Animal &
Plant Health
Agency

Livestock Demographic Data Group:
Poultry population report

Livestock population density maps for GB 2018

Published 2018

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Who are these reports for?

These reports are suitable for use in animal health and welfare policy work which requires an estimate of the distribution and size of the poultry population at GB level. This type of population level information is often required to assess the economic or social impact of particular animal health policies, for contingency, disease control and resource planning, or to provide evidence to trading partners. There are important assumptions and uncertainties with these estimates which the user needs to take into consideration and can be found with the Quality Statement.

Who did this work?

The Livestock Demographic Data Groups (LDDGs) were formed in January 2014 and are made up of APHA representatives from data, epidemiology, species expert and GIS groups. The work was initiated and completed between April 2017 and March 2018.

What do the data show about the population?

The maps (Figures 1 and 2) show either the density of animals, with a small map to show how this compares with the density of holdings, or vice versa. The data extract is interpreted as a snapshot of the poultry population in April 2017. The GB poultry population density map and the GB poultry holding density map correspond with the Avian Expert Group's current opinion of the geographical distribution of the industry. The significant concerns over data quality discussed below, alongside the inability to distinguish between poultry species and production type, limit the application of the maps and tables. Our current understanding of the inaccuracy in the data restricts the interpretation to an indication of likely relative density.

How accurate are the data?

The Great Britain Poultry Register (GBPR) (now incorporated within the APHA Sam database) contains registration information of locations and animal numbers of poultry holdings in Great Britain. Assessment of the GBPR data quality during a survey identified a significant percentage of holding records were ineligible for use in an annual survey on avian influenza, which can be considered a proxy for percentage of inaccurate records. Eligibility varied between poultry species, turkey breeders for example being 62% ineligible, while turkey fatteners only 20% were ineligible. The causes of this inaccuracy are discussed in the quality statement (Annex 1).

There is also concern regarding the number of unregistered poultry holdings. Registration with the GBPR is mandatory for holdings with equal to, or greater than, 50 birds. We currently have no assessment of the number of unregistered poultry holdings, but it is

possible that a high proportion of the poultry holdings in some sectors, particularly non-commercial, hobby and backyard poultry, are under-represented, particularly in the absence of a mechanism for regular updating of the numbers. Some recent validation work using data obtained from foot patrols in the Avian Influenza (2016-17) surveillance and protection zones has provided further information to indicate that commercial holdings are more likely to be registered, and to estimate the population of unknown holdings with less than 50 birds. For further information please refer to the Data Quality Statement in Appendix 1.

What do the data not show?

The data and maps presented here do not show the seasonal variations the population undergoes across the year, instead these data represent the maximum capacity of the holdings. Although the dataset contains information regarding poultry species, rearing method and production purpose, the diverse nature of the poultry industry was too complex to represent in the maps. However, we do recognise that it would be useful to produce maps by species, for example chickens, turkeys, ducks, geese, gamebirds. In addition, this dataset does not include details of wild birds or birds in zoological collections.

There is significant uncertainty in the accuracy of the information displayed. Limitations in the dataset are discussed in the supporting quality statement (Annex 1). The creation of maps from incomplete data results in a high risk of incomplete and or misleading information being portrayed. Similarly population and holding density maps are classified to different scales and units and due care must be taken regarding their interpretation.

How were the maps produced?

The maps have been created using the kernel density function in *ArcGIS software*. This tool distributes population information over a defined radius (15km radius used for the figures presented within this report), creating a smooth density surface. Two key parameters that require adjustment are the *search radius distance* and the size of the *output surface grid*. Discussion at the LDDG meetings informed these criteria, and their selection is recognised as a subjective process[1]. A search radius of 15km was deemed sufficient to enable distinction between categories and a 1km grid square was used for the density surfaces themselves. The classification bins were limited to six, to aide in cross referencing areas of the map to the key. Comparison between the maps was optimised by assigning similar parameters between the species. However, further refinement of the parameters for each species' dataset could represent the information more accurately. Note that the ArcGIS Kernel Density tool does not take into account edge effects[2], and as such density estimates in and around coastal areas may be under estimated.

