



Animal &  
Plant Health  
Agency

**Livestock Demographic Data**

**Group:**

**Goat population report**

**Livestock population density maps  
for Great Britain using December  
2021/January 2022 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 2021/2022 (Goat holdings on 1st December 2021 for England and Scotland, and 1 <sup>st</sup> January 2022 for Wales)

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

These reports are suitable for use in animal health and welfare policy work or by anyone who requires an estimate of the distribution and size of the goat population at Great Britain (GB) level. This type of population level information is often required to provide official statistical returns to the World Organisation for Animal Health (WOAH), assess the economic or social impact of particular animal health policies, for contingency, disease monitoring/control and resource planning, or to provide evidence to trading partners.

## 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 England and Wales have decreased since the 2020/2021 inventory, but have increased in Scotland.

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 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, although the change in number of goats due to seasonality of breeding is not of the same magnitude as for sheep. According to the June 2021 full Census of Agricultural Survey, the total number of goats in GB in June 2021 was 108,126, indicating that the GB goat population decreased by approximately 5% between summer 2021 and winter 2021/22 ([Farming statistics - land use, livestock populations and agricultural workforce as at 1 June 2021, England - GOV.UK \(www.gov.uk\)](#), Wales: [Survey of agriculture and horticulture: June 2021 | GOV.WALES](#), Scotland: [Supporting documents - Results from the Scottish Agricultural Census: June 2021 - gov.scot \(www.gov.scot\)](#)). 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 2021 for England and Scotland and January 2022 for Wales) holds information about the location and animal count of goat holdings in GB in winter. All sheep and goat keepers are required to register their holding and it is a legal requirement to complete the annual sheep and goat inventory. 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 110,019 holdings in GB that were previously recorded as keeping sheep and/or goats. The questionnaire was completed by 85,735 respondents, giving an overall return rate of 77.9%. Out of those returning the questionnaire, 10,563 holdings (12.3%) were keeping goats.

For England, the questionnaire was sent to 74,369 holdings, and responses were received from 58,441 respondents (78.6%) of which 8,859 holdings (15.2%) were keeping goats.

For Scotland, the questionnaire was sent to 18,825 holdings, responses were received from 14,206 respondents (75.5%) of which 798 (5.6%) holdings were keeping goats.

For Wales, the questionnaire was sent to 16,825 holdings, responses were received from 13,088 respondents (77.8%) of which 906 holdings (6.9%) were keeping goats.

