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## Understanding Companion Animal Demographics: A Foundation for Human-Animal Bond Studies?

by

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# Presentation Covers:

- Pet Demographics: a Global Outline
  - Dog and Cat Population Estimates.
  - Different survey methods produce different numbers.
    - E.G. The USA and the UK.
  - Relative Dog & Cat Measures (e.g. animals per 1,000 people or % of homes with pets) have interesting qualities.
  - Variations in (or lack of) relative populations over time.
- Human Density & Impact on Relative Dog (pet?) populations.
- International Differences in Relative Dog populations.
- Conclusions

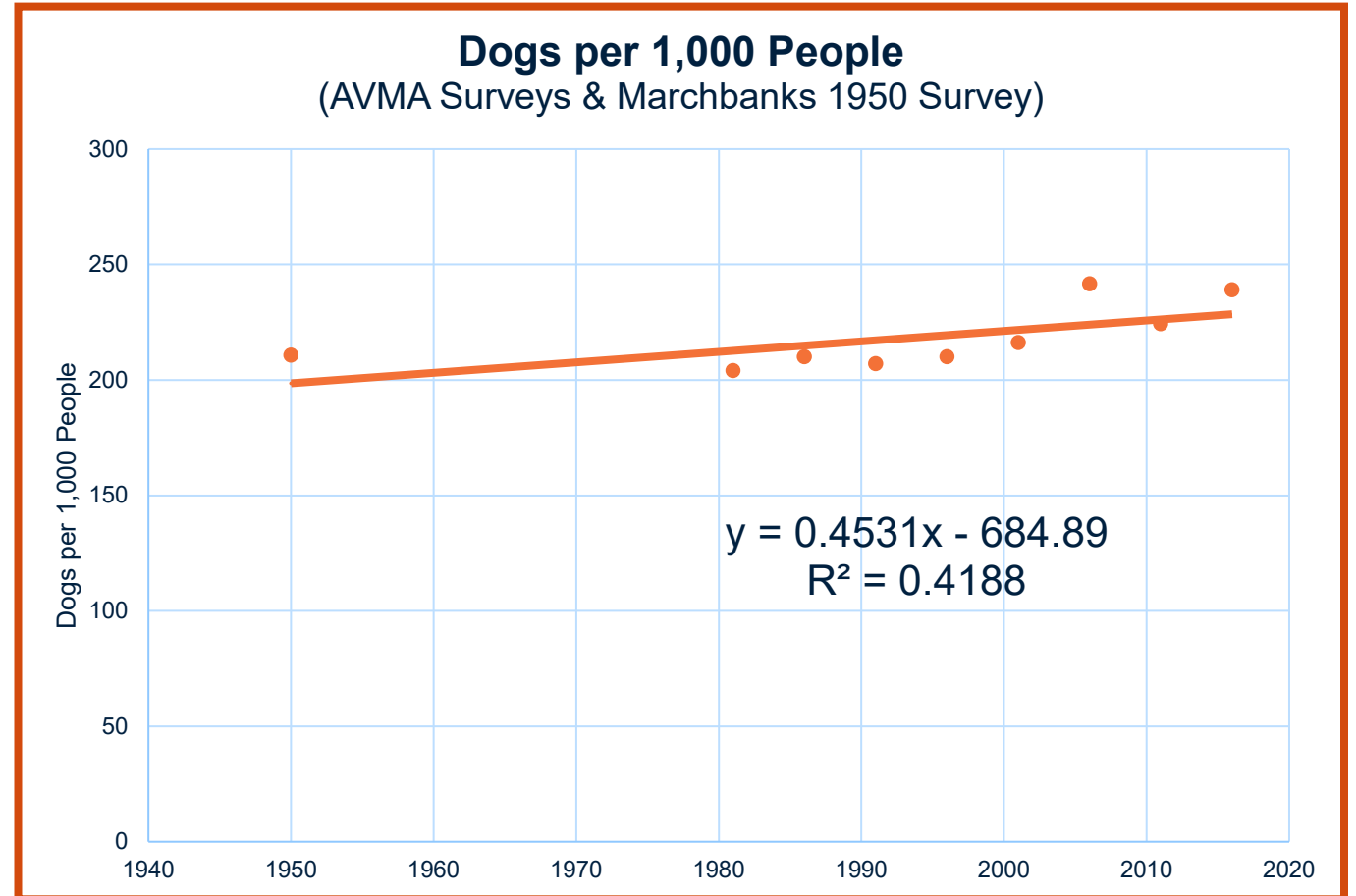
# OUTLINE

- Trends & Variations in Dog/Cat Ownership
- Different Survey Methods Produce Different Results
- Cat Estimates by AVMA: Survey Issues
- Puppy and Kitten Numbers/Sources
- Human Density Effects
- International Differences
- Conclusions

