2	0.9	2.9	1.4	7.1	3.9	9.3	0.0	6.9	2.7
Low N (<19% N)	6.5	2.8	72.4	3.3	6.3	24.0	7.5	2.8	10.6	2.7	32.3	3.3	6.4
High N (>=19% N)	12.0	2.4	2.5	2.7	0.9	4.5	3.6	44.3	48.2	39.9	19.5	41.4	13.0
Other	0.3	0.3	0.0	5.5	0.8	3.8	0.7	0.2	0.0	0.2	0.0	0.1	0.6
Total product ('000 tonnes)	**267**	**1431**	**41**	**49**	**440**	**125**	**2354**	**770**	**103**	**524**	**7**	**915**	**3268**

Source: British Survey of Fertiliser Practice 2018

Table EW3.2 Use of product type by crop group, England & Wales 2018

row %	spring cereal	winter cereal	potatoes	sugar beet	oilseed rape	other tillage	all tillage	grass for grazing	grass for hay	grass for silage	grass not specified	all grass	total product ('000 tonnes)
Ammonium Nitrate	11.1	65.8	0.3	1.2	18.8	2.7	74.1	78.1	7.5	59.9	0.7	25.9	1301
Urea	11.2	62.4	0.1	1.4	22.7	2.3	87.2	80.4	5.1	60.2	1.7	12.8	327
Calcium Ammonium Nitrate (CAN)	14.1	51.5	0.3	3.8	18.3	11.9	64.8	89.8	1.4	57.6	0.1	35.2	66
Urea Ammonium Nitrate (UAN)	8.1	68.2	0.0	1.1	21.4	1.2	97.3	90.4	11.4	75.4	7.6	2.7	442
Other Straight N	16.5	48.3	0.5	1.6	27.3	5.9	79.4	92.7	0.6	20.0	0.0	20.6	53
Triple Superphosphate (TSP)	12.1	62.5	0.3	1.0	13.4	10.7	95.4	74.1	2.5	47.6	0.0	4.6	72
Other Straight P	0.0	0.0	0.0	0.0	0.0	100.0	16.9	100.0	0.0	100.0	0.0	83.1	1
Muriate of Potash (MOP)	12.3	51.8	5.9	1.4	15.6	13.0	91.6	51.7	11.9	72.9	2.4	8.4	77
Other Straight K	2.6	32.9	0.0	34.2	12.2	18.0	85.3	18.0	0.0	100.0	0.0	14.7	22
PK	10.8	64.5	0.2	6.1	12.3	6.1	92.8	94.4	8.9	51.9	1.6	7.2	209
NK	9.7	64.2	5.1	2.1	10.3	8.6	38.1	89.1	7.2	79.7	0.0	61.9	85
Low N (<19% N)	13.3	19.7	23.0	1.4	20.3	22.1	85.6	79.5	29.3	38.8	5.9	14.4	151
High N (>=19% N)	38.8	36.2	2.3	2.2	4.4	16.1	12.5	89.3	16.0	52.7	0.3	87.5	442
Other	4.3	28.8	0.0	12.3	16.4	38.3	98.8	100.0	0.0	78.0	0.0	1.2	20
All Fertilisers	**11.4**	**60.8**	**1.7**	**2.1**	**18.7**	**5.3**	**72.0**	**84.1**	**11.3**	**57.2**	**0.7**	**28.0**	**3268**

Source: British Survey of Fertiliser Practice 2018

Table EW3.3 Product use by month of application, England & Wales 2018

row %	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	total product ('000 tonnes)
Ammonium Nitrate	0.0	2.1	25.1	40.2	22.6	5.3	2.4	1.7	0.6	0.1	0.0	0.0	1301
Urea	0.0	4.4	30.9	42.7	15.2	3.4	1.3	0.8	0.4	0.9	0.1	0.0	327
Calcium Ammonium Nitrate (CAN)	0.2	1.5	26.4	33.6	19.2	5.1	11.9	1.9	0.2	0.0	0.0	0.0	66
Urea Ammonium Nitrate (UAN)	0.0	6.0	31.0	42.8	17.8	1.1	0.1	0.5	0.3	0.4	0.0	0.0	442
Other Straight N	0.0	8.4	34.7	31.0	18.3	1.5	1.2	3.7	0.5	0.8	0.0	0.0	53
Triple Superphosphate (TSP)	1.3	12.1	16.4	19.8	9.5	0.0	0.0	1.2	12.4	11.0	15.4	1.0	72
Other Straight P	0.0	0.0	2.4	11.8	85.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1
Muriate of Potash (MOP)	0.6	13.9	24.3	30.7	10.0	1.2	0.5	0.8	2.7	7.2	6.8	1.3	77
Other Straight K	9.0	10.6	15.4	24.7	7.5	0.0	0.0	0.0	14.4	0.9	2.5	15.1	22
PK	2.6	6.2	15.3	10.8	6.5	0.8	0.1	13.8	19.0	14.3	8.9	1.8	209
NK	0.0	0.5	15.8	21.0	26.1	21.3	9.6	3.7	2.0	0.0	0.0	0.0	85
Low N (<19% N)	1.3	1.0	29.5	25.9	15.3	1.5	1.0	11.4	6.2	5.8	0.9	0.0	151
High N (>=19% N)	0.0	0.6	14.4	40.6	23.3	7.6	5.1	6.8	1.1	0.4	0.1	0.0	442
Other	0.0	6.0	28.1	42.8	7.1	3.6	0.0	0.5	0.8	0.3	1.5	9.3	20
All Fertilisers	**0.3**	**3.5**	**24.3**	**36.7**	**19.1**	**4.5**	**2.4**	**3.4**	**2.5**	**1.8**	**1.2**	**0.3**	**3268**

Source: British Survey of Fertiliser Practice 2018

Table EW4.1a Average fertiliser practice on tillage and grassland by GOR, England & Wales 2018

		Crop area receiving dressing (%)				Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
		N	P_2O_5	K_2O	FYM	N	P_2O_5	K_2O	N	P_2O_5	K_2O	
North West	All tillage	88	19	30	47	143	65	121	126	13	36	100
	All grass	63	41	42	59	109	20	26	69	8	11	277
	All crops and grass	67	38	41	57	115	23	36	77	9	15	377
North East	All tillage	86	70	63	25	177	64	69	152	44	44	202
	All grass	33	23	26	19	87	33	41	29	8	10	223
	All crops and grass	51	39	39	21	139	51	57	71	20	22	425
Eastern	All tillage	91	37	31	15	151	56	64	138	21	20	668
	All grass	38	17	23	2	72	19	38	27	3	9	90
	All crops and grass	86	35	30	13	147	54	62	127	19	19	758
Yorkshire and the Humber	All tillage	94	49	51	24	176	63	81	165	31	41	633
	All grass	59	43	48	42	93	20	27	55	8	13	335
	All crops and grass	80	46	50	32	151	47	60	120	22	30	968
West Midlands	All tillage	93	29	36	41	165	47	82	154	14	30	316
	All grass	69	29	32	33	107	26	37	73	7	12	210
	All crops and grass	80	29	34	37	139	36	60	112	10	20	526
East Midlands	All tillage	94	35	35	20	165	57	61	155	20	21	493
	All grass	51	16	19	31	94	24	40	48	4	8	186
	All crops and grass	80	29	30	24	150	51	56	119	15	17	679
South West	All tillage	84	49	48	43	140	56	70	117	27	33	584
	All grass	57	30	32	43	98	23	29	56	7	9	679
	All crops and grass	66	36	37	43	116	37	46	76	14	17	1263
South East	All tillage	90	42	42	19	171	53	62	155	22	26	387
	All grass	35	13	14	12	76	24	34	27	3	5	230
	All crops and grass	68	30	30	16	151	48	57	102	14	17	617
Wales	All tillage	83	63	65	53	120	62	70	99	39	46	117
	All grass	66	49	50	37	89	19	24	59	9	12	414
	All crops and grass	67	50	51	38	92	23	28	62	11	14	531

Source: British Survey of Fertiliser Practice 2018

Table EW4.1b Average fertiliser practice on tillage and grassland by BSFP region, England & Wales 2018

		Crop area receiving dressing (%)				Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
		N	P_2O_5	K_2O	FYM	N	P_2O_5	K_2O	N	P_2O_5	K_2O	
Wessex	All tillage	89	50	51	45	139	51	65	123	26	34	304
	All grass	55	19	20	42	101	23	27	55	4	5	295
	All crops and grass	68	31	32	43	121	41	51	83	13	17	599
Anglia	All tillage	91	37	31	15	151	56	64	138	21	20	668
	All grass	38	17	23	2	72	19	38	27	3	9	90
	All crops and grass	86	35	30	13	147	54	62	127	19	19	758
Northern	All tillage	84	64	58	29	163	67	90	138	43	52	202
	All grass	53	38	41	45	103	23	29	55	9	12	394
	All crops and grass	59	43	44	42	119	35	44	70	15	19	596
North East	All tillage	94	50	52	25	175	62	77	164	31	40	698
	All grass	58	41	46	41	90	20	27	52	8	12	393
	All crops and grass	79	28	49	32	149	46	58	117	21	28	1091
North Mercia	All tillage	89	18	31	58	157	42	77	140	8	24	172
	All grass	70	28	30	45	118	25	38	82	7	11	169
	All crops and grass	76	25	30	49	133	29	51	102	7	16	341
South Mercia	All tillage	85	28	30	25	172	50	84	147	14	25	233
	All grass	42	13	15	14	84	25	39	36	3	6	121
	All crops and grass	67	22	23	20	148	44	72	99	9	17	354
East Midland	All tillage	94	35	35	20	165	57	61	155	20	21	493
	All grass	51	16	19	31	94	24	40	48	4	8	186
	All crops and grass	80	29	30	24	150	51	56	119	15	17	679
South East	All tillage	90	42	42	19	171	53	62	155	22	26	387
	All grass	35	13	14	12	76	24	34	27	3	5	230
	All crops and grass	68	30	30	16	151	48	57	102	14	17	617
South West	All tillage	87	69	63	51	129	66	81	112	45	52	226
	All grass	64	45	49	48	96	22	30	61	10	14	352
	All crops and grass	68	50	52	49	104	34	42	71	17	22	578
Wales	All tillage	83	63	65	53	120	62	70	99	39	46	117
	All grass	66	49	50	37	89	19	24	59	9	12	414
	All crops and grass	67	50	51	38	92	23	28	62	11	14	531

Source: British Survey of Fertiliser Practice 2018

Table SC1.1 Total fertiliser use, Scotland 2018

	Crop area receiving dressing (%)					Average field rate (kg/ha)				Overall application rate (kg/ha)				Fields in sample
	N	P_2O_5	K_2O	SO_3	FYM	N	P_2O_5	K_2O	SO_3	N	P_2O_5	K_2O	SO_3	
Winter wheat	98	88	88	79	19	169	66	94	65	165	58	83	51	79
Spring barley	99	92	94	53	43	102	52	73	40	101	48	68	21	174
Winter barley	100	90	90	80	26	148	62	81	55	148	56	73	44	49
Oats	81	78	78	38	19	113	54	98	56	92	42	76	21	41
Potatoes[1]	100	95	85	46	19	163	132	240	-	163	125	205	-	14
Winter oilseed rape	100	100	100	88	9	186	55	66	67	186	55	66	59	23
Other crops	67	48	52	23	31	93	40	86	48	62	19	45	11	70
All tillage	95	87	88	58	33	124	57	83	51	118	50	73	30	450
Grass less than five years old	83	59	66	24	46	127	32	46	37	105	19	30	9	219
Grass five years and over	68	56	57	8	33	80	20	25	25	54	11	14	2	314
All grass	71	57	59	12	36	94	23	31	31	67	13	18	4	533
All crops and grass	80	68	69	28	35	107	39	54	46	85	26	38	13	983

Source: British Survey of Fertiliser Practice 2018

[1] Sulphur rates on potatoes are not shown as some growers apply additional sulphur to acidify the soil for this crop. **These applications cannot be separated from those intended as a fertiliser nutrient.**

Table SC1.2 Use of straight fertiliser, Scotland 2018

	Crop area receiving dressing (%)			Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O	
Winter wheat	94	11	11	154	62	91	145	7	10	79
Spring barley	64	4	6	80	44	68	51	2	4	174
Winter barley	94	18	18	136	55	64	128	10	11	49
Oats	55	5	5	98	-	-	54	-	-	41
Potatoes	51	5	32	114	-	-	59	-	-	14
Winter oilseed rape	100	14	21	139	-	61	139	-	13	23
Other crops	37	1	2	84	-	-	31	-	-	70
All tillage	70	6	9	110	55	87	77	3	8	450
Grass less than five years old	33	0	1	110	-	-	36	-	-	219
Grass five years and over	17	0	0	79	-	-	13	-	-	314
All grass	21	0	0	91	-	-	19	-	-	533
All crops and grass	38	2	3	104	57	90	40	1	3	983

