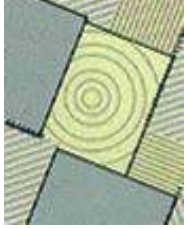
THE BRITISH SURVEY OF

Fertiliser Practice

FERTILISER USE ON FARM CROPS
FOR CROP YEAR 2016



First published 2017
British Library Cataloguing in Publication Data.
A catalogue record for this book is available from the British Library.
ISBN 978-0-99297-352-0

The United Kingdom Statistics Authority has designated these statistics as National Statistics, in accordance with the Statistics and Registration Service Act 2007 and signifying compliance with the Code of Practice for Official Statistics.

Designation can be broadly interpreted to mean that the statistics:

- meet identified user needs;
- are well explained and readily accessible;
- are produced according to sound methods; and
- are managed impartially and objectively in the public interest.

Once statistics have been designated as National Statistics it is a statutory requirement that the Code of Practice shall continue to be observed.

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

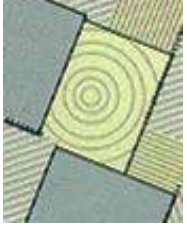
Alison Wray

Defra
Room 201, Foss House
Peasholme Green
York
YO1 7PX

Email: alison.wray@defra.gsi.gov.uk

Tel: +44 (0) 20 802 66119

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 2016 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 2016, 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.

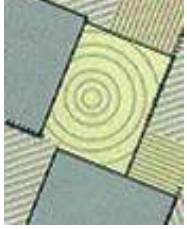
Contact information and feedback

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 2016.

June 2017



ACKNOWLEDGEMENTS

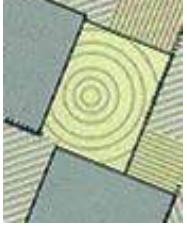
The sponsors gratefully acknowledge the co-operation of all farmers taking part in the 2016 British Survey of Fertiliser Practice.

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

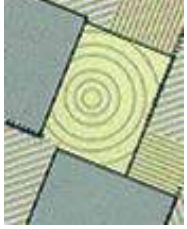
The agronomic interpretation of the Survey results benefited from advice from Chris Dawson (Chris Dawson and Associates), agronomic consultant to the Agricultural Industries Confederation (AIC).

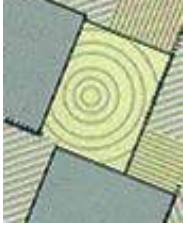
Kate Benford[1]

[1] Kynetec, Weston Court, Weston, Newbury, Berkshire RG20 8JE

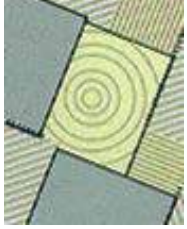


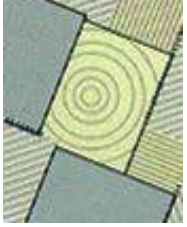
CONTENTS

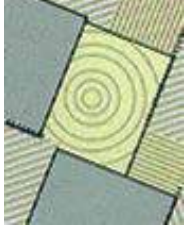




LIST OF TABLES AND FIGURES







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.

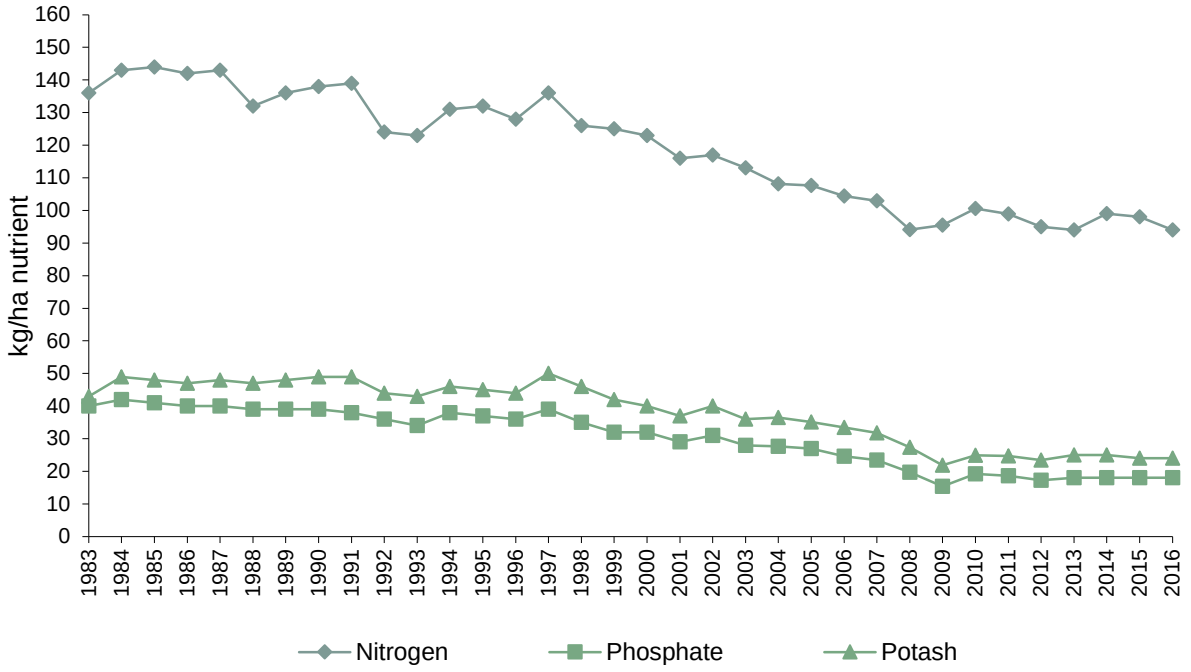
The main findings from the 2016 Survey on the use of the nutrients nitrogen, phosphorus, potassium and sulphur in Great Britain are summarised below (Table ES1).

Cropping patterns can influence fertiliser rates and dressing covers observed. In 2016 there was a 1.9% decrease in the total area of tillage crops planted, with the areas of winter wheat and winter oilseed rape both down on the previous year. Conversely, the area of legumes grown increased by just over 6%. 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 2016

	All Tillage	All Grass	All Crops and Grass
Total Nitrogen - N			
Overall application rate, 2016 (kg/ha)	141	56	94
Mean overall application rate, 2012-2016 (kg/ha)	143	57	96
Crop area receiving dressing, 2016 (%)	90	58	72
Average field rate, 2016 (kg/ha)	157	97	130
Total Phosphate - P_2O_5			
Overall application rate, 2016 (kg/ha)	29	9	18
Mean overall application rate, 2012-2016 (kg/ha)	29	9	18
Crop area receiving dressing, 2016 (%)	49	38	43
Average field rate, 2016 (kg/ha)	59	23	41
Total Potash - K_2O			
Overall application rate, 2016 (kg/ha)	39	12	24
Mean overall application rate, 2012-2016 (kg/ha)	39	13	24
Crop area receiving dressing, 2016 (%)	50	39	44
Average field rate, 2016 (kg/ha)	77	31	54
Total Sulphur - SO_3			
Overall application rate, 2016 (kg/ha)	31	3	16
Mean overall application rate, 2012-2016 (kg/ha)	30	3	15
Crop area receiving dressing, 2016 (%)	54	9	29
Average field rate, 2016 (kg/ha)	58	35	54

Figure ES1 Overall fertiliser use (kg/ha) on all crops and grass, Great Britain 1983 - 2016

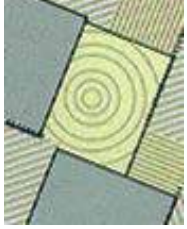


Nitrogen

- Nitrogen usually has a large immediate effect on crop growth, yield and quality. Most agricultural soils contain too little naturally occurring plant-available nitrogen to meet the needs of a crop so supplementary nitrogen applications have to be made each year.
- The 4 kg/ha decrease in total nitrogen use on all crops and grassland in 2016 resulted from a 5 kg/ha decrease in the overall rate on tillage crops, as the overall rate on grass was unchanged at 56 kg/ha. The rate on tillage crops remains in the typical 140-150 kg/ha range which has been observed for the majority of the 30 years of the survey. The previous lows for 2008 and 2009 were attributed mainly to the high fertiliser prices.
- Nitrogen levels applied to grassland have been consistently lower than tillage crops. Whereas overall nitrogen rates on tillage have remained 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.
- Overall application rates of nitrogen decreased on all the major tillage crops in 2016. The overall nitrogen rate on winter wheat decreased by 2 kg/ha to 188 kg/ha, with the reduction on oilseed rape more marked at 13 kg/ha. Winter barley, spring barley and sugar beet rate reductions were more modest at 1 kg/ha.

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. This may help to explain the trend seen for overall declining dressing cover on combinable crops, especially in England.
- 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 (34% cover) than on tillage crops (23% cover) and grazed grassland also receives manure as it is grazed.



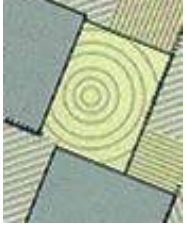
- Overall phosphate use on tillage crops declined gradually between 1984 and 1996. Thereafter the decline in rates became more marked until 2009, after which there was some recovery and relative stability, with an overall rate of 29 kg/ha in 2016. This is the third lowest rate since Great Britain records began. 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 9 kg/ha in 2016.
- 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 2012 and 2016 overall potash application rates have been apparently stable in the range 37-40 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 2016. Overall potash rates were relatively stable at 31-33 kg/ha during the mid-late 1980s but, since then, tended to decline, although achieving some stability in the range 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, and although there has been a slight reduction in dressing covers and overall rates since 2003 they are relatively stable again on tillage by 2016. 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 has reduced significantly. 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 fairly static until 2002, and then increased steadily to 2007. Dressing covers reduced in 2008 and 2009 for all cereals except winter barley. In 2016 cereals sulphur dressing covers were in the 56%-63% range. The 70% dressing cover for winter oilseed rape was a 3% decrease from 2015.
- In 2016, 29% of all crops and grass received a dressing of sulphur, this figure was 54% for tillage crops. On tillage crops the overall application rate for sulphur was 31 kg/ha, unchanged from 2015. Applications on grass were unchanged in 2016 at 3 kg/ha, this low overall rate is caused by the low dressing cover, with only 9% 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 2016, around 65% 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. 58% of cattle manure and 88% 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 predominantly dressed 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 of time.[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.

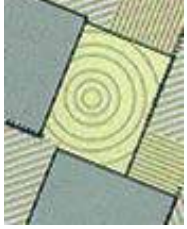
---

[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 4% of the total crop area and 10% 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.

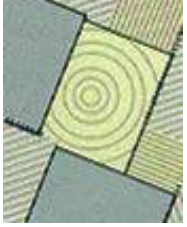
The target sample size is 1300 farms. This sample size has been designed in order to achieve a statistically representative sample at the national level. The farms are allocated to each of the combinations of farm type and size in proportion to the total area of crops and grass recorded in the June Survey (the latest available data). The exception to this is that in England & Wales 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 1,144 holdings in 2016. This is a smaller sample size than in previous years as, following a statistical review, the decision was taken to reduce it. It was felt that the limited impact on standard errors associated with the major crops meant the opportunity should be taken to reduce the cost of the survey. 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 complete 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 2016, 69% of the sample had responded in the previous year. The profile of the panel in terms of farm size was 69% >200ha, 71% 100-200ha, 65% 50-100 ha and 66% >20-50 ha.

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 are 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 2016 survey, England & Wales

	farm holdings in population in 2016	total crops and grass in 2016 (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	16,765	6.4	0.33	55	48	0.29
51-100 ha	15,316	12.7	0.75	115	106	0.69
101-200 ha	10,843	17.2	1.61	174	151	1.39
200+ ha	4,562	17.7	4.79	218	224	4.91
Total livestock & mixed	47,486	54.0	1.18	562	529	1.11
Crops						
(Robust types: cereals, general cropping)						
crops & grass area						
20-50 ha	6,653	2.6	0.39	26	18	0.27
51-100 ha	6,734	5.5	0.81	54	38	0.56
101-200 ha	6,142	10.1	1.54	94	73	1.19
200+ ha	5,718	26.2	5.66	323	255	4.46
Total crops	25,247	44.3	1.97	498	384	1.52
Horticulture						
(Robust type: horticulture)						
crops & grass area						
20-50 ha	734	0.3	0.79	6	4	0.54
51-100 ha	396	0.3	1.74	7	5	1.26
101-200 ha	213	0.3	3.47	7	4	1.88
200+ ha	114	0.7	13.09	15	7	6.14
Total horticulture	1,457	1.6	2.40	35	20	1.37
Total for England & Wales	74,190	100		1,095	933	1.26

[1] The *notional sampling fraction* is found by expressing the *target sample size* as a percentage of the *farm holdings in population in 2016*

[2] The *achieved sampling fraction* is found by expressing the *achieved sample size* as a percentage of the *farm holdings in population in 2016*

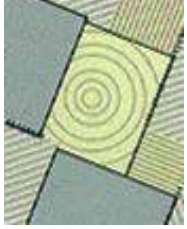


Table A2.2 Derivation of the stratified random sample for the 2016 survey, Scotland

	farm holdings in population in 2016	total crops and grass in 2016 (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	709	1.3	0.33	2	4	0.56
51-100 ha	795	3.2	0.88	7	7	0.88
101-200 ha	738	5.8	1.03	8	9	1.22
200+ ha	405	7.5	4.65	19	19	4.69
Total cereal/general	2,647	17.9	1.35	36	39	1.47
Livestock & mixed						
(Robust types: specialist pigs, specialist poultry, dairy, cattle and sheep (LFA & lowland), mixed, general cropping;forage)						
crops & grass area						
20-50 ha	4,734	8.6	0.41	19	19	0.40
51-100 ha	4,001	16.1	0.78	31	31	0.77
101-200 ha	3,321	25.7	1.43	47	47	1.42
200+ ha	1,639	31.6	4.82	79	75	4.58
Total livestock & mixed	13,695	82.1	1.29	177	172	1.26
Total for Scotland	16,342	100		213	211	1.29

A2.2 DATA COLLECTION

Data collection was undertaken between September 2016 and January 2017 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.

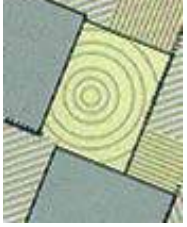
Official quantities of nitrogen, phosphate and potash fertiliser consumed annually in the UK since 1965 are shown in Table B2.6. These data are based on BSFP findings, HMRC import/export statistics and confidential trade and sales data which are contributed by AIC industry members who represent approximately 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.

[1] The *notional sampling fraction* is found by expressing the *target sample size* as a percentage of the *farm holdings in population in 2016*

[2] The *achieved sampling fraction* is found by expressing the *achieved sample size* as a percentage of the *farm holdings in population in 2016*



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 associated with this. 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 46% was achieved in 2016. 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 all tillage crops, all crops and 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 time 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 due to the fact that 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.

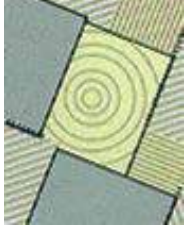
The statistics on the pattern of fertiliser practice reported for Great Britain largely reflect practice in England and Wales due to its greater area of total crops and grassland: about 9.2 million hectares in England and Wales and about 1.9 million hectares in Scotland. The estimates of the average 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 takes into account 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 A2.7 of this report.

Additionally, the survey design has been constructed to measure use of manufactured fertilisers so may not be wholly representative of manure use so 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 takes into account use on small farms (<20 ha) and use in Northern Ireland.



The AIC survey their 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.

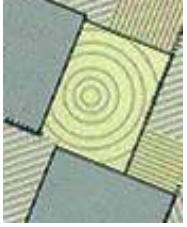
These AIC usage figures are compared to usage figures derived from BSFP and June crop area figures and the relationship between the ratios of N, P and K from both sets of data are checked and compared. Any inconsistencies or anomalies identified in the data are identified and followed up and any necessary 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, taking into account 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 2015 to autumn 2016, corresponding to the 2016 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 2015. 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 Single 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 Single Payment Scheme. **Grass** refers to all forms of grassland which may be grazed, conserved or grown for seed production; rough grazing is excluded.

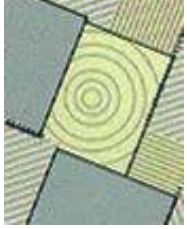
5. The abbreviation **N** is used for nitrogen; **P_2O_5** for phosphate; **K_2O** for potash, **SO_3** for sulphur and **FYM** for all types of organic manure e.g. slurries and solid manures. The phrase **total use** includes both straight (single nutrient) and compound (multi nutrient) products. Fertiliser 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 Fertiliser Manual, RB 209 which is available on the Defra website.

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 on the basis of 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:

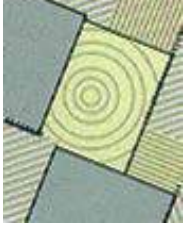
   https://www.gov.uk/structure-of-the-agricultural-industry-survey-notes-and-guidance

   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 2016. 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 in order for crops to achieve their maximum 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 in order 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.

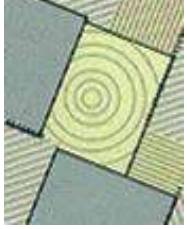
Nitrogen is important for building DNA and proteins in plants. It encourages growth of stems and leaves by promoting protein and chlorophyll. Provided there are adequate supplies of water and other nutrients, nitrogen usually has a large effect on crop growth, yield and quality. Whatever the source, to be usable by plants, it has to 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 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 and 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 Fertiliser Manual (RB209) which is available on the website of the Agriculture and Horticulture Development Board (AHDB)



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 2014/15 and 2015/16, 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 2016, of which 4.6 million hectares (42%) were cultivated for tillage cropping and the remainder, 6.5 million hectares, were grassland (excluding rough grazing).

The Single Farm Payment was introduced on 1 January 2005, replacing 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 in for the last 9 years, all calculations of fertiliser rates have been made on the basis of sown area rather than field size.

Table A3.1 Cropping and grassland areas ('000 ha) in Great Britain, 2015 – 2016

Crops	June 2015 '000s ha	June 2016 '000s ha	% change since 2015	% change since 2011	2016 crop areas as % of total tillage area
Wheat	1825	1815	-0.5	-7.3	39.4
Barley – winter	435	432	-0.7	-33.7	9.4
– spring	644	669	3.9	12.6	14.5
Total cereals[1]	*3066*	*3099*	*1.1*	*2.0*	*67.2*
Oilseed rape – total	652	579	-11.2	-17.8	12.6
Oilseed rape – winter	645	569	-11.8	-17.5	12.3
Oilseed rape – spring	7	10	42.9	-28.6	0.2
Sugar beet	90	86	-4.7	-24.9	1.9
Potatoes[2]	125	135	8.0	-4.3	3.0
Linseed	15	27	80.0	-25.0	0.6
Peas/beans[3]	213	227	6.6	46.5	4.9
Maize/other fodder	259	269	3.9	18.5	5.8
Vegetables	157	146	-7.0	15.0	3.2
Total tillage[4]	*4618*	*4609*	*-1.9*	*0.1*	*100.0*
Set-aside and bare fallow[5]	213	260	22.1	68.8	
Grassland					2016 grass areas as % of total grass area
Less than 5 years old	1017	995	-2.2	-13.3	15.4
5 years and older	5428	5466	0.7	4.5	84.6
Total grass[6]	*6444*	*6461*	*0.3*	*1.3*	*100.0*
Total crops and grass[7]	*11063*	*11069*	*0.1*	*0.78*	

[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 bare fallow or set-aside.
[5] the obligatory set-aside rate for the 2015 and 2016 Single Payment Years was set at 0%.
[6] managed grassland, excluding rough grazing.
[7] total tillage + total grassland.

Source: Annual Defra/Scottish Government/Welsh Assembly Government (WAG) June Agricultural Survey data

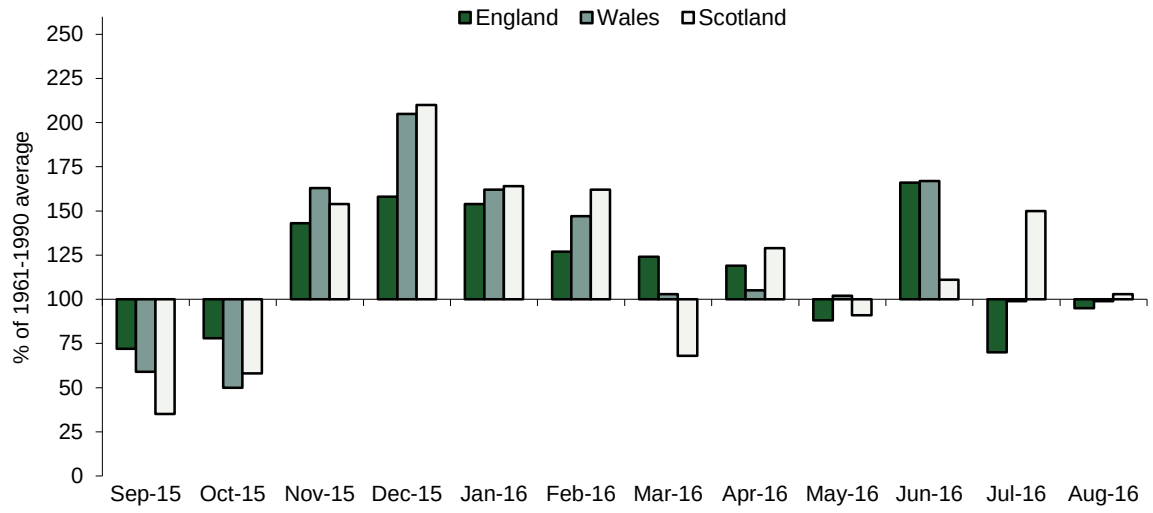
Comparing the 2015 and 2016 cropping years, the most marked change was the reduction in the area of winter oilseed rape grown. It is thought that this was due to a combination of low prices for the crop and difficulties with establishment following the withdrawal of the neonicitinoid seed treatments. The area of linseed grown increased significantly, but at 27,000 ha, this remains a minor crop. The area of peas and beans increased by 6.6%, and spring barley by 3.9%. The total area under tillage crops decreased by 1.9% in 2016, whilst the total area of uncropped land (bare fallow and set-aside) increased by 22%. This was predominantly caused by an increase in land left as bare fallow in England, with the obligatory set aside area remaining at zero in all three countries.

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

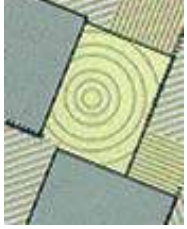
- A very wet (or very dry) autumn might delay the establishment of winter sown crops, or alter the ratio of winter to spring sown crops, with their different fertiliser requirements.
- Prolonged wet weather can increase leached losses of some nutrients, particularly nitrogen and sulphur. Weather conditions 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.

September and October were generally settled with high pressure often bringing dry and sunny conditions. Parts of Scotland had less than a third of normal rainfall in September. This was the coldest September in England and Wales since 1994. October continued dry with only half the normal rainfall across Wales and Scotland. In contrast November saw more than 200% of average rainfall in the upland areas of England, southern Scotland and north Wales. Near record rainfalls brought severe flooding in December, with January and February also unsettled. Winter 2015/16 was the third warmest and second wettest for the UK in a series from 1910. Following on from this, the spring was unremarkable with temperature and rainfall close to the seasonal average. March was a wet month in southern and eastern parts, whereas Scotland was drier than average. April was cool with late snowfalls and frosts in northern and eastern areas, which was offset by a warmer than average May. Summer 2016 began with a very cloudy wet June over most of Enland and Wales. Summer rainfalls were above average for most areas, but it was slightly drier in northern and western Scotland. July was wetter than average over Scotland, with August wetter than average in northern England. The timing of fertiliser applications was very similar to the pattern observed in the previous cropping year, with the peak months being March and April (Table GB3.0).

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



[6] http://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 2012-16. 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 2015-16 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 takes into account 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 9.6 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.

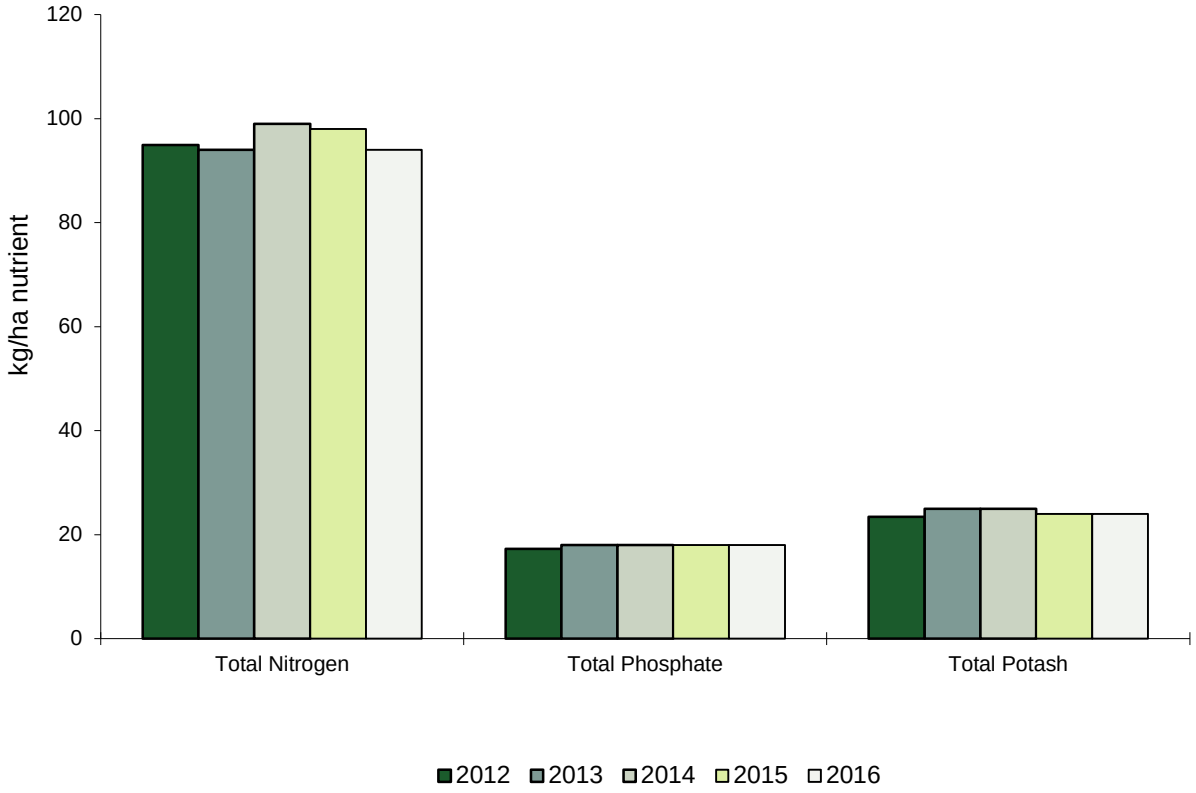
[7] Chalmers A. G. (2001) A Review of fertiliser, lime and organic manure use on farm crops in Great Britain from 1983 to 1997. *Soil Use and Management* **17**, 254-262.

