Department for Environment Food & Rural Affairs

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The British Survey of Fertiliser Practice
Fertiliser use on farm for the 2015 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.

This release gives key results from the 2015 survey. Full results and methodological details are published in a separate report here.

Key results

- Weather conditions in the 2015 crop year saw autumn and winter rainfall at average or above average levels while the summer was both cooler and wetter than the previous two years. 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 1 kg/ha between 2014 and 2015 to 98 kg/ha. This decrease was driven by a 4 kg/ha reduction in the overall rate on grass while the overall rate on tillage crops remained unchanged at 146 kg/ha. This is within the typical 145-150 kg/ha range which has been observed for the majority of the 30 years of the survey.
- Application rates of phosphate and potash on all crops and grassland were 18 and 24 kg/ha respectively in 2015, similar to rates in 2014. Rates have been relatively stable in recent years although the longer term trend has been downward, mainly due to a fall in the proportion of crops treated.
- The overall application rate for sulphur on tillage crops was 31 kg/ha in 2015, unchanged from 2014. Overall application rates on grass decreased to 3kg/ha in 2015. This low overall rate was the result of only 10% of grass receiving a sulphur dressing.
- 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

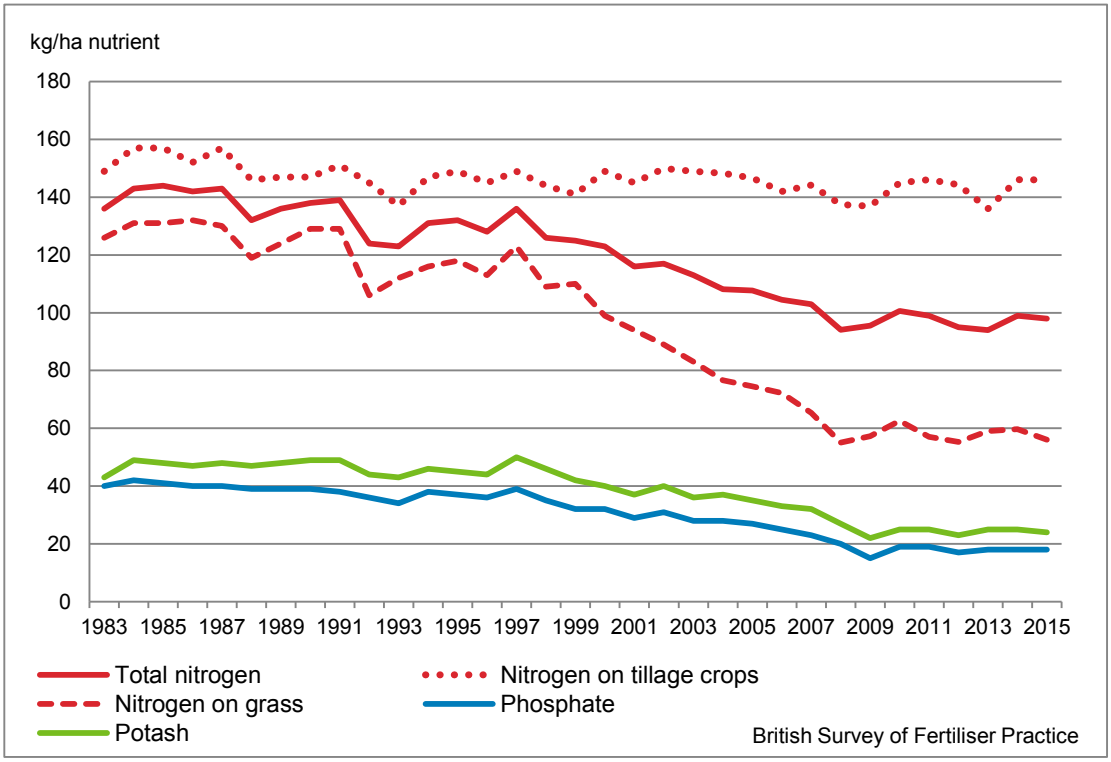
The British Survey of Fertiliser Practice (BSFP) is the primary source of data on inorganic and organic fertiliser use in Great Britain. Its main purpose is to estimate average application rates of nitrogen, phosphate and potash used for agricultural crops and grassland. Information is also collected 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, phosphate and potash on crops and grass from 1983. For all these there has been a general downward trend. The 28% decline in total nitrogen over this period is 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 2015, the overall rate for nitrogen on all crops and grass is 98kg/ha. For phosphate and potash the overall rates in 2015 are 18 kg/ha and 24 kg/ha respectively.