Source: British Survey of Fertiliser Practice 2018

Table SC1.3 Use of compound fertiliser, Scotland 2018

	Crop area receiving dressing (%)			Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O	
Winter wheat	46	78	78	42	65	93	19	51	73	79
Spring barley	86	90	89	58	52	72	50	47	64	174
Winter barley	45	74	74	44	62	84	20	46	62	49
Oats	65	77	77	58	52	95	38	40	72	41
Potatoes	89	89	65	117	136	196	104	122	128	14
Winter oilseed rape	91	91	79	51	50	67	46	45	54	23
Other crops	39	47	50	80	40	87	31	19	43	70
All tillage	70	82	81	58	56	81	41	46	65	450
Grass less than five years old	65	59	64	106	32	44	69	19	28	219
Grass five years and over	56	56	57	74	20	24	41	11	14	314
All grass	58	57	59	83	23	30	48	13	18	533
All crops and grass	62	66	67	73	38	52	45	25	35	983

Source: British Survey of Fertiliser Practice 2018

Table SC1.4 Use of lime, Scotland 2018

	Crop area receiving dressing (%)						Average application rate (tonnes of product/ha)						Fields in sample
	Limestone (ground, screened)	Chalk	Magnesian limestone	Sugar beet lime	Other	All	Limestone (ground, screened)	Chalk	Magnesian limestone	Sugar beet lime	Other	All	Fields limed	
Winter wheat	3.3	-	15.1	-	1.6	20.0	3.7	-	5.3	-	0.2	4.6	12	79
Spring barley	12.1	-	3.2	-	3.9	19.3	3.8	-	5.3	-	0.8	3.4	46	174
Winter barley	13.9	-	-	-	-	13.9	3.0	-	-	-	-	3.0	8	49
Oats	3.7	-	-	-	0.6	4.3	2.4	-	-	-	2.5	2.4	6	41
Potatoes	-	-	-	-	-	-	-	-	-	-	-	-	0	14
Winter oilseed rape	-	-	-	-	-	-	-	-	-	-	-	-	4	23
Other crops	12.5	-	1.6	-	2.1	16.2	3.8	-	5.0	-	0.3	3.5	17	70
All tillage	9.8	-	5.0	-	2.6	17.4	3.7	-	5.2	-	0.7	3.7	93	450
Grass less than five years old	8.9	-	1.9	-	0.9	11.7	3.3	-	3.0	-	3.4	3.3	29	219
Grass five years and over	3.3	-	1.5	-	2.1	6.9	4.5	-	10.6	-	2.1	5.0	27	314
All grass	4.7	-	1.6	-	1.8	8.1	3.9	-	8.3	-	2.2	4.4	56	533
All crops and grass	6.5	-	2.8	-	2.1	11.4	3.8	-	6.3	-	1.6	4.0	149	983

Source: British Survey of Fertiliser Practice 2018

Table SC1.5 Percentage of crop area by field application rate - Nitrogen, Scotland 2018

	kg/ha																		Fields in
row %	0	<25	25-	50-	75-	100-	125-	150-	175-	200-	225-	250-	275-	300-	325-	350-	375-	400+	sample
Winter wheat	2	0	5	3	8	4	12	6	22	31	7	-	-	-	-	-	-	-	79
Spring barley	1	0	6	15	23	36	11	4	3	-	-	-	-	-	-	-	-	-	174
Winter barley	0	0	4	4	8	9	14	33	22	5	-	-	-	-	-	-	-	-	49
Oats	19	0	1	9	12	30	30	-	-	-	-	-	-	-	-	-	-	-	41
Potatoes	0	0	5	4	5	14	24	0	0	38	0	9	-	-	-	-	-	-	14
Winter oilseed rape	0	0	0	0	0	13	17	7	7	36	17	0	4	-	-	-	-	-	23
Other crops	33	2	16	5	15	12	6	7	1	3	-	-	-	-	-	-	-	-	70
All tillage	5	0	6	10	16	24	12	7	8	9	2	-	-	-	-	-	-	-	450
Grass less than five years old	17	1	9	9	15	9	10	7	10	9	3	0	0	1	-	-	-	-	219
Grass five years and over	32	1	20	17	9	6	7	5	1	2	-	-	-	-	-	-	-	-	314
All grass	29	1	17	15	11	7	7	5	3	4	1	-	-	-	-	-	-	-	533
All crops and grass	20	1	13	13	13	13	9	6	5	6	1	-	-	-	-	-	-	-	983

Source: British Survey of Fertiliser Practice 2018

Table SC1.6 Percentage of crop area by field application rate - Phosphate, Scotland 2018

	kg/ha																		Fields in
row %	0	<25	25-	50-	75-	100-	125-	150-	175-	200-	225-	250-	275-	300-	325-	350-	375-	400+	sample
Winter wheat	12	1	19	39	27	0	0	0	1	-	-	-	-	-	-	-	-	-	79
Spring barley	8	6	27	52	8	-	-	-	-	-	-	-	-	-	-	-	-	-	174
Winter barley	10	4	21	44	15	6	-	-	-	-	-	-	-	-	-	-	-	-	49
Oats	22	2	30	40	4	0	1	-	-	-	-	-	-	-	-	-	-	-	41
Potatoes	5	0	4	5	0	31	40	5	0	10	-	-	-	-	-	-	-	-	14
Winter oilseed rape	0	18	8	55	19	-	-	-	-	-	-	-	-	-	-	-	-	-	23
Other crops	52	15	21	6	5	-	-	-	-	-	-	-	-	-	-	-	-	-	70
All tillage	13	6	23	43	12	1	1	-	-	-	-	-	-	-	-	-	-	-	450
Grass less than five years old	41	26	22	7	3	0	1	-	-	-	-	-	-	-	-	-	-	-	219
Grass five years and over	44	40	12	3	1	-	-	-	-	-	-	-	-	-	-	-	-	-	314
All grass	43	36	15	4	1	-	-	-	-	-	-	-	-	-	-	-	-	-	533
All crops and grass	32	26	18	18	5	1	-	-	-	-	-	-	-	-	-	-	-	-	983

Source: British Survey of Fertiliser Practice 2018

Table SC1.7 Percentage of crop area by field application rate - Potash, Scotland 2018

	kg/ha																		Fields in
row %	0	<25	25-	50-	75-	100-	125-	150-	175-	200-	225-	250-	275-	300-	325-	350-	375-	400+	sample
Winter wheat	12	0	6	10	44	19	1	6	1	-	-	-	-	-	-	-	-	-	79
Spring barley	6	1	19	29	33	10	0	0	1	-	-	-	-	-	-	-	-	-	174
Winter barley	10	0	7	29	39	8	4	2	-	-	-	-	-	-	-	-	-	-	49
Oats	22	2	3	6	37	15	4	9	0	1	-	-	-	-	-	-	-	-	41
Potatoes	15	0	0	0	0	11	2	0	12	18	9	0	0	20	0	0	12	-	14
Winter oilseed rape	0	3	12	52	34	-	-	-	-	-	-	-	-	-	-	-	-	-	23
Other crops	48	5	7	18	9	5	0	7	0	0	0	0	2	-	-	-	-	-	70
All tillage	12	1	13	24	33	11	1	3	1	-	-	-	-	-	-	-	-	-	450
Grass less than five years old	34	21	21	10	6	5	1	0	1	-	-	-	-	-	-	-	-	-	219
Grass five years and over	43	35	15	5	1	1	-	-	-	-	-	-	-	-	-	-	-	-	314
All grass	41	32	16	6	2	2	-	-	-	-	-	-	-	-	-	-	-	-	533
All crops and grass	31	21	15	13	13	5	0	1	1	-	-	-	-	-	-	-	-	-	983

Source: British Survey of Fertiliser Practice 2018

Table SC2.1 Average fertiliser practice by grassland utilisation, Scotland 2018

	Crop area receiving dressing (%)				Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
	N	P_2O_5	K_2O	FYM	N	P_2O_5	K_2O	N	P_2O_5	K_2O	
Grazed not mown	62	49	50	23	68	17	20	42	8	10	282
Grazed mown	90	73	78	64	130	32	44	117	23	35	226
All grazings	71	57	59	36	93	23	30	66	13	18	508
Cut for silage - grazed	92	73	79	70	134	32	46	123	23	36	194
Cut for silage - not grazed	98	93	88	24	152	38	62	148	35	54	16
All cut for silage	92	73	79	68	135	32	47	124	24	37	210
Cut for hay - grazed	81	72	72	26	104	29	33	84	20	23	38
Cut for hay - not grazed	100	96	96	0	69	20	34	69	19	33	7
All cut for hay	83	74	74	23	99	27	33	82	20	24	45
All mowings	90	73	79	62	130	32	45	118	23	35	246
All grass	71	57	59	36	94	23	31	67	13	18	533

Source: British Survey of Fertiliser Practice 2018

Table SC2.2 Percentage of grass area by field application rate - Nitrogen, Scotland 2018

	kg/ha																		Fields in
row %	0	<25	25-	50-	75-	100-	125-	150-	175-	200-	225-	250-	275-	300-	325-	350-	375-	400+	sample
Grazed not mown	38	1	23	17	9	4	4	2	1	1	-	-	-	-	-	-	-	-	282
Grazed mown	10	0	5	10	15	13	14	12	7	10	3	0	0	1	-	-	-	-	226
All grazings	29	1	17	15	11	7	7	5	3	4	1	-	-	-	-	-	-	-	508
Cut for silage - grazed	8	0	6	6	15	14	16	11	8	11	3	0	0	1	-	-	-	-	194
Cut for silage - not grazed	2	0	2	7	10	22	3	22	5	15	12	-	-	-	-	-	-	-	16
All cut for silage	8	0	6	6	15	14	15	12	8	11	4	0	0	1	-	-	-	-	210
Cut for hay - grazed	19	0	0	32	14	6	6	21	0	1	-	-	-	-	-	-	-	-	38
Cut for hay - not grazed	0	0	48	13	6	33	-	-	-	-	-	-	-	-	-	-	-	-	7
All cut for hay	17	0	5	30	13	9	6	19	0	1	-	-	-	-	-	-	-	-	45
All mowings	10	0	6	10	14	13	14	13	7	10	3	0	0	1	-	-	-	-	246
All grass	29	1	17	15	11	7	7	5	3	4	1	-	-	-	-	-	-	-	533

Source: British Survey of Fertiliser Practice 2018

Table SC2.3 Percentage of grass area by field application rate - Phosphate, Scotland 2018

	kg/ha																		Fields in
row %	0	<25	25-	50-	75-	100-	125-	150-	175-	200-	225-	250-	275-	300-	325-	350-	375-	400+	sample
Grazed not mown	51	39	9	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	282
Grazed mown	27	32	26	11	3	0	1	-	-	-	-	-	-	-	-	-	-	-	226
All grazings	43	37	14	4	1	-	-	-	-	-	-	-	-	-	-	-	-	-	508
Cut for silage - grazed	27	31	28	10	4	0	1	-	-	-	-	-	-	-	-	-	-	-	194
Cut for silage - not grazed	7	25	48	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16
All cut for silage	27	30	29	10	3	0	1	-	-	-	-	-	-	-	-	-	-	-	210
Cut for hay - grazed	28	44	12	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	38
Cut for hay - not grazed	4	83	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7
All cut for hay	26	48	12	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	45
All mowings	27	32	27	11	3	-	-	-	-	-	-	-	-	-	-	-	-	-	246
All grass	43	36	15	4	1	-	-	-	-	-	-	-	-	-	-	-	-	-	533

Source: British Survey of Fertiliser Practice 2018

Table SC2.4 Percentage of grass area by field application rate - Potash, Scotland 2018

	kg/ha																		Fields in
row %	0	<25	25-	50-	75-	100-	125-	150-	175-	200-	225-	250-	275-	300-	325-	350-	375-	400+	sample
Grazed not mown	50	35	12	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	282
Grazed mown	22	25	24	16	6	5	1	0	1	-	-	-	-	-	-	-	-	-	226
All grazings	41	32	16	6	2	2	-	-	-	-	-	-	-	-	-	-	-	-	508
Cut for silage - grazed	21	24	25	16	6	6	1	0	1	-	-	-	-	-	-	-	-	-	194
Cut for silage - not grazed	12	9	21	31	27	-	-	-	-	-	-	-	-	-	-	-	-	-	16
All cut for silage	21	23	25	16	7	6	1	0	1	-	-	-	-	-	-	-	-	-	210
Cut for hay - grazed	28	33	16	19	3	-	-	-	-	-	-	-	-	-	-	-	-	-	38
Cut for hay - not grazed	4	57	6	33	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7
All cut for hay	26	36	15	21	2	-	-	-	-	-	-	-	-	-	-	-	-	-	45
All mowings	21	25	24	17	6	5	1	0	1	-	-	-	-	-	-	-	-	-	246
All grass	41	32	16	6	2	2	-	-	-	-	-	-	-	-	-	-	-	-	533

Source: British Survey of Fertiliser Practice 2018

Table SC3.0 Product use by month of application, Scotland 2018

(a) Product use

row %	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Straight N	0	0	0	0	0	2	14	42	33	5	3	1
Straight P	6	4	0	6	0	0	0	57	21	0	0	6
Straight K	0	0	0	0	6	1	3	61	27	1	0	1
Straight S	0	0	0	0	0	0	0	100	0	0	0	0
Compounds	2	4	0	0	0	0	10	47	18	10	6	3
All fertilisers	1	2	0	0	0	1	11	46	23	8	5	2

(b) Nutrient use

row %	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Nitrogen	0	0	0	0	0	1	11	43	27	10	6	2
Phosphate	4	6	0	0	0	0	10	53	14	5	3	3
Potash	3	6	0	0	1	0	11	51	16	6	4	2
Sulphur	1	1	0	0	0	2	18	50	22	5	1	1
Total	2	3	0	0	0	1	12	47	22	8	4	2

Note: All fertilisers includes other straight fertilisers (e.g. trace elements)

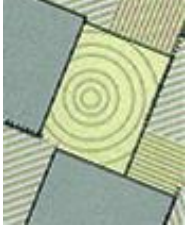
'Product' refers to the total tonnage of the products used by the farmers in the survey year 2018.

