

**RESAS**

Rural & Environmental Science  
and Analytical Services



Scottish Government  
Riaghaltas na h-Alba  
gov.scot



# June Agricultural Census 2020: Final Results

## Methodology



This document provides a summary of quality-related information on the final June Agricultural Census 2020 results.

The information is based on the European Statistical System (ESS) quality framework: Relevance; Accuracy; Timeliness and Punctuality; Accessibility and Clarity; and Comparability.

The Scottish Government adheres to the Code of Practice for Official Statistics and the Government Statistical Service (GSS) Quality Strategy. In addition, the Scottish Government provides its own guidance on quality, which is available to view at the Scottish Government's Statistics internet pages.

Further information on quality:

- [Code of Practice for Official Statistics](#)
- [Government Statistical Service Quality Strategy](#)
- [Scottish Government's Corporate Policy Statement](#)
- [Scottish Government Guide to basic quality assurance](#)
- [European Statistics Code of Practice \(including quality framework\)](#)

## **Relevance**

The content of the census and any changes to it are agreed with a range of Scottish Government divisions and, where necessary, through wider consultation. The survey provides data used by both the Scottish Government and the EU to assess agricultural activity, in the monitoring and development of policy.

## **Uses of the information**

The census is conducted for a wide range of purposes. The statistics help the government to form, monitor and evaluate policy, and to assess the economic well-being of the different agricultural sectors. Most of the data collected are required by the Statistical Office of the European Communities. Equally important is the regular contact with farmers, which enables the department's register to be kept up to date. This means, for example, that information on new animal health requirements, or new subsidy schemes can be quickly directed to relevant farmers.

Most of the data collected are required by the Statistical Office of the European Communities, specifically Council Regulation 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 and half-year production forecasts. There is also a separate EC Regulation covering the submission of winter crops. This information is collated by the Department for Environmental and Rural Affairs (Defra) for submission at member state (UK) level.

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

to estimate the total income from farming, as part of the Scottish GDP figures and to compile the National Accounts for the UK.

to model various scenarios and analyse outcomes/impacts on Scottish agriculture in relation to a range of options on the future of support for Scottish Agriculture.

to provide disease and epidemiology modellers with a snap-shot of livestock numbers and locations (at 1st June) to assist with real-time and emergency planning procedures for animal disease outbreaks.

UK ammonia and greenhouse gas inventories – the census provides Scottish agricultural land and livestock data.

to support work on various research packages such as assessing the potential impact of CAP (Common Agricultural Policy) reform on payments to farmers; early environment effects on animal health and welfare; assessing the effectiveness of measures to manage water quality and control diffuse water pollution.

The census is also used by the main research providers working for the Scottish Government on numerous projects and underpins the majority of the analysis and research that is carried out, and to provide sampling frames for this research. In some cases it is also used to identify holdings for receipt of important and relevant information by mail, subject to the terms of Agriculture (Retained EU Law and Data) (Scotland) Act 2020.

## **EC regulations**

The EC demands that each member state collect agricultural statistics every year, enforced through a number of EC regulations relating primarily to crops and livestock. Specific regulations are listed on pages 11 to 13 of our annual statistics plan; a link is provided [here](#).

These regulations are legally enforceable by the EC, meaning that member states must comply with the data collection requirements in order to avoid financial penalties. The EC requirements remain during the Brexit Implementation period. In Scotland, the June census is the main survey that is used to meet these requirements as part of providing a response to the EC at a UK level.

We also use the June census to contribute to the formulation and publication of UK statistics on agriculture. These publications are co-ordinated by Defra and more details are available [here](#).

## **June Census outputs**

Results from the June census are available to the public as follows:

The Annual Abstract of Statistics presents a time series from 1982 onwards which also contains some additional detail on selected items (common grazing, land tenure etc.). It is available to download as a spreadsheet along with this publication and can be accessed [here](#).

The outputs from the census on livestock and crops are also used as key inputs to the Total Income from Farming (TIFF) model, which is used to estimate the value of agricultural productivity in Scotland. Headline results are usually published each January with more detailed analysis presented in the Economic Report on Scottish Agriculture (ERSA) tables, which are published in May or June of each year. Results for TIFF can be accessed [here](#).

The Economic Report on Scottish Agriculture (ERSA) is a compendium publication which contains detailed statistics on Scottish agriculture. It contains three sections covering, (i) Total Income From Farming (TIFF – see above for more details), (ii) Farm Accounts analysis (income and expenditure statistics by different farm types) and (iii) additional statistics/analysis from the June census e.g. more detail is provided on the structure and composition of Scottish agriculture in terms of the types of activity on holdings, additional geographic analysis is provided along with some UK comparisons. Since 2017 this is no longer an annual publication, but a full set of tables are published each year. Please note the 2019 release of ERSA was postponed. The publication will return as normal in 2020. The Economic Report on Scottish Agriculture can be accessed [here](#).

