

SDR 194/2014

18 November 2014

## June 2014 Survey of Agriculture and Horticulture: Results for Wales

This First Release contains the headline results from the June 2014 Agricultural and Horticultural Survey for Wales. These results provide estimates for Wales as a whole for the following key items:

- The numbers of sheep and cattle – the main livestock groups in Wales;
- Estimates for the number of other livestock found on agricultural holdings – pigs, poultry goats and horses;
- The area of land on agricultural holdings in Wales, including the main crop types grown;
- Estimates of the number of people working on agricultural holdings in Wales.

All of these measures are taken as a snapshot on the survey day of 2 June 2014.

### Headlines

- The number of sheep and lambs rose by 3 per cent to 9.7 million in June 2014. This was the result of an increase of 10 per cent in the number of breeding ewes which was only partially offset by a fall in the number of lambs, rams for service and other sheep.
- There was an increase of 6 per cent in the size of the dairy herd in the last 12 months. This is believed to be due to stronger milk prices in the latter part of 2013 and early 2014. This increase was offset by a small fall (2.6 per cent) in the beef herd and also in cattle under 2 years of age. Overall the total number of cattle and calves rose by 0.7 per cent.

### Main Results

Results are presented separately for sheep, cattle, other livestock, land use and farm labour. In each case the headline figures for June 2014 are given along with the change from the previous year. However the longer term trends are usually more significant than a single year-on-year comparison. For this reason results are also presented in their historical context with any contributory factors for changes over the period.

Note that the detailed data for the years 1998 to 2014 are available to download in spreadsheet format on the same page of the website as this Release. (The June Survey form was fundamentally redesigned in 1998 so the series from this point allows for a consistent set of definitions).

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## Background and Purpose of the Survey

The June Agricultural and Horticultural Survey provides estimates for all c42,000 holdings in Wales on an annual basis. From 1867 to 1995 it was carried out as a Census of all farm holdings, since when it has been conducted as a sample survey. The exception to this is every 10 years when the European Union require all member states to carry out a full Census (2010 being the most recent).

The June Survey is the primary source for information about agricultural land, livestock and farm labour covering all known farms. As a statistical source the intention is to produce robust estimates for land, livestock and labour across all farms. This is in contrast to administrative systems, such as the agricultural subsidy payments, which give definitive information about a restricted range of farms.

This First Release shows estimates for the main agricultural variables at the Wales level. The figures fit into long term time series for these variables and are of general interest. More detailed analyses can be found in some of the other outputs listed in the Further Information section of this Release.

For the June 2014 Survey a sample size of 12,800 was taken and returns were received from 56 per cent of these holdings. The Welsh Government would like to thank all farmers who responded for their co-operation in this survey

## Users of the Survey Results

The Survey results are used by a variety of users. The main users (known to us) can be classified into the following groups:

Other areas of Welsh Government: Survey data is used widely across agricultural policy areas within the Welsh Government. It is used in monitoring the effectiveness of existing policies and in projecting the effect of introducing or amending existing policies. Data is also used in the area of animal health in assessing the potential effects of various disease outbreaks or in limiting the spread of diseases.

The data is also used extensively by Welsh Government economists in their work in assessing and analysing the agricultural economy in Wales.

Government outside Wales: Survey results are provided in the compilation of UK results by the Department for the Environment, Food and Rural Affairs (DEFRA). They are also provided to Eurostat who use them in their analysis of agricultural statistics across the European Union. Survey data is used periodically in assorted projects and studies into a range of aspects of agriculture. These are commissioned by DEFRA at a UK, Great Britain or England and Wales level.

Agricultural sector bodies: The key sector bodies who make regular use of the survey results are:

Farming unions - primarily the National Farmers Union (Wales) and the Farmers Union of Wales. Generally the statistics enable them to maintain an overall knowledge of the current state of the agricultural sector as well as being aware of the latest trends.

Meat Promotion Wales / Hybu Cig Cymru – their role is to monitor the state of the red meat industry in Wales. Survey livestock numbers provide one of a number of inputs that they require in order to carry this out.

ADAS undertake consultancy, research and policy advice on the areas of the environment and rural development. They are an independent company but are frequently commissioned by the Welsh Government and other government departments. Agricultural survey data is often an input required to allow them to undertake this.

Other, more specialist, sector bodies also require data but this is on a more infrequent basis.

Media: First Releases of survey results are provided to contacts in the farming press. The interest from the general media is more infrequent, but in the past have come from television, radio and the written media.

Researchers: Often academics and/or specialists who have a focus on a specific topic. In many cases the agricultural survey data is combined with data from other sources for modelling purposes. Recent examples would include statistics on numbers of cattle for studying greenhouse gasses, and details on the growing of arable crops in assessing the effect of pesticide usage.

Animal and Plant Health Agency (APHA) Formerly known as the Animal Health and Veterinary Laboratories Agency (AHVLA). This body are provided with detailed survey data in order to carry out modelling work in the event of a serious disease outbreak or other emergency.

General enquiries: A whole range of enquiries have been received in the past. These tend to be a combination of phone calls and e-mails to our general inbox ([stats.agric@wales.gsi.gov.uk](mailto:stats.agric@wales.gsi.gov.uk)). This category includes individual farmers, schoolchildren, postgraduate students and other members of the public with an interest in agriculture or in Wales as a whole.

## June 2014 Survey of Agriculture & Horticulture: Land Use in Wales

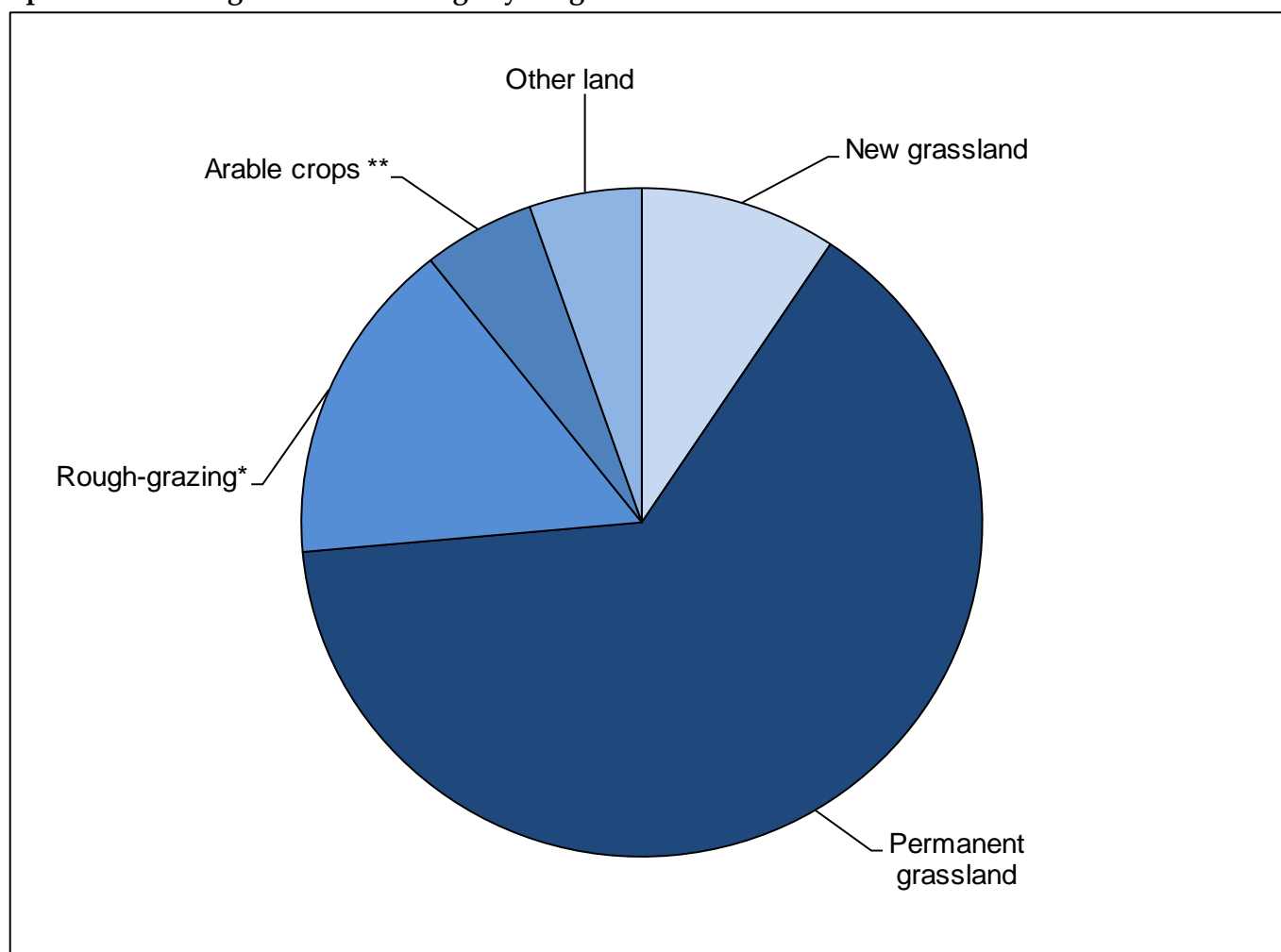
The estimates for the 2014 survey for agricultural land use show the following headline figures:

- The total amount of land on holdings rose by 4.6 per cent to **1,631,400 hectares** in June 2014. When combined with the 180,300 hectares of common rough grazing, this means that land used for agricultural purposes accounts for approximately 87 per cent of the total land area of Wales. However this increase is at least partly attributable to holdings who have recently registered to qualify for farm woodland schemes.
- The total area of arable crops and bare fallow rose by 7 per cent to **85,000 hectares** in June 2014. As can be seen on the accompanying spreadsheet, the 2014 estimates have returned to levels observed in years prior to 2013. A spell of cold weather in the early months of 2013 adversely affected that year's crop.

