



Animal &  
Plant Health  
Agency

**Livestock Demographic Data**

**Group:**

**Goat population report**

**Livestock population density maps  
for GB using December  
2020/January 2021 data**



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APHA is an Executive Agency of the Department for Environment, Food and Rural Affairs and also works on behalf of the Scottish Government, Welsh Government and Food Standards Agency to safeguard animal and plant health for the benefit of people, the environment and the economy.

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Data year	Winter 2020/2021 (Goat holdings on 1st December 2020 for England and Scotland, and 1 <sup>st</sup> January 2021 for Wales)

## Contents

Who are these reports for and what is their purpose? .....	1
Who did this work? .....	1
What do the data show about the population?.....	1
What do the data not show about the population? .....	1
How accurate are the data? .....	2
How were the maps produced? .....	3
Acknowledgements.....	6
References .....	6
Annex 1: Data quality statement for goats (August 2021).....	7
Introduction .....	7
Overview and purpose of source data used .....	7
Annex 2: Number of goat holdings and number of goats per county .....	12

## Who are these reports for and what is their purpose?

These reports provide an estimate of the distribution and size of the goat population at GB level. This type of population level information is often required in animal health and welfare policy work, to assess the economic or social impact of particular policies, for contingency, disease control and resource planning.

## Who did this work?

The reports are produced by the Livestock Demographic Data Groups (LDDG). The LDDGs were formed in January 2014 and are made up of APHA representatives from data, epidemiology, species expert and GIS work groups.

## What do the data show about the population?

The maps show the density of animals (Figure 1) and the density of holdings (Figure 2). The estimated number of holdings and number of goats per country is shown in Table 1. The number of goat holdings and the number of goats in each country has gradually increased over the last five years.

A livestock holding is defined as the land and buildings used to keep livestock. Each holding has a unique County Parish Holding (CPH). A livestock business can have more than one holding, which can include permanent holdings (used for more than one year) and temporary holdings (used for less than one year).

The maps reflect the common understanding of the GB goat population, as in previous years, showing that goat holdings are diffusely spread across England and Wales with areas of greater goat holding density in the south-west, south-east and western parts of England and in south Wales. There are relatively few goat holdings in Scotland. There are a few areas of high goat population density but low holding density in the south-west, midlands and northern parts of England, which are likely to be due to a small number of large dairy goat units. Outside of these areas the goat density is less than one goat per km<sup>2</sup>.

## What do the data not show about the population?

The Sheep and Goat inventory is carried out during the winter and therefore does not capture any seasonal variation in the goat population. The June 2021 Agricultural census

results for goats in GB are not yet available for comparison, but it is not expected that changes in numbers of goats due to seasonality of breeding will be of the same magnitude as for sheep. Due to the small size of the goat population in GB, the visual representation of population density is not very precise in areas of low density.

## How accurate are the data?

There are important assumptions and uncertainties with these estimates which the user should take into consideration. Limitations of the dataset are discussed in detail in the data quality statement ([Annex 1](#)) and it is important that the user considers these in the context of their work. Population and holding density maps are each classified to different scales and units and due care must be taken regarding their interpretation.

The Sheep and Goat Inventory (Data from December 2020 for England and Scotland and January 2021 for Wales) holds information about the location and animal count of goat holdings in GB in winter. This is described in the data quality statement. The results are summarised in Table 1 and visualised in Figures 1 and 2.

Questionnaires were sent to 133,241 holdings in GB that were previously recorded as keeping sheep and/or goats. The questionnaire was completed by 101,889 respondents, giving an overall return rate of 76.5%. Out of those returning the questionnaire, 11,251 holdings (11.0%) were keeping goats.

For England, the questionnaire was sent to 88,545 holdings, and responses were received from 69,838 respondents (78.9%) of which 9,444 holdings (13.5%) were keeping goats.

For Scotland, the questionnaire was sent to 26,867 holdings, responses were received from 18,920 respondents (70.4%) of which 692 (3.7%) holdings were keeping goats.

For Wales, the questionnaire was sent to 17,829 holdings, responses were received from 13,131 respondents (73.6%) of which 1,115 holdings (8.5%) were keeping goats.