B1 2016 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 2016 overall rate for all crops and grass is 94 kg/ha, a decrease of 4 kg/ha from 2015. Overall rates for phosphate and potash in 2016 were 18 kg/ha and 24 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 2012 - 2016

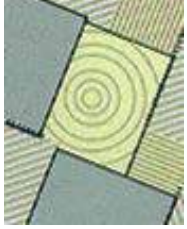


B1.1.1 Nitrogen

All crops and grassland

Table B1.1 Overall nitrogen use (kg/ha), Great Britain 2012 – 2016
Total nitrogen

	tillage crops	*grass*	*all crops and grass*
2012	144	55	95
2013	136	59	94
2014	146	60	99
2015	146	56	98
2016	141	56	94



Straight nitrogen

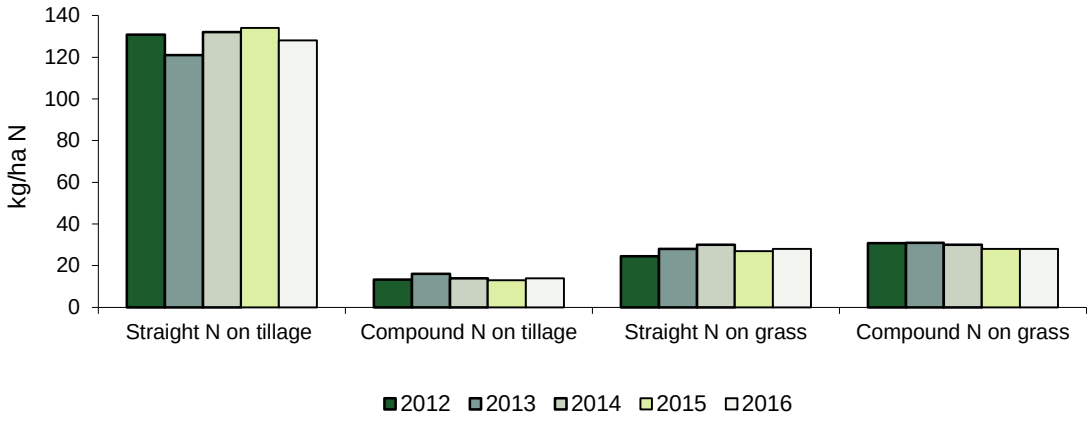
	tillage crops	*grass*	*all crops and grass*
2012	131	25	72
2013	121	28	69
2014	132	30	76
2015	134	27	77
2016	128	28	73

Compound nitrogen

	tillage crops	*grass*	*all crops and grass*
2012	13	31	23
2013	16	31	24
2014	14	30	23
2015	13	28	21
2016	14	28	21

The 4 kg/ha decrease in total nitrogen use on all crops and grassland (Figure B1.1) was caused by a decrease in the overall rates on tillage crops. The overall nitrogen rate on grass was unchanged from 2015. On grass the overall application rates increased for straight N by 1 kg/ha, whilst compound N was unchanged at 28 kg/ha. On tillage crops the rate of straight N decreased to 128 kg/ha whilst the rate of compound N increased by 1 kg/ha to 14 kg/ha. The overall rate of compound N on all crops and grass was stable at 21-24 kg/ha over the five year period 2012-16.

Figure B1.2 Overall straight and compound nitrogen use (kg/ha), Great Britain 2012 – 2016

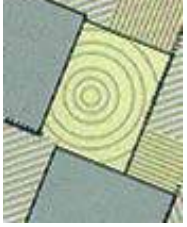


Tillage crops

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 82% in 2016. The decrease in the overall application rate was caused by both a reduction of dressing cover as well as a decrease to the average field rate, which was 156 kg/ha in 2016.

There are a number of 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 61% of the tillage area is sown to winter cereals and 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 growing separation of nitrogen applications from those of other nutrients for spring-sown crops, especially spring cereals and sugar beet. Thus a continuing increase in the use of straight nitrogen now applies to spring-sown crops, including potatoes, for agronomic and environmental reasons, as well as for the optimisation of logistics and the efficient use of time in the spring.

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

The the overall N application rate in 2016 on grass was unchanged at 56 kg/ha. This was due to an increase in the average field rate of straight N and and a reduction to the proportion of the grass area receiving a dressing of compound N to 39%. The average field rate of straight N increased by 5 kg/ha to 105 kg/ha, whilst the compound N average field rate increased by 1 kg/ha to 71 kg/ha.

B1.1.2 Phosphate, Potash and Sulphur

Phosphate

Table B1.2a shows overall phosphate applications for the past five years. The 2016 phosphate rate on tillage was unchanged at 29 kg/ha, with the same proportion receiving a dressing (49%) and a slightly decreased average field rate (59 kg/ha). For grassland the overall rate has been stable, and 2016 saw a reduction in dressing cover and an increase in the average field rate to 23 kg/ha. The five year means for overall phosphate rates for tillage crops and grass were 29 and 9 kg/ha respectively.

Table B1.2a Overall phosphate and potash use (kg/ha), Great Britain 2012 – 2016

Total phosphate

	tillage crops	*grass*	*all crops and grass*
2012	28	9	17
2013	28	9	18
2014	29	10	18
2015	29	9	18
2016	29	9	18

Total potash

	tillage crops	*grass*	*all crops and grass*
2012	37	12	23
2013	40	13	25
2014	39	14	25
2015	38	12	24
2016	39	12	24

Potash

In line with the recent average, in 2016 the overall potash rate was 39 kg/ha on tillage crops, and on grassland the overall rate was unchanged at 12 kg/ha. On tillage crops the proportion of the area receiving a dressing of potash was unchanged at 50%, whilst the average field rate increased by 2 kg/ha to 77 kg/ha. On grass dressing cover decreased slightly to 39% and the average field rate increased to 31 kg/ha.

Sulphur

Table B1.2b shows overall sulphur applications for the past five years. The overall rate on tillage crops has varied between 27 and 31 kg/ha over the period, with the highest rates recorded in the last three years. The proportion of the tillage area receiving a sulphur dressing was also at its highest over the five year period at 54% in 2016. The average field rate on tillage crops decreased by 1 kg/ha in 2016 to 58 kg/ha. The overall rate of sulphur on grass has been more stable; albeit with a 4 kg/ha increase in the average field rate between 2015 and 2016. The low overall rate of sulphur on grass is caused by lower dressing cover percentages and lower average field rates on grass than on tillage crops.

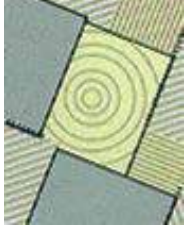


Table B1.2b Overall sulphur use (kg/ha), Great Britain 2012 – 2016
Total sulphur

	tillage crops	*grass*	*all crops and grass*
2012	29	2	14
2013	27	2	13
2014	31	4	16
2015	31	3	16
2016	31	3	16

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 2016 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.

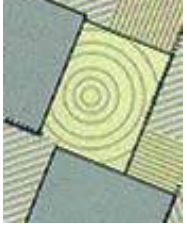


Table B1.3a Overall fertiliser use (kg/ha) on major tillage crops, Great Britain 2012 – 2016

Total nitrogen	*winter wheat*	*spring barley*	*winter barley*	*maincrop potatoes* [8]	*oilseed rape* [9]	*sugar beet*
2012	184	99	143	135	186	95
2013	183	108	142	173	177	94
2014	185	106	144	141	191	96
2015	190	105	147	157	193	98
2016	188	104	146	134	180	97

Straight nitrogen	*winter wheat*	*spring barley*	*winter barley*	*maincrop potatoes* [1]	*oilseed rape* [2]	*sugar beet*
2012	177	63	133	43	179	88
2013	177	77	130	56	169	87
2014	179	70	134	62	186	85
2015	184	72	139	56	185	88
2016	182	71	137	36	171	86

Compound nitrogen	*winter wheat*	*spring barley*	*winter barley*	*maincrop potatoes* [1]	*oilseed rape* [2]	*sugar beet*
2012	7	37	10	92	7	7
2013	7	31	12	116	8	7
2014	6	36	10	79	5	10
2015	6	33	8	102	8	10
2016	6	33	9	98	9	11

Total phosphate	*winter wheat*	*spring barley*	*winter barley*	*maincrop potatoes* [1]	*oilseed rape* [2]	*sugar beet*
2012	25	34	30	103	25	23
2013	26	31	27	121	27	24
2014	27	35	31	91	26	21
2015	28	32	30	111	30	23
2016	27	33	29	110	29	17

Total potash	*winter wheat*	*spring barley*	*winter barley*	*maincrop potatoes* [1]	*oilseed rape* [2]	*sugar beet*
2012	31	47	41	192	27	70
2013	32	46	41	225	28	74
2014	35	46	44	173	27	69
2015	34	44	41	186	31	64
2016	33	46	41	186	29	51

Total sulphur	*winter wheat*	*spring barley*	*winter barley*	*maincrop potatoes* [1,10]	*oilseed rape* [2]	*sugar beet*
2012	28	17	25		63	12
2013	29	19	27		59	27
2014	32	21	28		63	26
2015	34	21	29		60	26
2016	36	24	34		59	28

[8] Figures for maincrop potatoes include second earlies.
[9] Single crop grouping for the combined winter and spring oilseed rape areas.
[10] 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.

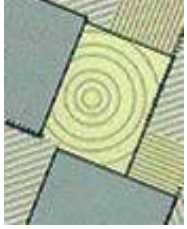


Table B1.3b Average field rates (kg/ha) on major tillage crops, Great Britain 2012 – 2016

Total nitrogen	*winter wheat*	*spring barley*	*winter barley*	*maincrop potatoes* [11]	*oilseed rape* [12]	*sugar beet*
2012	187	104	144	142	186	98
2013	186	110	145	179	178	96
2014	188	110	146	151	192	97
2015	193	107	149	166	193	100
2016	192	106	148	142	183	99

Straight nitrogen	*winter wheat*	*spring barley*	*winter barley*	*maincrop potatoes* [1]	*oilseed rape* [2]	*sugar beet*
2012	184	86	140	81	181	96
2013	182	95	139	99	170	93
2014	186	94	141	106	187	90
2015	189	95	144	118	186	96
2016	190	95	144	101	177	89

Compound nitrogen	*winter wheat*	*spring barley*	*winter barley*	*maincrop potatoes* [1]	*oilseed rape* [2]	*sugar beet*
2012	72	61	65	128	39	50
2013	61	64	67	149	37	48
2014	63	67	57	119	28	48
2015	58	65	58	144	35	47
2016	51	64	61	118	39	50

Total phosphate	*winter wheat*	*spring barley*	*winter barley*	*maincrop potatoes* [1]	*oilseed rape* [2]	*sugar beet*
2012	61	48	57	134	57	59
2013	62	50	55	143	60	61
2014	59	53	58	120	59	61
2015	64	48	55	145	63	59
2016	60	50	56	125	57	48

Total potash	*winter wheat*	*spring barley*	*winter barley*	*maincrop potatoes* [1]	*oilseed rape* [2]	*sugar beet*
2012	77	63	72	247	68	110
2013	74	67	73	255	68	110
2014	74	68	74	226	69	104
2015	73	62	68	230	70	98
2016	71	68	70	213	67	88

Total sulphur	*winter wheat*	*spring barley*	*winter barley*	*maincrop potatoes* [1,13]	*oilseed rape* [2]	*sugar beet*
2012	54	39	50		86	59
2013	55	43	54		82	65
2014	57	45	50		82	57
2015	55	44	56		83	62
2016	56	42	59		84	49

[11] Figures for maincrop potatoes include second earlies.
[12] Single crop grouping for the combined winter and spring oilseed rape areas.
[13] 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.

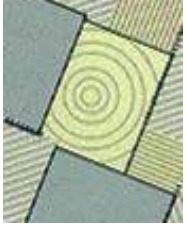


Table B1.4 Dressing cover (% area) on major tillage crops, Great Britain 2012 – 2016

Total nitrogen	*winter wheat*	*spring barley*	*winter barley*	*maincrop potatoes* [14]	*oilseed rape* [15]	*sugar beet*
2012	99	96	99	95	100	97
2013	99	98	98	97	99	99
2014	98	97	99	93	100	98
2015	99	98	99	95	100	98
2016	98	98	99	94	98	98

Straight nitrogen	*winter wheat*	*spring barley*	*winter barley*	*maincrop potatoes* [1]	*oilseed rape* [2]	*sugar beet*
2012	96	73	95	53	99	92
2013	97	81	94	57	99	94
2014	96	75	95	58	99	95
2015	98	75	97	47	99	92
2016	96	75	95	35	97	97

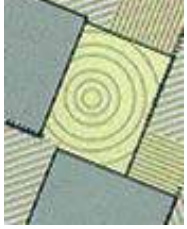
Compound nitrogen	*winter wheat*	*spring barley*	*winter barley*	*maincrop potatoes* [1]	*oilseed rape* [2]	*sugar beet*
2012	10	60	16	72	17	13
2013	11	48	18	78	21	16
2014	10	54	18	66	16	21
2015	10	51	13	70	23	21
2016	11	52	15	83	23	22

Total phosphate	*winter wheat*	*spring barley*	*winter barley*	*maincrop potatoes* [1]	*oilseed rape* [2]	*sugar beet*
2012	41	70	53	76	43	40
2013	43	63	49	84	45	40
2014	45	67	53	76	45	34
2015	44	67	54	76	47	40
2016	45	65	52	88	51	35

Total potash	*winter wheat*	*spring barley*	*winter barley*	*maincrop potatoes* [1]	*oilseed rape* [2]	*sugar beet*
2012	40	74	57	78	40	64
2013	43	68	57	88	41	67
2014	46	68	60	77	39	67
2015	46	70	60	81	44	65
2016	46	67	58	87	43	58

Total sulphur	*winter wheat*	*spring barley*	*winter barley*	*maincrop potatoes* [1]	*oilseed rape* [2]	*sugar beet*
2012	52	45	51	31	73	21
2013	53	43	50	26	72	42
2014	57	47	57	17	76	45
2015	62	48	52	23	73	42
2016	63	56	57	29	70	58

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



B1.2.1 Nitrogen

Overall rates of total nitrogen (Table B1.3a) decreased between 2015 and 2016 for all the major tillage crops. The overall rate of total nitrogen on winter wheat decreased by 2 kg/ha, with the reduction on oilseed rape more marked at 13 kg/ha. Average field rates (Table B1.3b), which are unaffected by changes in dressing cover, followed a similar pattern; the rate on spring barley decreased to 106 kg/ha, that on oilseed rape to 183 kg/ha. Rates for potatoes are more variable; the standard error for total nitrogen for the average field rate was 7.7 (see Appendix 1.1 for details).

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 2012 – 2016

Total nitrogen

	winter wheat		*spring barley*		*winter barley*	
	milling	*non-milling*	*malting*	*non-malting*	*malting*	*non-malting*
2012	217	176	110	93	129	152
2013	208	177	110	110	131	151
2014	208	182	112	106	140	147
2015	213	184	112	101	136	153
2016	206	185	112	100	127	153

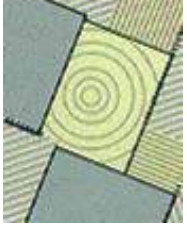
Nitrogen fertiliser requirements for winter wheat depend on the intended market end use (grain N levels), as well as upon soil type and the residual soil nitrogen fertility from previous cropping and manure practice Milling varieties are often grown as a second wheat and often receive extra nitrogen, 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 also to avoid any risk of lower grain protein concentrations as a result of high yield diluting the grain nitrogen concentration for first wheat in the rotation. The average field application rate on milling wheat in 2016 was 206 kg/ha a decrease of 7 kg/ha over 2015. The non-milling crop continues to dominate the wheat crop area (Table B1.6) with 34% of the crop area in 2016 being grown as milling wheat (5 year mean: 29%).

Table B1.6 Percentage distribution (% crop area) of cereal crop areas by market use, Great Britain 2012 – 2016, as estimated from the Survey

	winter wheat		*spring barley*		*winter barley*	
	milling	*non-milling*	*malting*	*non-malting*	*malting*	*non-malting*
2012	27	73	63	37	32	68
2013	30	70	51	49	29	71
2014	25	75	57	43	36	64
2015	30	70	55	45	23	77
2016	34	66	53	47	19	81

Spring barley

Overall use of total nitrogen on spring barley decreased by 1 kg/ha in 2016 to 104 kg/ha. The 2013 rate was the highest reported rate since 2002, and including the 2016 rate increased the 5 year mean to 104 kg/ha. The overall application rate of straight nitrogen decreased to 71 kg/ha, whilst the overall application rate for



compound N was unchanged at 33 kg/ha. The percentage of the spring barley area receiving a dressing of straight N was unchanged at 75%, whereas dressing cover with compound N increased slightly to 52%. (Table B1.4). The average field rate for total nitrogen was 106 kg/ha in 2016, in line with the five year average.

Further analysis of the data by crop type (Table B1.5) shows the average rate applied to the spring malting crop was unchanged in 2016 at 112 kg/ha. For non-malting crops the nitrogen application rate decreased to 100 kg/ha, with a five year mean of 102 kg/ha.

Estimated nitrogen rates on spring barley crops has been consistently slightly higher on malting than non-malting crops, with a mean difference of 9 kg/ha over the last five years. 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)[16]. 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. In 2013 the average field rate of nitrogen was the same on malting and non malting crops, which was unusual, with the difference in rates in 2016 being more in line with normal practice.

The proportion of spring barley grown for malting has fluctuated during the last five years (Table B1.6). The mean for the period 2012-16 is 56%, with the lowest proportion recorded in 2013 at 51%.

Winter barley

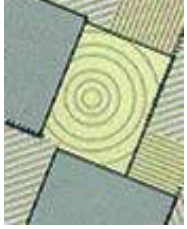
In the period 2002-08 overall total nitrogen use on winter barley decreased from year to year, down to 132 kg/ha in 2008. This rate has increased albeit with some fluctuations to 146 kg/ha in 2016. The straight nitrogen rate decreased by 2 kg/ha whereas the compound nitrogen rate increased by 1 kg/ha in 2016.

Nitrogen requirements for winter barley, as with the spring sown crop, depend on a range of agronomic factors, including the intended market for the grain. Average field rates of nitrogen on malting crops decreased by 9 kg/ha to 127 kg/ha in 2016 giving a five year mean of 133 kg/ha. For non malting crops the average field rate was 153 kg/ha in 2016, the same as the previous year (Table B1.5), with the 5 year average being 151 kg/ha.

The higher application rates of nitrogen (five-year mean of +19 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 relative crop area grown for malting was 19% in 2016, which was less than in the recent past, with the five year mean calculated as 28%. (Table B1.6).

[1] Anon. (2010). *Fertiliser Manual (RB209),* Defra, 8th edition. The Stationery Office, London. ISBN 978-0-11-243286-9. For the latest May 2017 release see the AHDB web site: http://www.ahdb.org.uk/projects/RB209.aspx



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 due to the fact that 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 2016 the overall rate was 134 kg/ha, below the five year mean of 148 kg/ha. (Table B1.3a). The decrease in 2016 is due to reductions in the average field rates of straight and compound N as well as a decrease in the dressing cover percentage of straight nitrogen (Table B1.3b, B1.4), compared to the previous year.

Oilseed rape

In 2016, overall total nitrogen use on oilseed rape, as a combined category for both the autumn and spring sown crop, decreased by 13 kg/ha to 180 kg/ha (five year mean 185 kg/ha). Despite the decrease the overall rate is still higher than that observed in 2013, when more spring oilseed rape was planted, due to poor weather conditions in the autumn. The 2016 overall rate could have been affected by patchy crops due to cabbage stem flea beetle.

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 decreased by 9 kg/ha between 2015 and 2016 to 184 kg/ha. The rate for the spring crop increased by 17 kg/ha to 132 kg/ha. In a normal year spring oilseed rape represents only about 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 2012 – 2016

Total nitrogen (kg/ha)

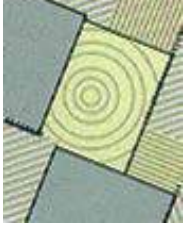
	winter oilseed rape	*spring oilseed rape**
2012	187	119
2013	188	121
2014	192	154
2015	193	115
2016	184	132

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

.

Sugar beet

The overall nitrogen use on sugar beet decreased by 1 kg/ha in 2016 to 97 kg/ha, slightly over the five year mean (96 kg/ha). The proportion of crop area receiving a nitrogen dressing was 98%, which is consistent with recent years. The average field rate of compound nitrogen was higher than in 2015, although dressing cover with compound nitrogen is low at 22% of the sugar beet area, in comparison to 97% dressing cover with straight N. The average field rate of straight nitrogen decreased by 7 kg/ha to 89 kg/ha in 2016.



B1.2.2 Phosphate and Potash

Phosphate

In 2016 the overall phosphate rate decreased on all the major crops except spring barley. Lower overall rates were caused by decreases to average field rates on winter wheat, potatoes, oilseed rape and sugar beet (Table B1.3b). Dressing cover percentages decreased on spring barley, winter barley and sugar beet. The overall phosphate rate of 29 kg/ha for tillage crops is in line with the 2012-16 five year average (Table B1.2a). There are indications that the declining trend in overall usage of phosphate (and potash) which has been apparent since the late 1990s, driven by reducing annual dressing cover, may have ceased (Figure B2.4).

Potash

Overall potash use on tillage crops increased in 2016 by 1 kg/ha, to 39 kg/ha. This is in line with the 2012-16 five year average (Table B1.2a). The increase in overall potash rate on tillage crops in 2016 was caused by an increase in the average field rate as the proportion of the crop area receiving a dressing was unchanged at 50%. The average field rates for potash decreased on winter wheat, oilseed rape and sugar beet and increased spring and winter barley. As noted for nitrogen, part of the reason for recent apparent fluctuations in values for 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. The potash dressing cover percentages decreased in 2016 for spring barley, winter barley, oilseed rape and sugar beet.

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 2016 cereals dressing covers with sulphur were in the 56-63% range. In oilseed rape the 3% decrease in dressing cover makes it below the five year average, 73% (Table B1.8). In 2016 average field rates increased in winter wheat, winter barley and oilseed rape, but decreased on spring barley.

Table B1.8 Dressing cover (% area) and average application rate (kg/ha SO_3) of sulphur on cereals and oilseed rape, Great Britain 2012 – 2016

Dressing cover (%)

	winter wheat	*winter barley*	*spring barley*	*oilseed rape*	*all tillage*
2012	52	51	45	73	47
2013	53	50	43	72	47
2014	57	57	47	76	51
2015	62	52	48	73	52
2016	63	57	56	70	54

Average field rate (kg/ha SO_3)

	winter wheat	*winter barley*	*spring barley*	*oilseed rape*	*all tillage*
2012	54	50	39	86	61
2013	55	54	43	82	58
2014	57	50	45	82	60
2015	55	56	44	83	59
2016	56	59	42	84	58

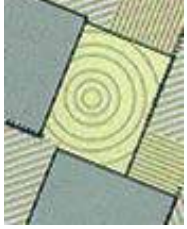


Table B1.9 shows the proportion of major tillage crops receiving a sulphur dressing in England & Wales compared with Scotland. Historically a higher proportion of cereal and oilseed crops was treated with sulphur in Scotland than in England & Wales which may have been due to the greater awareness of the risk of sulphur deficiency in Scotland due to historically extremely low levels of atmospheric sulphur deposition, compared to most other areas of Britain. Arable farmers in England & Wales became more aware of the need to apply sulphur and there has been an increase in the percentage dressing cover figures for all major tillage crops. By 2016 dressing covers in England & Wales have reached parity with, or even exceeded, those in Scotland (Table B1.9).

Table B1.9 Dressing cover (% area) of sulphur on cereals and oilseed rape by region, 2012 – 2016

		winter wheat	*winter barley*	*spring barley*	*oilseed rape*
England & Wales	*2012*	52	50	45	74
	2013	53	50	46	73
	2014	56	58	50	77
	2015	61	51	53	82
	2016	65	56	57	71
Scotland*	*2012*	61	54	44	49
	2013	45	45	39	53
	2014	61	46	43	69
	2015	65	58	41	72
	2016	49	63	54	59

* 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 2012 – 2016

	straight nitrogen	*compound nitrogen*	*total nitrogen*	*total phosphate*	*total potash*	*total sulphur*
2012	25	31	55	9	12	2
2013	28	31	59	9	13	2
2014	30	30	60	10	14	4
2015	27	28	56	9	12	3
2016	28	28	56	9	12	3

Dressing cover for total nitrogen on grass decreased in 2016 to 58% (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 2008. 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 105 kg/ha.

Overall application rates for phosphate and potash on grass were 9 and 12 kg/ha respectively, unchanged from 2016.

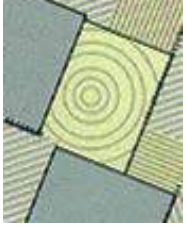


Table B1.11 Dressing cover (%) and average application rate (kg/ha) of fertiliser on grassland, Great Britain 2012 – 2016

Dressing cover (%)

	straight nitrogen	*compound nitrogen*	*total nitrogen*	*total phosphate*	*total potash*	*total sulphur*
2012	26	41	61	41	42	7
2013	28	42	62	42	43	8
2014	29	41	62	41	43	11
2015	27	41	60	41	42	10
2016	27	39	58	38	39	9

Average field rate (kg/ha)

	straight nitrogen	*compound nitrogen*	*total nitrogen*	*total phosphate*	*total potash*	*total sulphur*
2012	94	75	91	22	29	32
2013	100	74	96	22	29	33
2014	104	72	96	24	32	33
2015	100	70	93	22	30	31
2016	105	71	97	23	31	35

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 decreased by 2% to 39% in 2016. The dressing cover percentage of phosphate on grass decreased by 3% to 38% in 2016, with the potash decreasing by the same percentage. The five year means are 41% and 42% respectively.

Average field rates for 2016 increased to 23 kg/ha for phosphate and 31 kg/ha for potash, up from the historic low rates reported between 2011 and 2013.

B1.3.1 Nitrogen

Cutting and grazing management

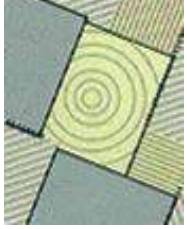
Fertiliser requirements for grassland vary according to the type of livestock enterprise, intensity of production and the associated cutting and grazing regimes used for sward management. Fertiliser use on dairy, other livestock and mixed farms in Great Britain in 2016 are presented in Section C. The Survey estimates of annual distributions of the total grassland area between grazing and cutting management regimes since 2012 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 2012 – 2016

	grazed [1]	*silage* [2]	*hay* [2]
2012	90	28	10
2013	90	28	12
2014	88	29	11
2015	90	29	11
2016	92	28	9

Nearly all grassland is grazed at some stage during the season (Table B1.12) and the proportion in 2016 is slightly above the five year mean of 90%.

[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 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 2012 – 2016

Total nitrogen

	overall application rate				*average field rate*		
	grazed [1]	*silage* [2]	*hay* [2]		*grazed* [1]	*silage* [2]	*hay* [2]
2012	51	99	47	*2012*	87	117	75
2013	55	106	44	*2013*	91	124	77
2014	54	104	44	*2014*	90	124	76
2015	51	100	37	*2015*	87	121	75
2016	52	103	38	*2016*	93	127	75

Straight nitrogen

	overall application rate				*average field rate*		
	grazed [1]	*silage* [2]	*hay* [2]		*grazed* [1]	*silage* [2]	*hay* [2]
2012	22	43	25	*2012*	91	105	79
2013	26	50	21	*2013*	94	112	78
2014	26	52	22	*2014*	98	119	79
2015	24	49	17	*2015*	95	114	76
2016	26	53	20	*2016*	102	119	93

Compound nitrogen

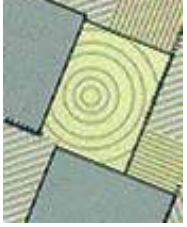
	overall application rate				*average field rate*		
	grazed [1]	*silage* [2]	*hay* [2]		*grazed* [1]	*silage* [2]	*hay* [2]
2012	28	56	22	*2012*	71	97	64
2013	29	57	23	*2013*	71	96	64
2014	28	52	22	*2014*	70	94	64
2015	26	51	21	*2015*	67	91	64
2016	26	50	18	*2016*	69	95	55

In 2016 the overall total nitrogen rate for the grazed category increased by 1 kg/ha to 52 kg/ha, with the rate on the silage category increasing by 3 kg/ha to 103 kg/ha.