'Nutrient' refers to the tonnage of each nutrient contained in the products used.

(e.g. 100 kg of a 20:10:10 compound contains 20 kg of N, 10 kg of P_2O_5 and 10 kg of K_2O, while 100 kg of ammonium nitrate (straight N) contains typically 34.5 kg of N).

Estimates of total nutrients are shown in Section B, Table B2.6.

Source: British Survey of Fertiliser Practice 2018



SECTION D

USE OF ORGANIC MANURES – GREAT BRITAIN, 2018

Introduction

Whilst the British Survey of Fertiliser Practice has focussed historically on the application of manufactured fertilisers, in recent years it has also collected increasingly detailed information on the use of organic manures. In previous years, farmers were asked where their manure applications fell within pre-specified 'high', 'medium' and 'low' ranges. From 2007, and to better quantify the organic manure data, farmers were asked to provide a specific rate of application which could then be weighted in the same way as the manufactured fertiliser data to deliver a national picture of organic manure usage. However, it should be remembered that the underlying sample design is constructed to measure manufactured fertiliser usage and may not represent the population of farmers using organic manures as robustly.

D1 FARMS HANDLING ORGANIC MANURES

Organic manures applied to agricultural land may be produced on farm by livestock as slurries, farmyard manure (FYM) and poultry manures, or imported from other sources such as treated sewage sludges (also called bio-solids) and some industrial 'wastes' such as compost, paper waste or brewery effluent.

Of the 1303 farms in the survey 932 used organic manures on at least one field on the farm. Once the data are weighted to reflect the population of farms this equates to 68%. The details are shown in Table D1.1a.

Table D1.1a Numbers and percentage (%) of farms using each type of manure in Great Britain, 2018

	none	*cattle FYM*	*cattle slurry*	*pig FYM*	*pig slurry*	*layer manure*	*broiler/ turkey litter*	*other FYM*	*other farm*	*bio-solids*	*other non-farm*	*total with manure*
Farms in sample	371	686	237	38	10	30	31	75	5	49	45	932
Farms in population	28,942	45,793	15,390	1,537	354	1,140	1,359	6,097	353	1,601	2,020	61,417
Farms in population %	32%	51%	17%	2%	0%	1%	2%	7%	0%	2%	2%	68%
Volume (Mt; Mm^3)	n/a	39.2	40.8	1.6	1.0	0.5	0.6	2.7	0.8	2.8	5.1	95.1
Volume %	n/a	41%	43%	2%	1%	0%	1%	3%	1%	3%	5%	100%

Note: some farmers may use more than one type of manure. Mt; Mm^3 are Million tonnes and cubic metres.

Table D1.1b Percentage (%) of farms using each type of manure in Great Britain, 2014 – 2018

	none	*cattle FYM*	*cattle slurry*	*pig FYM*	*pig slurry*	*layer manure*	*broiler/ turkey litter*	*other FYM*	*other*
2014	34	52	16	2	1	2	1	4	4
2015	35	50	16	1	1	2	2	6	3
2016	35	51	16	2	1	2	2	6	4
2017	37	47	16	2	1	1	1	5	4
2018	32	51	17	2	0	1	2	7	4

Cattle manure from beef and dairy farms is by far the largest volume of manure type generated in Great Britain. The percentage of farms using cattle FYM and cattle slurry has been reasonably consistent over the last 5 years with use in 2018 being 51% and 17% of farms, respectively.

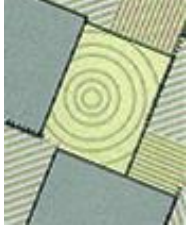


Table D1.1c Dressing cover of organic manure in Great Britain, 2014 - 2018

	all tillage	*grass 5 years and over*	*grass under 5 years old*
2014	22	29	49
2015	23	29	53
2016	23	31	48
2017	25	31	46
2018	27	33	52

Dressing covers of organic manure on tillage appear to have increased in the past few years from 23% in 2016 to 27% in 2018. The proportion of grass receiving a dressing of manure is higher for both categories, at 33% of grass 5 years and over and 52% on grass under 5 years old in 2018.

Not all the manure generated by a farm is necessarily retained for use by that farm and excess manure/slurry can be exported for use elsewhere.

The number and percentage of farms using each type of slurry application method in Great Britain are shown in Table D1.2. These data serve as a guide only and are calculated as an expression of the number of farms adopting a proportion of each application method, where slurry was applied. The data do not account for the proportion of each farm's total cultivatable area receiving slurry, or any variation in the rate at which slurry may have been applied using different application methods. Notwithstanding these considerations, it is clear that broadcast application remains the most widespread method adopted for both types of slurry.

Table D1.2 Number and percentage (%) of farms using each type of application method by slurry type, Great Britain 2018

			percentage of farms						
	farms in sample	*farms in population*	*broadcast*	*band spread*	*shallow injection*	*deep injection*	*rain gun*	*rotating boom*	*non-broadcast*
Cattle slurry	237	15,390	79	14	2	4	1	0	21
Pig slurry	10	354	59	28	18	0	0	0	47
Grand Total	**243**	**15,555**	**79**	**14**	**3**	**4**	**1**	**0**	**21**

Note: some farms may apply both types of slurry

Whilst some of these application methods (e.g. shallow injection or deep injection) apply slurry below the surface of the field, the majority require secondary cultivation to incorporate the manure/slurry into the soil. Assessment of how often organic manures are incorporated into the soil is complicated by the fact that some farmers make more than one application or apply more than one type of manure and may incorporate each of these differently. As manure on grass fields is seldom incorporated (unless they are destined for re-seeding), grass fields have been excluded from the incorporation analysis.

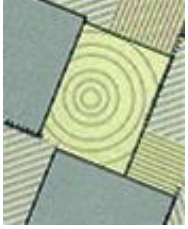


Table D1.3 gives estimates of the volume and area of manure/slurry incorporation on tillage fields by manure type and immediacy of incorporation. Farmyard manure is the most extensively incorporated at 97% of the volume with 89% of it incorporated within a week of spreading on tillage fields. Cattle slurry makes up 99% of all slurry volume (Table D2.3a) and 88% of cattle slurry was applied to grassland. This helps to explain why cattle slurry is less likely to be incorporated at 37% of the volume (Table D1.3). Data on pig slurry need to be treated with caution due to the relatively low number of farms using manure of this type. Table D2.3a suggests that pig slurry was only applied to arable land, specifically winter sown crops, often using band spreading or shallow injection (Table D1.2).

Table D1.3 Percentage (%) of organic manure incorporated (volume and area) on tillage fields by incorporation time and manure/slurry type, Great Britain 2018

	incorporation time after spreading										*total*	
	not incorporated		*within 6 hours*		*between 6 and 24 hours*		*between 1 and 7 days*		*more than 1 week*		*applied area*	*volume applied*
	%area	*%vol*	*%area*	*%vol*	*%area*	*%vol*	*%area*	*%vol*	*%area*	*%vol*	*'000 ha*	*'Mt; Mm³*
FYM	3	3	8	9	40	41	36	37	13	11	872	19.1
Cattle slurry	27	37	13	16	30	27	15	15	14	5	139	4.6
Pig slurry	55	54	17	13	18	21	10	12	0	0	16	0.3
Poultry FYM	4	6	23	26	31	31	13	10	29	27	111	0.9
Other	11	15	20	21	38	38	20	15	11	11	256	6.7
Total	**8**	**11**	**12**	**13**	**38**	**37**	**29**	**28**	**14**	**10**	**1,394**	**31.7**

Farmers were asked to indicate what proportion of their livestock manures had been spread by a contractor (Table D1.4a). The percentage of farmers using a contractor to spread at least some of their FYM was 30% in 2018. Where contractors were used, they were applying between 84% and 96% of the manure on average.

Table D1.4a Use of contractors to spread manure/slurry in current season, Great Britain 2018

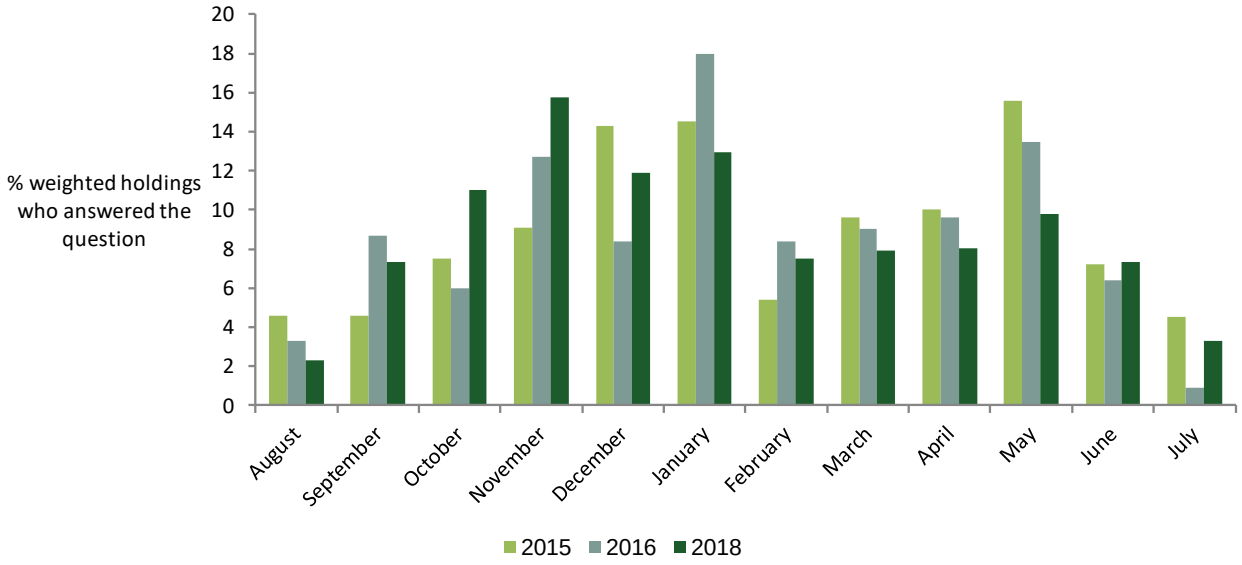
	% of farms using a contractor	*% volume applied by contractor*	*average % of contractor-applied manure, where contractor is used*
FYM	30	29	84
Cattle slurry	27	24	94
Other	50	55	96
Total	**30**	**30**	**90**

Use of contractors to spread manures is fairly consistent over the 5-year period 2014-2018, on 30-36% of farms (Table 1.4b), as was the average amount spread, at 87-92%.