A full list of variables and time series for land use is included in the spreadsheet which can be downloaded with this release.

The landscape, soil quality and climate of Wales limits the use to which its land can be put. Most of Wales is hilly or mountainous and this, combined with relatively poor soil quality and a wet climate, means that the majority of the land is restricted to the grazing of sheep and cattle. This is illustrated in the split of the land on agricultural holdings by usage:

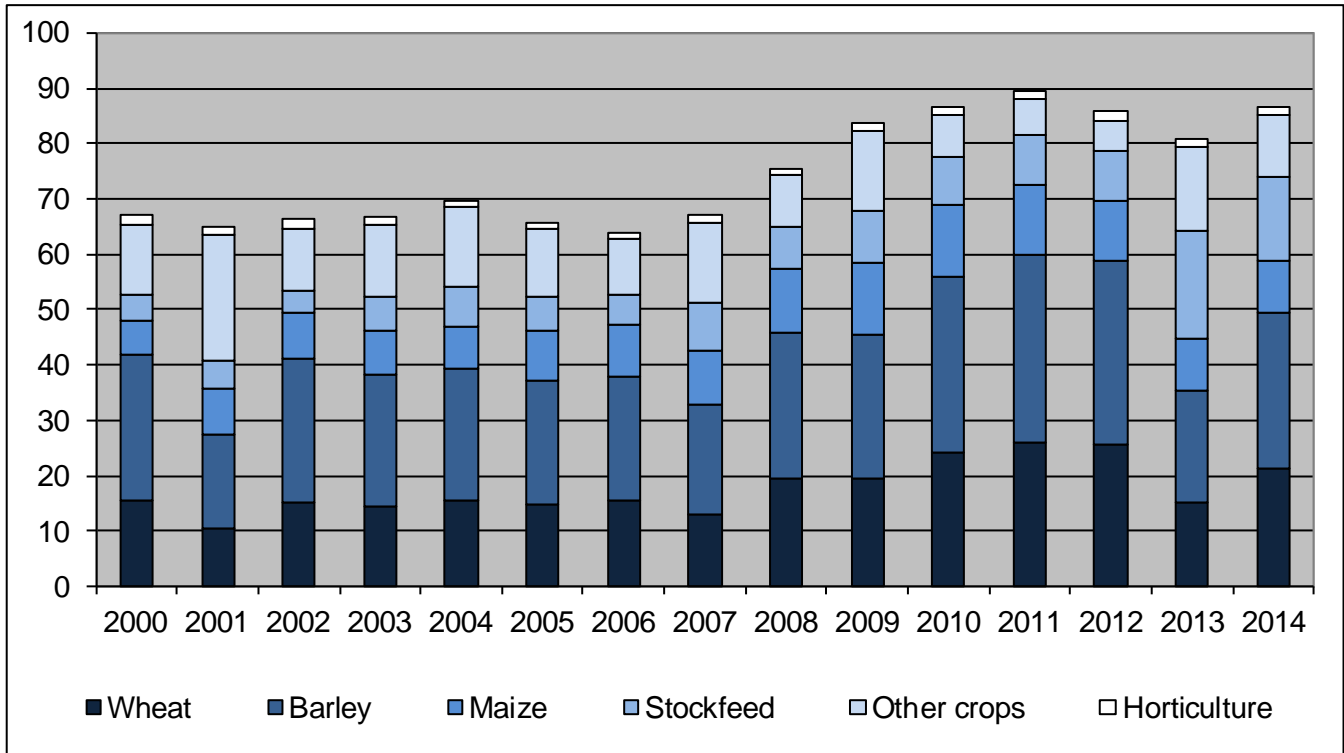
### Split of land on agricultural holdings by usage 2014:



\*Rough grazing where holder has sole rights (ie excludes common rough grazing)

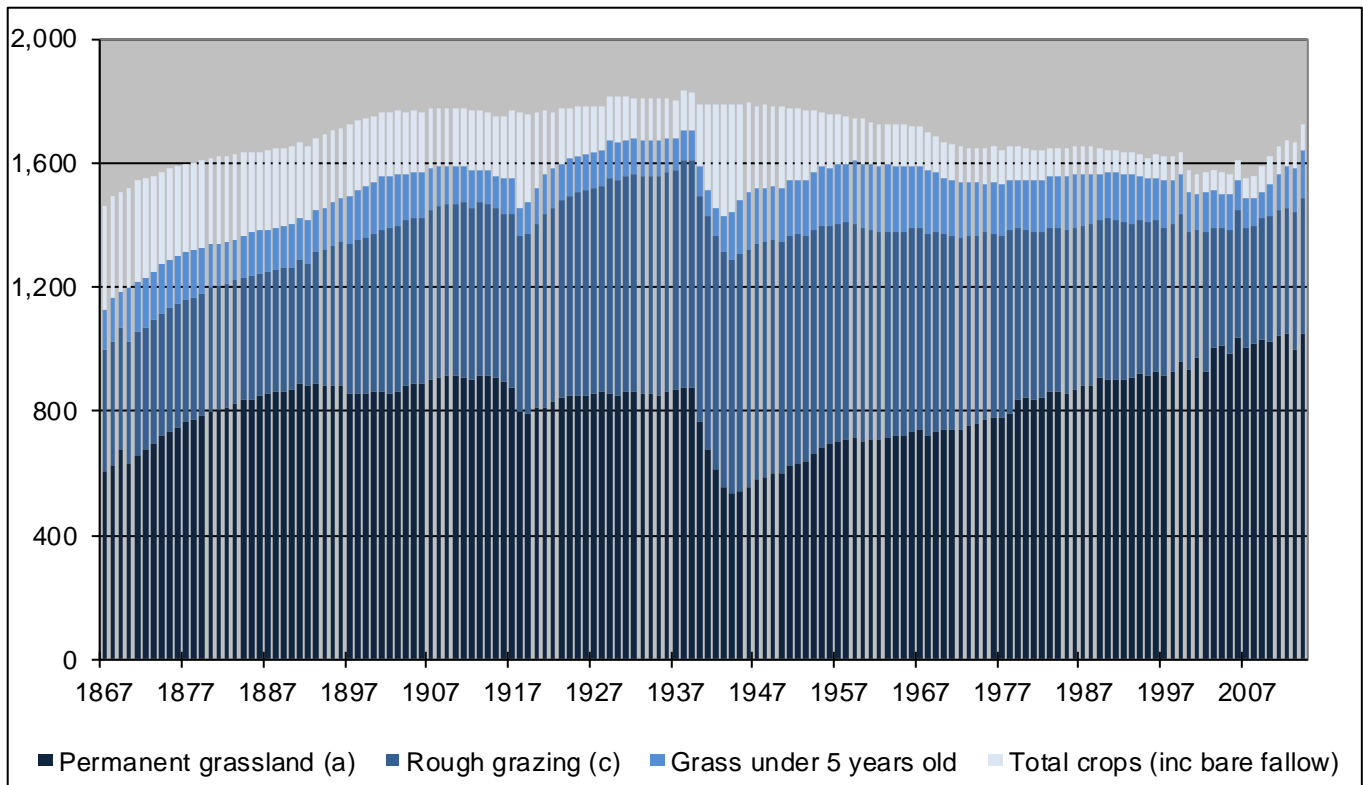
\*\* Includes horticulture

**Area of arable crops and horticulture (thousand hectares) in Wales 2000-2014**



The increase in the total area in the latter years in the series is attributable to the phasing out of the Set-Aside Scheme in 2008. This scheme offered a financial incentive for farmers not to grow crops for food production on parts of their land. Instead the land would be left fallow or used for other purposes. As the scheme ceased, the land has returned to its original use.

**Land on farm holdings in Wales (thousand hectares) 1867-2014**



At the beginning of this series the area of crops grown in Wales was over 300,000 hectares. This gradually declined as mechanisation was introduced, meaning the land could be used more efficiently. The same yield of crop could now be obtained by using a smaller area of land. The effects of the World Wars (particularly the Second) can be seen where greater areas of crops were grown at the expense of grassland but these shifts were only temporary. The other factor which has impacted the area of crops in Wales is the improvement in transport links. Rather than crops being made available only in a relatively local area, faster transport has meant that crops grown in the more fertile areas of the UK (eg east of England) became more available and ultimately cheaper to produce than those grown in the less fertile land in Wales.

