



## June Survey of Agriculture and Horticulture: Methodology

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## **1 Survey background**

The June Survey of Agricultural and Horticultural activity has a long standing tradition in England. It was first run in 1866 and since then was carried out as a full Census every year until 1995, when it decreased to a sample survey (although still surveyed around 80% of the farming population). These days, the survey samples between 30,000 and 70,000 holdings each year, dependent on EU requirements. A full Census is now only carried out once every ten years, 2000 and 2010 being the most recent.

The survey is run by Defra to collect detailed information on arable and horticultural cropping activities, land usage, livestock populations and agricultural labour force figures.

## **2 Data uses**

The survey data are used heavily within Defra to make estimates of crop/livestock production and to provide information for management of the EU cereals markets. They are used in the farm accounts calculations, income from farming estimates and in the Agriculture in the United Kingdom (AUK) publication. The data are also used by animal movement and health divisions to monitor livestock distributions throughout England and the results feed into national and regional inventories of ammonia and greenhouse gas emissions from agriculture.

June survey data are used heavily by the environmental policy teams who assess the impact of CAP reform on the agricultural industry and the landscape. As it is such a large survey, the data can be used to provide low level statistics e.g. at county level, which makes it a powerful tool for researchers and anyone interested in local features.

The data may also be used in the case of emergencies. For example, details on livestock were supplied to experts to help predict the spread of the foot-and-mouth outbreak in 2001 and the poultry data was supplied to help with the investigations into Avian Flu.

## **3 Survey methodology**

The sample survey is run every year on 1 June across England. Up until 2010, the survey was mainly postal. However, from 2011 the survey is run predominantly online through the Whole Farm Approach (WFA) with the option for farmers to complete a paper form if they preferred. A specimen survey questionnaire can be viewed in the 'Forms & Publications' section of the Defra website at <http://www.defra.gov.uk/forms/2011/03/30/css947-agrihort-census/>.

### **3.1 Stratification**

We use a stratified random sampling approach in which holdings are divided into groups (strata) on the basis of their theoretical labour requirement, with higher sampling rates being used in the larger strata. The Standard Labour Requirements (SLRs), as they are known, are calculated using coefficients across all activities on a holding to give a standardized measure of labour activity and give an indication of the number of full time workers required to run a holding. For further information about SLRs please refer to section 5.3.

Simply stratifying on labour requirements would lead to unacceptably low precision for some important crops, particularly horticultural crops. We therefore have separate strata with higher sampling rates for horticultural holdings. The strata and approximate sampling rates are shown in table 1.

Table 1: Approximate sampling rates used in the June Survey (this varies depending on total sample size required)

Stratum	Description (SLR= Standard Labour Requirement)	Sampling rate (%)
1	SLR=0	10
2	SLR >0 and <0.25	10
3	SLR >=0.25 and <1	20
4	SLR >=1 and <2	30
5	SLR >=2 and <3	50
6	SLR >=3 and <5	60
7	SLR >=5	90
8	Hort SLR <0.25	20
9	Hort SLR >=0.25 and <1	30
10	Hort SLR >=1 and <2	50
11	Hort SLR >=2 and <3	60
12	Hort SLR >=3 and <5	90
13	Hort SLR >=5	90

Although the number of strata for sampling appears high, for analysis of results the strata are collapsed down to 6 bands, according to their sampling rates e.g. all strata sampled at approximately 20% are combined together for analysis, thus avoiding the risk of bias.

### 3.2 Sample sizes

The sample sizes used in recent years are shown in table 2, along with the survey response rates.