Table D1.4b Use of contractors to spread manure/slurry, Great Britain 2014 - 2018

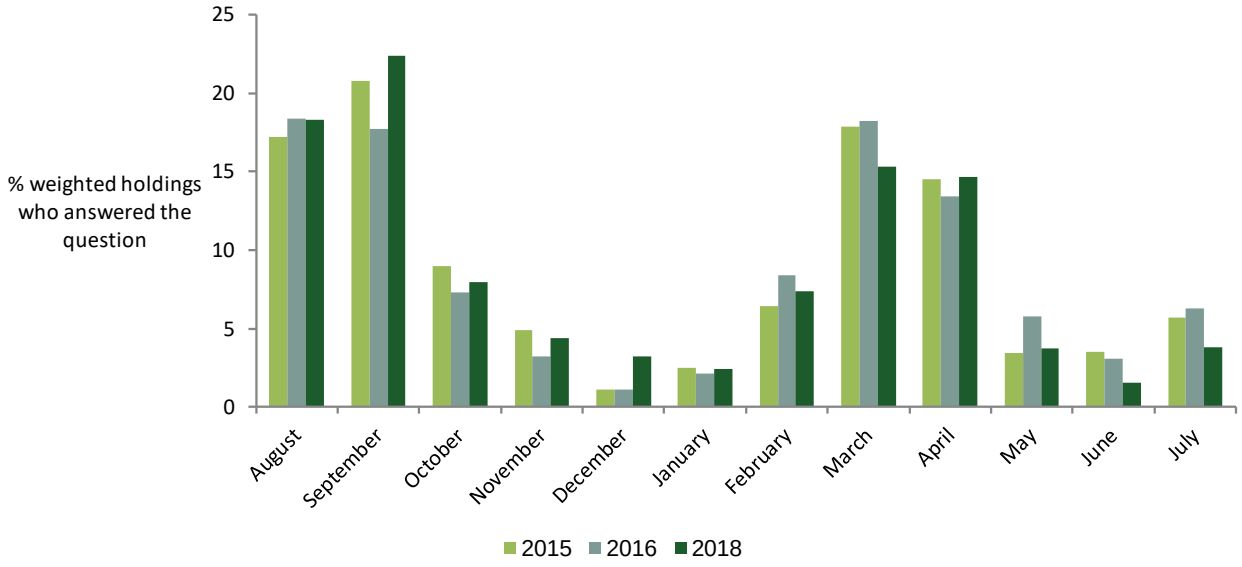
	% of farms using a contractor	*% volume applied by contractor*	*average % of contractor-applied manure, where contractor is used*
2014	36	39	87
2015	34	33	89
2016	34	32	83
2017	33	30	92
2018	30	30	90

Figure D1.5a Temporary field heaps of manure, month of establishment, Great Britain 2015, 2016 and 2018



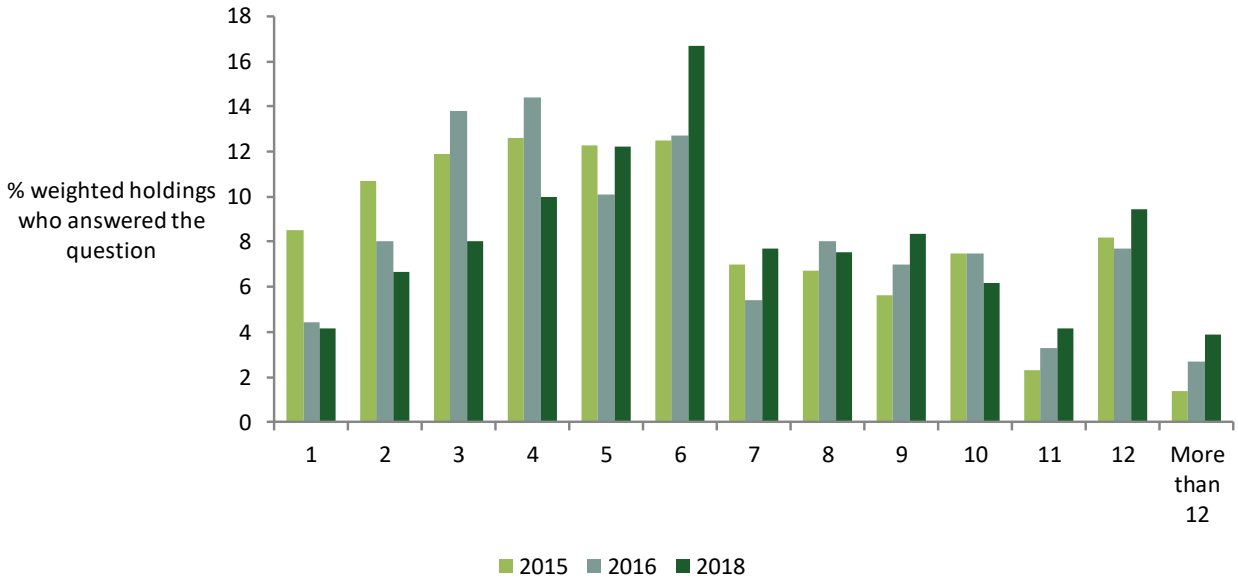
In the 2015, 2016 and 2018 surveys, farmers were asked when they established temporary heaps of solid manure in their fields (Figure D1.5a) and the month in which they subsequently spread most of the manure (Figure D1.5b). The peak months for establishment in 2015 were December, January and May with between 14% and 16% of farms creating them at each of these timings. In 2016, the peak months for establishment were November, January and May with between 13% and 18% of farms starting them in these months. In 2018, the peak months for establishment were November and January with 16% and 13% of farms, respectively. In all three survey years, the peaks for spreading the manure were August, September and March, with more than 50% of farms spreading most manure during these months. This pattern reflects the practice of applying a dressing of manure before establishing winter or spring sown tillage crops.

Figure D1.5b Temporary field heaps of manure, month most spread, Great Britain 2015, 2016 and 2018



Note – Historical data collected in the 2015 and 2016 BSFP Surveys

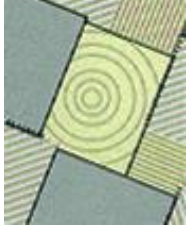
Figure D1.5c Temporary field heaps of manure, duration of storage in months, Great Britain 2015, 2016 and 2018



Note – Historical data collected in the 2015 and 2016 BSFP Surveys

Farmers were also asked on average the duration in months that manure was stored in this way (Figure D1.5c). Storage for 3-6 months accounted for the practice on 49% of farms in 2015, 51% in 2016, and with this figure being 47% in 2016. When all types of manure are considered, in 2015 and 2016, only 10% of farms were storing for 12 months or more, and 13% of farms in 2018. The recommendation from the Food Standards Agency (FSA) is that manure should be stacked for 8 weeks to reduce the risk of spreading antibiotic-resistant bacteria[9]. Where manure is to be applied to land before growing ready-to-eat crops such as salad leaves, the FSA recommend that manure should be stored for at least 6 months prior to use to kill microbial pathogens, with no fresh additions being made to the store during this period.

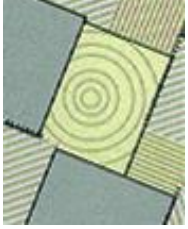
[9] Guidance on the handling of slurry and manure to help reduce the spread of antibiotic resistance can be found at the following link: https://www.gov.uk/guidance/handling-of-manure-and-slurry-to-reduce-antibiotic-resistance



D2 USE OF ORGANIC MANURES

Recent and current fertiliser recommendations are consistent in their advice to farmers to take note of the nutrient contributions from manures when calculating fertiliser input requirements. When making comparisons of the data presented in this report several factors should be considered:

- the extent to which individual farmers have accounted for the nutrients in the manures cannot be judged from these data,
- the data presented for 'with/without' manure are not a paired comparison of otherwise identical fields,
- fields which have not received manures may be on farms which have no manure and are thus managed in a different way,
- in grassland systems, fields which have not received manures may be managed differently (e.g. grazed only) compared with manured fields which may be cut more than once as well as grazed,
- for tillage crops, the overall fertiliser rate means that some fields are included which have received no fertiliser. For the 'with manure' data, it may indicate that the manure was judged to supply all the fertiliser required,
- for grassland, the average fertiliser rate has been used to avoid distorting the data by inclusion of 'unmanaged' grass, which receives no fertiliser, although this has the effect of excluding any fields on which no fertiliser was applied because the manure was considered sufficient, thus obscuring a substitution effect,
- the dataset of fields where manures are used includes fields which may have received only a very small amount of manure (see section D3). On those fields receiving large dressings, there may be a greater adjustment in mineral fertiliser,
- where reductions in phosphate and potash fertiliser have not been made, this may indicate a desire to build up soil reserves of these nutrients.



The proportion of the sown area, of all crops, receiving each of the main types of manure is shown in Table D2.1a, with cattle FYM and cattle slurry being the most extensively applied manures.

Table D2.1a Percentage (%) of sown area receiving each organic manure type, Great Britain 2014 - 2018

	cattle FYM	*cattle slurry*	*pig FYM*	*pig slurry*	*layer hen manure*	*broiler/ turkey litter*	*other FYM*	*other farm*	*bio-solids*	*other non-farm*
2014	16	8	1	1	1	1	1	0	1	0
2015	14	8	1	0	1	1	1	0	1	1
2016	16	8	1	0	1	1	1	0	1	0
2017	16	8	1	0	1	1	1	0	1	1
2018	17	9	1	0	1	1	1	0	1	1

Note: some areas may receive more than one type of manure

Table D2.1b Percentage (%) distribution of each organic manure type on manured sown area, Great Britain 2014 – 2018

	cattle FYM	*cattle slurry*	*pig FYM*	*pig slurry*	*layer hen manure*	*broiler/ turkey litter*	*other FYM*	*other farm*	*bio-solids*	*other non-farm*
2014	59	30	2	2	3	2	3	1	4	2
2015	53	30	3	1	4	3	5	1	3	2
2016	57	30	2	2	3	3	4	1	3	2
2017	57	30	2	2	2	2	3	1	5	2
2018	57	30	2	1	2	2	5	0	4	4

Note: some areas may receive more than one type of manure

The percentage of the sown area receiving an application of cattle FYM in 2018 was 17%, which is slightly above the five-year average (15%). Cattle FYM and cattle slurry were applied to 87% of the sown area receiving organic manure (Table D2.1b).

The levels of nutrient in organic manures vary according to which type of manure is being applied as well as factors such as the size, age, gender, and market for the animals being farmed. Furthermore, the concentration of nutrients is dependent on the proportion of bedding, the length of time that the manure has been stored and, in the case of slurries particularly, diluting factors such as rainwater or dirty water which affect the proportion of dry matter. The British Survey of Fertiliser Practice does not ask detailed questions on the animals producing manures or the nutrient analysis of any organic applications made, but it is possible to use typical values for different manure types to estimate the likely nutrient levels delivered. Details of these values are given in Table D2.2.

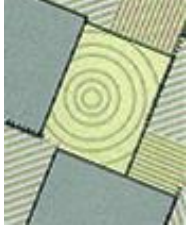


Table D2.2 Typical dry matter and nutrient content of different organic manure types[10]

	dry matter (%)	*total N (kg/t; kg/m³)*	*total P_2O_5 (kg/t; kg/m³)*	*total K_2O (kg/t; kg/m³)*
Cattle FYM	25	6.0	3.2	9.4
Pig FYM	25	7.0	6.0	8.0
Sheep FYM	25	7.0	3.2	8.0
Duck FYM	25	6.5	5.5	7.5
Layer hen manure	40	19.0	12.0	15.0
Poultry litter	60	28.0	17.0	21.0
Cattle slurry	6	2.6	1.2	2.5
Pig slurry	4	3.6	1.5	2.2
Biosolids: Digested cake	25	11.0	11.0	0.6
Biosolids: Thermally dried	95	40.0	55.0	2.0
Biosolids: Lime stabilised	25	8.5	7.0	0.8
Biosolids: Composted	40	11.0	10.0	3.0
Compost-green	60	7.5	3.0	6.8
Compost-green/food	60	11.0	4.9	8.0

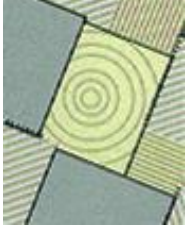
In Table D2.3, crops receiving manure applications have been classified as either “winter-sown”, “spring-sown” or “grass” and their average treated areas and manure application rates shown.

Table D2.3a Treated areas and average manure field application rates to winter-sown and spring-sown crops and grassland by manure type, Great Britain 2018

	cattle FYM	*cattle slurry*	*pig FYM*	*pig slurry*	*layer manure*	*broiler/ turkey litter*	*other FYM*	*other farm manure*	*bio-solids*	*other non-farm*
Winter sown										
Treated area %	12.0	1.7	1.5	0.5	1.2	1.5	1.2	-	3.6	2.9
Treated area (ha)	360,690	50,209	44,337	14,622	34,575	46,022	36,221	-	108,148	87,576
Avg manure rate (t; m^3/ha)	21	41	23	22	7	8	13	-	21	34
Volume (Mt; Mm^3)	7.4	2.1	1.0	0.3	0.2	0.4	0.5	-	2.3	2.9
Fields in sample	346	35	36	17	26	31	28	0	54	62
Spring sown										
Treated area %	23.5	5.6	1.6	-	0.8	1.0	2.1	-	1.6	2.2
Treated area (ha)	367,673	88,247	24,735	-	12,863	15,408	32,913	-	25,014	34,121
Avg manure rate (t; m^3/ha)	24	29	24	-	9	8	26	-	20	29
Volume (Mt; Mm^3)	8.7	2.5	0.6	-	0.1	0.1	0.9	-	0.5	1.0
Fields in sample	372	103	32	4	20	13	21	0	17	23
Grass										
Treated area %	26.8	25.6	-	-	0.3	0.3	2.1	0.4	-	0.7
Treated area (ha)	1,531,839	1,466,607	-	-	19,728	14,341	121,084	20,424	-	42,691
Avg manure rate (t; m^3/ha)	15	25	-	-	4	5	12	39	-	25
Volume (Mt; Mm^3)	22.8	35.9	-	-	0.1	0.1	1.4	0.8	-	1.1
Fields in sample	674	474	2	2	12	11	62	10	2	30

Note: This table excludes crops that cannot be classified as either winter- or spring-sown, such as permanent crops.

