



Understanding the dog population in the Republic of Ireland: insight from existing data sources?

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Part one of this paper appeared in *Veterinary Ireland Journal* in June 2023. Part Two begins on the next page.

Table 2 The number of pet passports issued by the Department of Agriculture, Food and the Marine to private veterinary practitioners (PVPs) and animal welfare organisations in Ireland during 2014–20. These data may not reflect the actual number of pet passports issued by PVPs and animal welfare organisations to pet dog owners

	2014	2015	2016	2017	2018	2019	2020	Total
<i>Private veterinary practitioners</i>	11,836	22,208	18,391	19,450	18,418	18,400	18,281	126,984
<i>Animal welfare organisations</i>	2855	4512	4612	5462	3799	3570	2709	27,519
Total	14,691	26,720	23,003	24,912	22,217	21,970	20,990	154,503

Dog movements based on data from the European Commission

A summary of the official record of dog movements from Ireland to other European Economic Area (EEA) countries and to third (ie non-EU) countries during 2016–20 is presented in Table 3 and Table S4 (in the [Supplementary material](#)), respectively. During this period, records are available for 55,240 exported dogs, with the most frequent destinations including the UK (41,167 dogs), Sweden (6457), Italy (1874), Germany (1583) and Singapore (1290).

A summary of the official record of dog movements from other EU countries to Ireland from January 2018 through to July 2021 is presented in Table 4. There was a large increase in dogs moving into Ireland in 2021, compared to previous years during this period, notably from Hungary (438 during the first 7 months of 2021 compared with an annual mean of 170 during 2018–2020), Poland (255, 51) and Romania (116, 59.3).

Dog movements based on data from commercial enterprises

As reported to DAFM, the number of dogs recorded on commercial flights into Dublin, Shannon and Cork from January 2015 to June 2020 is presented in the [Supplementary material](#) (Tables S5 and S6). The number of dogs recorded on commercial ferries into Cork Roscoff during July to October 2020, into Cork Ringaskiddy from January to February 2020, and into Rosslare, Co. Wexford from 2018 to May 2021 is presented in the [Supplementary material](#) (Tables S7 to S9, respectively). In 2020, 1124 dogs were recorded on commercial flights and 1947 dogs on commercial ferries into Rosslare.

The quality of available data

A brief description and evaluation of existing potential data sources for estimating the Irish pet dog population and the movement of dogs to and from Ireland is presented in Table 5. Relevant to the Irish dog population, the representativeness of existing data sources were considered either low (dog licencing data, dog control statistics) or unknown (dog microchipping and identification data), and the accuracy of information considered either uncertain (dog licencing data), variable (dog

microchipping and identification data) or likely variable (dog control statistics). Relevant to the movement of dogs to and from Ireland, the representativeness of all existing data sources (pet passport data, dog movements data (from the European Commission, from commercial enterprises)) were considered low, whereas the accuracy of information was considered very high (dog movements data (from the European Commission), low (pet passport data) or very low (dog movements data (from commercial enterprises)). Linked with the suggestions in Table 5, we present a proposal to improve both the representativeness and accuracy of information about the Irish pet dog population by linking existing key national databases (Fig. 7).

Discussion

The current study was conducted to investigate the utility of existing data to inform our understanding of recent changes to the pet dog population in Ireland, including those relating to biological (demographics, flows, trends) and organisational (the roles of different organisations, regulatory and non-regulatory impacts, drivers of supply and demand) processes. By extension, we hoped to gain insights into aspects of the national pet dog population, and to highlight strengths and areas of concern with respect to the use of existing data for this purpose.

Available data provide fragmented and inaccurate insight into the pet dog population of Ireland. These data are unsuited for estimating the overall size of the total pet dog population, with the only direct information coming from published Fediaf estimates, for which the underpinning data gathering method(s) are unknown. Methods are available to estimate overall dog population size, but their application would require carefully designed and planned study [66]. The national data do provide hints of several temporal trends, both in terms of biological and organisational processes.