Table 2: June Survey sample sizes and response rates <sup>(a) (b)</sup>

Year	Number of holdings in agricultural population	Number in population over threshold <sup>(c)</sup>	Sample size	Sampling fraction (%)	No. responses (excludes refusals to complete)	of which: no. e-forms through WFA	% response rate
1994	153 426		153 928	100.0	128 703		83.6
1995	146 112		118 263	80.9	98 056		82.9
1996	145 638		119 431	82.0	96 449		80.8
1997	144 777		106 000	73.2	84 489		79.7
1998	145 093		108 000	74.4	87 016		80.6
1999	147 220		110 031	74.7	86 769		78.9
2000	167 855	127 717	149 431	100.0	118 126		79.1
2001	177 934	127 550	37 907	21.3	28 576		75.4
2002	187 871	125 689	76 472	40.7	51 387		67.2
2003	190 687	128 334	73 793	38.7	49 611		67.2
2004	192 824	128 914	47 693	24.7	30 691		62.8
2005	195 908	132 414	75 043	38.0	53 587		71.1
2006	200 381	134 436	61 406	30.6	41 351	600	67.3
2007	208 166	134 998	58 986	28.1	40 248	223	68.2
2008	210 520	136 048	40 512	19.2	28 218	1 546	69.7
2009	216 000	118 595	40 500	18.5	27 000	1 832	66.6
2010	199 993	121 797	120 000	100.0	86 791	8 508	73.0
2011		104 789	30 000	28.6	21 395	8 799	73.2

(a) In 2001, the sample size was much lower as this was run during the foot and mouth outbreak.

(b) From 2001 to 2009, the survey covered all holdings (large and small). From 2010 onwards (and pre-2000) only holdings above the thresholds are included in the survey. For further information about the thresholds please refer to section 3.3.

(c) Includes records with temporarily reduced levels of activity (e.g. seasonally let out land, temporarily empty pig and poultry sheds).

### 3.3 Thresholds

There has always been considerable interest in knowing how the structure of the farming industry is changing over time. In recent years, this has become difficult to quantify. There are a significant number of small farms (around 40% of all farms) and these, combined with the large number of holdings registered with Defra in recent years, have obscured the genuine picture of structural change. We have resolved this issue by applying pre-defined thresholds (see table 3) to filter out these farms so the survey population now only covers the larger, more active farms. This gives better indications of the genuine picture of structural change and the size of the active farming industry.

While this exclusion removes around 40% of holdings from the official estimates of the number of agricultural holdings, it only excludes around 1% of activity from the main agricultural activities (e.g. sheep, crops, pigs). It has a much larger effect on estimates of the number of people working in agriculture.

These thresholds have been applied for the first time in 2010 and will be applied to all our future farming surveys. The FAQs section below provides more detail of this change.

#### Q1. How are the thresholds defined?

Holdings are above the threshold if they have at least one of the following levels of activity (based on their latest June Survey of Agriculture return):