The Agricultural Facts and Figures pocketbook provides a useful summary of the key statistics in the Scottish agriculture and food sector in a convenient pocketbook format. The online version of the Facts and Figures pocketbook is available [here](#). The printed pocketbook is usually distributed at the Royal Highland Show. Please note that, due to the cancellation of the show in 2020, the pocketbook was not produced in 2020.

## Data Collection

The June Agricultural Census is conducted annually by the Scottish Government's Rural and Environmental Science Analytical Services division (RESAS).

Data for the June census is collected from three main sources:

i) **June Census Form:** In a normal Census year, RESAS go out to around 35,000 holdings and usually receive around 22,000 returns. This year, in light of the COVID-19 restrictions and to reduce the burden on farmers, RESAS initially conducted the census as a voluntary, online-only survey. The move to online-only reduced the sampling frame to around 18,000 holdings. As expected due to the voluntary nature of the survey, the response rate was lower than in previous years. Consequently, as restrictions lifted, RESAS sent paper Census forms to around 10,000 holdings in a targeted follow-up exercise designed to ensure as large a coverage of the key variables as possible whilst minimising the number of farms contacted. In total, around 11,400 census forms were returned.

ii) **Single Application Form (SAF):** Land data were extracted from the Single Application Form (SAF) database for around 22,800 holdings that are claiming under the Basic Payment Scheme (BPS). For SAF holdings we effectively receive 100 per cent response for all land items.

iii) **Cattle Tracing Scheme administrative source:** All cattle data (including data on cattle breeds) were collected from the Cattle Tracing Scheme administrative source. Farmers are required by law to register any births, deaths and movements of their cattle to the British Cattle Movement service who maintain an online database. More information can be found online [here](#). By using this data source we effectively have 100 per cent coverage, even for those smaller holdings that were not selected for inclusion in the census.

Table 1 shows the coverage of 2020 returns compared to those in June 2019 for some of the key census variables. It can be seen that the use of SAF and CTS data means that the level of coverage for both cereals and cattle remains almost complete. For the categories captured mainly through the census form, the targeting of larger farms and key variables has meant that, while the number of holdings captured by the census is noticeably down on 2019, the coverage of animals remains comparatively high.

**Table 1: Comparison of responses in June 2020 compared to June 2019**

	June 2019		June 2020		2020 Response compared to 2019	
	Holdings	Ha / Number	Holdings	Ha/ Number	Holdings	Ha/ Number
Cereals	7,673	427,302	7,409	423,836	97%	99%
Cattle	10,976	1,727,728	10,697	1,713,437	97%	99%
Sheep	9,228	4,723,355	5,431	3,713,547	59%	79%
Poultry	3,394	12,364,261	1,741	10,577,546	51%	86%
Pigs	605	244,785	352	236,087	58%	96%

## Online Data Collection

Since 2017 respondents have been able to complete their census online, through the Rural Payments and Services website. This year, all holdings for which we hold a contact email address were sent email notification to complete the survey. In total, 6,915 holdings returned online data. For future surveys RESAS will make more of a push to increase online response rates.

## Accuracy

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, and (iv) assessing farm-level trends between years and 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.

## Treatment of non-response

In Scotland the registered details of the 50,966 agricultural holdings are used to maintain a holding-level dataset of agriculture for statistical purposes. This provides a virtually complete coverage of agricultural activity in Scotland. However, please note that:

- as noted above, we do not conduct a full census as this would place an unnecessary burden on farmers.
- for the holdings that are surveyed, not all farmers return data to us.
- gaps in our holding-level data set are 'maintained' by producing estimates.

Estimates are produced for holdings which were (i) not surveyed and (ii) surveyed but did not provide a response, either to the whole form or to certain questions. Holdings are divided into strata (using farm type and 'economic' size) and estimates are made (using ratio estimation) for non-responders within each separate stratum. Estimates are restricted to a maximum of +/- 2.5% change on the previous year for each holding, in order to avoid artificial distortion in the overall statistics. Artificial distortion can occur when large actual changes in a small number of holdings within a stratum are applied to non-response holdings in the same stratum.

Within each stratum, land, livestock and labour values for non-response holdings are calculated by looking at those holdings that returned data in 2020 and calculating the percentage change since their previous census responses. These percentages are applied to the non-responders' previous data for the corresponding years. That is, if a given non-responder last returned data in 2015, the percentage change for holdings returning data in both 2015 and 2020 is calculated, and this is applied to the 2015 data for the non-responder to give an estimate for 2020. Labour figures are rolled forward using the most recently returned data.