Over the last 20 years, but particularly prior to 2007, there was an upward trend in dog licences issued (Fig. 3), now representing approximately 200,000 dogs licenced annually (Fig. 3). Concurrently, in recent years there has been a relatively stable number of microchips registered annually (approximately 90,000 microchips, Fig. 4). In the

Table 3 The number of dog movements from Ireland to other European Economic Area countries during 2016–20, as recorded in TRACES, including those dogs en-route to third countries (Argentina, Bermuda, Singapore, United States). TRACES is the online platform of the European Commission to facilitate sanitary and phytosanitary certification of animals, animal products, food and feed and plants, into the EU, for intra-EU trade and EU exports (https://ec.europa.eu/food/animals/traces_en)

Country	2016	2017	2018	2019	2020	Total
European Union countries						
Austria	5	2	1	2	5	15
Belgium	47	63	33	39	50	232
Bulgaria	–	15	–	–	–	15
Croatia	–	–	1	–	–	1
Cyprus	–	1	–	–	–	1
Czechia	63	45	114	90	108	420
Denmark	12	5	3	3	6	29
Finland	25	26	24	25	5	105
France	15	27	38	26	23	129
Germany	336	340	364	256	287	1583
Greece	19	–	–	–	–	19
Hungary	–	–	–	1	2	3
Ireland	18	–	–	–	2	20
Italy	443	384	336	341	370	1874
Latvia	–	–	–	–	1	1
Lithuania	–	1	1	–	–	2
Luxembourg	3	–	–	–	–	3
Netherlands	20	35	102	79	32	268
Poland	1	4	4	1	5	15
Portugal	69	38	7	48	24	186
Slovakia	–	–	–	–	1	1
Slovenia	11	4	3	8	19	45
Spain	66	79	46	56	51	298
Sweden	1201	1183	1400	1418	1255	6457
Non-European Union countries						
Argentina (via Spain)	1	–	–	–	–	1
Bermuda (via England)	1	–	–	–	–	1
Gibraltar	1	–	–	–	–	1
Norway	50	69	52	19	5	195
Singapore (via Germany)	–	–	–	4	7	11
Switzerland	12	17	8	8	5	50
United Kingdom ^a	9625	10,571	7810	7368	5793	41,167
United States (via Germany or England)	–	–	–	19	28	47
Total	12,044	12,909	10,347	9811	8084	53,195

^a The United Kingdom left the European Union on 31 January 2020

popular press, there has been considerable commentary about recent changes to the national pet dog population (including [36, 37, 39]), particularly in relation to the COVID-19 pandemic. Unfortunately, the current study does not clarify this discussion, as apart from limitations of the data available, our study period only partially overlaps with these recent events. We note several points of caution when interpreting these temporal trends in the

data. In Ireland, the dog licensing and microchipping databases are currently not linked, which precludes the ability to match individuals or dogs across databases. This is perhaps reflected in Fig. 5, where there is no visual relationship between the number of dog licences and microchip registrations per year. Further, it is not possible to directly compare individual dog licences and microchipping, noting that individual dog licences

Table 4 The number of dog movements from other EU countries into Ireland during 2018 through to July 2021, as recorded in TRACES, which is the online platform of the European Commission to facilitate sanitary and phytosanitary certification of animals, animal products, food and feed and plants, into the EU, for intra-EU trade and EU exports (https://ec.europa.eu/food/animals/traces_en)

Country	2018	2019	2020	2021 (Jan-Jul)	Total
European Union countries					
Belgium	1	–	4	6	11
Croatia	3	1	12	35	51
Cyprus	1	2	2	1	6
Czech Republic	7	1	9	15	32
Estonia	–	–	–	1	1
Finland	1	–	–	1	2
France	–	2	2	10	14
Germany	–	4	4	28	36
Greece	–	1	–	1	2
Hungary	157	157	196	438	948
Ireland	–	–	2	–	2
Italy	–	1	6	12	19
Latvia	–	1	1	8	10
Lithuania	1	6	12	62	81
Malta	1	–	–	–	1
Poland	29	47	77	255	408
Portugal	–	–	–	7	7
Romania	98	26	54	116	294
Slovakia	–	–	3	30	33
Slovenia	–	–	–	2	2
Spain	1	88	1	54	144
Non-European Union countries					
United Kingdom ^a	2	17	4	–	23
Total	302	354	389	1082	2127

^a The United Kingdom left the European Union on 31 January 2020

are issued annually, whereas the latter are only assigned once. In addition, compliance with national legislation (on licencing and on microchipping) are uncertain, and may be relatively low. Similar challenges were seen in earlier work by Downes et al. [30, 31], leading to a focus on demographic change rather than national estimates.