[1] Pfieffer, D. Spatial Analysis in Epidemiology, 2008. p47.
[2] https://www.e-education.psu.edu/geog586/l5_p15.html

Figure 1: Poultry population density in GB (SAM)

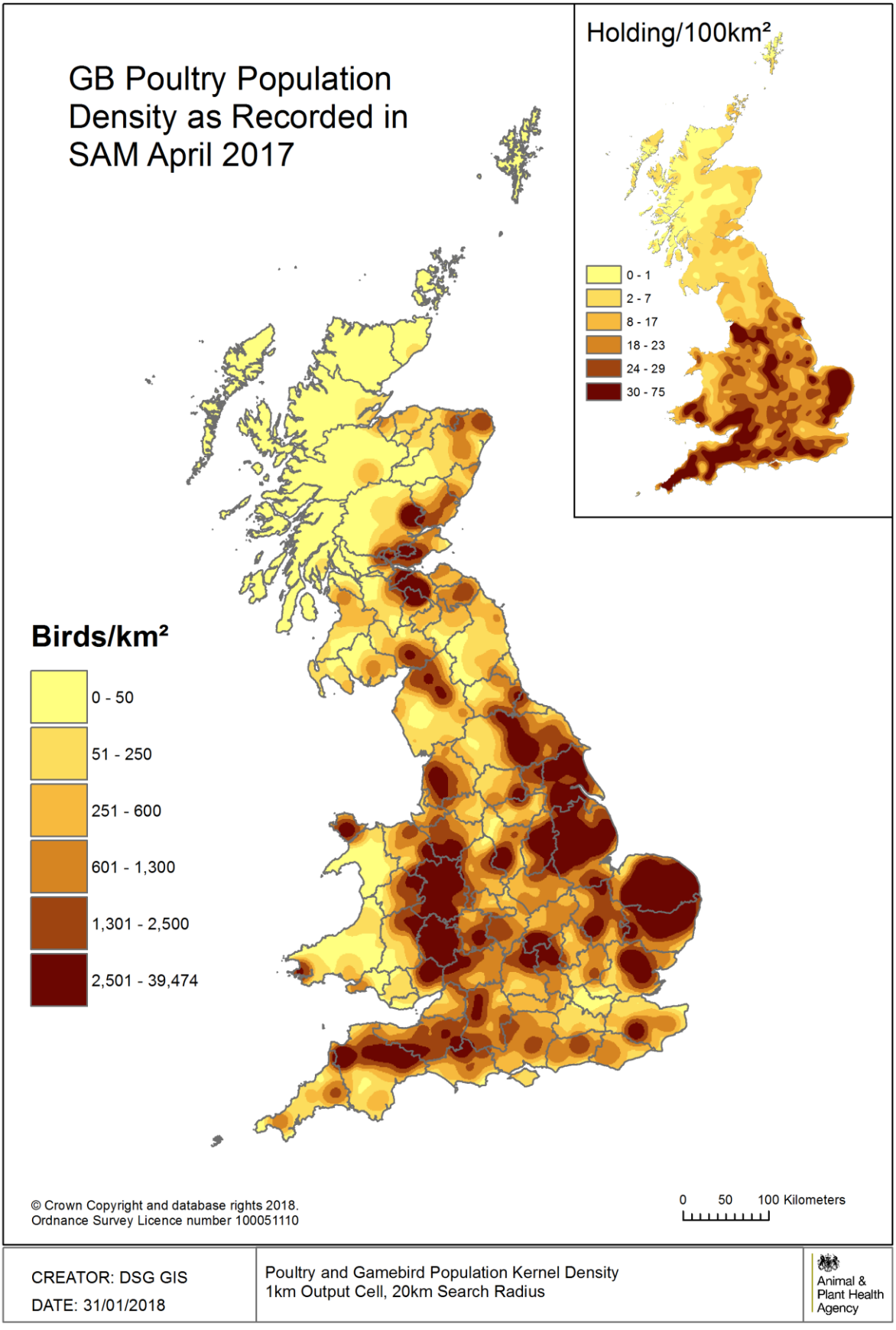
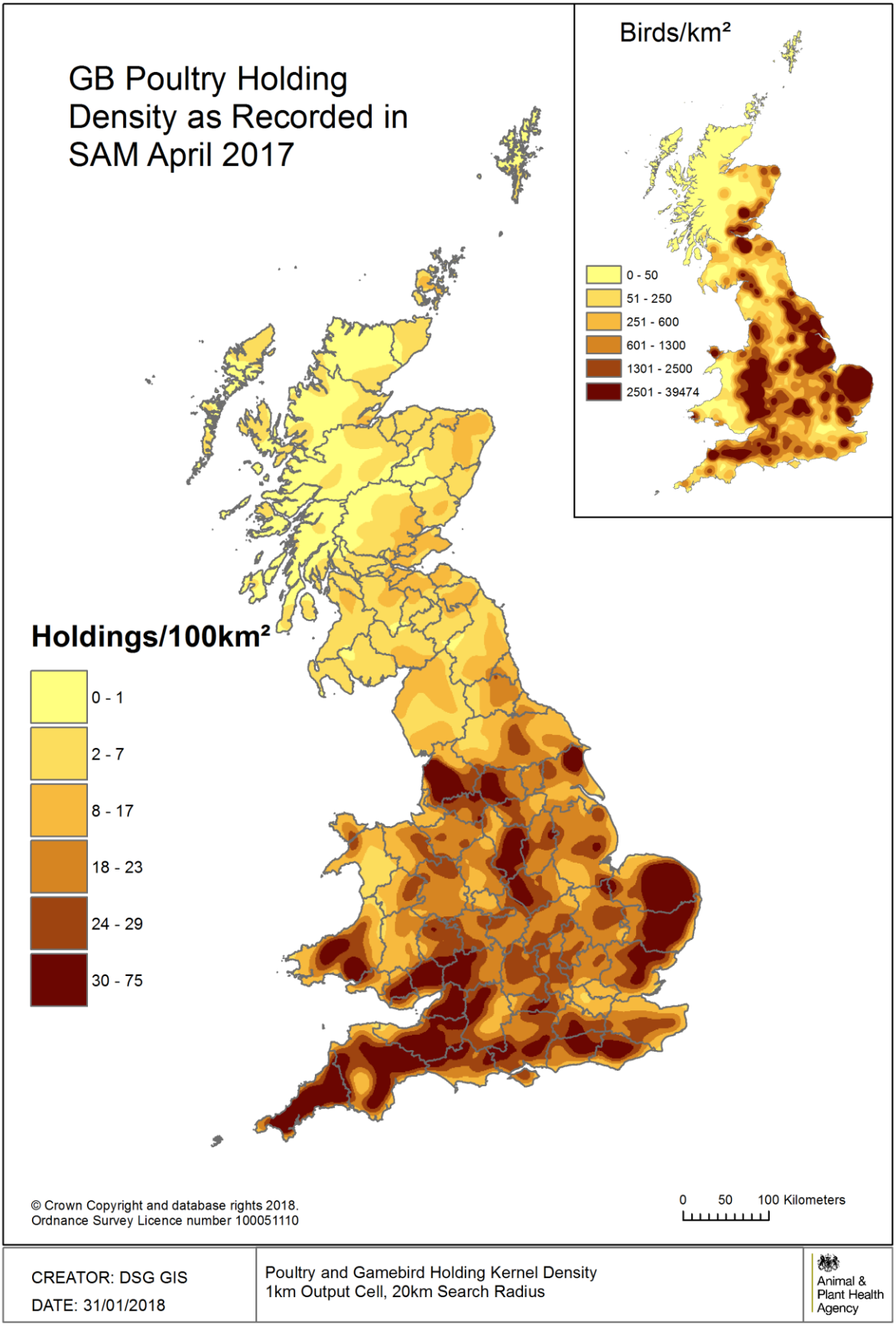


