

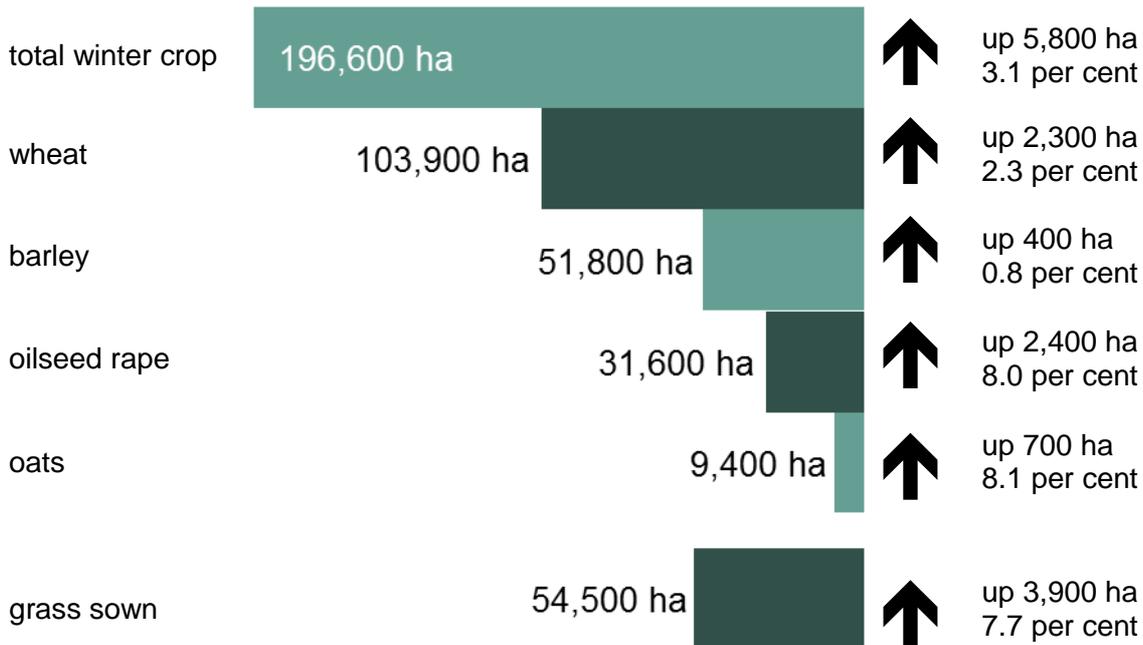
AGRICULTURE, ENVIRONMENT AND MARINE

Results from the 2016 December Agricultural Survey

16th March 2017

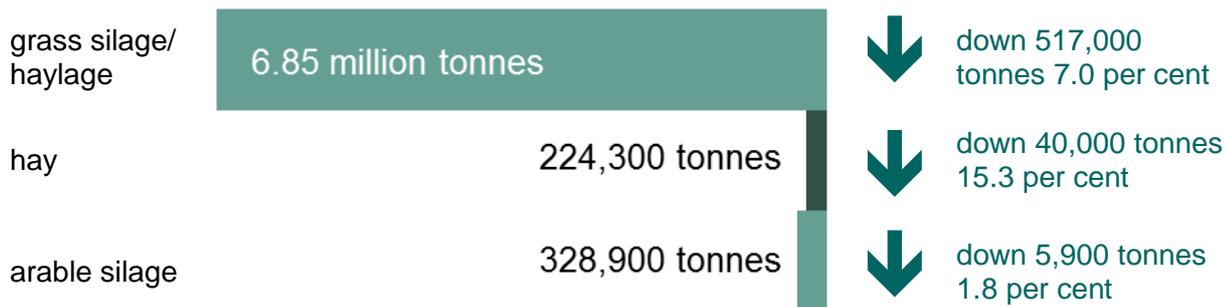
1. Main Findings

The areas planted in December 2016 increased compared to the previous year, with oilseed rape up eight per cent and wheat up two per cent. The area planted as oats was the largest in the last ten years. [source: Table 1](#)



Overall production of hay and silage decreased in 2016, due to a drop in the yields.

source: Table 1



The number of sheep, pigs and poultry rose for the second successive year, while the decrease in cattle reversed the upward trend seen in the previous two years.

source Tables 2-5

			Annual change compared to annual change seen in June
cattle	1.71 million	↓ down 23,900 1.4 per cent	larger decrease than in June
....beef cows	420,900	↓ down 3,600 0.8 per cent	larger decrease than in June
....dairy cows	174,700	↓ down 2,600 1.5 per cent	larger decrease than in June
sheep	5.04 million	↑ up 83,900 1.7 per cent	smaller increase than in June
pigs	367,800	↑ up 36,800 11.1 per cent	larger increase than in June
poultry	14.42 million	↑ up 1.00 million 7.5 per cent	smaller increase than in June

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2. Introduction

This publication contains results from the 2016 December Agricultural Survey, covering winter-sown crops, hay and silage production, livestock and machinery. It provides commentary and graphics on the latest annual changes, and trends over the past ten years, together with comparisons with June Census results.

Unlike the June Census, which collects results covering all agricultural holdings in Scotland, the results of the December Survey are derived from a representative sample of larger agricultural holdings only, involving about 15,000 holdings, and do not cover smaller agricultural holdings at all. These smaller agricultural holdings are generally those of less than one hectare in size, and in the June 2016 census accounted for only 9.3 per cent of agricultural land.

The results in this publication have, however, been scaled up to include an estimate for the smaller holdings (except where stated), in order that full comparison can be made with data from the June Agricultural Census.

For the second year, the December survey was merged with the Sheep and Goat Annual Inventory (SGAI). The Inventory goes to all sheep and goat keepers, and so any keepers not included in the December Survey sample were required to complete a separate form covering sheep and goat numbers. Therefore, in addition to sheep and goat data collected through December Survey forms, an additional 10,000 holdings were asked about sheep and goat data only, meaning sheep numbers are now fully representative. As usual, the cattle data are also obtained from the British Cattle Movement Service, giving a fully representative figure.

The surveys were again available online. This year, those who were using online SAF completion were sent email notification of the survey, rather than a paper form. However, if the online form was not initially completed, a paper form was sent as a reminder. Of those returning the December Survey or the Sheep and Goat Inventory, 33 per cent completed it online, compared with 13 per cent last year.

We welcome comments on the content or format of this publication at:

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3. Winter crops

Year-on-year comparisons between 2015 and 2016 December Survey results show:

- An increase in the area of **winter crops**, of 5,800 hectares (3.1 per cent) to 196,600 hectares. The figure is 0.5 per cent higher than the ten-year average of 195,700 hectares.
- An increase in winter **wheat** of 2,300 hectares (2.3 per cent) to 103,900 hectares. The figure is 3.0 per cent higher than the ten-year average of 100,900 hectares.
- An increase in winter **barley** of 400 hectares (0.8 per cent) to 51,800 hectares. The figure is 3.4 per cent lower than the ten-year average of 53,600 hectares.
- An increase in winter **oats** of 700 hectares (8.1 per cent) to 9,400 hectares. The figure is 24 per cent higher than the ten-year average of 7,600 hectares.
- An increase in winter **oilseed rape** of 2,400 hectares (8.0 per cent) to 31,600 hectares. The figure is 6.0 per cent lower than the ten-year average of 33,600 hectares.

Insight

In 2015, changes were made to the EU Common Agricultural Policy (CAP) support schemes. In particular, there was a requirement for crop diversification. This may have impacted upon winter planting choices, particularly the continued increase in oats.