The average field rates of straight nitrogen increased on all categories of grass in 2016. Compound nitrogen rates also increased except on grass fields cut for hay. The five year means for the overall compound nitrogen rate are 27, 53 and 21 kg/ha for grazed grass, silage and hay respectively.

The fall in nitrogen use over the long term on grassland is likely to be related in part to decreases in ruminant livestock numbers which may have reduced herbage production requirements.

[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 2012 – 2016

Total phosphate

	overall application rate			*average field rate*		
	grazed [1]	*silage* [2]	*hay* [2]	*grazed* [1]	*silage* [2]	*hay* [2]
2012	8	15	8	20	27	21
2013	9	16	8	21	28	22
2014	9	15	9	23	28	27
2015	8	15	8	21	27	23
2016	8	14	8	22	28	23

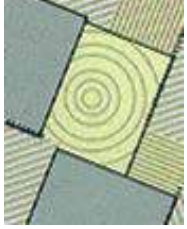
Total potash

	overall application rate			*average field rate*		
	grazed [1]	*silage* [2]	*hay* [2]	*grazed* [1]	*silage* [2]	*hay* [2]
2012	11	25	9	27	41	26
2013	11	27	11	27	44	29
2014	12	26	14	29	44	36
2015	11	25	11	27	42	33
2016	11	24	9	29	46	27

The overall phosphate rate decreased by 1 kg/ha on grass cut for silage in 2016, and was unchanged on grazed and grass cut for hay. Rates reported on grass cut for hay needs to be treated with caution due to the relatively small numbers of grass fields being managed this way (Table B1.14). The corresponding five-year means for grazed grass, silage and hay were 8, 15 and 8 kg/ha, respectively. The slight increases in average field rates on grazed and silage grass suggest that the long term decline in application rates may be coming to an end.

Overall potash rates in 2016 decreased by 1 kg/ha on grass cut for silage grass, decreased by 2 kg/ha on grass cut for hay, with the rate on grazed grass the same as in 2015. The average field rate of potash increased by 2 kg/ha on grazed grass, increased by 4 kg/ha on grass for silage and decreased by 6 kg/ha on grass cut for hay.

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



B1.3.3 Sulphur

In 2016, 9% of the total grassland area received a sulphur dressing (mean 9% for 2012-16 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 slight decreases on cut grass categories in 2016.

The significant proportion of heavier textured soil types which occur in the main grassland farming areas, and 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 2012 – 2016

Dressing cover (%)

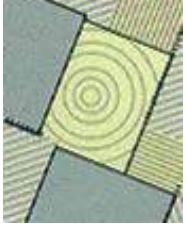
	grazed [1]	*silage* [2]	*hay* [2]	*all grass*
2012	6	14	7	7
2013	7	16	8	8
2014	10	18	11	11
2015	9	17	6	10
2016	9	16	5	9

Average application rate per year (kg/ha SO_3)

	grazed [1]	*silage* [2]	*hay* [2]	*all grass*
2012	31	34	23	32
2013	31	37	32	33
2014	32	34	28	33
2015	30	34	37	31
2016	35	37	41	35

Estimated average field rates of sulphur application peaked for grazed and silage grass in 2007 at 45 kg/ha and 47 kg/ha and for hay in 2008 at 47 kg/ha. In 2016 average field rates increased on all categories of grass. The five year means are 32, 35 and 32 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



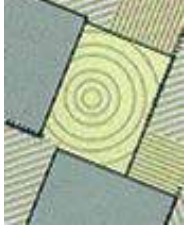
B2 LONGER TERM TRENDS FOR GREAT BRITAIN

B2.1 NITROGEN USE

The British Survey of Fertiliser Practice was first undertaken as an integrated British survey in 1992. Before then, the annual Survey of Fertiliser Practice had been carried out separately for England & Wales and for Scotland. Some survey statistics from those earlier surveys have since been collated in order 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 - 2016 and Scotland and Great Britain 1983 – 2016

	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



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 located 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 rate for 2016 is just within that range, with the overall rate of nitrogen on tillage crops for Great Britain being 141 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 to 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 85 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 – 2016

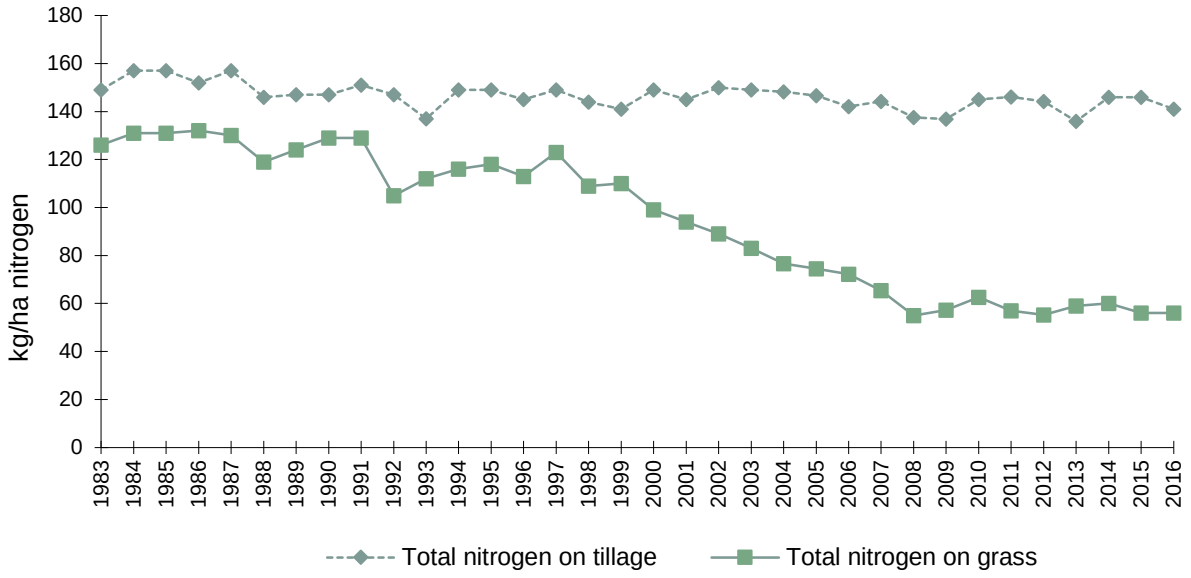
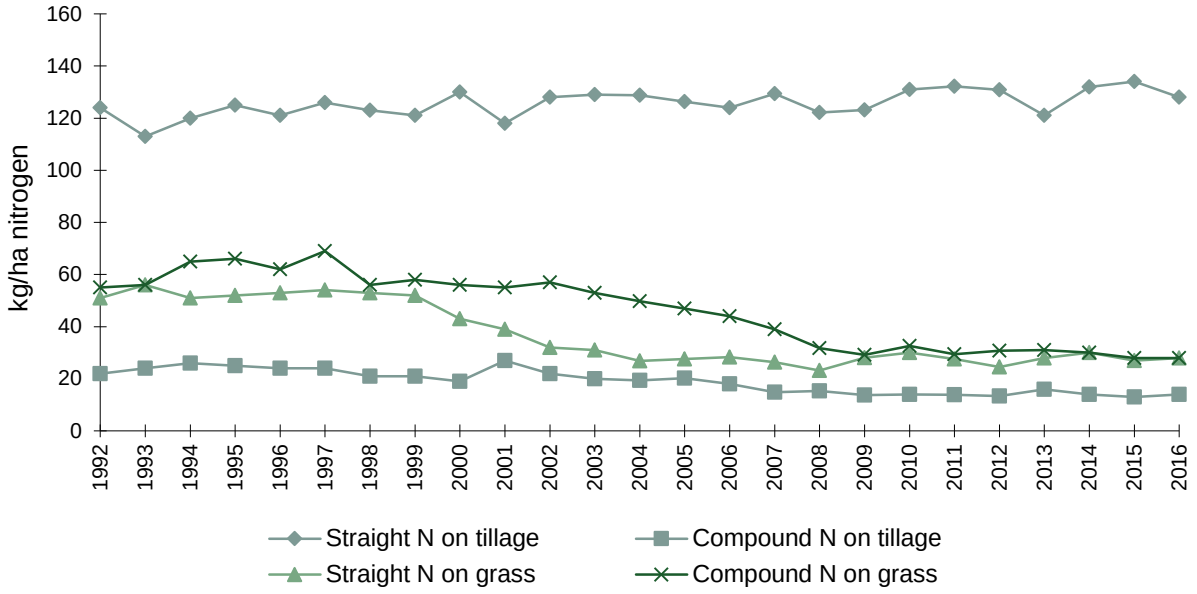


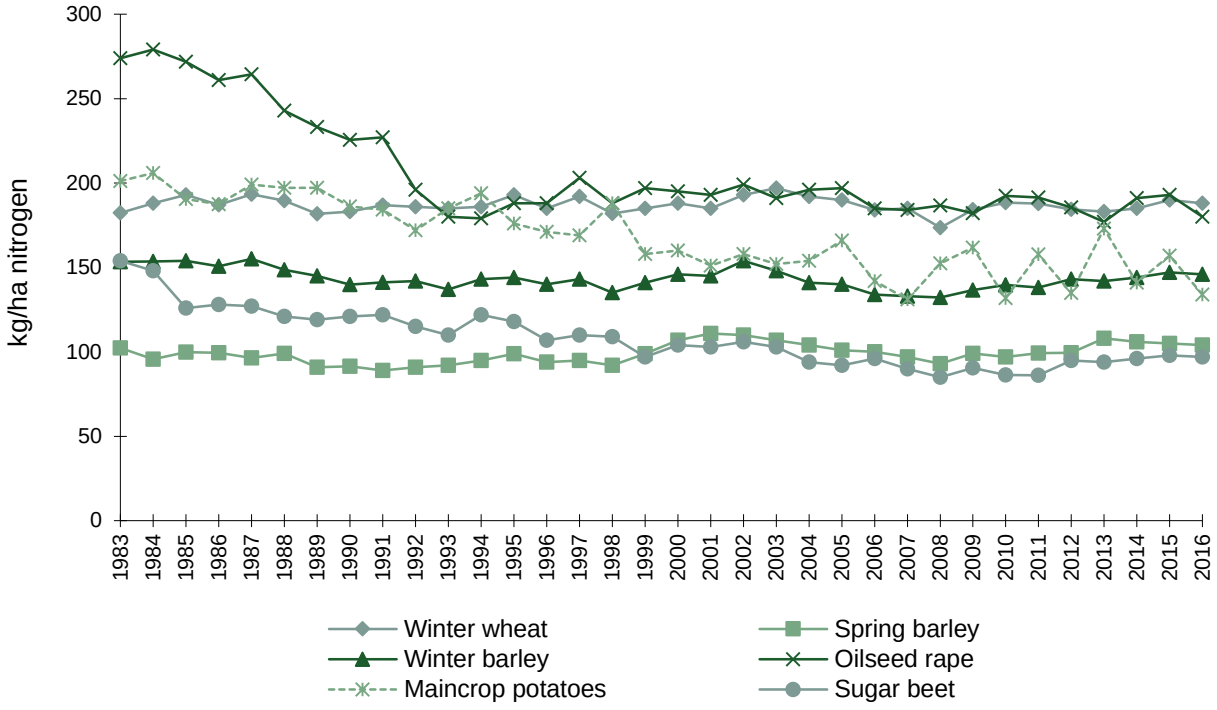
Figure B2.2 Overall application rates (kg/ha) of straight and compound nitrogen on tillage crops and grassland, Great Britain 1992 – 2016

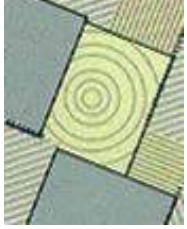


B2.1.1 Nitrogen use on major tillage crops

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 – 2016





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, and the trend continues to be reduced dressing cover of autumn applied nitrogen on winter cereals. 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.

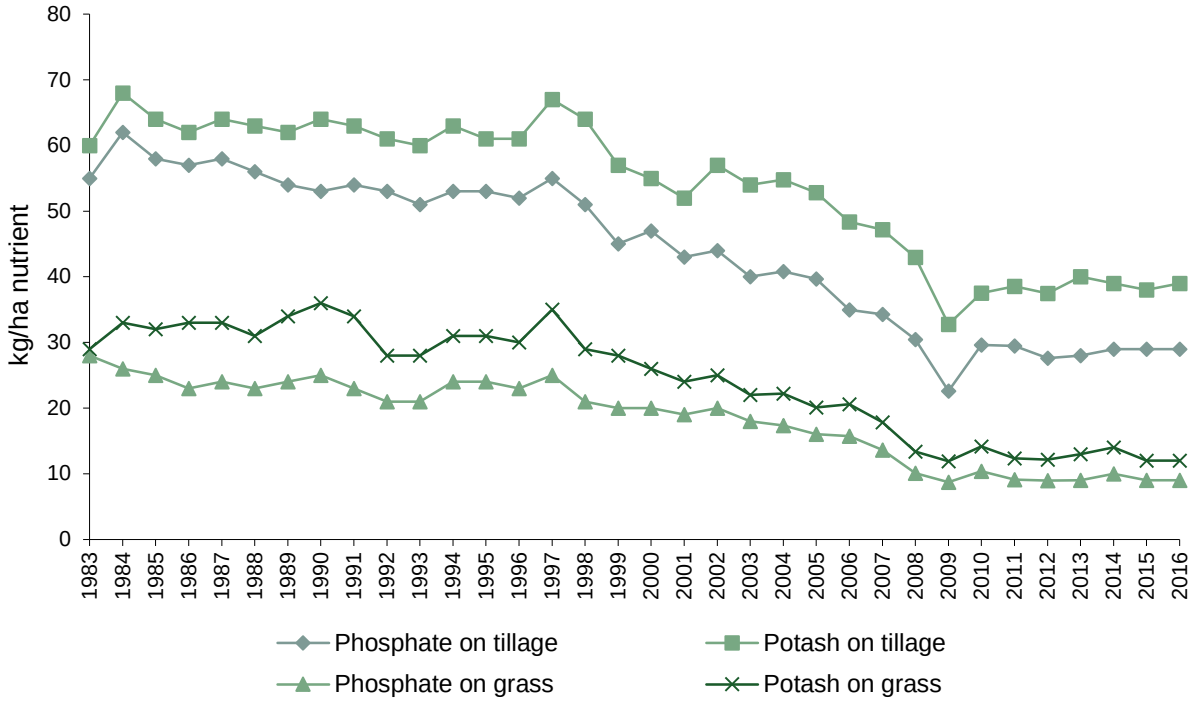
Table B2.2 Dressing cover (% area) of autumn or winter-applied (August to January) nitrogen on winter cereals and winter oilseed rape and average application rate (kg/ha) for winter oilseed rape, England & Wales 1987 – 1998 and Great Britain 1999 – 2016

	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

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 – 2016



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 9-10 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 37-40 kg/ha range.

The pattern of overall potash use on grassland has been more variable, compared to tillage crops, but has also shown a net decline between 1983 and 2016. Overall potash rates were relatively stable at 31-33 kg/ha during the mid-late 1980s and in the last five years have been in the 12-14 kg/ha range.

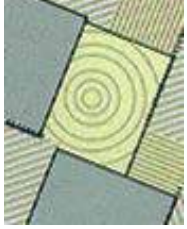


Table B2.3 Overall phosphate application rates (kg/ha), England & Wales 1969 - 2016 and Scotland and Great Britain 1983 – 2016

	tillage crops			*grass*			*all crops and grass*		
	England & Wales	*Scotland*	*Great Britain*	*England & Wales*	*Scotland*	*Great Britain*	*England & Wales*	*Scotland*	*Great Britain*
1969	53	-	-	34	-	-	-	-	-
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

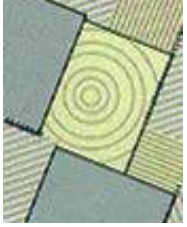
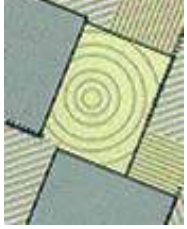


Table B2.4 Overall potash application rates (kg/ha), England & Wales 1969 - 2016 and Scotland and Great Britain 1983 – 2016

	tillage crops			*grass*			*all crops and grass*		
	England & Wales	*Scotland*	*Great Britain*	*England & Wales*	*Scotland*	*Great Britain*	*England & Wales*	*Scotland*	*Great Britain*
1969	61	-	-	23	-	-	-	-	-
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



Overall rates of phosphate and potash applied to tillage crops are nearly three times those used on grassland. However there is greater use of applied manures on grassland (34% cover) than on tillage crops (23% cover) and grazed grassland also receives manure as it is grazed.

Dressing covers of phosphate and potash on tillage and grass for the period 2004-16 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 (28% reduction) in comparison to Scotland where the reduction was 9% 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 – 2016

	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

Table B2.5b Potash dressing covers (%), Great Britain 2004 – 2016

	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

B2.2.1 Phosphate and potash use on major tillage crops

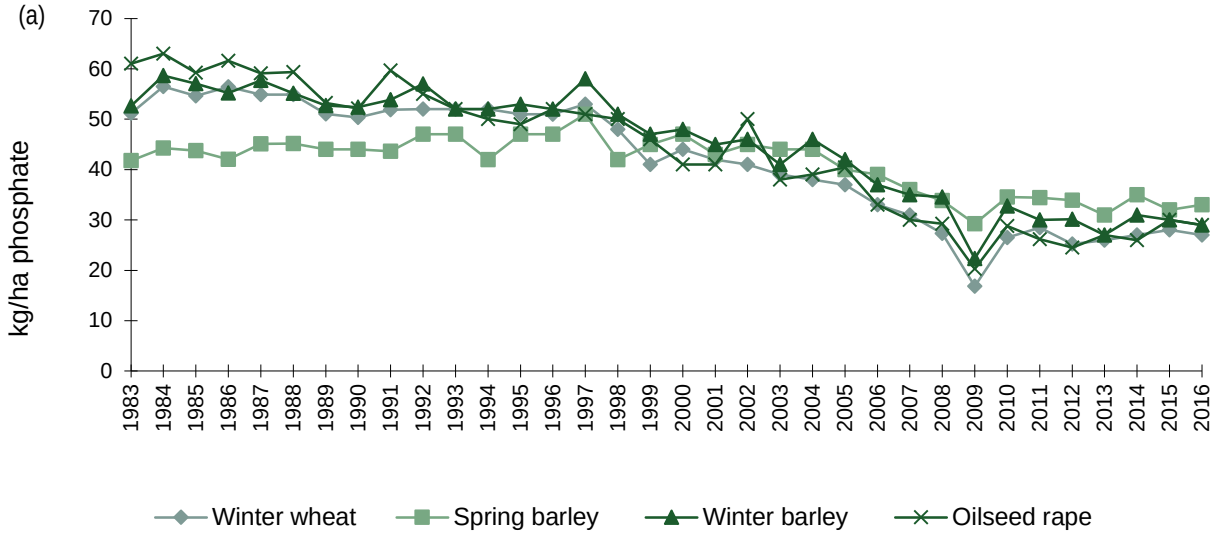
Overall application rates of phosphate and potash on the main arable crops in Great Britain since 1983 are shown in Figure B2.5.

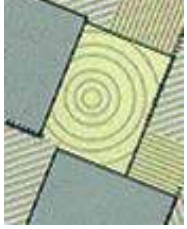
Phosphate use on most major tillage crops has shown a gradual net decline over the survey period. Overall application rates of phosphate have gradually declined on winter wheat and, less consistently, on winter barley since the mid 1980s (Figure B2.5(a)). By 1999 the overall phosphate rate had fallen 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. 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 33 kg/ha by 2016.

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

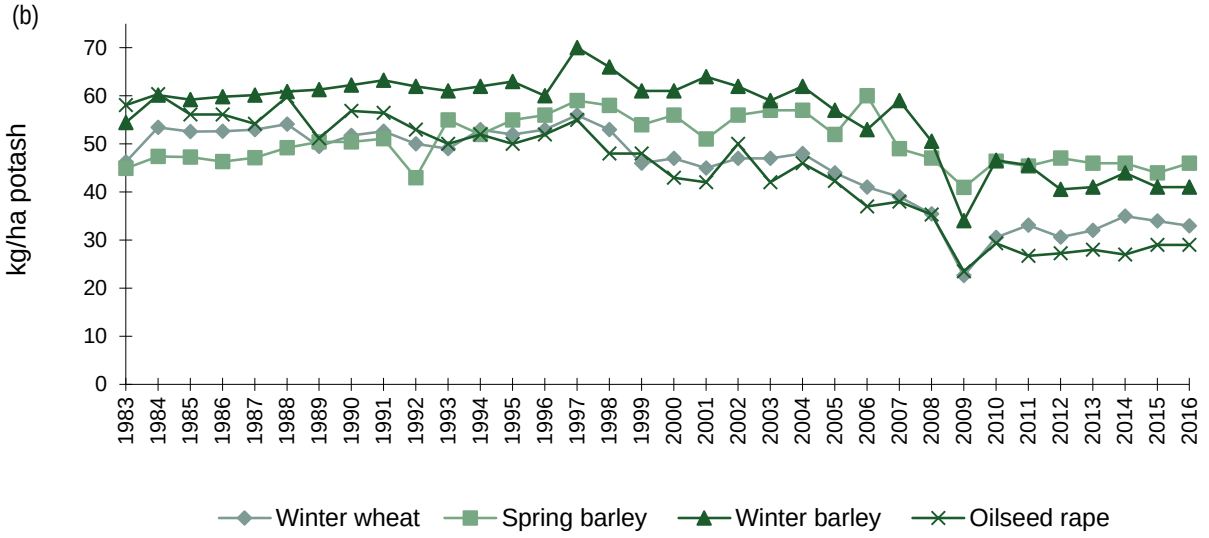
On winter wheat, the overall potash rates were fairly consistent between 1983 and 2005, in the range 44-56 kg/ha. Thereafter the rate declined, with a 2009 dip to 23 kg/ha, with modest recoveries since that point. For barley the rates were in the range of 49-61 kg/ha between 1983 and 2008. The rates 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 41-47 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 – 2016

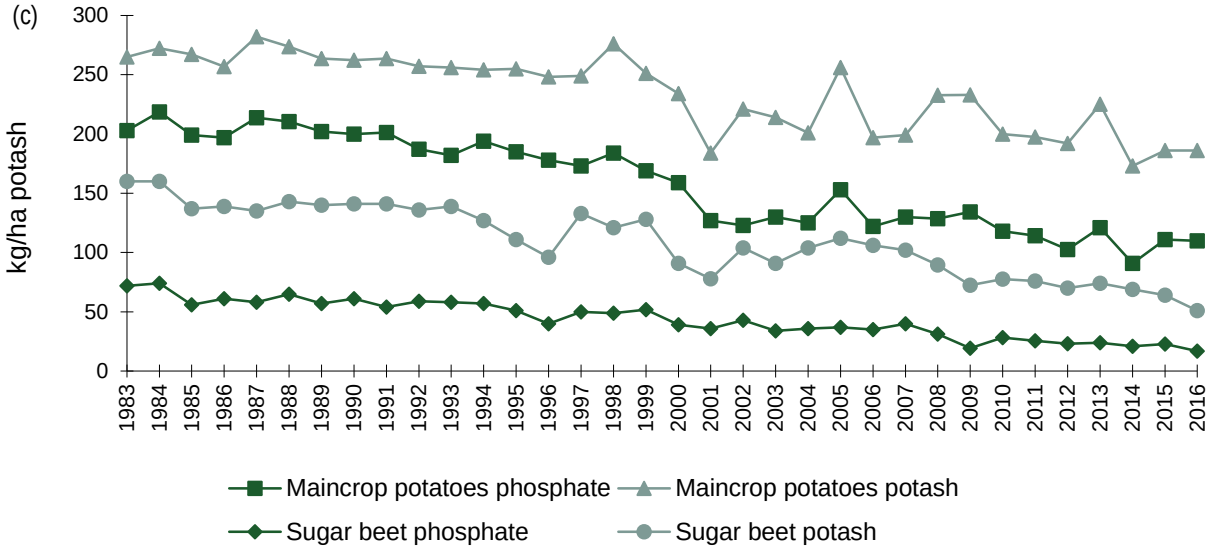




(b)


kg/ha potash
0
10
20
30
40
50
60
70
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
Winter wheat
Spring barley
Winter barley
Oilseed rape

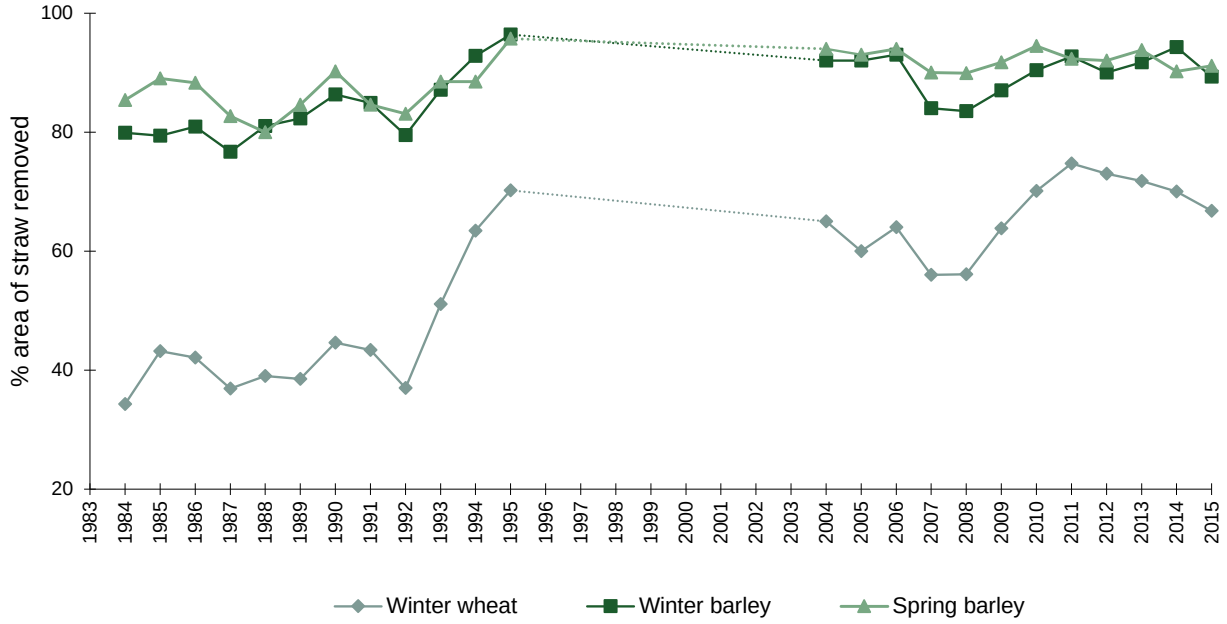
(c)


kg/ha potash
0
50
100
150
200
250
300
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
Maincrop potatoes phosphate
Maincrop potatoes potash
Sugar beet phosphate
Sugar beet potash

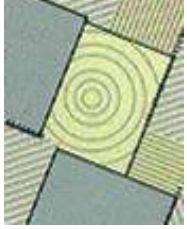
B2.3 STRAW REMOVAL

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 2016 survey will relate to the fate of the straw from the 2015 harvest so is reported against 2015. In 2015 67% of the winter wheat straw was removed from the fields, with the percentages for winter and spring barley much higher at 89 and 91% respectively.