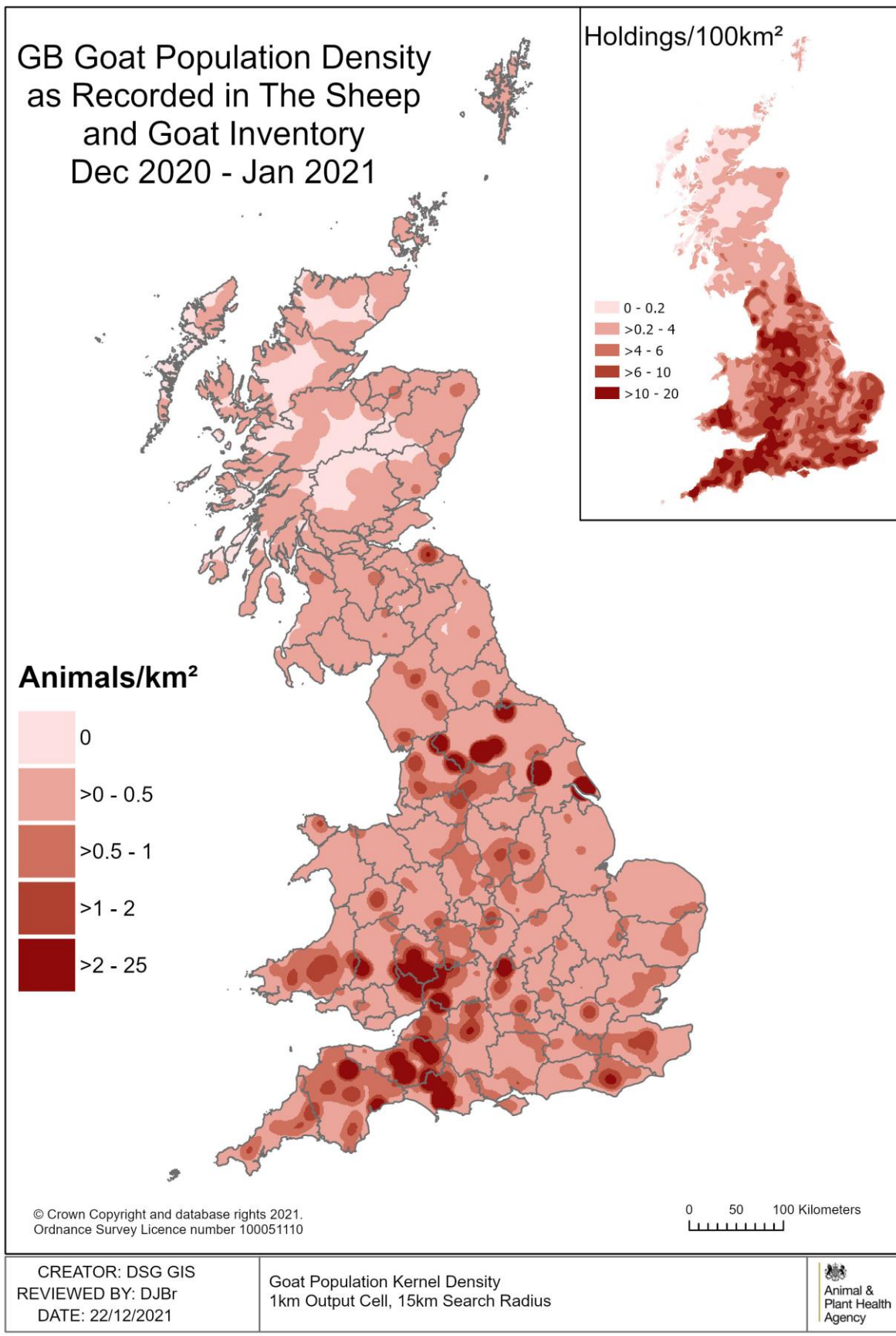
The data are therefore derived from the 11,251 goat holdings that returned a response to the inventory survey. The characteristics of the non-responders are unknown and the effect of these missing data has not been evaluated, but assuming that many non-responders are no longer keeping sheep or goats, any underestimate in number of holdings and number of goats is likely to be small.

The sheep and goat inventory collects data on the number of animals kept on 1<sup>st</sup> December for England and Scotland, and on 1<sup>st</sup> January for Wales. It is not expected that the collection of data for England and Scotland one month earlier than for Wales would have any effect on the data.

