

**RESAS**

Rural & Environmental Science  
and Analytical Services

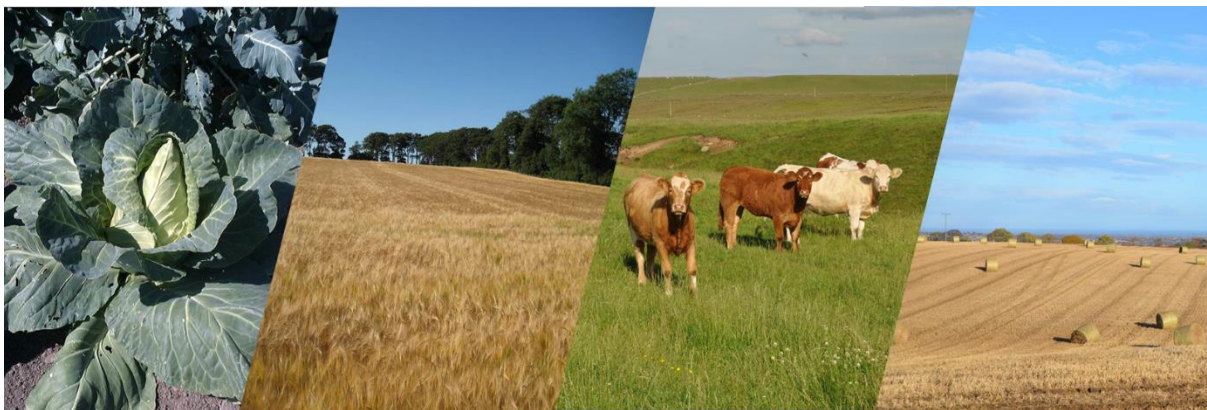


Scottish Government  
Riaghaltas na h-Alba  
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# June Agricultural Census 2021

## Methodology Report



This document provides a summary of quality-related information on the June Agricultural Census 2021 results.

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 Guide on producing official statistics](#)

## 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 the Scottish Government, industry bodies and researchers to assess agricultural activity, and 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. 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.

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 the data are used to identify holdings which either hold livestock or grow crops. This is for the purposes of ensuring public, animal and plant health, or as part of legal or planning proceedings in accordance with the Agriculture (Retained EU Law and Data) (Scotland) Act 2020 Section 17.

## **UK and International reporting requirements**

The data from June census are used 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](#). The UK figures are also used to meet the UK's reporting requirements to the United Nations' Food and Agriculture Organisation.

## **June Census outputs**

As well as through the June Census publication, 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. The latest Economic Report on Scottish Agriculture can be accessed [here](#).

## Data Collection

The June Agricultural Census is conducted annually by the Scottish Government's Rural and Environmental Science Analytical Services division (RESAS). Data are requested from all holdings who submitted a Single Application Form (SAF) in the previous year, together with some other large businesses that would not be eligible for support payments. A sample of holdings which didn't submit a SAF or who didn't return a form last year were also sent a census form.

Data for the June census is collected from three sources:

Land data were extracted from the Single Application Form (SAF) database for around 22,700 holdings that are claiming under the Basic Payment Scheme (BPS). Holdings that submitted a SAF in 2021 were also sent a cut-down census form (21,400 forms) to collect the additional data on livestock and labour.

From the remaining holdings that did not complete a SAF in 2021, 13,500 (potentially including holdings that submitted a SAF for the first time in 2021) were sent a full census form covering land, livestock and labour.

RESAS categorises all agricultural holdings in Scotland as either a "Main" holding or a "Min" holding. A holding is a "Main" if it meets certain thresholds such as a certain area of land or a certain amount of animals. All "Main" holdings in Scotland are included in the census and if any did not complete a SAF they are automatically included in the sample for the full form. The remaining full forms are a sample of the "Min" holdings in Scotland. The smaller holdings are only surveyed once every four years to reduce the burden on the smaller farms. Holdings which have not received a form in the past four years are included in the sample for the Full Form.