Figure B2.6 Percentage of straw removed from wheat and barley fields, England and Wales harvest years 1985 – 1995, Great Britain harvest years 2004 - 2015



Data for the period 1984-95 were sourced from MAFF/Defra straw disposal surveys, those for the period 2004-13 from this survey. No data are available for the period 1996-03. 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.

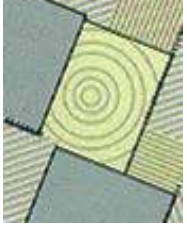


B2.4 TOTAL QUANTITIES OF NITROGEN PHOSPHATE AND POTASH, UK

Table B2.6 Quantities of major nutrients used, United Kingdom 1965-2015

	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*
1965	473	72	20	565	369	88	23	479	346	62	17	425
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	1059	315	69	19	404	322	59	17	398
1977	879	146	68	1093	316	69	21	406	330	59	20	409
1978	924	156	75	1155	316	72	22	410	328	64	20	412
1979	941	160	85	1186	321	73	22	416	333	65	21	419
1980	1031	156	81	1268	342	75	24	440	361	65	22	447
1981	1100	159	76	1335	344	73	24	441	367	66	21	454
1982	1180	160	76	1416	357	65	24	446	394	67	22	483
1983	1227	161	82	1470	359	65	24	448	409	68	23	500
1984	1316	183	89	1588	391	69	28	488	457	73	29	559
1985	1298	186	96	1580	375	71	23	469	441	72	28	541
1986	1297	176	99	1572	341	65	28	434	415	66	29	510
1987	1370	193	111	1674	340	65	27	432	429	70	29	528
1988	1251	180	94	1525	341	70	24	435	419	76	29	524
1989	1223	193	98	1514	334	65	26	425	420	74	29	523
1990	1275	194	113	1582	323	63	28	414	409	73	33	515
1991	1224	193	98	1515	321	61	24	406	393	71	28	492
1992	1105	166	94	1365	295	55	21	371	351	64	26	441
1993	968	142	109	1219	286	50	24	360	344	57	29	430
1994	986	133	129	1248	312	51	28	391	361	59	38	458
1995	1064	156	128	1348	325	53	27	405	378	64	34	476
1996	1048	157	128	1333	302	62	30	394	370	65	36	471
1997	1156	172	112	1440	325	63	24	412	405	65	31	501
1998	1111	158	106	1375	308	56	19	383	397	64	26	487
1999	1015	152	117	1284	274	50	23	347	365	59	27	451
2000	1005	150	113	1268	237	59	21	317	322	61	26	409
2001	876	180	106	1162	201	57	21	279	274	69	26	369
2002	915	187	95	1197	209	55	19	283	397	70	24	391
2003	853	170	108	1131	203	60	19	282	283	66	26	375
2004	875	150	100	1125	205	57	16	278	288	65	22	375
2005	834	150	77	1061	192	55	12	259	267	67	18	352
2006	780	153	70	1003	173	51	11	235	243	66	16	325
2007	802	126	80	1008	169	46	9	224	241	59	17	317
2008	800	127	74	1001	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	1016	134	44	6	184	182	57	12	251
2011	824	124	74	1022	145	42	5	192	213	59	11	283
2012	809	125	66	1000	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	1060	146	48	7	201	206	65	13	284
2015	819	155	75	1049	142	48	6	196	196	64	12	272
2016e	800	155	71	1026	142	52	7	201	188	69	13	270

Note: Years are harvest (e.g. 2016 refers to the 2015/16 cropping year) rather than calendar years. Data for 2016 are estimates.

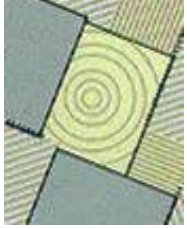


Quantities of nitrogen, phosphate and potash used in the UK since 1965 are shown in Table B2.6. These data are based on BSFP findings and trade and sales data. They are compiled by the Agricultural Industries Confederation in conjunction with Defra using the methodology described in Section A2.5. They are the official figures for fertiliser usage.

Total nitrogen use in the UK increased from 565 thousand tonnes in 1965 up to 1674 thousand tonnes in 1987 before declining gradually to 1001 thousand tonnes in 2008. The drop in 2009 was related to high fertiliser prices. Between 2010 and 2016 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 2015 at 184-201 thousand tonnes, but use is still approximately half that compared to use between 1965 and 1985. The low use of 129 thousand 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 2015 has been between 251-284 thousand tonnes, which is around half that used at its peak. The low use of 208 thousand tonnes in 2009 was price related.



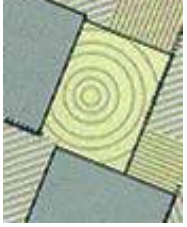
SECTION C – TABLES

CONTENTS

GREAT BRITAIN TABLES 2016

ENGLAND AND WALES TABLES 2016

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 2016

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 2016

	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	N	P_2O_5	K_2O	
Spring wheat	89	32	29	36	26	141	51	63	126	16	18	104
Winter wheat	98	45	46	63	19	192	60	71	188	27	33	1206
Spring barley	98	65	67	56	31	106	50	68	104	33	46	609
Winter barley	99	52	58	57	21	148	56	70	146	29	41	433
Oats	88	45	57	50	23	110	61	79	96	27	46	175
Rye/triticale/Durum wheat	59	43	40	36	5	109	53	75	65	23	30	16
Potatoes (seed or earlies)	100	100	85	11	0	110	110	167	110	110	141	14
Potatoes (maincrop)	94	88	87	29	42	142	125	213	134	110	186	67
Sugar beet	98	35	58	58	41	99	48	88	97	17	51	63
Spring oilseed rape	100	53	53	78	9	132	-	-	132	-	-	6
Winter oilseed rape	98	51	43	70	20	184	58	67	180	30	29	421
Linseed	95	30	27	58	16	91	35	32	87	10	9	33
Forage maize	79	53	37	8	95	57	50	67	45	27	25	123
Rootcrops for stockfeed	87	62	69	19	44	84	56	76	73	35	53	72
Leafy forage crops	86	66	71	8	37	78	38	45	66	25	32	43
Arable silage/other fodder crops	43	19	19	10	44	116	57	64	49	11	12	83
Peas - human consumption	0	23	28	4	2	-	71	83	-	16	23	42
Peas - animal consumption	1	40	42	18	0	-	44	46	-	17	19	28
Beans - animal consumption	2	30	28	7	6	49	59	70	1	17	20	189
Vegetables (brassicae)	97	97	97	15	9	136	78	113	132	75	110	9
Vegetables (other)	43	48	50	11	4	107	88	123	46	42	61	32
Soft Fruit	100	78	100	22	0	104	79	228	104	61	228	10
Top Fruit	84	40	42	49	0	107	81	107	90	32	45	24
Other tillage	35	17	19	23	5	105	65	123	37	11	24	46
All tillage	90	49	50	54	23	157	59	77	141	29	39	3848
Grass under 5 years old	82	51	54	17	48	124	30	43	102	15	24	841
Grass 5 years and over	53	36	36	8	31	88	21	27	47	7	10	1961
All grass	58	38	39	9	34	97	23	31	56	9	12	2802
All crops and grass	72	43	44	29	29	130	41	54	94	18	24	6650

Source: British Survey of Fertiliser Practice 2016

Table GB1.2 Use of straight fertiliser, Great Britain 2016

	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	84	10	10	139	67	84	116	7	9	104
Winter wheat	96	17	18	190	67	80	182	11	14	1206
Spring barley	75	7	11	95	52	78	71	3	8	609
Winter barley	95	8	13	144	63	85	137	5	11	433
Oats	80	6	21	106	87	93	85	5	20	175
Rye/triticale/Durum wheat	57	16	13	105	-	-	60	-	-	16
Potatoes (seed or earlies)	20	4	29	-	-	-	-	-	-	14
Potatoes (maincrop)	35	1	19	101	-	220	36	-	42	67
Sugar beet	97	4	31	89	-	85	86	-	27	63
Spring oilseed rape	78	0	0	146	-	-	114	-	-	6
Winter oilseed rape	97	16	17	177	60	75	172	9	13	421
Linseed	95	6	6	86	-	-	82	-	-	33
Forage maize	48	5	15	65	27	92	31	1	14	123
Rootcrops for stockfeed	40	6	14	96	-	112	38	-	15	72
Leafy forage crops	27	0	0	61	-	-	16	-	-	43
Arable silage/other fodder crops	36	1	1	125	-	-	44	-	-	83
Peas - human consumption	0	19	24	-	75	86	-	14	21	42
Peas - animal consumption	0	21	23	-	41	45	-	9	11	28
Beans - animal consumption	2	14	12	-	68	68	-	9	8	189
Vegetables (brassicae)	60	38	38	-	-	-	-	-	-	9
Vegetables (other)	18	10	11	87	-	-	16	-	-	32
Soft Fruit	65	9	32	65	-	-	43	-	-	10
Top Fruit	72	11	25	109	54	104	78	6	26	24
Other tillage	30	1	8	96	-	102	29	-	8	46
All tillage	82	12	16	156	64	84	128	8	13	3848
Grass under 5 years old	46	0	1	121	-	90	56	-	1	841
Grass 5 years and over	23	0	0	98	68	101	23	0	0	1961
All grass	27	0	1	105	66	96	28	0	1	2802
All crops and grass	52	6	7	141	64	85	73	4	6	6650

Source: British Survey of Fertiliser Practice 2016

Table GB1.3 Use of compound fertiliser, Great Britain 2016

	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	22	19	69	44	52	10	10	10	104
Winter wheat	11	29	28	51	54	65	6	16	18	1206
Spring barley	52	58	58	64	50	65	33	29	38	609
Winter barley	15	44	45	61	55	65	9	24	29	433
Oats	23	38	36	49	57	71	12	22	26	175
Rye/triticale/Durum wheat	11	27	27	-	52	91	-	14	25	16
Potatoes (seed or earlies)	100	100	67	102	107	164	102	107	110	14
Potatoes (maincrop)	83	88	75	118	124	193	98	109	144	67
Sugar beet	22	32	33	50	40	74	11	13	24	63
Spring oilseed rape	53	53	53	-	-	-	-	-	-	6
Winter oilseed rape	23	37	27	39	55	59	9	20	16	421
Linseed	14	24	21	-	36	32	-	8	7	33
Forage maize	51	51	23	27	49	48	14	25	11	123
Rootcrops for stockfeed	58	56	56	60	55	66	35	31	37	72
Leafy forage crops	71	66	71	71	38	45	50	25	32	43
Arable silage/other fodder crops	9	18	18	58	56	62	5	10	11	83
Peas - human consumption	0	4	4	-	-	-	-	-	-	42
Peas - animal consumption	1	18	18	-	47	47	-	9	9	28
Beans - animal consumption	1	16	16	-	51	71	-	8	11	189
Vegetables (brassicae)	52	59	59	58	53	89	30	31	52	9
Vegetables (other)	36	39	39	85	95	124	30	37	48	32
Soft Fruit	68	68	68	89	86	268	61	59	184	10
Top Fruit	29	29	17	41	91	-	12	26	-	24
Other tillage	12	16	13	67	66	118	8	11	16	46
All tillage	23	38	35	59	56	72	14	21	25	3848
Grass under 5 years old	53	51	53	87	30	42	46	15	22	841
Grass 5 years and over	36	36	36	66	20	26	24	7	9	1961
All grass	39	38	39	71	22	30	28	9	12	2802
All crops and grass	32	38	37	67	37	48	21	14	18	6650

Source: British Survey of Fertiliser Practice 2016

Table GB1.4 Use of lime, Great Britain 2016

	Crop area receiving dressing (%)						Average application rate (tonnes of product/ha)							
	Ground limestone	Ground chalk	Magnesian limestone	Sugar beet lime	Other	All	Ground limestone	Ground chalk	Magnesian limestone	Sugar beet lime	Other	All	Fields limed	Fields in sample
Spring wheat	3.0	-	0.5	-	-	3.5	4.5	-	5.0	-	-	4.5	7	104
Winter wheat	2.0	0.1	1.5	0.3	0.1	4.0	4.6	10.2	3.5	5.0	0.9	4.3	64	1206
Spring barley	6.8	0.4	1.5	0.1	1.2	10.0	4.1	4.9	6.6	2.5	0.8	4.1	74	609
Winter barley	4.2	-	0.5	-	0.8	5.4	4.3	-	5.3	-	0.8	3.9	33	433
Oats	1.8	0.7	0.3	0.3	0.3	3.3	4.5	7.0	3.8	3.8	1.3	4.6	12	175
Rye/triticale/Durum wheat	-	-	-	-	-	-	-	-	-	-	-	-	1	16
Potatoes (seed or earlies)	-	-	-	-	-	-	-	-	-	-	-	-	0	14
Potatoes (maincrop)	-	-	-	-	-	-	-	-	-	-	-	-	0	67
Sugar beet	5.5	2.4	-	13.5	-	21.4	2.0	4.7	-	4.6	-	3.9	15	63
Spring oilseed rape	-	-	-	-	-	-	-	-	-	-	-	-	1	6
Winter oilseed rape	6.9	1.2	1.5	0.4	0.2	10.3	5.3	5.0	5.7	7.1	0.2	5.3	50	421
Linseed	-	-	-	-	-	-	-	-	-	-	-	-	0	33
Forage maize	4.4	-	0.6	-	-	5.0	5.1	-	5.0	-	-	5.1	7	123
Rootcrops for stockfeed	22.6	-	5.7	-	1.7	30.0	5.2	-	5.5	-	4.8	5.2	18	72
Leafy forage crops	26.6	-	-	-	0.4	27.1	5.0	-	-	-	0.5	4.9	10	43
Arable silage/other fodder crops	5.7	-	0.8	-	0.2	6.8	4.6	-	3.0	-	1.3	4.3	11	83
Peas - human consumption	-	-	-	-	-	-	-	-	-	-	-	-	2	42
Peas - animal consumption	-	-	-	-	-	-	-	-	-	-	-	-	1	28
Beans - animal consumption	1.1	0.3	0.1	-	0.4	1.9	3.5	1.0	6.3	-	0.3	2.6	6	189
Vegetables (brassicae)	20.7	-	-	9.1	-	29.9	4.7	-	-	7.5	-	5.5	5	9
Vegetables (other)	-	-	-	-	-	-	-	-	-	-	-	-	2	32
Soft Fruit	-	-	-	-	-	-	-	-	-	-	-	-	0	10
Top Fruit	-	-	-	-	-	-	-	-	-	-	-	-	2	24
Other tillage	-	-	-	-	-	-	-	-	-	-	-	-	4	46
All tillage	3.9	0.4	1.2	0.4	0.4	6.4	4.6	5.5	4.7	5.2	0.8	4.4	325	3848
Grass under 5 years old	5.7	-	0.8	-	0.2	6.7	4.1	-	5.0	-	2.2	4.2	69	841
Grass 5 years and over	1.8	0.0	0.2	-	0.4	2.5	4.2	5.4	4.0	-	0.9	3.6	83	1961
All grass	2.4	0.0	0.3	-	0.4	3.2	4.2	5.4	4.5	-	1.1	3.8	152	2802
All crops and grass	3.1	0.2	0.7	0.2	0.4	4.6	4.4	5.5	4.6	5.2	1.0	4.2	477	6650

Source: British Survey of Fertiliser Practice 2016

Table GB2.1 Average fertiliser practice by grassland utilisation, Great Britain 2016

	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	49	34	34	20	77	19	21	38	6	7	1326
Grazed mown	72	44	47	58	115	26	40	82	12	19	1129
All grazings	56	37	38	32	93	22	29	52	8	11	2455
Cut for silage - grazed	79	47	51	66	123	28	44	97	13	22	834
Cut for silage - not grazed	90	58	64	70	138	30	50	124	17	32	239
All cut for silage	81	49	54	67	127	28	46	103	14	24	1073
Cut for hay - grazed	50	33	34	38	75	21	25	37	7	9	321
Cut for hay - not grazed	59	45	46	11	76	29	31	44	13	15	70
All cut for hay	51	34	35	34	75	23	27	38	8	9	391
All mowings	74	46	49	59	118	27	42	88	13	21	1434
All grass	58	38	39	34	97	23	31	56	9	12	2802

Source: British Survey of Fertiliser Practice 2016

Table GB3.0 Product use by month of application, Great Britain 2016

(a) Product use

row %	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Straight N	0	0	0	0	0	6	28	38	18	5	2	1
Straight P	20	14	3	0	0.0	17	21	17	7	0	0	1
Straight K	5	7	5	2	1	17	37	19	5	1	0	1
Compounds	6	4	1	0	0	3	20	35	17	7	4	3
All fertilisers	3	2	1	0	0	5	26	36	17	5	3	2

(b) Nutrient use

row %	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Nitrogen	1	0	0	0	0	4	26	39	19	6	3	2
Phosphate	11	8	2	0	1	8	22	28	11	3	2	4
Potash	7	7	2	1	1	8	26	27	12	4	2	2
Total	3	2	1	0	0	5	25	36	17	5	3	2

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

'Product' refers to the total tonnage of the products used by the farmers in the survey year 2016.

'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 2016

Table GB3.1 Product type as percentage of all product used by crop group, Great Britain 2016

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	33.6	45.3	8.5	30.5	44.6	19.4	39.2	31.2	32.4	31.2	36.6	31.2	37.2
Urea	8.2	14.0	1.8	5.2	14.4	4.2	11.6	5.5	5.7	5.6	8.2	5.8	10.1
Calcium Ammonium Nitrate (CAN)	0.9	0.7	0.0	0.4	0.5	5.1	1.0	2.1	2.2	1.9	1.7	2.0	1.3
Urea Ammonium Nitrate (UAN)	7.7	14.7	0.3	5.2	15.8	4.1	12.0	1.3	1.7	1.9	19.0	1.8	9.4
Other Straight N	1.2	1.6	0.2	0.0	2.6	4.2	1.8	0.7	1.3	0.8	0.0	0.9	1.6
Triple Superphosphate (TSP)	1.9	2.8	1.0	0.6	3.0	4.1	2.7	0.2	0.7	0.2	1.9	0.2	2.1
Other Straight P	0.1	0.1	0.0	0.0	0.2	1.2	0.2	0.1	0.0	0.1	0.0	0.1	0.2
Muriate of Potash (MOP)	2.9	3.2	7.2	1.0	2.7	5.9	3.4	0.6	0.3	0.9	5.2	0.6	2.7
Other Straight K	0.1	0.2	1.1	24.3	0.6	3.4	1.0	0.1	0.0	0.1	0.0	0.1	0.8
PK	6.6	10.9	4.4	19.7	5.8	10.1	9.3	2.3	3.4	2.1	0.0	2.2	7.5
NK	3.7	1.2	0.0	0.9	0.9	2.2	1.6	5.4	1.6	7.3	4.9	5.5	2.6
Low N (<19% N)	19.3	2.6	71.0	7.2	6.3	23.9	10.7	4.1	4.8	3.7	13.3	4.3	9.1
High N (>=19% N)	13.4	2.4	3.7	2.7	2.0	11.3	5.0	46.5	45.8	44.0	9.2	45.2	15.1
Other	0.6	0.2	0.7	2.4	0.5	0.7	0.4	0.0	0.0	0.1	0.0	0.1	0.3
Total product ('000 tonnes)	**440**	**1586**	**94**	**50**	**405**	**157**	**2731**	**1026**	**79**	**616**	**6**	**1199**	**3930**

Source: British Survey of Fertiliser Practice 2016

Table GB3.2 Use of product type by crop group, Great Britain 2016

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	13.1	65.9	0.5	1.3	16.5	2.7	73.4	85.4	6.8	51.3	0.5	26.6	1406
Urea	10.9	66.3	0.9	0.8	19.3	1.8	87.0	82.7	6.0	58.1	1.0	13.0	443
Calcium Ammonium Nitrate (CAN)	9.4	51.3	0.0	0.3	6.6	32.5	55.4	82.8	3.1	52.9	0.3	44.6	52
Urea Ammonium Nitrate (UAN)	10.2	69.6	0.1	1.1	16.9	2.2	96.9	67.9	3.0	67.0	10.6	3.1	353
Other Straight N	10.4	57.3	0.3	0.0	23.0	9.1	86.4	89.4	11.7	34.7	0.0	13.6	76
Triple Superphosphate (TSP)	11.2	63.5	0.3	0.8	15.0	9.0	97.9	88.4	10.6	20.7	5.6	2.1	80
Other Straight P	7.3	39.4	0.0	0.0	7.5	45.8	79.2	100.0	0.0	100.0	0.0	20.8	4
Muriate of Potash (MOP)	15.1	57.2	4.3	0.4	11.3	11.7	95.2	66.2	11.2	89.9	5.0	4.8	95
Other Straight K	0.8	17.0	6.4	48.9	12.8	14.2	96.2	65.8	0.0	88.6	0.0	3.8	30
PK	9.7	68.7	2.3	3.9	9.5	5.8	92.1	81.1	11.5	42.5	0.0	7.9	254
NK	46.8	35.7	0.0	3.2	5.0	9.2	44.1	82.6	1.4	79.1	1.0	55.9	114
Low N (<19% N)	36.4	13.9	23.8	0.3	9.1	16.5	88.2	79.2	7.8	48.8	2.1	11.8	329
High N (>=19% N)	45.5	30.9	4.7	2.3	6.8	9.8	13.1	87.4	6.8	47.9	0.0	86.9	681
Other	21.8	38.4	3.2	7.6	16.5	12.6	98.3	75.0	0.0	100.0	0.0	1.7	11
All Fertilisers	**16.1**	**58.1**	**3.5**	**1.8**	**14.8**	**5.7**	**69.5**	**85.6**	**6.6**	**51.4**	**0.5**	**30.5**	**3930**

Source: British Survey of Fertiliser Practice 2016

Table GB3.3 Product use by month of application, Great Britain 2016

row %	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	total product ('000 tonnes)
Ammonium Nitrate	0.0	4.3	27.2	37.1	20.7	5.7	2.6	1.6	0.6	0.0	0.1	0.0	1406
Urea	0.2	8.9	32.9	36.9	13.6	5.1	0.7	0.6	0.4	0.7	0.0	0.0	443
Calcium Ammonium Nitrate (CAN)	1.0	4.6	15.7	30.3	14.9	12.3	11.5	8.9	0.8	0.0	0.0	0.0	52
Urea Ammonium Nitrate (UAN)	0.0	5.1	29.0	45.9	17.9	1.3	0.3	0.1	0.2	0.1	0.0	0.0	353
Other Straight N	0.0	26.6	34.2	29.0	4.0	3.3	0.9	1.2	0.1	0.6	0.0	0.1	76
Triple Superphosphate (TSP)	0.0	16.1	21.4	14.9	7.2	0.1	0.0	1.5	20.9	14.3	3.6	0.0	80
Other Straight P	0.0	26.0	0.0	41.5	26.6	0.0	0.0	0.1	5.3	0.5	0.0	0.0	4
Muriate of Potash (MOP)	0.2	19.0	36.4	17.1	6.9	1.6	0.1	0.7	4.6	9.6	1.4	2.5	95
Other Straight K	1.9	9.0	40.8	24.2	0.7	0.0	0.0	0.0	5.0	0.0	18.5	0.0	30
PK	1.7	9.6	23.6	9.0	2.1	1.0	1.6	4.2	23.9	17.0	5.2	1.1	254
NK	0.0	0.7	17.2	21.6	30.9	17.3	8.9	3.3	0.2	0.0	0.0	0.0	114
Low N (<19% N)	0.8	2.3	26.4	45.2	11.7	1.7	0.7	4.7	3.9	2.6	0.2	0.0	329
High N (>=19% N)	0.0	0.7	16.2	42.4	22.2	9.3	6.0	2.7	0.4	0.1	0.0	0.1	681
Other	0.0	16.1	18.5	19.2	16.7	0.0	0.1	0.8	6.3	20.4	1.9	0.0	11
All Fertilisers	**0.2**	**5.5**	**25.6**	**35.9**	**17.1**	**5.3**	**2.7**	**2.1**	**2.8**	**2.0**	**0.6**	**0.2**	**3930**

Source: British Survey of Fertiliser Practice 2016

Table GB4.1 Average fertiliser practice on cereal farms, Great Britain 2016

	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	93	32	27	18	141	56	69	132	18	19	64
Winter wheat	99	49	44	13	193	58	68	190	29	30	668
Spring barley	99	57	56	17	117	52	71	116	30	40	210
Winter barley	100	61	62	7	149	59	71	149	36	44	187
Oats	97	42	60	9	112	65	79	109	27	47	64
Rye/triticale/Durum wheat	100	92	84	0	93	46	-	93	42	-	6
Potatoes (seed or earlies)	-	-	-	-	-	-	-	-	-	-	3
Potatoes (maincrop)	79	85	85	62	152	204	319	120	174	273	14
Sugar beet	94	41	66	39	85	51	90	80	21	60	28
Spring oilseed rape	-	-	-	-	-	-	-	-	-	-	3
Winter oilseed rape	98	55	43	18	180	58	66	177	32	28	274
Linseed	95	34	30	7	96	41	38	91	14	11	24
Forage maize	99	90	55	77	78	66	78	77	60	43	12
Rootcrops for stockfeed	88	40	69	23	99	53	102	87	22	71	11
Leafy forage crops	-	-	-	-	-	-	-	-	-	-	1
Arable silage/other fodder crops	41	24	24	25	154	-	-	63	-	-	16
Peas - human consumption	0	20	24	1	-	66	91	-	13	22	22
Peas - animal consumption	0	41	43	0	-	43	45	-	17	20	16
Beans - animal consumption	1	30	26	6	-	59	60	-	18	15	120
Vegetables (brassicae)	-	-	-	-	-	-	-	-	-	-	0
Vegetables (other)	0	23	23	0	-	-	-	-	-	-	10
Soft Fruit	-	-	-	-	-	-	-	-	-	-	0
Top Fruit	-	-	-	-	-	-	-	-	-	-	2
Other tillage	40	14	9	7	98	-	-	39	-	-	13
All tillage	91	50	46	14	167	58	70	151	29	32	1768
Grass under 5 years old	62	24	30	16	115	35	54	72	8	16	100
Grass 5 years and over	45	19	21	5	79	29	40	36	5	8	263
All grass	49	20	22	7	88	31	44	43	6	10	363
All crops and grass	85	46	43	13	160	56	68	136	26	29	2131

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

Source: British Survey of Fertiliser Practice 2016

Table GB4.2 Average fertiliser practice on general cropping and horticultural farms, Great Britain 2016