The role of dog control centres in Ireland has changed substantially in recent years. During the period 2004–2020, but particularly since about 2015, the number of dogs managed through these centres has substantially decreased (Fig. 6). Further, over the last 10 years, there has been a dramatic drop in the number of dogs seized and the number of dogs euthanised or which have died of natural causes. Concurrently, there has been a more gradual decrease in the number of dogs surrendered or collected, and, since 2012, an increase in the number of dogs either sent to dog welfare organisations or

reclaimed/rehomed. We speculate, but cannot confirm based on these national data, that the decreasing role of dog control centres is linked with an increasing role for dog welfare organisations. This is an area of separate study. As highlighted elsewhere, the DAFM Animal Welfare Grants have provided substantial support over some years to registered animal welfare organisations to assist in delivery of animal care and animal welfare services (Table 1) [42].

The 6-month pilot study on online dog sales was undertaken to assess the utility of these methods in contributing to an understanding of aspects of the dog population in Ireland. Our results support its usefulness. Extrapolating from the monthly mean, it is plausible that approximately 30,000 dogs were listed on these two websites over the previous 12 months. Of those dogs listed on these sites, information are now available on breed, age, location, price and microchip numbers. As expected, the majority of these dogs are puppies. With longer-term monitoring of these sites, it could be possible to assess trends in supply and demand based on price, to identify (potential changes in) favoured breeds, as well as identifying high-volume sellers. This methodology could also be considered, pending legal and ethical considerations, to support national regulatory action, including an assessment of legislative compliance.

Irish pet insurance data are currently not available for analysis. In 2017, it was suggested that ‘*the pet insurance market in Ireland is in its relative infancy (and) according to figures from Insurance Ireland, fewer than 10% of pets are insured here. In the UK, the equivalent figure is around 25%*’ [67]. In 2018, research conducted by Allianz Nationwide revealed that “70% of dog owners and nearly 90% of cat owners are without pet health cover” [68]. In 2021, a survey conducted by Pet Sitters Ireland found that “75% of people didn’t have pet insurance” citing cost as the main reason for not taking out cover [69]. According to one insurance provider, there was a 97% increase in the number of insurance policies taken out during the first quarter of 2021 as compared to the same period in 2020 [70]. Based on lessons from Sweden, the pet insurance database has proved particularly useful in describing aspects of national dog populations, particularly with respect to mortality and morbidity, in general and with respect to defined diseases. Egenvall et al. [13] have outlined limitations with insurance data, particularly in terms of validity and representativeness. In time, analysis of similar Irish data, if available, will prove useful.

Based on available data, the number of outward movements of dogs from Ireland has been substantially greater than the number of inward movements of dogs into Ireland. According to the TRACES database, there were 2127 inward movement of dogs from other EU Member

Table 5 Brief description and evaluation of existing potential data sources for estimating the Irish pet dog population and the movement of dogs to and from Ireland