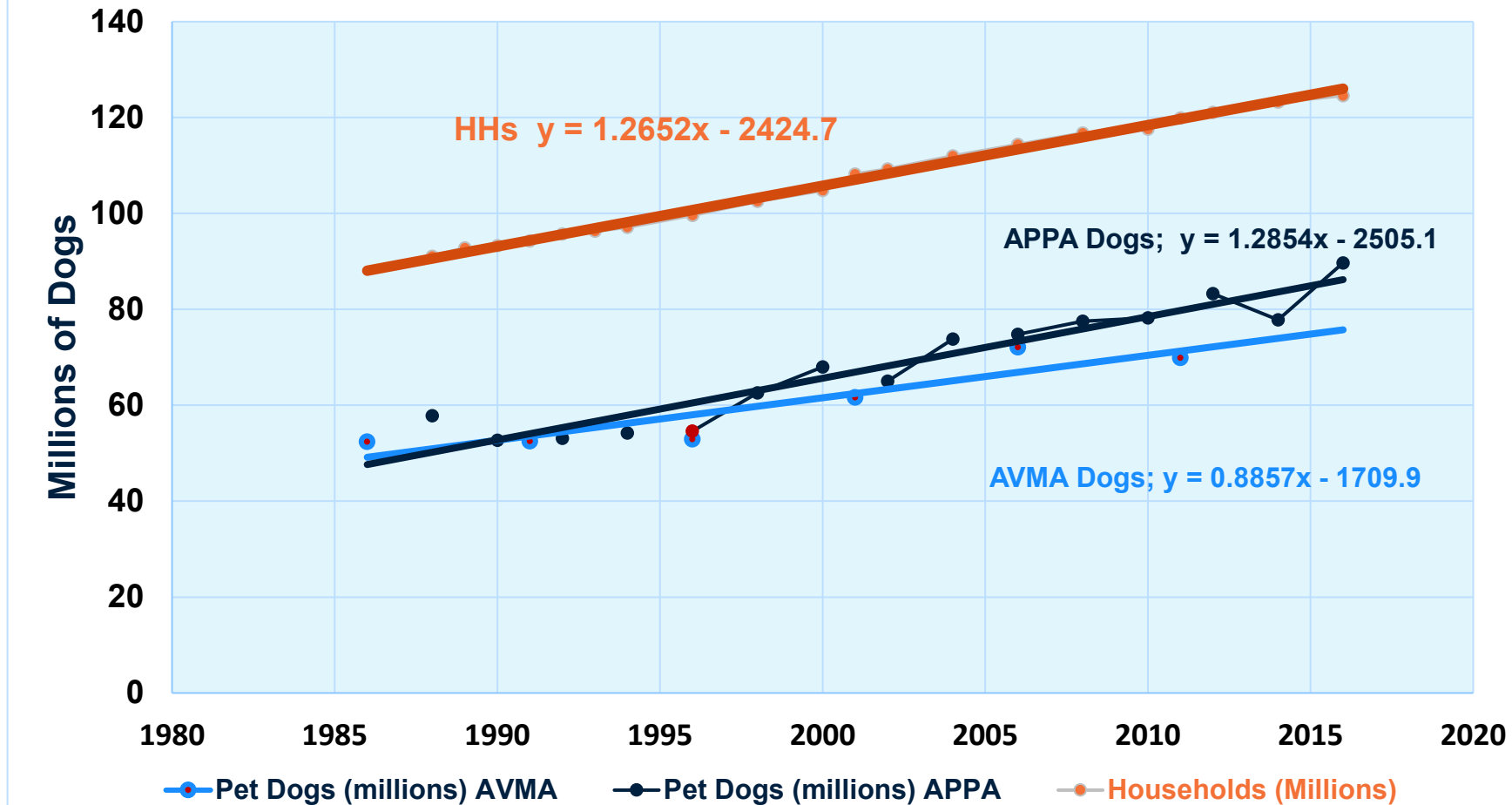


# Trends in Relative US Dog Populations

- The rate of dog ownership (% HHs or dogs/1,000) in the USA has changed very little in 70 years.
- The total dog population increases with the human population.
- In 1976, there were 76.8 million dogs (AVMA) and 38% of households had dogs.
- There is a 4-fold variation in the rate of dog ownership across states (105 to 460 dogs/1,000).