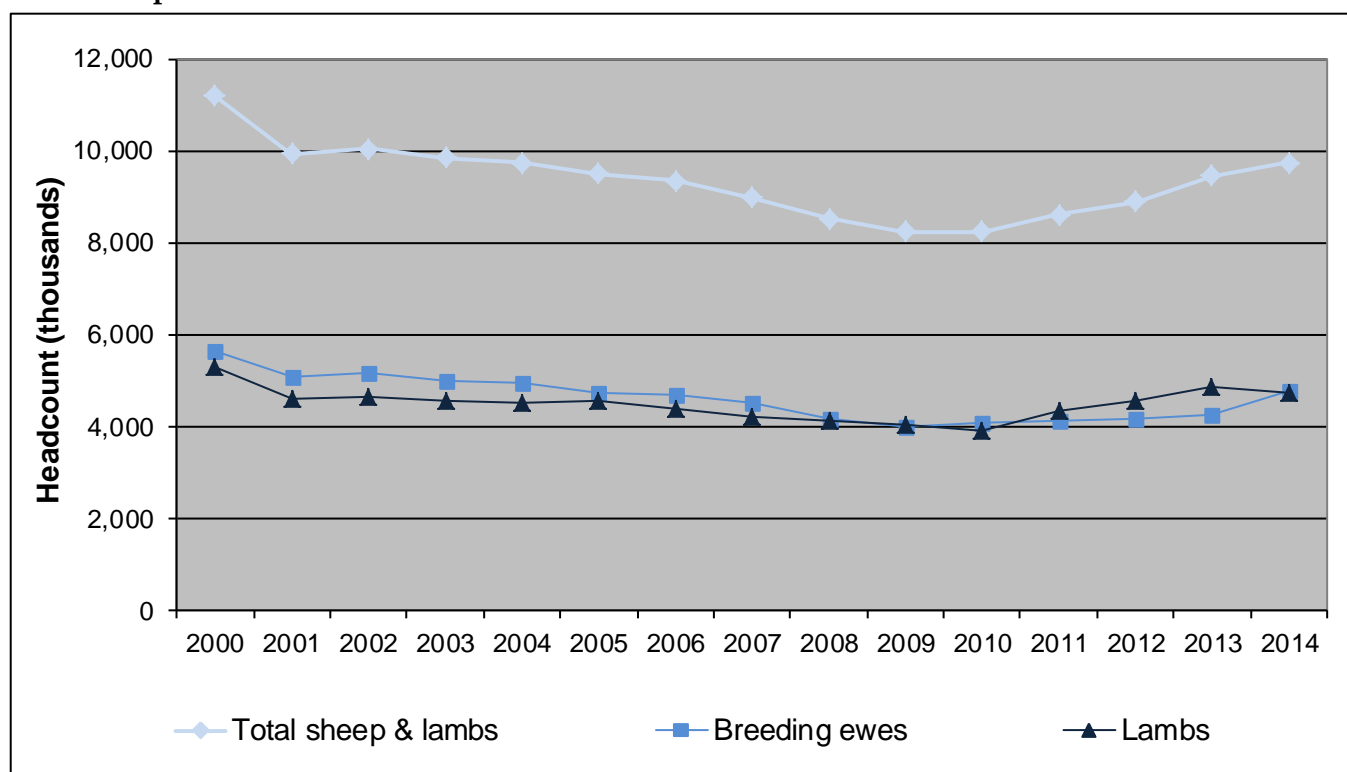
## June 2014 Survey of Agriculture & Horticulture: Sheep in Wales

The estimates for the 2014 survey for sheep and lambs show the following headline figures:

- The total number of sheep and lambs in Wales was **9,738,900** – an increase of 2.9 per cent on the previous year and the fifth consecutive annual rise in numbers;
- The main contributory factor to this increase was a 10.4 per cent in the number of breeding ewes to a figure of **4,418,700**.
- 2014 saw a significant fall (60 per cent) in the number of other sheep. The higher numbers in previous years reflected lower market prices which resulted in farmers retaining animals that would previously been sold by the summer.

A full list of variables and time series for sheep is included in the spreadsheet which can be downloaded with this release.

### Total Sheep and Lambs in Wales 2000-2014:



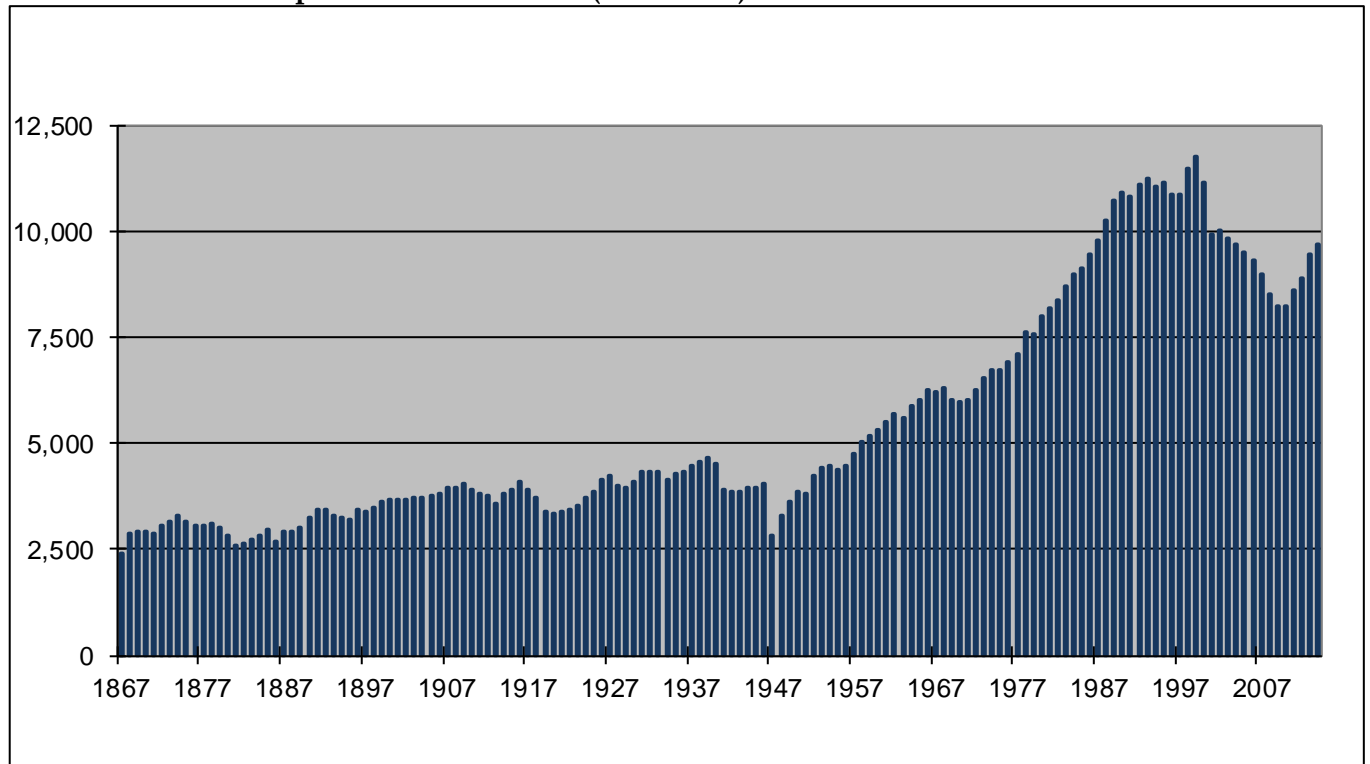
The number of sheep and lambs in Wales peaked towards the end of the 1990s at which point they began to gradually decline over subsequent years. This trend ended in 2010 when the total number of sheep and lambs reached 8.2 million, the same figure as in the previous year.

Since this point numbers have begun to rise steadily over the past 4 years to today's level of 9.7 million. Initially this was mainly attributable to an increase in the number of lambs. This was to the extent that the number of lambs began to exceed the number of breeding ewes. In 2014 however the largest rise was in the number of ewes so that the numbers of each group are now approximately equal.

Prior to 2014 the industry had suffered from the effects of poor weather and low market prices in 2012 and 2013. The weather has led to many farmers not being able to finish lambs and thus sell them (or at least at an acceptable price). Thus many of these animals were retained on the farm while the farmer decided what to do with them. Often this meant that they were recorded as 'other female sheep' on the survey form and the data on the spreadsheet shows the effect of this.

The longer term series in the number of sheep and lambs is also of interest:

#### Total number of sheep and lambs in Wales (thousands) 1867-2014



The numbers that we see today, whilst still not at their levels of 10 or so years earlier, are still high in the historical context. The general trend over the period (excepting the World Wars) was upward – from around 2.5 million in 1867 to over 6 million one hundred years later. At this time, the domestic market was subject to competition from imports – notably New Zealand. Upon the UK joining the European Union (as it now is) in 1974, farmers became eligible for various schemes under the Common Agricultural Policy, some of which were in part based on the number of livestock kept. In recent years these schemes have been modified so that they are now more based on maintaining land in a good condition. This may be a factor in the drop in numbers in recent years although the upturn in the most recent years could indicate that numbers are now finding their “natural” level.



## June 2014 Survey of Agriculture & Horticulture: Cattle in Wales

The estimates for the 2014 survey for cattle show the following headline figures:

- The total number of cattle and calves in Wales was **1,102,800** – this represents an increase of 0.7 per cent on the figure from June 2013;
- The number of dairy females aged 2 years or more rose by 5.9 per cent to a figure of 289,900. This represents the highest figure seen since 2006. This is believed to have come about as result of more favourable milk prices in the later part of 2013 and early 2014.
- There was a fall in the number of beef females aged 2 years or more – the latest figure is **214,200** which represents a 2.6 per cent fall on the previous year.