Data source	Description	Assessment of quality
A. The Irish pet dog population Dog licencing and registration database	<p>Legislative requirement for dog owners to purchase a dog licence either for individual dogs greater than 4 months of age (annual, €20; lifetime, €140) or for multiple dogs (general, €400 each year). Annual and general licences must be renewed yearly. Data is collected by An Post which gives access to each local authority within the Department of Rural and Community Development.</p> <p><i>Data collected:</i></p> <ul style="list-style-type: none"> • Applicants: Name, age, address, Eircode, phone number and e-mail. • Dog: Name, sex, microchip status and number if present, colour and breed. 	<p><i>Characteristics of information:</i></p> <p>Database contains information on the annual number of:</p> <ul style="list-style-type: none"> • New individual dog licences issued. • Individual dog licences renewed. • Lifetime dog licences issued (for the duration of the dog's life). • General licences (for multiple dogs) issued. • General licences (for multiple dogs) renewed. <p><i>Representativeness of dog population:</i> Low.</p> <p>a. Not a one-to-one relationship between number of licences issued and number of dogs in Ireland since</p> <p>i. No way to know if licence non-renewal represents non-compliance or death of dog as death information is not collected.</p> <p>ii. The number of dogs for which a general licence applies is not recorded.</p> <p>iii. A priori excludes dogs younger than 4 months old, dogs housed by the Irish Society for the Prevention of Cruelty to Animals (ISPCA) or Gardai, currently possessed by a local authority, sight dogs for the blind and dogs imported into the State for less than 30 days.</p> <p>b. Compliance is not enforced and percentage compliance unknown.</p> <p><i>Accuracy of information:</i> Uncertain.</p> <ul style="list-style-type: none"> • Data provided by applicant's self-report, no verification of accuracy of dog(s) date of birth, sex, breed or address (mailed in or online). • No microchip requirement for dog(s) prior to licence application. Identity of dog cannot be determined. <p><i>Suggestion:</i></p> <ul style="list-style-type: none"> • Requirement of microchip number prior to issuing of licence. • Linkage with the following data sources. • Dog identification data (via microchip number). • Local authority dog control statistics.

Table 5 (continued)