Figure 2: Poultry holding density in GB (SAM)



Annex 1: Data quality statement for poultry (March 2018)

Introduction

This data quality statement provides an overview of the quality of the data used to underpin the kernel density holding and livestock maps. This statement is written in the context of the data being used to provide an overview of the livestock demographics within Great Britain. The statement may not necessarily relate to data quality for other purposes.

Overview of source data used

APHA's SAM database as at April 2017.

Overview and purpose of the source data

The dataset holds information from registration of poultry holdings ≥50 birds, which is a legal requirement. Premises with less than 50 birds are encouraged to register and so a proportion of these premises will be included within the Sam extract.

Category (+definition)	**Quality description**
Relevance of data [degree to which data meets user needs in terms of currency, geographical coverage, content and detail]	**Spatial coverage**: The data cover Great Britain. **Temporal coverage**: Registrations have been recorded in the GBPR since 2008. The data are an extract from APHA's SAM data source which incorporated the GBPR data after it's decommissioning in April 2013. **Key data items available**: The dataset includes information on poultry species, rearing method, industry sector and housing type. A metadata document is available with more detailed information from the APHA Data Systems Group.

Timeliness [the degree to which data represent reality from the required time point]	**How often are data collected**: Data were captured continuously from submissions by poultry holding owners that were received by the GBPR team since the start of the register up to its point of decommission, and then subsequently by Customer Registrations, TB Tracings and TB Overdues at the Cardiff Specialist Service Centre (SSC) as an incorporation into SAM. **When does data become available**: Data are available on request from the MIDAS team in Worcester. **Was the data updated often:** Onus with GBPR data was on the holding owner. Since its incorporation into SAM data can no longer be directly updated by the owner and so now need to go via APHA staff who are encouraged to update incorrect or incomplete data when found. However, there is no current means whereby owners can regularly update their information. Surveys relying on SAM demographic data such as the Avian Influenza Survey feedback on data inaccuracies to SSC Cardiff for amendment.
Accuracy and precision [extent of data error and bias and how well data portrays reality]	**How was the data collected:** Data entered by the SSC from submissions of a registration form which is mandatory for holdings with ≥50 birds. However examination of the SAM extract shows that about 50% of registrations are for holdings with <50 birds. **Sample & collection size:** The dataset lists 37,966 records. Of 37,966 premises, 4,124 have 0 stock recorded. 21,100 premises have less than 50 birds (all species). **What steps have been taken to minimise processing errors?** A review of the poultry register form to simplify the process is underway and a publicity campaign by DEFRA and the NFU to promote registration has taken place. Work in other projects indicate that approximately half the premises in the GBPR do not contain the poultry types as listed e.g. only 52% of premises contacted for the avian influenza survey in 2017 were theoretically eligible for