## How were the maps produced?

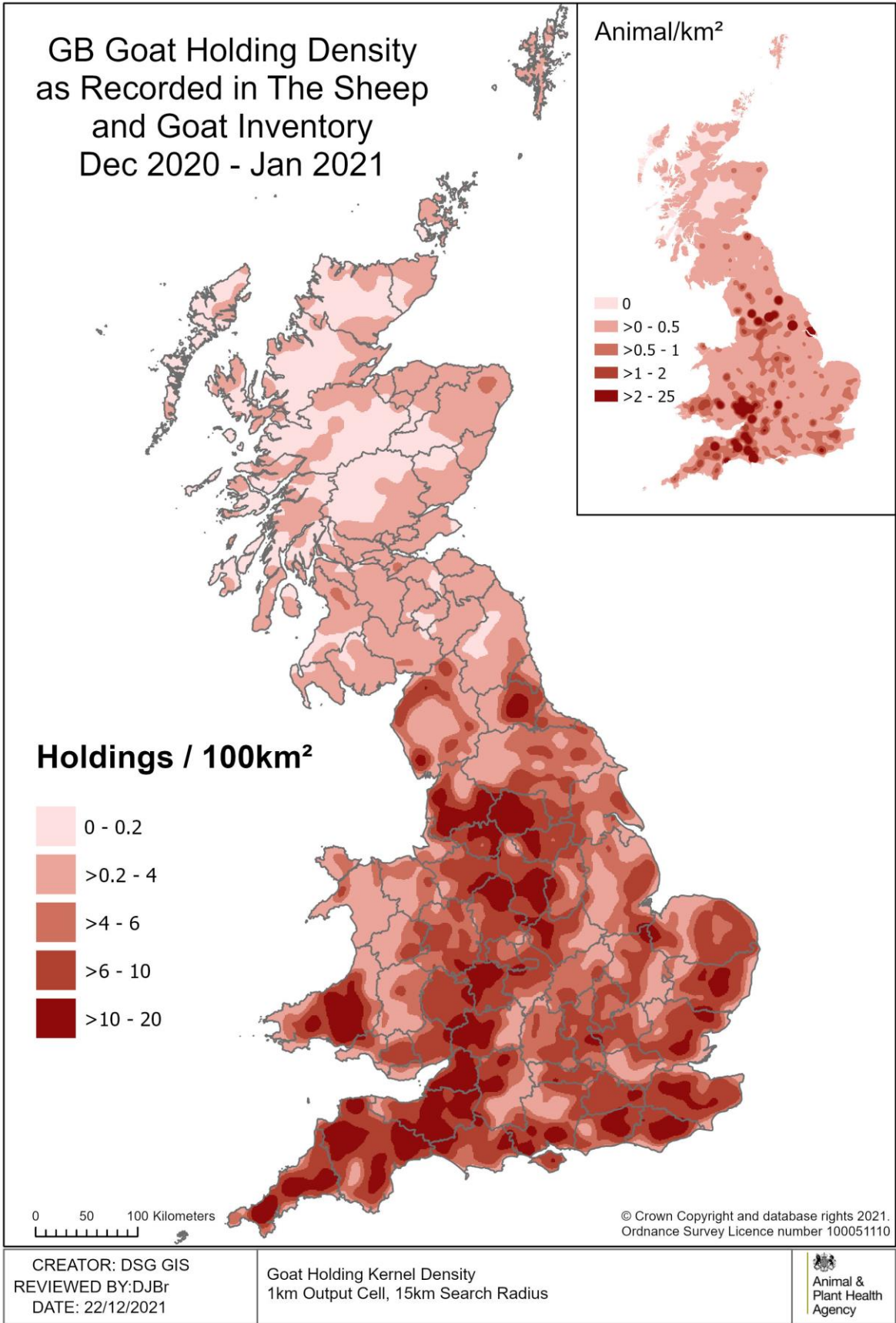
The maps have been created using the kernel density function in ArcGIS software. This tool distributes population information over a defined radius, creating a smooth density surface. Two key parameters that require adjustment are the search radius distance (15km radius for the maps presented within this report) 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 (Pfeiffer et al., 2008). 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 aid 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 dataset could represent the information more accurately. Note that the ArcGIS Kernel Density tool does not take into account edge effects, and as such density estimates in and around coastal areas may be under estimated (Charpentier & Gallic, 2016).



**Figure 1 Goat population density in GB (Sheep and Goat Inventory Dec 2020/Jan 2021)**





**Figure 2 Goat holding density in GB (Sheep and Goat Inventory Dec 2020/Jan 2021)**



**Table 1. Number of goat holdings and number of goats by country in GB, Dec 2020/Jan 2021.** The number of goat holdings and number of goats per county is provided in [Annex 2](#).