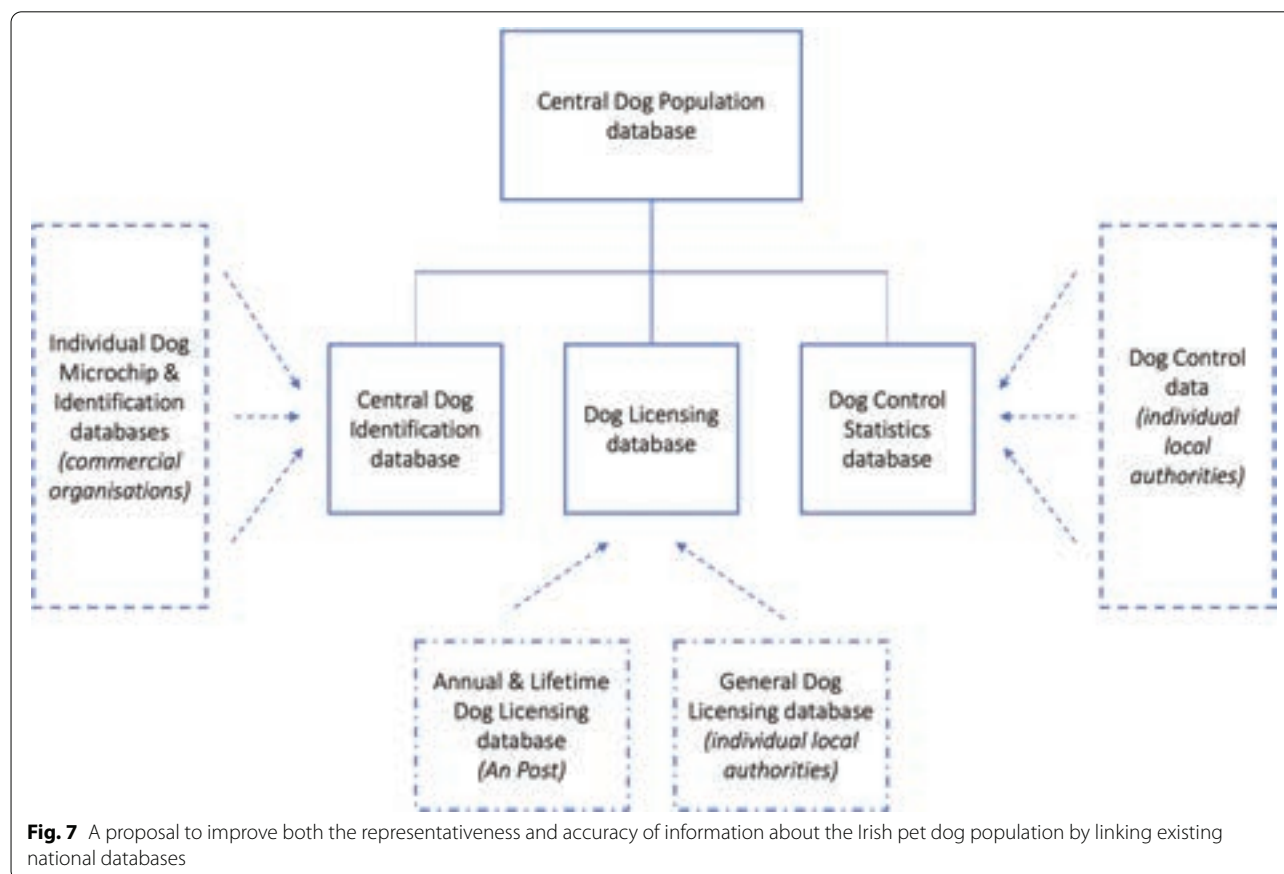
Data source	Description	Assessment of quality
Dog microchipping and identification data	<p>Legislative requirement that all dogs be micro-chipped and registered in a dog identification database by 12 weeks of age, or before they leave the property on which they are born (whichever comes earlier). Currently in Ireland, there are four DAFM-approved microchip databases, each sharing data with EuroPetNet (http://www.europetnet.com).</p> <p><i>Data collected:</i></p> <ul style="list-style-type: none"> • Applicant (or possessor of dog): Name, address, contact details. • Dog: Date of birth, breed, colour and markings, sex, address of premises of residence, microchip number and date of insertion, date and cause of death (if relevant), date lost (if relevant). • Additional information: Identity of person inserting microchip. 	<p><i>Characteristics of information:</i></p> <p>Four databases give yearly and total information on the dogs that have had a microchip inserted and have been registered.</p> <p><i>Representativeness of dog population:</i> Unknown.</p> <ul style="list-style-type: none"> • Compliance not enforced. Percent compliance unknown. <p><i>Accuracy of information:</i> Variable.</p> <ul style="list-style-type: none"> • Microchip information - likely high as this can only be undertaken by specified trained individuals • Identification of person claiming ownership/possession - potentially high - Requires official identification (passport, driver's licence or identification issued by the Gardaí [the Irish police]) but depends on enforcement. • Date of birth, colour, breed, sex of dog and address of dog - likely high - Microchip insertion done in the context of veterinary clinics done by a veterinary surgeon, veterinary nurse or another trained professional. • Information on death and/or loss of dog - Uncertain - this depends on owner compliance. • Change in ownership - not enforced or recorded automatically. • Duplication - dog might be registered in more than one of the databases under different names due to change of ownership, lack of updating and non-linkage between them. <p><i>Suggestion:</i></p> <ul style="list-style-type: none"> • The four dog identification databases should be linked to each other or to a central government database resulting in each microchip number being linked to one and only one Irish owner/address. • The dog licensing database should be linked to the dog identification databases to ensure consistency and verification of recorded information. • The dog identification should be linked with local authority databases which contain information on dogs strayed, surrendered and seized, rehomed, euthanised etc.

Table 5 (continued)