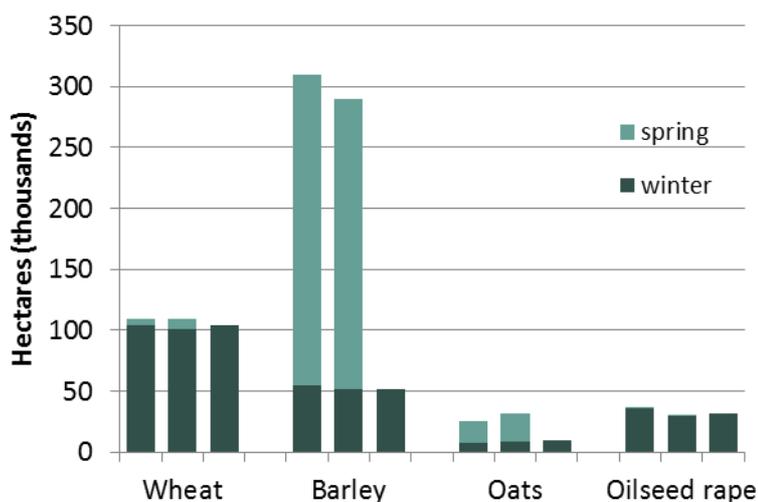
3.1 Winter or Spring?

Chart 1 illustrates winter and spring crop areas from the 2014/15 and 2015/16 growing years, together with the latest December 2016 data.

Spring varieties are prominent for barley and oats, with winter varieties prominent for wheat and oilseed rape.

Chart 1: Winter and Spring Crops

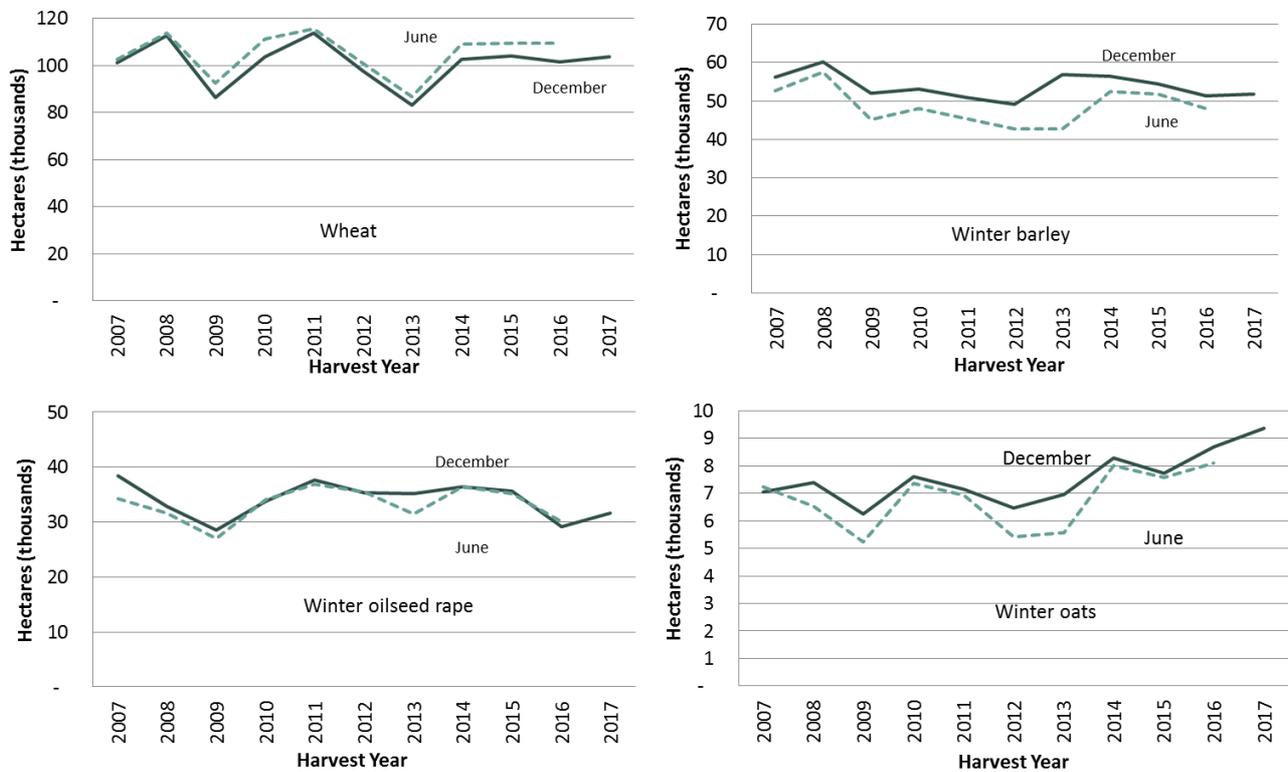
For each crop the chart shows the values at June 2015, June 2016, and then December 2016. The spring-planting values for the latest year are not yet known



The December Survey only provides the first indication of trends of winter sown crops. More comprehensive results are produced from the June Census in the following year.

Chart 2 shows trends in winter crops reported in the December Survey and the following June Census over the past ten years. Results are presented against the year of harvest, so for example the 2015 December Survey results are presented against June Census results from 2016.

Chart 2: Winter crops¹, December Survey and June Census by year of harvest



Insight

Final wheat figures are generally slightly higher than December figures due to small areas of spring wheat, or winter wheat sown after the start of December. Among other crops, the June figures for winter crops are often lower than those reported in December. This is likely to be due to poor weather conditions resulting in failed winter crops which are then re-sown as spring crops.

¹ Winter and spring varieties of wheat are not identified separately in the June Census as wheat is nearly all winter sown. The comparison in this chart is therefore between the December figure and the total June figure.

4. Hay and silage

Chart 3 shows the production of silage/haylage, hay and arable silage between 2006 and 2016. These results also include estimates for hay and grass silage/haylage production on minor agricultural holdings.

Year-on-year comparisons between 2015 and 2016 show:

- A decrease in **grass silage/haylage** production of 517,000 tonnes (7.0 per cent) to 6.85 million tonnes. The tonnage is 2.0 per cent lower than the ten year average of 6.99 million tonnes.
- A decrease in **arable silage** production of 6,000 tonnes (1.8 per cent) to 329,000 tonnes. The tonnage is 3.2 per cent lower than the ten year average of 340,000 tonnes.
- A decrease in the production of **hay** of 40,000 tonnes (15.3 per cent) to 224,000 tonnes. The tonnage is 18 per cent lower than the ten year average of 273,000 tonnes.

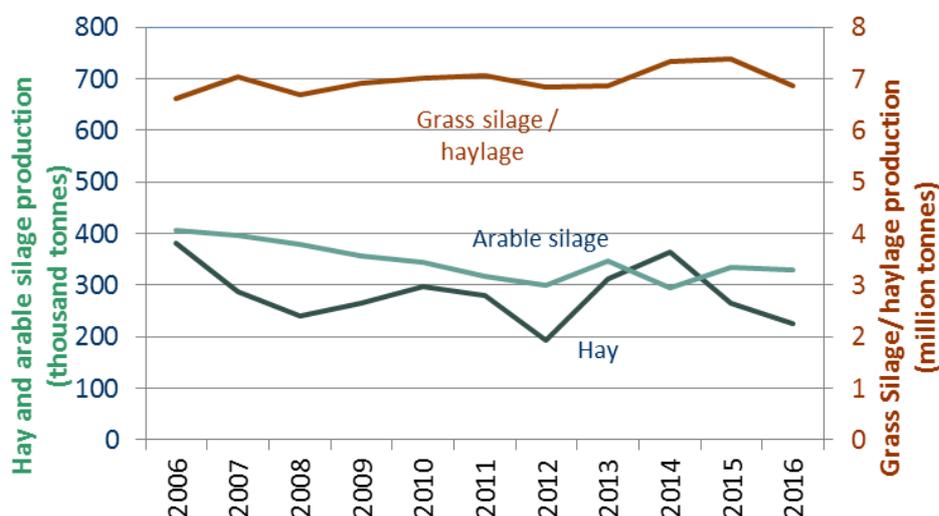
Insight

While there were no extreme weather conditions in 2016, there were less than ideal conditions at several times during the year, with few extended periods of sunshine. The reduction in hay and silage mirrors the poor cereal harvest also reported.