# Number of Dogs (millions) in the US – Increases Track Human Population





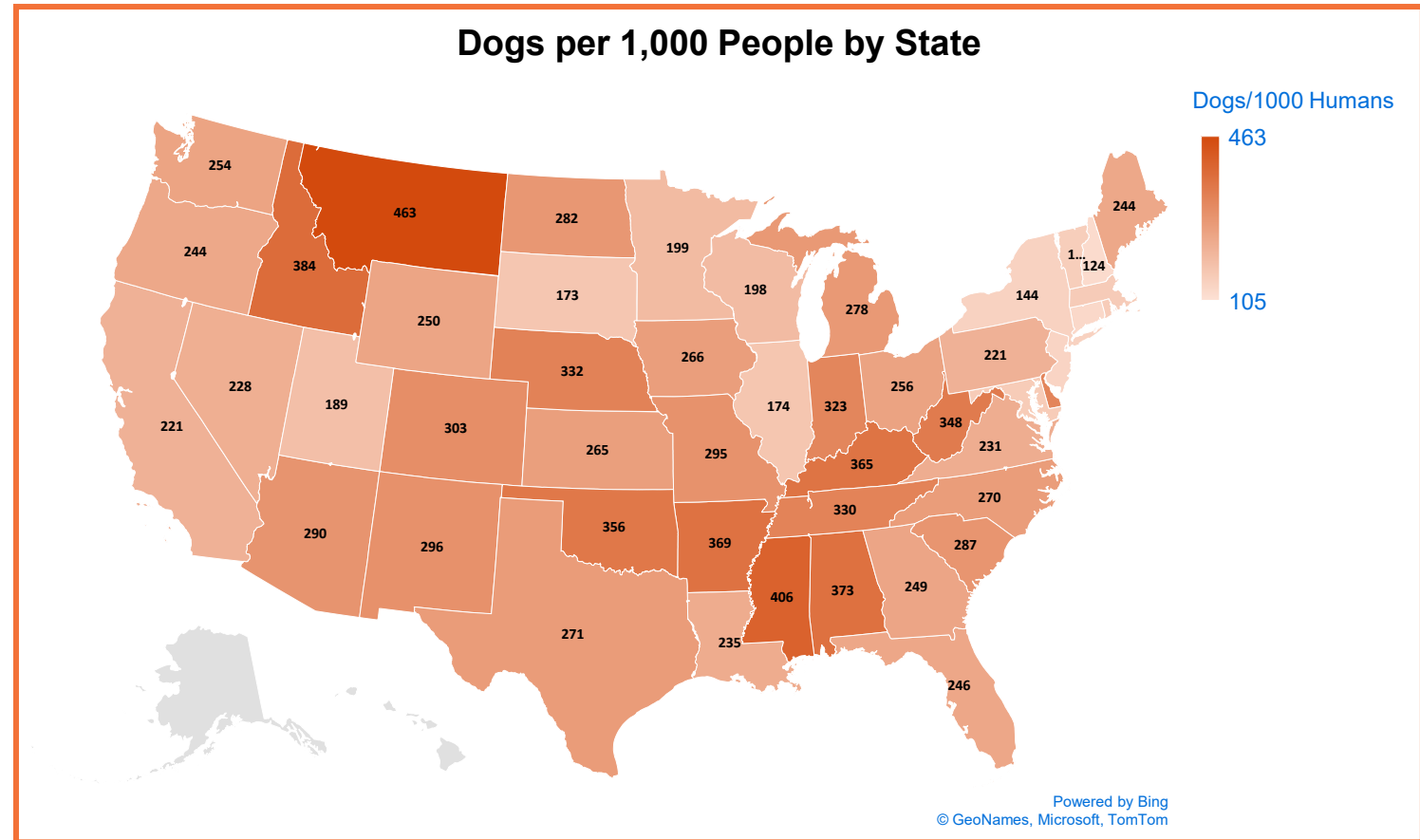
# Dog Ownership Rates Vary by State

**AVMA 2016 survey**

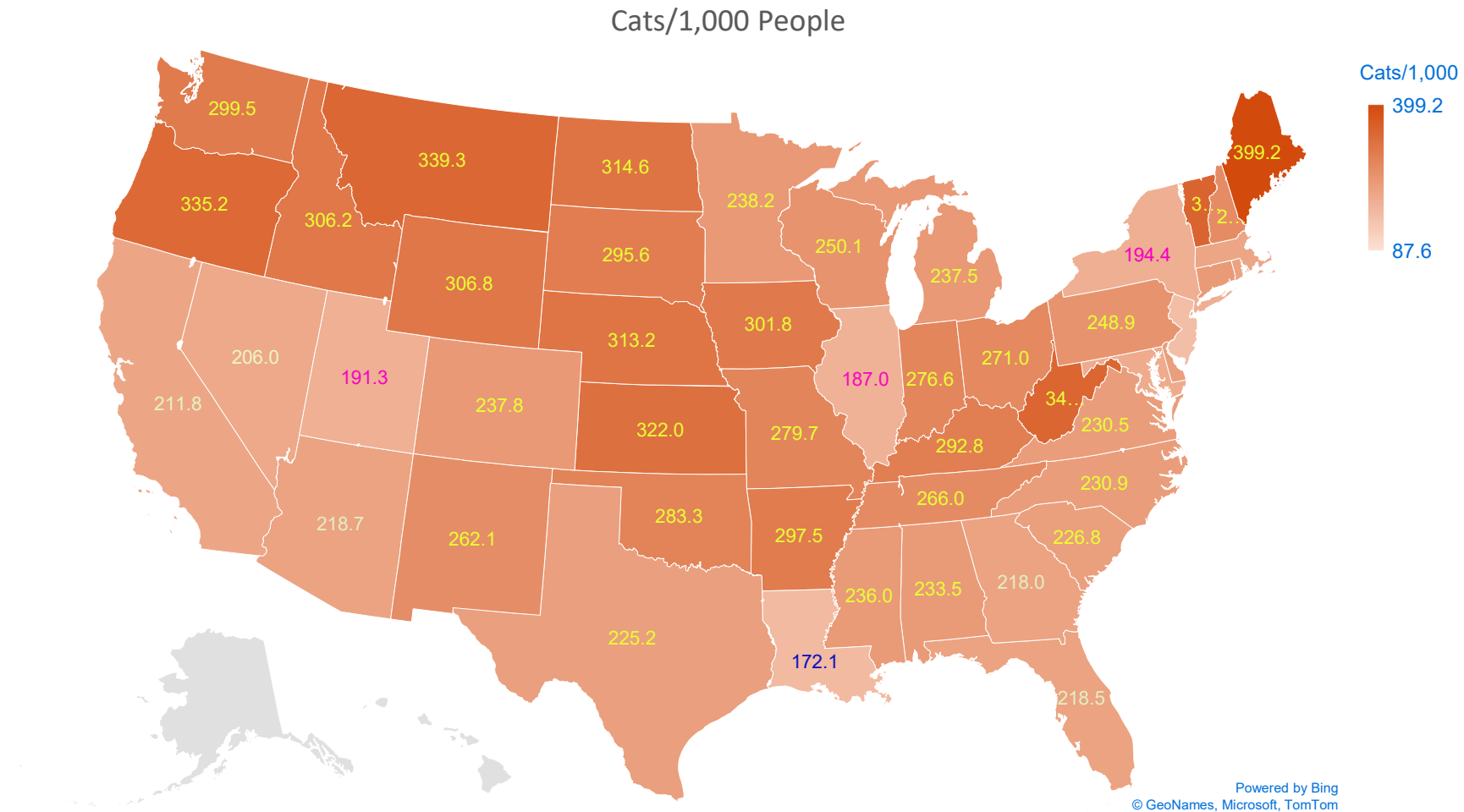
**Significant variation in relative dog population (ca. 3to4-fold) from one state to another.**

**Yet, little indication that anybody pays any attention to these variations.**

**Cats also vary 3- to 4-fold across states.**



# Cats per 1,000 People by State





# USA Dog & Cat Trends: 1970-2019

Big changes have occurred in both dog and cat supply in the USA in last fifty years.

	1950	1973	1982	2011	2016	2019
US Pet Dogs & Cats (mill)	52	65	92	146	135	140
Total US Dog Population (mills)	32.6	35	46	69.9	76.8	80.3
Stray Dogs/Shelter Intake (mills) - (not transfers & RTOs & seizures)	10	10	4 to 5	1.74	1.34	1.14
% Stray Dogs (of all dogs)	30%	Ca. 24%	Ca.9%	2.4%	1.7%	1.4%
Stray Cat Shelter Intake (mills)				2.0	1.65	1.83
Shelter Euthanasia (mill)		13.5	7.6-10	3.44	1.54	1.24
% D&C Popln euthanized in shelters		21%	ca.10%	2.4%	1.1%	0.9%

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# Different Methods produce Different Estimates

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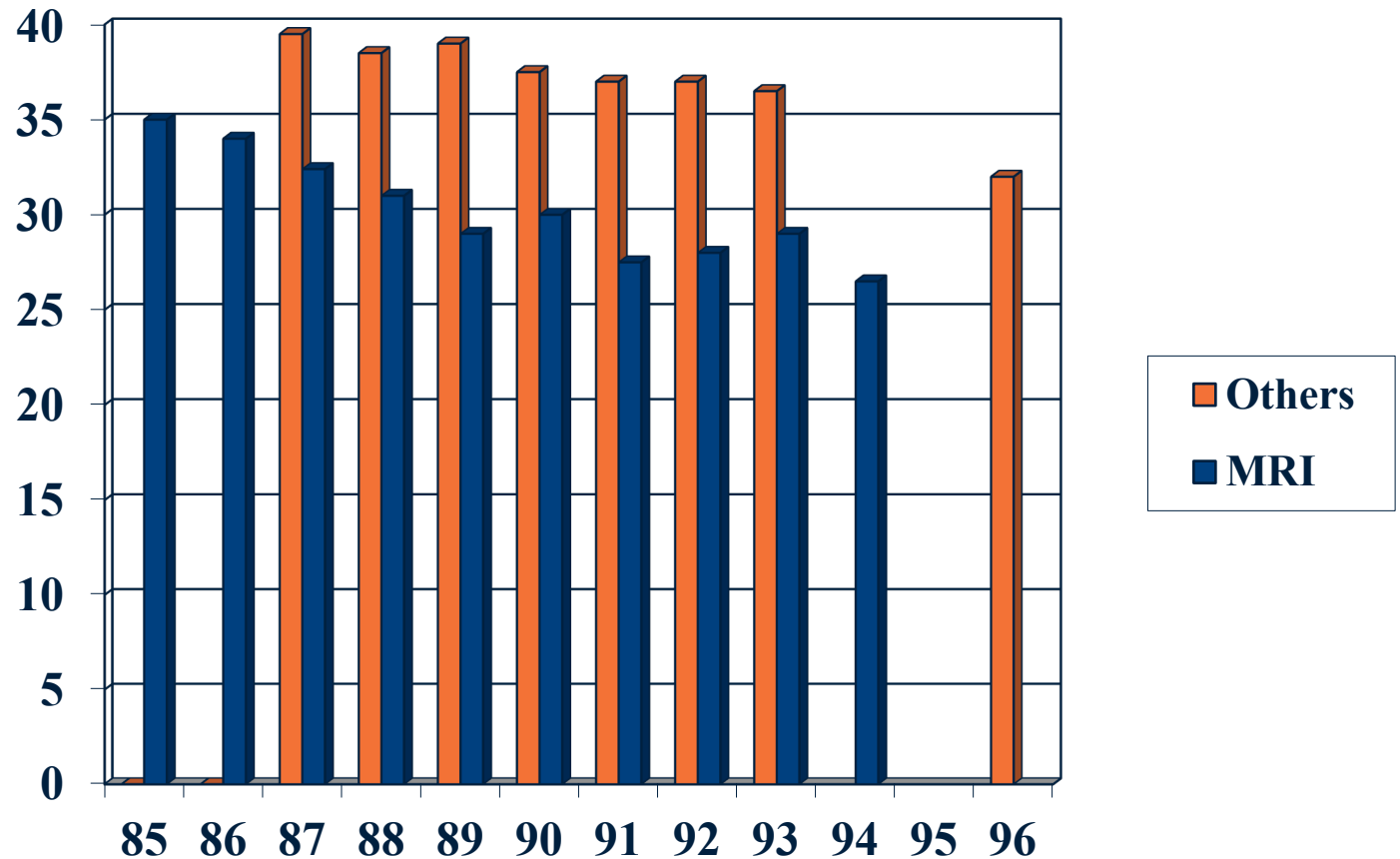
- RDD surveys appear to produce the lowest estimates with Household Panels producing 20% higher estimates and Online methods producing higher numbers yet.
- Recent HASS Survey (online method) reported higher rates of dog and cat ownership in specific regions compared to AVMA survey reports.
- A recent online survey in Costa Rica produced higher (double) dog estimates compared to earlier non-online surveys in the country.
- APPA estimates been rising since started using online survey methods.
- Advise users of pet population data to be aware of differences produced by different survey technologies.