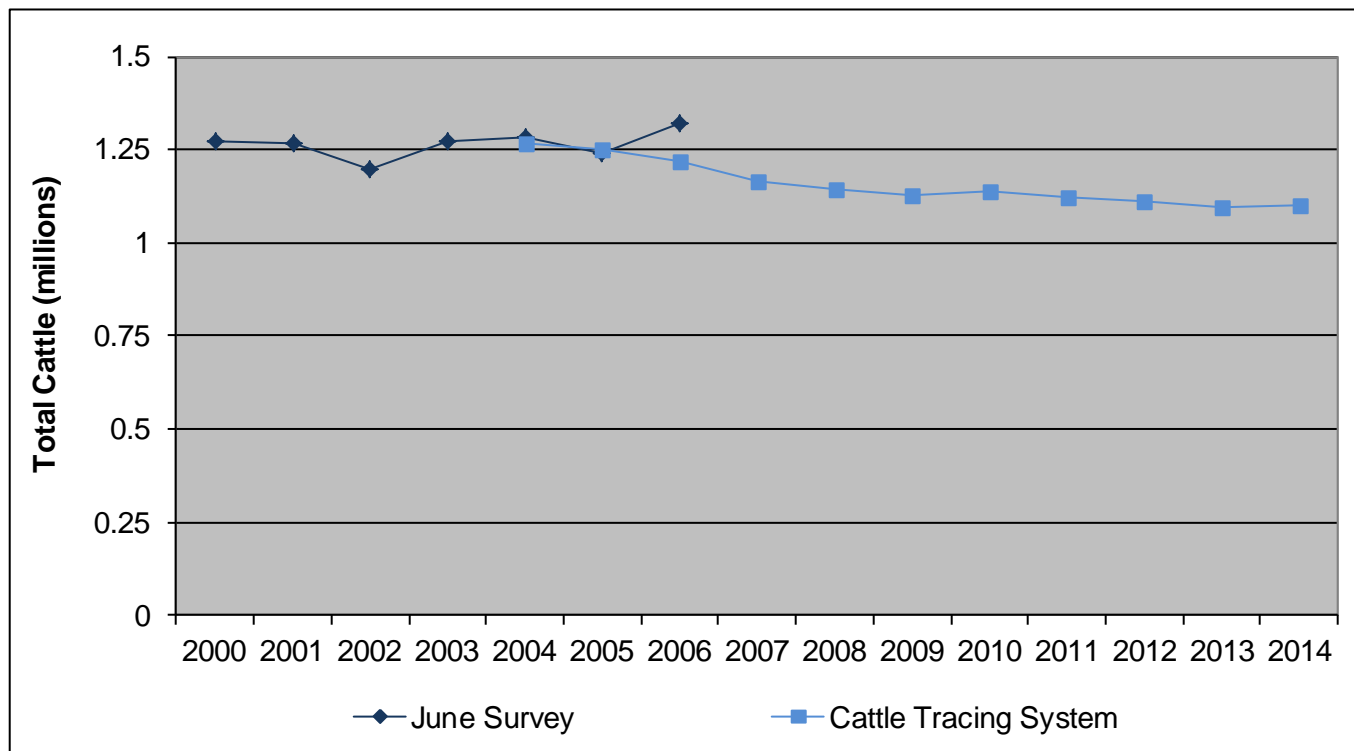
A full list of variables and time series for cattle is included in the spreadsheet which can be downloaded with this release.

The data for cattle numbers is now sourced from the Cattle Tracing System (CTS) which is managed by the British Cattle Movement Service (BCMS), primarily for animal health purposes. This information was used for the first time in the June 2007 Survey of Agriculture following checks that the figures produced from CTS for earlier years were comparable with the estimates from the June Survey for the equivalent years. As the CTS is intended to be a definitive source (by law all movements of cattle must be recorded), the figures should now be more accurate than a survey estimate (which by its nature is prone to statistical error).

The data recorded on CTS does not precisely correspond with that collected on the survey form prior to 2007. CTS is of a factual nature; it records the age, breed and sex of the animal as well as its movements during its lifetime. It does not record whether an animal is currently being used for breeding, is intended to be used for breeding in the future or whether the farmer intends to keep the animal at all. This limits any comparisons that can be made between current figures and those from several years ago.

The chart on the following page shows the change in the total number of cattle and calves over the period 2000 to 2014.

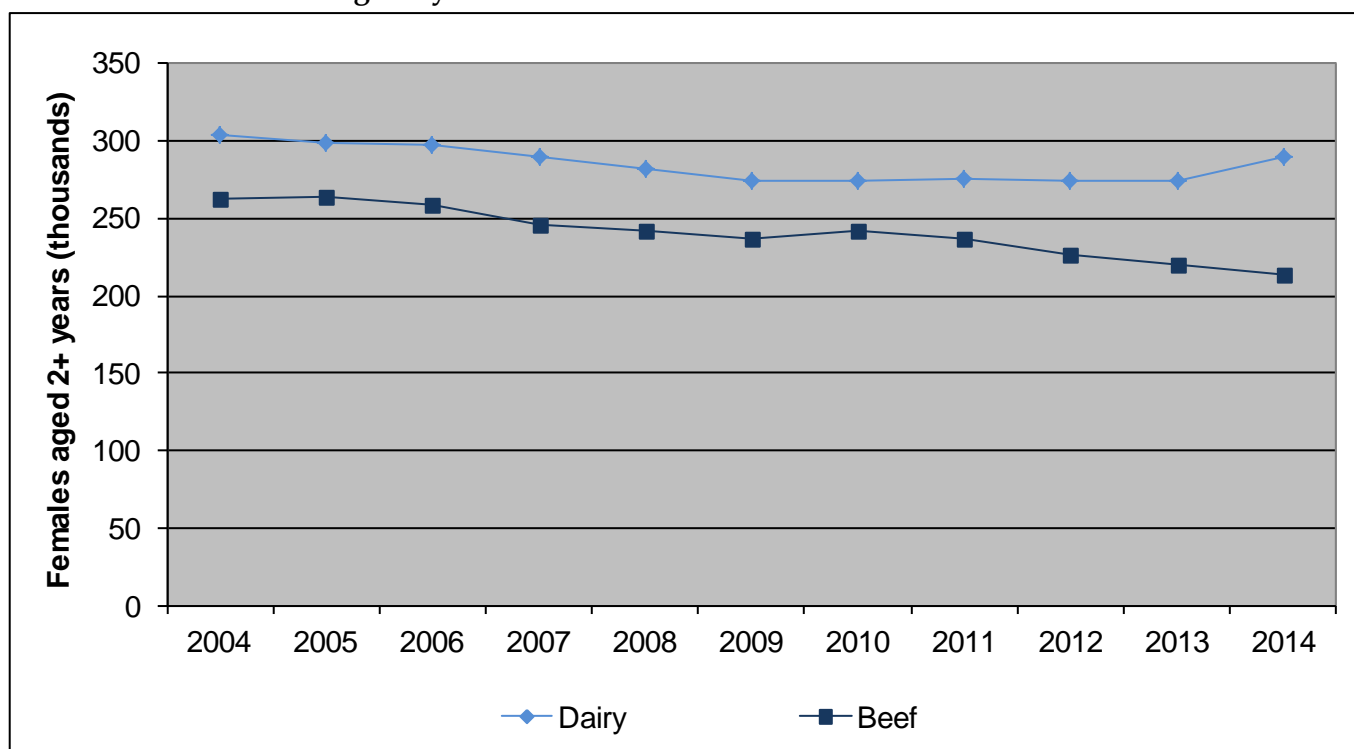
**Total Cattle and Calves in Wales 2000-2014:**



Source: June Survey of Agriculture 2000-2006, Cattle Tracing System 2004-2014

The total number of cattle and calves has fallen by 13.4 per cent since June 2000. The breakdown between dairy and beef is not possible over the whole period because of the change to using data from the Cattle Tracing System. However the CTS data is available back to 2004 and so a comparison of dairy and beef numbers over this period is possible:

**Number of female cattle aged 2 years and above 2004-2014:**



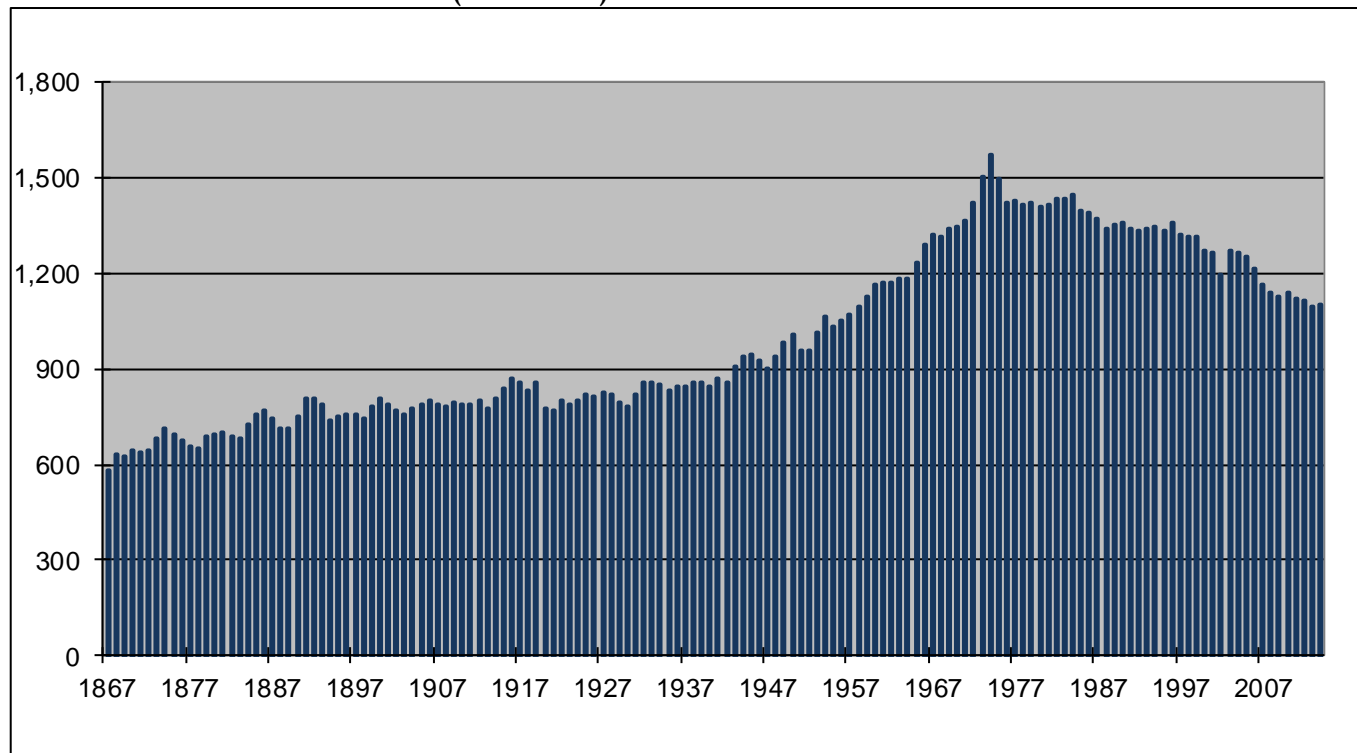
Source: Cattle Tracing System 2004-2014

Between 2004 and 2014 a comparison of the number of females aged over 2 years (those animals used for breeding and of most interest) showed a smaller fall in dairy breeds (4.5 per cent) than for beef breeds (18 per cent).

