

VetCompass: Unweaving the rainbow of canine health

Dr Dan O'Neill

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Beauty and Understanding

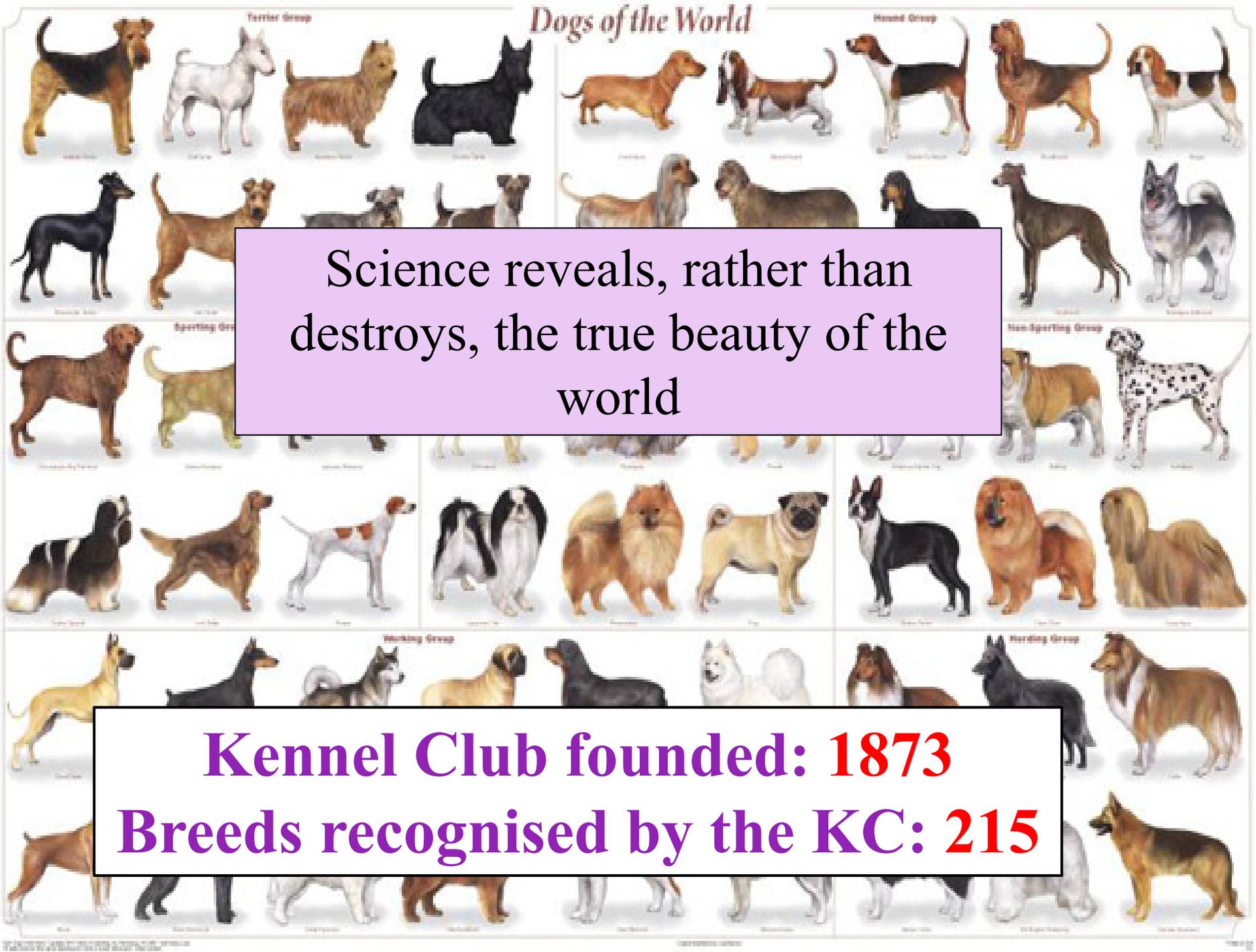
Science reveals, rather than destroys, the true beauty of the world



Dogs of the World

Science reveals, rather than destroys, the true beauty of the world

Kennel Club founded: 1873
Breeds recognised by the KC: 215



Journal of Small Animal Practice 1963

1. Hodgman, S. F. J. (1963) Abnormalities and defects in pedigree dogs—I. An investigation into the existence of certain defects in pedigree dogs in the British Isles. *Journal of Small Animal Practice* 4, 455-456
2. Hein, H. E. (1963) Abnormalities and defects in pedigree dogs-II. Hereditary defects in pedigree dogs. *Journal of Small Animal Practice* 4, 457-462
3. Knight, C. (1963) Abnormalities and defects in pedigree dogs—III. **Tibio-femoral joint deformity and patella luxation.** *Journal of Small Animal Practice* 4, 463-464
4. Barnett, K. C. (1963) Abnormalities and Defects in Pedigree Dogs—IV. *Journal of Small Animal Practice* 4, 465-466

Do we know as much as we think we do???

RVC



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Dogs – do we really know as much as we think?

A few simple questions:

- a) What are the 3 most common disorders of dogs?
- b) Is the prevalence of common disorders higher in purebred dogs than in crossbred dogs?
- c) What is the average lifespan of a dog?
- d) Do crossbred dogs live longer than purebred dogs?
- e) Do similarly-sized dogs have the same top disorders?

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Is our belief: Blind or Evidence-based?

What is the truth?

Epistemology

OED: The theory of knowledge, especially with regard to its methods, validity, and scope, and the distinction between justified belief and opinion.

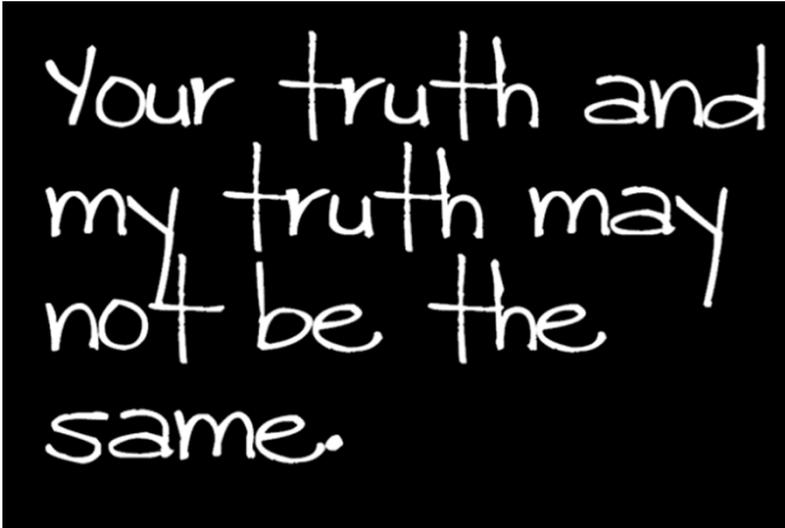
Truth is Truth
even if no one believes it
a LIE is a LIE
even if everyone believes it

Truth

OED: A fact or belief that is accepted as true.

Vs.

OED: That which is true or in accordance with fact or reality.



Your truth and
my truth may
not be the
same.

Reality

OED: The state of things as they actually exist, as opposed to an idealistic or notional idea of them.



How do we know what is real?

Five senses: sight, smell, touch, hearing, taste

Five senses: sight, smell, touch, hearing, taste **and science**

- Dinosaurs?
- Stars?
- Bacteria?
- Radio waves?
- DNA?
- Aggression?

**Science gives us
Evidence**



Evidence

OED: The available body of facts or information indicating whether a belief or proposition is true or valid.

**Key Message:
Base your Belief of the
Truth on the Evidence**



Companion animals – do we really know everything?