# Percentage of Households with Dogs

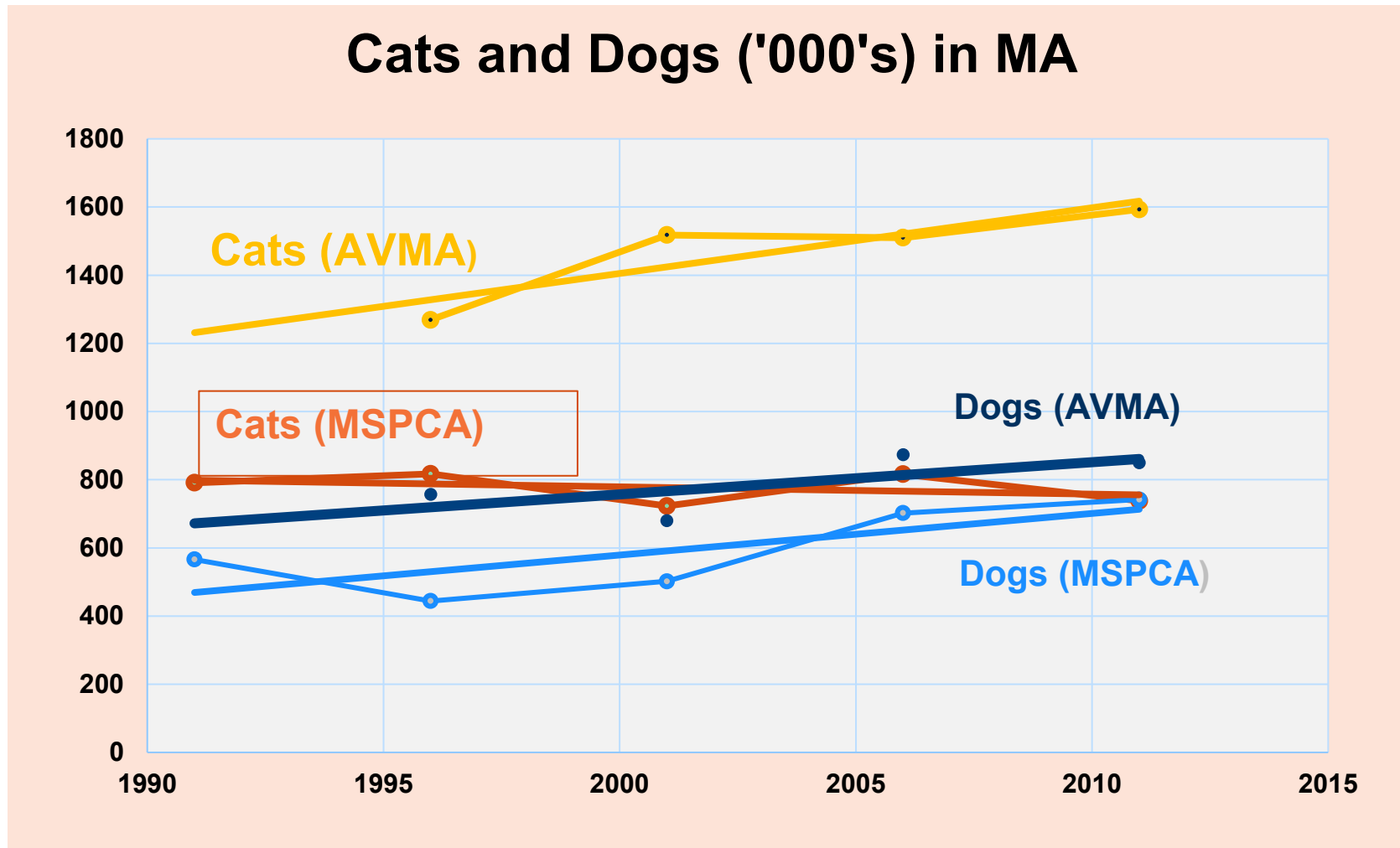
(from GJ Patronek & AN Rowan, 1995, Anthrozoos 8:199-205)

## Different Results from Different Methods

Mediamark Research (MRI) carried out RDD surveys, the others used household panel methods. RDD results are about 20% lower than the household panel surveys.