These changes in the method of imputation were introduced for the 2014 Census. More information on these changes can be found in that year's publication.<sup>1</sup>

## Amendments between provisional and final results:

Between the initial provisional results, published in early October, and final results published in December, there have been a number of changes in the results. The main reasons for the differences are outlined below:

- i) The main difference in the figures is due to RESAS undertaking a data cleaning exercise that removed holdings where there was evidence to suggest they had stopped farming. This removed around 1,400 farms from the dataset and has had a small impact on the results for 2020. The methodology used to identify these farms used a live database and it was not possible to remove potentially inactive farms from past years in the time series.

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<sup>1</sup> <https://www2.gov.scot/Topics/Statistics/Browse/Agriculture-Fisheries/PubFinalResultsJuneCensus>

ii) The final results include a small number of additional returns received after the deadline from the provisional figures.

iii) The time series for poultry has been updated to reflect new information from a poultry provider that some poultry figures have been wrongly categorised in the past. This impacts on the number of pullets being reared for laying and the number of breeding hens. In addition, further investigation of the provisional protected vegetable estimate revealed an element of double counting which has been resolved. The affected figures are footnoted in the relevant tables.

## **Comparability**

Results have been published with a ten year time series where possible for comparison. Where required, data tables includes notes to make users aware of any potential issues with data comparisons. Further explanations of the larger issues is provided below:

### **Migrant labour estimates**

Migrant labour estimates are not available as part of the final results. The migrant labour estimates produced from the Census are usually provided with a note of caution and the disruptions to this year's collection mean that the data collected do not allow reliable estimates to be calculated.

The research study 'Farm workers in Scottish agriculture: case studies' found that the numbers usually reported in the Census are likely to be an undercount. As noted in the study, 'it is challenging to estimate the extent of seasonal migrant labour use in Scotland for a variety of reasons: (i) variation in the proportion of labour directly employed on farms compared to that indirectly employed through labour providers; (ii) incomplete estimates of seasonal migrant labour provision in administrative databases; (iii) farm businesses leasing their land to specialist growers who undertake all of the farming activity; (iv) the transitory nature of some migrant labour – working on multiple farms'. In light of the findings of the study, the method of collecting migrant labour statistics will be reviewed. The study included some estimates of migrant worker numbers for 2017 and can be accessed [here](#).

### **Livestock Estimates**

The reliability of poultry estimates is affected by the availability of returns from a small number of large poultry producers and year on year changes should be viewed with some caution.

For sheep 1 year and over, since 2016 there has been a considerable decrease in those to be used for breeding and an increase in the number of other sheep. This was investigated and found to be a fairly widespread amongst holdings with sheep and seems to reflect a genuine change.

Prior to 2013, statistical data on cattle populations were collected through the June census and December survey in Scotland. In order to reduce the burden on survey

respondents, cattle data has been obtained through the Cattle Tracing System (CTS) since June 2013, with data from 2006 onwards being published. CTS, an administrative data source held by the British Cattle Movement Service (BCMS), records cattle movements across Great Britain.

Usable data from the CTS is only available for Scotland from 2006. For those years where both census and CTS data were available (2006 to 2012), CTS numbers were, on average, 3.2 per cent higher than that collected through the census.

### **Full tenancies and seasonal tenancies**

The methodology for calculating holdings with rented land and full tenancy arrangements was refined in 2014. In order to calculate a breakdown of tenancy types and associated areas, in cases of non-response, data from the most recently returned data was used. In addition, information returned in 2014 on holdings for which there was previously no tenancy type information available was applied to data for 2013. Additional information from the Crofting Commission has also been applied to data for 2013 and 2014. Estimates for remaining cases of non-response were calculated by applying proportions from actual responses to those holdings with rented land for which no tenancy type information was available. Further work was carried out in 2015 to validate data on Small Landholder Act Tenancies, which has led to a reduction in the estimated number of holdings.

Due to changes in the Single Application Form, data on seasonal tenancies were not available this year. It is hoped that we will be able to collect data in future years. Data on seasonal tenancies was previously published in '[Tenanted Agricultural Land in Scotland 2014](#)<sup>2</sup> .

### **Changes resulting from use of administrative data from the Single Application Form**

Since 2009, data on land use has been obtained from the **Single Application Form** (SAF). These data were combined with land use data from all the other holdings, collected through June Census forms, to generate overall June Census results. This development led to a substantial reduction in statistical data collection and an overall improvement in the quality of land use statistics. In 2020, SAF data was obtained for 22,800 agricultural holdings.

Changes were made in 2015 to the ways in which **rough grazing, woodland, other land and seasonally let land** were collected on the SAF. This has affected the level of detail available in these land use categories for some holdings while data on seasonally let land data could not be collected. In 2015 to 2017 woodland and other land were disaggregated by imputing values for land parcels based on information supplied in 2014. These were becoming less reliable estimates with each passing

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<sup>2</sup> <https://www.gov.scot/publications/tenanted-agricultural-land-scotland-2014/>

year, so from 2018 onwards an estimate for the two categories combined has been provided.