Data source	Description	Assessment of quality
Dog controls statistics	<p>These data are published annually by the Department of Rural and Community Development (https://www.gov.ie/en/collection/879d4c-dog-control-statistics/).</p> <p><i>Data published:</i></p> <ul style="list-style-type: none"> • Numbers of strayed, surrendered and seized dogs. • Numbers of dogs reclaimed, rehomed, and transferred to welfare groups. • Number of dog deaths (including euthanized dogs). 	<p><i>Characteristics of information</i></p> <p>Database contains information on the annual number of dogs that are possessed by the local authorities including information of the movement of dogs in and out of the local authorities. Thus, it provides information on pet dogs not under the control of a private owner:</p> <ul style="list-style-type: none"> • The number of stray, surrendered and seized dogs. • The number of re-homed/reclaimed dogs. • The number of dogs transferred to welfare organisations. <p><i>Representative of dog population:</i> Low, but likely possibly representative of pet dog population not under control of private owners.</p> <p><i>Accuracy of information:</i> Likely variable.</p> <ul style="list-style-type: none"> • Dependant on accuracy of data gathering mechanisms of local authorities. • Dependant on timeliness of data gathering mechanisms of local authorities.
B. The movement of dogs to and from Ireland	<p><i>Data published:</i></p> <ul style="list-style-type: none"> • Individual dog licence. • A lifetime licence (for the duration of the dog's life). • A general licence (for multiple dogs). 	<p><i>Characteristics of information:</i></p> <p>Database contains information on the annual number of:</p> <ul style="list-style-type: none"> • Individual dog licences (online and in person) issued. • Lifetime dog licences issued (for the duration of the dogs life). • General licences (for multiple dogs) issued. <p><i>Representativeness of dog population and accuracy of information:</i> See previous comments on dog licensing database.</p> <p><i>Suggestion:</i></p> <ul style="list-style-type: none"> • Link database to both dog identification and dog licensing databases. This will enhance the accuracy of the dog identification and dog licensing databases as this will allow one to determine and update both with regards to deaths and losses of dogs.
Pet passport data	<p>In accordance with Regulation (EU) No 576/2016:</p> <ol style="list-style-type: none"> 1. Each dog must be identified by a microchip, or by a tattoo applied before 3 July 2011. 2. A valid EU pet passport, issued by a private veterinary practitioner (PVP), is required for movement of dogs throughout the EU. Passports are required both for commercial and non-commercial movements of dogs into and out of Ireland. 	<p><i>Characteristics of information:</i></p> <p>This database records the annual number of pet passports issued to private PVPs yearly.</p> <p><i>Representativeness of dog population:</i> Low.</p> <ul style="list-style-type: none"> • The number of passports issued to PVDs is not a reflection of the number of passports issued by the PVP. <p><i>Accuracy of information:</i> Low.</p> <ul style="list-style-type: none"> • No information in the database on the dogs for which passports have been issued. <p><i>Suggestion:</i></p> <ul style="list-style-type: none"> • Request data from private veterinary practitioners on dogs for which pet passports have been issued monthly. At a minimum, the microchip number of each dog issued a passport should be reported to DAFM.

Table 5 (continued)

Data source	Description	Assessment of quality
Dog movements data (from the European Commission)	TRACES (Trade Control and Expert System) is the online platform of the European Commission to facilitate sanitary and phytosanitary certification of animals, animal products, food and feed and plants, into the EU, for intra-EU trade and EU exports.	<p><i>Characteristics of information</i> These data capture the yearly number of dogs that are commercially exported to EU member States.</p> <p><i>Representativeness of dog population:</i> Low, as data reflects movements where certification is required, including the commercial movement of dogs between EU Member States (e.g., private operators or charities selling or supplying dogs for re-homing). Thus, it is representative for that subset of dogs requiring certification.</p> <ul style="list-style-type: none"> • Does not capture pets travelling with owners from Ireland to another EU Member State because animal health certification is not required. • Inaccurate to the extent that certification might be required but not sought. <p><i>Accuracy of information:</i> Very high, as dogs registered on the TRACES database must have a microchip and a pet passport and must come from establishments registered with DAFM.</p>
Dog movements data (from commercial enterprises)	Data are collected by commercial organisations, including airlines and ferry companies, as part of their commercial operations. These data are not linked to TRACES.	<p><i>Characteristics of information:</i> The data contain heterogeneously collected records of inward movements of dog to Ireland.</p> <p><i>Representativeness of dog population:</i> Low.</p> <ul style="list-style-type: none"> • Reporting reliant on owner compliance. • Reporting varies with the commercial operator. • Reporting various with port of entry. Further, commercial and non-commercial movements are not distinguished. These data relate solely to inward movements. <p><i>Accuracy of information:</i> Very low.</p> <ul style="list-style-type: none"> • Entirely reliant on owner compliance. • Not verified. <p><i>Suggestion:</i></p> <ul style="list-style-type: none"> • Requirement that all dogs entering the country be declared at the port of entry.