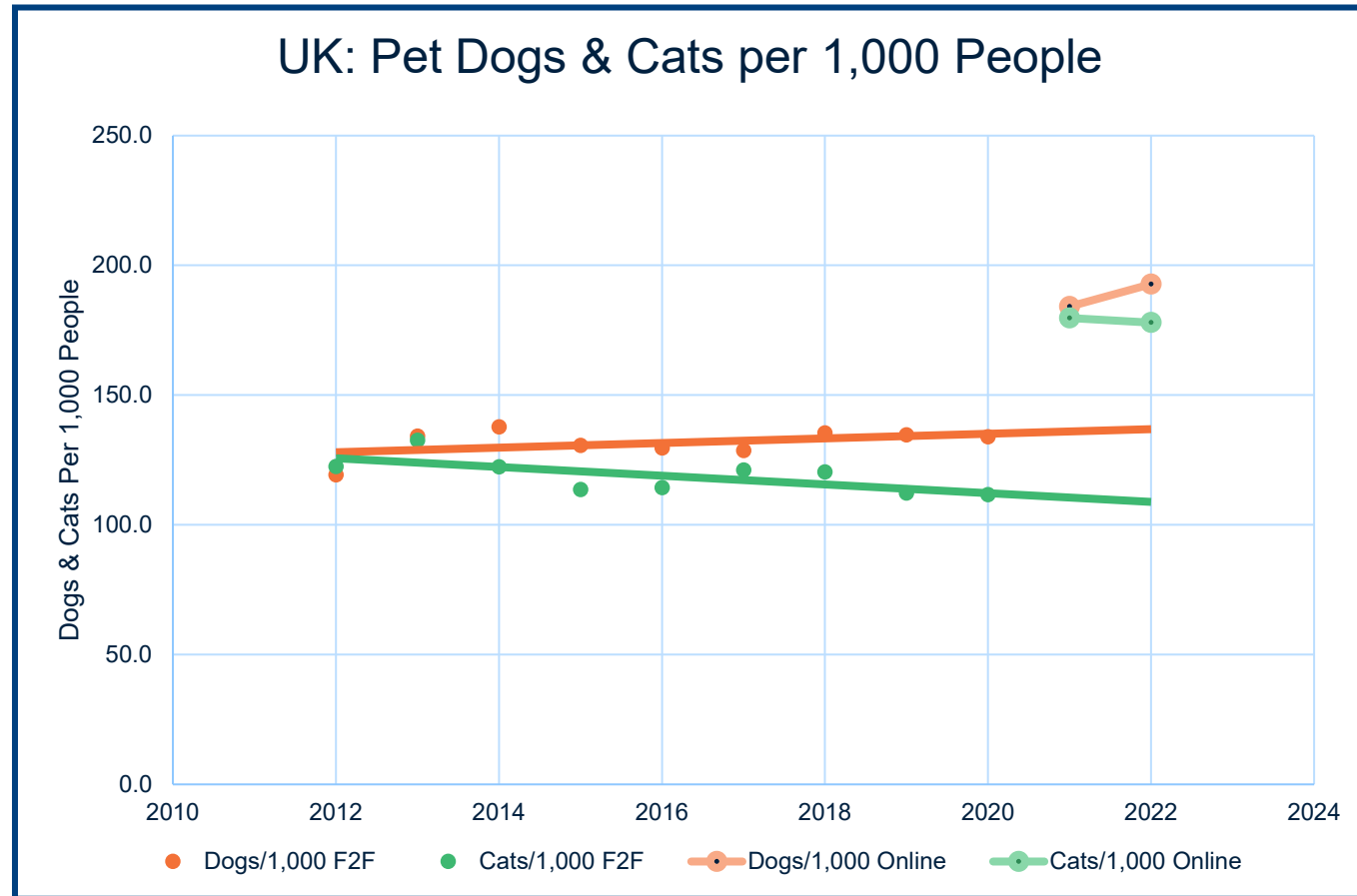


# Different Results from RDD (MSPCA) Versus HH Panel Surveys (AVMA) - Massachusetts



# Pet Ownership Surveys in the UK - PFMA

- Surveys from 2012 to 2020 carried out face-to-face. The 2021 and 2022 surveys were online.
- Pet dog estimates jumped from 9.0 to 12.5 million, pet cat estimates jumped from 7.5 to 12.2 million.
- PFMA cautions that one cannot compare 2021/2 to earlier data because of different methods.



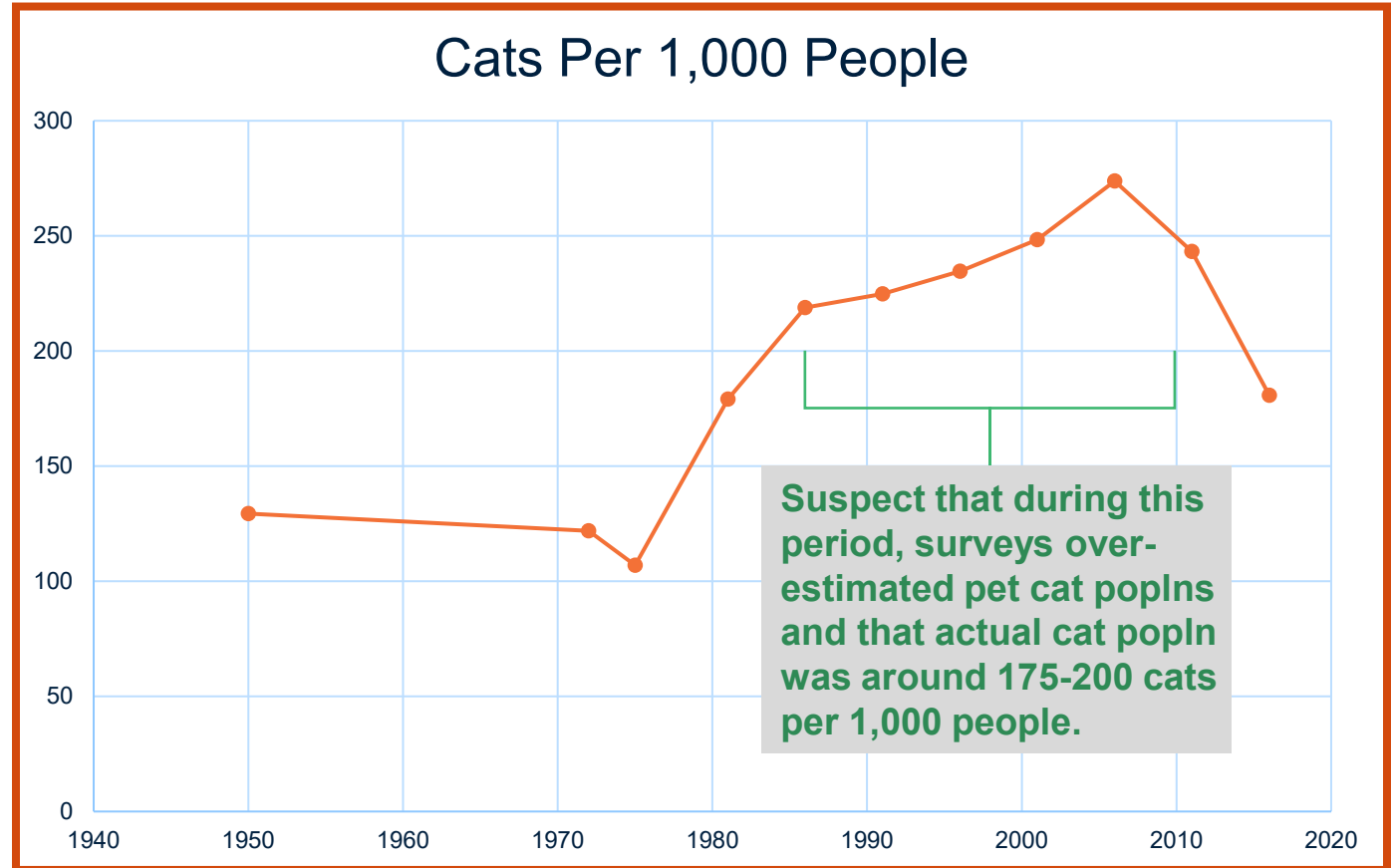
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# Trends in Relative Cat Populations - USA

- Relative cat population numbers from AVMA surveys have changed considerably over time.
- But in 2016, the AVMA determined that they had been overestimating total cat populations.
- In 2016, the AVMA concluded that only 25.4% of US households owned cats.
- There is a 3-fold variation in relative cat numbers across the US states.