A few simple questions:

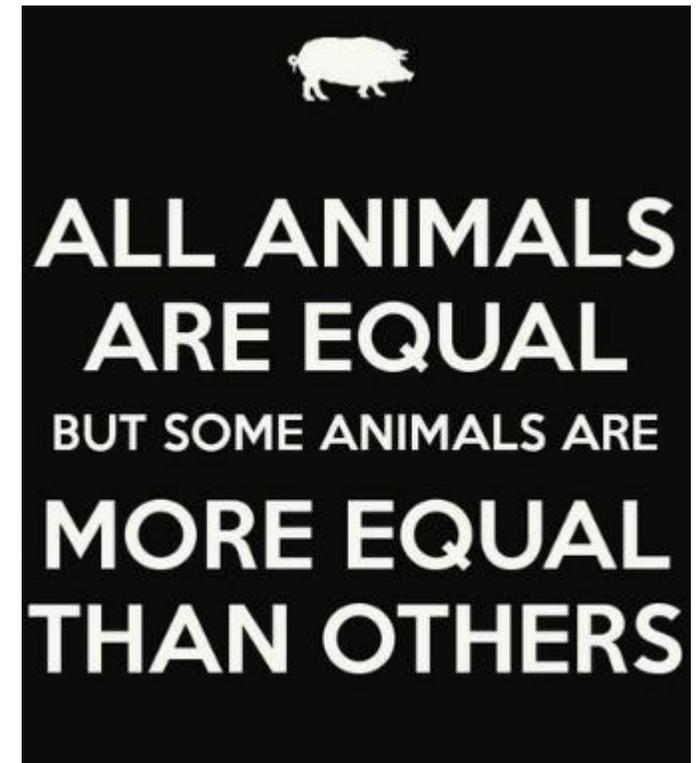
- a) What are the 3 most common disorders of dogs?**
- b) Is the prevalence of common disorders higher in purebred dogs than in crossbred dogs?**
- c) What is the average lifespan of dogs?**
- d) Do crossbred dogs live longer than purebred dogs?**
- e) Do similarly-sized small dogs have the same top disorders?**

Canine Health Evidence To Date

- Questionnaires/surveys
- Referral vet data
- Insurance data
- Laboratory/Experimental

- Biased
- Not representative
- Out of date
- Non-UK
- Non-standardised
- Not generalisable

RVC



The new face of Canine Health Evidence



Data collection and analysis from primary-care vet practices

- Representative
- Healthy and sick
- Animal histories
- Anonymised
- Veterinary diagnoses
- Longitudinal
- Blinded
- Treatment data
- Large data volumes
- Franchisable
- Data waiting to be picked

VetCompass Programme

Other stakeholders

Vet practices



Prevalence of Disorders Recorded in Dogs Attending Primary-Care
Dan G. O'Neill¹, Church DB¹, McGreevy PD¹, Thomson PC¹, Brodbelt DC¹

Exposing pedigree dogs using disorder prevalence evidence
O'Neill DG¹, Church DB¹, McGreevy PD¹, Thomson PC¹, Brodbelt DC¹

Is there a 'pedigree dog' problem?

Prior study belief

Abstract

What disorders most commonly affect our dogs?

The Aim - To identify the most common conditions affecting dogs in England and to see if health differed between purebred and crossbred dogs.

The Data - Random sample of 3,884 dogs.

Longevity and mortality of owned dogs in England
Presented by: Dr Dan O'Neill

Select a region on the map to see a breakdown of demographic information specific to pet dogs in Scotland, Wales, Northern Ireland, Northern England, Midland England, South West England or South East England.

Dogs Total: 232486

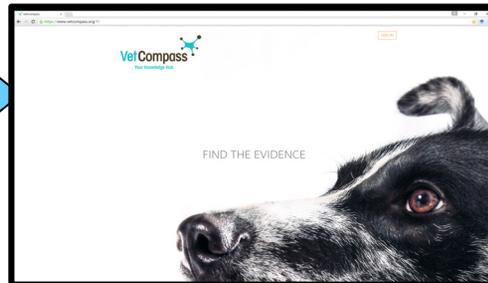
Male	117526
Female	111241
Unknown	3719

Neutered 41% **Insured** 19% **Microchipped** 42%

Top 5 Breeds

1. Crossbreed OR 'Mongrel' OR 'Bastard'
2. Terrier - Staffordshire Bull (unspecified) OR Staffordshire Bull Terrier (unspecified)
3. Retriever - Labrador OR Labrador Retriever
4. Terrier - Jack Russell (JRT)
5. Shih-tzu

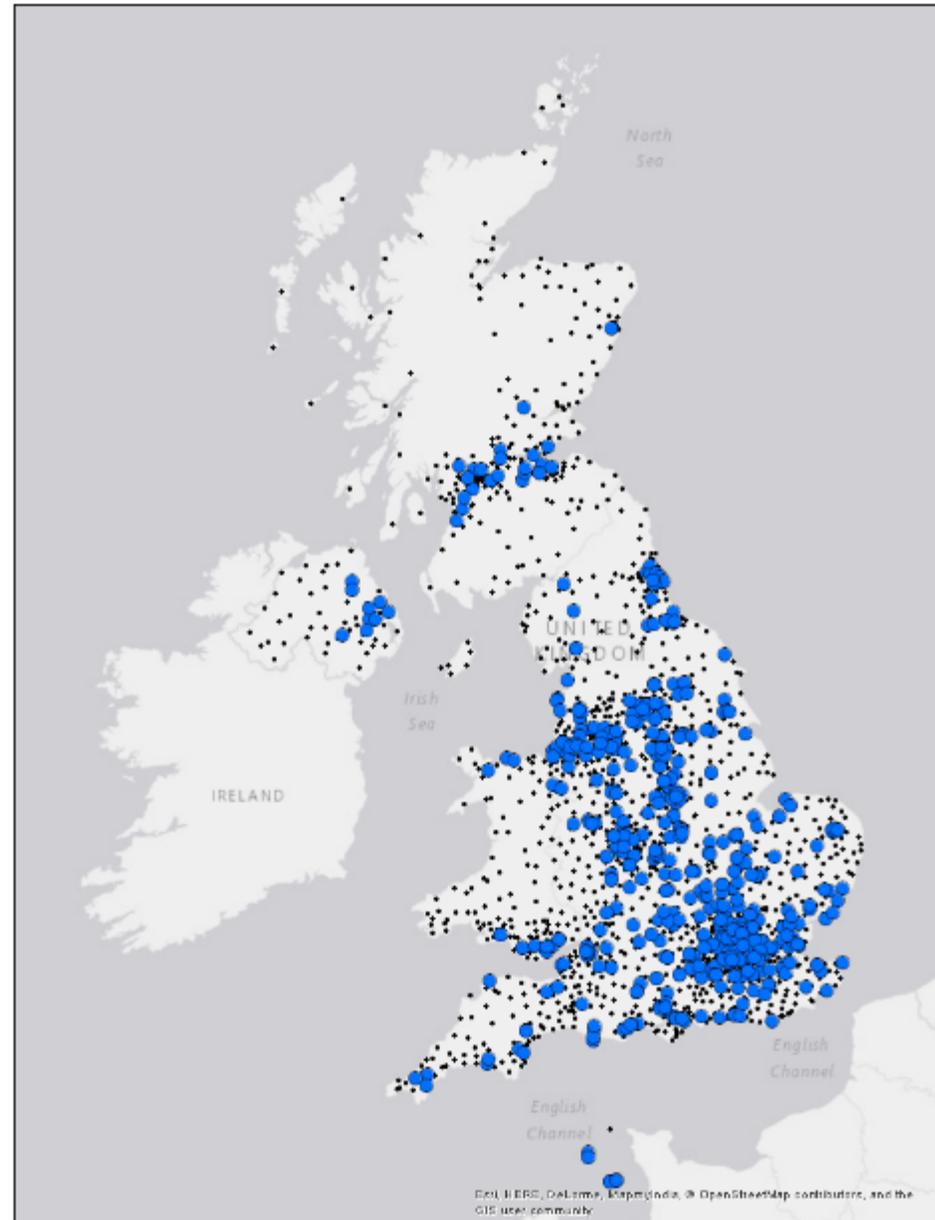
Real-time



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September 2016: VetCompass: 498 Practices

