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The British Survey of Fertiliser Practice Fertiliser use on farm for the 2016 crop year

The British Survey of Fertiliser Practice, which is carried out annually, provides information on usage and application rates of nitrogen, phosphate, potash, sulphur, organic manures and lime on the major crops and grass grown in mainland Britain. It also includes the official statistics on annual fertiliser consumption in the UK (Table B2.6 of the full report, see link below).

This release gives key results from the 2016 survey. Full results and methodological details are published in a separate report [here](#).

Key results

- Weather conditions in the 2016 crop year began with a generally dry and sunny autumn. This was followed by near record rainfalls in November and December leading to severe flooding in some areas. Spring saw temperatures and rainfall return to near the seasonal average although summer rainfalls were above average for most areas. Overall the timing of fertiliser applications was very similar to the pattern in the previous cropping year.
- The total nitrogen application rate on all crops and grassland decreased by 4 kg/ha between 2015 and 2016 to 94 kg/ha. The decrease was driven by a 5 kg/ha reduction (to 141 kg/ha) in the overall rate on tillage crops. This is still within the typical 140-150 kg/ha range observed for the majority of the 30 years of the survey. The overall rate on grassland remained unchanged at 56 kg/ha. .
- Application rates of phosphate and potash on all crops and grassland were 18 and 24 kg/ha respectively in 2016, this was no change on 2015. Rates have been relatively stable in recent years although the longer term trend has been downward.
- The overall application rate for sulphur on tillage crops was 31 kg/ha in 2016, unchanged from 2015. At 3 kg/ha overall application rates on grass were also unchanged from 2015.
- Around 65% of farms in the survey 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 used.

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1. Background

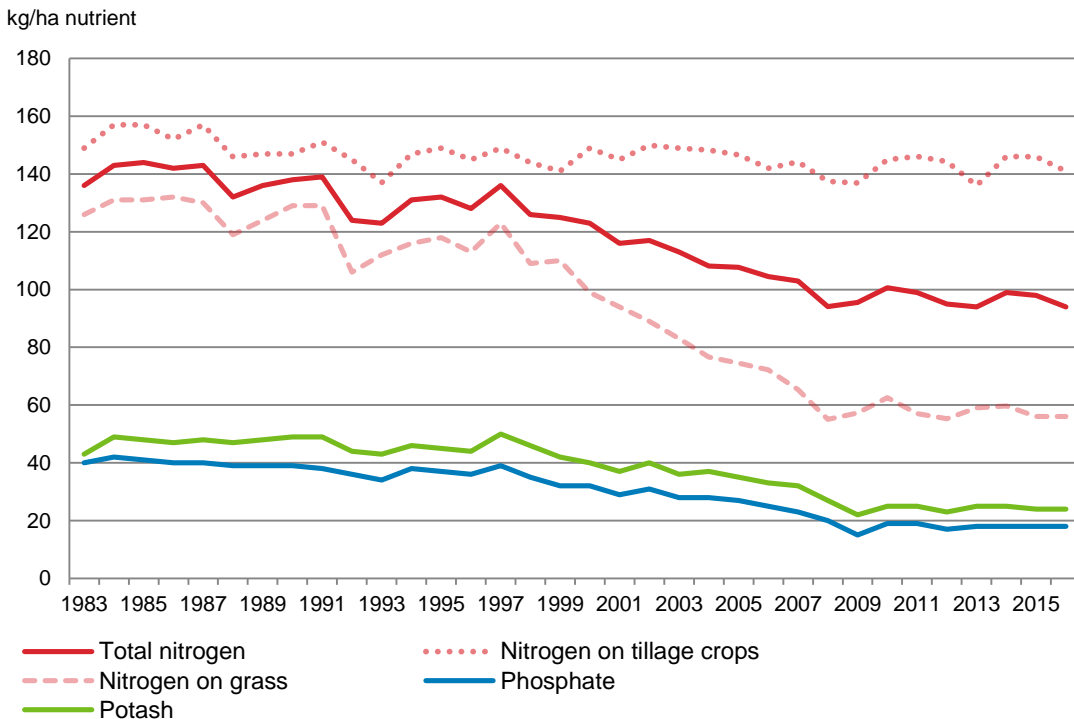
The British Survey of Fertiliser Practice (BSFP) is the primary source of data on inorganic and organic fertiliser use in Great Britain. Its main purpose is to estimate average application rates of nitrogen, phosphate and potash used for agricultural crops and grassland. Information is also collected on applications of sulphur fertilisers, organic manures and lime. The survey data are used by Government, industry and the wider agricultural community to monitor best practice, to assess potential environmental impacts and mitigation strategies and provide important evidence to estimate greenhouse gas emissions from agriculture to inform policy.

The full Report with detailed methodological information plus separate key datasets are available on the GOV.UK [website](#).