[10]Anon. (2018). Nutrient Management Guide (RB209). Agriculture and Horticulture Development Board (AHDB). https://ahdb.org.uk/nutrient-management-guide-rb209



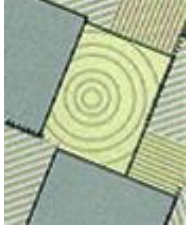
The majority of cattle manure and slurry applications were made to grassland, reflecting the practice of utilising the manure within the farm on which it is produced. Conversely, non-farm manures such as biosolids appear to be favoured on winter-sown tillage land. The profile of the % treated area and average manure rates are broadly similar to those reported for 2017.

Table D2.3b Cattle FYM treated areas and average manure field application rates to winter-sown and spring-sown crops and grassland by farm type, Great Britain 2018

Cattle FYM	*Cereals*	*Dairy*	*General cropping*	*Mixed*	*Other livestock*	*All farm types*
Winter sown						
Treated area %	39.4	7.5	12.7	31.5	8.3	100.0
Treated area (ha)	141,938	26,930	45,902	113,619	29,884	360,690
Avg manure rate (t; m^3/ha)	21	20	22	20	20	21
Volume (Mt; Mm^3)	3.0	0.5	1.0	2.2	0.6	7.4
Fields in sample	100	46	37	97	60	346
Spring sown						
Treated area %	12.4	18.5	14.0	34.5	20.3	100.0
Treated area (ha)	45,658	68,034	51,376	126,961	74,806	367,673
Avg manure rate (t; m^3/ha)	23	26	24	22	23	24
Volume (Mt; Mm^3)	1.1	1.8	1.3	2.8	1.7	8.7
Fields in sample	45	84	46	88	106	372
Grass						
Treated area %	0.7	14.0	2.6	6.9	75.8	100.0
Treated area (ha)	11,194	214,680	39,223	105,100	1,161,642	1,531,839
Avg manure rate (t; m^3/ha)	18	14	19	15	15	15
Volume (Mt; Mm^3)	0.2	3.1	0.8	1.5	17.2	22.8
Fields in sample	6	90	13	48	517	674

Note: Only cattle FYM was applied in sufficient volume to warrant reporting by farm type. The treated area percentages may not add to 100% in “All farm types” as pig and poultry farms have been excluded.

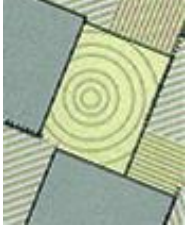
Table D2.3b shows a breakdown of the cattle FYM applications by robust farm type. Cereal farms have the most extensive treatments of cattle FYM on winter sown crops at 39.4% of the treated area. On grass 75.8% of the area treated with cattle FYM is on ‘Other Livestock’ robust classification farms.



The time of year when manure was applied is shown in Table D2.4 as a proportion of fields receiving manure applications. Once again, the crops have been classified as either “winter sown”, “spring sown” or “grass”. This segmentation highlights the prevalence of applications in August and September for winter-sown crops (prior to drilling), or between February and April for spring-sown and grass fields, with treatments in the summer months (May to July) also important for the latter. When comparing percentage values of different manures, it is important to recognise the very different quantities involved, as indicated by the percentages of treated areas at the foot of the table.

Table D2.4 Percentage (%) of each organic manure type applied, by sowing season and timing, Great Britain 2018

	cattle FYM	*cattle slurry*	*pig FYM*	*pig slurry*	*layer manure*	*broiler/ turkey litter*	*other FYM*	*other farm manure*	*bio-solids*	*other non-farm*
Winter sown										
August	4	0	39	22	19	35	8	0	35	18
September	10	1	19	3	15	17	11	0	37	13
October	1	0	5	1	17	5	0	0	0	2
Winter (Nov, Dec, Jan)	0	0	0	0	0	0	0	0	0	0
Spring (Feb, Mar, Apr)	1	0	0	24	1	2	0	0	5	16
Summer (May, Jun, Jul)	0	1	0	8	0	1	0	0	4	6
Spring sown										
August	0	0	0	0	1	0	1	0	1	0
September	1	0	5	0	0	2	1	0	1	0
October	1	0	1	0	0	0	1	0	2	0
Winter (Nov, Dec, Jan)	2	1	1	0	0	0	5	0	0	1
Spring (Feb, Mar, Apr)	12	4	28	3	17	17	4	0	13	18
Summer (May, Jun, Jul)	1	1	1	1	1	1	5	0	1	2
Grass										
August	8	4	0	0	0	0	17	3	0	0
September	5	3	1	0	0	0	7	27	0	1
October	7	2	0	0	0	0	0	0	0	0
Winter (Nov, Dec, Jan)	4	8	0	0	0	0	12	22	0	1
Spring (Feb, Mar, Apr)	29	46	0	20	16	13	21	31	0	16
Summer (May, Jun, Jul)	14	29	0	18	13	6	6	16	0	5
% of total treated area	**50**	**33**	**2**	**1**	**2**	**2**	**4**	**0**	**3**	**4**



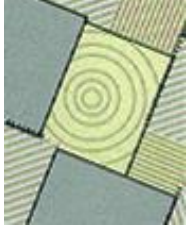
D3 FERTILISER VALUE OF ORGANIC MANURES

Organic manures are valuable sources of the major plant nutrients nitrogen, phosphorus and potassium and, where used, applications of manufactured fertiliser can theoretically be reduced[11]. In the survey, farmers were not asked directly whether they had made an adjustment to fertiliser inputs because of manure use. However, an indication of possible adjustments has been derived by comparing fields that received manure with those that did not. Organic fields, which use no mineral fertilisers, have been excluded from these comparisons, since they would distort the influence of manures on mineral application rates. Table D3.1a shows the dressing cover, average field rate and overall fertiliser rates for the main tillage crops in Great Britain, with and without manure inputs.

Table D3.1a Dressing cover (%) and application rates (kg/ha) of manufactured fertiliser to tillage crops in Great Britain, with and without applications of organic manure, 2018

	nitrogen		*phosphate*		*potash*		*fields in sample*	
dressing cover (%)	*with manure*	*without manure*	*with manure*	*without manure*	*with manure*	*without manure*	*with manure*	*without manure*
Winter wheat	97	99	24	49	31	49	318	870
Spring barley	96	99	70	62	73	62	216	461
Winter barley	91	100	35	47	35	50	133	321
Potatoes (maincrop)	100	100	79	93	100	94	19	37
Sugar beet	100	96	35	49	50	61	36	44
Winter oilseed rape	96	100	25	54	25	46	112	360
	nitrogen		*phosphate*		*potash*		*fields in sample*	
average field rate (kg/ha)	*with manure*	*without manure*	*with manure*	*without manure*	*with manure*	*without manure*	*with manure*	*without manure*
Winter wheat	176	194	59	61	60	72	318	870
Spring barley	98	107	45	52	63	67	216	461
Winter barley	138	149	57	62	70	75	133	321
Potatoes (maincrop)	141	145	102	119	212	221	19	37
Sugar beet	83	84	38	44	73	83	36	44
Winter oilseed rape	182	194	47	59	58	66	112	360
	nitrogen		*phosphate*		*potash*		*fields in sample*	
overall application rate (kg/ha)	*with manure*	*without manure*	*with manure*	*without manure*	*with manure*	*without manure*	*with manure*	*without manure*
Winter wheat	170	193	14	30	19	35	318	870
Spring barley	94	106	32	32	46	42	216	461
Winter barley	125	149	20	29	25	37	133	321
Potatoes (maincrop)	141	145	81	110	212	207	19	37
Sugar beet	83	80	13	21	36	51	36	44
Winter oilseed rape	174	193	12	32	15	30	112	360

[11]Anon. (2018). Nutrient Management Guide (RB209). Agriculture and Horticulture Development Board (AHDB). https://ahdb.org.uk/nutrient-management-guide-rb209



For all the major tillage crops except sugar beet, the overall rate of nitrogen from manufactured mineral fertiliser was higher on fields where organic manures were not applied in 2018. The difference in overall application rates of nitrogen ranged from 12 kg/ha for spring barley to 23 kg/ha and 24 kg/ha for winter wheat or winter barley, respectively. The data for sugar beet should be treated with caution as these are derived from a small number of fields. The survey does not collect reasons why manufactured fertiliser application rates may vary when used with or without organic manures. It is possible that certain fields are being managed to achieve a desired nutrient status and a strategy of this sort may require unusually high or low applications of specific nutrients. Where only a small number of fields are surveyed, such a strategy may exert an influential bias on the overall figures for a crop in the report.

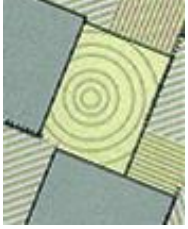
Table D3.1b Overall application rates (kg/ha) of manufactured fertiliser application to tillage crops in Great Britain, with and without applications of organic manure, 2014 - 2018

nitrogen (kg/ha)	*2014*		*2015*		*2016*		*2017*		*2018*	
	with manure	*without manure*	*with manure*	*without manure*	*with manure*	*without manure*	*with manure*	*without manure*	*with manure*	*without manure*
Winter wheat	167	192	179	196	177	193	175	191	170	193
Spring barley	100	113	95	111	93	112	92	106	94	106
Winter barley	137	147	147	148	135	150	128	155	125	149
Potatoes (maincrop)	137	149	126	178	124	140	137	136	141	145
Sugar beet	89	101	92	105	93	100	80	103	83	80
Winter oilseed rape	175	195	174	197	153	187	164	184	174	193

phosphate (kg/ha)	*2014*		*2015*		*2016*		*2017*		*2018*	
	with manure	*without manure*	*with manure*	*without manure*	*with manure*	*without manure*	*with manure*	*without manure*	*with manure*	*without manure*
Winter wheat	16	29	18	32	16	30	15	33	14	30
Spring barley	36	37	30	34	30	34	32	33	32	32
Winter barley	22	34	18	33	19	32	27	31	20	29
Potatoes (maincrop)	82	100	114	111	124	100	127	110	81	110
Sugar beet	7	33	18	30	-	23	11	22	13	21
Winter oilseed rape	11	29	14	33	11	34	20	37	12	32

potash (kg/ha)	*2014*		*2015*		*2016*		*2017*		*2018*	
	with manure	*without manure*	*with manure*	*without manure*	*with manure*	*without manure*	*with manure*	*without manure*	*with manure*	*without manure*
Winter wheat	27	36	31	35	24	35	25	39	19	35
Spring barley	46	48	42	45	46	47	46	43	46	42
Winter barley	31	48	27	45	23	46	39	40	25	37
Potatoes (maincrop)	152	191	163	202	191	182	213	204	212	207
Sugar beet	62	75	66	61	64	42	43	49	36	51
Winter oilseed rape	20	28	24	32	13	33	22	33	15	30

Differences in overall application rates with and without manures for nitrogen, phosphate and potash for the period 2014 to 2018 are shown in table D3.1b above. The application of higher rates on unmanured fields holds true for nitrogen for all major tillage crops throughout the period. The higher rates are most noticeable for winter wheat and winter barley at 10% to an average for the period of 12% for winter oilseed rape and spring barley over manured fields. Overall rates for phosphate and potash in winter wheat show a similar relationship over the five-year period at 49% and 30%, respectively over manured fields. Other crops show greater variability between manured and unmanured field rates for the different nutrients which may in part be due to the smaller number of fields of each of these crops in the survey causing higher statistical variability.



Data for grassland are presented separately because grass is managed differently according to the amount of production required. Thus, intensive milk production requires large volumes of grass and is likely to receive higher inputs of both manure and mineral fertilisers than beef or sheep systems. Table D3.2 shows the average field rate of fertiliser applied to grassland in different management systems (as defined by robust farm type groups) with and without applications of manure. Average field rates have been used for grassland because some grass fields receive no mineral fertiliser, not because of manure use, but because the amount of grass production required does not warrant fertiliser input.

Table D3.2 Average field rates (kg/ha) of manufactured fertiliser application on grassland with and without applications of organic manure by robust type group, Great Britain 2018

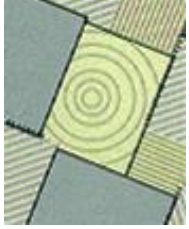
	nitrogen (kg/ha)		*phosphate (kg/ha)*		*potash (kg/ha)*		*fields in sample*	
	with manure	*without manure*	*with manure*	*without manure*	*with manure*	*without manure*	*with manure*	*without manure*
Cereals								
Grass under 5 years old *	148	121	-	34	-	62	9	91
Grass 5 years and over *	-	83	-	30	-	49	15	264
All grass	118	93	-	31	-	53	24	355
Dairy								
Grass under 5 years old	152	140	26	23	47	32	132	63
Grass 5 years and over	139	104	24	17	37	20	145	109
All grass	144	115	25	19	41	23	277	172
General cropping								
Grass under 5 years old *	212	92	45	34	69	49	12	62
Grass 5 years and over *	151	73	9	19	24	30	16	135
All grass	172	77	25	22	44	34	28	197
Mixed								
Grass under 5 years old	168	113	42	35	58	50	46	128
Grass 5 years and over	83	76	21	22	25	26	36	208
All grass	129	89	28	27	39	36	82	336
Other livestock								
Grass under 5 years old	109	92	28	26	39	33	209	140
Grass 5 years and over	83	65	20	19	25	21	502	608
All grass	88	68	21	20	28	22	711	748
All farm types								
Grass under 5 years old	139	111	29	30	45	43	408	490
Grass 5 years and over	101	73	21	19	27	23	714	1330
All grass	113	81	23	21	32	27	1122	1820

Note: The values in “All farm types” exceed the sum of the components in the table as it also includes pig and poultry farms

* Note small number of fields receiving manures (typically fewer than 16 fields).