RVC



VetCompass: Sept 2016 status

Participating practices	498
Unique animals:	5,843,600
Total episodes of care:	36,347,778
Total treatments used:	111,212,641

VetCompass: Sept 2016 status

Canine	2,764,825
Feline	1,859,095
Rabbit	426,679
Guinea Pig	66,750
Bird	64,007
Exotic	21,948
Reptile	13,756
Equine	11,337
Unassigned yet	615,203

Data shared: VetCompass

Identifier
Vet Group ID
Clinic ID
Vet ID
Owner ID
Animal ID
Visit ID
Microchip number
Partial postcode

VetCompass Support & Impact



Approval:

- ✓ RCVS
- ✓ RVC Ethics
- ✓ Data Protection Act

Stated Support:

- ✓ BVA
- ✓ BSAVA
- ✓ SPVS
- ✓ RSPCA
- ✓ PDSA
- ✓ Dogs Trust
- ✓ The Kennel Club
- ✓ iCatCare
- ✓ GCCF
- ✓ APGAW
- ✓ International Partnership for Dogs
- ✓ Dog Advisory Council
- ✓ UFAW
- ✓ Eurogroup for Animals

Research Collaboration

University projects:

- RVC
- Cambridge
- Lincoln
- Edinburgh
- Sussex
- Newcastle
- Aberdeen
- Bristol

Veterinary groups:

- Medivet
- Vets4Pets/ Companion Care
- Vets Now
- PDSA
- DogsTrust
- Multiple independent practices



VetCompass – International extension



- **Australia**
- **New Zealand**
- **Spain**
- **Germany**
- **US**
- **Sweden**
- **Denmark**



Peer-reviewed publications



General

1. Disorder prevalence in dogs
2. Longevity and mortality in dogs
3. Disorder prevalence in cats
4. Longevity and mortality in cats
5. Brachycephaly in dogs
6. Disorders of CKCSs
7. Canine health surveillance methods
8. Disorders of Pugs

Dogs and cats

9. Glucocorticoid use: cats and dogs
10. Antimicrobials in cats and dogs

RVC Translational

11. Aging: dog as model for human

Specific disorders

Dogs

12. Epilepsy
13. Pyoderma
14. Chronic kidney disease
15. Diabetes mellitus
16. Mitral valve disease – 1
17. Mitral valve disease - 2
18. Cruciate disease
19. Patellar luxation
20. Mast cell tumours
21. Patellar luxation
22. Hyperadrenocorticim
23. Syringomyelia

Cats

20. Hyperthyroidism in cats
21. Diabetes mellitus

Companion animals – do we really know everything?

A few simple questions:

- a) What are the 3 most common disorders of dogs?
- b) Is the prevalence of common disorders higher in purebred dogs than in crossbred dogs?
- c) What is the average lifespan of dogs?
- d) Do crossbred dogs live longer than purebred dogs?
- e) Do similarly-sized small dogs have the top disorders?

Ask for the Evidence

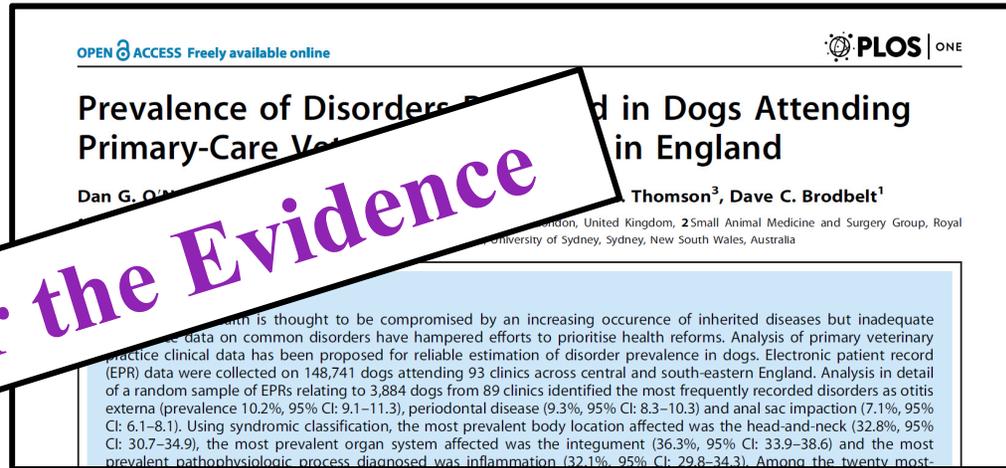
Crossbreds vs. Purebreds?

‘Hybrid vigour’ - superior average performance of crossbred progeny of two purebred parents compared with their purebred parents species (Dechow et al., 2007; Nicholas, 2010).

‘Inbreeding depression’ - declining fitness as inbreeding increases (Whitlock et al., 2000; Keller and Waller, 2002).

Production species

- viability
- production
- fecundity



Ask for the Evidence

O'Neill, D. G., Church, D. B., McGreevy, P. D., Thomson, P. C. & Brodbelt, D. C. (2014) Prevalence of disorders recorded in dogs attending primary-care veterinary practices in England. *PLoS One* 9, 1-16

Are Crossbreds healthier than Purebreds?

- What are the most common disorders of dogs?
- Is the prevalence of common disorders higher in purebred dogs than in crossbred dogs?

Prevalence of disorders in dogs

Methods

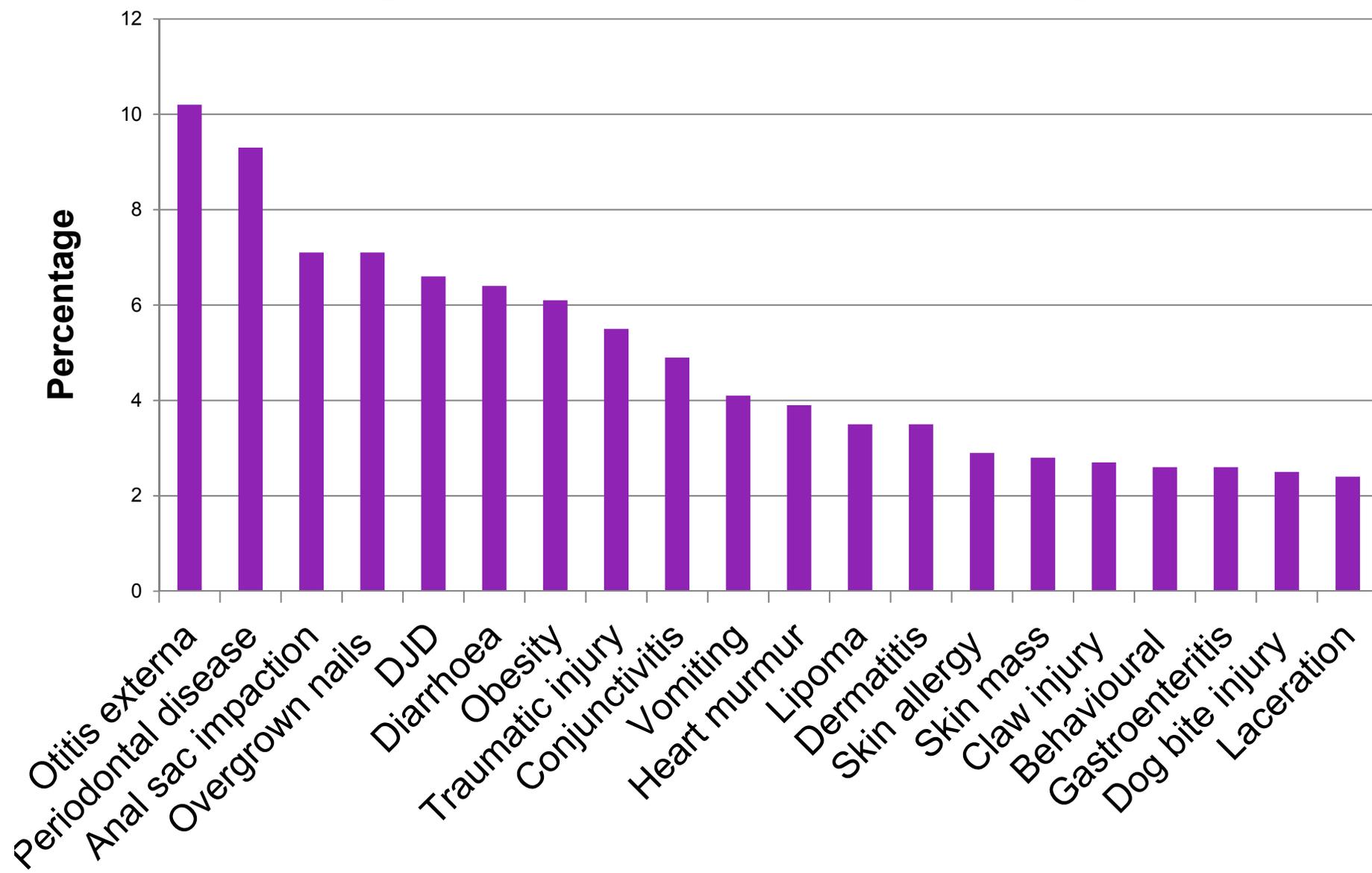
- Study population: 148,741 dogs from 93 clinics
- Random sample: 3,884 dogs
- All recorded disorder events extracted