4.1 Production

In terms of total tonnage, grass silage/haylage accounted for 93 per cent of production in 2016, with arable silage four per cent and hay three per cent. However, this does not take into account dry matter and nutrient content, which is higher per tonne in hay and arable silage.

Chart 3: Production of hay, silage/haylage and arable silage², 2006 to 2016



Longer term trends show that the production of grass silage/haylage has remained fairly steady over the past ten years other than the higher than usual figures in 2014 and 2015. Arable silage production decreased between 2006 and 2012, but has fluctuated around 325,000 tonnes since. The hay figures show very strong weather effects, with a very low figure in 2012. In 2016, the hay production figure fell by

² Data on arable silage excludes holdings of less than one hectare which account for approximately 0.03% of arable land

40,000 tonnes (15 per cent) following less than ideal weather conditions.

4.2 Silage

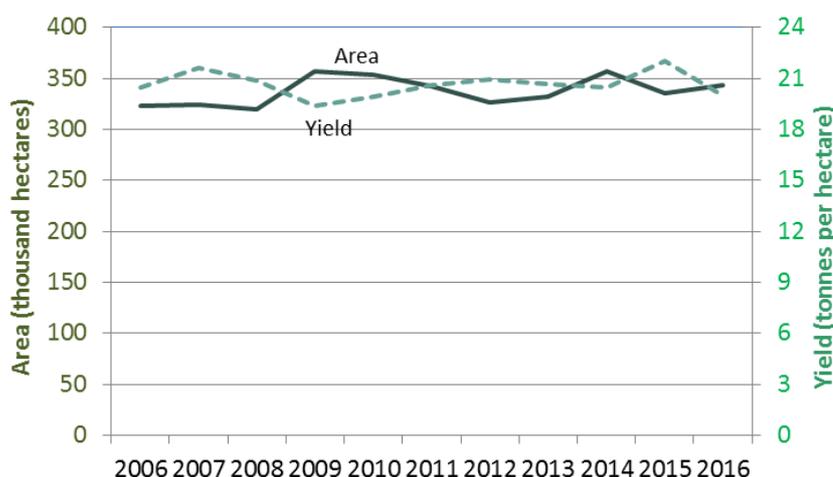
The production of silage is dependent on both the areas of grass cut and the yields per hectare. Chart 4 shows trends for areas and yields of grass cut since 2006. In 2016 the total area cut increased by 8,100 hectares (2.4 per cent) to 343,000 hectares (using the left hand axis).

However, a decrease in the yield (down from 22 to 20 tonnes per hectare, shown on the right hand axis) led to a decrease in the production of silage/haylage (down 517,000 tonnes (7.0 per cent) to 6.85 million tonnes).

For silage and haylage production, several cuts of grass can be taken from the same area in a single year.

The yields reported here correspond to total production, which incorporates all cuts of grass taken from the corresponding area. In 2016, the total area of grass reported on the December Survey for the production of hay, silage and haylage was 381,000 hectares. This represents 29 per cent of the 1.33 million hectares of grass area reported on all holdings in the 2016 June Census.

Chart 4: Area of grass cut for silage/haylage and yields 2006 to 2016



4.3 Hay

Chart 5 illustrates how the area of grass cut for hay has varied. After two years in 2013 and 2014 with relatively high areas grown, the area has been around 40,000 hectares.

Hay yields have fluctuated between six and seven tonnes per hectare over the past ten years. 2016 saw a fall in the yield to 5.8 tonnes per hectare after two years of yields around seven tonnes per hectare.

Chart 5: Area of grass cut for hay and yields 2006 to 2016



4.4 Arable Silage

Separate information on the area of arable silage is not collected on the December Survey, so it is not possible to produce a corresponding analysis of areas and yields. Production of arable silage will be determined by a range of factors. These include the areas of arable crops, which are collected on the June Census, but also decisions by farmers on how much of this crop to use for arable silage. This in turn may be determined by the quality of these arable crops, with poorer crops generally being used for animal feed, including arable silage.

4.5 Grass sown

Data for the area of grass sown are only available for larger holdings (generally at least one hectare), and results exclude smaller holdings which, in June 2016, accounted for approximately 5.1 per cent of the total area of grassland (temporary and permanent grass).

The area of grass sown on larger holdings in the last ten years has ranged between 41,000 and 60,000 hectares. In 2016 there was an increase from 2015 of 3,900 hectares (7.7 per cent) to 54,500 hectares. The total area sown at 1st December 2016 equates to four per cent of the total grass area on larger holdings at 1st June 2016 (1.26 million hectares). Of the total sown, 18,200 hectares was under-sown to cereal or other crops (grass and cereals grown together allowing grass to establish ready for autumn grazing whilst still giving a useful yield of grain) and 36,300 hectares was directly sown or reseeded.

5. Cattle

Year-on-year comparisons between 2015 and 2016 show:

- A decrease in **total** cattle of 23,900 (1.4 per cent) to 1.71 million – larger than the 0.1 per cent year on year decrease reported between June Census results. The figure is 3.5 per cent lower than the ten year average of 1.77 million.
- A decrease in the number of **beef** cows³ of 3,600 (0.8 per cent) to 420,900 – in contrast to no change between the 2015 and 2016 June Census results. The figure is 4.5 per cent lower than the ten year average of 440,900.
- A decrease in the number of **dairy** cows⁴ of 2,600 (1.5 per cent) to 174,700, a larger decrease than the 0.3 per cent decrease in the June Census results. The figure is 1.9 per cent higher than the ten year average of 171,300.

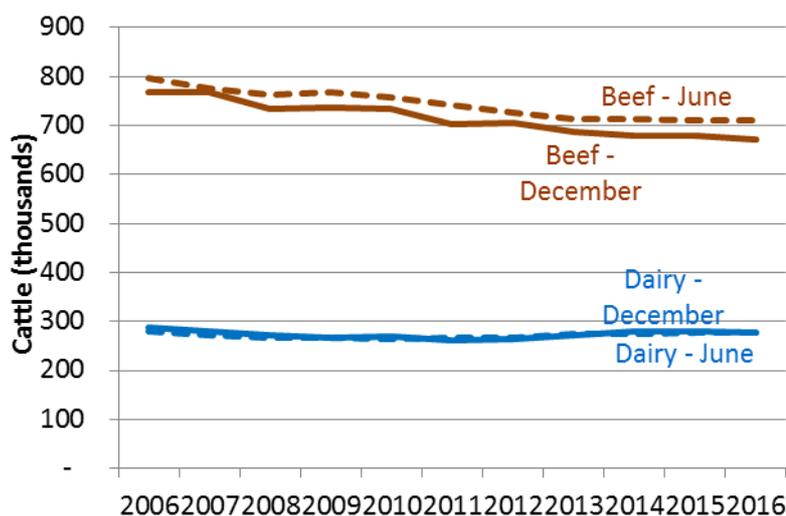
Insight

It is likely that short-term decisions regarding when to slaughter livestock, which may depend more on weather conditions and shorter-term price variations, are responsible for changes in beef numbers. June numbers have stabilised in recent years.

Relatively low milk prices and incentives to reduce herd size may have led to the slight drop in dairy numbers

Chart 6 gives a comparison of trends over the past ten years for the numbers of beef and dairy cattle⁵ from the December Survey and June Census. It shows that numbers vary little between December and June, though a greater seasonality is evident among beef cattle numbers.