Figure 1: Overall fertiliser use (kg/ha) on all crops and grass, Great Britain 1983 - 2015



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 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.

2015 saw a 1 kg/ha decrease in total nitrogen use on all crops and grassland (Table 1). This is driven by a 4 kg/ha fall in the overall rates on grass. 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 86 kg/ha. A reduction in total cattle numbers (by 12% between 2000 and 2015) is thought to have contributed to this, probably in conjunction with some improvement in manure use efficiency.

The total nitrogen use on tillage crops of 146 kg/ha on tillage crops is in the typical 145-150 kg/ha range seen over the majority of the 30 years of the survey.

Table 1: Overall nitrogen use (kg N/ha), Great Britain 2011 - 2015

	Tillage crops	Grass	All crops and grass
2011	146	57	99
2012	144	55	95
2013	136	59	94
2014	146	60	99
2015	146	56	98

4. 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 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 2011 - 2015

Total phosphate (P_2O_5)				Total potash (K_2O)			
	Tillage crops	Grass	All crops and grass		Tillage crops	Grass	All crops and grass
2011	29	9	19	2011	39	12	25
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

Table 2 shows overall phosphate and potash application rates for the past five years. Overall, 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 P_2O_5/ha in 2015. 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 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 2015.

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 K_2O/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 2015 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 2015; 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 significantly. 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 SO_3/ha), Great Britain 2011 - 2015

	Tillage crops	Grass	All crops and grass
2011	26	2	13
2012	29	2	14
2013	27	2	13
2014	31	4	16
2015	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 2015, 48-62% of the area of cereals and 73% of oilseed rape received a dressing of sulphur (a decrease of 3% on 2014). Overall applications of sulphur on tillage crops remained unchanged between 2014 and 2015 at 31 kg SO_3/ha while applications on grass decreased in 2015 to 3 kg/ha (Table 3). This low overall rate on grass is a result of the low dressing cover, with only 10% of grass receiving a sulphur dressing.

6. Organic manures

Organic manures[1] 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 provide a valuable source of nitrogen, phosphorus and potassium.

In 2015, around 65% of farms in the survey used organic manures on at least one field on the farm[2] (Table 4). Cattle manure from beef and dairy farms represents by far the largest volume of manure type generated in Great Britain. The proportion of farms using cattle FYM and cattle slurry has remained relatively stable over the last 5 years and was 50% and 16% of farms respectively in 2015.

Table 4: Numbers and percentage (%) of farms using each type of manure in Great Britain, 2015

	None	Cattle FYM	Cattle slurry	Pig FYM	Pig Slurry	Layer manure	Broiler/ turkey litter	Other FYM	Other farm	Bio-solids	Other non-farm	Total
Farms in sample	420	702	247	34	16	42	38	66	11	35	27	923
Farms in population	31,857	45,955	15,012	1,354	991	2,258	1,498	5,307	787	1,417	1,063	59,773
Farms in population %	35%	50%	16%	1%	1%	2%	2%	6%	1%	2%	1%	65%
Volume (Mt: Mm^3)	n/a	33.1	38.6	1.7	1.4	0.9	0.7	2.1	1.1	2.0	1.9	83.5
Volume %	n/a	40%	46%	2%	2%	1%	1%	2%	1%	2%	2%	100%

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

In 2015, organic manure was applied to 23% of the area of tillage crops whereas this was 29% for grass five years and over and 53% for grass under five years old. The majority of cattle manure and slurry applications were made 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. Fields for winter sown crop are primarily treated in August and September (prior to drilling) although there is significant use of pig slurry and poultry manure as a spring top-dressing on winter-sown crops, whereas spring sown and grass fields are predominantly treated between February and April with grass also receiving manure during the summer.

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

[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.

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 around 1,500 farms; this sample size has been designed to achieve a statistically representative sample at the national level. Data collection is undertaken mainly through face to face interviews with individual farmers and in 2015 the response rate was 53%. 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 areas[3] 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.

Revisions

The dressing cover percentage of sulphur on grassland for 2014 (Table B1.11, page 25 of the main report) has been corrected.

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.