Country	Number of goat holdings	Number of goats
England	9,444	94,317
Scotland	692	5,653
Wales	1,115	11,150
Total GB	11,251	111,120

## Acknowledgements

The LDDG is grateful to Defra, Welsh Government, Scottish Government, and APHA Weybridge DSG staff who handle the Sheep and Goat Inventory data and Rapid Analysis and Detection of Animal Related Risks (RADAR) data warehouse for their assistance in producing this report.

## References

- Charpentier, A., & Gallic, E. (2016). Kernel density estimation based on Ripley's correction. *GeoInformatica*, 20(1), 95–116. <https://doi.org/10.1007/s10707-015-0232-z>
- Pfeiffer, D. U., Robinson, T. P., Stevenson, M., Stevens, K. B., Rogers, D. J., & Clements, A. C. A. (2008). *Spatial Analysis in Epidemiology* (1st ed.). Oxford University Press.

# Annex 1: Data quality statement for goats (August 2021)

## 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 and purpose of source data used

Data were supplied by the Data Systems Group (DSG), APHA Weybridge and sourced from the Sheep and Goat Inventory via the Rapid Analysis and Detection of Animal-related Risks (RADAR) data warehouse.

Sheep and Goat inventory (via RADAR) was chosen to represent the sheep and goat data as this has the most inclusive coverage on holdings across GB. This dataset records the number of sheep and goats kept on all registered individual premises. The inventory data is collected once a year (1st December for England and Scotland, and 1st January for Wales) by means of a questionnaire which is sent to every registered sheep and goat holding in GB, and, for England, additional holdings recorded in the Animal Reporting and Movement Service (ARAMS) and in Sam (APHA customer database). This gives a winter count of the population. For the winter 2020/21 inventory there was a response rate of 70% for Scotland, 79% for England, and 74% for Wales.

Category <i>[definition]</i>	Quality description
<b>Relevance of data</b> <i>[degree to which data meets user needs in terms of currency, geographical coverage, content and detail]</i>	<b>Spatial coverage:</b> The data cover GB (England, Scotland and Wales). <b>Temporal coverage:</b> The data presented are for December 1 <sup>st</sup> 2020 (England and Scotland) and January 1 <sup>st</sup> 2021 (Wales). The data were accessed in August 2021. <b>Key data items available:</b> The dataset includes species (sheep or goat) and number of animals on holding, purpose of holding, CPH, name and address of keeper/holding.
<b>Timeliness</b>	<b>How often are the data collected?</b> The data are collected annually on December 1 <sup>st</sup> for England and Scotland, and January 1 <sup>st</sup> for Wales.

<p><i>[the degree to which data represent reality from the required time point]</i></p>	<p><b>When does the data become available?</b> The data are available and uploaded into RADAR about 6 months after the survey is collected by the Defra Statistics Team based in York.</p> <p><b>Data reference period:</b> The data are a snapshot at the date of the survey.</p> <p><b>How often are the data updated?</b> Data are updated annually.</p>
<p><b>Accuracy and precision</b></p> <p><i>[extent of data error and bias and how well data portrays reality]</i></p>	<p><b>How were the data collected?</b> Questionnaires are sent once a year by post to all holdings that have registered or are recorded as keeping sheep or goats.</p> <p><b>Sample &amp; collection size:</b> All holdings registered or recorded as keeping sheep or goats are sent a questionnaire, so the survey is intended to be a full census of all known potential goat holdings. It is not known how many other holdings are keeping goats that have not registered or been recorded in ARAMS or Sam. The counts of holdings and number of goats is obtained from all the holdings that have returned the inventory form.</p> <p><b>Further information on rules for registering a holding where sheep and goats are kept:</b></p> <p><a href="https://www.gov.uk/sheep-and-goats-identification-registration-and-movement">https://www.gov.uk/sheep-and-goats-identification-registration-and-movement</a></p> <p><b>What steps have been taken to minimise processing errors?</b> The data collected through the survey is subject to manual validation to check the data accuracy. Not all data that fails validation can be corrected/confirmed as the survey team cannot always get in contact with the keeper. There are a number of different errors that can be detected such as incorrect flock number, illegible forms, etc. The team check every form and verify the information where possible.</p> <p><b>What are the response rates?</b> Response rates for the surveys conducted in December 2020 and January 2021 were 79% for England, are estimated to be 70% for Scotland and 74% for Wales.</p> <p><b>Are any parts of the population unaccounted for in the data collection?</b> The Defra Statistics Team do not receive returns from around 21% of holdings in England, 30% of holdings in Scotland and 26% holdings in Wales to which the questionnaires were sent. However, it is not known whether</p>