As in the previous two surveys (for 2016 and 2017), when looking at all farm types taken together the rates of nitrogen, phosphate and potash fertiliser were usually higher on fields where manures were also used. Mineral fertiliser rates were also consistently higher on short term grass than permanent grassland. The data for certain robust groups, notably cereals, general cropping and mixed farms are derived from relatively few fields, so need to be treated with due caution.

As so many fields on dairy farms receive manure, a separate analysis was carried out to examine the influence of grass management (Table D3.3a).



All grazing land also receives manure, it is just that it is not applied as a dressing in our context.

Table D3.3a Average field rates (kg/ha) of manufactured fertiliser application on dairy grassland with and without applications of organic manure, Great Britain 2018

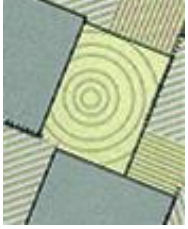
	nitrogen (kg/ha)		*phosphate (kg/ha)*		*potash (kg/ha)*		*fields in sample*	
	with manure	*without manure*	*with manure*	*without manure*	*with manure*	*without manure*	*with manure*	*without manure*
All cut for hay	132	83	33	-	38	-	19	16
All cut for silage	153	135	26	20	46	37	201	45
All grazings	138	111	24	19	37	22	230	162

Application rates of mineral fertilisers are generally higher for grass to be cut for silage. Average field rates on grazed grass are higher on those fields receiving a dressing of manure.

Table D3.3b Average field rates (kg/ha) of manufactured fertiliser application on dairy grassland with and without applications of organic manure, Great Britain 2014 – 2018

all cut for hay	*nitrogen (kg/ha)*		*phosphate (kg/ha)*		*potash (kg/ha)*		*fields in sample*	
	with manure	*without manure*	*with manure*	*without manure*	*with manure*	*without manure*	*with manure*	*without manure*
2014	114	255	20	22	43	54	26	13
2015	117	107	34	23	32	24	17	13
2016	106	-	13	-	15	-	15	3
2017	123	89	-	-	-	-	11	11
2018	132	83	33	-	38	-	19	16
all cut for silage	*nitrogen (kg/ha)*		*phosphate (kg/ha)*		*potash (kg/ha)*		*fields in sample*	
	with manure	*without manure*	*with manure*	*without manure*	*with manure*	*without manure*	*with manure*	*without manure*
2014	164	148	26	26	55	53	238	69
2015	157	141	26	29	50	50	246	67
2016	159	170	28	30	54	69	196	51
2017	163	137	24	16	56	32	199	28
2018	153	135	26	20	46	37	201	45
all grazings	*nitrogen (kg/ha)*		*phosphate (kg/ha)*		*potash (kg/ha)*		*fields in sample*	
	with manure	*without manure*	*with manure*	*without manure*	*with manure*	*without manure*	*with manure*	*without manure*
2014	150	134	25	23	43	34	282	186
2015	143	122	25	20	41	30	280	186
2016	150	144	27	25	44	41	245	135
2017	155	136	24	19	46	25	211	122
2018	138	111	24	19	37	22	230	162

Over the 5-year period 2014-18, mineral fertiliser application rates whilst variable are higher for grass cut for silage than any other grass management system. Data for grass cut for hay should be treated with caution as the number of fields managed this way is low. It is notable that the average field rates for phosphate and potash on unmanured fields of grass cut for silage or grazing are lower in 2017 and 2018 than in previous survey years.



SECTION E

SPREADING PRECISION, RECORD KEEPING, SOIL TESTING, GREENHOUSE GASES, PROFESSIONAL QUALIFICATIONS AND ADVICE, AND EFFICIENCY IMPROVEMENTS

Farmers were asked a series of questions about the care taken in application of fertilisers and manures and in record keeping. The results are presented in this section.

In 2018, 40% of farmers, who were using a spreader, indicated they check the accuracy of mineral fertiliser spreaders by using catch trays on an annual basis (Table E1.1). Farmers checking more frequently than this total 4%, checking at each change of fertiliser. Twenty percent of farmers never check their spreaders for accuracy and a further 5% of farmers considered that spreader accuracy did not need to be checked.

Table E1.1 **Frequency of spread pattern checks using catch trays, percentage (%) of those farms with a spreader, Great Britain 2014 – 2018**

	No spreader	*It is factory set & doesn't need checking*	*At each change of fertiliser type*	*Less than once a year*	*Once a year*	*Never checked*	*Contract applied*	*Other*
2014	10	8	4	11	37	25	14	1
2015	12	9	4	12	37	24	13	1
2016	14	8	5	14	36	22	14	1
2017	13	6	6	14	38	23	13	1
2018	13	5	4	18	40	20	11	1

Practices of checking are generally consistent over the five-year period 2014-2018, with contractors used on 13% of farms on average over this time.

Table E1.2a **Record keeping methods for fertiliser and manure applications on farms where each respective nutrient type was applied during the 2017/18 crop year, Great Britain 2018**

	manufactured fertilisers				*organic manures*			
	farms	*farms %*	*area (ha)*	*area %*	*farms*	*farms %*	*area (ha)*	*area %*
Computer program	18,234	25.1	3,538,648	38.2	10,403	17.9	2,167,740	30.1
Farm diary	39,598	54.5	4,593,028	49.6	34,698	59.8	3,837,817	53.2
Farm notebook/pocketbook	13,227	18.2	1,434,612	15.5	9,616	16.6	1,136,485	15.8
File record sheet (file in the office)	12,922	17.8	1,807,108	19.5	9,185	15.8	1,399,938	19.4
Other paper record	3,794	5.2	422,204	4.6	3,166	5.5	380,611	5.3
No records kept	1,544	2.1	115,722	1.2	3,426	5.6	239,654	3.2

Note: more than one method may be used

Farm diaries continue to be the most common method for recording both fertiliser and manure use (Table E1.2a). Computers were used for recording fertiliser applications on 25% of farms, representing 38% in area terms. No records were kept on 2% of farms - half that recorded in the 2017 survey - and this figure falls to 1% when considered on an area basis. Computerised record keeping is slightly less common for organic manures at 18% of farms.

Table E1.2b shows the approach to record keeping on different types of farms. For manufactured fertilisers use of computers is highest on 'cereals' farms at 50%, and lower at 18% on 'dairy' and 10% on 'other livestock' farms, where a higher proportion use farm diaries. Farms of all types favour diaries for recording applications of organic manures. The method of record keeping for 'all farm types' is broadly similar for both manufactured and organic fertilisers.

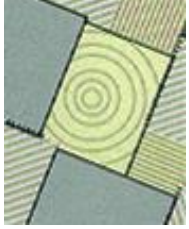


Table E1.2b Record keeping methods for fertiliser and manure applications on farms where each nutrient type was applied during the 2017/18 crop year, by farm type, Great Britain 2018

	manufactured fertilisers		*organic manures*	
Cereals	*farms*	*farms %*	*farms*	*farms %*
Computer program	8,224	49.8	3,374	44.0
Farm diary	6,211	37.6	3,250	42.4
Farm notebook/pocketbook	2,119	12.8	464	6.1
File record sheet (file in the office)	3,897	23.6	1,872	24.4
Other paper record	643	3.9	408	5.3
No records kept	115	0.7	372	4.6
	manufactured fertilisers		*organic manures*	
Dairy	*farms*	*farms %*	*farms*	*farms %*
Computer program	1,464	18.2	1,457	17.2
Farm diary	4,659	58.0	5,042	59.5
Farm notebook/pocketbook	1,304	16.2	1,496	17.7
File record sheet (file in the office)	1,339	16.7	1,270	15.0
Other paper record	422	5.3	422	5.0
No records kept	367	4.4	514	5.7
	manufactured fertilisers		*organic manures*	
General cropping	*farms*	*farms %*	*farms*	*farms %*
Computer program	3,893	36.1	1,850	34.1
Farm diary	5,373	49.8	2,852	52.5
Farm notebook/pocketbook	1,572	14.6	741	13.6
File record sheet (file in the office)	2,426	22.5	1,000	18.4
Other paper record	650	6.0	170	3.1
No records kept	0	0.0	350	6.1
	manufactured fertilisers		*organic manures*	
Mixed	*farms*	*farms %*	*farms*	*farms %*
Computer program	1,636	19.6	1,697	20.8
Farm diary	4,843	58.0	4,620	56.5
Farm notebook/pocketbook	1,694	20.3	1,476	18.1
File record sheet (file in the office)	1,684	20.2	1,842	22.5
Other paper record	461	5.5	497	6.1
No records kept	264	3.1	402	4.7
	manufactured fertilisers		*organic manures*	
Other livestock	*farms*	*farms %*	*farms*	*farms %*
Computer program	2,857	10.0	1,886	6.7
Farm diary	18,373	64.1	18,774	67.0
Farm notebook/pocketbook	6,412	22.4	5,440	19.4
File record sheet (file in the office)	3,555	12.4	3,201	11.4
Other paper record	1,617	5.6	1,669	6.0
No records kept	797	2.7	1,788	6.0
	manufactured fertilisers		*organic manures*	
All farm types	*farms*	*farms %*	*farms*	*farms %*
Computer program	18,234	25.1	10,403	17.9
Farm diary	39,598	54.5	34,698	59.8
Farm notebook/pocketbook	13,227	18.2	9,616	16.6
File record sheet (file in the office)	12,922	17.8	9,185	15.8
Other paper record	3,794	5.2	3,166	5.5
No records kept	1,544	2.1	3,426	5.6

Note: more than one method may be used

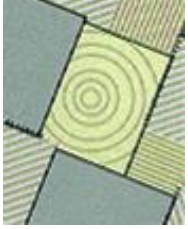


Table E1.2c Record keeping methods percentage (%) of farms, for fertiliser and manure applications on farms where each respective nutrient type was applied in the crop year, Great Britain 2014-2018

		computer program	*farm diary*	*farm notebook/ pocket-book*	*file record sheet (file in the office)*	*other paper record*	*no records kept*
manufactured fertilisers	*2014*	20.6	50.2	24.6	18.8	4.3	5.1
	2015	23.2	54.6	19.7	19.4	3.4	3.8
	2016	23.3	52.6	22.4	20.7	3.0	4.3
	2017	22.6	49.7	24.0	21.7	2.1	4.1
	2018	25.1	54.5	18.2	17.8	5.2	2.1
organic manures	*2014*	16.5	55.4	20.0	19.7	5.1	11.4
	2015	17.0	54.3	20.9	18.4	3.5	12.7
	2016	15.4	60.0	21.8	17.0	3.4	9.9
	2017	16.7	55.8	23.8	18.9	2.7	8.3
	2018	17.9	59.8	16.6	15.8	5.5	5.6

Note: more than one method may be used

Recording methods for manufactured fertilisers show minor variations across the five-year period 2014-18, with farm diaries remaining the most widely used recording method. For organic manures, records of some type were kept on 87-94% of farms for the five-year period.

Table E1.3 Soil testing percentage (%) of tillage and grass area, Great Britain 2014 - 2018

	tillage area %				*grass area %*			
	Standard P, K, Mg, pH	*Nitrogen*	*pH (lime only)*	*Precision Farming purposes*	*Standard P, K, Mg, pH*	*Nitrogen*	*pH (lime only)*	*Precision Farming purposes*
2014	34	13	14	7	7	3	4	2
2015	25	10	10	6	5	2	3	0
2016	24	9	8	5	6	2	3	1
2017	27	11	7	6	6	1	3	1
2018	26	11	7	7	7	2	3	1

Table E1.3 shows the percentage of the tillage and grass area that was soil tested for the cropping years 2014 – 2018. It is usual practice, especially for tillage fields to test a sub-set of them in any given year. Standard P, K, Mg, pH was the most commonly used soil test for the period, with an average of 27% of the tillage area and 6% of the grass area. All types of soil tests were more prevalent on tillage than on grass.