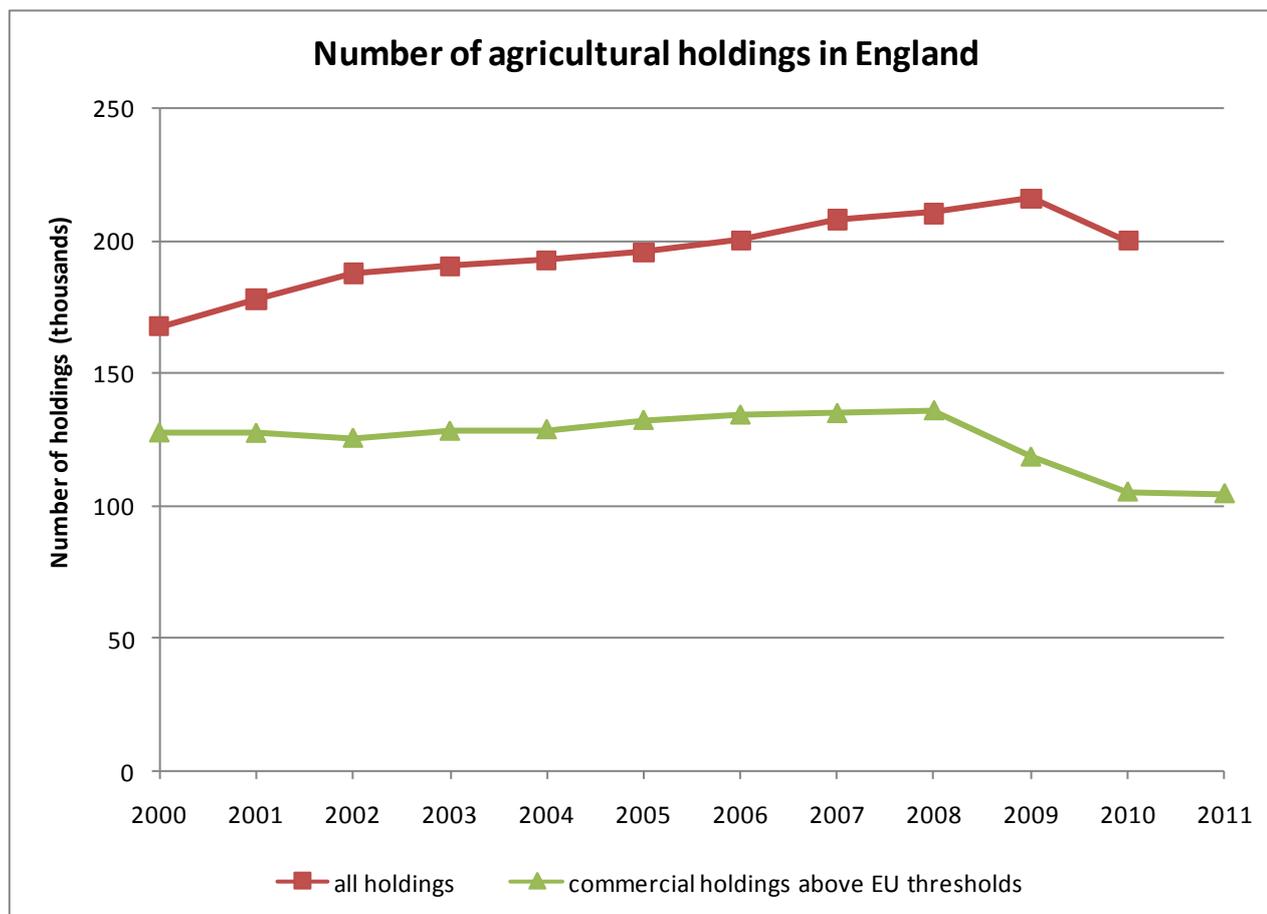
Table 3: Thresholds for the Defra farm surveys from 2010 onwards

Characteristics		Threshold
Utilised agricultural area	Arable land, kitchen gardens, permanent grassland, permanent crops	>5 ha
Permanent outdoor crops	Fruit, berry, citrus and olive plantations, vineyards and nurseries	>1 ha
Outdoor intensive production	Hops	>0.5 ha
	Tobacco	>0.5 ha
	Cotton	>0.5 ha
	Fresh vegetables, melons and strawberries, which are outdoors or under low (not accessible) protective cover	>0.5 ha
Crops under glass or other (accessible) protective cover	Fresh vegetables, melons and strawberries	>0.1 ha
	Flowers and ornamental plants (excluding nurseries)	>0.1 ha
Bovine animals	All	>10 head
Pigs	All	>50 head
	Breeding sows	>10 head
Sheep	All	>20 head
Goats	All	>20 head
Poultry	All	>1 000 head
Hardy nursery stock		>1 ha
Mushrooms	All mushroom holdings to be included	>0

Holdings with temporarily reduced levels of activity (e.g. seasonally let out land, temporarily empty pig or poultry sheds) are also classed as being above the threshold.

## Q2. How have results for earlier years been affected by applying these thresholds?

The chart below shows how the application has affected the total number of holdings included in the activity estimates.



The chart shows that the exclusion of the smallest holdings has significantly dampened the effect of the rapidly increasing number of registered holdings. The data are much more consistent and show that the number of genuine agricultural holdings has remained steady over the past decade. The larger decrease seen in 2009 was as a result of findings from the Census in 2010 when a number of inactive holdings were identified and backdated by removal from the 2009 results.

The amounts of agricultural activity excluded are minimal for crops, sheep, pigs etc. but there is much more of an effect on the labour estimates. Table 4 shows the comparison between the number of people working on all holdings compared to those on commercial holdings in 2009. It shows that 19% of the agricultural workforce are on the smallest holdings and of these, the majority were in the part-time principal farmer category. This is expected as the smallest holdings all have at least one part time principal farmer on the basis that someone must be responsible for looking after the livestock. In reality, as this work is only a hobby or spare-time activity, it is justified to exclude these from the estimates of the size of the agricultural labour force.