States and the UK in 2018–July 2021 (Table 4) compared to 53,195 (Table 3) and 2045 (Table S4 in the [Supplementary material](#)) outward movements during 2016–2020 to EEA and third countries, respectively. We acknowledge that the TRACES data only provides a partial picture of all dog movements (Table 5) and relates solely to those dog movements where certification is required. Such movements would be linked to private operators or organisations that sell or supply dogs for rehoming. However, it is these movements that are of particular interest in the context of dog welfare organisations. Considering outgoing movements from Ireland in greater detail, substantial numbers of dogs were moved during 2016–20 to the UK (41,167 dogs), Sweden (6457), Italy (1874), Germany (1583) (Table 3) and Singapore (1290) (Table S4 in the [Supplementary material](#)). Data on pet passports provide some additional information about outward movements (Table 2), however, this is limited. These data reflect the issuing of passports rather than use. In contrast to the TRACES data, pet passports are required both for commercial and non-commercial movement, and do not distinguish between those dogs leaving Ireland temporarily (for example, owners going on holidays) or permanently (dog breeding establishments selling dogs abroad). Based

on the data in Table 2, the number of passports issued annually during 2014–20 has been remarkably stable, particularly in later years. With respect to inward movements, there was a marked increase, albeit from a low base, in imports from Hungary, Poland and Romania in the first 7 months of 2021 compared to each of the full calendar years of 2018, 2019 and 2020 (Table 4). We also have some access to data from commercial operators, however, this has proved difficult to assemble and interpret given that data were available for differing time periods and in different formats.

Each of the existing databases relating to dogs in Ireland needs to be interpreted with care. As highlighted in Table 5, the assessed quality of these existing databases is very variable, and often poor. None of the available data sources are of a quality that would allow a valid estimation either of the Irish pet dog population or the movement of dogs to and from Ireland (see Table 5), as to varying degrees they suffer from missing information, inconsistent data gathering mechanisms and most importantly a lack of linkage to each other. This was one of the key findings of this study. Consequently, we have refrained from presenting analytic statistics (estimates of trend, p values, confidence intervals etc.) throughout

the manuscript as we do not believe they would be valid. Based on our qualitative assessment of these databases, confidence in the accuracy of information was only possible with the dog movement data from the European Commission (which was assessed as very high). Further, the representativeness of these databases was assessed as either unknown (the dog microchipping and identification data) or low. Relevant to this and in the context of data from dog control centres in Ireland, O'Sullivan and Hanlon [2] suggested that methods for data capture and utilisation varied considerably among Local Authorities. These authors suggest that standardisation of data capture and utilisation of dog control services would provide an opportunity to develop cohesive national policy and an improved approach to responsible dog ownership in Ireland.

The data from commercial organisations were particularly difficult to use, as these data are collected differently by different companies. It is likely that they are a conservative estimate of numbers of dogs travelling, particularly for ferry companies, given the potential for owner under-reporting. We also note that no record is available of the movement of dogs across the border between Ireland and Northern Ireland. Some data from Northern Ireland is available with the council dog summary statistics [71]. In Northern Ireland, ferry companies previously provided the Department of Agriculture, Environment and Rural Affairs (DAERA) with a (conservative) estimate of 20,000 dog movements moving annually between GB and NI.

In Table 5, we present a range of suggestions to address the aforementioned data quality concerns. In particular, the linking of existing national databases (individual dog identification, dog licensing, dog control statistics) has the potential to improve both the representativeness and accuracy of information about the Irish pet dog population. We understand that this could be achieved within the existing legislative framework (that is, the legislative framework for reliable and accurate data collection already exists), as previously suggested by others, including Wedderburn [36] and Alston [72], and illustrate this proposal in Fig. 7. To illustrate, although the application form for a licence includes a place to insert the microchip number, it is very unfortunate that a microchip number is not a requirement of licensing [73]. We anticipate multiple potential beneficiaries from such a centralised database. It would contribute to the compliance and enforcement work undertaken by relevant authorities (dog wardens, port authorities, Gardaí [the Irish police]), and at relevant points of entry and exit (ports, airports) or control (rehoming centres). If these data could be accessed in real-time, this would enable authorities to identify stolen dogs, and prospective owners to cross-check the validity of information in relation to animals

