



Animal &
Plant Health
Agency

Livestock Demographic Data

Group:

Goat population report

**Livestock population density maps
for Great Britain using December
2022/January 2023 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 source	Sheep and Goat Inventory: Rapid Analysis and Detection of Animal related Risk (RADAR) data warehouse for England and Wales and ScotEID for Scotland.
Data year	Winter 2022/2023 (Goat holdings on 1st December 2022 for England and Scotland, and 1 st January 2023 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 have increased across all 3 countries since the 2021/2022 inventory.

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 km².

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 ([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 \(www.gov.scot\)](#)), which is similar to the total number of goats indicated by the winter 2022/23 inventory – 109,140.

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 2022 for England and Scotland and January 2023 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 106,861 holdings in GB that were previously recorded as keeping sheep and/or goats. The questionnaire was completed by 82,248 respondents, giving an overall return rate of 77.0%: 11,720 holdings were keeping goats.

For England, the questionnaire was sent to 72,726 holdings, and responses were received from 55,100 respondents (75.8%): 9,441 holdings were keeping goats.

For Scotland, the questionnaire was sent to 16,577 holdings, responses were received from 13,335 respondents (80.4%): 930 holdings were keeping goats.

For Wales, the questionnaire was sent to 17,558 holdings, responses were received from 13,813 respondents (78.7%): 1349 holdings were keeping goats.

The data are therefore derived from the 11,720 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 1st December for England and Scotland, and on 1st 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).