As the labour section is affected most by these changes, a full dataset from 2000-2009 showing the number of agricultural workers on commercial agricultural holdings has been produced to give more accurate estimates of the number of people employed in agriculture. This is shown alongside the total number in the workforce on an “all holdings” basis for comparability. This time series is available on our website at <http://www.defra.gov.uk/statistics/foodfarm/landusellivestock/junesurvey/junesurveyresults/>.

Table 4: Comparison between results for “all” holdings compared to “commercial” holdings in 2009

	Number of people (thousands)		
	all holdings 2009	commercial 2009	% difference
<b>Total number of people working on commercial agricultural holdings</b>	<b>363</b>	<b>293</b>	<b>-19%</b>
<b>Farmers, partners, directors and spouses</b>	<b>223</b>	<b>165</b>	<b>-26%</b>
Full time	96	85	-11%
Part time	127	80	-37%
<b>Salaried managers</b>	<b>12</b>	<b>10</b>	<b>-12%</b>
Full time	9	8	-10%
Part time	3	3	-16%
<b>Other workers</b>	<b>128</b>	<b>117</b>	<b>-9%</b>
<b>Full time</b>	<b>49</b>	<b>46</b>	<b>-7%</b>
- Male	40	38	-6%
- Female	9	8	-13%
<b>Part time</b>	<b>33</b>	<b>29</b>	<b>-13%</b>
- Male	19	17	-12%
- Female	14	12	-15%
<b>Casual workers</b>	<b>45</b>	<b>42</b>	<b>-7%</b>
- Male	30	28	-7%
- Female	15	14	-6%

### Q3. How will the smaller holdings be monitored/reported in future?

The national estimates of activity below the thresholds will only be updated in EU Farm Structure Survey years (confirmed for this coming decade in 2013 and 2016). In these years, a larger survey of agriculture is carried out and offers a good opportunity to refresh our estimates.

However, we will be maintaining the register behind the scenes to ensure there are no major step changes in the Structure Survey years. Each year, a “promotions and demotions” exercise will be carried out to capture the flux of holdings which grow or contract in size. Holdings will be taken out of the main holdings population if the activity levels from their survey return fall below the threshold levels. The administrative registers held by Defra will be used to monitor any holdings with significantly increased numbers of livestock or crop areas. These holdings would then be re-included in the main population.

The registers used to monitor this will be the Cattle Tracing System (CTS), the Sheep and Goat Inventory and Single Payment Scheme (SPS) data.

### Q4. How should the updated results be interpreted?

The activity levels on the larger “commercial” holdings give the best indication of the size of the agricultural industry so should be used, where available.

Estimates of activity on commercial holdings are available from 2009 onwards, with 2009 estimates being presented on both bases, to allow comparability. As the labour section is affected most by these changes, a full

dataset from 2000-2009 showing the number of agricultural workers on commercial agricultural holdings has been produced to give more accurate estimates of the number of people employed in agriculture. This is available within the England timeseries on our website at <http://www.defra.gov.uk/statistics/foodfarm/landuselivestock/junesurvey/junesurveyresults/>.

As the main agricultural activities are not substantially affected by the implementation of thresholds, the national estimates have not been revised onto a commercial holdings only basis pre-2009. However, if you need to study data on the numbers of holdings with specific activities, it would be more informative to only look at holdings above the thresholds. The numbers of holdings are not published as standard so you should contact us to request these.

### 3.4 Survey analysis

Statistical analysis of the June Survey uses the separate ratio approach. In brief, this method works by firstly finding the trend between the current number of e.g. sheep and the previous year's number of sheep (called the ratio) for the holdings which responded to this year's survey. This ratio is then applied to the total number of sheep from last year to get a new estimate for the number of sheep in England. These calculations are performed on each stratum separately and then the estimated totals are summed to give a national figure. This ensures that the final estimate is approximately unbiased, despite the differing sampling rates in the different strata.

For the new holdings strata, there is no previous number on which to base a ratio, so expansion raising is used to generate a total for these holdings. This method works by expanding the responses up to the non-respondents to give an estimate. For example, if the population is 100 holdings and we have responses from 20 of these, the number of e.g. sheep of the respondents is multiplied up by 5 ( $100/20$ ) to give the national number of sheep for the 100 holdings in the population.