Chart 6: Beef and Dairy cattle, June and December, 2006 to 2016



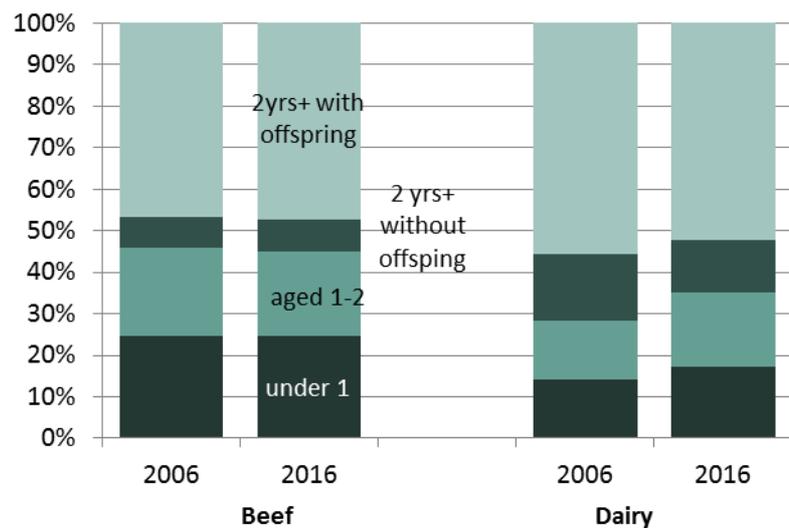
³ This refers to female beef cattle aged two years and over, with offspring. If all female beef cattle aged one year and over are considered, there was a 1.2 per cent decrease to 671,000.

⁴ This refers to female dairy cattle aged two years and over, with offspring. If all female dairy cattle aged one year and over are considered, there was a 0.6 per cent decrease to 277,000.

⁵ This chart includes all cattle aged one year and over.

Chart 7 shows the respective age profiles of beef and dairy cattle in December. While there has been a decline in the total number of beef cattle over the last ten years, the structure of the herd has been largely consistent. Among dairy cattle however, the relatively small fall in numbers over the last ten years has been driven by a fall in older cattle, while numbers of calves and dairy cattle aged between one and two have risen over the period.

Chart 7: Age profile of beef and dairy cattle, December 2006 and 2016



6. Sheep

From 2015, the collection of sheep data from the December Survey was combined with that for the Sheep and Goat Annual Inventory (SGAI). This causes two issues for the data which mean that comparisons with previous years should be made with caution:

- A different set of categories, meeting the minimum requirements of both surveys, means a break in the time series for the detailed data. While the categories were chosen so that four broad groupings remained comparable, it is clear from the results that this change has unreliably affected these data. This does not however affect the total.
- The slightly wider coverage of the SGAI resulted in an increase in the total number of sheep recorded.

While the total obtained from the 2015 survey was considered reliable, there appeared to have been some confusion around the categories. Category definitions on the 2016 forms were clarified, with this year's data looking more in line with previous years.

In 2016, there were

- 5.04 million sheep on holdings in Scotland. This was an increase of 1.7 per cent.
- 1.83 million lambs. This was 1.3 per cent larger than the average number between 2006 and 2014 of 1.81 million
- 2.91 million ewes and lambs used for breeding in 2016/17. This was 3.3 per cent smaller than the average number between 2006 and 2014 of 3.01 million

7. Pigs

Year-on-year comparisons between 2015 and 2016 December Survey results show:

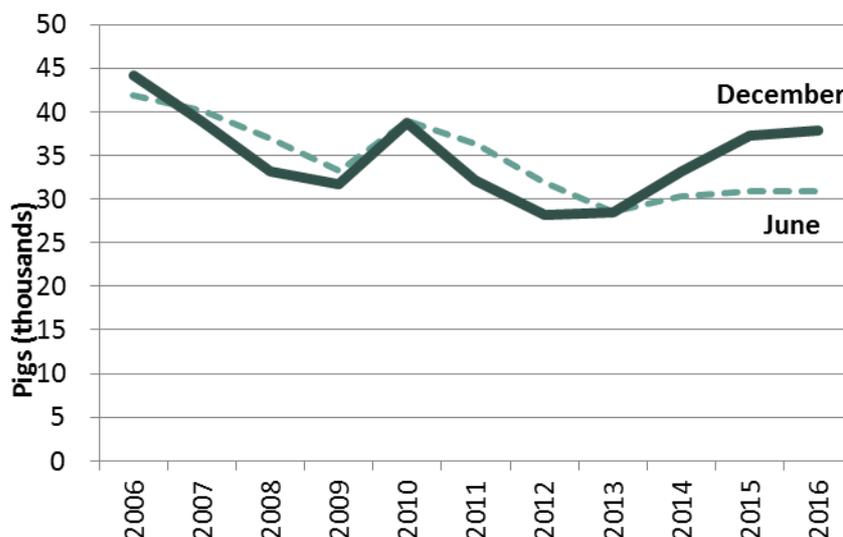
- An increase in the **total** number of pigs of 36,800 (11.1 per cent), up to 367,800. This was larger than the 3.9 per cent annual increase reported in the 2016 June Census results. The figure is 0.9 per cent larger than the ten year average of 364,500.
- An increase in **breeding** pigs of 500 (1.4 per cent) up to 37,800 – again, larger than the 0.4 per cent annual increase reported in the 2016 June Census results. The figure is 11 per cent higher than the ten year average of 33,900.

Insight

There has been some restructuring in the industry resulting in larger numbers of weaners being fattened in Scotland rather than being moved to elsewhere in the UK.

Chart 8 shows trends over the past ten years for breeding pigs from the December Survey and June Census. After several years of decline, breeding pig figures increased between 2013 and 2015. 2016 saw a small year-on-year increase.

Chart 8: Breeding pigs, June and December 2006 to 2016



8. Poultry

Year-on-year comparisons between 2015 and 2016 December Survey results show:

- An increase in the **total** number of poultry of 1.00 million (7.5 per cent) to 14.42 million – similar to the 8.1 per cent annual increase reported in the 2016 June Census results. The December figure is four per cent higher than the ten year average of 13.81 million.
- An increase in the number of **broilers** of 1.07 million (19.1 per cent) to 6.67 million – larger than the 14.9 per cent increase reported in the 2016 June Census results. The figure is 9.2 per cent lower than the ten year average of 7.35 million.
- A decrease in birds for **laying** eggs for eating of 90,000 (1.4 per cent), with the number of layers falling to 6.51 million – compared with a 3.5 per cent increase in the 2016 June Census results. The figure is 25 per cent higher than the ten year average of 5.21 million.
- An increase in **breeding** birds of 56,000 (5.1 per cent), with the number rising to 1.15 million – larger than the 0.3 per cent increase reported in the 2016 June Census results. The figure is 2.4 per cent lower than the ten year average of 1.17 million.

Insight

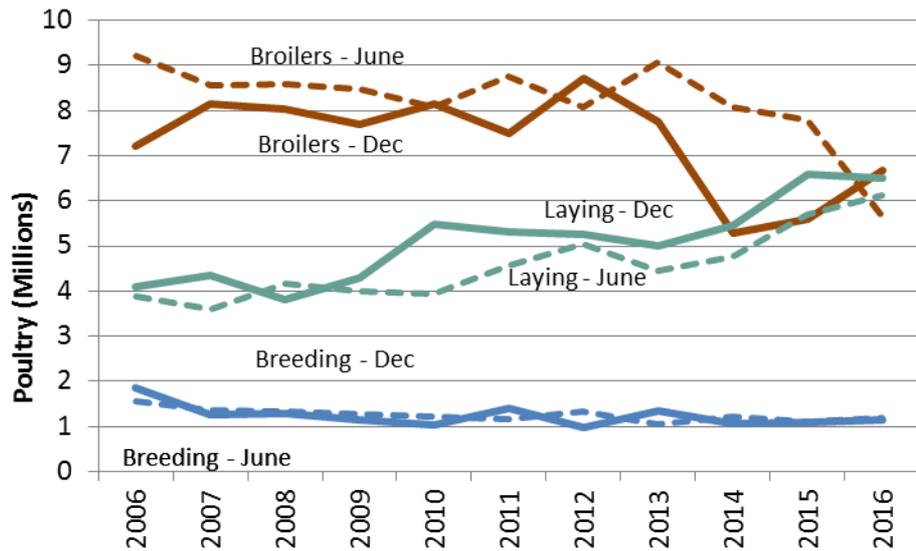
Significant restructuring in the broiler industry resulted in poultry numbers decreasing markedly in 2014/15, but then recovering in 2016. In the longer term, layer numbers have been increasing, with, in 2015, layers outnumbering broilers. (Contrast this with 2008 when there were 8.0 million broilers to 3.8 million layers). In 2016, broiler numbers recovered, exceeding layers in both the June and December counts. These changes have also been reflected in the income figures published in January.