	<p>non-responders represent particular parts of the population. There may also be holdings that are not registered or recorded, and therefore did not receive the inventory questionnaire. In order to minimise the number of holdings not represented, information about the annual inventory and how to access the questionnaire is shared through various social media alerts.</p> <p>There is guidance on how to register your holding and flock or herd at: <a href="https://www.gov.uk/guidance/sheep-and-goat-keepers-register-your-holding-and-flock-or-herd">https://www.gov.uk/guidance/sheep-and-goat-keepers-register-your-holding-and-flock-or-herd</a></p> <p>More information on how to keep and update a holding register in the annual sheep and goat inventory at: <a href="https://www.gov.uk/guidance/sheep-and-goat-keepers-how-to-keep-a-holding-register">https://www.gov.uk/guidance/sheep-and-goat-keepers-how-to-keep-a-holding-register</a></p>
<p><b>Comparability</b></p> <p><i>[how well these data can be compared with data taken from the same dataset and with similar data from other sources]</i></p>	<p><b>Within dataset comparability:</b> The format and survey methods are similar between years.</p> <p><b>Other dataset comparability:</b> The data compares with the Agricultural Survey, which shows data collected in the summer. The June 2020 Survey of Agriculture on a sample of commercial holdings in England estimated the total population of goats to be 90,000 animals (<a href="https://www.gov.uk/government/statistics/farming-statistics-final-land-use-livestock-populations-and-agricultural-workforce-as-at-1-june-2020-england">https://www.gov.uk/government/statistics/farming-statistics-final-land-use-livestock-populations-and-agricultural-workforce-as-at-1-june-2020-england</a>), which is lower than the number in the winter 2020/21 inventory, most likely because it excludes holdings with small numbers of goats. The June 2021 full Census of Agriculture Survey data for goats in GB are projected to be available in late 2021/early 2022.</p> <p>Animal Movement Licensing System (AMLS) holds movement data, which can compare information on holding locations and relative sizes. However, both datasets have a difference in data capture, as does data held within Sam.</p>
<p><b>Coherence</b></p> <p><i>[degree to which data can be or have been merged with other data sources]</i></p>	<p><b>How consistent are the data over time? If there are differences, what are they and what is their impact? Have there been changes to the underlying data collection?</b> The list of holdings in England to be included in the 2020 inventory was updated to include all registered holdings, plus any additional holdings recorded in ARAMS and Sam, and therefore was likely to be more comprehensive than for the last few years. However, a large number of the holdings contacted were no longer keeping sheep or goats,</p>

	<p>and will be removed from the list for the 2021/22 survey.</p> <p><b>Have any real world events impacted on the data since the previous release?</b> No.</p> <p><b>What other data sources are these data comparable with?</b> Location data are comparable between the Agricultural survey, Sam and the Animal Movement Licensing System (AMLS). The Agricultural survey data has been used for total population and the AMLS for total holdings.</p> <p><b>What other data sources in society report similar information? How do these data sources compare?</b> Industry has their own datasets but these are obtained from, for example, the sheep and goat inventory and Agricultural Survey. It is thought they are unlikely to offer any additional information.</p>
<p><b>Interpretability</b></p> <p><i>[how well the data is understood and utilised appropriately]</i></p>	<p><b>Is there a particular context that this data needs to be considered within?</b> The sheep and goat inventory is conducted in the winter, but the small ruminant expert group advises that seasonality in the goat population is minimal so the data provided is unlikely to vary much by season.</p> <p><b>What other information is available to help users better understand this data source?</b> There is a metadata catalogue for RADAR available at <a href="http://ahvlaintranet/day-to-day/tools-and-applications/Pages/radar.aspx">http://ahvlaintranet/day-to-day/tools-and-applications/Pages/radar.aspx</a></p> <p><b>Are there any ambiguous or technical terms that may need further explanation?</b> No.</p>
<p><b>Accessibility</b></p> <p><i>[availability of relevant information and access to the data in a convenient and suitable manner]</i></p>	<p><b>What data are shared and with whom?</b> Addresses and coordinates of individual locations cannot be released without Confidentiality Agreements. DSG access data through RADAR or directly from York Stats.</p> <p><b>Contact details for data source queries:</b></p> <p>Agricultural Survey England: <a href="mailto:Farming-statistics@defra.gov.uk">Farming-statistics@defra.gov.uk</a></p> <p>Agricultural Survey Wales: <a href="mailto:Stats.agric@wales.gov.uk">Stats.agric@wales.gov.uk</a></p> <p>Agricultural Survey Scotland: <a href="mailto:agric.stats@scotland.gov.uk">agric.stats@scotland.gov.uk</a></p> <p>ScotEID Livestock Traceability - <a href="mailto:support@scoteid.com">support@scoteid.com</a></p> <p>Freedom of Information (FOI), Environmental Information Regulations (EIR) and Subject Access requests -</p>