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.

The table below gives a breakdown for forms returned for each category of holding.

Land-use data was received for holdings covering 87 per cent of the total agricultural area, either from returned full census forms or the SAF (shaded grey).

Cattle data was received for 100 per cent of holdings with cattle, from the CTS.

Other data was received for holdings covering 61 per cent of the total agricultural area, from returned census forms (the final column in the table).

Census type <sup>(1)</sup>	Total number	Number selected <sup>(2)</sup>	Number of returns <sup>(3)</sup>	Total area	Area of selected <sup>(2)</sup>	Area of returns <sup>(3)</sup>
SAF	22,671	21,851	14,974	4,939,020	4,716,243	3,237,160
Full Form	463	252		69,922	44,608	50,256
Part Form	21,388	14,722		4,646,322	3,192,552	3,460,403
Non-SAF	27,561	13,480	5,463	702,161	435,161	189,501
Full Form	13,014	175		434,986	165,642	194,830
Part Form	466	5288		175	23,859	51,022
Total	50,232	35,331	20,437	5,641,181	5,151,404	3,426,661

(1) "SAF" refers to holdings where land-use data is available from the Single Application Form dataset.

"Non-SAF" refers to holdings where land-use data is only available through the June Agricultural Census form (if at all).

"full form" refers to the long version of the census form covering land use, livestock (except cattle), and labour, designed for those not completing the SAF.

"part form" refers to the short version of the census form covering livestock (except cattle), and labour, designed for those known to be completing the SAF.

(2) The numbers selected are slightly lower than the total number eventually identified due to annual changes in the list of holdings.

(3) The return numbers quoted here relate to the number of survey forms received. For SAF holdings this masks the fact that we effectively receive 100 per cent response for all land items. Cattle data, from the CTS database, is also effectively 100 per cent complete. Response rates based on these figures therefore relate to other livestock and employment data.

## Online Data Collection

Since 2017 respondents have been able to complete their census online, through the Rural Payments and Services website. This year, all those in the sample who had completed the June Census online the previous year or have indicated on the Rural Payments website that they wished to be contacted via email, were sent email notification to complete the survey. However, if the online form was not initially completed, a paper form was sent as a reminder. All other census recipients received paper forms as normal. In total 6,730 SAF holdings returned online data, 45 per cent of SAF census returns or 31 per cent of the SAF sample. In addition, we received 478 online non-SAF returns. 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 50,232 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 2021 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 2021 is calculated, and this is applied to the 2015 data for the non-responder to give an estimate for 2021. 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>

### **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:

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

## **Migrant labour estimates**

Migrant labour estimates should be viewed with caution. The research study 'Farm workers in Scottish agriculture: case studies' noted that '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.

In 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 2021, SAF data was obtained for 22,700 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 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](#)

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



## **Timeliness and Punctuality**

Results have been published just over four months after the census date. The census date was set at 1st June 2021, with initial returns requested by 30th June (subsequently extended to end of August). However, forms were still being received through to September, when the census was then closed to finalise results. Forms received after closure of the census are used for imputation of the following year's census, and will be incorporated into revisions published alongside the results of the June 2022 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 and PDF format 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 cereal production estimates. 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**

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**

Scottish Government's Rural and Environmental Science Analytical Services division (RESAS) are currently undertaking a review of data requirements from the June Agricultural Census. We are always interested to here from users about what is most relevant to them and welcome 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 12,989 hours completing the June Census forms in 2021 at a cost of £202,900:

Number of responses (partial form)	14,897
Median time taken to respond in hours	0.5
<b>Time taken to respond to partial form in hours</b>	<b>7,449</b>
Number of responses (full form)	5,540
Median time taken to respond in hours	1
<b>Time taken to respond to full form in hours</b>	<b>5,540</b>
Total hours taken to respond to forms	12,989
Hourly rate of typical respondent*	£15.62
<b>Total cost of responding to June Census forms</b>	<b>£202,888</b>

\* 2020 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)