presented for sale. A centralised database would also facilitate communications across relevant policy areas, noting that DAFM currently has responsibility for legislation in relation to microchipping and the sale or supply of pets, whereas DRCD is responsible for the Control of Dogs Act, including licensing and strays. These challenges are not unique to Ireland. In the UK for example, concerns have been raised in relation to the recording of microchip data, where there are currently at least 16 different databases, without agreed common standards [74].

Conclusions

This study highlights the challenges faced when using existing national data to gain insights into the dog population of Ireland. Although it was not possible to estimate the dog population of Ireland, some temporal changes are apparent. Based on national data on dog licensing and microchipping registration, pet dog numbers have remained relatively stable in recent years (ie prior to the COVID-19 pandemic). Since 2015, there has been a substantial decrease in the number of dogs managed through dog control centres, concurrent – we speculate – with an increasing role for dog welfare organisations. We note the potential utility of online private dog sales, as an additional data source to consider. Although the data are incomplete, there appear to be substantial, and increasing, number of dogs moving from Ireland to UK, Sweden, Italy, Germany and Singapore. We also note an increase (albeit much smaller) in the number of dogs being moved into Ireland. The linking of existing national databases (individual dog identification, dog licensing, dog control statistics) has the potential to improve both the representativeness and accuracy of information about the Irish pet dog population. In the next phases of our work, we will focus on the work of dog welfare organisations, given both the increased role played by these organisations and the substantial public funding that has been committed in this sector.

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s13620-022-00223-8>.

Additional file 1: Table S1. The number of dog licences issued in Ireland during 2000–2020, by type of licence. These data were collated by the Department of Rural and Community Development and are available at <https://www.gov.ie/en/collection/879d4c-dog-control-statistics/>. **Table S2.** The number of dog microchips issued in Ireland by Animark, Fido and Microdog ID from 2015 to 2020 and by the Irish Kennel Club from 2015 to 2020. **Table S3.** Annual statistics relevant to dog control centres in Ireland during 2004–2020, including the number of dogs on hand at the start and end of each year, the number of incoming dogs (either surrendered/collected or seized), the number of dogs, and the number of outgoing dogs (euthanised or died from natural causes, reclaimed/rehomed or transferred to a dog welfare organisation). These data were collated by the Department of Rural and Community Development and

are available at <https://www.gov.ie/en/collection/879d4c-dog-control-statistics/>. **Table S4.** The number of dog movements from Ireland to third countries during 2016–20, as recorded in TRACES, which is the online platform of the European Commission to facilitate sanitary and phytosanitary certification of animals, animal products, food and feed and plants, into the EU, for intra-EU trade and EU exports (https://ec.europa.eu/food/animals/traces_en). **Table S5.** The number of dogs recorded on commercial flights into Dublin airport during 2015 to June 2021. **Table S6.** The number of dogs recorded on commercial flights into Shannon airport during 2015 to June 2021. **Table S7.** The number of dogs recorded on commercial ferries into Cork Roscoff from July to October 2020. **Table S8.** The number of dogs recorded on commercial ferries into Cork Ringaskiddy from January to February 2020. **Table S9.** The number of dogs recorded on commercial ferries into Rosslare, Co. Wexford from 2018 to May 2021.

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Authors' contributions

The study was conceived by all authors. SJM led the drafting of the manuscript, with support from CL, DMC, LLMcV, NVM, SM and PR. CL, SM and AM collected the majority of the data, DMC collated the data and produced the map using ArcView based on locations supplied by DAFM. NVM conducted the pilot study on web-scraping. All authors read and approved the final manuscript.

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Availability of data and materials

Some of the datasets used in the current study are publicly available.

Declarations

Ethics approval and consent to participate

Not applicable.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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