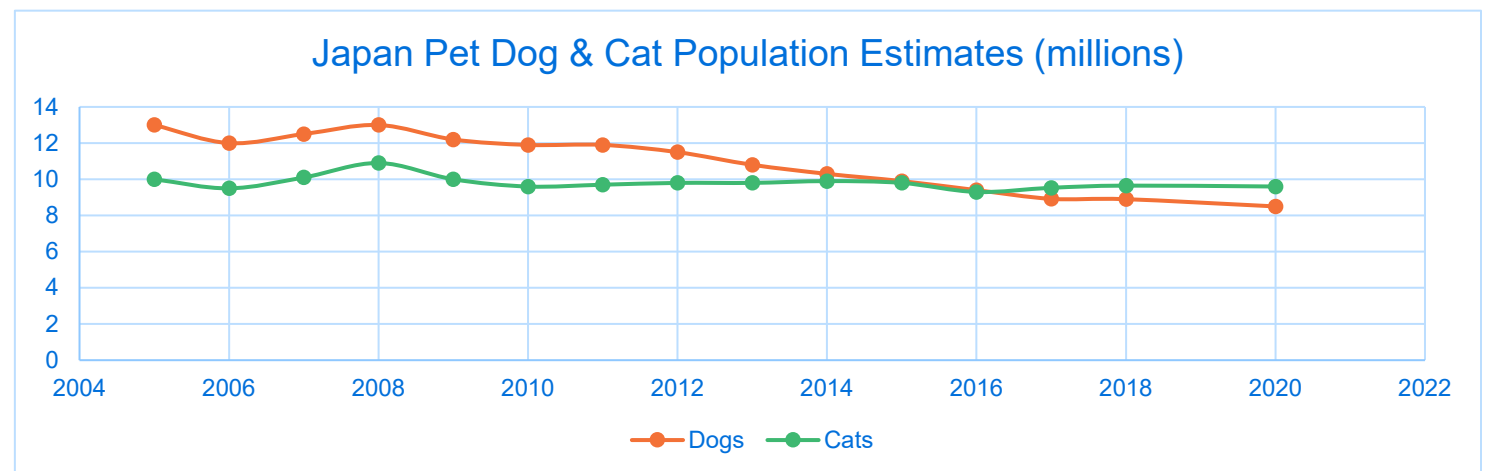




# Japanese Pet Trends (2005-2020)

- In 2006, Japanese government introduced new dog breeder rules.
- Big change in dog supply.
- Big jump in puppy prices - \$1,000 to \$3,000 – in recent years.

# Puppies p.a.	Pre 2006				After New Regulations in 2006			
	# Breeders	%	# Puppies	%	# Breeders	%	# Puppies	%
1 to 10	25,171	73.9%	107,225	18.4%	4,984	51.7%	21,706	7.1%
11 plus	8,894	26.1%	455,488	81.6%	4,659	48.3%	284,732	92.9%
TOTAL	34,065		581,713		9,643		306,438	

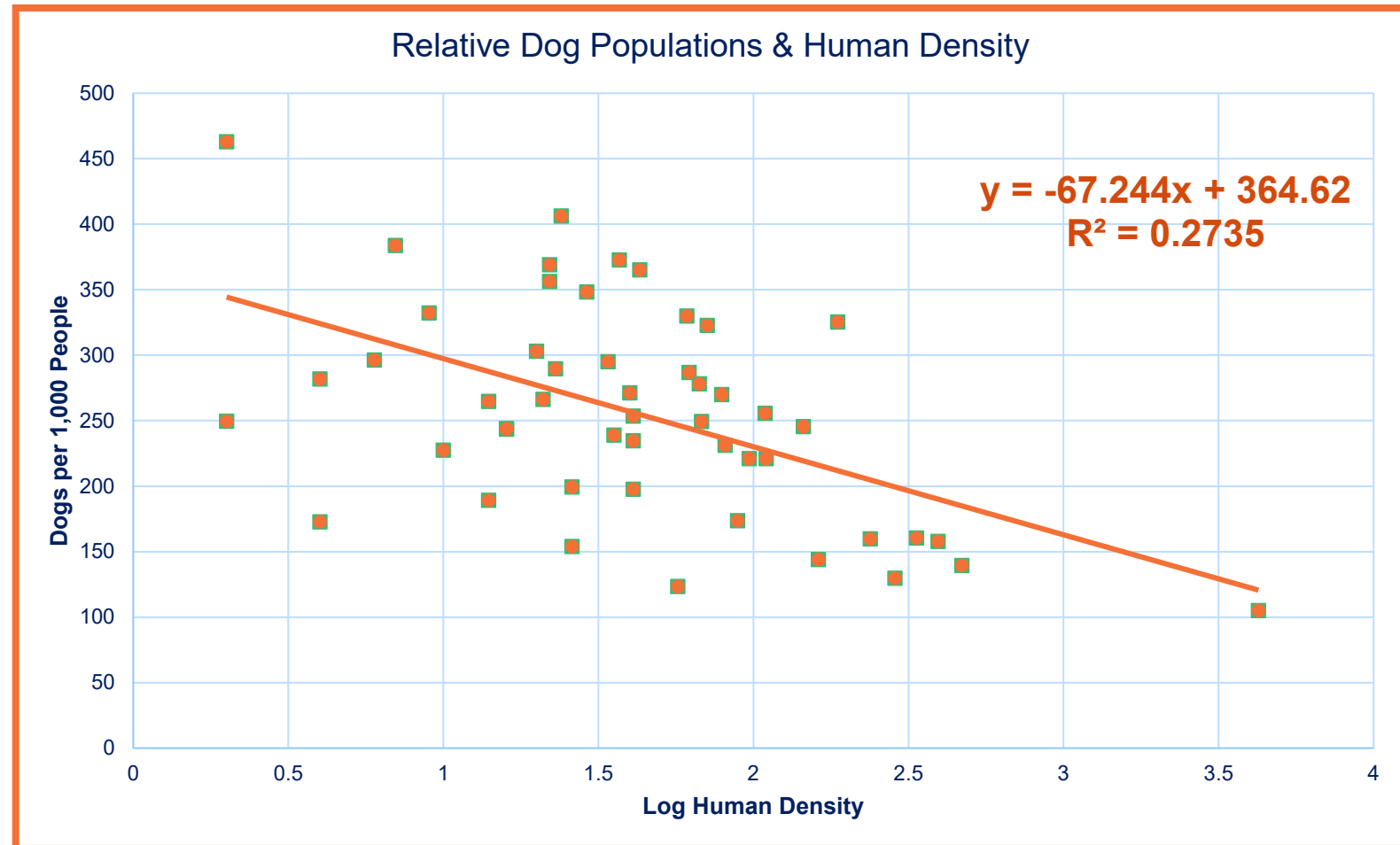


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# Dogs/1,000 by State Human Density in USA

Inverse relationship between relative dog populations and human density found across the world.



# UK – Pet Ownership is Low in High-Density Urban Areas

- Low rates of pet dogs and cats kept in households in urban areas but dog and cat population density highest in urban areas.

(Aegerter et al, 2017. PLoS ONE 12(4) e0174709.)

