Department for Environment Food & Rural Affairs

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Water usage on farms: Results from the Farm Business Survey, England 2013/14

In 2013/14, the Farm Business Survey (FBS) collected data on the sources of water used on farms and the proportion of water used from each of these sources. Volumes were not collected. The results cover the year ending spring 2014 (including the 2013 harvest). Key results are given below:

Water Sources

- Mains supply was the most common source of water on farms (86% in 2013/14), particularly for those in the east of England and those outside Less Favoured Areas (LFA).
- 28% of farms abstracted water from rivers/streams/springs for immediate use. Usage was more likely on LFA grazing livestock farms, farms in the South West, farms in severely disadvantaged areas (SDA) and lower performing farms.
- 24% of farms used water from bore holes. Usage was more likely on specialist dairy, pig and poultry farms, very large farms and farms in the South West.

Average proportions of water used per farm by source

- In 2013/14 farms sourced, on average, two thirds of their water from the mains supply, 18% from bore holes and abstracted 12% from rivers/streams/springs for immediate use.
- Cereal farms, spare and part time (very small) farms and farms in the east of the country tended to source a greater proportion of their water from the mains supply than other farms.
- Dairy farms, very large farms and farms in the South West tended to source a greater proportion of their water from bore holes than other farms.
- LFA grazing livestock farms and farms in North East, Yorkshire & Humber tended to abstract a greater proportion of the water that they used than other farms.

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Detailed results

Government sustainability strategies for the use of water highlight its importance for both business and residential users in terms of both resources and cost. They also reflect the need to adapt to climate change and other pressures (such as changing land use) and underpins an overall need to find ways of using water more efficiently and sustainably. Whilst agricultural use amounts to only 1%[1] of England's water usage, there are regional differences[2].

Water has a wide range of uses on farms including irrigation, spraying, drinking for livestock and washing down livestock buildings. Some farms abstract water from rivers and bore holes whilst others rely solely on the mains supply.

The 2009/10 Farm Business Survey (FBS) included a detailed water module. This collected a range of information on the source and utilisation of water, the economic cost of water and water related activities and behavioral attitudes among farmers to water management. The results of this module were published alongside results from the 2010 Irrigation survey[3]. In 2013/14, the FBS began to collect data on water sources and the proportion of water used from each source. Volumes have not been collected.

Results from the 2009/10 and 2013/14 surveys are not directly comparable due to changes in the coverage of the survey and the classification of farms. Whilst equivalent results from 2009/10 have been presented alongside 2013/14 results in the tables; comparisons should be treated with extreme caution. To enable more robust comparisons between the results from the two surveys, we have examined the changes for the subset of farms that participated in both years and carried out significance testing. Commentary alongside the tables refers to this analysis rather than making direct comparisons with the 2009/10 data displayed.

This release provides the main results from the 2013/14 FBS survey together with confidence intervals. A full breakdown of results by farm type, farm size, farm tenure, region, farm economic performance and Less Favoured Area (LFA) status can be found at: https://www.gov.uk/government/collections/farm-business-survey#documents.

Regression models were fitted to the key results to help determine the main factors driving response in 2013/14. In each case six factors were considered - farm type, farm size, farm tenure, region, farm economic performance and LFA status.

[1] Estimated abstractions from all surface and groundwaters by purpose and Environment Agency region: 2000 – 2013. For more information please see: https://www.gov.uk/government/statistical-data-sets/env15-water-abstraction-tables

[2] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/435394/agindicator-da5-16jun15.pdf

[3] http://webarchive.nationalarchives.gov.uk/20130315143000/http://www.defra.gov.uk/statistics/foodfarm/farmmanage/fbs/publications/water-usage/

1. Weather

Weather conditions can influence water usage on farm. This section provides some background to the differing weather conditions that affected the 2009 and 2013 harvests.

2009/10 (2009 harvest)
Autumn 2008 was wet, so much so that autumn cultivations were delayed or even postponed to spring. Early winter was colder, sunnier and drier than seasonal averages, whilst late winter (early 2009) was milder and more settled. During the spring the North West experienced higher than average levels of rainfall compared with lower than average in East Anglia and the South East. In the summer, June saw rainfall below normal for most areas but parts of the West Midlands received around double. In July, rainfall was significantly above the seasonal average in almost all areas (three times the seasonal average in the South West and parts of the North East).