Where serious inconsistencies are found in the form received from a holding (for example, if the area of crops reported greatly exceeds the size of the holding), we telephone the farmer or grower to seek clarification. Where we are unable to contact them prior to the publication of results, the holding is excluded from the analysis for the relevant sections, and treated as though no form had been received.

The June Survey is only run in England by Defra and results are published in September. Similar surveys are run in Scotland, Wales & Northern Ireland and Defra collates these to produce UK level results which are published in October.

Following publication, we also produce a holding level dataset for the whole of the agricultural population, imputing records for non-response and incomplete records. This full dataset allows us to cross-tabulate the data to generate low level results, such as regional or county level or by any other geographical elements.

### 3.5 Changes to data collection of fattening pigs

From 2010 onwards we are no longer collecting data on the numbers of fattening pigs within different weight bands. Instead, we ask farmers to give us the total number of fattening pigs on the holding and this is the figure we publish. A thorough investigation into the numbers of fattening pigs in each category over the years shows that the proportion of pigs within each weight band has remained consistent from 2002 to 2009. Therefore, if you wish to calculate the numbers split by weight band, you can apply the proportions provided in table 5 to the published total fattening pigs figure as a rough estimate.

Table 5: Proportion of fattening pigs in each weight category

Weight band	Proportion of total fattening pigs (%)
Over 110 kg	1
80 to 110 kg	16
50 to 80 kg	25
20 to 50 kg	29
Under 20 kg	29

### **3.6 Data limitations**

As with all sample surveys, the main limitation on the June Survey is that it is (usually) not a Census so estimates have to be made for non-sampled and non-responding holdings. We publish indicators alongside our estimates to give an indication of the scale of the sampling errors. However, the sampling rate is still around 20 to 30% of the agricultural population. As it is an online and postal survey, there is also a degree of non-response which may potentially cause a bias in the results. Obviously, the bias is unquantifiable but the response rate is still reasonably high at 70% and we do monitor how the response differs between farm types and size to try and avoid this possibility.

The data are also subject to the vagaries of farmers' interpretation of the categories on the form. We try to keep both the paper and online forms as clear as possible, including notes on how to complete the sections, to try and minimise the confusion. The data validation exercise to clean the data prior to processing also helps to keep the data as accurate as possible.

To generate the dataset needed for producing the low level results, we impute data for non-sampled and non-responding holdings. This imputation procedure, while based on actual response trends, is an estimation procedure so is subject to a degree of error, particularly on the small holdings, which are sampled at a low rate each year. For this reason, in non-census years, we are now unable to produce estimates for geographical levels lower than county or unitary authority. The data are not robust enough below this level and would not give accurate indications of industry trends.

## **4 Use of administrative data**

Since 2007, Defra has used data from the Cattle Tracing System (CTS) to produce cattle population figures at six monthly intervals in June and December. This has replaced asking the questions on the surveys and is part of our continuing efforts to minimise survey burden on farmers.

The decision to use administrative cattle tracing data was supported by a report prepared by a National Statistics Strategic Review Group which was widely drawn and included economists, statisticians and policy makers from Defra and the devolved administrations. The full report is available at <http://www.defra.gov.uk/statistics/foodfarm/landuselivestock/junesurvey/junesurveyresults/>.

Industry views were represented by the Meat and Livestock Commission (MLC) who were able to endorse the move to using the new source. The Welsh Assembly and Northern Ireland Department of Agriculture and Rural Development also dropped the cattle questions from their own surveys. The Scottish Government intends to follow suit in time.

Overall the administrative source, although identifying a higher number of cattle (6% or 360 thousand more in England in June 2006), shows very similar trends to the data collected from the June Survey. Many other Member States have observed similar differences between their administrative and statistical sources. The UK administrative data are believed to provide more reliable information than surveys as the coverage is more complete. Additional confidence in the reliability of tracing data is provided by the mechanisms in place for cross checking and correcting anomalies.

## **5 Small area statistics**

As described earlier, a full holding level dataset is produced each year to enable the calculation of low level statistics. In our standard publications, we produce county and regional level estimates of crop areas/ livestock populations and numbers of people employed in agriculture. We also produce estimates of the activity in National Parks and in "Areas of Outstanding Natural Beauty" (AONB).