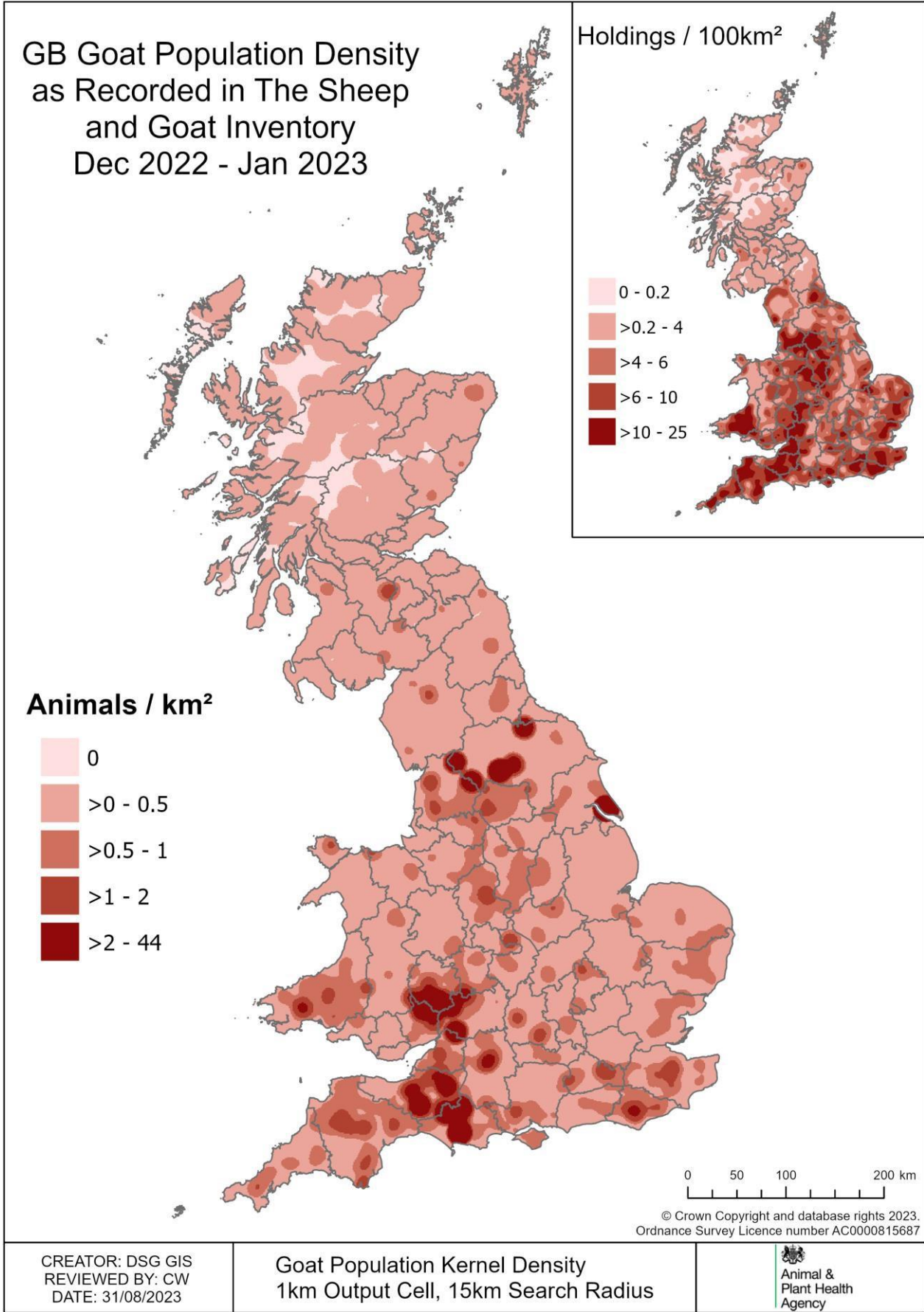


Figure 1 Goat population density in GB (Sheep and Goat Inventory Dec 2022/Jan 2023)

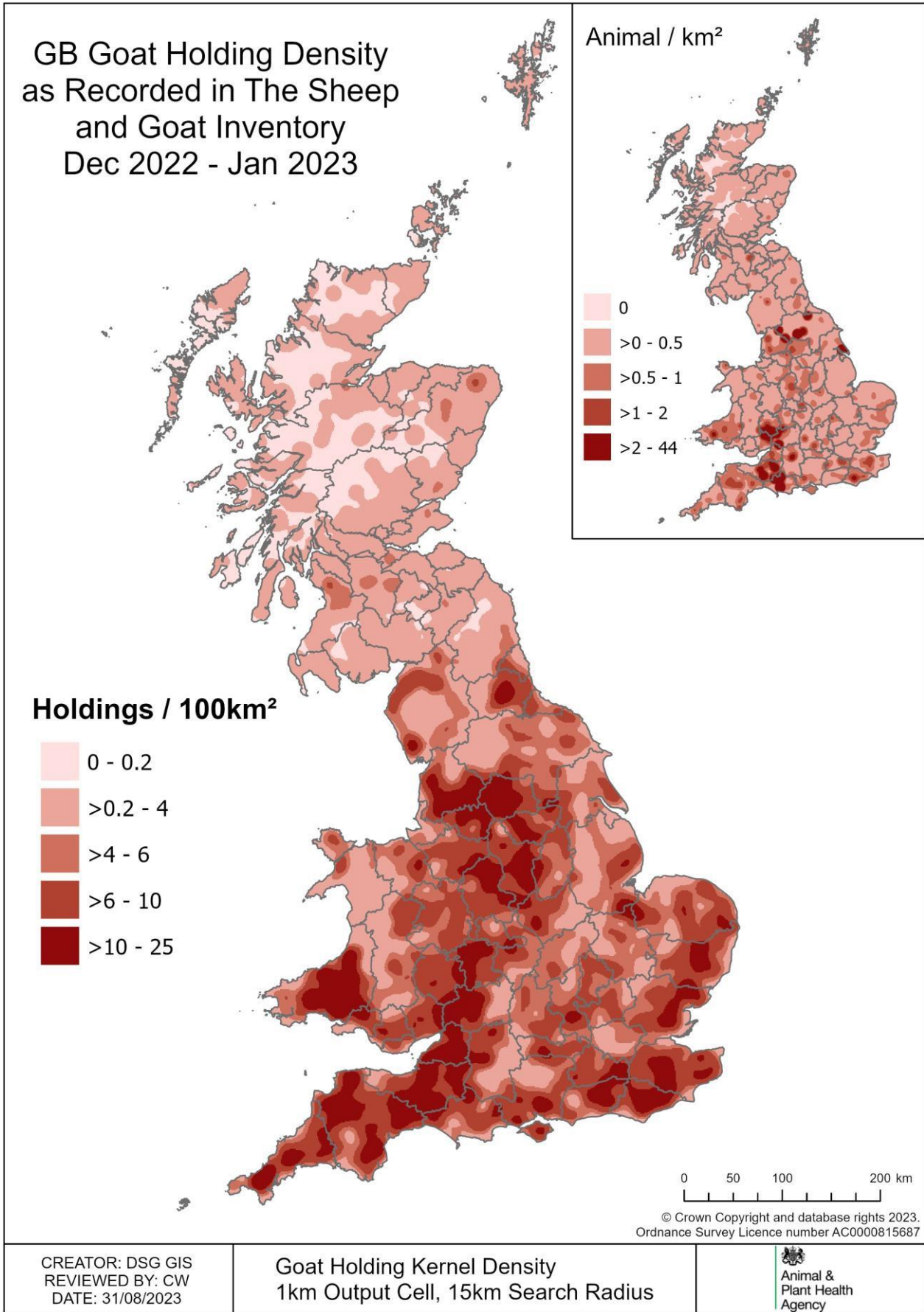


Figure 2 Goat holding density in GB (Sheep and Goat Inventory Dec 2022/Jan 2023)

Table 1: Number of goat holdings and number of goats by country in GB, Dec 2021/Jan 2022 and Dec 2022/Jan 2023. The number of goat holdings and number of goats per county in Dec 2022/Jan 2023 is provided in [Annex 2](#).