2013/14 (2013 harvest)
Rainfall tended to be above average in autumn 2012, although there were marked regional variations. The wet weather meant that some farmers struggled to drill crops, disrupting cropping patterns for the 2013 harvest. The spring of 2013 was the coldest recorded since 1962 with heavy snow falls from mid to late January which hampered the establishment of spring sown crops and the recovery of poorly established winter sown crops. Summer 2013 was warmer and drier than average (with a prolonged heat wave in July). Parts of southern and south west England and East Anglia received less than half the average rainfall. The harvest began slightly later than usual (due to crop ripeness), but weather conditions were generally favourable with warm and settled weather in late August.

2. Water sources

Key findings:

- Mains supply was the most common source of water on farms (86% in 2013/14), particularly for those in the east of England and those outside Less Favoured Areas (LFA).
- 28% of farms abstracted water from rivers/streams/springs for immediate use. Usage was more likely on LFA grazing livestock farms, farms in the South West, farms in severely disadvantaged areas (SDA) and lower performing farms.
- 24% of farms used water from bore holes. Usage was more likely on specialist dairy, pig and poultry farms, very large farms and farms in the South West.

This section looks at the sources of water used on farms. The most common source of water continues to be the mains supply (86% of farms), 28% of farms abstract water from rivers/streams/springs for immediate use and 24% use water from bore holes (Table 1).

Table 1: Percentage of farms using various water sources[(a)], England 2009/10 and 2013/14

Water source	Percentage of farm businesses (%) 2009/10	2013/14	95% Confidence Interval (%) 2009/10	2013/14
Mains water*	83	86	± 2	±2
Rivers, streams, springs for abstraction (immediate use)*	37	28	± 3	±2
Bore holes	21	24	± 2	±2
Rainwater storage	9	7	± 2	±2
Rivers, streams, springs for abstraction (storage)*	2	5	± 1	±1
Ponds/lakes/reservoirs[(b)]	2	3	± 1	±1

Source: Farm Business Survey, England 2009/10 and 2013/14

* Signifies statistically significant difference for those 967 farms present in both 2009/10 and 2013/14, i.e. $p < 0.05$.

(a) Farm businesses could have more than one water source.

(b) Due to the small sample size it was not possible to conduct a significance test for ponds/lakes/reservoirs.

Analysis suggests that between 2009/10 and 2013/14, there was a significant reduction in the proportion of farms abstracting water for immediate use and a significant increase in the proportion of farms using mains water and abstracting water for storage for the subset of 967 farms responding to both surveys.

Figures 1 to 3 show the relationship between water sources and region, farm type and LFA status. To provide a better understanding of the underlying relationships between farm characteristics and water sources, we have fitted regression models. In each case six factors were considered - farm type, farm size, farm tenure, farm economic performance and LFA status.

Mains water

The use of mains water was significantly[4] related to region, LFA status and farm tenure. Farms in the South East were more likely to use mains water (97%, Figure 2) and those in the South West least likely (77%). Farms located in Severely Disadvantaged Areas (SDA) were less likely to use mains water (48%, Figure 3) than those not in LFAs (91%). Around 90% of mixed tenure farms used mains water compared to 84% of owner occupied and 80% of wholly tenanted farms.

Rivers, streams, springs for abstraction (immediate use)

The use of abstracted water from rivers/streams/springs for immediate use was significantly[5] related to farm type, region, LFA status, farm size and economic performance. Usage was more likely on LFA grazing livestock farms (Figure 1) than on other farm types and on farms in the South West (Figure 2) and those located in SDA

[4] A generalised linear regression model was fitted to examine which factors (farm type, farm size, region, farm tenure, LFA status, and farm economic performance) were significant. Farm region, LFA status and tenure were significant at the 5% level.