[enquiries@apha.gov.uk](mailto:enquiries@apha.gov.uk)

## Annex 2: Number of goat holdings and number of goats per county

Results of GB Sheep and Goat Inventory, December 2020/January 2021. Data for counties with 6 or less holdings have been excluded from this table for data protection reasons.

Country	County	Number of goat holdings	Number of goats
ENGLAND	AVON	189	1050
	BEDFORDSHIRE	74	489
	BERKSHIRE	80	466
	BUCKINGHAMSHIRE	121	644
	CAMBRIDGESHIRE	168	1033
	CHESHIRE	170	908
	CLEVELAND	37	136
	CORNWALL AND ISLES OF SCILLY	403	1836
	CUMBRIA	332	2432
	DERBYSHIRE	277	1391
	DEVONSHIRE	668	7145
	DORSET	227	7459
	DURHAM	172	764
	EAST SUSSEX	174	1547
	ESSEX	269	1428
GLOUCESTERSHIRE	231	3926	
GREATER LONDON	72	682	



Country	County	Number of goat holdings	Number of goats
	GREATER MANCHESTER	139	878
	HAMPSHIRE	283	1725
	HEREFORDSHIRE	186	5561
	HERTFORDSHIRE	108	522
	HUMBERSIDE	192	11177
	ISLE OF WIGHT	45	342
	KENT	321	1984
	LANCASHIRE	308	2602
	LEICESTERSHIRE	165	1025
	LINCOLNSHIRE	301	1444
	MERSEYSIDE	33	159
	NORFOLK	348	1725
	NORTH YORKSHIRE	391	8579
	NORTHAMPTONSHIRE	121	837
	NORTHUMBERLAND	96	677
	NOTTINGHAMSHIRE	129	851
	OXFORDSHIRE	141	2297
	SHROPSHIRE	217	1215
	SOMERSET	370	6561
	SOUTH YORKSHIRE	128	551
STAFFORDSHIRE	261	1317	
SUFFOLK	280	1421	

Country	County	Number of goat holdings	Number of goats
	SURREY	141	821
	TYNE & WEAR	28	113
	WARWICKSHIRE	123	758
	WEST MIDLANDS	57	343
	WEST SUSSEX	175	729
	WEST YORKSHIRE	280	1330
	WILTSHIRE	220	1964
	WORCESTERSHIRE	193	1473
SCOTLAND	ABERDEENSHIRE	74	625
	ANGUS	28	226
	ARGYLL	31	147
	AYRSHIRE	50	394
	BANFFSHIRE	18	122
	BERWICKSHIRE	13	49
	CAITHNESS	22	109
	DUMFRIESSHIRE	47	514
	EAST LOTHIAN	12	523
	FIFE	28	87
	INVERNESS-SHIRE	31	229
	KINCARDINESHIRE	11	216
	KIRKCUDBRIGHT	34	303
	LANARKSHIRE	41	526
MIDLOTHIAN &	8	44	

Country	County	Number of goat holdings	Number of goats
	EDINBURGH		
	MORAY	14	248
	ORKNEY	20	74
	PEEBLES	9	45
	PERTH	44	340
	ROSS & CROMARTY	38	183
	ROXBURGH	25	153
	SHETLAND	13	46
	STIRLING	14	63
	SUTHERLAND	20	119
	WEST LOTHIAN	12	97
	WIGTOWN	14	53
WALES	CLWYD	100	607
	DYFED	462	3840
	GWENT	112	2629
	GWYNEDD	129	962
	MID GLAMORGAN	70	420
	POWYS	190	2446
	SOUTH GLAMORGAN	13	53
	WEST GLAMORGAN	39	193