2. Overall fertiliser use on crops and grass in Great Britain

Figure 1 shows the overall application rates of nitrogen (N), phosphate (P₂O₅) and potash (K₂O) on crops and grass from 1983. The 1980s was the period of maximum usage of these nutrients, since then there has been a general downward trend. The 31% decline in total nitrogen over this period has been mainly due to decreased use on grassland. This compares to a 55% reduction in overall rate for phosphate and a 44% decline for potash. The dip in use in 2009 is thought to have been caused by the major price increases for fertiliser at that time. In all cases the rate of application on tillage crops is higher than the rate applied to grassland. In 2016, the overall rate for nitrogen on all crops and grass was 94 kg/ha, a 4% reduction on 2015. For phosphate and potash the overall rates in 2016 were 18 kg/ha and 24 kg/ha respectively, no change on 2015 rates.

Figure 1: Overall fertiliser use (kg/ha) on all crops and grass, Great Britain 1983 - 2016



3. Nitrogen

Most agricultural soils do not contain enough naturally occurring plant available nitrogen to meet the needs of a crop throughout the growing season, so supplementary manure and nitrogen applications are needed each year. Nitrogen usually has a large immediate effect on crop growth, yield and quality. Correct rate and timing of nitrogen fertiliser application is important to ensure it meets the crops growth requirements and that there is minimum risk of adverse environmental impacts as a result of the application.

2016 saw a 4 kg/ha decrease in total nitrogen use on all crops and grassland (Table 1). This was driven by a 5 kg/ha fall in the overall rates on tillage crops while there was no change to the overall rate to grassland. However, the total nitrogen use of 141 kg/ha on tillage crops was still within the typical 140-150 kg/ha range seen over the majority of the 30 years of the survey.

Nitrogen rates on grassland have always been lower than tillage crops. Between 1983 and 1999 they were on average 27 kg/ha lower. However since 2000, grassland rates have consistently fallen and over the last five years the average difference has been 85 kg/ha. A reduction in total cattle numbers (by 12% between 2000 and 2016) is thought to have contributed to this, probably in conjunction with some improvement in manure use efficiency.

Table 1: Overall nitrogen use (kg N/ha), Great Britain 2012 - 2016

	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

4. Phosphate and potash

Phosphate and potash are also applied in fertilisers and manures, particularly to replace the quantities removed in harvested crops. Most British soils can hold large quantities of these nutrients in forms that are available for crop uptake over several years. Consequently managing the supply of these nutrients for optimum yield is based more on maintaining appropriate levels in the soil according to crop rotation needs and the timing of application tends to be less critical than that for nitrogen or sulphur.

Table 2: Overall phosphate and potash use (kg/ha), Great Britain 2012 - 2016

Total phosphate (P ₂ O ₅)			Total potash (K ₂ O)				
	Tillage crops	Grass	All crops and grass		Tillage crops	Grass	All crops and grass
2012	28	9	17	2012	37	12	23
2013	28	9	18	2013	40	13	25
2014	29	10	18	2014	39	14	25
2015	29	9	18	2015	38	12	24
2016	29	9	18	2016	39	12	24

Table 2 shows overall phosphate and potash application rates for the past five years. Overall, fertiliser phosphate and potash use on all crops and grass has varied little over this period with rates on tillage crops about three times higher than those used on grassland.

On tillage crops overall phosphate application rates decreased gradually between 1984 and 1996. The decline became more marked until 2009, after which there was some recovery and relative stability with an overall rate of 29 kg P₂O₅/ha in 2016. This picture varies across countries in Great Britain: in Scotland phosphate and potash application rates on tillage have been largely maintained relative to the decrease seen in England and Wales. The overall application rate of phosphate on grassland in Great Britain was highest in 1983 at 28 kg/ha. It remained relatively stable between 1984 and 1998 then declined more rapidly between 1999 and 2009 but has remained relatively stable since with a rate of 9 kg/ha in 2016.

In the longer term overall potash application rates on tillage crops fell slightly between 1983 and 1997, with rates in the range of 60-68 kg K₂O/ha. Like phosphate, overall application rates reduced at a greater rate after this, dropping to 33 kg/ha in 2009 when fertiliser prices were high. Between 2011 and 2016 overall potash application rates to tillage have been in the range 37-40 kg/ha. Whilst the pattern of use 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, have tended to decrease and have been in the range 12-14 kg/ha since 2008.

5. Sulphur

Sulphur is an essential plant nutrient. In the past demand was satisfied through atmospheric deposition but this has declined to the extent that it now contributes very little. There is therefore a need for sulphur application to crops and grass, with crops such as oilseed rape being particularly sensitive to sulphur deficiency. This nutrient is often applied in the sulphate form together with nitrogen fertilisers.