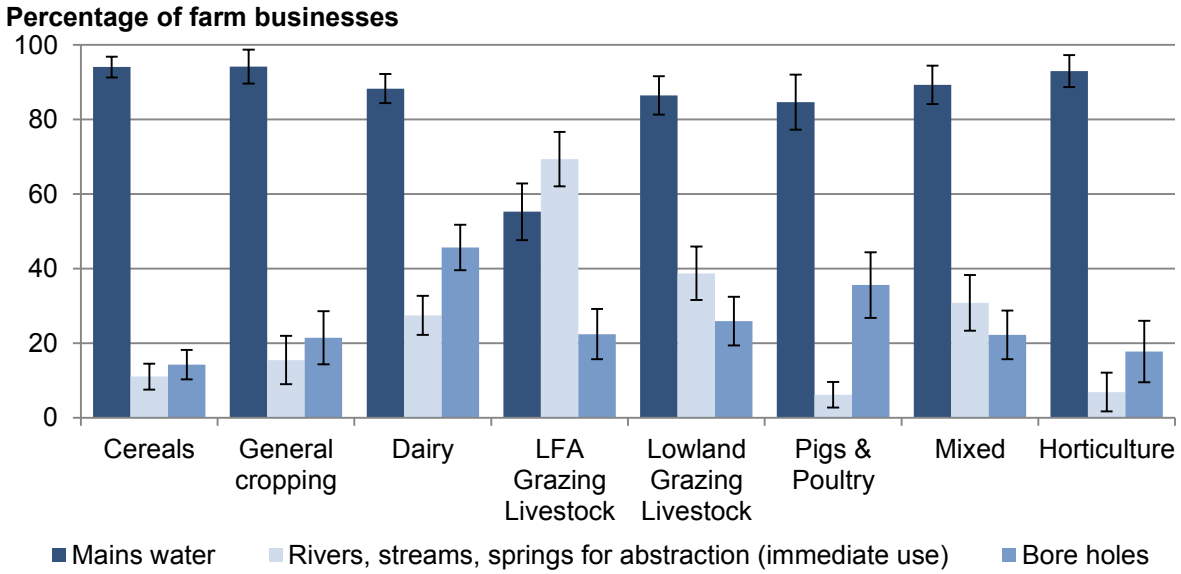
[5] A generalised linear regression model was fitted to examine which factors (farm type, farm size, region, farm tenure, LFA status, and farm economic performance) were significant. Farm type, size, region, LFA status and performance band were significant at the 5% level.

(figure 3). Lower performing farms were more likely to use abstracted water (39%) than higher performing farms (21%). After allowing for these factors, larger farms were more likely to abstract water than smaller farms.

Bore holes

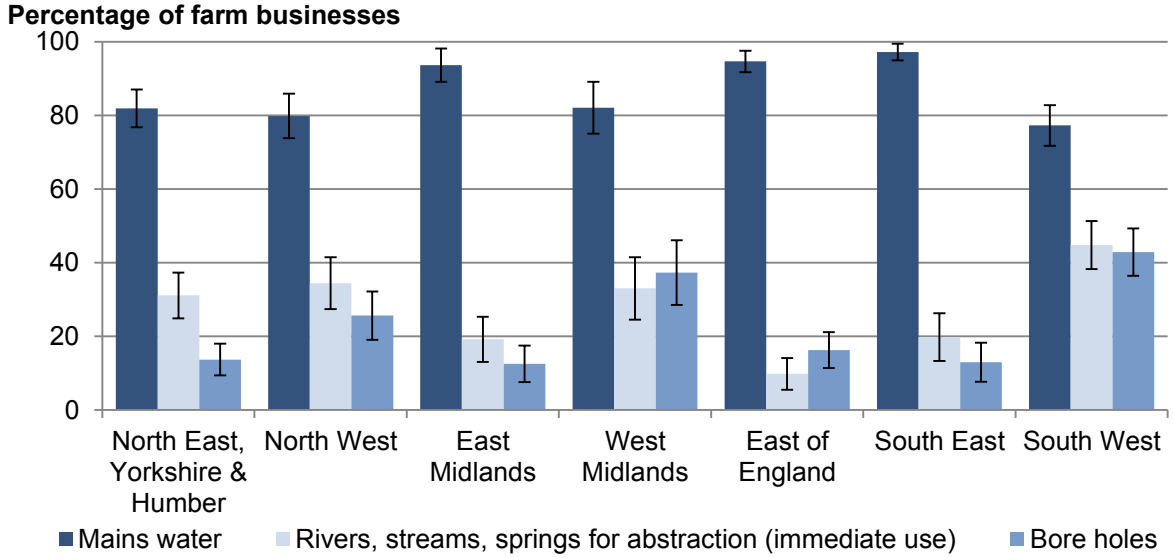
The use of water from bore holes was significantly[6] related to region, farm size, farm type and tenure. Farms in the west of England and larger farms were more likely to use bore holes than those in other regions and smaller farms. Usage was more likely on specialist dairy, pig and poultry farms than on other farm types and less likely on farms of mixed tenure.