Results

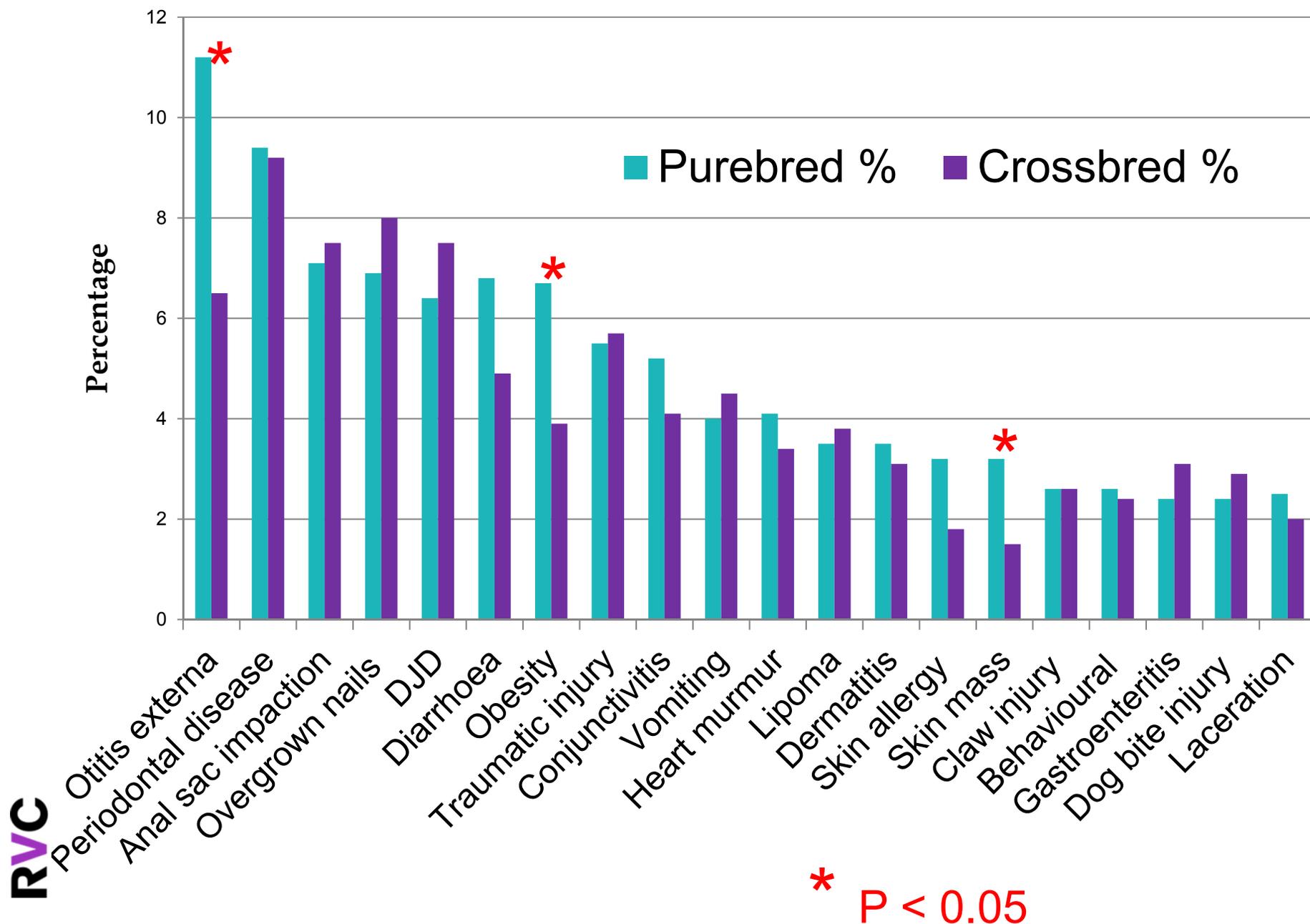
- 430 different disorder types
- 8,025 disorder events



Frequent disorders recorded in dogs



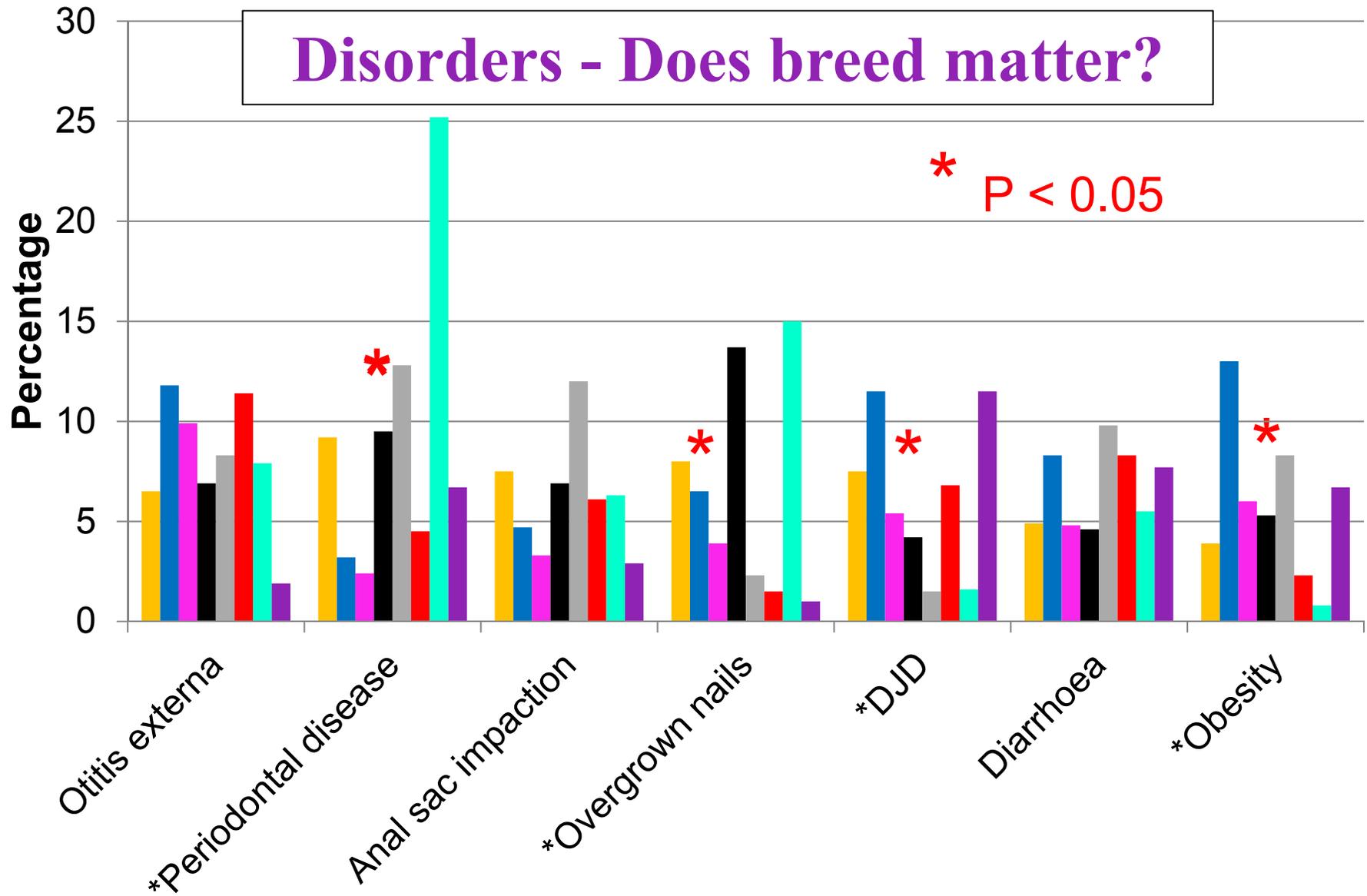
Disorders in dogs: Purebred vs Crossbred



Does breed matter?