### Pet Density per SqKm

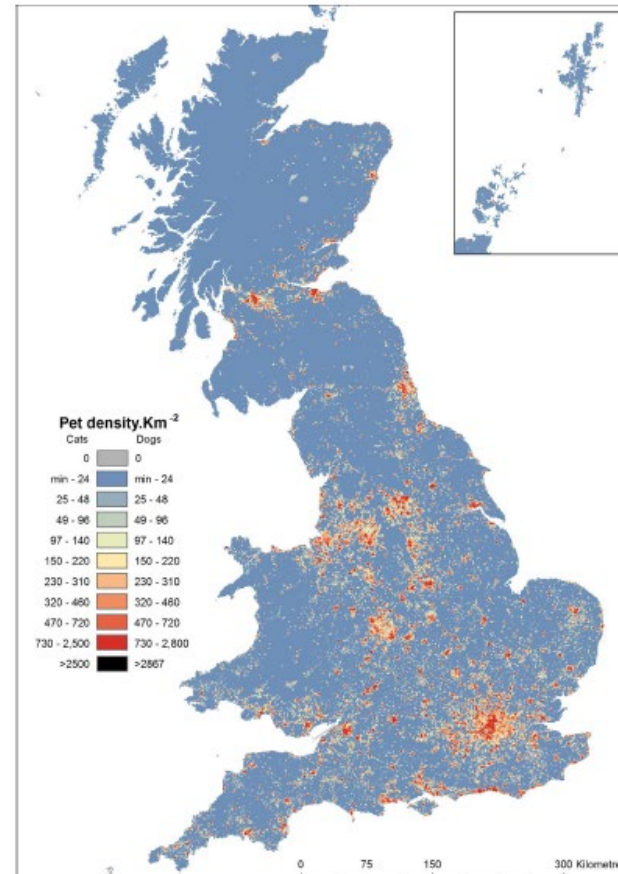


Fig 2. Density of pet cats and dogs across GB. Density predicted from mean population estimates; predictions of density derived from minimum and maximum population estimates can be produced by adjusting values shown here by ±9.7% for cats and ±7.7% for dogs.

<https://doi.org/10.1371/journal.pone.0174709.g002>

### Pets per Household

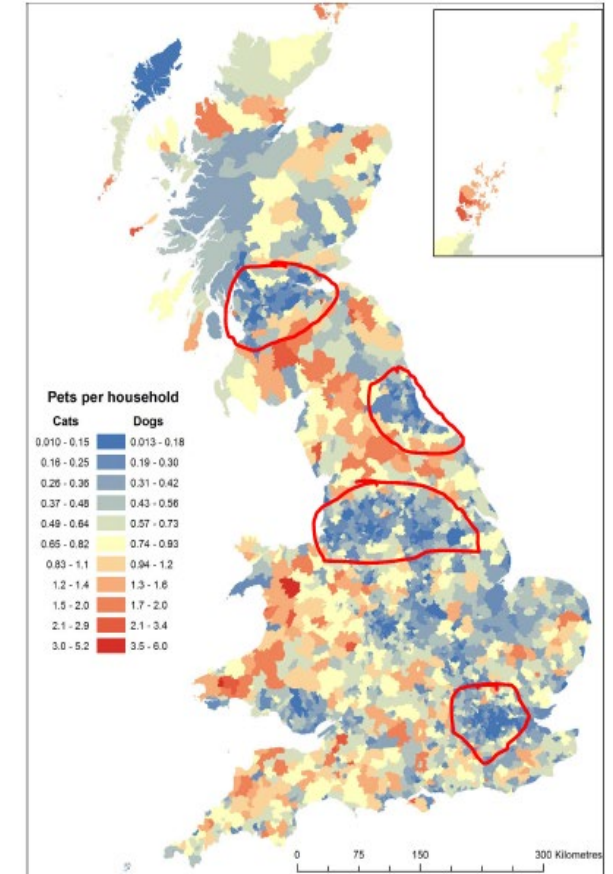


Fig 3. Spatial variation in the number of pet cats and dogs per household. Rate of ownership predicted from mean population estimates; predictions of ownership derived from minimum and maximum population estimates can be produced by adjusting values shown here by ±9.7% for cats and ±7.7% for dogs.

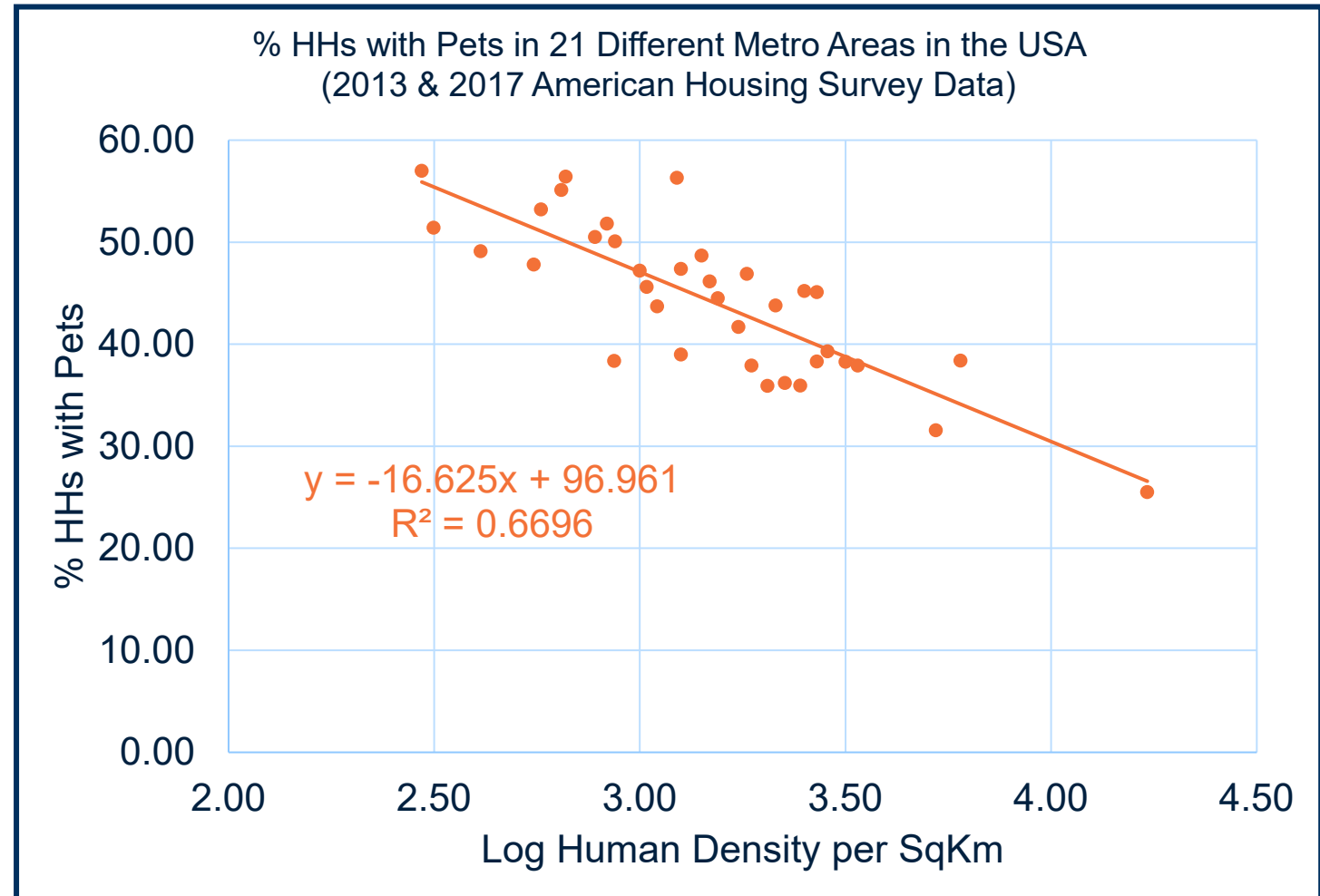
<https://doi.org/10.1371/journal.pone.0174709.g003>