Chart 9 shows trends over the past ten years from the December Survey and June Census for broilers (used for meat production), laying fowls (used for egg production) and breeding birds (used to produce broiler and layer chicks). It should be noted that there is some inherent variability in the annual poultry data, which can be affected by short-term operational factors.

For some years, the chart shows large differences in the number of broilers and layers between June and December. This variability can occur if large poultry units reduce the number of birds on their holdings over the survey date, for operational reasons such as the cleaning of premises. Also the poultry production cycle is very short compared to other livestock, which provides producers with the flexibility required to change production levels in response to market conditions.

Over the past ten years total poultry numbers have fluctuated around 14 million. However since 2013 there has been a drop in the number of broilers, and an increase in the number of poultry for laying eggs.

Chart 9: Poultry, June and December 2006 to 2016



Broilers fluctuated around 8 million until 2013, since when broiler numbers fell. There were 6.67 million broilers in December 2016.

The figures for laying fowls had been steady at about four million until 2009, before increasing noticeably to over five million in 2010, a level which was maintained through 2013, before increasing again recently. Over the ten year period the December Survey results show an increase of 2.42 million (59 per cent).

The trends in the annual number of breeding birds have been fairly constant with the December Survey and June Census both averaging about 1.2 million birds over the ten year period.

9. Machinery

Information on machinery is only collected through the December Survey (of larger holdings only, generally greater than one hectare) and not the June Census. This means that we have been unable to scale figures up for smaller holdings, as we do not have a proxy measure to use from the June Census. The results published here relate therefore only to the larger holdings.

In the past, and with the exception of tractors and transport vehicles, machinery data were divided into two sets of categories, so that different categories were collected in odd and even years. From December 2015, all categories of data are now collected, but are not collected in as much detail as previously. Figures on milking parlours are also added for the first time in 2015.

These changes have been made with the aim of producing more consistent annual data, however it appears to have affected comparison with previous years' data for all machinery and transport categories. This is possibly because in previous years, in the absence of all categories, respondents may have put some of their machinery in the category that best fitted.

Changes in the number of holdings classified as large enough to be covered by the December Survey will also have affected the amount of machinery included in the survey.

In December 2016, on the 23,200 larger holdings in Scotland, there were 41,100 wheeled tractors and 20,700 transport vehicles.

Insight

When considering trends in machinery, it is also worth noting that there has been a real terms increase in the value of agricultural contract work being carried out over the past ten years (about 47 per cent, unpublished background data used in '[Total Income from Farming Estimates for Scotland, 2014 to 2016⁶](#)'). If it is the case that there are more holdings using contractors and their machinery to carry out certain work, it is possible that this may have led to a decrease in some of the machinery categories observed in the survey results.

⁶ www.gov.scot/stats/bulletins/01261

10. Notes

10.1 Background

This publication contains results for the December Agricultural Survey for 2016 and includes trends for the last ten years where available. Where appropriate, comparisons have been made between results of the December Survey and the June Agricultural Census.

10.2 Uses of the information

The December survey is conducted for a range of purposes. The statistics help the government to form, monitor and evaluate policy, and to assess the economic well-being of the agricultural sector.

Most of the data collected is required by the Statistical Office of the European Communities, specifically Council Regulation No 1165/2008 which sets out requirements for provision of cattle, pig, sheep and goat statistics in both May/June and November/December. It defines the category, age or weight of livestock for which statistics are to be provided and specifies the provision of quarter-year or half-year production forecasts. There is also a separate EC Regulation covering the provision of winter crops. This information is collated by Defra (Department for Environment, Food and Rural Affairs) for submission at member state (UK) level.

December Survey results are not as widely used as results from the June Census as the survey only covers larger holdings, generally of at least one hectare, whereas the June Census is representative of all agricultural holdings in Scotland. However, December results supply supplementary information not available through the June census on machinery, winter livestock levels and grass sown as well as detail on hay and silage production.

Some examples detailing how the December Survey data are or have been used are:

- Estimates of Total Income From Farming (TIFF), which are used to measure the value of agricultural productivity in Scotland. The December Survey, which gives approximately end-year livestock numbers, are more useful for the calculation of calendar-year production. For example, although the June Census records the number of lambs present in summer each year, it does not (on its own) give an indication of the volumes of finished sheep and lambs that are being processed within the calendar year.
- It is also useful to monitor livestock maintained for the next breeding season and winter crops in December so that the farming industry can better understand what to plan for in the coming year.
- The data on machinery that is collected on the December Survey is also used to help estimate some of the input costs incurred within Scottish agriculture (for example, machinery repairs, depreciation, fuel and asset worth).

- The December Survey contributes to the formulation and publication of UK statistics on agriculture. These publications are coordinated by Defra. More details are available here.

www.gov.uk/government/collections/structure-of-the-agricultural-industry

Results from the December survey are available to the public as follows:

This statistical publication is available for download from the Scottish Government website along with previous releases of December Survey results:

www.gov.scot/Topics/Statistics/Browse/Agriculture-Fisheries/PubFinalResulsDecCensus

Headline results for TIFF (mentioned above) are published each January. These can be accessed as follows:

www.gov.scot/Topics/Statistics/Browse/Agriculture-Fisheries/ResultsTIFFFI

Economic Report on Scottish Agriculture (ERSA) is a compendium publication containing detailed statistics on Scottish agriculture, combining further information from Total Income From Farming (TIFF – see above for more details), Farm Accounts analysis (income and expenditure statistics by different farm types) and additional statistics/analysis from the June census.

www.gov.scot/Topics/Statistics/Browse/Agriculture-Fisheries/PubEconomicReport

10.3 Methodology – Data collection

Since 2015, the December Survey has incorporated collection of data for the Sheep and Goat Annual Inventory (SGAI). This involves 14,700 December Survey forms requesting data on land, livestock and machinery data (including questions on sheep and goats) in addition to 9,800 holdings requesting only sheep and goat information. Holdings completing December Survey forms were selected using stratified random sampling where the sampling frame comprised of a list of all the larger (generally over one hectare) holdings in Scotland stratified by farm size and region as measured through the 2016 June Census. This spread is intended to ensure a good representation across the country and by farm size. Optimal allocation was used to calculate the sample size required in each strata in order to maximise precision of results. Following this, a random sample is selected from each strata. The sample was topped up with holdings which were included in the previous December survey (2015) but didn't respond.

The results are based on information returned from approximately 10,100 holdings, providing a response rate of 69 per cent for the December Survey. There were also 7,700 returns from holdings receiving the SGAI form only, providing a response rate of 78 per cent. Together with holdings responding to the sheep question in the December Survey form, this means that the overall response rate for the sheep question was 77 per cent.

From 2015 respondents have been able to complete their December Survey (and SGAI) online. In 2015 there were 2,200 online responses, which increased in 2016 to 6,100, accounting for a third of all survey returns.

10.4 Methodology – Non-response

In Scotland there are around 51,900 agricultural holdings registered with the Scottish Government. We use these register details to maintain a full holding-level data set of Scottish agriculture for statistical purposes. This provides us with virtually complete coverage of agricultural activity in Scotland. However, please note that:

- we very rarely conduct a full census of holdings as this would place an unnecessary burden on farmers;
- for the selected holdings that are surveyed, not all farmers return data to us;
- where we have gaps in our holding level data set, we maintain records by producing estimates.