As the small area statistics have been generated for so many years, we also store large back series of low level crop areas, livestock numbers and labour force numbers which are available on our website. We also provide bespoke analyses which feed into Defra policy making and support the Departmental Strategic Objectives.

## 5.1 Grid referencing

To enable June Survey data to be grouped into different geographic areas, such as region or county, every holding must be allocated a grid reference. To maximise existing departmental data and improve consistency, we use the following data in this order of preference:

1. Firstly, where the holding has returned a Single Payment Scheme (SPS) subsidy claim, we use the grid reference provided on SPS. This relates to the grid reference of the land parcels covered by the claim.
2. If no grid reference can be found, we use grid references provided on the Cattle Tracing System (CTS). This relates to the location of the cattle.
3. For the remaining holdings, checks are run to see if the holdings have ever been given a grid reference in previous years and if it has this is then allocated.
4. Finally, for the very small handful of holdings where no grid reference can be found, the postcode of the farm address is used to estimate a grid reference.

## 5.2 Farm type classification

As part of the production of the holding level dataset, we also assign each holding to a farm type to indicate the main type of activity on the holding. To meet EU requirements, from 2010 the methodology employed to do this has changed to using “Standard Outputs” rather than “Standard Gross Margins”. The Standard Output (SO) is a measure of the total value of the output costs on a farm based on standardised coefficients, whereas Standard Gross Margins (SGM) are a measure of the profitability. Full details of these changes and an explanation of the impact on farm type classification can be found in the June standard output typology document available at <http://www.defra.gov.uk/statistics/foodfarm/landuselivestock/junesurvey/junesurveyresults/>.

Where an activity makes up more than two thirds of the SO, the holding is assigned to this main farm type. There are 10 main farm types which are briefly described below.

- Cereals  
Holdings on which cereals and other crops generally found in cereal rotations (e.g. oilseeds, peas and beans harvested dry and land set-aside) account for more than two thirds of the total SO.
- General cropping  
Holdings on which arable crops (including field scale vegetables) account for more than two thirds of the total SO and also holdings with a mixture of arable and horticultural crops which again account for more than two thirds of the total SO. In a change to the previous classification system, holdings without livestock that also have grassland and forage crops accounting for more than two thirds of the total SO are assigned to general cropping.
- Horticulture  
Holdings on which fruit (including vineyards), hardy nursery stock, specialist mushrooms, glasshouse flowers and vegetables, market-garden-scale vegetables and outdoor bulbs and flowers account for more than two thirds of the total SO.
- Specialist pigs  
Holdings on which pigs account for more than two thirds of the total SO.
- Specialist poultry  
Holdings on which poultry account for more than two thirds of the total SO.
- Dairy  
Holdings on which dairy cattle account for more than two thirds of the total SO. Dairy holdings inside “Less Favoured Areas” (LFA) are included within this group.

- Uplands grazing livestock  
Holdings in the “Less Favoured Areas” (LFA) on which grazing livestock account for more than two thirds of the total SO. Note that under this classification horses are considered as grazing livestock along with sheep, beef cattle, goats and deer. A holding is classified as being in the LFA if 50% or more of its total area is in the LFA.
- Lowland grazing livestock  
Holdings on which grazing livestock account for more than two thirds of the total SO (excludes holdings classified as dairy). Note that under this classification horses are considered as grazing livestock. A holding is classified as lowland if less than 50% of its total area is in the LFA. In a change to the previous classification system, holdings with grazing livestock that also have grassland and forage crops accounting for more than two thirds of the total SO will be assigned to lowland grazing livestock.
- Mixed  
Holdings on which neither crops nor livestock are the predominant activity. For these holdings the dominant activity will usually account for between one third and two thirds of the total SO.
- Other/Unclassified  
Under the SGM typology, this category used to include holdings with only horses, with only grass or fodder crops or with only fallow land or buildings. It was therefore named ‘Other types’ and also captured non-classified holdings. However, under the new SO typology, these holdings now fall under the above categories, so only non-classified holdings remain. We have therefore changed the category name to ‘Unclassified’. Non-classified holdings have unknown activity because we have never had any survey contact since registration, therefore we are unable to estimate their activity. Approximately 90% of these non-classified holdings were removed as part of the 2010 register cleaning exercise.