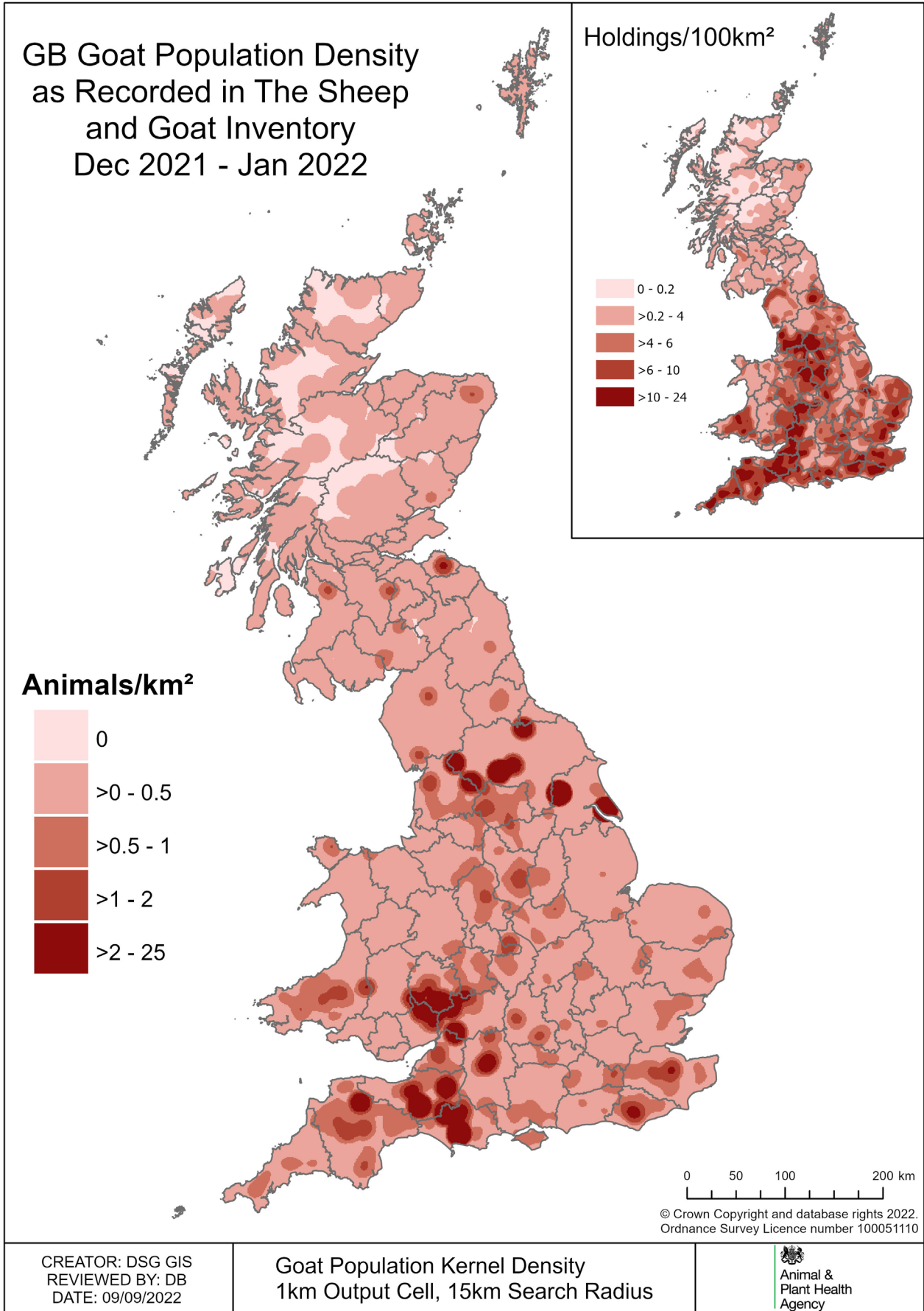
The data are therefore derived from the 10,563 goat holdings that returned a response to the inventory survey. The characteristics of the non-responders are unknown and the effect of these missing data has not been evaluated, but assuming that many non-responders are no longer keeping sheep or goats, 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.