Country	Number of goat holdings			Number of goats		
	Dec 2021/Jan 2022	Dec 2022/Jan 2023	% Change	Dec 2021/Jan 2022	Dec 2022/Jan 2023	% Change
ENGLAND	8,859	9,441	6.57%	87,522	91,965	5.08%
SCOTLAND	798	930	16.54%	6,457	6,672	3.33%
WALES	906	1,349	48.90%	8,334	10,503	26.03%
GB TOTAL	10,563	11,720	10.95%	102,313	109,140	6.67%

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 (October 2023)

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.

The Sheep and Goat inventory 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 are 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 2022/23 inventory there was a response rate of 80.4% for Scotland, 75.8% for England, and 78.7% for Wales.

Category <i>[definition]</i>	Quality description
Relevance of data <i>[degree to which data meets user needs in terms of currency, geographical coverage, content and detail]</i>	Spatial coverage: The data cover GB (England, Scotland and Wales). Temporal coverage: The data presented are for December 1 st 2022 (England and Scotland) and January 1 st 2023 (Wales). The data were accessed in August 2023. Key data items available: The dataset includes species (sheep or goat) and number of animals on holding, purpose of holding, CPH, name and address of keeper/holding.

<p>Timeliness</p> <p><i>[the degree to which data represent reality from the required time point]</i></p>	<p>How often are the data collected? The data are collected annually on December 1st for England and Scotland, and January 1st for Wales.</p> <p>When does the data become available? 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>Data reference period: The data are a snapshot at the date of the survey.</p> <p>How often are the data updated? Data are updated annually.</p>
<p>Accuracy and precision</p> <p><i>[extent of data error and bias and how well data portrays reality]</i></p>	<p>How were the data collected? 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>Sample & collection size: 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>Further information on rules for registering a holding where sheep and goats are kept:</p> <p>Sheep and goat keepers: register your holding and flock or herd - GOV.UK (www.gov.uk)</p> <p>What steps have been taken to minimise processing errors? The data collected through the survey are subject to manual validation to check the data accuracy. Not all data that fail 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>What are the response rates? Response rates for the surveys conducted in December 2022 and January 2023 were 75.8% for England, 80.4% for Scotland and 78.7% for Wales.</p> <p>Are any parts of the population unaccounted for in the data collection? The Defra Statistics Team did not receive returns from</p>

	<p>around 24.2% of holdings in England, 19.6% of holdings in Scotland and 21.3% 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: https://www.gov.uk/guidance/sheep-and-goat-keepers-register-your-holding-and-flock-or-herd</p> <p>More information on how to keep and update a holding register in the annual sheep and goat inventory at: https://www.gov.uk/guidance/sheep-and-goat-keepers-how-to-keep-a-holding-register</p>
<p>Comparability</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>Within dataset comparability: The format and survey methods are similar between years.</p> <p>Other dataset comparability: The data compare with the Agricultural Survey, which shows data collected in the summer. The June 2021 Survey of Agriculture was a full census of commercial holdings that indicated that the total number of goats in GB in June 2021 was 108,126. This total is similar to the total number of goats indicated by the winter 2022/23 inventory – 109,140. 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>Coherence</p> <p><i>[degree to which data can be or have been merged with other data sources]</i></p>	<p>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? The list of keepers contacted in connection with their annual inventory obligation is derived from the list of holdings statutorily maintained by APHA for England, Scottish government and Welsh government. Returns from those keepers who declare they are no longer keeping sheep or goats are used to update that list, and in turn update subsequent inventory-gathering exercises.</p> <p>Have any real world events impacted on the data since the previous release? No.</p>