Disorders - Does breed matter?

* P < 0.05



RVC

- Crossbred
 Labrador Retriever
 Staff. Bull Terrier
- Jack Russell
 Cocker Spaniel
 German Shepherd
- Yorkshire Terrier
 Border Collie

Companion animals – do we really know everything?

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- e) Do similarly-sized small dogs have the top disorders?

Ask for the Evidence



The Veterinary Journal 198 (2013) 638–643

Contents lists available at [ScienceDirect](#)

 **The Veterinary Journal** 

journal homepage: www.elsevier.com/locate/tvj

Longevity and mortality of owned dogs in England  CrossMark

D.G. O'Neill^{a,*}, D.B. Church^b, P.D. McGreevy^c, P.C. Thomson^c, D.C. Brodbelt^a

^a*Veterinary Epidemiology, Economics and Public Health, The Royal Veterinary College, Hawkshead Lane, North Mymms, Hatfield, Herts AL9 7TA, UK*
^b*Small Animal Medicine and Surgery Group, The Royal Veterinary College, Hawkshead Lane, North Mymms, Hatfield, Herts AL9 7TA, UK*
^c*R.M.C. Gunn Building (B19), Faculty of Veterinary Science, The University of Sydney, NSW 2006, UK*

<p>ARTICLE INFO</p> <p><i>Article history:</i> Accepted 18 September 2013</p> <p><i>Keywords:</i></p>	<p>ABSTRACT</p> <p>Improved understanding of longevity represents a significant welfare opportunity for the domestic dog, given its unparalleled morphological diversity. Epidemiological research using electronic patient records (EPRs) collected from primary veterinary practices overcomes many inherent limitations of referral clinic, owner questionnaire and pet insurance data. Clinical health data from 102,609 owned dogs attending first opinion veterinary practices (n = 86) in central and southeast England were analysed, focusing on</p>
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Longevity and mortality of Purebred and Crossbred Dogs

O'Neill DG, Church DB, McGreevy PD, Thomson PC, Brodbelt DC. Longevity and mortality of owned dogs in England. The Veterinary Journal. 2013;198(3):638-43.

Results

Overall

- 86 practices
- 102,609 dogs
- 5,095 confirmed deaths
- 4,153 (86.4%) euthanased



Median longevity

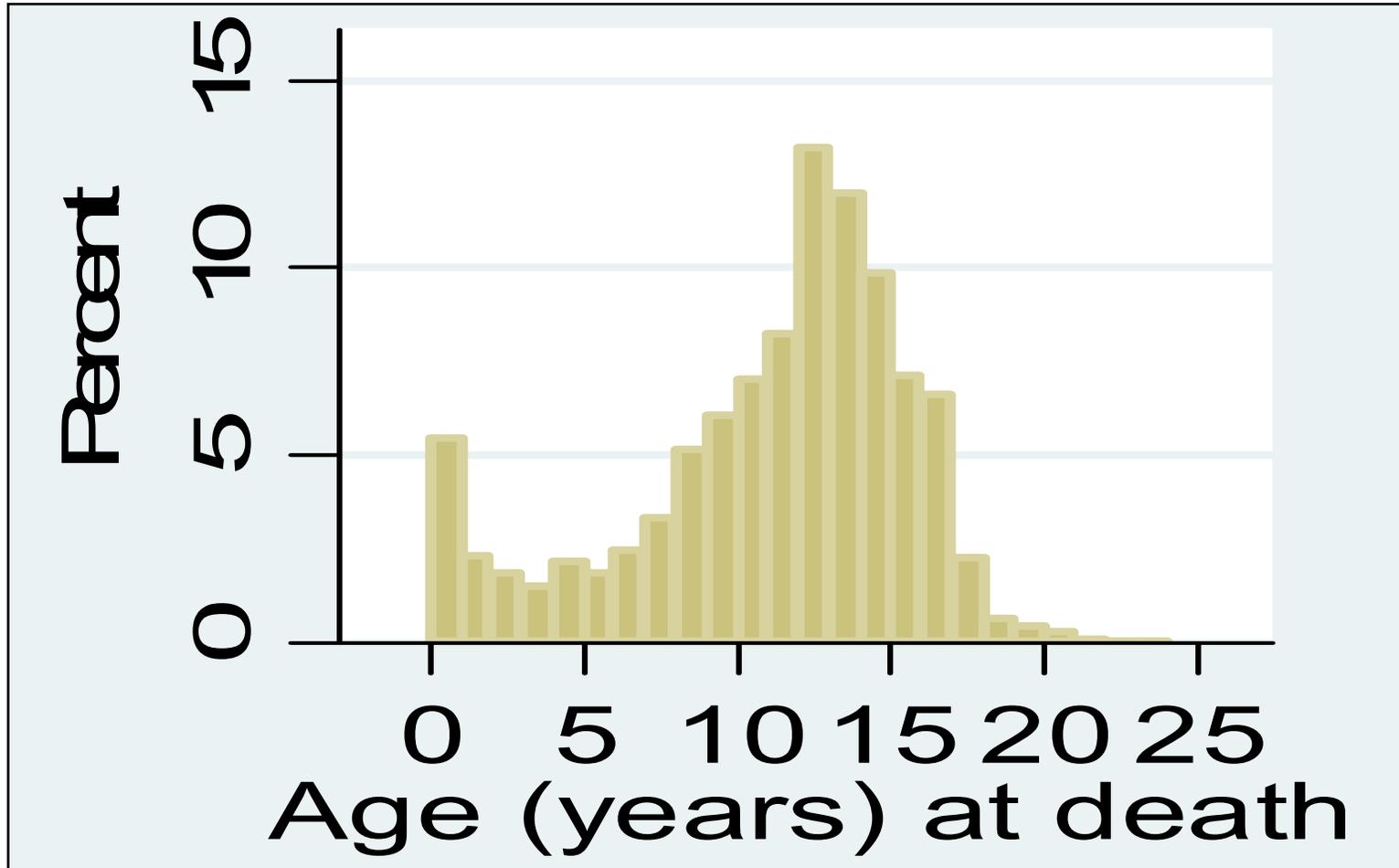
- Overall: 12.0 years (IQR: 8.9-14.2, range: 0.0-24.0)
- Crossbred: 13.1 years (IQR: 10.1-15.0, range 0.0-22.0)
- Purebred: 11.9 years (IQR: 8.4-14.0, range: 0.0-24.0)

P < 0.001

Longevity - Does breed matter?