Figure 1: Sources of water by farm type, England 2013/14



Source: Farm Business Survey, 2013/14.

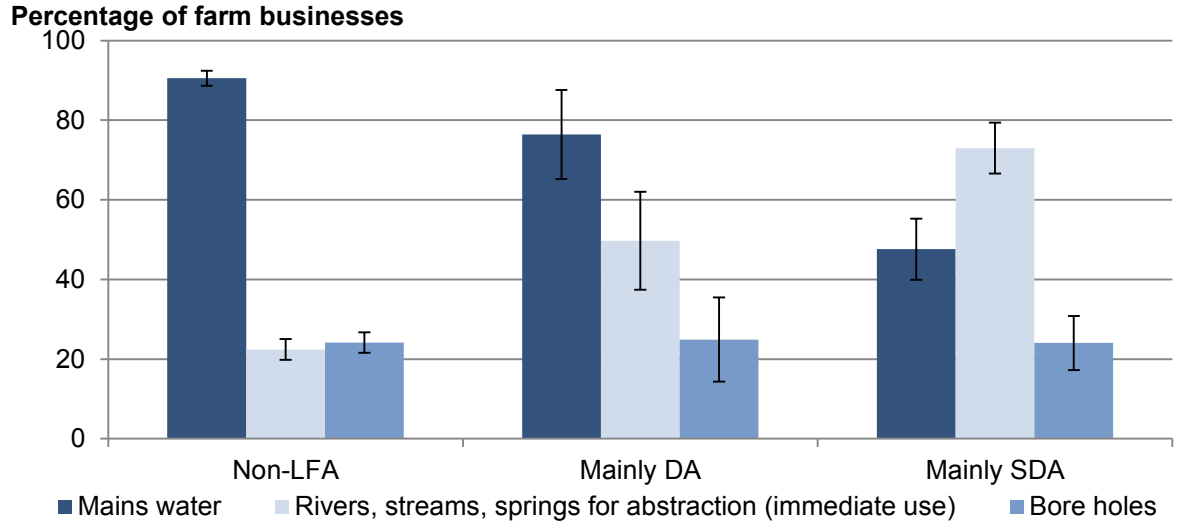
Figure 2: Sources of water by region, England 2013/14



Source: Farm Business Survey, 2013/14.

[6] A generalised linear regression model was fitted to examine which factors (farm type, farm size, region, farm tenure, LFA status, and farm economic performance) were significant. Farm type, size, region and tenure were significant at the 5% level.

Figure 3: Sources of water by LFA status, England 2013/14



Source: Farm Business Survey, 2013/14.

3. Proportions of water used per farm by source

Key findings:

- In 2013/14 farms sourced, on average, two thirds of their water from the mains supply, 18% from bore holes and abstracted 12% from rivers/streams/springs for immediate use.
- Cereal farms, spare and part time (very small) farms and farms in the east of the country tended to source a greater proportion of their water from the mains supply than other farms.
- Dairy farms, very large farms and farms in the South West tended to source a greater proportion of their water from bore holes than other farms.
- LFA grazing livestock farms and farms in North East, Yorkshire & Humber tended to abstract a greater proportion of the water that they used than other farms.