One possible contributory reason for this is that market forces have benefitted farmers not retaining as many non-dairy females for future breeding and instead fattening more for sale for beef production. The switch from CAP Single Farm Payments being based partly on numbers of livestock could be another contributory factor in the general fall in numbers.

The longer term trend in cattle numbers is shown in the chart below:

**Total number of Cattle & Calves (thousands) 1867 to 2014:**



Source: June Survey of Agriculture 2000-2003, Cattle Tracing System 2004-2014

Cattle numbers increased steadily over the period until the mid 1970s. By this point the domestic market for beef was subject to increasing competition from imports. This was increased when the UK joined the European Union (as it is now) in 1974. In 1983 the EU introduced the concept of milk quotas for member states. This restricted the amount of milk that a dairy holding could produce (each individual holding's limit or quota). Any milk produced in excess of this quota could not be sold and thus was of no value. The dairy industry has become more efficient in recent years. A lot of smaller units have been amalgamated into bigger units which has meant that the same amount of milk can be produced from fewer animals.

## June 2014 Survey of Agriculture & Horticulture: Other Livestock in Wales

The estimates for the 2014 survey for pigs, poultry, horses, goats and farmed deer show the following headline figures:

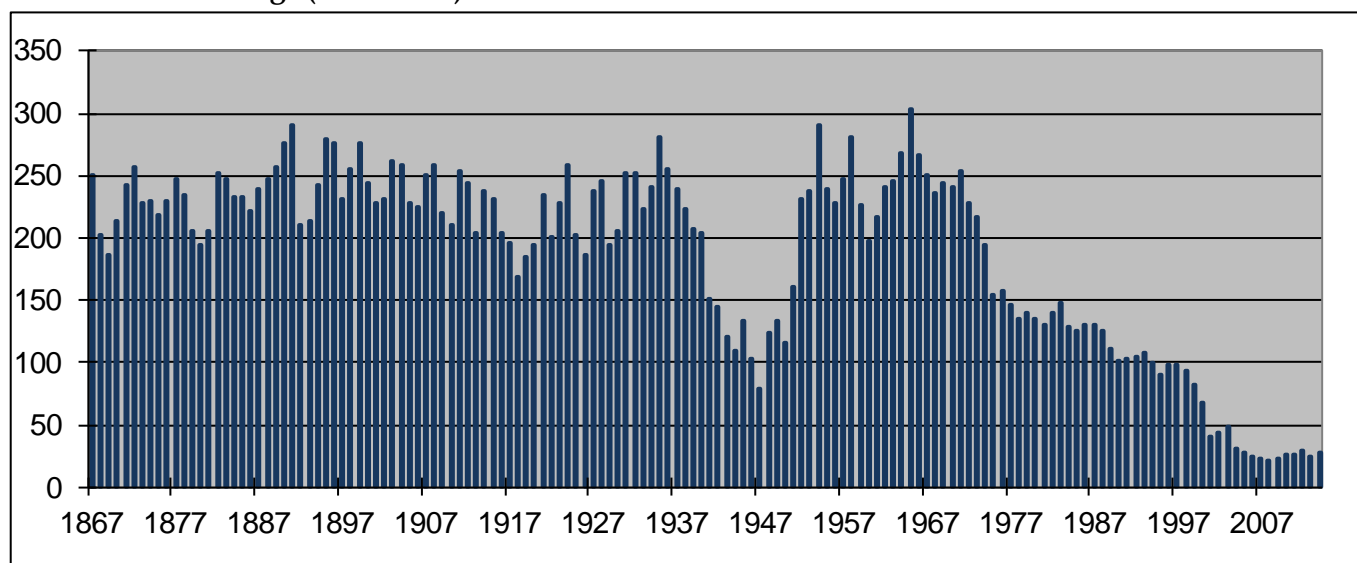
- There was an increase of 14 per cent in the number of pigs in Wales in June 2014. The current total is **28,400**. This came about due to a rise in the number of fattening pigs (from **20,500** to **24,000**). The number of breeding pigs remained unchanged at **4,400**;
- The total poultry in Wales was **8,997,200** in June 2014 – the majority of these were chicken kept for eggs (**2.1 million** birds) and table chicken or broilers (**6.3 million**);
- The number of horses in June 2014 was **50,100**, down very slightly from the previous year (**50,400**). It is worth noting, however, that the majority of horses in Wales are kept for non-agricultural purposes. Most are found at livery, riding schools or kept in paddocks or stables as pets for recreational purposes.

A full list of variables and time series for other livestock groups is included in the spreadsheet which can be downloaded with this release.

### Pigs

In recent years the number of pigs in Wales has fluctuated at a level between **20,000** and **30,000**. This is as likely to be as attributable to variations among a handful of large producers from year to year as any sustained trend. However to appreciate the magnitude of the numbers today, consider them in the longer term context:

#### Total Number of Pigs (thousands) in Wales 1867-2014:

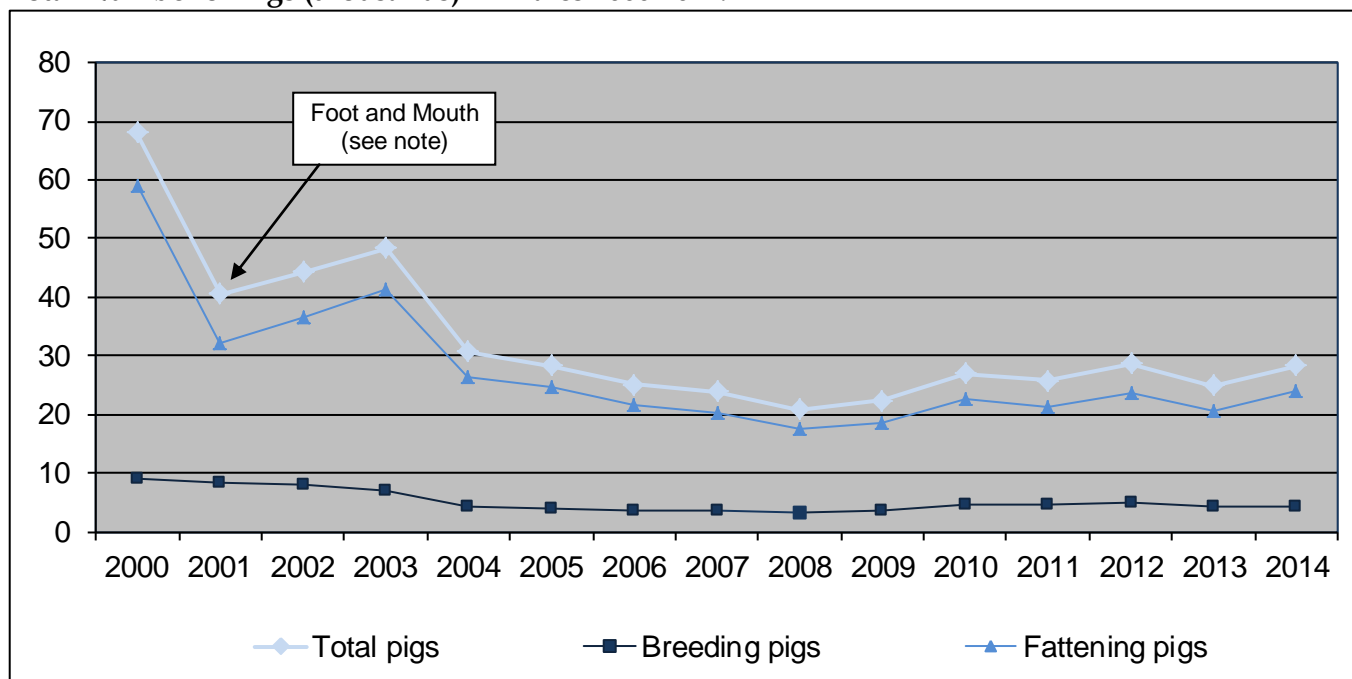


The chart shows that historically the number of pigs in Wales was consistently over the 200,000 mark. The only exceptions were dips during and immediately after the World Wars. This ended in the mid 1970s (the last year when more than 200,000 pigs were recorded was 1973). The reason for this fall is economic. Following the UK's entry into the European Union (EU) in 1974, the pig industry in this country was faced with cheaper, imported meat from countries such as Denmark, Germany and the Netherlands.

These market forces have meant that pig meat production is no longer viable for smaller producers. The majority of the Welsh pig population are to be found on a relatively small number of holdings. To illustrate this, almost two-thirds of the pigs in June 2013 were to be found on less than 40 holdings. The majority of the remainder of holdings with pigs would be using them for personal consumption only and/or as pets.

The more recent trend in pig numbers can be seen in the chart below:

**Total Number of Pigs (thousands) in Wales 2000-2014:**



The number of pigs in Wales hit its all-time low figure of just over **20,000** in June 2008. Since this point numbers have fluctuated up and down in subsequent years with no discernable trend showing. The structure of the pig industry is different from that of cattle and sheep. The number of producers is relatively small and particularly the number of large producers. It is quite feasible that a handful of such producers choosing to reduce their stock in the summer months could have a significant effect on the estimate.