Due to the nature of the farm type classifications, there are several step changes in the data so historic results are not directly comparable. There are numerous reasons for this:

1. As mentioned above, in 2010 the methodology used to assign farm types changed to SOs rather than SGMs, which has resulted in some shifts between categories. Further details can be found in the June standard output typology document on our website.
2. From 2006 onwards, the farm types use cattle data from the Cattle Tracing System (CTS) rather than survey data so this has caused a step change in the results as cattle holdings have been re-classified.
3. The farm type classifications listed above have been in place since 2004. Prior to this, there were only 9 categories which are not all directly comparable. The spreadsheets on the website for years prior to 2004 are based on these old farm types.
4. Also in 2004, we switched from using the 1988 SGM coefficients to the 2000 SGM coefficients, which causes a slight shift between categories (though we wouldn’t expect major scale changes).
5. Prior to 2000, results are based on main holdings only.

Results have been produced showing the effects of all these step changes at an England level at: <http://www.defra.gov.uk/statistics/foodfarm/enviro/observatory/programme-indicators> (see Indicator B2 Farm Type).

When comparing numbers of farm types across years, bear in mind that the change in overall numbers of farms is not necessarily the best indicator of the changing structure of the agricultural sector. This masks a considerable change in farm size distributions, with the longer term trend towards fewer, larger and more productive farms.

The number of farms also includes large increases in holdings registering for animal tracing purposes, particularly following the Foot & Mouth disease outbreak in 2001 and in 2005, with the introduction of the Single Payment Scheme where large numbers of holdings were registered to enable farmers to make subsidy claims.

### 5.3 Standard Labour Requirements (SLRs)

The SLR for a holding is the hypothetical amount of full time labour required on the holding for a year, calculated from the demands of all the crops and animals present. One SLR equates to one full time worker for a year. Each activity has a certain value for the crop area or number of livestock that constitutes one SLR. The values we currently use are shown in table 7. For each holding a SLR value is calculated for each activity and these are then summed to give a total SLR. Table 6 shows the SLR bands that define the size of a farm.

Table 6: Farm size definitions

Farm size	Definition
Very small	<1 SLR
Small	>=1 and <2 SLR
Medium	>=2 and <3 SLR
Large	>= 3 and <5 SLR
Very large	>=5 SLR

Table 7: Land areas and numbers of livestock that constitute 1 SLR

	Activity	Area (hectares) or number of livestock
Arable crops	Cereals	95
	Oilseeds	125
	Hops	30
	Sugar beet	60
	Field peas and beans	190
	Maincrop potatoes	20
	Early potatoes	15
	Fodder crops	315
	Horticultural crops	Outdoor vegetables and salad
Vining peas		75
Other peas and beans for human consumption		3.8
Top and soft fruit		4.2
Hardy nursery stock		1.25
Mushrooms		0.25
Other land	Bare fallow	1 900
	Grassland	475
	Rough grazing	1 265
Cattle	Dairy cows	50
	Beef cows	160
	Other cattle	210
Sheep	Ewes and rams (lowland)	365
	Ewes and rams (upland)	450
	Other sheep (lowland)	575
	Other sheep (upland)	730
Pigs	Sows	136
	Finishing and rearing pigs	1 000
	Piglets (weighing less than 20 kg)	9 500
Poultry	Growing pullets	15 800
	Laying hens	11 175
	Table chickens	47 500
	Any other poultry not listed above	42 000
Other livestock	Horses	13
	Goats	95
	Deer	125

#### 5.4 Suppression of data

Estimates cannot be disclosed where the value is based on less than five holdings as this would breach our confidentiality rules. Where we have to suppress estimates of this nature, we usually have to also suppress the second smallest estimate in the group so that the original estimate cannot be derived from the total. Where estimates are suppressed, the value is represented by the symbol "#". If a value is not present, it is recorded as zero.

#### 6 Contact details

For further explanations of any of the above, please contact the Farming Statistics team on 01904 455332 or by email [farming-statistics@defra.gsi.gov.uk](mailto:farming-statistics@defra.gsi.gov.uk).