In 2015, the definitions of temporary and permanent grass were changed on the SAF. From 2015, temporary grass relates to whether it has been reseeded in the last five years, whereas previously it related to how long it had been used for grass. The new definition only includes land that is included in a holding's crop rotation. This means changes between 2014 and 2015 in **grass under 5 years old**, and **grass 5 years and older** do not represent genuine changes in land use, but instead differences in how grass data were recorded.

A change in the collection of data on strawberries and raspberries led to some discontinuities between 2010 and 2011 and between 2011 and 2012.

## **Comparison with other UK nations**

The other UK nations each run a similar survey of Agriculture in June. The Department for the Environment and Rural Affairs (DEFRA) co-ordinates a UK level publication. Links for comparison are provided below:

[England](#)

[Wales](#)

[Northern Ireland](#)

[United Kingdom](#)

## **Timeliness and Punctuality**

Provisional results were published just over four months after the census date, on 6<sup>th</sup> October. Final results were published on 15<sup>th</sup> December. The census date was set at 1st June 2020, with returns requested by 31<sup>st</sup> July. The follow-up paper exercise had a return date of 31<sup>st</sup> August. Forms were still being received through September, when the census was closed to finalise provisional results. Forms received after closure of the census for the provisional results are incorporated into these final results and will be used for imputation of next year's census.

## **Accessibility and Clarity**

These statistics are made available online at the Scottish Government's statistics website in accessible formats (html and pdf versions are available). Data tables are made available in excel to allow users to carry out further analysis. Anonymised farm-level datasets may be made available to recognised research organisations.

Methodological notes and additional notes to tables, identifying specific quality issues, are included in this document, which is available online and linked to from all National Statistics outputs containing agricultural census results. Links to the Agriculture Statistics series of outputs are available from the Gov.uk website, [www.gov.uk](http://www.gov.uk).

## **Related Scottish Government publications**

The next large agricultural survey will be the 2020 December Survey of agricultural holdings. This is a smaller exercise which surveys around 15,000 of the larger holdings, and, since December 2015, has been combined with the Sheep and Goat Annual Inventory. Results will be published in spring 2021.

Statistics on the production of meat, milk, eggs and other livestock products are published in the Economic Report on Scottish Agriculture (ERSA). These can show different trends in livestock numbers to those shown above, as they are also dependent on factors such as production yields and international trade in livestock for finishing and slaughter. ERSA also provides statistics on the price and value of livestock and other agricultural outputs. Since 2017 it exists as spreadsheet tables only. The latest data can be accessed [here](#).

Results from all Scottish Government agricultural surveys can be accessed [here](#)

Results from previous June censuses can be accessed [here](#)

Publications relating to cereal and oilseed rape production can be accessed [here](#)

## **User Feedback**

Though we are not aware of any unmet user needs in relation to these statistics, the Scottish Government is always interested to here from users about what is most relevant to them and welcomes feedback from users of these statistics. Contact details are available on the back page of the publication.

## **Respondent Burden**

In 2014 around 110 farmers were asked over the telephone for an estimate of the total time it took them to fill in the December Survey form itself as well as the time taken to read guidance notes, count livestock or consult business records containing information required to fill in the form etc.

A median time of 30 minutes was derived from this survey of farmers in December and is the figure used as the baseline for calculating respondent burden for the June Census. Calculations for estimating respondent burden for the June Census are based on the assumption that the partial form completed by those also submitting a Single Application Form (SAF) takes around the same time to complete as the December Survey form, while the full June Census form takes twice as long. It has also been assumed that completing the online versions of the forms takes about the same length of time as the paper versions.

The table below employs formulae based on guidance given by the Scottish Government Statistics group. It is estimated that farmers spent 8,730 hours completing the June Census forms in 2020 at a cost of £130,400:

**Table 2: Estimated cost of responding to June Census 2020**

Number of responses (partial form)	5,823
Median time taken to respond in hours	0.5
<b>Time taken to respond to partial form in hours</b>	<b>2,912</b>
Number of responses (full form)	5,818
Median time taken to respond in hours	1
<b>Time taken to respond to full form in hours</b>	<b>5,818</b>
Total hours taken to respond to forms	8,730
Hourly rate of typical respondent*	£14.94
<b>Total cost of responding to June Census forms</b>	<b>£130,426</b>

\* 2018 Annual Survey of Hours and Earnings (ASHE) - Table 3.5a Median "Full Time Gross" hourly pay for males and females (provisional results – Full time tab, Scotland total median)