The earlier rise in numbers (between 2001 and 2003) was a consequence of the Foot & Mouth outbreak in spring 2001. As a proportion of the size of the total herd, the number of pigs slaughtered at that time was greater than for any other livestock group. The increase in the two years following the outbreak is believed to be due to premises re-stocking before the gradual downward trend resumed.

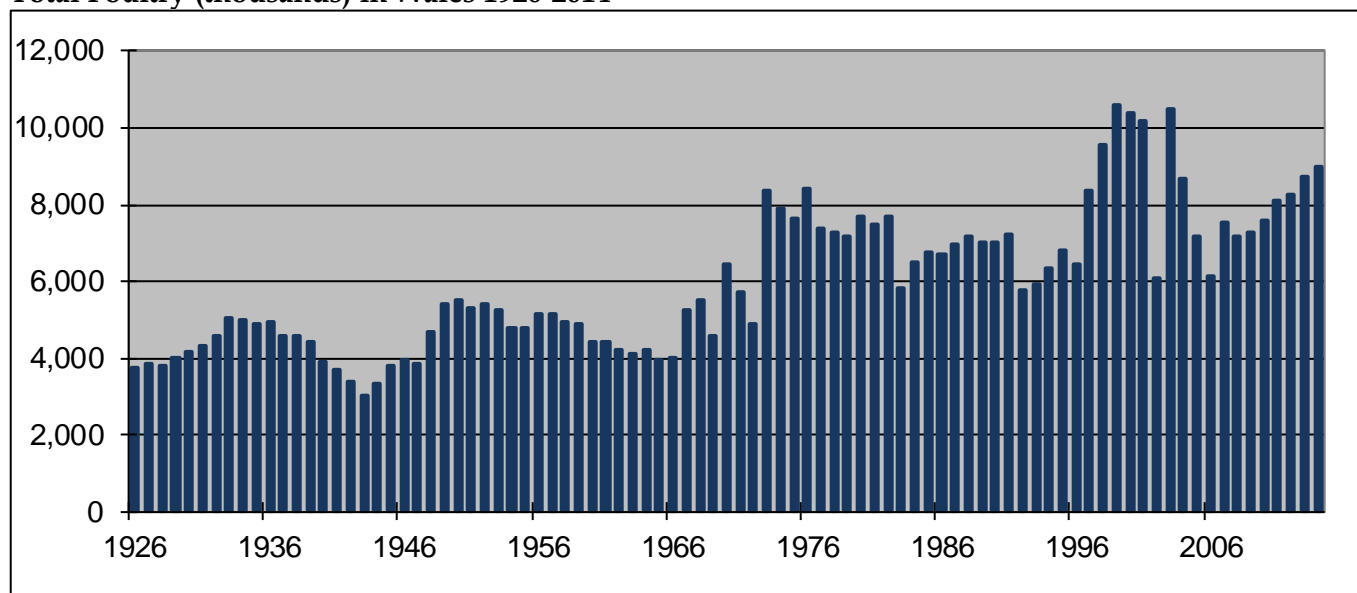
## Poultry

The poultry industry in Wales is similar to that for pigs in the sense that almost all of the livestock are to be found on a relatively small number of large producers. The number of birds is also particularly difficult to measure accurately since the June Survey provides a snapshot of activity on a single day (the first working day of June).

The housing of large poultry units requires that the sheds in which the birds are kept must be emptied periodically (every 2-3 months) for complete cleansing. It is perfectly possible that, on the survey day, any particular shed may contain no birds. It has already been stated that there are relatively few producers in Wales and so the number of sheds that are not in use on the day is clearly of great significance in estimating poultry numbers.

With this in mind it is perhaps better to consider the longer term trend:

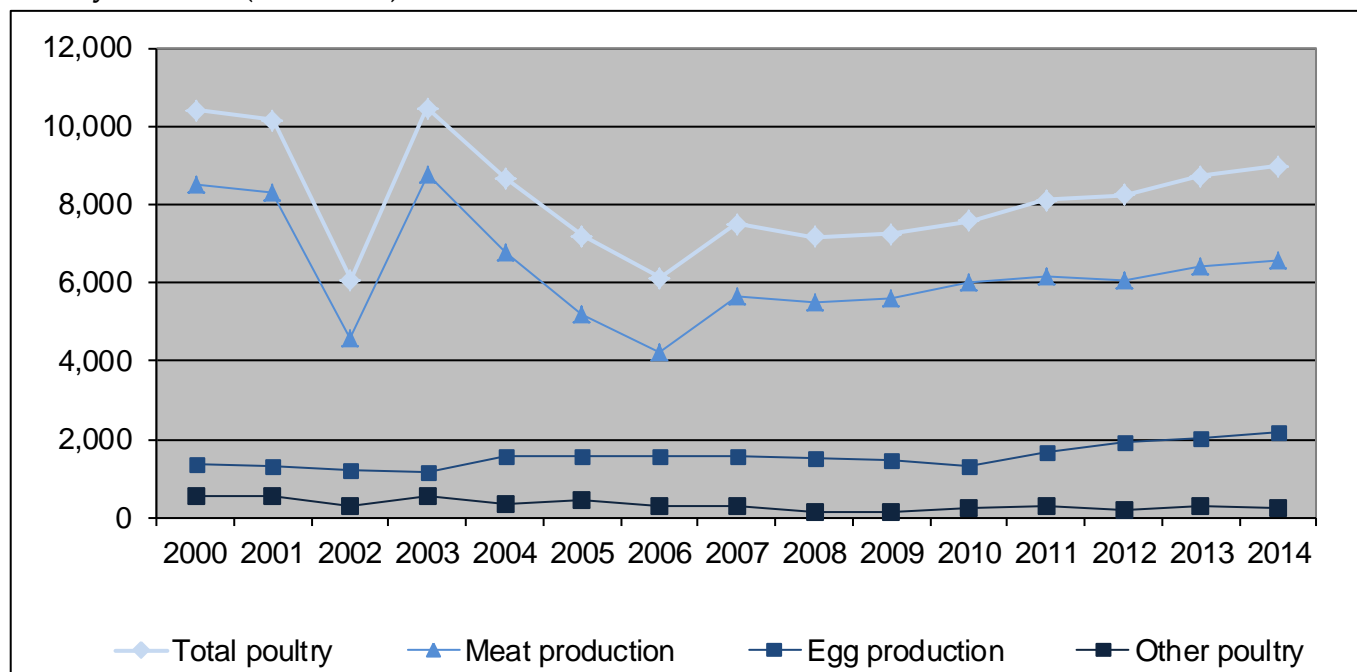
**Total Poultry (thousands) in Wales 1926-2014**



Even over this period there is no steady long-term trend – reflecting the volatile nature of this series mentioned above. It is fair to conclude that the numbers are generally lower in the earlier half of the chart. The increase in numbers after this can be attributed to the introduction of more intensive poultry units for the production of both meat and eggs. As stated above, the need for a period of emptying sheds for cleaning means the series exhibits more volatility over this period.

In terms of the number of birds, the poultry industry is dominated by the production of broilers (or table chicken) for meat production. This is illustrated in the chart below:

**Poultry numbers (thousands) in Wales 2000-2014**



The striking feature is the ‘V’ caused by a sharp drop in 2002 followed by a recovery in 2003. The reasons for this are unclear. It may be that this is simply an extreme example of the “empty sheds” situation

described above. Another possibility is a temporary switch of production to pigs after the Foot and Mouth outbreak. Pigs and poultry units are easily interchangeable and it might be the case that there was a temporary switch to help re-stock the pig population in the immediate aftermath.

### **Horses, goats and farmed deer**

Data on these livestock groups are not presented as part of this Release although they are available in the accompanying spreadsheet. The reason for this is that, in an agricultural context for Wales as a whole, they are less significant than other livestock groups.

As a result of mechanisation, the use of horses for agricultural purposes is almost a redundant concept in the 21<sup>st</sup> century. A tiny fraction may still be used in this way but these will be on tourism/ museum sites rather on real modern-day working farms. Almost all of the horses in Wales today are kept purely for recreational purposes.

Whilst there are some goat herds in Wales, the majority of these will be relatively small and certainly not form the basis for a commercial undertaking. Typically they would be used for grazing to maintain the land and, in some cases, a small amount of milk production. There are a handful of more commercial dairy producers but it isn't possible to focus on these without risking disclosure of individual farm operations.

Farmed deer need to be distinguished from deer in general. Farmed deer are those deer that are bred and kept primarily for producing meat or hide. Deer kept for recreational or tourism purposes are not included. Thus farmed deer tends to be a very specialised area with only a handful of producers and relatively few animals.

## June 2014 Survey of Agriculture & Horticulture: Agricultural Workforce in Wales

The estimates for the 2014 survey for agricultural land use show the following headline figures:

- The number of principal famers, business partners and their spouses rose by 6.8 per cent since June 2013. To a large degree this reversed the falls in the number of people observed in 2013.
- There was an apparent 30 per cent increase in the number of employed workers. Whilst the level of increase varied according to worker type (e.g. male/female, full-time/part-time), an increase was seen in every type.

The time series for labour shows far more variability than would probably be expected. The nature of work carried out on the farm would be expected to be broadly the same year in, year out. Clearly there will be exceptional years which would entail an increased workload on the farm but these would cause peaks to appear in the series rather than the more general volatility that is observed.

The validation process (where farmers are contacted regarding queries on their survey returns) suggests that there are serious reporting issues in the way the questions on farm labour are completed. That isn't to blame farmers for completing the questions incorrectly. It is a reflection on the variety of ways that labour can be used in agriculture.

The issues largely concern those workers on the farm who are not partners in the business. The split of workers into full and part time, regular workers and casuals is a gross simplification of agricultural practices. There is a complex pattern of unpaid, family and informal working arrangements. How farmers record these varied practices on the survey will always be an issue of interpretation.