	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	100	38	43	0	150	-	72	150	-	31	10
Winter wheat	100	36	50	13	204	68	80	203	24	40	200
Spring barley	100	60	71	12	106	49	70	106	30	50	95
Winter barley	100	40	55	8	147	55	78	147	22	43	57
Oats	96	6	58	4	117	-	110	112	-	64	17
Rye/triticale/Durum wheat	-	-	-	-	-	-	-	-	-	-	3
Potatoes (seed or earlies)	100	100	78	0	109	101	175	109	101	137	9
Potatoes (maincrop)	95	87	87	36	142	116	197	135	101	172	39
Sugar beet	100	31	53	42	107	42	82	107	13	43	32
Spring oilseed rape	-	-	-	-	-	-	-	-	-	-	0
Winter oilseed rape	99	34	34	16	200	59	78	197	20	27	59
Linseed	-	-	-	-	-	-	-	-	-	-	4
Forage maize	89	6	21	86	-	-	-	-	-	-	5
Rootcrops for stockfeed	100	80	100	27	70	73	96	70	58	96	7
Leafy forage crops	-	-	-	-	-	-	-	-	-	-	0
Arable silage/other fodder crops	32	11	11	37	-	-	-	-	-	-	9
Peas - human consumption	0	25	34	0	-	-	74	-	-	25	16
Peas - animal consumption	0	30	30	0	-	-	-	-	-	-	6
Beans - animal consumption	0	25	41	0	-	55	95	-	14	39	29
Vegetables (brassicae)	100	100	100	8	179	100	145	179	100	145	6
Vegetables (other)	75	67	70	2	126	96	124	94	64	87	13
Soft Fruit	100	78	100	0	104	79	228	104	61	228	10
Top Fruit	84	39	42	0	107	83	103	90	33	43	20
Other tillage	42	22	30	3	105	56	122	44	13	37	26
All tillage	91	44	55	14	159	70	104	145	31	57	672
Grass under 5 years old	77	21	34	16	112	27	65	86	6	22	47
Grass 5 years and over	36	18	19	18	77	21	28	28	4	5	118
All grass	41	18	21	18	85	22	35	34	4	7	165
All crops and grass	78	37	46	15	149	64	96	117	24	44	837

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 2016

Table GB4.3 Average fertiliser practice on dairy farms, Great Britain 2016

	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	89	51	51	92	125	27	36	112	14	19	10
Winter wheat	94	20	20	67	181	63	74	171	12	15	69
Spring barley	97	40	46	88	78	34	37	76	14	17	36
Winter barley	100	40	54	73	133	48	61	133	19	33	31
Oats	69	8	8	71	89	-	-	61	-	-	10
Rye/triticale/Durum wheat	-	-	-	-	-	-	-	-	-	-	1
Potatoes (seed or earlies)	-	-	-	-	-	-	-	-	-	-	2
Potatoes (maincrop)	-	-	-	-	-	-	-	-	-	-	0
Sugar beet	-	-	-	-	-	-	-	-	-	-	1
Spring oilseed rape	-	-	-	-	-	-	-	-	-	-	1
Winter oilseed rape	100	0	0	61	187	-	-	187	-	-	7
Linseed	-	-	-	-	-	-	-	-	-	-	1
Forage maize	75	46	41	99	56	47	66	43	22	27	58
Rootcrops for stockfeed	87	62	43	87	98	61	-	86	38	-	9
Leafy forage crops	70	51	51	63	76	36	36	53	19	19	10
Arable silage/other fodder crops	39	13	13	89	107	-	-	41	-	-	31
Peas - human consumption	-	-	-	-	-	-	-	-	-	-	0
Peas - animal consumption	-	-	-	-	-	-	-	-	-	-	0
Beans - animal consumption	0	10	10	22	-	-	-	-	-	-	5
Vegetables (brassicae)	-	-	-	-	-	-	-	-	-	-	2
Vegetables (other)	-	-	-	-	-	-	-	-	-	-	1
Soft Fruit	-	-	-	-	-	-	-	-	-	-	0
Top Fruit	-	-	-	-	-	-	-	-	-	-	0
Other tillage	-	-	-	-	-	-	-	-	-	-	1
All tillage	84	33	34	79	120	50	64	101	16	22	286
Grass under 5 years old	85	41	50	81	166	30	51	142	12	25	187
Grass 5 years and over	79	42	43	66	143	26	42	114	11	18	317
All grass	81	42	45	71	151	27	45	122	11	20	504
All crops and grass	82	40	43	72	145	30	48	119	12	21	790

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

Source: British Survey of Fertiliser Practice 2016

Table GB4.4 Average fertiliser practice on other livestock farms, Great Britain 2016

	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	36	36	36	82	-	-	-	-	-	-	8
Winter wheat	94	44	52	64	143	30	41	134	13	21	49
Spring barley	98	86	80	52	83	47	55	82	41	44	103
Winter barley	94	58	55	66	150	49	59	142	29	32	47
Oats	69	73	56	51	82	58	62	57	42	35	29
Rye/triticale/Durum wheat	-	-	-	-	-	-	-	-	-	-	0
Potatoes (seed or earlies)	-	-	-	-	-	-	-	-	-	-	0
Potatoes (maincrop)	-	-	-	-	-	-	-	-	-	-	0
Sugar beet	-	-	-	-	-	-	-	-	-	-	0
Spring oilseed rape	-	-	-	-	-	-	-	-	-	-	1
Winter oilseed rape	-	-	-	-	-	-	-	-	-	-	4
Linseed	-	-	-	-	-	-	-	-	-	-	0
Forage maize	68	72	19	97	40	40	36	27	29	7	26
Rootcrops for stockfeed	94	86	86	40	68	45	60	64	38	52	26
Leafy forage crops	94	80	87	41	73	30	40	69	24	35	24
Arable silage/other fodder crops	69	25	25	24	89	42	51	61	11	13	16
Peas - human consumption	-	-	-	-	-	-	-	-	-	-	0
Peas - animal consumption	-	-	-	-	-	-	-	-	-	-	1
Beans - animal consumption	24	0	0	23	-	-	-	-	-	-	7
Vegetables (brassicae)	-	-	-	-	-	-	-	-	-	-	1
Vegetables (other)	-	-	-	-	-	-	-	-	-	-	2
Soft Fruit	-	-	-	-	-	-	-	-	-	-	0
Top Fruit	-	-	-	-	-	-	-	-	-	-	0
Other tillage	-	-	-	-	-	-	-	-	-	-	0
All tillage	89	67	60	58	103	44	52	91	29	32	344
Grass under 5 years old	84	60	60	45	94	29	37	79	17	22	310
Grass 5 years and over	49	38	38	31	72	18	22	35	7	8	960
All grass	53	41	41	32	75	20	24	40	8	10	1270
All crops and grass	55	42	42	34	78	22	27	43	9	11	1614

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 2016

Table GB4.5 Average fertiliser practice on mixed farms, Great Britain 2016

	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	79	17	17	40	154	-	-	122	-	-	12
Winter wheat	93	51	58	32	187	61	78	174	31	45	189
Spring barley	95	77	83	49	101	51	71	96	39	59	157
Winter barley	96	44	56	28	150	55	72	144	24	41	95
Oats	76	60	63	39	113	58	76	86	35	48	55
Rye/triticale/Durum wheat	18	11	11	8	-	-	-	-	-	-	6
Potatoes (seed or earlies)	-	-	-	-	-	-	-	-	-	-	0
Potatoes (maincrop)	100	94	87	61	134	122	229	134	115	200	14
Sugar beet	-	-	-	-	-	-	-	-	-	-	2
Spring oilseed rape	-	-	-	-	-	-	-	-	-	-	0
Winter oilseed rape	100	64	65	29	191	57	69	191	37	44	66
Linseed	-	-	-	-	-	-	-	-	-	-	3
Forage maize	78	25	32	99	47	42	69	37	11	22	21
Rootcrops for stockfeed	73	44	45	57	98	66	73	71	29	33	19
Leafy forage crops	70	42	42	11	97	-	-	68	-	-	8
Arable silage/other fodder crops	41	33	33	18	-	-	-	-	-	-	11
Peas - human consumption	-	-	-	-	-	-	-	-	-	-	4
Peas - animal consumption	0	28	28	0	-	-	-	-	-	-	5
Beans - animal consumption	3	39	41	11	-	61	92	-	24	38	27
Vegetables (brassicae)	-	-	-	-	-	-	-	-	-	-	0
Vegetables (other)	88	79	79	12	44	-	-	39	-	-	6
Soft Fruit	-	-	-	-	-	-	-	-	-	-	0
Top Fruit	-	-	-	-	-	-	-	-	-	-	1
Other tillage	11	11	11	0	-	-	-	-	-	-	6
All tillage	89	57	63	37	145	57	77	128	33	49	707
Grass under 5 years old	83	63	64	24	118	31	42	98	20	27	190
Grass 5 years and over	60	37	39	14	78	22	29	47	8	11	287
All grass	66	44	46	17	92	26	34	61	11	15	477
All crops and grass	77	50	54	27	121	43	58	93	22	31	1184

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

Source: British Survey of Fertiliser Practice 2016

Table EW1.1 Total fertiliser use, England & Wales 2016

	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	89	30	27	27	141	51	63	125	15	17	98
Winter wheat	98	42	43	19	194	58	70	190	25	30	1116
Spring barley	97	46	47	24	111	49	59	108	22	28	401
Winter barley	99	50	55	21	148	55	70	146	27	38	389
Oats	87	31	49	19	116	68	84	101	21	41	130
Rye/triticale/Durum wheat	51	32	28	6	125	43	-	64	14	-	14
Potatoes (seed or earlies)	100	100	100	0	132	103	206	132	103	206	7
Potatoes (maincrop)	93	87	87	46	146	128	217	137	111	189	59
Sugar beet	98	35	58	41	99	48	88	97	17	51	63
Spring oilseed rape	100	53	53	9	132	-	-	132	-	-	6
Winter oilseed rape	98	49	41	21	185	58	67	181	28	27	392
Linseed	95	30	27	16	91	35	32	87	10	9	33
Forage maize	79	53	37	95	57	50	67	45	27	25	123
Rootcrops for stockfeed	94	60	69	42	85	56	81	79	34	56	54
Leafy forage crops	75	51	60	34	73	30	42	55	15	25	29
Arable silage/other fodder crops	40	14	14	47	105	49	58	42	7	8	77
Vining peas (for human consumption)	0	23	28	1	-	71	83	-	16	23	39
Field peas (harvested dry)	1	41	43	0	-	44	46	-	18	20	27
Field beans (harvested dry)	2	30	29	6	49	59	70	1	18	20	188
Vegetables (brassicae)	97	97	97	9	136	78	113	132	75	110	9
Vegetable Other	39	45	46	4	117	83	117	46	37	54	28
Soft Fruit	100	75	100	0	104	86	231	104	65	231	6
Top Fruit	84	39	41	0	107	83	103	90	32	42	23
Other tillage	34	15	17	5	103	67	116	35	10	20	40
All tillage	89	44	44	22	163	59	77	145	26	34	3351
Grass less than five years old	77	38	42	53	129	28	45	99	11	19	606
Grass five years and over	49	31	31	34	91	21	28	45	7	9	1619
All grass	53	32	33	37	99	22	31	53	7	10	2225
All crops and grass	70	37	38	30	137	42	56	96	16	21	5576

Source: British Survey of Fertiliser Practice 2016

Table EW1.2 Use of straight fertiliser, England & Wales 2016

	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	86	11	11	138	67	84	119	7	9	98
Winter wheat	96	16	17	192	67	81	185	11	14	1116
Spring barley	87	9	10	107	58	70	93	5	7	401
Winter barley	95	8	12	145	65	90	137	5	11	389
Oats	84	6	25	114	99	95	96	5	24	130
Rye/triticale/Durum wheat	49	4	0	119	-	-	58	-	-	14
Potatoes (seed or earlies)	31	0	21	-	-	-	-	-	-	7
Potatoes (maincrop)	37	0	17	105	-	229	39	-	38	59
Sugar beet	97	4	31	89	-	85	86	-	27	63
Spring oilseed rape	78	0	0	146	-	-	114	-	-	6
Winter oilseed rape	97	15	16	179	60	78	174	9	13	392
Linseed	95	6	6	86	-	-	82	-	-	33
Forage maize	48	5	15	65	27	92	31	1	14	123
Rootcrops for stockfeed	45	6	17	98	-	126	44	-	21	54
Leafy forage crops	19	0	0	66	-	-	12	-	-	29
Arable silage/other fodder crops	33	1	1	114	-	-	37	-	-	77
Peas - human consumption	0	20	25	-	75	86	-	15	21	39
Peas - animal consumption	0	22	24	-	41	45	-	9	11	27
Beans - animal consumption	2	14	12	-	68	68	-	9	8	188
Vegetables (brassicae)	60	38	38	-	-	-	-	-	-	9
Vegetables (other)	19	10	12	87	-	-	17	-	-	28
Soft Fruit	62	0	25	-	-	-	-	-	-	6
Top Fruit	72	10	24	109	-	-	78	-	-	23
Other tillage	30	1	7	92	-	-	28	-	-	40
All tillage	84	12	15	162	65	85	136	8	13	3351
Grass under 5 years old	52	0	2	123	-	92	64	-	2	606
Grass 5 years and over	24	0	0	103	68	105	25	0	0	1619
All grass	28	0	1	108	66	100	31	0	1	2225
All crops and grass	54	6	7	147	65	85	80	4	6	5576

Source: British Survey of Fertiliser Practice 2016

Table EW1.3 Use of compound fertiliser, England & Wales 2016

	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	11	19	16	49	42	48	5	8	8	98
Winter wheat	9	27	26	49	52	62	5	14	16	1116
Spring barley	25	37	37	63	46	56	16	17	21	401
Winter barley	14	42	44	64	53	63	9	22	28	389
Oats	10	26	24	54	61	72	5	16	17	130
Rye/triticale/Durum wheat	13	28	28	-	-	-	-	-	-	14
Potatoes (seed or earlies)	100	100	100	120	103	174	120	103	174	7
Potatoes (maincrop)	81	86	76	120	128	198	98	110	151	59
Sugar beet	22	32	33	50	40	74	11	13	24	63
Spring oilseed rape	53	53	53	-	-	-	-	-	-	6
Winter oilseed rape	20	35	25	36	54	59	7	19	15	392
Linseed	14	24	21	-	36	32	-	8	7	33
Forage maize	51	51	23	27	49	48	14	25	11	123
Rootcrops for stockfeed	56	54	54	63	53	64	35	29	35	54
Leafy forage crops	60	51	60	71	30	42	42	15	25	29
Arable silage/other fodder crops	8	13	13	55	47	55	4	6	7	77
Peas - human consumption	0	3	3	-	-	-	-	-	-	39
Peas - animal consumption	1	19	19	-	47	47	-	9	9	27
Beans - animal consumption	1	16	16	-	51	71	-	8	12	188
Vegetables (brassicae)	52	59	59	58	53	89	30	31	52	9
Vegetables (other)	32	35	35	93	90	117	29	31	41	28
Soft Fruit	75	75	75	90	86	270	67	65	203	6
Top Fruit	29	29	17	41	91	-	12	27	-	23
Other tillage	11	14	11	64	69	125	7	10	13	40
All tillage	16	32	30	57	55	71	9	18	21	3351
Grass under 5 years old	40	38	40	87	28	43	35	10	17	606
Grass 5 years and over	31	31	31	65	21	27	20	6	8	1619
All grass	32	32	32	69	22	29	22	7	10	2225
All crops and grass	25	32	31	65	38	48	16	12	15	5576

Source: British Survey of Fertiliser Practice 2016

Table EW1.4 Use of lime, England & Wales 2016

	Crop area receiving dressing (%)						Average application rate (tonnes of product/ha)							
	Ground limestone	Ground chalk	Magnesian limestone	Sugar beet lime	Other	All	Ground limestone	Ground chalk	Magnesian limestone	Sugar beet lime	Other	All	Fields limed	Fields in sample
Spring wheat	-	-	-	-	-	-	-	-	-	-	-	-	4	98
Winter wheat	2.1	0.1	0.8	0.3	0.1	3.5	4.6	10.2	2.5	5.0	1.3	4.3	54	1116
Spring barley	4.7	0.7	0.4	0.1	1.4	7.3	3.8	4.9	5.0	2.5	0.7	3.4	30	401
Winter barley	4.3	-	0.3	-	0.9	5.4	4.4	-	3.8	-	0.8	3.7	28	389
Oats	1.1	1.0	0.5	0.4	0.4	3.3	3.9	7.0	3.8	3.8	1.3	4.5	9	130
Rye/triticale/Durum wheat	-	-	-	-	-	-	-	-	-	-	-	-	1	14
Potatoes (seed or earlies)	-	-	-	-	-	-	-	-	-	-	-	-	0	7
Potatoes (maincrop)	-	-	-	-	-	-	-	-	-	-	-	-	0	59
Sugar beet	5.5	2.4	-	13.5	-	21.4	2.0	4.7	-	4.6	-	3.9	15	63
Spring oilseed rape	-	-	-	-	-	-	-	-	-	-	-	-	1	6
Winter oilseed rape	7.0	1.3	1.3	0.4	-	10.1	5.4	5.0	5.4	7.1	-	5.4	43	392
Linseed	-	-	-	-	-	-	-	-	-	-	-	-	0	33
Forage maize	4.4	-	0.6	-	-	5.0	5.1	-	5.0	-	-	5.1	7	123
Rootcrops for stockfeed	20.5	-	4.2	-	2.1	26.8	5.3	-	5.0	-	5.0	5.2	12	54
Leafy forage crops	29.2	-	-	-	0.7	29.9	5.1	-	-	-	0.5	5.0	6	29
Arable silage/other fodder crops	5.4	-	-	-	0.2	5.7	4.3	-	-	-	1.3	4.1	8	77
Peas - human consumption	-	-	-	-	-	-	-	-	-	-	-	-	1	39
Peas - animal consumption	-	-	-	-	-	-	-	-	-	-	-	-	1	27
Beans - animal consumption	1.1	0.3	0.1	-	0.4	2.0	3.5	1.0	6.3	-	0.3	2.6	6	188
Vegetables (brassicae)	20.7	-	-	9.1	-	29.9	4.7	-	-	7.5	-	5.5	5	9
Vegetables (other)	-	-	-	-	-	-	-	-	-	-	-	-	1	28
Soft Fruit	-	-	-	-	-	-	-	-	-	-	-	-	0	6
Top Fruit	-	-	-	-	-	-	-	-	-	-	-	-	2	23
Other tillage	-	-	-	-	-	-	-	-	-	-	-	-	3	40
All tillage	3.5	0.4	0.7	0.5	0.4	5.5	4.6	5.5	3.8	5.2	0.9	4.4	237	3351
Grass under 5 years old	5.5	-	0.4	-	0.3	6.2	4.4	-	4.7	-	1.8	4.2	52	606
Grass 5 years and over	2.0	0.0	0.1	-	0.5	2.7	4.1	5.4	2.8	-	0.9	3.5	70	1619
All grass	2.5	0.0	0.1	-	0.5	3.2	4.2	5.4	3.6	-	1.0	3.7	122	2225
All crops and grass	3.0	0.2	0.4	0.2	0.4	4.2	4.4	5.5	3.8	5.2	1.0	4.1	359	5576

Source: British Survey of Fertiliser Practice 2016

Table EW1.5 Percentage of crop area by field application rate - Nitrogen, England & Wales 2016

	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	11	0	4	2	6	11	34	17	10	2	2	0	1	-	-	-	-	-	98
Winter wheat	2	0	1	2	4	3	7	15	18	21	14	6	5	2	-	-	-	-	1116
Spring barley	3	0	9	7	18	25	22	14	1	1	-	-	-	-	-	-	-	-	401
Winter barley	1	0	0	6	6	12	22	33	13	5	1	-	-	-	-	-	-	-	389
Oats	13	1	2	9	11	38	13	12	0	2	-	-	-	-	-	-	-	-	130
Rye/triticale/Durum wheat	49	0	0	4	13	11	0	24	-	-	-	-	-	-	-	-	-	-	14
Potatoes (seed or earlies)	0	0	0	0	10	0	90	-	-	-	-	-	-	-	-	-	-	-	7
Potatoes (maincrop)	7	0	1	5	11	23	12	18	7	7	6	3	-	-	-	-	-	-	59
Sugar beet	2	5	1	15	23	39	14	1	-	-	-	-	-	-	-	-	-	-	63
Spring oilseed rape	0	0	0	29	0	6	31	0	33	-	-	-	-	-	-	-	-	-	6
Winter oilseed rape	2	0	3	5	3	4	7	14	15	27	11	6	4	-	-	-	-	-	392
Linseed	5	5	5	14	30	34	6	-	-	-	-	-	-	-	-	-	-	-	33
Forage maize	21	21	17	14	13	9	4	-	-	-	-	-	-	-	-	-	-	-	123
Rootcrops for stockfeed	6	0	14	22	26	19	6	7	-	-	-	-	-	-	-	-	-	-	54
Leafy forage crops	25	0	4	49	9	4	8	-	-	-	-	-	-	-	-	-	-	-	29
Arable silage/other fodder crops	60	0	4	4	10	10	5	6	0	1	-	-	-	-	-	-	-	-	77
Peas - human consumption	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	39
Peas - animal consumption	99	0	0	0	1	-	-	-	-	-	-	-	-	-	-	-	-	-	27
Beans - animal consumption	98	1	0	0	1	-	-	-	-	-	-	-	-	-	-	-	-	-	188
Vegetables (brassicae)	3	25	12	0	0	6	0	0	9	38	6	-	-	-	-	-	-	-	9
Vegetables (other)	61	0	4	1	21	3	0	0	0	10	-	-	-	-	-	-	-	-	28
Soft Fruit	0	0	0	6	0	89	0	0	4	-	-	-	-	-	-	-	-	-	6
Top Fruit	16	0	9	13	18	0	42	0	1	1	-	-	-	-	-	-	-	-	23
Other tillage	66	0	1	10	9	7	5	0	0	2	-	-	-	-	-	-	-	-	40
All tillage	11	1	3	5	7	10	11	14	11	13	7	3	2	1	-	-	-	-	3351
Grass under 5 years old	23	2	9	12	10	7	7	10	6	4	4	3	2	1	-	-	-	-	606
Grass 5 years and over	51	3	12	11	6	4	5	2	2	1	0	1	-	-	-	-	-	-	1619
All grass	47	3	12	11	7	4	5	3	3	2	1	1	1	-	-	-	-	-	2225
All crops and grass	30	2	8	8	7	7	8	9	7	7	4	2	2	1	-	-	-	-	5576

Source: British Survey of Fertiliser Practice 2016

Table EW1.6 Percentage of crop area by field application rate - Phosphate, England & Wales 2016

	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	70	4	13	8	5	-	-	-	-	-	-	-	-	-	-	-	-	-	98
Winter wheat	58	3	14	14	10	1	-	-	-	-	-	-	-	-	-	-	-	-	1116
Spring barley	54	7	16	18	4	1	-	-	-	-	-	-	-	-	-	-	-	-	401
Winter barley	50	4	14	24	7	-	-	-	-	-	-	-	-	-	-	-	-	-	389
Oats	69	3	5	17	3	1	0	2	1	-	-	-	-	-	-	-	-	-	130
Rye/triticale/Durum wheat	68	14	2	12	4	-	-	-	-	-	-	-	-	-	-	-	-	-	14
Potatoes (seed or earlies)	0	0	10	0	59	0	31	-	-	-	-	-	-	-	-	-	-	-	7
Potatoes (maincrop)	13	3	5	8	30	3	7	6	9	6	1	8	-	-	-	-	-	-	59
Sugar beet	65	15	5	11	0	4	1	-	-	-	-	-	-	-	-	-	-	-	63
Spring oilseed rape	47	53	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6
Winter oilseed rape	51	5	14	19	10	1	-	-	-	-	-	-	-	-	-	-	-	-	392
Linseed	70	10	12	5	3	-	-	-	-	-	-	-	-	-	-	-	-	-	33
Forage maize	47	11	13	17	7	3	1	-	-	-	-	-	-	-	-	-	-	-	123
Rootcrops for stockfeed	40	11	21	7	18	3	-	-	-	-	-	-	-	-	-	-	-	-	54
Leafy forage crops	49	14	31	3	4	-	-	-	-	-	-	-	-	-	-	-	-	-	29
Arable silage/other fodder crops	86	3	3	7	1	1	-	-	-	-	-	-	-	-	-	-	-	-	77
Peas - human consumption	77	3	7	3	1	9	-	-	-	-	-	-	-	-	-	-	-	-	39
Peas - animal consumption	59	15	12	6	4	4	-	-	-	-	-	-	-	-	-	-	-	-	27
Beans - animal consumption	70	2	9	11	3	4	-	-	-	-	-	-	-	-	-	-	-	-	188
Vegetables (brassicae)	3	25	9	12	6	38	0	0	6	-	-	-	-	-	-	-	-	-	9
Vegetables (other)	55	3	11	11	0	0	19	-	-	-	-	-	-	-	-	-	-	-	28
Soft Fruit	25	31	6	0	4	0	0	33	-	-	-	-	-	-	-	-	-	-	6
Top Fruit	61	17	1	9	0	0	0	0	0	12	-	-	-	-	-	-	-	-	23
Other tillage	85	1	4	3	5	3	-	-	-	-	-	-	-	-	-	-	-	-	40
All tillage	56	5	13	15	8	1	-	-	-	-	-	-	-	-	-	-	-	-	3351
Grass under 5 years old	62	20	13	5	1	-	-	-	-	-	-	-	-	-	-	-	-	-	606
Grass 5 years and over	69	19	10	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1619
All grass	68	19	10	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2225
All crops and grass	63	13	11	8	4	1	-	-	-	-	-	-	-	-	-	-	-	-	5576

Source: British Survey of Fertiliser Practice 2016

Table EW1.7 Percentage of crop area by field application rate - Potash, England & Wales 2016