Table 3: Overall sulphur use (kg SO₃/ha), Great Britain 2012 - 2016

	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

Data on sulphur use have been collected since 1993 when only 3-6% of the cereal crop areas and 8% of the oilseed rape area received a sulphur application. By 2016, 56%-63% of the area of cereals and 70% of winter oilseed rape received a dressing of sulphur (a decrease of 3% on 2015). Overall applications of sulphur on tillage crops remained unchanged between 2015 and 2016 at 31 kg SO₃/ha. Similarly applications on grass remained unchanged at 3 kg/ha (Table 3). This low overall rate on grass is a result of the low dressing cover, with only 9% of grass receiving a sulphur dressing.

6. Organic manures

Organic manures¹ 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 sludge (also called bio-solids) and some industrial 'wastes' such as compost, paper waste or brewery effluent. The nutrient levels in organic manures vary but can provide a valuable source of nitrogen, phosphorus and potassium.

In 2016, around 65% of farms in the survey used organic manures on at least one field on the farm² (Table 4). Cattle manure from beef and dairy farms represents by far the largest volume of manure type generated in Great Britain (87% of all manures). The proportion of farms using cattle FYM and cattle slurry has remained relatively stable over the last 5 years and was 51% and 16% of farms respectively in 2016.

Table 4: Numbers and percentage (%) of farms using each type of manure in Great Britain, 2016

	Farms in sample	Farms in population	Farms in population %	Volume (Mt: Mm ³)	Volume %
None	360	31,325	35%	n/a	n/a
Cattle FYM	605	45,734	51%	33.4	38%
Cattle slurry	202	14,203	16%	42.8	49%
Pig FYM	35	1,906	2%	2	2%
Pig Slurry	14	1,250	1%	1	1%
Layer man ure	28	1,975	2%	0.6	1%
Broiler/ turkey litter	31	1,712	2%	0.8	1%
Other FYM	54	4,993	6%	2	2%
Other farm	11	709	1%	1.7	2%
Bio-solids	39	1,637	2%	2	2%
Other non-farm	18	1,046	1%	1.4	2%
Total with manure	784	59,207	65%	87.7	100%

Note: some farmers may use more than one type of manure. Mt: Mm³ are million tonnes and cubic metres.

In 2016, organic manure was applied to 23% of the area of tillage crops whereas this was 31% for grass of five years and over and 48% for grass under five years old. The majority of cattle manure (58%) and slurry (88%) was applied to grassland, reflecting the practice of utilising the manure on the farm on which it is produced.

Broadcast application is by far the predominant method of applying slurry being mostly spread on grassland. Manures applied to fields for winter sown crop are primarily treated in August and September (prior to drilling) whereas spring sown and grass fields are predominantly treated in the spring.

Where organic manures are used, applications of manufactured fertiliser can usually be reduced. Whilst the survey did not specifically ask farmers whether they adjusted manufactured fertiliser inputs because of manure use, an indication of this is possible by comparing fields that received manure with those that did

¹ The underlying sample design of the BSFP is constructed to measure manufactured fertiliser usage and therefore may not represent the population of farmers using organic manures as robustly.

² Not all manure generated by a farm is necessarily retained for use by that farm and excess manure/slurry may be exported for use elsewhere.

not. This shows that for the major tillage crops the overall application rate of nitrogen was lower on fields which received manure. A similar trend is also seen for phosphate and potash use.

Further information

Methodology

The BSFP is a voluntary annual survey of a sample of farmers selected from a population of agricultural holdings compiled using the June Agricultural Survey. The target sample size is 1,300 farms; this sample size has been designed to achieve a statistically representative sample at the national level. Holdings of less than 20 hectares are not included in the sample. While these smaller holdings account for a significant proportion of all holdings in terms of numbers, they cover a much smaller proportion of the total area of crops and grass.

Data collection is undertaken mainly through face to face interviews with individual farmers and in 2016 the response rate was 46%. The underlying sample design of the BSFP is constructed to measure manufactured fertiliser usage and therefore may not as reliably represent the population of farmers using organic manures. The standard errors are relatively small for tillage crops, all crops and the main arable crops of wheat, oilseed rape and barley. Detailed methodology is provided in the full report.

All calculations of fertiliser rates are based on sown area of crops rather than field areas³ and results are expressed in terms of the equivalent nutrient. The overall application rate takes into account the proportion of the crop area treated and the actual field rate of application used.

Glossary of key terms

Tillage: refers to all crops except grass, forestry, glasshouse crops and uncropped land.

Grass: refers to all forms of grassland which may be grazed, conserved or grown for seed production; rough grazing is excluded.

Feedback

Feedback on the publication and the survey is welcome. Contact information for feedback or questions is provided on the front page of this statistical notice.

Other surveys of interest

Defra also run other surveys which may be of relevance and interest to fertiliser use and related practices through its Farm Practices Survey for England which is available of the Defra [website](#).

³ This reflects cross-compliance and environmental scheme measures where field margins remain uncropped.