Volumes of water were not collected within the 2013/14 survey, instead farmers were asked to provide the proportion of water that was used from each water source. In 2013/14 farms sourced, on average, two thirds of their water from the mains supply, 18% from bore holes and abstracted 12% from rivers/streams/springs for immediate use.

Analysis suggests that the changes between 2009/10 and 2013/14 for mains waters (increased proportion of water) and water abstracted from rivers/streams/springs for immediate use (reduced proportion of water) were statistically significant for the subset of 967 farms responding to both surveys.

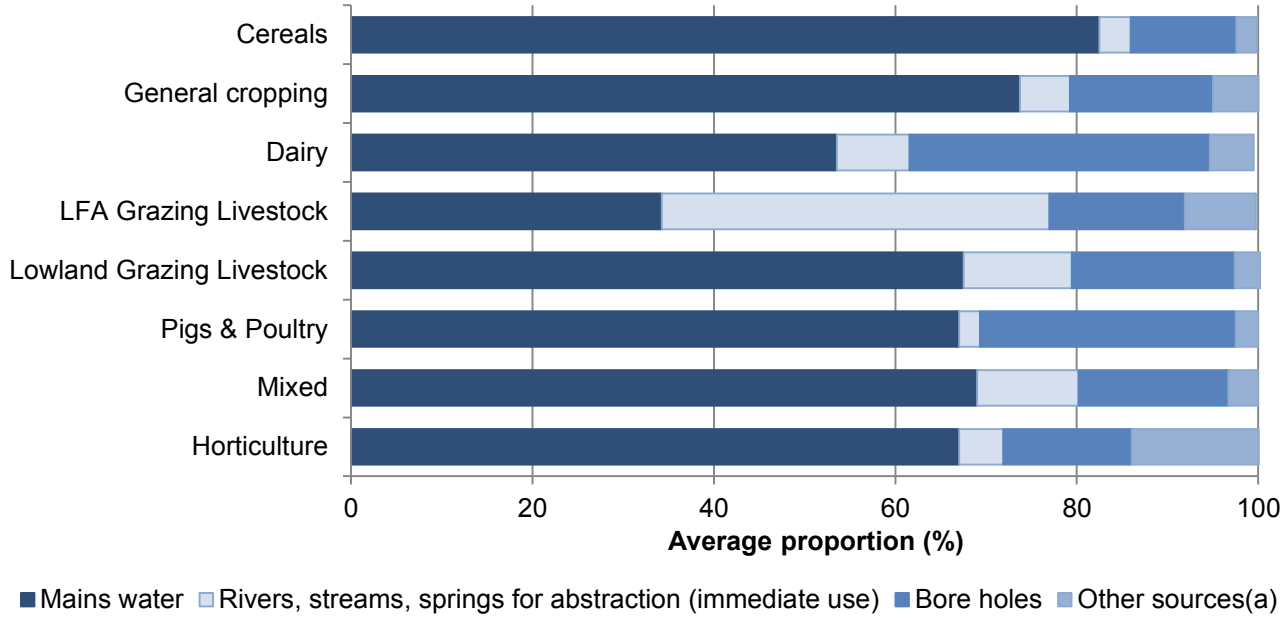
Table 2: Average proportion of water used[(a)] per farm, England 2009/10 and 2013/14

Water source	Average proportion of water used (%) 2009/10	2013/14	95% Confidence Interval (%) 2009/10	2013/14
Mains water *	62	66	±2	±2
Bore holes	15	18	±2	±2
Rivers, streams, springs for abstraction (immediate use) *	19	12	±2	±1
Rivers, streams, springs for abstraction (storage)	2	2	±1	±1
Rainwater storage	2	2	±1	±1
Ponds/lakes/reservoirs	1	1	±0	±0

Source: Farm Business Survey, England 2009/10 and 2013/14
* Signifies statistically significant difference for farms responding in both 2009/10 and 2013/14, i.e. $p < 0.05$.
(a) Farms that did not provide any data on the proportion of water used were excluded.