The December Survey is representative of larger holdings (generally over one hectare in size around), of which there were 23,200 at June 2016. Estimates are produced for those holdings which were (a) large enough but not sampled, (b) surveyed but did not provide a response, and, for some variables, (c) smaller holdings.

Two stages of estimation are undertaken to calculate the December results where holdings are not included in the sample, or do not return data:

(i) For items collected both in the June Census and December Survey (livestock items and winter crops), a trending technique is applied to estimate the current year December values. The holdings are divided into strata using farm size and region. Where holdings have reported for both surveys, the total change between June and December for holdings within individual stratum are calculated. These rates of change are then applied to June Census results.

From 2013, the trending methodology was refined to provide improved estimates to account for the fact that holdings often report farming a particular crop or livestock in either the December Survey or June Census only. The previous method will have partially suppressed these trends. A time series for all items has been provided back to 2008, calculated using the new methodology. For years prior to 2008, the previous estimates have been adjusted by the percentage difference between the old and new methodologies.

(ii) For items only collected in December, such as machinery, arable silage production and grass sown, data in each strata are simply scaled up proportionally to account for non-response/inclusion in order to calculate estimates for all of those larger holdings within the scope of the survey. Note that the number of holdings classified as larger holdings will change from year to year, which will affect the scaled up figure. We are unable to scale figures up for smaller holdings as we do not have a proxy measure to use from the June Census. However, for hay and grass silage/haylage this is possible, based on proportions of grass grown recorded in the June Census.

10.5 Collection of Cattle Data through the Cattle Tracing System

Statistical data on cattle populations have historically been collected through the June Census and December Survey in Scotland. In order to reduce the burden on survey respondents' data for the December Survey has been obtained through the Cattle Tracing System (CTS), an administrative data source held by the British Cattle Movement Service (BCMS) which holds records of cattle numbers and movements across Great Britain. These were used for the first time in Scotland in the publication of results from the 2013 June Agricultural Census.

More information about CTS data, particularly in relation to the differences between CTS data and data collected via paper forms prior to 2013 can be found in section 4.5 of the publication '[Results from the December Agricultural Survey, 2013](#)'⁷.

10.6 Collection of Sheep and Goat Data through the Annual Sheep and Goat Inventory

In order to reduce the burden on survey respondents, data collection for the December Survey and the Sheep and Goat Annual Inventory (SGAI) were merged for the first time in 2015. A section requesting sheep and goat data was incorporated into the December Survey form, while shorter forms asking just about sheep and goats were used for remaining businesses understood to keep sheep. Use of SGA I data allows for a more complete data collection and eliminates the need for separate data collections.

10.7 Data Quality

Data undergo several validation processes as follows; (i) checking for any obvious errors on the paper census forms upon receipt, (ii) auto-checking and identifying any internal inconsistencies once loaded onto the initial database, (iii) auto-checking for any sudden changes in comparison with previous annual returns and other holdings, (iv) assessing any trends or switches in item areas or quantities that look unreasonable.

If necessary, farmers are contacted to ensure data are correct. Additional quality assurance is provided at the later stages by utilising expert knowledge within the Scottish Government and the agriculture industry. The opportunity to complete the December Survey and SGA I form online was made available for the first time in 2015, incorporating in-form validation in order to minimise errors in completion.

10.8 Main sources of bias and other error

The December Survey will be subject to **measurement bias** since we are reliant on farmers completing the form accurately. Ideally livestock counts should be undertaken to ascertain precise numbers of animals but, given time constraints, exact numbers of livestock are likely to be estimated. This bias will impact particularly on sub categories of livestock (e.g. weight categories for pigs or ages of

⁷ www.gov.scot/Publications/2014/03/6349/4

cattle) rather than the total population for a livestock type. Other categories likely to be estimated by farmers include the tonnage of hay and silage produced in the year.

Guidance notes detailing what to include on the form are supplied to avoid farmers misreporting information. With regards to livestock, we require farmers to report those animals located on the holding that are either owned by the farmer or animals that are owned by someone else but are held under formal contract. It has been noted that animals are sometimes double counted in situations where animals are held under contract with both the owner of the livestock and the farmer looking after the livestock reporting the animals. To avoid this double counting we have added specific guidance on the form itself in attempt to avoid this **reporting bias**.

The survey may also be subject to an element of **non-response bias** with farmers on certain farm types being more likely to respond to the survey than others. This means that we need use older information to estimate values for farm types less likely to supply us with current information.

A stratified random sample, grouped by farm size and region, is used to select holdings for the December survey. Individual strata are sampled to different extents. However, in estimating the results we weight by strata in order to produce a full dataset and to counteract the effects of some strata being sampled to a greater degree than others. This helps to address any **sampling bias** that is inherent in the sample design.

10.9 Survey burden

In December 2011, a representative sample of around 110 farmers participated in a telephone survey in order to calculate the burden of participating in the December survey. It was not considered beneficial to repeat this survey each year, however we do have updated figures for hourly rates⁸ which we can apply to the time data from the 2011 survey. These give a total compliance cost for the December Survey of **£68,700**. It should however be noted that since the 2011 survey there have been several changes, namely the removal of the requirement to report cattle data on the form, reducing the burden for approximately 5,700 holdings, but added information on tenancy for approximately 4,300 holdings⁹.

In addition, from this year, the December Survey incorporated the Sheep and Goat Annual Inventory (SGAI) which amounted to a reduction in the estimated total compliance cost for the two surveys of **£6,347** since around 5,600 holdings no longer had to complete two surveys. Please refer to the December 2011

⁸ Annual Survey of Hours and Earnings (2016 provisional) – full-time median gross hourly pay in Scotland.

⁹ Data from these holdings will be published in 'Tenanted Agricultural Land in Scotland, 2015/16' scheduled for release in April 2016.

publication¹⁰ for details on how this figure was calculated and the range of times reported.

10.10 Other publications

The next large agricultural survey is the June Census of agricultural holdings. This is a larger exercise which surveys around 33,000 holdings with results scheduled for publication in October 2017. Results for the 2017 December survey will be released in Spring 2018.

Results from all Scottish Government agricultural surveys can be accessed here:

www.gov.scot/Topics/Statistics/Browse/Agriculture-Fisheries/Publications

Results from previous June Censuses can be accessed here:

www.gov.scot/Topics/Statistics/Browse/Agriculture-Fisheries/PubFinalResultsJuneCensus

Publications relating to cereal and oilseed rape production can be accessed here:

www.gov.scot/Topics/Statistics/Browse/Agriculture-Fisheries/PubCerealHarvest

Agricultural Facts and Figures pocketbook. This provides a useful summary of the key statistics in the Scottish agriculture and food sector in a convenient pocketbook format.