Breed	Median (years)	IQR	No. of dogs
Miniature Poodle	14.2	11.1-15.6	20
Bearded Collie	13.7	12.2-14.3	25
Border Collie	13.5	11.5-15.0	184
Miniature Dachshund	13.5	9.2-14.3	25
West Highland White Terrier	13.5	10.4-14.9	128
Cairn Terrier	13.4	10.6-15.4	27
Jack Russell Terrier	13.4	9.3-15.7	298
~~~~~	~~~~~	~~~~~	~~~~~
Crossbreed	<b>13.1</b>	<b>10.1-15.0</b>	<b>1120</b>
~~~~~	~~~~~	~~~~~	~~~~~
Bulldog	8.4	3.2-11.3	26
Rottweiler	8.0	5.5-10.2	105
Chihuahua	7.1	1.0-11.9	36
Mastiff	7.1	2.01-9.01	35
Great Dane	6.0	4.0-9.0	23
Dogue de Bordeaux	5.5	3.3-6.1	21

Age at Death



Causes of Mortality

Attributed cause of death	<3 years		≥3 years	
	Rank	No. deaths	Rank	No. deaths
Behavioural abnormality	1	72 (14.7%)	10	130 (2.8%)
Gastrointestinal (GIT)	2	71 (14.5%)	5	261 (5.7%)
No cause recorded	3	65 (13.3%)	2	596 (13.0%)
Road traffic accident (RTA)	4	62 (12.7%)		
Neurological	5	36 (7.4%)	4	533 (11.6%)
Trauma	6	32 (6.5%)		
Congenital defect	7	24 (4.9%)		
Respiratory	8	18 (3.7%)	7	179 (3.9%)
Cardiac	9	13 (2.7%)	6	252 (5.5%)
Dangerous Dogs Act	10	12 (2.5%)		
Collapse			8	176 (3.8%)
Neoplastic			1	831 (18.2%)
Musculoskeletal			3	567 (12.4%)
Renal/urinary			9	171 (3.7%)

Companion animals – do we really know everything?

A few simple questions:

- a) What are the 3 most common disorders of dogs?
- b) Is the prevalence of common disorders higher in purebred dogs than in crossbred dogs?
- c) What is the average lifespan of dogs?
- d) Do crossbred dogs live longer than purebred dogs?
- e) **Do similarly-sized small dogs have the top disorders?**

Ask for the Evidence



Summers et al. *Canine Genetics and Epidemiology* (2015) 2:4
DOI 10.1186/s40575-015-0016-7



Canine Genetics
and Epidemiology

RESEARCH

Open Access

Prevalence of disorders recorded in Cavalier King Charles Spaniels attending primary-care veterinary practices in England

Jennifer F Summers^{1*}, Dan G O'Neill¹, David B Church¹, Peter C Thomson², Paul D McGreevy² and David C Brodbelt¹

Abstract

Background: Concerns have been raised over breed-related health issues in purebred dogs, but reliable prevalence estimates for disorders within specific breeds are sparse. Electronically stored patient health records from primary-care practice are emerging as a useful source of epidemiological data in companion animals. This study used large volumes of health data from UK primary-care practices participating in the VetCompass animal health surveillance project to evaluate in detail the disorders diagnosed in a random selection of over 50% of dogs recorded as Cavalier King Charles Spaniels (CKCSs). Confirmation of breed using available microchip and Kennel Club (KC) registration data was attempted.

Results: In total, 3624 dogs were recorded as CKCSs within the VetCompass database of which 143 (3.9%) were confirmed as KC-registered via microchip identification linkage of VetCompass to the KC database. 1875 dogs (75 KC registered and 1800 of unknown KC status, 52% of both groups) were randomly sampled for detailed clinical review. Clinical data associated with veterinary care were recorded in 1740 (92.3%) of these dogs. The

SUMMERS, J., O'NEILL, D., CHURCH, D., THOMSON, P., MCGREEVY, P. & BRODBELT, D. 2015. **Prevalence of disorders recorded in Cavalier King Charles Spaniels attending primary-care veterinary practices in England.** *Canine Genetics and Epidemiology*, 2, 4.

Cavalier King Charles Spaniels



Study population

- 3,624 CKCS (Sep 1st, 2009 to July 9th 2013)
- Studied 1,749 dogs (52% random sample)

Descriptive

- Median adult weight: 10.5 kg
- Median age at last consult: 5.25 years
- Median age at death: 10.5 years
- Method of death: 77.4% by euthanasia

CKCS: Specific disorders (1-15)

Specific diagnosis recorded	Rank	%
Heart murmur	1	30.9
Diarrhoea	2	11.0
Dental disease	3	9.5
Otitis externa	4	9.2
Conjunctivitis	5	7.5
Anal sac infection	6	7.4
Heart disease	7	7.3
Corneal disorder	8	6.5
Periodontal disease	9	5.6
Mitral valve disorder	10	5.0
Umbilical hernia	11	4.1
Flea infestation	12	3.7
Anal sac impaction	13	3.6
Skin mass lesion	14	3.5
Keratoconjunctivitis sicca (Dry Eye)	15	3.5

CKCS: Specific disorders (16-30)

Specific diagnosis recorded	Rank	%
Gastroenteritis	16	3.4
Patellar luxation	17	3.3
Otitis	18	2.7
Osteoarthritis	19	2.6
Colitis	20	2.5
Cataract	21	2.5
Ear mite infestation - Otodectes	22	2.4
Urinary tract infection	23	2.4
Gastritis	24	2.3
Joint disorders	25	2.2
Pyoderma	26	2.1
Enteritis	27	1.9
Pancreatitis	28	1.8
Syringomyelia	29	1.7
Kennel Cough	30	1.7



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O'Neill et al. *Canine Genetics and Epidemiology* (2016) 3:5
DOI 10.1186/s40575-016-0035-z

Canine Genetics and
Epidemiology

RESEARCH

Open Access



Demography and health of Pugs under primary veterinary care in England

Dan G. O'Neill^{1*}, Elisabeth C. Darwent¹, David B. Church² and Dave C. Brodbelt¹

Abstract

Background: The Pug is an ancient dog breed and was the fifth most commonly registered UK pedigree breed in 2014. However, the breed has been reported to be predisposed to several disorders including ocular, respiratory and dermatological problems. The VetCompass Programme collates de-identified clinical data from primary-care veterinary practices in the UK for epidemiological research. Using VetCompass clinical data, this study aimed to characterise the demography and common disorders of the general population of Pugs under veterinary care in England.

Results: Pugs comprised 2709 (1.03 %) of 264,260 study dogs under veterinary care from September 1st, 2009 to 30th April, 2015. Annual proportional birth rates showed that Pugs rose from less than 1 % of annual birth cohorts before 2008 to comprise 2.8 % of the 2013 annual birth cohort. The most common colours of Pugs were fawn (63.1 %), black (27.7 %), apricot (7.6 %) and silver (2.1 %).

Of the 1009 pugs under veterinary care in the study during 2013, 688 (68.19 %) had at least one disorder recorded. The most prevalent disorders recorded overall were overweight/obesity (number of events: 133, prevalence: 13.18 %, 95 % CI: 11.12–15.43), corneal disorder (88, 8.72 %, 95 % CI: 7.05–10.63) and otitis externa (76, 7.53 %, 95 % CI: 5.98–9.34). The most prevalent disorder groups were ophthalmological ($n = 164$, prevalence: 16.25 %, 95 % CI: 14.03–18.68).

O'NEILL, D. G., DARWENT, E. C., CHURCH, D. B. &
BRODBELT, D. C. 2016. **Demography and health of
Pugs under primary veterinary care in England.**
Canine Genetics and Epidemiology, 3, 1-12.