	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	6	8	7	2	-	-	-	-	-	-	-	-	-	-	-	-	98
Winter wheat	57	2	10	14	10	5	1	2	-	-	-	-	-	-	-	-	-	-	1116
Spring barley	53	4	15	15	8	4	1	-	-	-	-	-	-	-	-	-	-	-	401
Winter barley	45	3	11	18	15	6	1	2	-	-	-	-	-	-	-	-	-	-	389
Oats	51	1	4	11	21	11	2	-	-	-	-	-	-	-	-	-	-	-	130
Rye/triticale/Durum wheat	72	10	2	4	0	0	12	-	-	-	-	-	-	-	-	-	-	-	14
Potatoes (seed or earlies)	0	0	10	0	0	0	0	0	0	69	0	0	21	-	-	-	-	-	7
Potatoes (maincrop)	13	3	0	4	2	12	1	18	0	2	4	11	9	9	6	2	4	1	59
Sugar beet	42	3	11	2	13	19	8	0	0	0	0	1	-	-	-	-	-	-	63
Spring oilseed rape	47	31	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6
Winter oilseed rape	59	2	9	16	8	4	1	1	-	-	-	-	-	-	-	-	-	-	392
Linseed	73	6	14	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	33
Forage maize	63	4	8	7	13	4	0	1	-	-	-	-	-	-	-	-	-	-	123
Rootcrops for stockfeed	31	2	25	10	13	4	0	7	4	4	-	-	-	-	-	-	-	-	54
Leafy forage crops	40	14	31	3	8	4	-	-	-	-	-	-	-	-	-	-	-	-	29
Arable silage/other fodder crops	86	3	3	5	2	1	0	1	-	-	-	-	-	-	-	-	-	-	77
Peas - human consumption	72	0	7	7	2	4	4	3	-	-	-	-	-	-	-	-	-	-	39
Peas - animal consumption	57	1	27	5	9	-	-	-	-	-	-	-	-	-	-	-	-	-	27
Beans - animal consumption	71	0	7	8	9	3	0	1	-	-	-	-	-	-	-	-	-	-	188
Vegetables (brassicae)	3	25	0	0	18	0	0	38	9	0	0	6	-	-	-	-	-	-	9
Vegetables (other)	54	2	2	8	1	21	0	0	9	4	-	-	-	-	-	-	-	-	28
Soft Fruit	0	0	0	0	37	25	0	0	0	0	0	0	4	0	0	0	0	33	6
Top Fruit	59	0	0	0	30	0	9	2	-	-	-	-	-	-	-	-	-	-	23
Other tillage	83	0	2	1	5	3	0	1	3	0	2	-	-	-	-	-	-	-	40
All tillage	56	2	10	13	10	5	1	2	-	-	-	-	-	-	-	-	-	-	3351
Grass under 5 years old	58	14	13	7	4	3	-	-	-	-	-	-	-	-	-	-	-	-	606
Grass 5 years and over	69	18	10	2	1	1	-	-	-	-	-	-	-	-	-	-	-	-	1619
All grass	67	17	10	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-	2225
All crops and grass	62	10	10	7	6	3	1	1	-	-	-	-	-	-	-	-	-	-	5576

Source: British Survey of Fertiliser Practice 2016

Table EW2.1 Average fertiliser practice by grassland utilisation, England & Wales 2016

	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	43	27	27	23	82	20	22	35	6	6	1019
Grazed mown	69	39	42	60	113	25	39	78	10	16	987
All grazings	52	31	32	36	96	22	30	50	7	10	2006
Cut for silage - grazed	76	42	46	68	122	26	43	93	11	20	710
Cut for silage - not grazed	86	45	50	75	139	22	43	119	10	22	124
All cut for silage	78	42	46	69	124	25	43	96	11	20	834
Cut for hay - grazed	48	31	32	39	75	20	25	36	6	8	301
Cut for hay - not grazed	56	42	44	12	78	30	32	44	13	14	59
All cut for hay	49	32	33	36	75	22	26	37	7	9	360
All mowings	70	40	43	60	115	25	39	81	10	17	1166
All grass	53	32	33	37	99	22	31	53	7	10	2225

Source: British Survey of Fertiliser Practice 2016

Table EW2.2 Percentage of grass area by field application rate - Nitrogen, England & Wales 2016

	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	57	2	14	10	4	3	4	2	2	1	0	1	-	-	-	-	-	-	1019
Grazed mown	31	3	9	14	11	6	7	6	5	2	2	2	2	-	-	-	-	-	987
All grazings	48	3	12	11	7	4	5	3	3	2	1	1	1	-	-	-	-	-	2006
Cut for silage - grazed	24	3	7	13	13	8	8	7	6	3	3	2	2	1	-	-	-	-	710
Cut for silage - not grazed	14	1	7	4	13	13	15	11	5	7	3	3	2	0	0	1	-	-	124
All cut for silage	22	3	7	12	13	8	9	8	5	4	3	3	2	-	-	-	-	-	834
Cut for hay - grazed	52	3	13	16	4	4	3	2	2	-	-	-	-	-	-	-	-	-	301
Cut for hay - not grazed	44	1	5	33	9	0	7	1	0	1	-	-	-	-	-	-	-	-	59
All cut for hay	51	3	12	18	5	3	4	2	2	-	-	-	-	-	-	-	-	-	360
All mowings	30	3	8	13	11	7	8	7	4	3	2	2	2	-	-	-	-	-	1166
All grass	47	3	12	11	7	4	5	3	3	2	1	1	1	-	-	-	-	-	2225

Source: British Survey of Fertiliser Practice 2016

Table EW2.3 Percentage of grass area by field application rate - Phosphate, England & Wales 2016

	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	18	7	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1019
Grazed mown	61	21	15	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	987
All grazings	69	19	10	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2006
Cut for silage - grazed	58	21	17	3	1	-	-	-	-	-	-	-	-	-	-	-	-	-	710
Cut for silage - not grazed	55	32	9	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	124
All cut for silage	58	22	16	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	834
Cut for hay - grazed	69	20	9	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	301
Cut for hay - not grazed	58	6	34	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	59
All cut for hay	68	18	13	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	360
All mowings	60	22	15	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1166
All grass	68	19	10	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2225

Source: British Survey of Fertiliser Practice 2016

Table EW2.4 Percentage of crop area by field application rate - Potash, England & Wales 2016

	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	18	6	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1019
Grazed mown	58	17	15	4	3	2	-	-	-	-	-	-	-	-	-	-	-	-	987
All grazings	68	17	9	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-	2006
Cut for silage - grazed	54	16	17	5	3	3	1	0	1	-	-	-	-	-	-	-	-	-	710
Cut for silage - not grazed	50	12	28	1	3	4	0	0	0	1	-	-	-	-	-	-	-	-	124
All cut for silage	54	15	18	5	3	3	1	0	1	-	-	-	-	-	-	-	-	-	834
Cut for hay - grazed	68	19	10	2	0	1	-	-	-	-	-	-	-	-	-	-	-	-	301
Cut for hay - not grazed	56	6	37	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	59
All cut for hay	67	17	14	2	0	1	-	-	-	-	-	-	-	-	-	-	-	-	360
All mowings	57	16	17	4	3	2	-	-	-	-	-	-	-	-	-	-	-	-	1166
All grass	67	17	10	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-	2225

Source: British Survey of Fertiliser Practice 2016

Table EW3.0 Product use by month of application, England & Wales 2016

(a) Product use

row %	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Straight N	1	0	0	0	0	6	29	38	18	5	2	1
Straight P	23	14	4	0	0.0	18	22	11	7	0	0	2
Straight K	5	8	6	2	1	18	39	14	4	1	0	1
Compounds	7	4	1	0	1	3	23	28	18	6	3	5
All fertilisers	3	2	1	0	0	6	28	34	17	5	2	2

(b) Nutrient use

row %	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Nitrogen	1	0	0	0	0	5	28	38	19	5	3	2
Phosphate	14	9	3	0	1	9	25	20	11	2	1	4
Potash	9	7	3	1	1	10	29	20	12	4	2	3
Total	3	2	1	0	0	6	27	33	17	4	2	2

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

'Product' refers to the total tonnage of the products used by the farmers in the survey year 2016.

'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 2016

Table EW3.1 Product type as percentage of all product used by crop group, England & Wales 2016

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	41.4	46.4	8.9	30.5	46.3	22.8	41.9	36.2	35.7	37.4	36.6	37.1	40.8
Urea	9.2	14.1	2.1	5.2	14.5	4.8	12.1	6.1	6.0	6.3	8.2	6.4	10.8
Calcium Ammonium Nitrate (CAN)	0.4	0.6	0.0	0.4	0.4	6.1	1.0	2.6	2.5	2.3	1.7	2.5	1.3
Urea Ammonium Nitrate (UAN)	10.6	15.4	0.3	5.2	15.1	4.0	12.9	1.6	1.6	2.3	19.0	2.2	10.5
Other Straight N	1.0	1.5	0.2	0.0	2.7	0.6	1.4	0.6	0.9	0.6	0.0	0.6	1.3
Triple Superphosphate (TSP)	2.5	2.9	0.5	0.6	3.0	5.0	2.9	0.3	0.8	0.2	1.9	0.3	2.3
Other Straight P	0.1	0.0	0.0	0.0	0.2	0.1	0.1	0.1	0.0	0.2	0.0	0.1	0.1
Muriate of Potash (MOP)	3.5	3.2	6.3	1.0	2.7	7.2	3.5	0.7	0.3	1.2	5.2	0.8	2.9
Other Straight K	0.1	0.3	1.3	24.3	0.7	2.2	1.1	0.1	0.0	0.2	0.0	0.1	0.8
PK	9.0	10.4	5.2	19.7	6.3	11.6	9.7	2.3	3.9	2.2	0.0	2.3	8.0
NK	2.1	0.9	0.0	0.9	0.5	2.7	1.1	5.8	1.2	8.0	4.9	5.7	2.1
Low N (<19% N)	6.8	1.7	72.2	7.2	5.3	22.0	7.6	3.4	3.7	2.3	13.3	3.2	6.6
High N (>=19% N)	12.6	2.4	2.2	2.7	1.9	10.2	4.3	40.2	43.3	36.8	9.2	38.7	12.0
Other	0.8	0.2	0.8	2.4	0.6	0.9	0.5	0.1	0.0	0.2	0.0	0.1	0.4
Total product ('000 tonnes)	**255**	**1437**	**81**	**50**	**385**	**135**	**2342**	**781**	**70**	**452**	**6**	**874**	**3217**

Source: British Survey of Fertiliser Practice 2016

Table EW3.2 Use of product type by crop group, England & Wales 2016

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	11.3	66.7	0.5	1.4	17.2	2.8	74.6	87.6	7.8	51.7	0.6	25.4	1278
Urea	8.0	67.3	1.0	0.9	20.9	1.9	88.8	85.2	5.9	64.1	1.3	11.2	386
Calcium Ammonium Nitrate (CAN)	4.0	52.7	0.0	0.3	6.6	36.5	54.1	89.0	3.4	49.3	0.3	45.9	47
Urea Ammonium Nitrate (UAN)	10.3	69.6	0.1	1.2	17.4	1.4	96.9	71.5	2.4	67.0	11.5	3.1	331
Other Straight N	6.6	62.2	0.2	0.0	29.3	1.6	88.3	93.4	7.7	26.0	0.0	11.7	57
Triple Superphosphate (TSP)	10.5	63.0	0.1	0.9	15.4	10.1	97.7	88.4	10.6	20.7	5.6	2.3	72
Other Straight P	30.6	36.2	0.0	0.0	31.4	1.8	47.7	100.0	0.0	100.0	0.0	52.3	2
Muriate of Potash (MOP)	10.2	59.0	3.5	0.4	12.7	14.1	94.6	65.5	11.2	90.0	5.3	5.4	80
Other Straight K	0.8	18.6	7.0	53.3	13.9	6.4	95.9	65.8	0.0	88.6	0.0	4.1	27
PK	10.3	66.1	2.6	4.5	10.8	5.6	93.3	84.2	15.7	40.1	0.0	6.7	221
NK	24.3	48.8	0.0	5.9	4.2	16.8	34.6	89.3	1.6	81.1	1.2	65.4	79
Low N (<19% N)	8.9	17.2	35.2	0.5	13.0	25.2	88.5	90.9	5.4	43.2	3.7	11.5	192
High N (>=19% N)	33.4	40.6	3.6	3.4	8.3	10.7	14.4	92.0	9.7	46.7	0.1	85.6	434
Other	21.8	38.4	3.2	7.6	16.5	12.6	98.3	75.0	0.0	100.0	0.0	1.7	11
All Fertilisers	**10.9**	**61.3**	**3.5**	**2.1**	**16.4**	**5.7**	**72.8**	**89.3**	**8.0**	**51.7**	**0.6**	**27.2**	**3217**

Source: British Survey of Fertiliser Practice 2016

Table EW3.3 Product use by month of application, England & Wales 2016

row %	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	total product ('000 tonnes)
Ammonium Nitrate	0.0	4.5	28.2	37.1	20.4	5.2	2.5	1.4	0.6	0.0	0.1	0.0	1278
Urea	0.3	10.0	35.2	36.1	12.2	4.5	0.8	0.4	0.4	0.0	0.0	0.0	386
Calcium Ammonium Nitrate (CAN)	1.1	4.9	16.6	29.7	13.7	11.5	12.0	9.6	0.9	0.0	0.0	0.0	47
Urea Ammonium Nitrate (UAN)	0.1	5.5	28.4	46.5	17.6	1.3	0.2	0.1	0.3	0.1	0.0	0.0	331
Other Straight N	0.0	33.3	35.4	20.5	3.9	3.3	1.2	1.5	0.1	0.7	0.0	0.1	57
Triple Superphosphate (TSP)	0.0	17.6	22.4	10.6	7.2	0.2	0.0	1.7	22.6	13.6	4.0	0.0	72
Other Straight P	0.0	4.1	0.0	14.0	66.9	0.0	0.0	0.3	13.5	1.2	0.0	0.0	2
Muriate of Potash (MOP)	0.1	20.5	36.9	13.3	5.2	1.9	0.1	0.9	5.5	11.0	1.7	3.0	80
Other Straight K	2.0	9.8	44.4	17.6	0.8	0.0	0.0	0.0	5.4	0.0	20.1	0.0	27
PK	1.9	10.0	25.6	8.9	2.3	0.6	0.3	4.7	24.8	13.6	6.0	1.3	221
NK	0.0	1.1	16.3	17.4	28.5	19.7	12.5	4.3	0.3	0.0	0.0	0.0	79
Low N (<19% N)	1.3	2.8	28.4	34.0	15.0	2.8	0.7	6.4	4.8	3.4	0.3	0.0	192
High N (>=19% N)	0.0	0.8	20.5	38.2	24.6	6.9	4.6	3.6	0.6	0.1	0.0	0.1	434
Other	0.0	16.1	18.5	19.2	16.7	0.0	0.1	0.8	6.3	20.4	1.9	0.0	11
All Fertilisers	**0.3**	**6.3**	**27.7**	**33.7**	**17.1**	**4.6**	**2.3**	**2.2**	**3.1**	**1.8**	**0.8**	**0.2**	**3217**

Source: British Survey of Fertiliser Practice 2016

Table EW4.1a Average fertiliser practice on tillage and grassland by GOR, England & Wales 2016

		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	89	32	64	39	147	51	97	131	17	63	123
	All grass	65	38	39	57	109	23	34	71	9	14	233
	All crops and grass	70	37	45	54	119	28	53	84	10	24	356
North East	All tillage	88	69	73	21	168	69	78	147	47	57	171
	All grass	26	25	24	17	71	34	38	19	8	9	162
	All crops and grass	44	38	38	18	127	52	60	56	20	23	333
Eastern	All tillage	90	44	30	11	165	61	71	148	27	21	502
	All grass	21	11	11	6	77	30	35	16	3	4	62
	All crops and grass	81	40	27	10	162	60	69	131	24	19	564
Yorkshire and the Humber	All tillage	95	47	50	19	173	64	82	164	30	41	707
	All grass	63	36	45	37	78	16	23	49	6	10	240
	All crops and grass	85	44	49	24	152	52	65	129	23	32	947
West Midlands	All tillage	88	34	46	30	160	63	109	141	22	51	285
	All grass	60	31	32	37	96	22	36	58	7	12	199
	All crops and grass	72	32	38	34	127	39	72	91	13	27	484
East Midlands	All tillage	91	45	44	14	163	58	65	149	26	29	474
	All grass	52	24	24	33	102	25	30	53	6	7	134
	All crops and grass	79	38	38	20	151	52	59	120	20	22	608
South West	All tillage	83	47	46	41	143	56	70	119	26	32	581
	All grass	53	29	28	45	106	24	33	56	7	10	620
	All crops and grass	64	36	35	44	123	39	51	78	14	17	1201
South East	All tillage	86	37	39	18	176	46	65	152	17	25	397
	All grass	39	17	18	11	83	21	28	32	4	5	216
	All crops and grass	66	28	30	15	153	40	56	101	11	17	613
Wales	All tillage	87	53	50	56	111	49	69	97	26	34	111
	All grass	62	46	46	37	102	20	27	63	9	13	359
	All crops and grass	63	46	47	39	102	22	30	65	10	14	470

Source: British Survey of Fertiliser Practice 2016

Table EW4.1b Average fertiliser practice on tillage and grassland by BSFP region, England & Wales 2016

		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	82	40	40	42	150	57	72	123	23	29	324
	All grass	43	12	10	42	113	34	37	49	4	4	295
	All crops and grass	60	24	23	42	135	51	63	81	12	15	619
Anglia	All tillage	90	44	30	11	165	61	71	148	27	21	502
	All grass	21	11	11	6	77	30	35	16	3	4	62
	All crops and grass	81	40	27	10	162	60	69	131	24	19	564
Northern	All tillage	88	44	62	36	143	65	81	126	29	50	184
	All grass	56	40	41	40	98	24	33	55	10	13	311
	All crops and grass	62	41	45	40	110	32	46	68	13	21	495
North East	All tillage	95	50	53	20	173	64	80	164	32	42	765
	All grass	53	32	39	35	79	20	26	42	7	10	278
	All crops and grass	80	36	48	25	152	53	65	121	23	31	1043
North Mercia	All tillage	84	35	55	30	155	70	130	131	25	71	161
	All grass	63	30	31	53	111	25	39	70	7	12	162
	All crops and grass	70	32	38	46	128	41	80	89	13	30	323
South Mercia	All tillage	89	36	48	25	170	58	78	151	21	38	209
	All grass	38	13	16	20	72	15	35	27	2	6	106
	All crops and grass	64	25	32	23	141	46	68	90	11	22	315
East Midland	All tillage	91	45	44	14	163	58	65	149	26	29	474
	All grass	52	24	24	33	102	25	30	53	6	7	134
	All crops and grass	79	38	38	20	151	52	59	120	20	22	608
South East	All tillage	86	37	39	18	176	46	65	152	17	25	397
	All grass	39	17	18	11	83	21	28	32	4	5	216
	All crops and grass	66	28	30	15	153	40	56	101	11	17	613
South West	All tillage	87	62	59	45	118	50	72	103	31	42	224
	All grass	64	47	47	51	103	21	33	66	10	15	302
	All crops and grass	70	50	49	50	108	30	44	75	15	22	526
Wales	All tillage	87	53	50	56	111	49	69	97	26	34	111
	All grass	62	46	46	37	102	20	27	63	9	13	359
	All crops and grass	63	46	47	39	102	22	30	65	10	14	470

Source: British Survey of Fertiliser Practice 2016

Table SC1.1 Total fertiliser use, Scotland 2016

	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	
Winter wheat	97	80	78	20	173	70	81	168	55	64	90
Spring barley	99	90	95	41	99	52	74	98	46	70	208
Winter barley	100	72	84	18	151	68	77	151	49	64	44
Oats	89	77	78	33	96	55	72	85	42	56	45
Potatoes	100	100	77	7	100	112	154	100	112	119	15
Winter oilseed rape	100	91	81	13	160	58	69	160	53	55	29
Other crops	78	71	71	21	108	57	92	85	40	65	66
All tillage	97	85	87	31	122	59	78	118	50	68	497
Grass less than five years old	93	80	83	36	116	32	42	108	25	34	235
Grass five years and over	70	57	58	19	80	19	25	56	11	15	342
All grass	76	63	64	23	91	23	30	69	14	20	577
All crops and grass	83	70	72	26	104	38	51	86	27	36	1074

Source: British Survey of Fertiliser Practice 2016

Table SC1.2 Use of straight fertiliser, Scotland 2016

	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	31	35	160	67	73	151	21	25	90
Spring barley	60	3	11	70	-	89	42	-	10	208
Winter barley	95	7	28	142	-	66	135	-	19	44
Oats	71	8	11	82	-	-	58	-	-	45
Potatoes	17	5	35	-	-	137	-	-	49	15
Winter oilseed rape	92	26	31	134	62	47	124	16	14	29
Other crops	43	14	17	119	34	128	51	5	22	66
All tillage	70	12	19	110	58	81	77	7	16	497
Grass less than five years old	32	0	0	111	-	-	36	-	-	235
Grass five years and over	21	0	0	76	-	-	16	-	-	342
All grass	24	0	0	88	-	-	21	-	-	577
All crops and grass	40	4	7	101	58	81	40	2	6	1074

Source: British Survey of Fertiliser Practice 2016

Table SC1.3 Use of compound fertiliser, Scotland 2016

	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	26	50	48	63	69	80	16	35	38	90
Spring barley	88	86	86	64	53	71	56	45	61	208
Winter barley	32	65	61	50	70	75	16	46	46	44
Oats	57	69	68	48	53	70	27	37	47	45
Potatoes	98	98	49	93	108	145	92	106	70	15
Winter oilseed rape	70	65	62	53	56	66	37	37	41	29
Other crops	44	57	57	76	62	76	34	35	43	66
All tillage	65	73	71	63	59	74	41	43	52	497
Grass less than five years old	82	80	83	88	32	41	72	25	34	235
Grass five years and over	59	57	58	69	19	25	40	11	15	342
All grass	65	63	64	75	23	30	48	14	19	577
All crops and grass	65	66	67	71	37	46	46	24	31	1074

Source: British Survey of Fertiliser Practice 2016

Table SC1.4 Use of lime, Scotland 2016

	Crop area receiving dressing (%)						Average application rate (tonnes of product/ha)							
	Ground limestone	Ground chalk	Magnesian limestone	Sugar beet lime	Other	All	Ground limestone	Ground chalk	Magnesian limestone	Sugar beet lime	Other	All	Fields limed	Fields in sample
Winter wheat	0.9	-	9.1	-	0.7	10.7	5.9	-	4.6	-	0.4	4.4	10	90
Spring barley	9.7	-	3.1	-	0.8	13.7	4.3	-	6.8	-	1.2	4.7	44	208
Winter barley	3.2	-	2.1	-	-	5.3	4.2	-	7.5	-	-	5.5	5	44
Oats	-	-	-	-	-	-	-	-	-	-	-	-	3	45
Potatoes	-	-	-	-	-	-	-	-	-	-	-	-	0	15
Winter oilseed rape	4.9	-	4.0	-	4.4	13.3	5.0	-	7.6	-	0.2	4.2	7	29
Other crops	14.6	-	9.5	-	0.1	24.2	5.0	-	3.9	-	3.8	4.5	19	66
All tillage	6.8	-	4.5	-	0.8	12.1	4.5	-	5.5	-	0.8	4.6	88	497
Grass less than five years old	6.1	-	1.7	-	0.1	7.9	3.7	-	5.2	-	5.5	4.0	17	235
Grass five years and over	0.9	-	0.7	-	0.1	1.6	4.8	-	4.8	-	0.5	4.6	13	342
All grass	2.2	-	0.9	-	0.1	3.2	4.0	-	5.0	-	1.9	4.3	30	577
All crops and grass	3.8	-	2.2	-	0.3	6.3	4.3	-	5.4	-	1.0	4.5	118	1074

Source: British Survey of Fertiliser Practice 2016

Table SC1.5 Percentage of crop area by field application rate - Nitrogen, Scotland 2016

	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	3	0	2	1	10	10	7	9	17	31	5	5	-	-	-	-	-	-	90
Spring barley	1	1	4	16	22	39	14	3	-	-	-	-	-	-	-	-	-	-	208
Winter barley	0	0	0	2	5	17	20	29	24	3	-	-	-	-	-	-	-	-	44
Oats	11	3	6	21	5	20	31	2	-	-	-	-	-	-	-	-	-	-	45
Potatoes	0	0	5	29	19	20	12	13	2	-	-	-	-	-	-	-	-	-	15
Winter oilseed rape	0	0	3	5	10	22	4	5	12	28	10	0	0	1	-	-	-	-	29
Other crops	22	2	16	7	11	15	6	4	10	7	-	-	-	-	-	-	-	-	66
All tillage	3	1	4	11	16	27	13	6	7	9	1	1	-	-	-	-	-	-	497
Grass less than five years old	7	2	13	13	12	17	10	6	6	8	1	4	1	-	-	-	-	-	235
Grass five years and over	30	3	17	24	8	6	5	1	2	2	1	1	-	-	-	-	-	-	342
All grass	24	3	16	21	9	9	6	2	3	4	1	2	-	-	-	-	-	-	577
All crops and grass	17	2	12	18	11	15	9	4	4	6	1	1	-	-	-	-	-	-	1074

Source: British Survey of Fertiliser Practice 2016

Table SC1.6 Percentage of crop area by field application rate - Phosphate, Scotland 2016

	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	20	2	13	29	30	4	0	0	1	-	-	-	-	-	-	-	-	-	90
Spring barley	10	7	28	48	7	-	-	-	-	-	-	-	-	-	-	-	-	-	208
Winter barley	28	4	7	27	29	1	0	3	-	-	-	-	-	-	-	-	-	-	44
Oats	23	4	27	39	7	-	-	-	-	-	-	-	-	-	-	-	-	-	45
Potatoes	0	0	0	32	11	13	24	15	2	0	4	-	-	-	-	-	-	-	15
Winter oilseed rape	9	5	26	45	15	-	-	-	-	-	-	-	-	-	-	-	-	-	29
Other crops	29	11	20	18	15	2	4	-	-	-	-	-	-	-	-	-	-	-	66
All tillage	15	5	22	40	14	1	1	1	-	-	-	-	-	-	-	-	-	-	497
Grass less than five years old	20	32	31	14	3	-	-	-	-	-	-	-	-	-	-	-	-	-	235
Grass five years and over	43	42	13	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	342
All grass	37	40	18	4	1	-	-	-	-	-	-	-	-	-	-	-	-	-	577
All crops and grass	30	28	19	17	6	1	-	-	-	-	-	-	-	-	-	-	-	-	1074

Source: British Survey of Fertiliser Practice 2016

Table SC1.7 Percentage of crop area by field application rate - Potash, Scotland 2016

	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	22	1	5	29	22	17	2	0	0	1	-	-	-	-	-	-	-	-	90
Spring barley	5	2	16	31	29	14	0	0	0	2	-	-	-	-	-	-	-	-	208
Winter barley	16	2	5	26	37	8	4	-	-	-	-	-	-	-	-	-	-	-	44
Oats	22	0	11	39	17	9	0	2	-	-	-	-	-	-	-	-	-	-	45
Potatoes	23	0	0	14	4	16	5	19	0	7	0	2	0	12	-	-	-	-	15
Winter oilseed rape	19	2	15	37	19	7	-	-	-	-	-	-	-	-	-	-	-	-	29
Other crops	29	6	14	10	23	1	0	3	0	13	-	-	-	-	-	-	-	-	66
All tillage	13	2	12	29	26	13	1	1	0	2	-	-	-	-	-	-	-	-	497
Grass less than five years old	17	26	25	21	4	5	1	-	-	-	-	-	-	-	-	-	-	-	235
Grass five years and over	42	39	14	2	2	2	-	-	-	-	-	-	-	-	-	-	-	-	342
All grass	36	36	17	7	2	3	-	-	-	-	-	-	-	-	-	-	-	-	577
All crops and grass	28	24	15	15	10	6	1	0	0	1	-	-	-	-	-	-	-	-	1074

Source: British Survey of Fertiliser Practice 2016

Table SC2.1 Average fertiliser practice by grassland utilisation, Scotland 2016

	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	68	56	57	11	69	17	19	47	9	11	307
Grazed mown	96	83	86	46	127	33	46	122	27	39	142
All grazings	73	61	62	18	82	21	26	60	13	16	449
Cut for silage - grazed	96	84	87	49	132	33	47	127	28	41	124
Cut for silage - not grazed	95	76	82	63	138	36	55	131	27	45	115
All cut for silage	96	80	85	55	135	34	51	129	27	43	239
Cut for hay - grazed	95	72	72	17	73	30	33	69	21	24	20
Cut for hay - not grazed	78	68	68	7	62	24	28	48	16	19	11
All cut for hay	90	71	71	14	70	28	31	63	20	22	31
All mowings	95	79	83	52	130	34	50	124	27	41	268
All grass	76	63	64	23	91	23	30	69	14	20	577