www.gov.scot/Topics/Statistics/Browse/Agriculture-Fisheries/PubFactsFigures

¹⁰ <http://www.gov.scot/Publications/2012/03/7513>

Appendix of tables

AGRICULTURAL STATISTICS: RESULTS OF DECEMBER 2016 AGRICULTURAL SURVEY

Table 1 Crops and grass area, hay and silage production, 2006 to 2016

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	% Change between 2015 & 2016
Crops and grass sown by 1 December												
(hectares) ⁽¹⁾												
Wheat	101,093	112,602	86,270	103,627	113,852	97,396	82,947	102,570	103,905	101,519	103,855	2.3%
Barley	56,305	60,182	52,034	53,174	50,929	49,222	56,977	56,411	54,353	51,368	51,804	0.8%
Oats	7,045	7,401	6,242	7,593	7,146	6,459	6,957	8,272	7,721	8,667	9,370	8.1%
Oilseed rape	38,376	32,810	28,536	33,737	37,622	35,304	35,146	36,328	35,580	29,206	31,556	8.0%
Total winter crops	202,819	212,995	173,081	198,132	209,550	188,382	182,027	203,581	201,559	190,760	196,585	3.1%
Grass sown ⁽¹⁾	57,098	46,440	40,812	57,761	58,586	47,060	45,576	60,329	54,119	50,584	54,503	7.7%
Grass cut (hectares)												
For hay	56,562	44,770	40,783	41,029	44,851	45,351	32,768	52,238	52,531	37,026	38,421	3.8%
For silage / haylage	323,294	324,674	319,553	356,279	353,018	342,443	326,148	332,069	357,375	334,893	343,009	2.4%
Production (tonnes) ⁽²⁾												
Hay	382,515	287,661	239,107	265,490	297,440	279,225	193,084	311,055	363,689	264,671	224,262	-15.3%
Grass silage / haylage	6,616,171	7,026,086	6,675,729	6,917,005	7,022,007	7,057,747	6,824,878	6,864,937	7,320,429	7,370,147	6,853,340	-7.0%
Arable silage ⁽²⁾	406,313	396,353	379,041	356,545	343,923	316,520	298,938	346,561	294,507	334,745	328,876	-1.8%
Yields (tonnes/hectare)												
Hay	6.8	6.4	5.9	6.5	6.6	6.2	5.9	6.0	6.9	7.1	5.8	-18.3%
For silage / haylage	20.5	21.6	20.9	19.4	19.9	20.6	20.9	20.7	20.5	22.0	20.0	-9.2%
Number of main holdings ³	26,740	26,063	25,272	26,188	26,545	23,943	24,373	24,693	21,807	23,323	23,240	
Agricultural area on main holdings ³	5,318,080	5,317,550	5,297,565	5,328,898	5,344,808	5,326,948	5,273,855	5,326,792	5,246,086	5,227,446	5,226,033	

(1) Grass sown excludes minor holdings, which account for approximately 5.1% of total grassland

(2) Arable silage excludes minor holdings, which account for approximately 0.8% of crops

(3) Figures for grass sown and arable silage are based on estimates for all main holdings, the numbers of which change from year to year.

AGRICULTURAL STATISTICS: RESULTS OF DECEMBER 2016 AGRICULTURAL SURVEY

Table 2 Number of cattle, 2006 to 2016

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	% Change between 2015 & 2016
Female Dairy Cattle												
Aged 1-2	47,689	47,001	46,590	49,312	50,839	51,255	53,652	55,864	56,071	57,068	59,436	4.1%
Aged 2 years and over - with offspring	186,535	182,764	174,539	169,836	167,753	162,112	162,605	167,386	174,458	177,262	174,676	-1.5%
Aged 2 years and over - without offspring	53,725	50,999	49,484	48,684	49,443	48,547	48,113	47,311	49,034	44,327	42,771	-3.5%
Total	287,949	280,764	270,613	267,832	268,035	261,914	264,370	270,561	279,563	278,657	276,883	-0.6%
Female Beef Cattle												
Aged 1-2	216,744	215,415	207,710	202,174	192,822	182,636	190,377	184,958	182,685	186,419	180,878	-3.0%
Aged 2 years and over - with offspring	477,076	471,440	448,508	451,634	459,701	449,607	431,422	428,504	422,923	424,507	420,917	-0.8%
Aged 2 years and over - without offspring	75,200	80,420	78,914	81,717	82,516	71,489	83,765	72,817	72,565	68,957	69,661	1.0%
Total	769,020	767,275	735,132	735,525	735,039	703,732	705,564	686,279	678,173	679,883	671,456	-1.2%
Male Cattle												
Aged 1-2	219,964	212,637	209,026	205,268	197,404	188,584	189,788	190,483	182,149	185,633	179,136	-3.5%
Aged 2 years and over	53,751	55,787	53,457	56,525	53,873	47,579	49,502	54,183	55,894	51,842	49,627	-4.3%
Total	273,715	268,424	262,483	261,793	251,277	236,163	239,290	244,666	238,043	237,475	228,763	-3.7%
Calves												
Female dairy cattle under 1	47,986	48,440	50,421	52,167	52,440	55,005	56,999	56,583	58,948	60,599	57,713	-4.8%
Female beef cattle under 1	253,278	246,857	237,414	226,464	229,106	231,681	223,804	213,856	218,248	218,546	220,548	0.9%
Male cattle under 1	283,676	274,505	269,502	265,548	269,186	269,056	265,415	252,694	257,957	260,937	256,792	-1.6%
Total	584,940	569,802	557,337	544,179	550,732	555,742	546,218	523,133	535,153	540,082	535,053	-0.9%
Total cattle	1,915,624	1,886,265	1,825,565	1,809,329	1,805,083	1,757,551	1,755,442	1,724,639	1,730,932	1,736,097	1,712,155	-1.4%

AGRICULTURAL STATISTICS: RESULTS OF DECEMBER 2015 AGRICULTURAL SURVEY

Table 3 Number of sheep, 2006 to 2016¹

	2006	2007	2008	2009	2010	2011	2012	2013	2014	change in data collection	
										2015	2016
Sheep 1 year old or over											
Ewes kept for breeding	3,154,831	3,087,769	2,938,365	2,880,901	2,831,403	2,791,010	2,847,481	2,796,462	2,930,534	2,883,076	2,797,741
Other sheep	256,061	261,071	238,290	210,530	216,511	210,971	236,120	242,600	208,884	724,943	416,224
Total	3,410,892	3,348,840	3,176,655	3,091,431	3,047,914	3,001,981	3,083,601	3,039,062	3,139,418	3,608,019	3,213,965
Sheep under 1 year old											
Lambs put to ram	92,884	94,821	77,286	100,538	101,481	109,357	91,496	85,670	108,599	127,946	116,527
Lambs not put to ram	1,900,264	1,883,396	1,761,153	1,652,160	1,645,203	1,577,481	1,733,373	1,638,973	1,593,396	1,223,638	1,713,018
Total	1,993,148	1,978,217	1,838,439	1,752,698	1,746,684	1,686,838	1,824,869	1,724,643	1,701,995	1,351,584	1,829,545
Total sheep	5,404,040	5,327,057	5,015,094	4,844,129	4,794,598	4,688,819	4,908,470	4,763,705	4,841,413	4,959,603	5,043,510

(1) From 2015, the collection of sheep data incorporated that via the Sheep and Goat Annual Inventory. This also resulted in a change in the sheep categories, and increased the number of holdings included within the survey. From 2016, the sheep categories were made more similar to years prior to 2015. However, comparisons with previous years should be made with caution.

AGRICULTURAL STATISTICS: RESULTS OF DECEMBER 2016 AGRICULTURAL SURVEY

Table 4 Number of pigs, 2006 to 2016

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	% Change between 2015 & 2016
Breeding herd												
Sows in pig	31,597	27,923	23,476	23,001	27,048	22,378	17,874	18,408	21,172	26,502	26,789	1.1%
Gilts in pig	4,696	4,460	4,053	3,893	5,299	4,438	4,588	4,863	5,850	6,615	6,017	-9.0%
Other sows for breeding	7,886	6,420	5,650	4,872	6,315	5,346	5,661	5,226	6,178	4,160	4,992	20.0%
Total	44,179	38,804	33,179	31,766	38,662	32,162	28,123	28,497	33,200	37,277	37,798	1.4%
Barren sows for fattening	693	1,032	517	526	540	603	731	569	408	605	816	34.9%
Gilts 50kg and over, not in pig but expected to be used for breeding	4,474	4,117	4,114	4,227	5,112	5,063	5,149	5,906	5,503	6,891	4,905	-28.8%
Boars being used for service	1,393	1,360	1,194	1,248	1,524	1,307	1,150	1,201	1,018	961	964	0.3%
All other pigs												
110kg liveweight and over	6,085	4,724	4,722	6,375	6,181	3,506	3,456	3,003	4,822	6,243	4,696	-24.8%
80kg and under 110kg liveweight	61,551	64,038	50,746	69,803	66,895	61,656	52,283	42,217	47,680	49,471	51,385	3.9%
50kg and under 80kg liveweight	103,631	98,842	78,629	85,187	91,385	85,145	70,684	59,089	63,074	63,239	68,834	8.8%
20kg and under 50kg liveweight	119,267	109,592	102,615	99,926	100,134	96,019	83,623	78,442	72,988	75,133	88,699	18.1%
Under 20kg liveweight	120,111	119,119	106,386	90,867	105,696	90,832	78,892	74,544	93,441	91,171	109,702	20.3%
Total	410,645	396,316	343,098	352,158	370,291	337,158	288,938	257,295	282,005	285,257	323,316	13.3%
Total pigs	461,385	441,629	382,102	389,925	416,129	376,293	324,091	293,468	322,134	330,991	367,799	11.1%