	sampling (some were ineligible for practical reasons such as seasonal variation in access to birds; *personal communication*). **What are the non-reporting or non-response rates?** We do not have information on non-reporting or non-response rates for holdings in SAM. The Avian Expert Group is aware of some turkey and game bird holdings keeping ≥50 birds which have not registered, but are unable to advise on the proportion of the industry that has not registered in SAM. **Are any parts of the population unaccounted for in the data collection?** Holdings with less than 50 birds are not required to register with SAM hence this "backyard" population is not fully accounted for and information held almost certainly only represents a snapshot of the backyard population.
Comparability [how well these data can be compared with data taken from the same dataset and with similar data from other sources]	**Within dataset comparability: How comparable are the extracts from at different times?** There is work currently being undertaken by SSC to consolidate old GBPR data and to trace missing or incomplete SAM data, identified by the importation of the GBPR data. This work is ongoing and subsequent extracts should reflect this. **Other dataset comparability: how does the data stored compared to data stored in other data sources?** The Agricultural Survey only targets holdings of over 1000 birds and last ran a full census in in 2010, though little work has been done by the LDDG to compare the GBPR with this dataset.
Coherence [degree to which data can be or have been merged with other data sources]	**How consistent are the data over time? If there are differences, what are they and what is their impact?** This has not been accurately assessed. More recent extracts indicate the presence of a greater number of poultry holdings, but it is unknown if this is representative of the population or an artefact due to inaccurate data e.g. poultry holdings that have gone out of business may not have been removed from the database. This might be clarified if there was a mechanism for owners to update their poultry numbers on a regular basis. **Have there been changes to the underlying data collection?** We are unaware of any changes in data capture methods but do not expect any changes to be significant or

	impact our use of the data. **Have any real world events impacted on the data since the previous release? How have these impacts on the data been managed?** The introduction of SAM has led to a switch in April 2013 to record data in SAM instead of GBPR. The mandatory requirement of holdings to register if they hold ≥50 birds has continued with SAM. **What other data sources in society report similar information? How do these data sources compare?** Aside from SAM and the Agricultural Survey and the Egg Marketing Inspectorate (EMI) database may hold comparable information
Interpretability [how well the data is understood and utilised appropriately]	**Is there a particular context that this data needs to be considered within:** See comments above. **What other information is available to help users better understand this data source:** Further information on data held in GBPR is described in a metadata document available from the Data Systems Group, APHA. SSC now holds the GBPR data. Are there any ambiguous or technical terms that may need further explanation? The UK poultry population is comprised of different poultry species and production types, as follows: •Chickens - breeder, layer and broiler (meat type) flocks. •Turkeys - fattener (meat-type) and breeder flocks. •Ducks - breeder, meat and layer flocks. •Geese - breeder, meat and layer flocks. •Feathered game classified as poultry - breeders and rearer flocks of pheasants, partridges and ducks reared for shooting. •Other minor poultry species including: guinea fowl, quail, pigeons reared for meat, ostriches, emus, rheas. Wild birds and birds in zoo collections are not included within

	the scope of this document; gamebirds are considered 'wild' once released.
Accessibility [availability of relevant information and access to the data in a convenient and suitable manner]	**What data are shared and with whom** Data must be aggregated to at least a county level before publishing so individual farms cannot be identified (e.g. by CPH or postcode). Also estimates based on less than five holdings should not be used as this would breach confidentiality. A confidentiality agreement is required for data that is not publically available. SAM data can be obtained from APHA SSC. APHA Weybridge Data Systems Group has a copy of the final extract **Contact details for data source queries:** poultryregister@ahvla.gsi.gov.uk and lddg@apha.gsi.gov.uk Animal and Plant Health Agency (APHA) Customer Registrations, TB Tracings and TB Overdues Poultry Data Team Government Buildings 66 Ty Glas Road Llanishen Cardiff CF14 5ZB Agricultural Survey England: Farming-statistics@defra.gsi.gov.uk Agricultural Survey Wales: Stats.agric@wales.gsi.gov.uk Agricultural Survey Scotland: agric.stats@scotland.gsi.gov.uk