Figure E1.4a Importance of Greenhouse Gases (GHGs), Great Britain - % farms

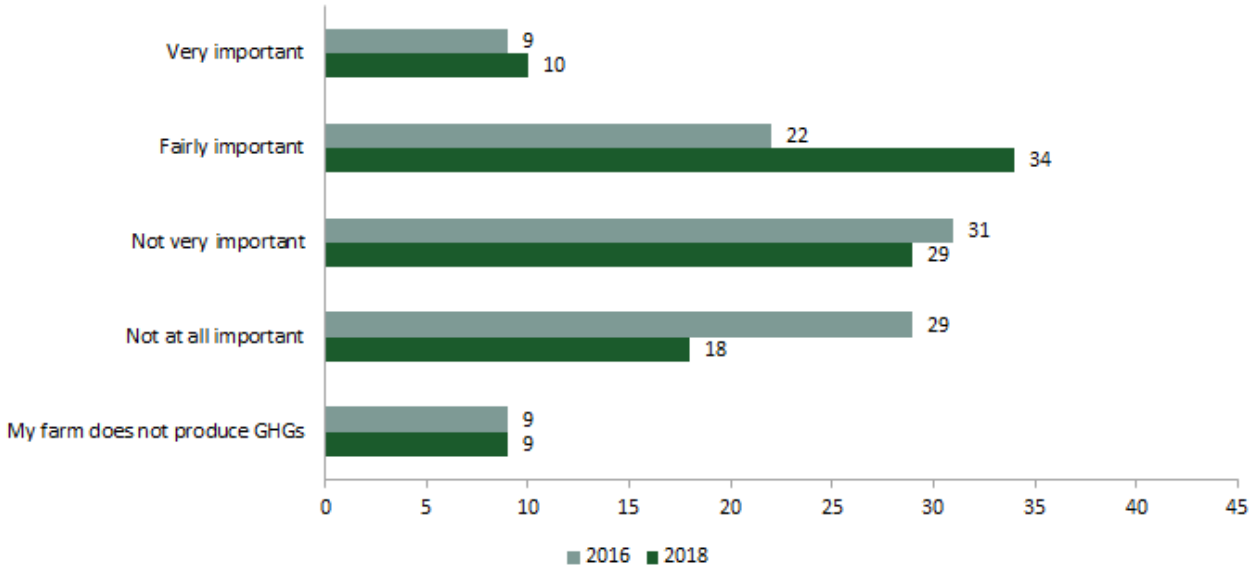
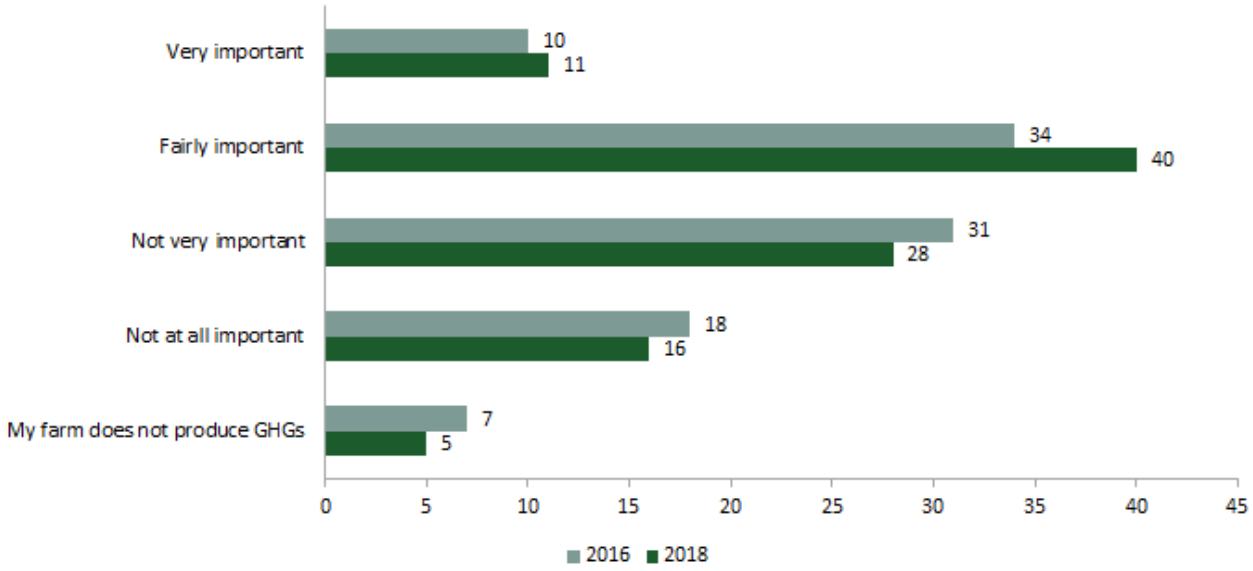


Figure E1.4b Importance of Greenhouse Gases (GHGs), Great Britain - % area



In 2016 and 2018 farmers were asked how important they considered Green House Gases (GHGs) to be when taking decisions on their land, crops and livestock (Figure E1.4a and b). In 2016, 31% of farms considered them to be either very or fairly important and 44% in 2018, increasing in terms of area to 44% and 51%, respectively. In both years, 9% of farms felt that their farms did not produce GHGs, falling in area terms to 7% in 2016 and 5% in 2018.

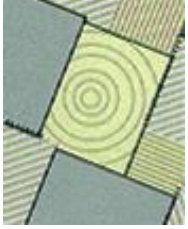


Table E1.4a Professional qualifications held by respondents and Continuous Professional Development, Great Britain 2016 and 2018

Respondents' professional qualifications held - % farms			*Kept up to date (CPD) where professional qualification held - % farms*					
			Yes		*No*		*Don't Know*	
	2016	2018	2016	2018	2016	2018	2016	2018
NRoSO	22	20	93	89	5	8	2	3
BASIS	7	8	81	67	15	29	4	4
FACTS	3	4	93	77	7	21	0	2
DairyPro	1	1	-	-	-	-	-	-
Professional Pig Register	0	0	-	-	-	-	-	-
Other	8	6	-	-	-	-	-	-
None of the above	68	69						

The National Register of Sprayer Operators (NRoSO) was the most popular professional qualification held by the respondents in 2016 (22% of farms) and in 2018 (20% of farms). Of those with a NRoSO accreditation, 93% of farms kept this up to date with Continuous Professional Development (CPD) and 89% in 2018. In both years the % of farms that did not hold any of the qualifications listed was nearly 70%.

Table E1.4b Professional advice sources received by number of farms, Great Britain 2016 and 2018

	Received advice - % farms					
	All farms		*Farms with tillage*		*Farms with grass*	
Professional advice sought	2016	2018	2016	2018	2016	2018
Crop protection agronomist	51	55	81	88	46	48
Fertiliser advisor	37	33	51	48	34	29
Feed advisor	23	21	24	24	26	22
Veterinary surgeon	47	50	44	47	53	55
Countryside or wildlife advisor	16	17	20	21	15	16
Land agent	15	15	18	19	15	13
Business advisor	12	14	15	16	12	13
Water advisor	13	14	17	18	13	13
None of the above	19	17	8	5	21	18
Other	5	4	4	4	6	5
Total number of farms	**89,884**	**89,005**	**51,446**	**47,528**	**78,395**	**79,682**

Respondents were asked about the sources of professional advice that they use (Table E1.4b). A crop protection agronomist was the most commonly used, on 51% and 55% of farms in 2016 and 2018, respectively. This figure increased to 81% and 88% when farms with tillage crops were considered. On farms with grass, a veterinary surgeon was the most prevalent source of advice at 53% (2016) and 55% (2018) of farms. Some farms will have both tillage crops and grass and will appear in both categories. In 2016, 19% of farmers and in 2018, 17% of all farmers reported that they did not use any of the professional advice sources listed. Professional advice used on an area basis is presented in Table E1.4c.

Table E1.4c Professional advice sources received by farm area, Great Britain 2016 and 2018

	Received advice - % area					
	All farms		*Farms with tillage*		*Farms with grass*	
Professional advice sought	2016	2018	2016	2018	2016	2018
Crop protection agronomist	64	70	90	94	43	49
Fertiliser advisor	44	43	57	56	34	32
Feed advisor	27	27	18	21	34	32
Veterinary surgeon	52	53	37	38	64	65
Countryside or wildlife advisor	22	24	28	29	17	19
Land agent	20	21	25	27	17	16
Business advisor	17	18	17	22	16	15
Water advisor	16	19	20	23	13	15
None of the above	11	10	4	2	17	15
Other	5	5	3	2	6	7
Total farm area, ha	**10,292,341**	**10,368,447**	**4,619,130**	**4,642,073**	**5,673,211**	**5,726,374**

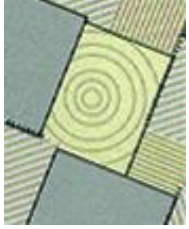


Table E1.4d Areas of expertise of professional advice: Advice received and its impact by number of farms, Great Britain 2016 and 2018

	Received advice or gained knowledge - % farms		*Implemented change having received advice - % farms*		*Level of influence of advice - % farms*					
					High		*Medium*		*Low*	
Professional advice sought	2016	2018	2016	2018	2016	2018	2016	2018	2016	2018
Soil management or protection	40	37	64	80	41	40	50	53	9	6
Crop nutrient management	42	40	67	72	44	51	51	44	5	5
Crop planning or land use	27	26	63	77	43	50	48	43	9	7
Fertiliser application methods	25	21	61	82	30	50	48	45	21	5
Crop protection (agrochemicals)	52	52	70	74	59	65	37	31	4	4
Integrated pest management	22	21	65	82	46	44	43	45	11	11
Animal nutrition or diet formulation	28	29	77	68	43	49	49	40	9	11
Manure storage	9	11	64	79	41	49	47	38	12	13
Manure application method	6	7	71	78	30	49	54	40	16	11
Animal housing design[1]		7		94		46		41		13
None of the above	20	20								
Total number of farms	**74,187**	**76,455**	**59,465**	**60,876**						

[1] Question not included in 2016 survey

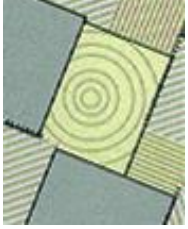
Farmers were then questioned about the areas of expertise in which they had either taken advice or gained knowledge from their professional qualifications (Table E1.4d). In 2016 and 2018, around 40% of farms had taken advice or gained knowledge on crop nutrient management and of those 67% and 72%, respectively had implemented change as a result. Considering how influential that advice had been, 44% rated it as high in 2016 (51% in 2018), 51% as medium (44% in 2018) and below 10% of low influence in both years.

Table E1.5 Potential efficiency improvements: Relevance and progress made by number of farms, Great Britain 2016 and 2018

	All who answered - number of farms		*Not relevant response - % farms*		*Relevant response - % farms*									
					number of farms		*No interest*		*Not done yet*		*Made some progress*		*Done all I can do*	
Potential production efficiency improvements	2016	2018	2016	2018	2016	2018	2016	2018	2016	2018	2016	2018	2016	2018
Managing soil structure	83,413	80,828	16	13	70,017	70,665	11	6	8	13	51	54	31	27
Soil health, other than compaction[1]		79,640		10	71,347			5		14		59		22
Crop nutrient use efficiency	80,610	79,436	27	28	58,634	57,454	11	6	5	13	57	57	27	24
Crop agronomy	78,755	79,471	31	32	54,488	53,761	10	6	3	7	51	52	36	35
Crop genetics or variety selection	77,390	78,924	34	37	50,780	49,915	15	10	8	14	49	50	29	26
Whole farm / integrated farm management	75,238	73,069	21	21	59,242	57,658	19	15	11	20	44	42	26	23
Precision technologies	76,711	77,758	30	28	53,656	55,685	35	28	21	28	31	32	12	12
Animal feed conversion efficiency	77,862	75,213	32	34	53,270	50,018	13	7	13	16	48	53	25	24
Emission reduction from stored manure	74,600	75,100	45	44	41,176	41,860	26	12	28	37	19	27	27	23
Efficiency of nutrient recovery from manure	74,530	75,038	39	38	45,660	46,279	16	9	19	22	36	43	29	26

[1] Question not included in 2016 survey

Table E1.5 describes potential areas where production efficiency improvements could be made. Farmers were given the opportunity to indicate whether they felt the individual areas were relevant to themselves. Managing soil structure was relevant to 84% and 87% of farmers in 2016 and 2018, respectively. Of those, 51% in 2016 and 54% in 2018 indicated that they had made some progress towards improving production efficiency. Included in the 2018 survey, 90% of farmers felt soil health, other than compaction was relevant to themselves and of those 59% indicated that they had made some progress and 22% believe that they have done all that they can do towards improving production efficiency.