	<p>What other data sources are these data comparable with? Location data are comparable between the Agricultural survey, Sam and the Animal Movement Licensing System (AMLS). The Agricultural survey data have been used for total population and the AMLS for total holdings.</p> <p>What other data sources in society report similar information? How do these data sources compare? 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>Interpretability</p> <p><i>[how well the data are understood and utilised appropriately]</i></p>	<p>Is there a particular context that these data need to be considered within? 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 are unlikely to vary much by season.</p> <p>What other information is available to help users better understand this data source? There is a metadata catalogue for RADAR available at http://ahvlaintranet/day-to-day/tools-and-applications/Pages/radar.aspx</p> <p>Are there any ambiguous or technical terms that may need further explanation? No.</p>
<p>Accessibility</p> <p><i>[availability of relevant information and access to these data in a convenient and suitable manner]</i></p>	<p>What data are shared and with whom? Addresses and coordinates of individual locations cannot be released without Confidentiality Agreements. DSG access data through RADAR or directly from Scottish government.</p> <p>Contact details for data source queries:</p> <p>Agricultural Survey England: Farming-statistics@defra.gov.uk</p> <p>Agricultural Survey Wales: Stats.agric@wales.gov.uk</p> <p>Agricultural Survey Scotland: agric.stats@scotland.gov.uk</p> <p>ScotEID Livestock Traceability - support@scoteid.com</p> <p>Freedom of Information (FOI), Environmental Information Regulations (EIR) and Subject Access requests - enquiries@apha.gov.uk</p>

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

Results of GB Sheep and Goat Inventory, December 2022/January 2023. 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	1015
	BEDFORDSHIRE	79	750
	BERKSHIRE	83	485
	BUCKINGHAMSHIRE	112	554
	CAMBRIDGESHIRE	156	1016
	CHESHIRE	168	928
	CLEVELAND	40	130
	CORNWALL AND ISLES OF SCILLY	366	1653
	CUMBRIA	336	1810
	DERBYSHIRE	293	1368
	DEVONSHIRE	678	5073
	DORSET	210	9087
	DURHAM	169	879
	EAST SUSSEX	186	1638
	ESSEX	291	1463
	GLOUCESTERSHIRE	237	3908
GREATER LONDON	63	350	

Country	County	Number of goat holdings	Number of goats
	GREATER MANCHESTER	146	759
	HAMPSHIRE	272	1557
	HEREFORDSHIRE	180	4887
	HERTFORDSHIRE	100	500
	HUMBERSIDE	194	11490
	ISLE OF WIGHT	50	431
	KENT	341	2136
	LANCASHIRE	300	3185
	LEICESTERSHIRE	153	950
	LINCOLNSHIRE	299	1469
	MERSEYSIDE	31	166
	NORFOLK	354	1838
	NORTH YORKSHIRE	388	8295
	NORTHAMPTONSHIRE	109	649
	NORTHUMBERLAND	106	813
	NOTTINGHAMSHIRE	136	788
	OXFORDSHIRE	143	1125
	SHROPSHIRE	212	1125
	SOMERSET	380	5580
	SOUTH YORKSHIRE	139	601
STAFFORDSHIRE	272	1724	
SUFFOLK	283	1533	

Country	County	Number of goat holdings	Number of goats
	SURREY	156	1389
	TYNE & WEAR	29	111
	WARWICKSHIRE	118	947
	WEST MIDLANDS	57	256
	WEST SUSSEX	168	760
	WEST YORKSHIRE	272	1369
	WILTSHIRE	204	1902
	WORCESTERSHIRE	193	1523
SCOTLAND	ABERDEENSHIRE	102	771
	ANGUS	33	355
	ARGYLL	50	217
	AYRSHIRE	71	520
	BANFFSHIRE	19	137
	BERWICKSHIRE	18	116
	BUTE	8	35
	CAITHNESS	30	141
	DUMFRIESSHIRE	9	44
	EAST LoTHIAN	49	631
	FIFE	10	40
	INVERNESS-SHIRE	43	210
	KINCARDINESHIRE	55	198
	KINROSS	41	324
KIRKCUDBRIGHT	55	648	

Country	County	Number of goat holdings	Number of goats
	LANARKSHIRE	13	68
	MIDLOTHIAN & EDINBURGH	15	75
	MORAY	25	143
	ORKNEY	10	88
	PEEBLES	54	451
	PERTH	7	24
	ROSS & CROMARTY	48	233
	ROXBURGH	27	274
	SHETLAND	16	58
	STIRLING	16	84
	SUTHERLAND	29	154
	WEST LOTHIAN	13	98
	WIGTOWN	34	187
	WALES	CLWYD	134
DYFED		556	3978
GWENT		132	2636
GWYNEDD		141	992
MID GLAMORGAN		73	354
POWYS		229	1340
SOUTH GLAMORGAN		26	85
WEST GLAMORGAN		58	270