Pugs



Diane Pearce Collection / The Kennel Club ©

Study population

- 1,009 Pugs under vet care during 2013

Descriptive

- Median adult weight: 9.2kg
- Median age during 2013: 3.0 years
- 68.2% had ≥ 1 disorder recorded during 2013

Pugs: Specific disorders (1-12)

Specific diagnosis recorded	Rank	%
Overweight/obesity	1	13.2
Corneal disorder	2	8.7
Otitis externa	3	7.5
Unspecified ear disorder	4	7.4
Anal sac impaction	5	6.5
Periodontal disease	6	6.1
Nails overlong	7	5.7
Brachycephalic obstructive airway syndrome (BOAS)	8	5.2
Vomiting	9	5.0
Diarrhoea	10	3.8
Upper respiratory tract noise increased	11	3.6
Intertrigo	12	3.2

Pugs: Specific disorders (13-24)

Specific diagnosis recorded	Rank	%
Retained deciduous tooth	13	3.1
Umbilical hernia	14	2.8
Respiratory noise increased	15	2.8
Lameness	16	2.4
Ocular discharge	17	2.2
Pruritus	18	2.2
Pyotraumatic dermatitis	19	2.1
Alopecia	20	2.0
Conjunctivitis	21	1.9
Keratoconjunctivitis sicca	22	1.9
Coughing	23	1.8
Pyoderma	24	1.7

Pugs: Proportional annual birth rates

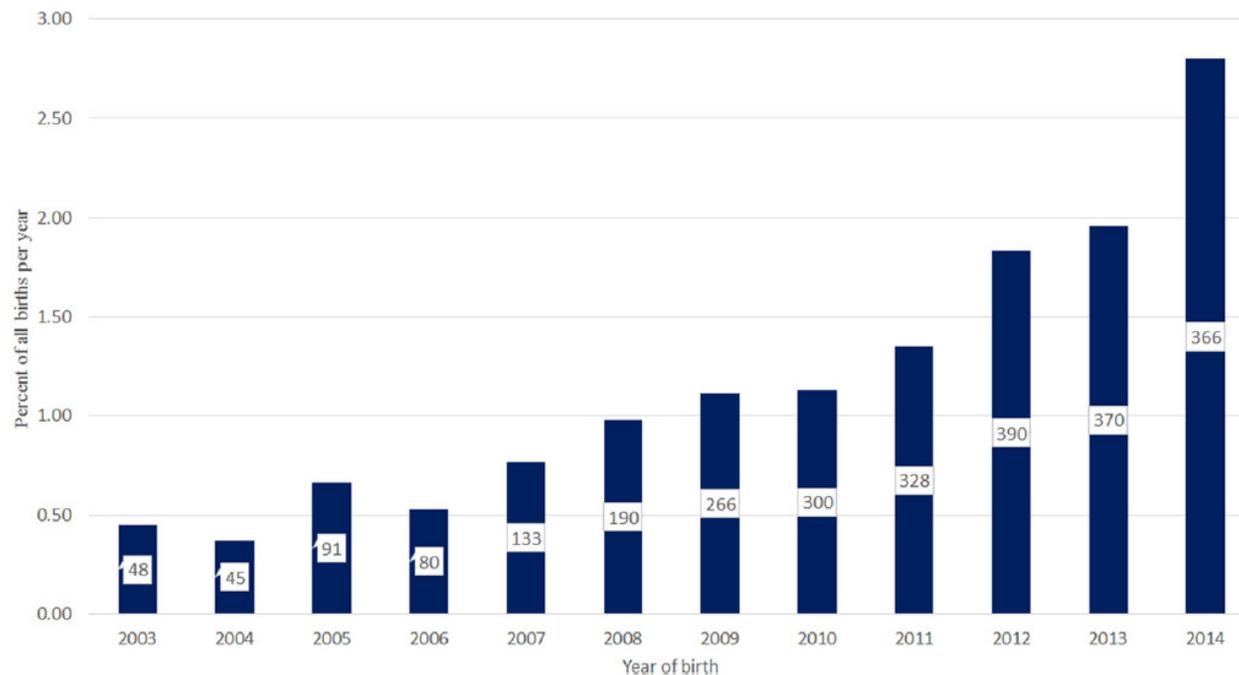


Fig. 2 Annual proportional birth rates (2003–2014) for Pugs among all dogs ($n = 263,456$) attending primary-care veterinary clinics in England participating in the VetCompass Programme. The annual birth count of Pugs is shown in each bar

Pugs: Growth curves

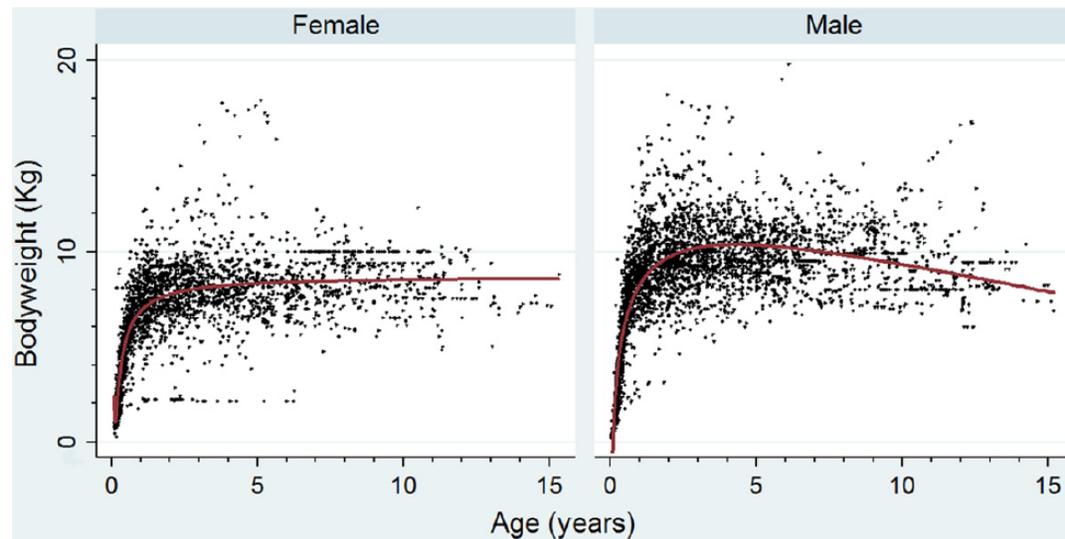


Fig. 3 Bodyweight growth curves overlaid with a fractional-polynomial prediction plot for female and male Pugs attending primary-care veterinary clinics in England participating in the VetCompass Programme. (Females $n = 772$, Males $n = 992$)



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O'NEILL, D. G., DARWENT, E. C., CHURCH, D.
B. & BRODBELT, D. C. **Border Terriers under
primary veterinary care in England:
Demography and disorders.** In preparation for
publication

Border Terriers



Diane Pearce Collection / The Kennel Club ©

Study population

- 1,327 Border Terriers under vet care during 2013

Descriptive

- Median adult weight: 10.1kg
- Median age during 2013: 5.9 years
- Median age at death: 12.7 years
- 88.5% of deaths by euthanasia
- 66.4% had ≥ 1 disorder recorded during 2013