AGRICULTURAL STATISTICS: RESULTS OF DECEMBER 2016 AGRICULTURAL SURVEY

Table 5 Number of poultry, 2006 to 2016

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	% Change between 2015 & 2016
Fowls for producing eggs for eating												
Pullets & hens in the laying flock:												
- Hens in first laying season	3,099,396	3,187,669	3,021,831	3,083,474	3,819,339	3,952,681	3,813,267	3,571,694	4,455,178	4,769,148	4,846,722	1.6%
- Moulded hens	37,919	44,671	39,100	46,110	44,040	41,682	42,227	43,511	43,516	43,244	45,288	4.7%
Pullets being reared for laying	947,183	1,114,577	759,142	1,149,717	1,605,772	1,330,404	1,412,285	1,385,991	967,221	1,785,675	1,616,152	-9.5%
Total	4,084,497	4,346,917	3,820,073	4,279,301	5,469,151	5,324,767	5,267,779	5,001,196	5,465,915	6,598,067	6,508,162	-1.4%
Fowls for breeding												
Breeding hens	1,737,734	1,154,501	1,165,922	1,026,827	924,492	1,263,033	878,033	1,215,233	937,916	963,433	1,019,624	5.8%
Cocks	107,633	109,842	123,630	108,861	101,351	143,496	94,324	136,513	123,376	127,043	126,939	-0.1%
Total	1,845,367	1,264,343	1,289,552	1,135,688	1,025,843	1,406,529	972,357	1,351,746	1,061,292	1,090,476	1,146,563	5.1%
Broilers and other table birds	7,210,040	8,139,412	8,027,373	7,698,459	8,146,495	7,483,899	8,725,482	7,740,664	5,295,250	5,605,893	6,674,880	19.1%
Other Poultry (e.g. turkeys, ducks, geese)	70,157	34,541	46,931	58,168	57,192	72,450	92,020	93,773	88,474	120,824	89,295	-26.1%
Total poultry	13,210,060	13,785,214	13,183,929	13,171,616	14,698,681	14,287,645	15,057,638	14,187,379	11,910,931	13,415,260	14,418,900	7.5%

AGRICULTURAL STATISTICS: RESULTS OF DECEMBER 2016 AGRICULTURAL SURVEY

Table 6 Number of tractors and other transport on main holdings, December 2006 to 2016 ^{(1) (2)}

	detailed transport questions asked in alternate years									summary questions asked	
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Tracklaying tractors (Caterpillars)	number 379	number 465	number 759	number 654	number 803	number 604	number 579	number 706	number 561	number 729	number 841
Wheeled tractors:											
under 35 hp	2,994	2,313	2,415	2,230	2,442	2,102	2,258	2,179	2,277	2,353	2,485
35 to under 55 hp	7,112	7,044	6,813	6,847	6,789	6,145	6,371	6,129	5,799	6,203	5,544
55 to under 80 hp	10,478	10,237	10,000	9,160	8,852	8,125	7,580	7,323	7,060	7,250	7,384
80 to under 108 hp	13,997	13,325	13,202	13,229	12,935	12,154	12,120	11,569	11,158	11,497	11,406
108 to under 134 hp	5,560	5,753	5,986	6,287	6,585	6,694	6,873	6,817	7,192	6,798	7,213
134 hp and over	2,686	3,313	3,757	4,244	4,587	5,004	5,481	5,991	6,276	6,892	7,035
Total wheeled tractors	42,827	41,985	42,173	41,997	42,190	40,224	40,683	40,008	39,762	40,993	41,067
of which:											
tractors under 10 hp	306	:	:	:	:	:	:	:	:	:	:
tractors 201 hp and over	:	236	280	435	461	539	684	812	896	941	1,104
4-Wheel drive tractors	22,941	22,660	26,091	26,661	27,557	25,895	26,438	26,374	26,792	26,984	27,629
Transport²	21,509	22,221	21,758	23,246	22,967	24,278	23,802	24,196	27,687	19,909	20,666
Number of main holdings ¹	26,740	26,063	25,272	26,188	26,545	23,943	24,373	24,693	21,807	23,323	23,240
Agricultural area on main holdings ¹	5,318,080	5,317,550	5,297,565	5,328,898	5,344,808	5,326,948	5,273,855	5,326,792	5,246,086	5,227,446	5,226,033

: Information not available

(1) Figures for tractors and transport are based on estimates for all main holdings only, the numbers of which change from year to year.

(2) From 2015, only summary transport data was collected (as opposed to data for individual sub-categories). Comparisons with previous years should be made with caution. See section 9 of the publication for more information.

(3) From 2007 the groups used to collect tractor power information were changed. A separate category for tractors of 201 hp and over was created, and the "under 10 hp" and "10 to under 35 hp" groups were combined.

Table 7 Machinery, 2006 to 2016 ⁽¹⁾⁽²⁾

	detailed questions asked in alternate years									summary questions asked	
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
	number	number	number	number	number	number	number	number	number	number	number
Cultivation	50,663	49,105	47,808	47,439	46,714	45,824	45,006	43,694	41,657	38,411	39,621
Planting and Fertiliser Distribution	32,154	30,842	29,941	29,796	29,468	28,915	28,254	27,348	25,370	23,594	23,393
Field crop or fruit sprayers	4,568	4,398	4,228	4,261	4,293	4,362	4,431	4,136	3,841	4,653	4,530
Combine harvesters	4,517	4,438	4,358	4,256	4,153	4,182	4,210	4,047	3,884	3,813	3,811
Harvesting	46,899	45,859	44,669	43,932	43,575	42,912	41,398	39,931	34,465	27,609	28,999
Load handling and Transporting	59,590	58,610	58,154	57,917	57,713	57,612	56,472	54,970	47,711	40,376	40,453
Drying and storage	4,793	4,739	4,684	4,525	4,365	4,254	4,142	4,012	3,882	3,391	3,434
Mounted hedge cutters	1,013	833	838	843	877	910	994	1,077	1,106	1,181	1,134
Drainage and ditching equipment	3,697	3,627	3,556	3,675	3,794	3,759	3,723	3,652	3,580	4,372	4,404
Feed mills, feed mixers and combined mill/mixers	3,515	3,358	3,200	3,196	3,192	3,108	3,023	2,895	2,767	3,367	3,533
Milking parlours	:	:	:	:	:	:	:	:	:	987	956
Cattle weighing crushes	2,523	2,442	2,379	2,315	2,403	2,491	2,411	2,331	2,780	2,818	3,229
Stand-by generators	5,247	5,309	5,371	5,404	5,436	5,298	5,160	5,077	4,993	5,636	5,921
Number of main holdings ¹	26,740	26,063	25,272	26,188	26,545	23,943	24,373	24,693	21,807	23,323	23,240
Agricultural area on main holdings ¹	5,318,080	5,317,550	5,297,565	5,328,898	5,344,808	5,326,948	5,273,855	5,326,792	5,246,086	5,227,446	5,226,033

(1) Figures for tractors and transport are based on estimates for all main holdings only, the numbers of which change from year to year.

(2) From 2015, only summary machinery data was collected (as opposed to data for individual sub-categories). Comparisons with previous years should be made with caution.

See section 9 of the publication for more information.

: not available - question on milking parlours introduced in 2015

A National Statistics publication for Scotland

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