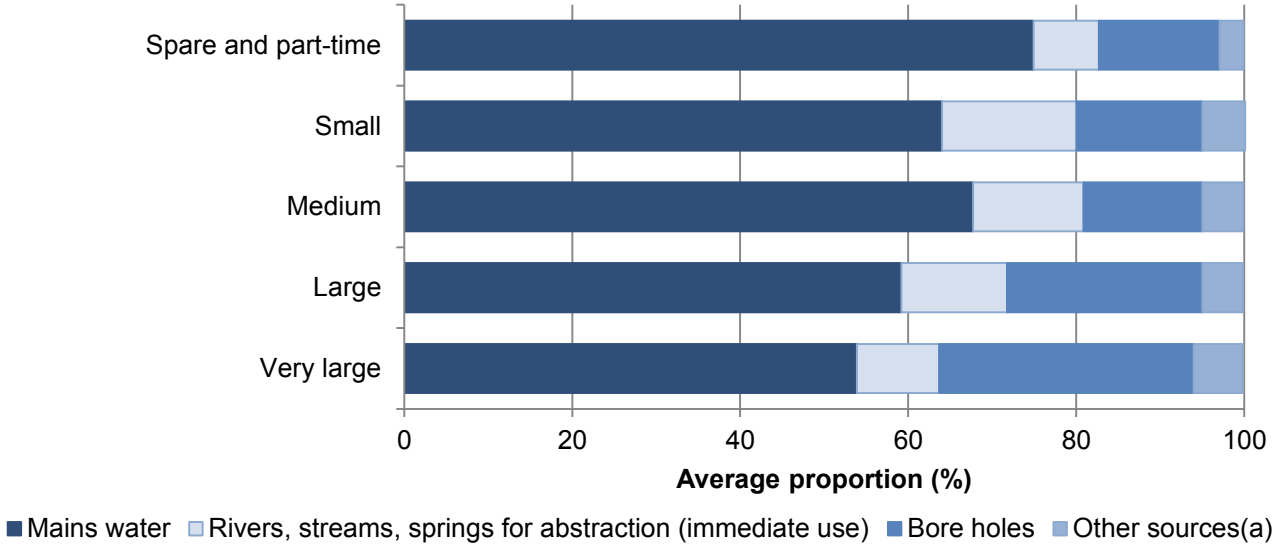
Figures 4 to 6 show the relationship between the average proportions of water used per farm from various water sources and farm type, farm size and region. Cereal farms, spare and part time (very small) farms and farms in the east of the country tended to source a greater proportion of their water from the mains supply than other farm types, other farm sizes and those in the west of the country. Dairy farms, very large farms and farms in the South West tended to source a greater proportion of their water from bore holes than other farm types, sizes and regions. LFA grazing livestock farms and farms in North East, Yorkshire & Humber tended to abstract a greater proportion of the water that they used than other farm types and those in other regions.

Figure 4: Average percentage of water used per farm by farm type, England 2013/14