Source: British Survey of Fertiliser Practice 2016

Table SC2.2 Percentage of grass area by field application rate - Nitrogen, Scotland 2016

	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	32	4	20	24	8	5	3	0	1	2	1	-	-	-	-	-	-	-	307
Grazed mown	4	1	7	12	17	13	18	8	9	4	2	6	1	-	-	-	-	-	142
All grazings	27	3	18	22	9	6	6	1	2	3	1	1	-	-	-	-	-	-	449
Cut for silage - grazed	4	1	7	9	16	14	18	8	10	4	3	7	1	-	-	-	-	-	124
Cut for silage - not grazed	5	0	3	13	7	24	9	8	11	12	1	6	-	-	-	-	-	-	115
All cut for silage	4	1	5	11	12	19	14	8	10	8	2	7	1	-	-	-	-	-	239
Cut for hay - grazed	5	0	22	33	23	0	15	1	-	-	-	-	-	-	-	-	-	-	20
Cut for hay - not grazed	22	0	0	62	8	7	-	-	-	-	-	-	-	-	-	-	-	-	11
All cut for hay	10	0	16	41	19	2	11	1	-	-	-	-	-	-	-	-	-	-	31
All mowings	5	0	5	14	12	17	14	7	9	7	2	6	1	-	-	-	-	-	268
All grass	24	3	16	21	9	9	6	2	3	4	1	2	-	-	-	-	-	-	577

Source: British Survey of Fertiliser Practice 2016

Table SC2.3 Percentage of grass area by field application rate - Phosphate, Scotland 2016

	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	44	45	10	0	1	-	-	-	-	-	-	-	-	-	-	-	-	-	307
Grazed mown	17	35	31	13	3	-	-	-	-	-	-	-	-	-	-	-	-	-	142
All grazings	39	43	14	3	1	-	-	-	-	-	-	-	-	-	-	-	-	-	449
Cut for silage - grazed	16	36	32	13	3	-	-	-	-	-	-	-	-	-	-	-	-	-	124
Cut for silage - not grazed	24	16	41	15	2	2	-	-	-	-	-	-	-	-	-	-	-	-	115
All cut for silage	20	27	36	14	2	1	-	-	-	-	-	-	-	-	-	-	-	-	239
Cut for hay - grazed	28	37	21	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20
Cut for hay - not grazed	32	14	55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11
All cut for hay	29	30	31	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	31
All mowings	21	27	36	14	2	1	-	-	-	-	-	-	-	-	-	-	-	-	268
All grass	37	40	18	4	1	-	-	-	-	-	-	-	-	-	-	-	-	-	577

Source: British Survey of Fertiliser Practice 2016

Table SC2.4 Percentage of grass area by field application rate - Potash, Scotland 2016

	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	43	43	12	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	307
Grazed mown	14	25	25	24	4	6	1	-	-	-	-	-	-	-	-	-	-	-	142
All grazings	38	39	15	5	1	1	-	-	-	-	-	-	-	-	-	-	-	-	449
Cut for silage - grazed	13	25	25	25	4	7	1	-	-	-	-	-	-	-	-	-	-	-	124
Cut for silage - not grazed	18	11	30	20	7	12	2	-	-	-	-	-	-	-	-	-	-	-	115
All cut for silage	15	18	27	23	6	9	1	-	-	-	-	-	-	-	-	-	-	-	239
Cut for hay - grazed	28	34	23	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20
Cut for hay - not grazed	32	14	49	0	5	-	-	-	-	-	-	-	-	-	-	-	-	-	11
All cut for hay	29	28	31	11	2	-	-	-	-	-	-	-	-	-	-	-	-	-	31
All mowings	17	18	28	22	5	9	1	-	-	-	-	-	-	-	-	-	-	-	268
All grass	36	36	17	7	2	3	-	-	-	-	-	-	-	-	-	-	-	-	577

Source: British Survey of Fertiliser Practice 2016

Table SC3.0 Product use by month of application, Scotland 2016

(a) Product use

row %	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Straight N	0	1	0	0	0	2	20	40	22	9	2	2
Straight P	4	15	0	0	0	12	9	55	5	0	0	0
Straight K	0	2	0	0	0	10	29	45	13	0	0	0
Compounds	2	3	0	0	0	1	14	49	15	9	6	1
All fertilisers	2	3	0	0	0	2	16	46	17	9	4	2

(b) Nutrient use

row %	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Nitrogen	0	1	0	0	0	1	16	45	20	10	4	2
Phosphate	5	7	0	0	0	4	15	49	10	5	4	2
Potash	3	5	0	0	0	3	19	46	13	6	3	1
Total	2	3	0	0	0	2	16	46	16	8	4	2

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

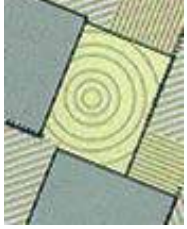
'Product' refers to the total tonnage of the products used by the farmers in the survey year 2016.

'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 2016



SECTION D

USE OF ORGANIC MANURES – GREAT BRITAIN, 2016

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. In 2007, in an effort 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 1,144 farms in the survey 784 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 65%. The details are shown in Table D1.1a.

Table D1.1a Numbers and percentage (%) of farms using each type of manure in Great Britain, 2016

	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	360	605	202	35	14	28	31	54	11	39	18	784
Farms in population	31,325	45,734	14,203	1,906	1,250	1,975	1,712	4,993	709	1,637	1,046	59,207
Farms in population %	35%	51%	16%	2%	1%	2%	2%	6%	1%	2%	1%	65%
Volume (Mt; Mm^3)	n/a	33.4	42.8	2.0	1.0	0.6	0.8	2.0	1.7	2.0	1.4	87.7
Volume %	n/a	38%	49%	2%	1%	1%	1%	2%	2%	2%	2%	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, 2012 - 2016

	none	*cattle FYM*	*cattle slurry*	*pig FYM*	*pig slurry*	*layer manure*	*broiler/ turkey litter*	*other FYM*	*other*
2012	36	48	19	2	1	2	2	4	5
2013	35	51	17	2	1	3	2	5	4
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

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 2016 being 51% and 16% of farms respectively.

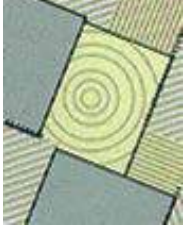


Table D1.1c Dressing cover of organic manure in Great Britain, 2012 - 2016

	all tillage	*grass 5 years and over*	*grass under 5 years old*
2012	23	32	47
2013	23	35	47
2014	22	29	49
2015	23	29	53
2016	23	31	48

Dressing covers of organic manure on tillage are the most consistent over the five year period 2012 – 2016. The proportion of grass receiving a dressing of manure is higher for both categories, at 31% of grass 5 years and over and 48% on grass under 5 years old in 2016.

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 is by far 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 2016

			percentage of farms						
	farms in sample	*farms in population*	*broadcast*	*band spread*	*shallow injection*	*deep injection*	*rain gun*	*rotating boom*	*non-broadcast*
Cattle slurry	202	14,203	83	12	8	0	2	0	21
Pig slurry	14	1,250	63	37	2	0	0	0	37
Grand Total	215	15,430	81	14	7	0	2	0	22

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.

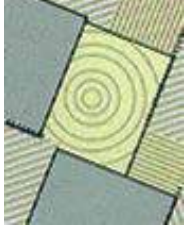


Table D1.3 gives estimates of the volume and area of manure/slurry incorporation on tillage fields by manure type and immediacy of incorporation. Farmyard manure is the most extensively incorporated at 97% of the volume with 86% of it incorporated within a week of spreading on tillage fields. Cattle slurry makes up 98% of all slurry volume (Table 2.3a) and 88% of cattle slurry was applied to grassland. This helps to explain why cattle slurry is less likely to be incorporated at 32% 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 80% of pig slurry was applied to arable land, which if applied to winter crops in the spring would not be incorporated.

Table D1.3 Percentage (%) of organic manure incorporated (volume and area) on tillage fields by incorporation time and manure/slurry type, Great Britain 2016

	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	11	10	30	28	45	48	11	10	749	16.8
Cattle slurry	28	32	7	7	19	19	30	26	15	15	140	5.0
Pig slurry	19	35	4	6	47	15	30	44	0	0	40	0.8
Poultry FYM	8	7	22	23	47	48	19	16	4	6	135	1.0
Other	9	12	27	20	27	30	26	29	2	1	128	2.9
Total	8	11	13	11	31	27	38	40	9	9	1,192	26.5

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 42% in 2016. Where contractors were used they were applying between 75% and 93% of the manure on average.

Table D1.4a Use of contractors to spread manure/slurry in current season, Great Britain 2016

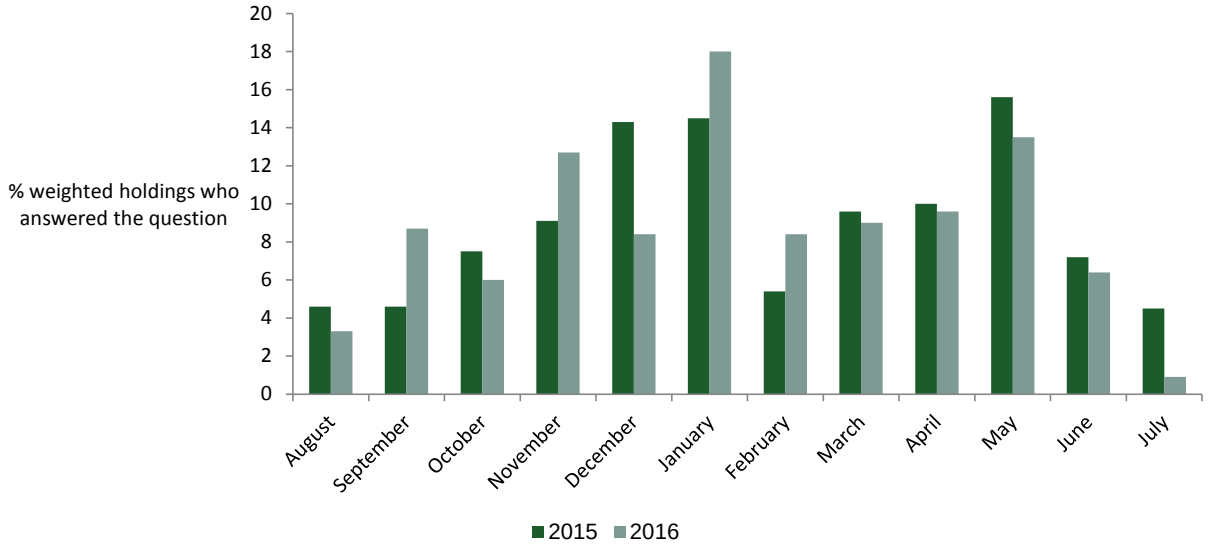
	% of farms using a contractor	*% volume applied by contractor*	*average % of contractor-applied manure, where contractor is used*
FYM	42	33	75
Cattle slurry	28	26	91
Other	50	46	93
Total	34	32	83

Use of contractors to spread manures is fairly consistent over the 5 year period 2012-2016, on 32-36% of farms (Table 1.4b), as was the average amount spread, at 83-89%.

Table D1.4b Use of contractors to spread manure/slurry, Great Britain 2012 - 2016

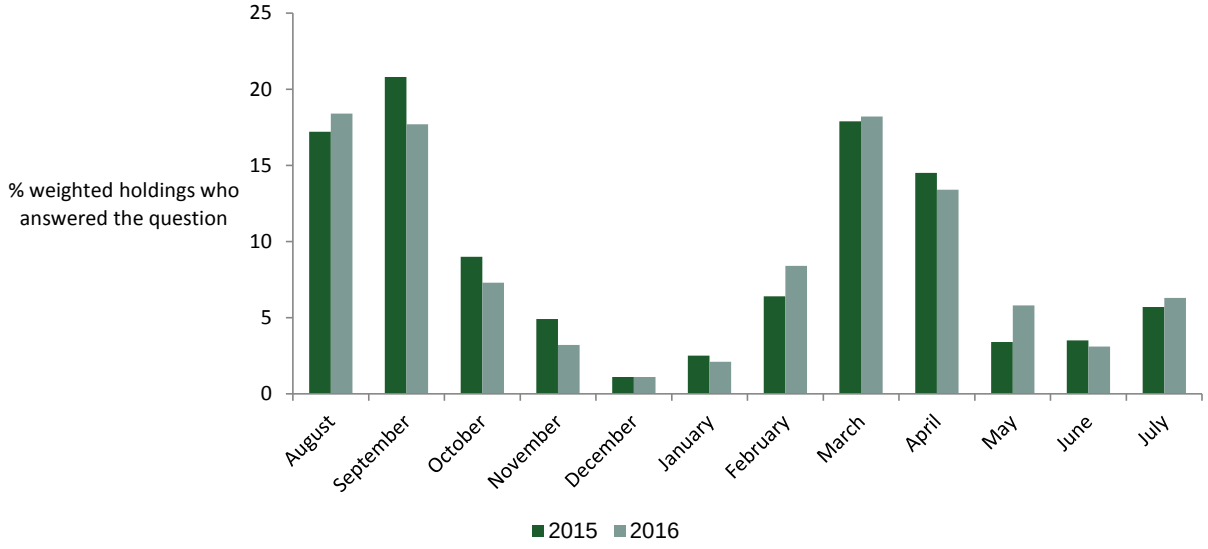
	% of farms using a contractor	*% volume applied by contractor*	*average % of contractor-applied manure, where contractor is used*
2012	32	32	84
2013	30	30	88
2014	36	39	87
2015	34	33	89
2016	34	32	83

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



In 2016 farmers were asked, as in 2015, 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. The peaks for spreading the manure were August, September and March across both years, 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



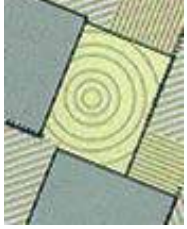
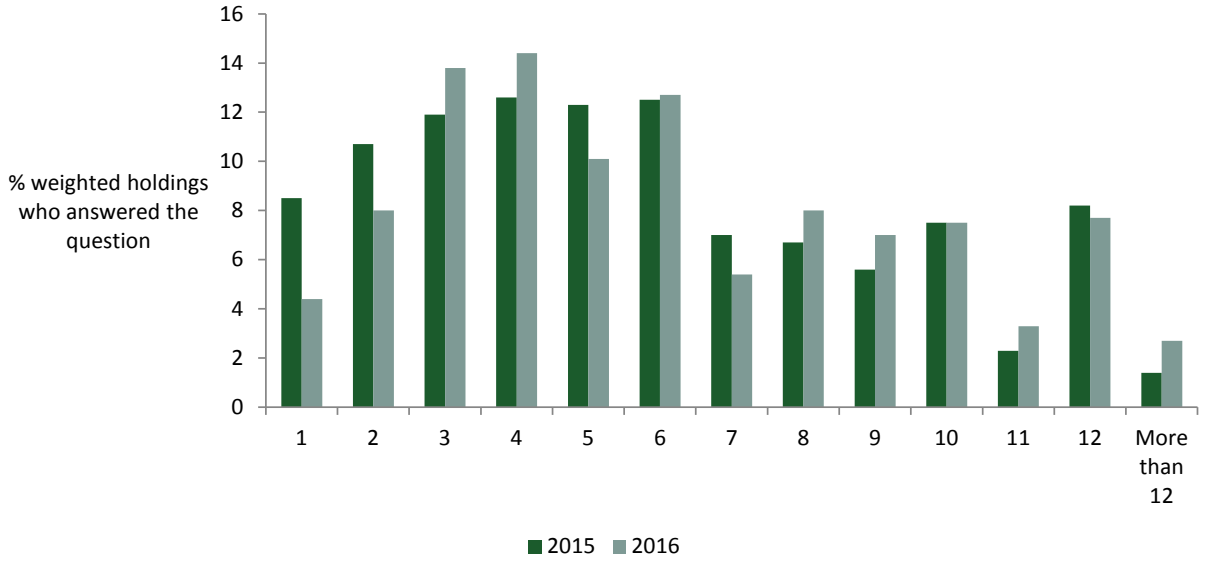
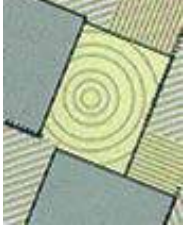


Figure D1.5c Temporary field heaps of manure, duration of storage in months, Great Britain 2015 – 2016



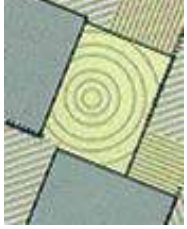
Farmers were also asked on average the duration in months that manure was stored in this way (Figure D1.5b). Storage for 3-6 months accounted for the practice on 49% of farms in 2015, with this figure being 51% in 2016. In 2015 and 2016 only 10% of farms were storing for 12 months or more, when all types of manure are taken into account. The recommendation from the Food Standards Agency is that manure should be stacked for 8 weeks to reduce the risk of spreading resistant bacteria.



D2 USE OF ORGANIC MANURES

In recent years there has been a great deal of promotional activity aimed at encouraging farmers to make adjustments to fertiliser inputs where manures are used. When making comparisons of the data presented in this report a number of factors should be taken into account:

- 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 which was required,
- for grassland, the average fertiliser rate has been used so as 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 D2). 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 2012 - 2016

	cattle FYM	*cattle slurry*	*pig FYM*	*pig slurry*	*layer hen manure*	*broiler/ turkey litter*	*other FYM*	*other farm*	*bio-solids*	*other non-farm*
2012	15	10	1	1	1	1	1	0	2	1
2013	16	9	1	1	1	1	1	0	1	0
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

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 2012 – 2016

	cattle FYM	*cattle slurry*	*pig FYM*	*pig slurry*	*layer hen manure*	*broiler/ turkey litter*	*other FYM*	*other farm*	*bio-solids*	*other non-farm*
2012	51	34	2	2	3	3	4	1	5	2
2013	56	31	2	2	3	3	4	1	4	2
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

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

The percentage of the sown area receiving an application of cattle FYM in 2016 was 16%, which is slightly above than the five year average. Cattle FYM and cattle slurry were applied to 87% of the sown area receiving organic manure.

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 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.

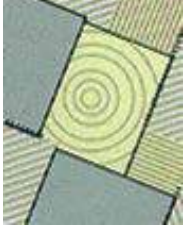


Table D2.2 Typical dry matter and nutrient content of different organic manure types[17]

	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	8.0
Pig FYM	25	7.0	6.0	8.0
Sheep FYM	25	7.0	3.2	8.0
Duck manure	25	6.5	5.5	7.5
Layer hen manure	35	19.0	14.0	9.5
Broiler/turkey litter	60	30.0	25.0	18.0
Cattle slurry	6	2.6	1.2	3.2
Pig slurry	4	3.6	1.8	2.4
Digested liquid sewage sludge	4	2.0	3.0	0.1
Digested cake	25	11.0	18.0	0.6
Thermally dried	95	40.0	70.0	2.0
Lime stabilised	40	8.5	26.0	0.8
Composted	60	11.0	6.0	3.0
Compost-green	60	7.5	3.0	5.5
Compost-green/food	60	11.0	3.8	8.0

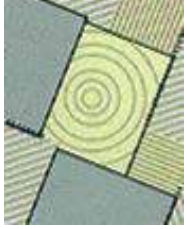
In Table D2.3, crops receiving manure applications have been classified as either “winter sown”, “spring sown” or “grass” and their average treated areas and manure application rates shown.

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 2016

	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 %	9.3	1.1	1.8	1.0	1.3	1.9	0.7	-	2.3	0.7
Treated area (ha)	277,357	33,588	54,217	28,481	39,441	56,084	21,116	-	69,450	20,511
Avg manure rate (t; m^3/ha)	22	33	23	17	8	7	14	-	23	22
Volume (Mt; Mm^3)	6.2	1.1	1.3	0.5	0.3	0.4	0.3	-	1.6	0.5
Fields in sample	286	34	38	21	26	29	19	2	46	17
Spring sown										
Treated area %	22.5	6.8	0.8	0.7	1.5	0.9	1.9	-	1.0	0.9
Treated area (ha)	352,451	106,631	12,073	11,291	23,736	14,728	29,419	-	16,090	14,512
Avg manure rate (t; m^3/ha)	22	36	40	27	8	10	22	-	20	28
Volume (Mt; Mm^3)	7.8	3.9	0.5	0.3	0.2	0.2	0.6	-	0.3	0.4
Fields in sample	398	93	18	7	14	17	23	2	14	15
Grass										
Treated area %	23.0	24.3	0.1	0.3	0.5	0.4	1.2	0.7	0.1	0.5
Treated area (ha)	1,317,462	1,389,249	3,577	15,555	28,406	23,071	68,860	39,037	8,111	28,086
Avg manure rate (t; m^3/ha)	15	27	38	12	5	5	16	40	13	18
Volume (Mt; Mm^3)	19.3	37.8	0.1	0.2	0.1	0.1	1.1	1.6	0.1	0.5
Fields in sample	581	403	5	12	11	6	31	14	9	15

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

[13] Anon. (2010). *Fertiliser Manual (RB209),* Defra, 8th edition. The Stationery Office, London. For the latest May 2017 revision of some of these values see the new edition of this manual on the AHDB web site: http://www.ahdb.org.uk/projects/RB209.aspx



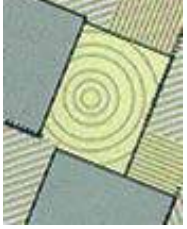
The majority of cattle manure and slurry applications were made to grassland, reflecting the practice of utilising the manure within the farm on which it is produced. Conversely, non-farm manures such as biosolids appear to be favoured on winter sown tillage land. The profile of the % treated area and average manure rates are broadly similar to those reported for 2015.

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 2016

Cattle FYM	*Cereals*	*Dairy*	*General cropping*	*Mixed*	*Other livestock*	*All farm types*
Winter sown						
Treated area %	32.1	16.1	7.9	26.7	15.9	100.0
Treated area (ha)	88,972	44,531	21,961	74,016	44,196	277,357
Avg manure rate (t; m^3/ha)	22	24	20	21	25	22
Volume (Mt; Mm^3)	1.9	1.1	0.4	1.6	1.1	6.2
Fields in sample	76	57	18	76	56	286
Spring sown						
Treated area %	17.2	16.0	8.1	37.6	21.0	100.0
Treated area (ha)	60,618	56,506	28,593	132,356	74,023	352,451
Avg manure rate (t; m^3/ha)	22	25	24	21	22	22
Volume (Mt; Mm^3)	1.3	1.4	0.7	2.7	1.6	7.8
Fields in sample	56	80	31	108	122	398
Grass						
Treated area %	1.4	16.7	2.4	5.9	73.6	100.0
Treated area (ha)	18,565	220,191	31,249	77,288	969,517	1,317,462
Avg manure rate (t; m^3/ha)	18	17	6	17	14	15
Volume (Mt; Mm^3)	0.3	3.7	0.2	1.3	13.8	19.3
Fields in sample	16	92	11	52	408	581

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.

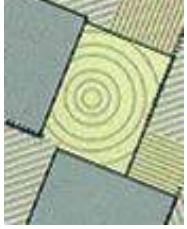
Table 2.3b shows a breakdown of the cattle FYM applications by robust farm type. Cereal farms have the most extensive treatments of cattle FYM on winter sown crops at 32.1% of the treated area. On grass 73.6% of the treated area (with cattle FYM) is on Other Livestock robust classification farms.



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), whereas spring sown and grass fields are predominantly treated between November and April.

Table D2.4 Percentage (%) of each organic manure type applied, by sowing season and timing, Great Britain 2016

	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	3	0	39	17	18	16	5	0	18	1
September	8	1	29	12	19	32	10	0	40	22
October	2	0	8	13	3	1	0	0	10	0
Winter (Nov, Dec, Jan)	0	0	0	0	0	0	0	0	0	0
Spring (Feb, Mar, Apr)	0	1	0	9	2	8	1	0	6	9
Summer (May, Jun, Jul)	1	0	1	0	0	3	1	0	0	0
Spring sown										
August	0	1	0	0	1	0	3	0	0	0
September	0	0	4	5	12	0	0	1	3	0
October	1	1	1	0	0	0	0	0	0	0
Winter (Nov, Dec, Jan)	2	0	0	0	0	0	4	11	3	2
Spring (Feb, Mar, Apr)	14	5	12	16	11	15	17	1	10	15
Summer (May, Jun, Jul)	1	1	0	0	2	1	0	0	2	5
Grass										
August	8	6	1	5	6	0	11	0	0	0
September	7	4	0	6	1	0	2	5	2	0
October	5	3	0	0	0	0	4	0	0	0
Winter (Nov, Dec, Jan)	8	8	0	0	0	3	4	21	0	6
Spring (Feb, Mar, Apr)	27	43	4	12	10	8	20	42	4	22
Summer (May, Jun, Jul)	12	26	0	6	14	13	18	19	3	16
% of total treated area	49	35	2	1	2	2	3	1	2	2



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[18]. 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.

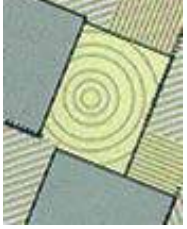
Table D3.1a Dressing cover (%) and application rates (kg/ha) of manufactured fertiliser to tillage crops in Great Britain, with and without applications of organic manure, 2016

	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	98	99	30	50	36	49	263	932
Spring barley	99	100	67	65	69	68	195	394
Winter barley	97	100	37	57	38	63	106	323
Potatoes (maincrop)	92	95	94	84	92	84	29	38
Sugar beet	98	98	-	51	70	49	26	37
Winter oilseed rape	93	99	21	59	20	49	90	331

	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	180	195	52	61	69	72	263	932
Spring barley	94	112	45	53	66	69	195	394
Winter barley	139	150	52	57	62	72	106	323
Potatoes (maincrop)	135	147	132	119	207	218	29	38
Sugar beet	95	102	-	45	91	85	26	37
Winter oilseed rape	163	188	50	59	64	68	90	331

	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	177	193	16	30	24	35	263	932
Spring barley	93	112	30	34	46	47	195	394
Winter barley	135	150	19	32	23	46	106	323
Potatoes (maincrop)	124	140	124	100	191	182	29	38
Sugar beet	93	100	-	23	64	42	26	37
Winter oilseed rape	153	187	11	34	13	33	90	331

[14] Anon. (2010). *Fertiliser Manual (RB209),* Defra, 8th edition. The Stationery Office, London. ISBN 978-0-11-243286-9. For the latest May 2017 release see the AHDB web site: http://www.ahdb.org.uk/projects/RB209.aspx



For all the major tillage crops the overall rate of nitrogen from manufactured mineral fertiliser is higher on fields where organic manures were not applied. Application rate increases of nitrogen ranged from 7 kg/ha for sugar beet to 34 kg/ha on oilseed rape, although for sugar beet the fact that the data derive from low number of fields should be taken into account. This is also predominantly the case for phosphate and potash fertiliser application rates. This is most dramatically illustrated by a 68% decrease in the application rate of phosphate on manured winter oilseed rape fields. This decrease was mainly caused by a reduction in dressing cover with only 21% of manured winter oilseed rape fields receiving a dressing of phosphate fertiliser. 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.