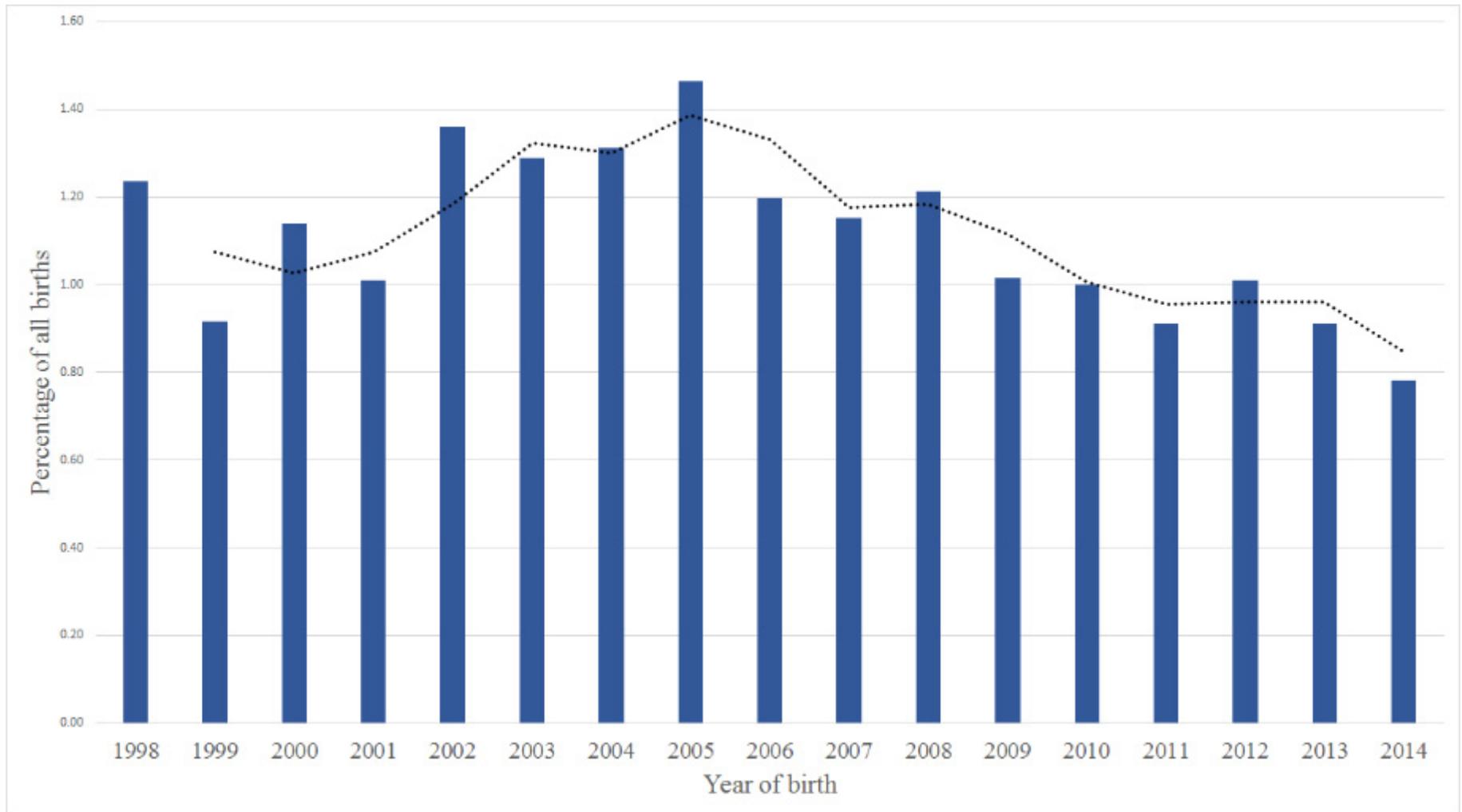
Border Terriers: Specific disorders (1-12)

Specific diagnosis recorded	Rank	%
Periodontal disease	1	17.6
Obesity	2	7.0
Otitis externa	3	6.7
Nail clip	4	5.3
Anal sac impaction	5	4.8
Vomiting	6	4.4
Conjunctivitis	7	3.3
Diarrhoea	8	3.2
Heart murmur	9	2.6
Lameness	10	2.6
Mass lesion - skin	11	2.5
Pruritus	12	2.5

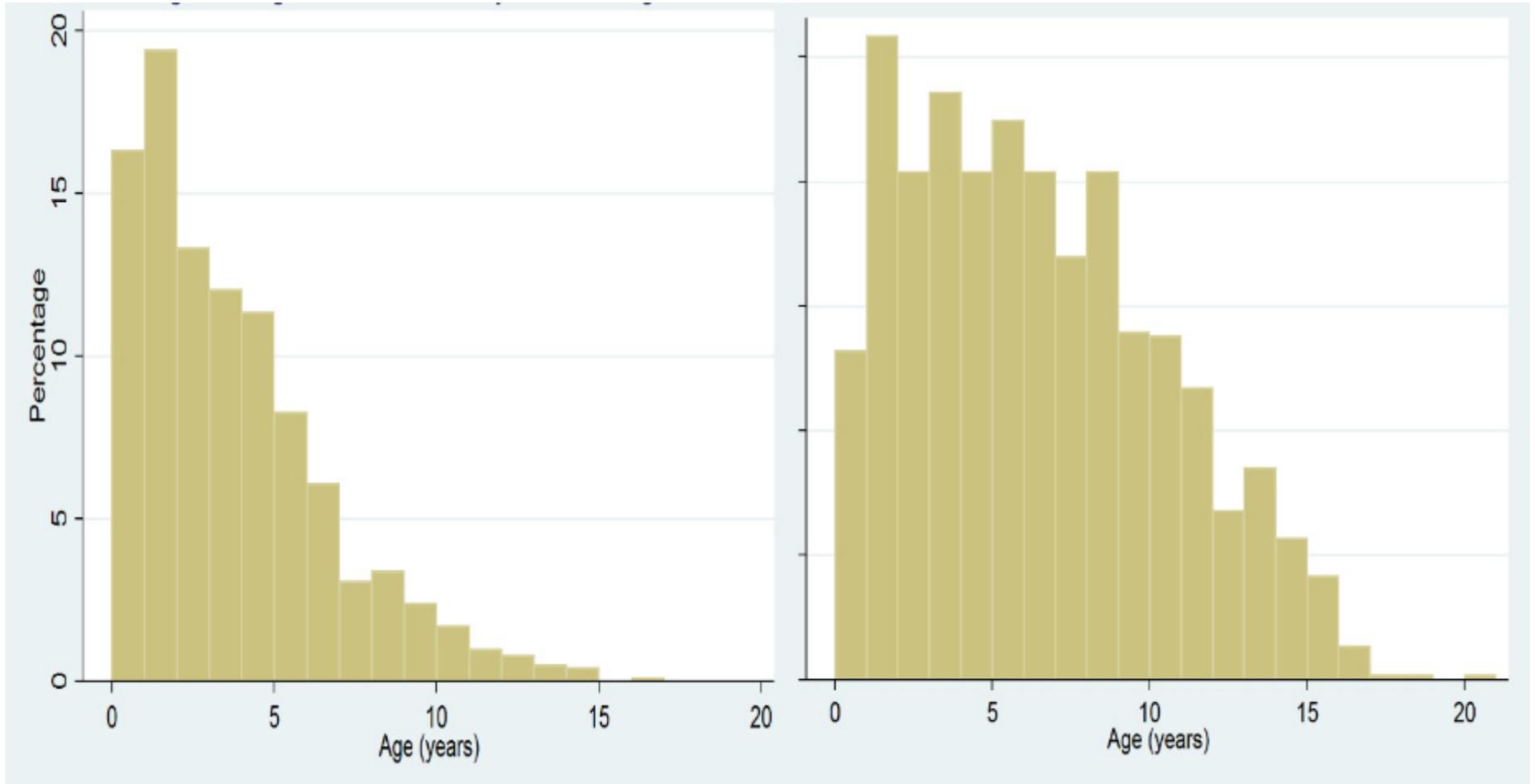
Border Terriers: Specific disorders (13-25)

Specific diagnosis recorded	Rank	%
Ear disorder	13	2.2
Lethargy	14	2.0
Cataract	15	1.8
Coughing	16	1.8
Seizure disorder	17	1.8
Hypersensitivity skin disorder	18	1.7
Dog bite injury	19	1.6
Epilepsy	20	1.6
Degenerative joint disease	21	1.6
Dermatitis	22	1.4
Gastroenteritis	23	1.4
Infectious canine tracheobronchitis (Kennel Cough)	24	1.4
Pyoderma	25	1.4

Border Terriers: Proportional annual birth rates



Ages of dogs under veterinary care during 2013



RVC

Pugs

Border Terriers

Companion animals – do we really know everything?

A few simple questions:

- a) What are the 3 most common disorders of dogs?**
 - **OE, Periodontal, Anal sac impaction**
- b) Is the prevalence of common disorders higher in purebred dogs than in crossbred dogs?**
 - **Limited evidence**
- c) What is the average lifespan of dogs?**
 - **12.0 years**
- d) Do crossbred dogs live longer than purebred dogs?**
 - **Yes: 13.1 yrs vs. 11.9 yrs**
- e) Do similarly-sized small dogs have the same top disorders?**
 - **No. Breed matters.**

Key Message:
Base your Belief of the
Truth on the Evidence

Ask for the Evidence



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