The estimates for farm labour should be used for indicative purposes. To assume, for example, that a 15 per cent rise in the number of full-time regular workers since the previous year is robust evidence of an economic upturn in the industry is very dangerous. (Similarly for numbers going down).

In the past a separate release has been necessary to further explain problems associated with estimates for labour on farms. In this Release last year it was stated that the whole topic of recording and reporting labour data on farms would need to be considered further.

Therefore we would very much welcome any suggestions as to how this whole process could be improved to better reflect and measure the proper extent of the agricultural workforce in Wales.



## Key Quality Information

The results for the total amount of land, livestock and labour on Welsh farms are largely robust and can be used with confidence at this level. However, as always, we need to be careful about over-interpreting small changes, particularly in small results.

The results in this Release, apart from cattle, are estimates based on a sample survey of farms. The main quality issues are the following.

- **Sample size.** The sample is a relatively large share of the all farms in Wales. The sample is stratified so that larger farms are sampled more frequently than smaller ones.
- **Farm registration.** There is no compulsory register of farms in the UK. The registrations in place will cover the main commercial farms very well. The problem is to identify smaller farms that may not be commercially focused. While this will affect estimates of the number of farms analysis has shown that it has limited impact on the estimates of total areas of land, livestock or data.
- **Non-response.** Falling response rates are an issue for the survey, as with many other government surveys. This is a particular issue because certain farm types and sizes appear to be more or less likely to respond to the form. Non-response is a particular issue when a variable is dominated by a very small number of particularly large farms. Examples are poultry, pigs, horticulture and some of the smaller crops types. It also impacts on the range of any confidence interval and the percentage of the estimate that actually comes from responses.
- **Mis-response.** At the level of recording if land is grass or a crop or which species an animal is there is limited scope for mis-response. There is more scope for error in the sub-categories, particularly in reporting the difference between breeding animals and others. As already stated earlier it appears that there may be an issue of mis-response for some of the questions on farm labour.
- **Sampling error.** Any sample survey will be subject to sampling error as we take the survey responses and estimate what this means in terms of all farms in Wales.
- **Consistency over time.** The questions that we ask the farmers have been largely consistent since the last major re-design in 1998. Changes since then have largely been restricted to cosmetic changes to the form and changes to wording and guidance.
- **Cattle data.** Since the cattle data are taken from the registration of animals with the Cattle Tracing Service the quality issues are rather different. The cattle results are not affected by sampling or response issues. As with any administrative system the coverage will not be entirely perfect but it is extremely good. For this Release the main issue for cattle that there is a discontinuity in the series for dairy cows and beef cows when we change over from survey data to administrative data. The mismatch between the two series was considered in the release SDR 186/2007 (available on request).

The detail on how the estimates are produced is covered in detail in Annex A (Methodology) of this Release. However the method of estimation used is dependent on the amount of data that is available for the item being estimated.

Items such as sheep and grassland have data available in sufficient quantity to allow trends to be calculated between 2013 and 2014 to produce an estimate. In such cases it is possible to calculate the associated standard error and thus a confidence interval.

In cases where limited data is available (eg horticulture) any calculated trend is prone to being dominated by observed changes on a very small number of holdings (perhaps even a single holding). This would introduce an unacceptable standard error if the estimate were based on this trend. Instead an estimate is produced by combining the observed values in 2014 with the values from holdings with that activity in 2013 (excluding those who are known to have stopped production in the meantime).

A summary of the method used for producing estimates for the main items is shown in the table below:

Items	Method	Estimate	Responses	Share	C.I. (+/-)	RSE
Arable crops & bare fallow	T	85,034	1,174	31%	3,009	3.50%
Permanent grassland	T	1,047,916	5,851	28%	32,384	3.10%
New grassland	T	152,571	2,271	31%	4,940	3.20%
Rough grazing	T	257,055	1,208	28%	17,224	6.70%
Sheep	T	9,738,871	3,716	25%	142,956	1.50%
Pigs	N	28,370	408	76%	n/a	n/a
Poultry	N	8,997,200	1,901	80%	n/a	n/a

Glossary: Method – whether the estimate is derived using a trend from observed values (T) or from combining observed values direct with the previous year’s values where no response is available (N).

Responses – the number of forms received in June 2014 with a non-zero value for this item.

Share – the proportion of the estimate that is comprised of actual 2014 responses.

C.I. – the 95% Confidence Interval for the estimate (where a trend estimate has been produced)

RSE – the relative standard error for the estimate. As standard errors can be large (in value) for large estimates, dividing the error by the estimate produces a relative standard error (as a percentage) which is easier to interpret. The lower the value, the better the estimate.

Statistical theory tells us that the greater the number of observations that are used in producing an estimate, the more robust that estimate will be. Thus the estimates for more detailed items than those listed above will be less robust as they are based on fewer observed values.

It is worth noting that when considering pigs and poultry, the number of non-zero observations may be slightly misleading. These industries tend to have a relatively small number of large producers who account for the majority of the livestock. The number of producers in the table above is greatly inflated by a much larger number of very small producers whose contribution to the overall estimate is negligible. For this reason, the large pig and poultry producers are surveyed separately from the main June Survey. (More detail on this can be found in the Methodology section at Annex A).

There is a more detailed consideration of the data quality issues in “Agricultural Small Areas Statistics 2002 to 2012”.

<http://wales.gov.uk/statistics-and-research/agricultural-small-area-statistics/?lang=en>



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<http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>

## June 2014 Results for the Rest of the UK

The results of the June 2014 Agricultural Survey for the other UK countries were published or are announced to be published, on the following dates:

- **England** on 30 October 2014 by the Department of Environment, Food and Rural Affairs. It is published on the GOV.UK website (link below) :  
<https://www.gov.uk/government/statistics/farming-statistics-final-land-use-livestock-populations-and-agricultural-workforce-as-at-1-june-2014-england>
- **Scotland** on 7 October 2014 by the Scottish Executive Rural Affairs Department, Economics and Statistics Group  
<http://www.scotland.gov.uk/Publications/2014/10/6277>
- **Northern Ireland** on 28 August 2014 (Preliminary Results) by the Department of Agriculture and Rural Development for Northern Ireland. Final results are due for release in late November 2014.  
<http://www.dardni.gov.uk/index/statistics/statistical-bulletins/june-agricultural-census-2014-preliminary-results.htm>
- **United Kingdom** On 18 December 2014 by the Department of Environment, Food and Rural Affairs. Further details will be made available on the DEFRA website (www.defra.gov.uk) accessible through the Internet.

## Further Information

The data presented in this release are available in spreadsheet format and this can be downloaded from the same page on the Welsh Government website as this release. More detailed statistics for agriculture in Wales can be found on the statistics pages of the Welsh Government website. The statistics home page is shown on the front page.

Other than this release, the main outputs relating to agricultural statistics are listed below:

- **Welsh Agricultural Statistics:** an annual reference publication that contains information relating to a range of agricultural areas. This comprises data beyond that collected as parts of statistical surveys and consequently involves a great deal of preparatory work and collation.  
<http://wales.gov.uk/statistics-and-research/welsh-agricultural-statistics/?lang=en>  
*Next release due November 2015*
- **Farming Facts and Figures:** a much-abridged version of Welsh Agricultural Statistics that is intended as a quick reference for high level data. For this reason it is published in a hard copy format although the data is available on request. Farming Facts and Figures is also published annually.  
*Next release due June 2014.*
- **Agricultural Small Area Statistics:** this presents the most detailed results from the June Agricultural Census each year. To meet the increasing needs for detailed agricultural statistics, this bulletin outlines the trade-off between detail and data quality and provides the user with a data set which attempts to strike a balance between these ends.  
<http://wales.gov.uk/statistics-and-research/agricultural-small-area-statistics/?lang=en>  
*Next release due 20 November 2014.*

- **Farm Incomes in Wales:** this annual bulletin presents the results of the Farm Business Survey which is carried out by the University of Wales, Aberystwyth on behalf of the Welsh Assembly Government.  
<http://wales.gov.uk/statistics-and-research/farm-incomes/?lang=en>  
*Next Release 27 November 2014.*
- **December Survey of Agriculture:** historically this survey was run each December and collected information on numbers of livestock at that time (plus other incidental questions). The survey ceased after the 2012 survey as the important livestock information could now be obtained from administrative sources.

For further information on agricultural statistics for Wales, please contact Stuart Neil at the address shown on the front page. The Welsh Government has agricultural statistics for Wales, which are available over a long historical record.

More general information relating to agriculture can be found on the website of the Welsh Government's Department for Environment and Countryside:

**[www.countryside.wales.gov.uk](http://www.countryside.wales.gov.uk)**

## Annex A : Methodology

This section provides methodological notes on two aspects of the survey – the drawing of the sample for the survey and the raising of estimates for the population at the conclusion of the survey.

### Typology

Both the sampling and the result-raising for the survey are based on the stratification of holdings by farm size. This section describes how these size groups are arrived at.

At the conclusion of the previous year's survey we have estimates for all of the variables on the survey for Wales as a whole. These would be presented in last year's equivalent of this Release:

<http://wales.gov.uk/statistics-and-research/survey-agricultural-horticulture/?lang=en>

Following this, a detailed data set is constructed for all active holdings at the time of the survey. This would include holdings who were not sampled or who did not respond. In these cases it was necessary to impute values – this is covered on the later section on Imputation.

Having this data at holding level means that, for each individual holding we can calculate additional derived fields. These mainly focus on the farm type and farm size. There can be different measures of both and, within farm type, a hierarchy of farm types. It is not proposed to discuss these in this document as only one measure of farm size is relevant at this stage – the farm size, measured by European Size Unit (ESU).

In uncomplicated terms, the ESU is a measure of the economic turnover of the holding. All holdings that were active in the previous year will have data associated with it for land usage and livestock numbers.