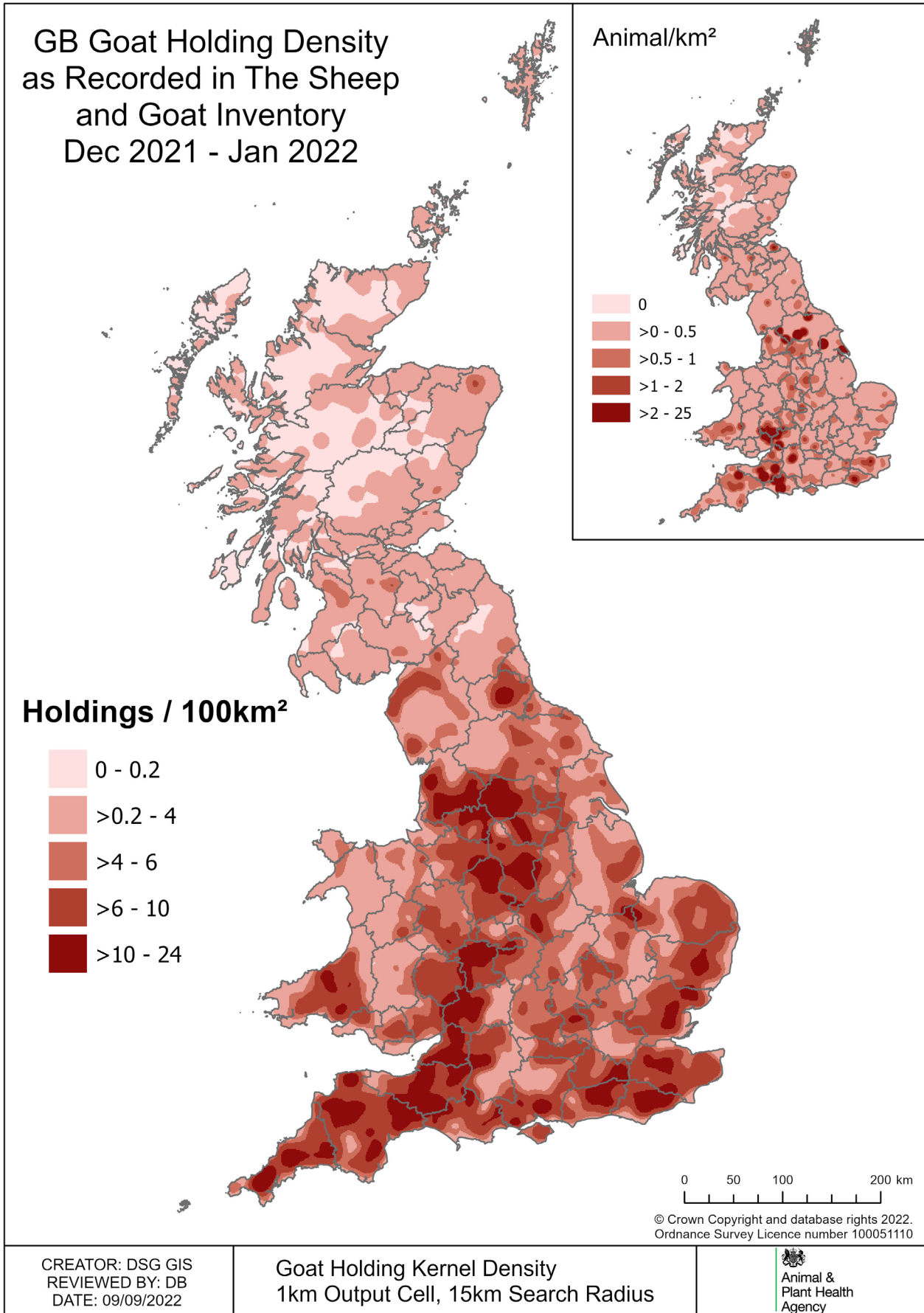
## How were the maps produced?

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 2021/Jan 2022)**



**Figure 2 Goat holding density in GB (Sheep and Goat Inventory Dec 2021/Jan 2022)**



**Table 1: Number of goat holdings and number of goats by country in GB, Dec 2020/Jan 2021 and Dec 2021/Jan 2022.** The number of goat holdings and number of goats per county is provided in [Annex 2](#).

Country	Number of goat holdings			Number of goats		
	Dec 2020/Jan 2021	Dec 2021/Jan 2022	% Change	Dec 2020/Jan 2021	Dec 2021/Jan 2022	% Change
ENGLAND	9,444	8,859	-6.2%	94,317	87,522	-7.2%
SCOTLAND	692	798	15.3%	5,653	6,457	14.2%
WALES	1,115	906	-18.7%	11,150	8,334	-25.3%
GB TOTAL	11,251	10,563	-6.1%	111,120	102,313	-7.9%

## 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 (September 2022)

## 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 2021/22 inventory there was a response rate of 75.5% for Scotland, 78.6% for England, and 77.8% for Wales.

<b>Category</b> <i>[definition]</i>	<b>Quality description</b>
<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> 2021 (England and Scotland) and January 1 <sup>st</sup> 2022 (Wales). The data were accessed in September 2022. <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.

<p><b>Timeliness</b></p> <p><i>[the degree to which data represent reality from the required time point]</i></p>	<p><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> <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 or by email 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/government/guidance/sheep-and-goat-keepers-register-your-holding-and-flock-or-herd">Sheep and goat keepers: register your holding and flock or herd - GOV.UK (www.gov.uk)</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 2021 and January 2022 were 78.6% for England, 75.5% for Scotland and 77.8% for Wales.</p> <p><b>Are any parts of the population unaccounted for in the data collection?</b> The Defra Statistics Team did not receive returns from</p>