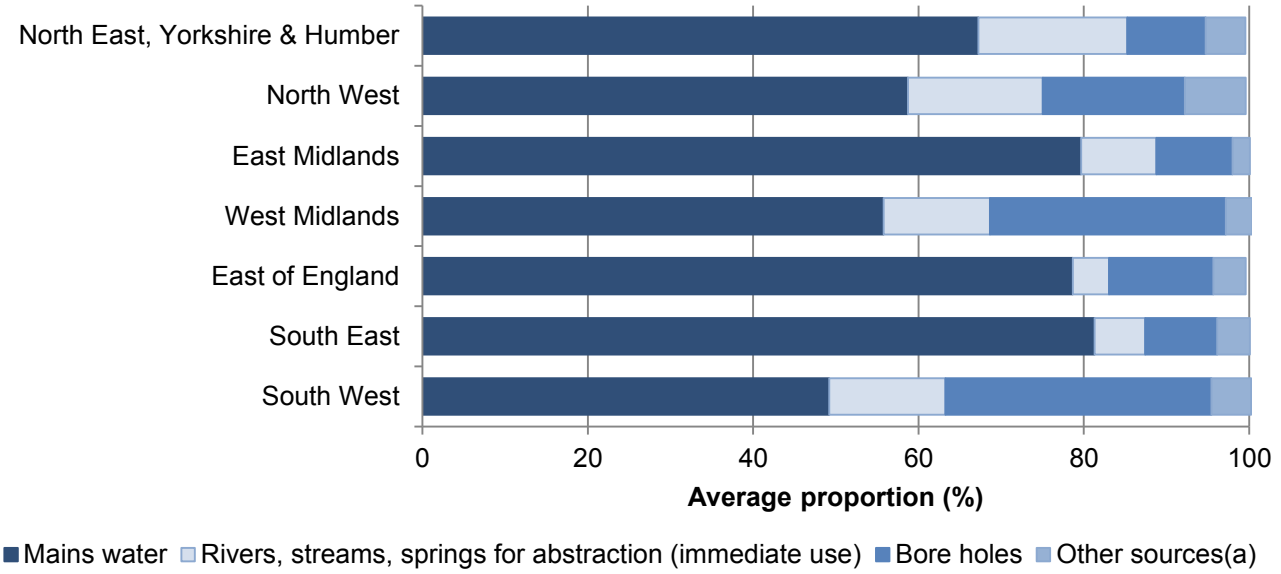
Source: Farm Business Survey, 2013/14.
(a) Other sources includes: Rivers, streams, springs for abstraction (storage), Ponds/lakes/reservoirs, Rainwater storage

Figure 5: Average percentage of water used per farm by farm size, England 2013/14



Source: Farm Business Survey, 2013/14.
(b) Other sources includes: Rivers, streams, springs for abstraction (storage), Ponds/lakes/reservoirs, Rainwater storage

Figure 6: Average percentage of water used per farm by region, England 2013/14



Source: Farm Business Survey, 2013/14.
(c) Other sources includes: Rivers, streams, springs for abstraction (storage), Ponds/lakes/reservoirs, Rainwater storage

Survey details

Survey content and methodology

The Farm Business Survey (FBS) is an annual survey providing information on the financial position and physical and economic performance of farm businesses in England. The sample of around 1,900 farm businesses covers all regions of England and all types of farming with the data being collected by face to face interview with the farmer. Results are weighted to represent the whole population of farm businesses that have at least 25,000 Euros of standard output[7] as recorded in the annual June Survey of Agriculture and Horticulture. In 2013 there were just over 58,000 farm businesses meeting this criteria[8].

For further information about the Farm Business Survey please see: https://www.gov.uk/government/organisations/department-for-environment-food-rural-affairs/series/farm-business-survey

Within the 2013/14 survey, extra questions were included to collect information on water usage on farm. The information collected covered water sources and the percentage of volumes of water used.

Full details of the information collected on water usage can be found here: https://www.gov.uk/farm-business-survey-technical-notes-and-guidance#fbs-documents

Data analysis

The results from the FBS relate to farms which have a standard output of at least 25,000 Euros. Initial weights are applied to the FBS records based on the inverse sampling fraction for each design stratum (farm type by farm size). These weights are then adjusted (calibration weighting[9]) so that they can produce unbiased estimators of a number of different target variables.

Comparisons between 2009/10 and 2013/14

Results from the 2009/10 and 2013/14 surveys are not directly comparable due to changes in the coverage of the survey and changes in the classification of farms for the 2010/11 campaign. In 2010/11 the survey was restricted to include farms which have at least 25,000 Euros of standard output; prior to this the survey was restricted to farms with ½ Standard Labour Requirement or more. The classification of farms into farm types was also revised for the 2010/11 Farm Business Survey, to bring the classification in line with European guidelines. Equivalent results from 2009/10 have been presented alongside 2013/14 results in the tables; however comparisons should be treated with extreme caution due to the reasons given above.