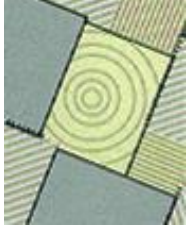
APPENDIX 1 - SURVEY STATISTICS

APP 1.1 SAMPLING VARIATION

Table App 1.1 Standard errors of application rates for the major crops in 2018

Great Britain	standard errors for overall application rates (kg/ha)						standard error for average field rates (kg/ha)						fields in sample
	total N	*strt N*	*comp N*	*total P_2O_5*	*total K_2O*	*total SO_3*	*total N*	*strt N*	*comp N*	*total P_2O_5*	*total K_2O*	*total SO_3*	
winter wheat	2.4	2.6	1.1	1.3	1.6	1.5	2.2	2.3	6.1	1.5	1.8	1.7	1199
oilseed rape	2.9	2.9	1.1	1.6	1.8	2.3	2.8	2.7	2.7	1.7	2.1	2.1	477
winter barley	2.4	2.7	1.2	1.7	2.2	1.7	2.1	2.2	4.6	1.6	2.1	1.6	457
spring barley	1.8	2.3	1.5	1.2	1.6	1.2	1.6	1.8	2.2	1.3	1.7	1.5	690
m/c potatoes	9.1	9.7	10.3	10.2	15.3	-	8.8	14.0	9.6	9.4	13.7	-	57
sugar beet	4.5	4.9	3.0	3.3	6.0	3.2	4.3	4.5	11.8	4.3	6.3	3.4	80
all tillage crops	2.0	2.3	1.1	0.9	1.3	1.1	1.9	2.0	1.9	1.2	1.7	1.7	3947
all grass	1.8	1.6	1.2	0.4	0.6	0.5	1.9	2.5	1.9	0.8	1.2	2.3	3177
England & Wales	standard errors for overall application rates (kg/ha)						standard error for average field rates (kg/ha)						fields in sample
	total N	*strt N*	*comp N*	*total P_2O_5*	*total K_2O*	*total SO_3*	*total N*	*strt N*	*comp N*	*total P_2O_5*	*total K_2O*	*total SO_3*	
winter wheat	2.5	2.7	1.1	1.3	1.6	1.6	2.3	2.3	7.3	1.6	1.9	1.8	1120
oilseed rape	3.0	3.0	1.0	1.7	1.9	2.4	2.9	2.8	3.0	1.8	2.3	2.1	454
winter barley	2.5	2.8	1.2	1.8	2.2	1.7	2.2	2.3	5.7	1.8	2.3	1.7	408
spring barley	2.1	2.5	1.5	1.4	1.7	1.4	1.9	2.0	3.2	1.8	2.1	1.6	516
m/c potatoes	10.0	10.0	11.7	12.0	16.5	-	9.5	14.7	11.1	11.3	15.4	-	46
sugar beet	4.5	4.9	2.3	3.4	6.1	3.3	4.3	4.5	8.5	4.4	6.5	3.5	78
all tillage crops	2.2	2.5	1.0	1.0	1.3	1.3	2.0	2.1	2.5	1.4	2.0	1.9	3497
all grass	2.0	1.8	1.2	0.4	0.6	0.5	2.2	2.7	2.2	0.9	1.4	2.7	2644
Scotland	standard errors for overall application rates (kg/ha)						standard error for average field rates (kg/ha)						fields in sample
	total N	*strt N*	*comp N*	*total P_2O_5*	*total K_2O*	*total SO_3*	*total N*	*strt N*	*comp N*	*total P_2O_5*	*total K_2O*	*total SO_3*	
winter wheat	8.3	8.9	5.9	4.3	5.5	4.9	7.6	7.7	11.2	3.7	4.3	4.6	79
oilseed rape	9.5	9.2	5.8	4.7	4.3	8.6	9.5	9.2	5.7	4.7	4.3	8.0	23
winter barley	6.7	7.9	4.0	4.3	5.5	6.1	6.7	7.1	5.4	3.6	4.3	5.5	49
spring barley	3.0	4.1	3.2	2.0	3.0	2.3	2.8	3.6	3.0	1.7	2.8	3.2	174
all potatoes	19.0	23.4	18.8	16.0	35.4	-	19.0	38.2	16.2	13.1	24.5	-	14
all tillage crops	3.7	4.5	2.9	2.1	3.1	2.1	3.5	4.2	2.7	1.8	2.8	2.9	450
all grass	4.2	3.2	3.5	1.2	1.7	1.4	3.8	6.0	3.7	1.8	2.6	4.8	533

The standard errors quoted in Table App 1.1 are a measure of the standard deviation of the mean and are used to judge the accuracy of the results for each cell in the table. This is a standard statistical process where the standard deviation of each cell is calculated first and then divided by the square root of the number of data points within that cell. Approximate 95% confidence limits will be the quoted value +/- 2 standard errors.



APP 1.2 RESPONSE RATE

Tables App 1.2 and App 1.3 summarise information regarding the response received to the main and reserve samples.

Table App 1.2 Response to main and reserve samples in 2018

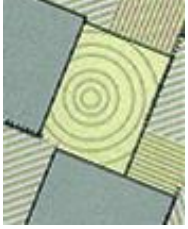
	2018	*% total*
Target sample	1500	100
2017 panellists agreeing to re-contact in 2018	1087	72
Achieved 'Main' sample from 2017 panel	782	52
Achieved additional 'Main' sample	206	14
Achieved '1st reserve' sample	146	10
Achieved '2nd reserve' sample	93	6
Achieved '3rd reserve' sample	76	5
Total achieved	**1303**	**87**
Total number of refusals/non-contact	1827	
Total number of farms approached	***3130***	

Table App 1.3 Response to main and reserve samples for 2014 - 2018

Net response rate	*2014 %*	*2015 %*	*2016 %*	*2017 %*	*2018 %*
Overall achieved rate	91	90	87	89	87
Achieved % of total contact attempts	52	53	46	45	42
Main sample	76	81	80	77	76
Reserve sample(s)	14	19	20	23	24
Main reason for refusal	*2014 %*	*2015 %*	*2016 %*	*2017 %*	*2018 %*
Too busy	22	17	10	11	11
Not interested	17	14	12	13	16
Do not do surveys	5	4	5	6	6
Want payment	0	0	0	0	1
Too much paperwork	1	1	1	1	1
Non-contact	41	45	50	43	44
Other[a]	13	20	22	25	22

[a] includes answerphone/screening, contracted out, contributed enough, farm sold/not farming, ill health, retired, and wrong telephone number.

Farms in the >200ha size band are oversampled by 25%, which has the effect of increasing response rates.

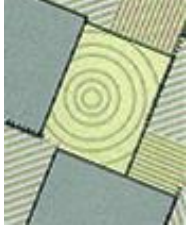


APP 1.3 INFORMATION ON HOLDINGS BELOW 20 HECTARES

Holdings of less than 20 hectares in size are excluded from the BSFP sample. These smaller farms account for a significant proportion of the number of holdings but a much smaller proportion of the area of crops and grass. Although in recent years the total number of farms in Great Britain has been nearly 200,000, many of these are relatively small. Holdings below 20 hectares accounted for less than 7% of the total crop area and around 13% of the total grass area. Further detailed information for Great Britain is provided in the table below on the equivalent crop or grassland areas and number of holdings for those holdings where the total size of the farm is below 20 hectares.

June 2017	Total GB area (ha)	Total no. of GB holdings with area >0 ha	Area on GB holdings of <20ha	No. of GB holdings with <20ha	Proportion of GB area on holdings <20ha	Proportion of GB holdings with <20ha	No. of GB holdings with zero area	Total no. of GB holdings
Total croppable area[a]	5,937,400	87,127	239,344	36,382	4%	43%	111,406	195,533
of which crops	4,937,324	66,341	192,484	28,571	4%	43%	129,192	195,533
of which temporary grass < 5 years old	1,000,076	50,922	246,605	35,511	25%	70%	144,611	195,533
Total grass	6,474,858	165,167	583,424	94,819	9%	57%	30,366	195,533
grass < 5 years old	1,000,076	50,922	246,605	35,511	25%	70%	144,611	195,533
grass ≥ 5 years old	5,474,782	160,382	588,782	98,009	11%	61%	35,151	195,533

(a) includes bare fallow land

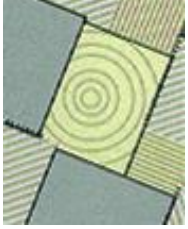


APPENDIX 2

APP 2.1 ENGLISH COUNTIES WITHIN BSFP AND DEFRA REGIONS

List of English counties indicating the BSFP and Government Office Regions within which they fall.

	County	BSFP REGION	GOR
1	Bedfordshire	Anglia	Eastern
2	Berkshire	South-East	South East
3	Buckinghamshire	South-East	South East
4	Cleveland	North-East	North East
5	Cambridgeshire	Anglia	Eastern
6	Cheshire	North Mercia	North West
7	Cornwall	South-West	South West
8	Cumbria	Northern	North West
9	Derbyshire	East Midlands	East Midlands
10	Devon	South-West	South West
11	Dorset	Wessex	South West
12	Durham	North-East	North East
13	Essex	Anglia	Eastern
14	Gloucestershire	South Mercia	South West
15	Hampshire	South-East	South East
16	Isle of Wight	South-East	South East
17	Hereford & Worcester	South Mercia	West Midlands
18	Hertfordshire	Anglia	Eastern
20	Kent	South-East	South East
21	Lancashire	Northern	North West
22	Leicestershire	East Midlands	East Midlands
24	Lincolnshire	Eastern	East Midlands
25	Merseyside	North Mercia	North West
26/27	Greater London(E)	South-East	London
28	Norfolk	Anglia	Eastern
29	Northamptonshire	East Midlands	East Midlands
30	Tyne and Wear	Northern	North East
31	Northumberland	Northern	North East
32	Nottinghamshire	East Midlands	East Midlands
33	Oxfordshire	South-East	South East
34	N Somerset and S Gloucestershire	Wessex	South West
35	Shropshire	North Mercia	West Midlands
36	Somerset	Wessex	South West
37	Staffordshire	North Mercia	West Midlands
38	Suffolk	Anglia	Eastern
39	Isles of Scilly		
40	Surrey	South-East	South East
41	East Sussex	South-East	South East
42	West Sussex	South-East	South East
43	Warwickshire	South Mercia	West Midlands
44	Greater Manchester	North Mercia	North West
45	Wiltshire	Wessex	South West
46	West Midlands	South Mercia	West Midlands
47	South Yorkshire	North-East	Yorkshire and the Humber
48	North Yorkshire (Northallerton)	North-East	Yorkshire and the Humber
49	West Yorkshire	North-East	Yorkshire and the Humber
50	North Yorkshire (Beverley)	North-East	Yorkshire and the Humber
51	East Riding of Yorks and North Lincs	North-East	Yorkshire and the Humber



APPENDIX 3

APP 3.1 UK FARM CLASSIFICATION SYSTEM

UK farm classification system (Revised 2004): composition of robust, main and other types by constituent EC type.

Robust types	Main types	Constituent EC types [1]
1 Cereals	1 Cereals	[1312]
2 General Cropping	2 General Cropping	[1412], 142, 143, [1443], 602, 603, 604, [6052]
3 Horticulture	3 Specialist fruit	3211
	4 Specialist glass	2012, 2022, 2032
	5 Specialist Hardy Nursery Stock	[3401]
	6 Other horticulture	2011, 2013, 2021, 2023, 2031,2033, 2034, 311, 312, 313, 314, [3402], 601, 6061, 6062
4 Specialist Pigs	7 Specialist pigs	5011, 5012, 5013
5 Specialist Poultry	8 Specialist poultry	5021, 5022, 5023
6 Dairy	9 Dairy (LFA)	411, 412 (LFA)
	10 Dairy (lowland)	411, 412 (non-LFA)
7 LFA Grazing Livestock	11 Specialist sheep (SDA)	441 (SDA)
	12 Specialist beef (SDA)	421,422 (SDA)
	13 Mixed Grazing Livestock (SDA)	431, 432, 442, 443, [4443], [4444] (SDA)
	14 Various Grazing Livestock (DA)	421, 422, 431, 432, 441, 442, 443, [4443], [4444] (DA)
8 Lowland Grazing Livestock [2]	15 Various Grazing Livestock (lowland)	421, 422, 431, 432, 441, 442, 443, [4443], [4444] (non-LFA)
9 Mixed	16 Cropping and dairy	811, 812
	17 Cropping, cattle and sheep	[8132], [8142]
	18 Cropping, pigs and poultry	821
	19 Cropping and mixed livestock	822, 8232
	20 Mixed livestock	5031, 5032, 711, [7122], 721, 722, 723
10 Other [3]	21 Specialist set-aside	[1311]
	22 Specialist grass and forage	[1411], [1444], [4442], [6051], [7121], [8131], [8141]
	23 Specialist horses	[4441]
	24 Non-classifiable holdings: fallow	[91]
	25 Non-classifiable holdings: other	[92]

[1] 2004 EC Typology described in Commission Decision 85/377/EEC as amended by Commission Decisions 94/376/EC, 96/393/EC and 99/725/EC with minor modifications to adapt it to United Kingdom conditions. For a full list of EC types see here. These minor modifications are indicated by the EC farm type number being shown in square brackets. Definitions for these modified EC farm types are available from the Defra contact shown at the front of this publication. EC types 132, 133, 1441, 1442, 3212, 3213, 322, 323, 330, and 8231 have not been allocated in the classification, since these types of production do not occur in the United Kingdom at a significant level.

[2] Definitions of LFA (Less Favoured Area), lowland, SDA (Severely Disadvantaged Area), and DA (Disadvantaged Area) farms are available on request from the Defra contact shown at the front of this publication.

[3] Not included in the British Survey of Fertiliser Practice.