	<p>around 21.4% of holdings in England, 24.5% of holdings in Scotland and 22.21% holdings in Wales to which the questionnaires were sent. However, it is not known whether 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 2021 Survey of Agriculture was a census of commercial holdings. In England the total population of goats was estimated to be 88,000 animals (<a href="#">Farming statistics - land use, livestock populations and agricultural workforce as at 1 June 2021, England - GOV.UK (www.gov.uk)</a>), which is similar to the number reported in the winter 2021/22 inventory (87,522). There was an approximately 34% decrease in the estimated goat population in Wales (<a href="#">Survey of agriculture and horticulture: June 2021   GOV.WALES</a>), and an approximately 18% decrease in Scotland (<a href="#">Supporting documents - Results from the Scottish Agricultural Census: June 2021 - gov.scot (www.gov.scot)</a>), between the June 2021 Agricultural Census and the population in this report.</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><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</p>

<p><i>[degree to which data can be or have been merged with other data sources]</i></p>	<p>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 previous few years. However, a large number of the holdings contacted were no longer keeping sheep or goats, and were 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 - <a href="mailto:enquiries@apha.gov.uk">enquiries@apha.gov.uk</a></p>
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## Annex 2: Number of goat holdings and number of goats per county

Results of GB Sheep and Goat Inventory, December 2021/January 2022. 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	169	1,003
	BEDFORDSHIRE	76	548
	BERKSHIRE	74	439
	BUCKINGHAMSHIRE	108	526
	CAMBRIDGESHIRE	148	944
	CHESHIRE	158	815
	CLEVELAND	32	91
	CORNWALL AND ISLES OF SCILLY	371	1,525
	CUMBRIA	307	1,793
	DERBYSHIRE	263	1,379
	DEVONSHIRE	639	5,405
	DORSET	217	8,062
	DURHAM	151	806
	EAST SUSSEX	175	1,480
	ESSEX	284	1,368
	GLOUCESTERSHIRE	218	3,598
GREATER LONDON	65	355	

Country	County	Number of goat holdings	Number of goats
	GREATER MANCHESTER	127	547
	HAMPSHIRE	255	1,474
	HEREFORDSHIRE	164	4,123
	HERTFORDSHIRE	89	461
	HUMBERSIDE	175	10,923
	ISLE OF WIGHT	43	431
	KENT	314	2,246
	LANCASHIRE	279	2,761
	LEICESTERSHIRE	150	1,015
	LINCOLNSHIRE	283	1,381
	MERSEYSIDE	32	129
	NORFOLK	325	1,664
	NORTH YORKSHIRE	375	8,166
	NORTHAMPTONSHIRE	108	769
	NORTHUMBERLAND	88	573
	NOTTINGHAMSHIRE	121	718
	OXFORDSHIRE	138	1,083
	SHROPSHIRE	194	1,007
	SOMERSET	346	6,349
	SOUTH YORKSHIRE	121	695
STAFFORDSHIRE	259	1,477	
SUFFOLK	257	1,225	



Country	County	Number of goat holdings	Number of goats
	SURREY	149	914
	TYNE & WEAR	23	66
	WARWICKSHIRE	111	877
	WEST MIDLANDS	53	391
	WEST SUSSEX	169	716
	WEST YORKSHIRE	257	1,370
	WILTSHIRE	201	2,270
	WORCESTERSHIRE	198	1,564
SCOTLAND	ABERDEENSHIRE	92	797
	ANGUS	30	344
	ARGYLL	45	165
	AYRSHIRE	65	588
	BANFFSHIRE	13	69
	BERWICKSHIRE	12	76
	BUTE	7	22
	CAITHNESS	23	87
	DUMFRIESSHIRE	51	678
	EAST LoTHIAN	11	553
	FIFE	37	165
	INVERNESS-SHIRE	42	200
	KINCARDINESHIRE	14	166
	KINROSS	7	75
KIRKCUDBRIGHT	36	403	

Country	County	Number of goat holdings	Number of goats
	LANARKSHIRE	50	549
	MIDLOTHIAN & EDINBURGH	10	51
	MORAY	14	86
	ORKNEY	21	125
	PEEBLES	11	66
	PERTH	42	387
	ROSS & CROMARTY	39	157
	ROXBURGH	24	145
	SHETLAND	17	60
	STIRLING	14	59
	SUTHERLAND	22	127
	WEST LOTHIAN	9	56
	WIGTOWN	25	128
WALES	CLWYD	90	581
	DYFED	359	3,190
	GWENT	90	2,403
	GWYNEDD	109	860
	MID GLAMORGAN	59	252
	POWYS	152	865
	SOUTH GLAMORGAN	11	44
	WEST GLAMORGAN	36	139