[7] For a definition of standard output please see the UK classification document here: https://www.gov.uk/farm-business-survey-technical-notes-and-guidance

[8] Prior to the 2010/11 campaign, the coverage of the FBS was restricted to those farms of size ½ Standard Labour Requirement (SLR) or more. For a definition of SLR please see the UK classification document here: https://www.gov.uk/farm-business-survey-technical-notes-and-guidance

[9] Further information on calibration weighting can be found here: https://www.gov.uk/farm-business-survey-technical-notes-and-guidance

To enable more robust comparisons between the 2009/10 and 2013/14 water usage data, we have examined the subset of farms that participated in both years (967 farms). For this subset of farms we have carried out significance testing using McNemar's test to determine whether the differences observed in use of various water sources between the two time periods are statistically significant. The McNemar's test is applied to 2x2 contingency tables, with matched pairs of subjects, to determine whether the row and column totals are equal.

We have also carried out significance testing using the Wilcoxon signed rank test to determine whether the differences observed between the proportions of water volumes used between the two time periods are statistically significant.

Where a statistically significant difference has been observed this has been indicated on the tables for the full survey results with a *. Commentary refers to these analyses rather than make comparisons with the displayed data.

Accuracy and reliability of the results
We show 95% confidence intervals (95% CI) with the results. These show the range of values that may apply to the figures. They mean that we are 95% confident that this range contains the true value and are calculated as the standard errors multiplied by 1.96. The standard errors only give an indication of the sampling error. They do not reflect any other sources of survey errors, such as non-response bias. For the Farm Business Survey, the confidence limits shown are appropriate for comparing groups within the same year only; they should not be used for comparing with previous years since they do not allow for the fact that many of the same farms will have contributed to the Farm Business Survey in both years.

Availability of results
This release contains headline results for each section. The full breakdown of results, by farm type, farm size, region, farm tenure, farm economic performance and Less Favoured Area status can be found at: https://www.gov.uk/government/collections/farm-business-survey#documents

Defra statistical notices can be viewed on the Food and Farming Statistics pages on the Defra website at https://www.gov.uk/government/organisations/department-for-environment-food-rural-affairs/about/statistics. This site also shows details of future publications, with pre-announced dates.

Data Uses
Data from the main FBS are provided to the EU as part of the Farm Accountancy Data Network (FADN). The data have been used to help inform policy decisions (e.g. Reform of Pillar 1 and Pillar 2 of the Common Agricultural Policy) and to help monitor and evaluate current policies relating to agriculture in England (and the EU). It is also widely used by the industry for benchmarking and informs wider research into the economic performance of the agricultural industry.

User engagement
As part of our ongoing commitment to compliance with the Code of Practice for Official Statistics http://www.statisticsauthority.gov.uk/assessment/code-of-practice/index.html, we wish to strengthen our engagement with users of these statistics and better understand the

use made of them and the types of decisions that they inform. Consequently, we invite users to make themselves known, to advise us of the use they do, or might, make of these statistics, and what their wishes are in terms of engagement. Feedback on this notice and enquiries about these statistics are also welcome.

Definitions

Farm Type

Where reference is made to the *type of farm* in this document, this refers to the 'robust type', which is a standardised farm classification system.

Farm Sizes

Farm sizes are based on the estimated labour requirements for the business, rather than its land area. The farm size bands used within the detailed results tables which accompany this publication are shown in the table below. Standard Labour Requirement (SLR) is defined as the theoretical number of workers required each year to run a business, based on its cropping and livestock activities.

Farm size	Definition
Spare & Part time	Less than 1 SLR
Small	1 to less than 2 SLR
Medium	2 to less than 3 SLR
Large	3 to less than 5 SLR
Very Large	5 or more SLR

Farm Economic performance

Economic performance for each farm is measured as the ratio between economic output (mainly sales revenue) and inputs (costs). The inputs for this calculation include an adjustment for unpaid manual labour. The higher the ratio, the higher the economic efficiency and performance. The farms are then ranked and allocated to performance bands based on economic performance percentiles:

- **Low performance band** - bottom 25% of performers
- **Medium performance band** - middle 50% of performers
- **High performance band** - top 25% of performers

Severely Disadvantaged Areas and Less Favoured Areas

The *Severely Disadvantaged Areas* (SDA) are more environmentally challenging areas. They are largely upland in character and together with Disadvantaged Areas (DA) form the Less Favoured Areas (LFA) classification established[10] in 1975 as a means to provide support to mountainous and hill farming areas.

[10] Council Directive 75/268/EEC.