The ESU for each holding is calculated by applying a coefficient to each variable in that holding's data, the outcome being the coefficient multiplied by the quantity of that variable present. In other words, a weighted sum of the number of livestock and areas of crops.

To help interpret this measure, the following table shows how many animals or how much land of a specific use is required to give a value of one European Size Unit. This is a brief selection of some of the main variables, intended to give an illustration.

ITEM	REQUIRED FOR 1 ESU	MEASURE
Sheep - breeding ewes	29.3	headcount
Cows - dairy breeding females	1.0	headcount
Cows - beef breeding females	3.1	headcount
Pigs - breeding sows	2.8	headcount
Pigs - others	63.2	headcount
Laying hens	271.3	headcount
Table chicken (broilers)	563.4	headcount
Wheat	1.4	hectares
Barley	1.6	hectares
Oats	1.2	hectares
Potatoes	0.3	hectares

For sampling and raising purposes, holdings are grouped into 6 size groups as follows:

SIZE GROUP	CRITERIA IN ESU
Zero ESU	ESU is 0
Very small	>0 and <8
Small	=> 8 and <40
Medium	=> 40 and <100
Large	=> 100 and <200
Very large	=> 200

These will be the size groups referred to in the remainder of the Methodology section.

### Sampling

With the exception of specialist pigs and poultry producers (covered below), the sample for the June Survey is a stratified one based on each holding's size group. The table below shows the proportions of the population that are sampled in each stratum.

SIZE GROUP	POPULATION SIZE	PROPORTION	NUMBER OF FARMS
Zero ESU	16,403	0%	0
Very small	14,226	33%	4,742
Small	6,479	40%	2,592
Medium	2,507	60%	1,504
Large	923	100%	923
Very large	436	100%	436

This framework excludes holdings with a zero ESU from the sample as, by definition, zero ESU means there is no agricultural activity on the holding (and thus little point in sending a form).

However a considerable number of holdings have not returned a survey form since before 2000. As activities may have changed since this time, it was decided that all such holdings should be sent a form (including those with an ESU of zero). This element of the sample consisted of 2,587 holdings.

These holdings were removed from the population before a random sample was drawn according to the proportions above:

SIZE GROUP	NEW POPULATION SIZE	PROPORTION	NUMBER OF FARMS
Zero ESU	15,522	0%	0
Very small	13,622	33%	4,541
Small	5,722	40%	2,289
Medium	2,177	60%	1,306
Large	902	100%	902
Very large	393	100%	393

This added a further 9,431 holdings to the sample.

Certain aspects covered by this survey consist of a small number of key/ main producers. Orchards and horticulture would be examples of these. In order to produce as robust an estimate as possible in these areas, the sample is augmented with additional known producers in these areas. This added a further 73 holdings to the sample.

The Agricultural Holdings Register is updated on a daily basis with new holdings being added, old holdings being de-activated and existing holdings being amended. Thus there are always going to be holdings that are active on the Register at the time that the sample is drawn but for whom we have no base data. This would mean they fall outside of the sampling frame detailed above. As a result, all such holdings are included in the sample (in order to obtain some base data for the following year). This added a further 478 holdings.

This section began by mentioning the exclusion of the specialist pig and poultry producers. These holdings have been excluded from the process outlined above. These specialists are identified as those holdings that, on their base data, have either 30 or more pigs or at least 1,000 poultry.

The nature of these producers is different from other areas of agriculture as the vast majority of the livestock are to be found on a relatively small number of holdings. In the case of pigs, 60 holdings accounted for over 70 per cent of the total population and in the case of poultry, fewer than 140 holdings accounted for 95 per cent of the total population.

These producers were sent a slightly different form. This form was shorter and focussed on these activities on the opening pages. The questions on other aspects of agriculture were more condensed than those listed on the main form. Some 217 holdings were included in this specialist exercise and this meant it was a lot easier to manage and monitor.

## **Validation of Survey Data**

All survey forms are returned to the Welsh Government where they are checked for basic errors (eg areas being given in acres and not hectares) and corrected where necessary. They are then sent for data capture and this data is then loaded for further validation checks.

Any data failing any of the validation rules is checked. After checking, the data may be corrected or it may found to be correct (and just outside the parameters of what would usually be expected). In the first case, it is hoped the correction will mean the amended data now passes validation. In the second case, the data value(s) are noted as accurate and allowed to stand.

At the close of the survey there will be some data which still have outstanding validation errors. Usually these will be where it has proved to be not possible to contact the farmer to resolve the matter.

## **Result raising**

The purpose of the raising process is to obtain estimates for the population totals of each item on the survey form. These estimates will include responders, non-responders and those holdings not surveyed. Result raising is carried out separately for each section of the form (eg crops, sheep, cattle).

The original method of raising involved calculating a trend between the sample data and the base data. This trend is then applied to the base data for the missing holdings (ie those who were not sampled or who did not respond). However, this method did not prove suitable for some questions on the form. These were in areas where there was a limited amount of sample data and/or base data. In these cases, a very small number of "outliers" (observations that are markedly different from their base data values) can have a profound effect on the estimate. (These would tend to be cancelled out or at least have a much smaller influence where larger amounts of data were available).

Therefore the variables are split into two groups. Those where there is sufficient data to be able to use the original raising method and those which are not. These groups are shown below - in most cases

listed by section than individual question. There is no numerical threshold in terms of the number of observations required to fall into one group or the other. The data itself neatly splits into areas where there are several hundred or thousand of observations and areas where there are relatively few (in most cases less than 100 and often less than 50).

SECTIONS/QUESTIONS THAT USE RAISING METHOD (WITH MANY OBSERVATIONS)	SECTIONS/QUESTIONS THAT USE MOST RECENT OBSERVATIONS (WITH FEW OBSERVATIONS)
Arable crops (13 questions)	Horticulture (6 questions)
Grass and other non-arable land (5 questions)	Pigs (12 questions)
Sheep (6 questions)	Poultry (8 questions)
Horses and goats (5 questions)	Farmed deer (1 question)

The simpler process is that using most recent observations so this method is described first. For each individual question, two lists of holdings are calculated. All holdings in June 2014 who have a (non-zero) value for that variable and an equivalent list from the previous year. These lists are then amalgamated. Any holdings that are no longer active are removed. Each holding is then assigned a value for that variable according to the following process:

The data provided in 2014 is taken where it is available

If there is no 2014 data then the 2013 value is taken

Note that holdings with a (non-zero) value in the previous year who returned a zero in 2014 will now be assigned that zero value. The final estimate is simply derived by totalling across all holdings. Note that no trend is applied (unlike in the raising method) because the paucity of data makes it impossible to calculate a sensible one.

The estimates produced by the raising method are calculated as follows. First all holdings that have outstanding validation errors are excluded from the raising process. Raising is carried out for individual questions at a time. It should be noted that only holdings with validation errors in that particular area being raised are excluded. That is to say, for example, if it was an estimate for sheep being raised, holdings with validation errors for crops would be included in the process.

In a similar manner to the validation errors, holdings that are thought to be outliers are excluded from the raising process. As mentioned above, outliers are holdings on which the change between the base value and the observed value may have a disproportionate effect on the raised estimate. Again only data relevant to the question being estimated are excluded. As this process is based on a relatively large number of observations, the effect of outliers is much diminished. Those outliers that are identified fall into two categories:

- i. those holdings where the base data is one of the largest values for that variable and the observed value is zero or a tiny proportion of the base value (or the other way round)
- ii. holdings in the larger size groups which exhibit very significant differences between the base and observed values. The larger size groups are focussed on in more detail as they contain far fewer holdings and an element of the raising concerns raising by individual strata (see below).

As mentioned previously, the raising is carried out for each individual item on the survey. After validation errors and outliers have been removed, the raising process involves producing two estimates by alternative methods.

The first estimate is derived by splitting holdings into their size group or strata and raising an individual estimate for each stratum. These estimates are then aggregated to produce the overall estimate for the item. The second estimate raises a single estimate for the item (irrespective of strata).



The two estimates, along with their associated standard errors, are then compared and the better (in most cases that with the lower error) is chosen. The data not included in the raising (validation errors and outliers) are then added to the selected raised estimate to produce the final estimate.

The exception to the above methodology is the section on farm labour. The changes from year to year for farm labour are different from those seen for land area and livestock. In the case of labour, the numbers observed are of a very low order (almost always between 0 and 4) and so any percentage change would be misleading (eg a holding going from 1 principal farmer to 2 would represent a 100 per cent increase).

Estimates for labour are based only on holdings where there is an actual observed value in both the current year and the base year (ie imputed values in the base year are not included, unlike for other sections). This method is referred to as "matched pairs". For each labour question, data is aggregated across all matched pairs and the trend between these two aggregates is calculated. This trend is then applied to the previous year's estimate.

## **Imputation**

Once results are published, the next step is to break the numbers down to a more detailed level. In order to be able to provide the most flexibility in analysing the results, the data is broken all the way down into individual holdings level. In order to do this, it is necessary to impute data for holdings who are still active but who either weren't sampled in the 2013 survey or who did not respond.

For these holdings, the trend observed on those holdings with returns in the current year is applied to the base value for each question in turn. Thus in aggregate, when combined with the actual observed values, the sum across all holdings will be very close to the published final estimate for that question. Slight differences will occur because of rounding (eg livestock numbers must be integers) and so some very small adjustments are made to the largest values to tally the total with the estimate.

By definition the exception to this process is cattle where the CTS data covers the entire population and thus no imputation is necessary.

**This process is not intended to produce accurate imputed data at individual holding level.** Clearly the changes on each holding that are not known about will be different. What we can be sure about is that in aggregate the imputed data will be a robust estimate. Further detail on the quality of the data can be found on page 17 of this release.