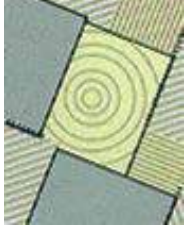
Table D3.1b Overall application rates (kg/ha) of manufactured fertiliser application to tillage crops in Great Britain, with and without applications of organic manure, 2012 - 2016

	2012		*2013*		*2014*		*2015*		*2016*	
nitrogen (kg/ha)	*with manure*	*without manure*	*with manure*	*without manure*	*with manure*	*without manure*	*with manure*	*without manure*	*with manure*	*without manure*
Winter wheat	170	190	175	187	167	192	179	196	177	193
Spring barley	95	105	96	113	100	113	95	111	93	112
Winter barley	140	145	141	145	137	147	147	148	135	150
Potatoes (maincrop)	133	136	183	167	137	149	126	178	124	140
Sugar beet	89	99	87	103	89	101	92	105	93	100
Winter oilseed rape	166	191	161	187	175	195	174	197	153	187

	2012		*2013*		*2014*		*2015*		*2016*	
phosphate (kg/ha)	*with manure*	*without manure*	*with manure*	*without manure*	*with manure*	*without manure*	*with manure*	*without manure*	*with manure*	*without manure*
Winter wheat	13	29	16	29	16	29	18	32	16	30
Spring barley	32	36	28	32	36	37	30	34	30	34
Winter barley	18	33	26	28	22	34	18	33	19	32
Potatoes (maincrop)	108	104	119	126	82	100	114	111	124	100
Sugar beet	13	31	15	34	7	33	18	30	-	23
Winter oilseed rape	8	28	21	28	11	29	14	33	11	34

	2012		*2013*		*2014*		*2015*		*2016*	
potash (kg/ha)	*with manure*	*without manure*	*with manure*	*without manure*	*with manure*	*without manure*	*with manure*	*without manure*	*with manure*	*without manure*
Winter wheat	21	33	22	34	27	36	31	35	24	35
Spring barley	42	51	40	48	46	48	42	45	46	47
Winter barley	27	44	36	43	31	48	27	45	23	46
Potatoes (maincrop)	183	208	203	249	152	191	163	202	191	182
Sugar beet	65	73	72	76	62	75	66	61	64	42
Winter oilseed rape	11	30	15	30	20	28	24	32	13	33

Differences in overall application rates with and without manures for nitrogen, phosphate and potash for the period 2012 to 2016 are shown in table D3.1b above. The trend for higher nitrogen rates on unmanured fields holds true for nitrogen for all major tillage crops throughout the period, with the exception being potatoes in 2013. The increased rates are most consistent for nitrogen on winter wheat at between 6% and 13% increase over manured fields. Overall rates for phosphate and potash in winter wheat show a similar trend over the five year period. Other crops show greater variability between manured and unmanured field rates for the different nutrients which may in part be due to the lower 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 grass fields often 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 2016

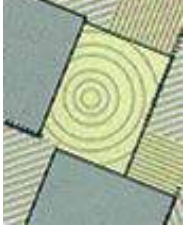
	nitrogen (kg/ha)		*phosphate (kg/ha)*		*potash (kg/ha)*		*fields in sample*	
	with manure	*without manure*	*with manure*	*without manure*	*with manure*	*without manure*	*with manure*	*without manure*
Cereals								
Grass under 5 years old *	138	109	-	29	77	44	11	85
Grass 5 years and over *	111	77	-	30	-	40	15	239
All grass	126	84	43	30	64	41	26	324
Dairy								
Grass under 5 years old	173	153	30	22	52	46	116	39
Grass 5 years and over	143	144	26	26	44	40	180	104
All grass	154	146	27	25	47	41	296	143
General cropping								
Grass under 5 years old *	-	115	-	27	-	66	4	43
Grass 5 years and over *	-	73	-	22	-	29	12	93
All grass	100	82	-	23	-	36	16	136
Mixed								
Grass under 5 years old *	136	113	42	28	55	38	34	138
Grass 5 years and over *	102	74	24	22	30	29	44	218
All grass	116	86	32	24	41	32	78	356
Other livestock								
Grass under 5 years old	97	91	29	28	39	35	138	152
Grass 5 years and over	85	63	21	16	26	19	371	510
All grass	88	67	22	18	28	21	509	662
All farm types								
Grass under 5 years old	141	109	32	28	49	39	308	459
Grass 5 years and over	108	75	23	19	31	24	626	1174
All grass	117	82	25	21	36	27	934	1633

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 44 fields).

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. Nitrogen rates were significantly higher on dairy farms but more comparable on other farm types except “other” livestock farms where rates were lower. This indicates that dairy farmers are intensive grass growers looking for high yields. For phosphate and potash rates were comparable across all farm types except “other livestock” farms where rates were lower also.

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 2016

	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	106	-	13	-	15	-	15	3
All cut for silage	159	170	28	30	54	69	196	51
All grazings	150	144	27	25	44	41	245	135

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

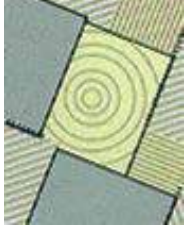
Table D3.3b Average field rates (kg/ha) of manufactured fertiliser application on dairy grassland with and without applications of organic manure, Great Britain 2012 – 2016

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*
2012	122	83	28	23	42	36	16	17
2013	103	124	15	19	27	21	20	18
2014	114	255	20	22	43	54	26	13
2015	117	107	34	23	32	24	17	13
2016	106	-	13	-	15	-	15	3

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*
2012	145	151	28	30	47	57	266	70
2013	161	146	28	30	50	47	260	71
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

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*
2012	138	113	24	21	38	30	320	190
2013	141	124	24	24	40	32	313	195
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

Mineral fertiliser application rates of nitrogen are variable over the 5 year period 2012-16 irrespective of the grass management system. Data for grass cut for hay should be treated with caution as the number of fields managed this way is low. Average field rates of phosphate are more stable, particularly on manured fields, in the range of 26-28 kg/ha for fields cut for silage and 24-27 kg/ha on all grazed fields. Potash average field rates for manured silage and grazed grass were in the range 47-55 kg/ha and 38-44 kg/ha respectively.



SECTION E

E1 SPREADING PRECISION, RECORD KEEPING, SOIL TESTING, PROFESSIONAL QUALIFICATIONS AND ADVICE

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 2016, 36% 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 5%, checking at each change of fertiliser. Twenty two percent of farmers never check their spreaders for accuracy.

Table E1.1 Frequency of spread pattern checks using catch trays, percentage (%) of those farms with a spreader, Great Britain 2012 – 2016

	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*
2012	8	7	6	8	37	27	13	3
2013	10	8	4	11	39	26	11	2
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

Practices of checking are generally consistent over the five year period 2012-2016, 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 2015/16 crop year, Great Britain 2016

	manufactured fertilisers				*organic manures*			
	farms	*farms %*	*area (ha)*	*area %*	*farms*	*farms %*	*area (ha)*	*area %*
Computer program	16,662	23.3	3,143,500	35.6	8,231	15.4	1,712,173	26.2
Farm diary	37,673	52.6	4,160,775	47.1	32,001	60.0	3,488,567	53.5
Farm notebook/pocketbook	16,019	22.4	1,705,040	19.3	11,614	21.8	1,291,950	19.8
File record sheet (file in the office)	14,847	20.7	1,915,555	21.7	9,062	17.0	1,192,144	18.3
Other paper record	2,115	3.0	270,953	3.1	1,791	3.4	249,610	3.8
No records kept	3,191	4.3	309,596	3.4	5,830	9.9	587,965	8.3

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 23% of farms, but this equates to 36% in area terms. No records were kept on 4% of farms, and this falls to 3% when considered on an area basis. Computerised record keeping is slightly less common for organic manures at 15% 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 general cropping farms at 44%, and lower at 11% on dairy and 6% 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 the different farm types is broadly similar for both manufactured and organic fertilisers.

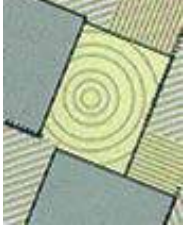


Table E1.2b Record keeping methods for fertiliser and manure applications on farms where each nutrient type was applied during the 2015/16 crop year, by farm type, Great Britain 2016

	manufactured fertilisers		*organic manures*	
Cereals	*farms*	*farms %*	*farms*	*farms %*
Computer program	7,707	39.7	2,658	35.5
Farm diary	6,849	35.3	3,662	48.9
Farm notebook/pocketbook	4,219	21.7	1,476	19.7
File record sheet (file in the office)	6,217	32.0	2,220	29.6
Other paper record	300	1.5	175	2.3
No records kept	221	1.1	592	7.3
	manufactured fertilisers		*organic manures*	
Dairy	*farms*	*farms %*	*farms*	*farms %*
Computer program	930	11.2	1,091	12.2
Farm diary	5,988	72.4	6,431	71.7
Farm notebook/pocketbook	981	11.9	1,004	11.2
File record sheet (file in the office)	1,482	17.9	1,786	19.9
Other paper record	417	5.0	417	4.6
No records kept	92	1.1	92	1.0
	manufactured fertilisers		*organic manures*	
General cropping	*farms*	*farms %*	*farms*	*farms %*
Computer program	3,377	44.1	1,290	40.8
Farm diary	3,932	51.4	1,500	47.5
Farm notebook/pocketbook	1,078	14.1	606	19.2
File record sheet (file in the office)	1,645	21.5	632	20.0
Other paper record	267	3.5	99	3.1
No records kept	51	0.7	743	19.0
	manufactured fertilisers		*organic manures*	
Mixed	*farms*	*farms %*	*farms*	*farms %*
Computer program	2,762	26.1	1,681	23.6
Farm diary	4,954	46.8	3,201	44.8
Farm notebook/pocketbook	3,216	30.4	2,497	35.0
File record sheet (file in the office)	1,574	14.8	875	12.3
Other paper record	430	4.1	407	5.7
No records kept	609	5.4	895	11.1
	manufactured fertilisers		*organic manures*	
Other livestock	*farms*	*farms %*	*farms*	*farms %*
Computer program	1,493	6.0	1,049	4.1
Farm diary	15,695	63.2	16,814	65.8
Farm notebook/pocketbook	6,525	26.3	6,031	23.6
File record sheet (file in the office)	3,644	14.7	3,266	12.8
Other paper record	701	2.8	693	2.7
No records kept	2,217	8.2	3,508	12.1
	manufactured fertilisers		*organic manures*	
All farm types	*farms*	*farms %*	*farms*	*farms %*
Computer program	16,662	23.3	8,231	15.4
Farm diary	37,673	52.6	32,001	60.0
Farm notebook/pocketbook	16,019	22.4	11,614	21.8
File record sheet (file in the office)	14,847	20.7	9,062	17.0
Other paper record	2,115	3.0	1,791	3.4
No records kept	3,191	4.3	5,830	9.9

Note: more than one method may be used

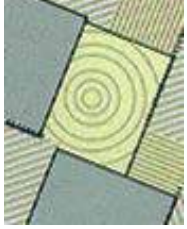


Table E1.2c Record keeping methods percentage (%) of farms, for fertiliser and manure applications on farms where each respective nutrient type was applied in the crop year, Great Britain 2012-2016

		computer program	*farm diary*	*farm notebook/ pocket-book*	*file record sheet (file in the office)*	*other paper record*	*no records kept*
manufactured fertilisers	*2012*	23.4	51.4	21.1	20.4	1.1	7.1
	2013	21.2	49.2	23.6	19.8	2.8	5.7
	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
organic manures	*2012*	20.0	53.1	20.4	20.4	1.7	12.6
	2013	18.0	51.9	22.0	18.9	2.6	9.9
	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

Note: more than one method may be used

Recording methods for manufactured fertilisers show minor variations across the five year period 2012-16 with farm diaries remaining the most widely used recording method. For organic manures, records of some type were kept on 87-90% of farms for the five year period.

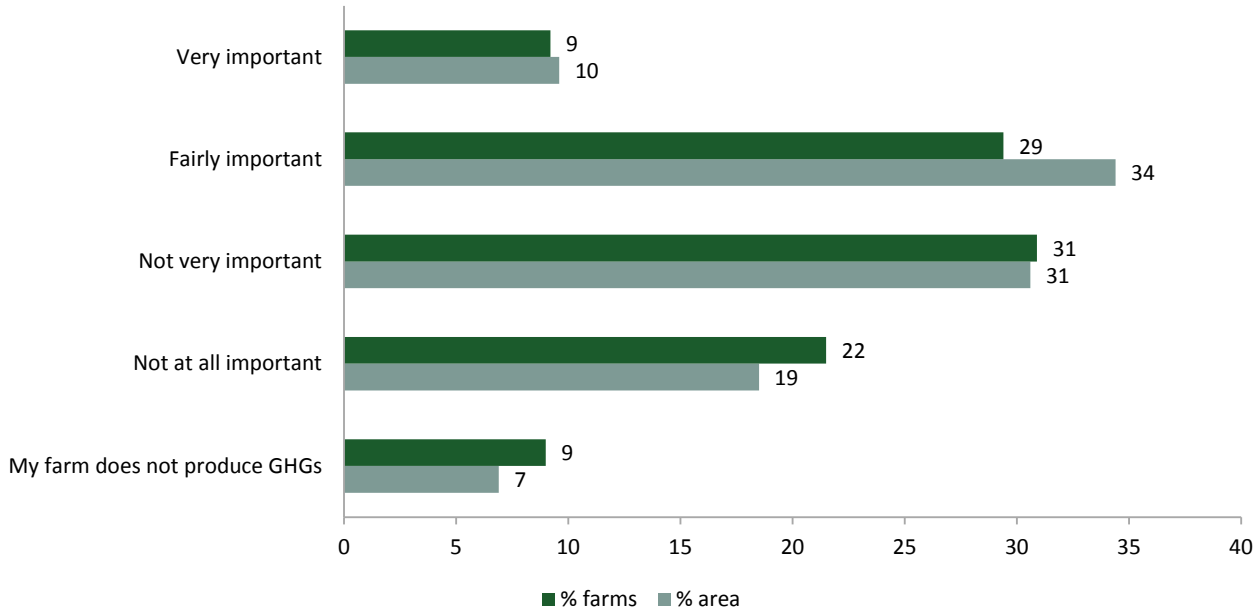
Table E1.3 Soil testing percentage (%) of tillage and grass area, Great Britain 2016

	tillage area %	*grass area %*
Standard P, K, Mg, pH	25	6
Nitrogen	9	2
pH (lime only)	8	3
Precison farming purposes	5	1

Table E1.3 shows the percentage of the tillage and grass area that was soil tested in the 2016 cropping year. It is usual practice, especially on 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 in 2016, at 25% of the tillage area and 6% of the grass area. All types of soil tests were more prevalent on tillage than on grass.

Soil testing questions have been asked since the 2014 survey, but the results are not shown here. The decision has been taken that the data need to be collected over a number of years, before publishing a time series.

Figure E1.4 Importance of Green House Gases (GHGs), Great Britain 2016



In 2016 farmers were asked how important they considered Green House Gases (GHGs) to be when taking decisions on their land, crops and livestock (Figure E1.4). 38% of farms considered them to either very or fairly important, which increased to 44% in area terms. 22% of farms indicated that they were not at all important and 9% of farms felt that their farms did not produce GHGs.

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

		Kept up to date with Continuous Professsional Development		
Farmers' professional qualifications held	*% farms*	*Yes* *% farms*	*No* *% farms*	*Don't Know* *% farms*
NRoSO	22	93	5	2
BASIS	7	81	15	4
FACTS	3	93	7	0
DairyPro	1	-	-	-
Professional Pig Register	0	-	-	-
Other	8	-	-	-
None of the above	68			

The National Register of Sprayer Operators was the most popular professional qualification held, by 22% of farmers (Table E1.4a). Of those with a NRoSO accreditation 93% kept it up to date with Continuous Professional Development. 68% of farms did not hold any of the qualifications listed in 2016.

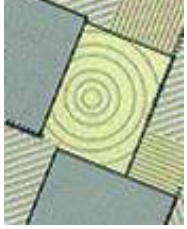


Table E1.4b Professional advice sources received by number of farms, Great Britain 2016

	All farms		Farms with tillage		Farms with grass	
Professional advice sources	*Received advice number of farms*	*Received advice % farms*	*Received advice number of farms*	*Received advice % farms*	*Received advice number of farms*	*Received advice % farms*
Crop protection agronomist	46,106	51	41,622	81	35,952	46
Fertiliser advisor	32,884	37	26,209	51	26,950	34
Feed advisor	20,936	23	12,356	24	20,467	26
Veterinary surgeon	42,532	47	22,543	44	41,715	53
Countryside or wildlife advisor	14,791	16	10,087	20	12,050	15
Land agent	13,832	15	9,516	18	11,561	15
Business advisor	11,056	12	7,554	15	9,392	12
Water advisor	11,952	13	8,978	17	10,371	13
None of the above	16,780	19	3,996	8	16,222	21
Other	4,617	5	1,914	4	4,370	6
Total farms	89,884		51,446		78,395	

Farmers 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% of farms in 2016. This figure increased to 81% when farms with tillage crops were considered. On farms with grass, a veterinary surgeon was the most prevalent source of advice at 53% of farms. Some farms will have both tillage crops and grass, and will appear in both categories. 19% of famers 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

	All farms		Farms with tillage		Farms with grass	
Professional advice sources	*Received advice area*	*Received advice % area*	*Received advice area*	*Received advice % area*	*Received advice area*	*Received advice % area*
Crop protection agronomist	6,593,801	64	4,177,373	90	2,416,428	43
Fertiliser advisor	4,549,143	44	2,621,519	57	1,927,624	34
Feed advisor	2,796,377	27	845,317	18	1,951,060	34
Veterinary surgeon	5,363,383	52	1,713,036	37	3,650,347	64
Countryside or wildlife advisor	2,275,539	22	1,294,826	28	980,713	17
Land agent	2,109,058	20	1,135,936	25	973,123	17
Business advisor	1,711,706	17	795,256	17	916,451	16
Water advisor	1,695,364	16	937,620	20	757,743	13
None of the above	1,130,322	11	184,131	4	946,191	17
Other	475,128	5	134,521	3	340,607	6
Total	10,292,341		4,619,130		5,673,211	

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

					Level of influence of advice		
Professional advice - areas of expertise	*Received advice or gained knowledge number of farms*	*Received advice or gained knowledge % all farms*	*Advised and implemented change number of farms*	*Advised and implemented change % farms*	*High % farms*	*Medium % farms*	*Low % farms*
Soil management or protection	29,908	40	19,104	64	41	50	9
Crop nutrient management	31,100	42	20,976	67	44	51	5
Crop planning or land use	19,988	27	12,654	63	43	48	9
Fertiliser application methods	18,187	25	11,043	61	30	48	21
Crop protection (agrochemicals)	38,393	52	26,844	70	59	37	4
Integrated pest management	16,632	22	10,859	65	46	43	11
Animal nutrition or diet formulation	20,748	28	16,051	77	43	49	9
Manure storage	6,732	9	4,319	64	41	47	12
Manure application method	4,387	6	3,095	71	30	54	16
None of the above	14,721	20					

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 52% of farms had taken advice or gained knowledge on crop protection and of those 70% had implemented change as a result. Considering how influential that advice had been, 59% rated it as high, 37% as medium and 4% of low influence. Crop protection was the area of expertise that was rated highly influential by the greatest number of farmers.

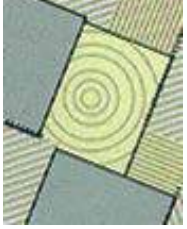
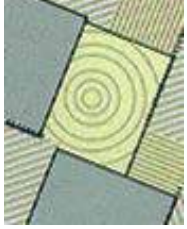


Table E1.4e Potential efficiency improvements: Relevance and progress made by number of farms, Great Britain 2016

			Relevant responses				
Potential production efficiency improvements	*All who answered number of farms*	*Not relevant % farms*	*Relevant responses number of farms*	*No interest % farms*	*Not done yet % farms*	*Made some progress % farms*	*Done all I can do % farms*
Managing soil structure	83,413	16	70,017	11	8	51	31
Crop nutrient use efficiency	80,610	27	58,634	11	5	57	27
Crop agronomy	78,755	31	54,488	10	3	51	36
Crop genetics or variety selection	77,390	34	50,780	15	8	49	29
Whole farm/intergrated farm management	75,238	21	59,242	19	11	44	26
Precision technologies	76,711	30	53,656	35	21	31	12
Animal feed conversion efficiency	77,862	32	53,270	13	13	48	25
Emission reduction from stored manure	74,600	45	41,176	26	28	19	27
Efficiency of nutrient recovery from manure	74,530	39	45,660	16	19	36	29

Table E1.4e 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. 84% of farmers reported that managing soil structure was relevant to them and of those 51% indicated that they had made some progress 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 2016

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	2.6	2.8	1.2	1.4	1.8	1.5	2.3	2.4	5.7	1.6	1.9	1.7	1206
oilseed rape	3.3	3.4	1.4	1.9	2.2	2.8	3.1	3.1	3.9	1.9	2.4	2.8	427
winter barley	2.4	2.9	1.5	1.9	2.3	1.9	2.2	2.4	5.1	2.0	2.3	2.1	433
spring barley	2.0	2.6	1.8	1.4	1.8	1.4	1.8	2.3	2.2	1.3	1.7	2.0	609
m/c potatoes	9.4	8.7	10.6	10.1	16.8	5.8	7.7	10.5	9.9	9.4	15.1	17.8	67
sugar beet	4.7	4.9	3.3	4.1	8.2	7.3	4.0	4.2	16.8	8.5	8.6	13.4	63
all tillage crops	2.1	2.5	1.1	1.0	1.4	1.0	1.9	2.1	1.8	1.3	1.9	1.6	3848
all grass	2.0	1.8	1.2	0.4	0.6	0.5	2.2	2.7	1.9	0.8	1.3	3.0	2802

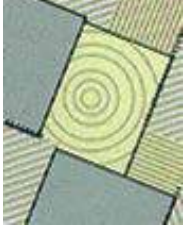
England & Wales

	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	2.7	2.9	0.9	1.3	1.8	1.6	2.4	2.4	5.0	1.7	2.0	1.8	1116
oilseed rape	3.4	3.5	1.2	1.9	2.3	2.9	3.2	3.1	4.2	2.1	2.7	2.9	398
winter barley	2.7	3.1	1.4	1.9	2.4	2.0	2.4	2.5	6.3	2.1	2.5	2.2	389
spring barley	2.6	3.1	1.9	1.6	2.0	1.7	2.3	2.6	3.6	1.9	2.2	2.3	401
m/c potatoes	10.6	9.4	12.1	11.7	18.5	6.8	8.1	10.0	11.6	11.0	16.6	20.0	59
sugar beet	4.7	4.9	3.3	4.1	8.2	7.3	4.0	4.2	16.8	8.5	8.6	13.4	63
all tillage crops	2.4	2.7	1.0	1.1	1.5	1.2	2.2	2.2	2.4	1.5	2.5	1.8	3351
all grass	2.3	2.1	1.2	0.4	0.7	0.6	2.6	3.1	2.4	1.0	1.7	3.2	2225

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	8.1	9.2	7.5	5.0	6.1	5.3	7.1	7.7	17.5	4.2	5.1	6.0	90
oilseed rape	12.9	13.9	8.5	5.3	6.5	9.2	12.9	11.8	9.2	4.5	4.5	10.0	29
winter barley	5.5	9.2	5.6	6.3	6.8	6.6	5.5	7.4	8.7	5.8	5.5	7.4	44
spring barley	2.8	3.8	3.1	2.2	2.9	2.5	2.7	3.6	2.8	1.9	2.6	3.9	208
all potatoes	13.5	14.9	13.0	15.4	29.0	6.0	13.5	40.5	11.8	15.4	27.4	19.0	15
all tillage crops	3.6	4.7	2.9	2.1	2.8	2.1	3.4	4.9	2.7	2.4	2.5	3.4	497
all grass	4.0	3.1	3.2	1.1	1.6	1.0	3.6	5.0	3.2	1.3	1.9	6.6	577

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.

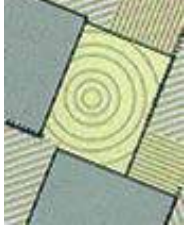
Table App 1.2 Response to main and reserve samples in 2016

	2016	*% total*
Target sample	1308	100
2015 panellists agreeing to re-contact in 2016	1290	-
Achieved 'Main' sample from 2015 panel	784	60
Achieved additional 'Main' sample	131	10
Achieved '1st reserve' sample	116	9
Achieved '2nd reserve' sample	68	5
Achieved '3rd reserve' sample	45	3
Total achieved	**1144**	**87**
Total number of refusals/non-contact	1329	
Total number of farms approached	***2473***	

Table App 1.3 Response to main and reserve samples for 2011 - 2015

Net response rate	*2012 %*	*2013 %*	*2014 %*	*2015 %*	*2016 %*
Overall achieved rate	94	91	91	90	87
Achieved % of total contact attempts	53	51	52	53	46
Main sample	82	78	76	81	80
Reserve sample(s)	18	12	14	19	20
Main reason for refusal	*2012 %*	*2013 %*	*2014 %*	*2015 %*	*2016 %*
Too busy	22	25	22	17	10
Not interested	13	16	17	14	12
Do not do surveys	4	5	5	4	5
Want payment	0	1	0	0	0
Too much paperwork	0	1	1	1	1
Non contact	41	32	41	45	50
Other [a]	20	20	13	20	22

[a] includes late submission, contributed enough and incorrect telephone number
Farms in the >200ha size band are oversampled by 25%, which has the effect of increasing response rates.

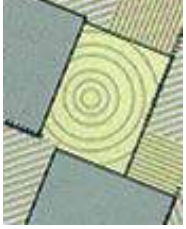


APP 1.3 INFORMATION ON HOLDINGS BELOW 20 HECTARES

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. At Great Britain level, the total number of holdings in the population for 2014 was 190,422. Holdings below 20 hectares accounted for 4% of the total crop area and 10% of the total grass area; this was unchanged from the previous year. 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.

2015	Total area (ha)	Total no. holdings area>0	Area (ha) <20ha	No. of holdings with <20ha	Proportion of area <20ha	Proportion of holdings <20ha	No. of holdings with zero area	Total no. holdings
Total croppable area	5,861,222	87,482	245,292	39,212	4%	45%	105,717	193,199
of which crops	4,844,412	66,193	187,510	28,168	4%	43%	127,006	193,199
of which temporary grass< 5 years old	1,016,810	53,141	257,654	37,500	25%	71%	140,058	193,199
Total grass	6,444,818	161,312	615,085	87,464	10%	54%	31,887	193,199
grass < 5 years old	1,016,810	53,141	257,654	37,500	25%	71%	140,058	193,199
grass ≥ 5 years old	5,428,008	154,359	618,139	87,932	11%	57%	38,840	193,199

Note: Includes bare fallow and uncropped land.

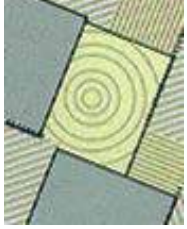


APPENDIX 2

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.