# Density Effects

- The inverse relationship between relative dog numbers (dogs per 1,000 people) and human density is found worldwide (USA, UK, India, Philippines, Mauritius, Pakistan, Afghanistan)
- Not sure if density effect applies to cats but in USA it applies to pet ownership.
- With surveys of just a few representative communities, it would be possible to develop a function enabling one to predict dog ownership rates from human census and densities.
- Ethnicity has been reported to affect pet ownership, but ethnic factors appear to disappear when density taken into account.

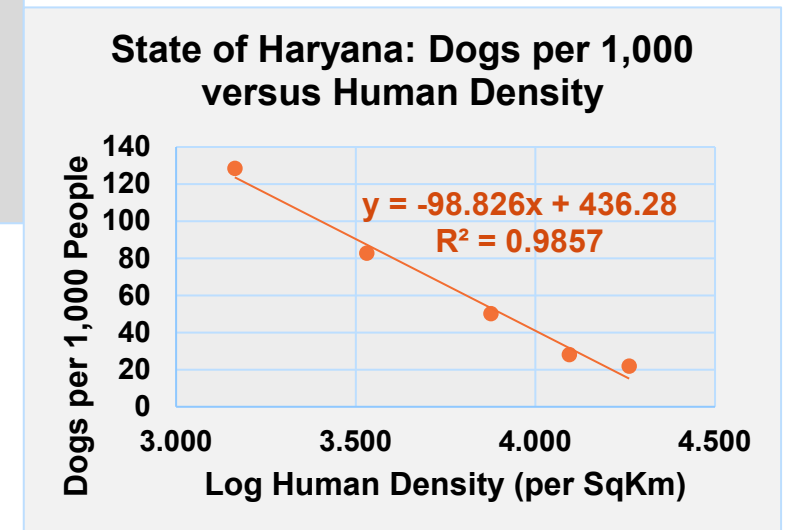
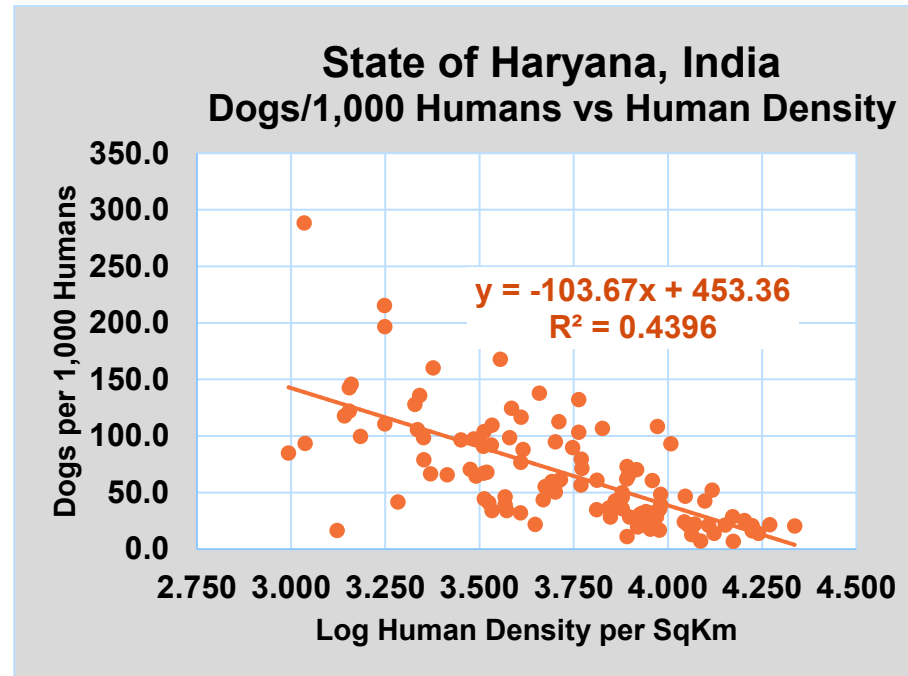
# US Pet Ownership and Human Density

- US Census Bureau's 2013 & 2017 Housing Surveys asked about pet ownership – to develop data for disaster planning. Strong, inverse relationship.



# Haryana dog populations and human density

- Count by HSI – John Boone led the team.
- Divided state into 1 Km-sq. cells and did dog counts in 113 selected cells.
- Condensing densities into 5 ranges produces much stronger  $R^2$ .



# Pet Ownership and Human Density - India

- Trend Line Equation:

$$Y = - [\text{Slope}].X + A$$

(where Y is the Relative dog population (dogs per 1,000 people) and A is the relative dog population at a human density of 1 person per SqKm – when Log Human Density = 0)

The R<sup>2</sup> value varies from 0 to 1.0. The higher the value, the better the fit with the data.

City/Region	A	R <sup>2</sup>
Bangalore (Urban)	208.2	0.958
Lucknow (Urban)	154.3	0.519
Haryana - 2 (condensed - Rural)	436.3	0.986
Jamshedpur (Urban)	203.6	0.793
Multiple Cities (Homed+Homeless) (Urban)	261.0	0.874
Punjab (Rural)	158.4	0.266
Kanha Tiger Reserve (Rural)	290.6	0.471

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# Relative Dog Populations in Different Countries

- Rates of dog keeping in some other countries also remained relatively constant over the years.
- But we do not know why there would be 239 dogs per 1,000 in the USA, 120-130 dogs per 1,000 in the UK and 80-90 dogs per 1,000 in Sweden.
- The relative stability of dog keeping RATES are a surprise.

	Dogs/1,000 People					
	1981	2010	2012	2017	2018	2020
Austria	70	73	72	72	93	92
Belgium	115	122	119	115	115	114
Denmark	133	104	105	102	103	105
Finland	86	121	120	145	147	136
France	170	121	117	110	104	115
W. Germany	55	66	65	111	113	128
Italy	78	118	116	115	116	137
Netherlands	84	89	95	89	88	114
Norway	68	93	91	94	88	89
Sweden	96	80	76	86	86	88
Switzerland	62	57	55	59	59	58
UK	100	126	132	131	135	125
Australia	152	157	182		198	
Canada	130	183		206	220	
Japan	39	94	89	79		
USA	216	225		239		

Data from Messent, 1981, FEDIAF, AVMA & others

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# CONCLUSIONS

- Our knowledge of Developed Country pet populations is surprisingly imprecise.

Different survey methods produce different estimates of pet poplns.  
Online>Household Panels>Random Digit Dial.

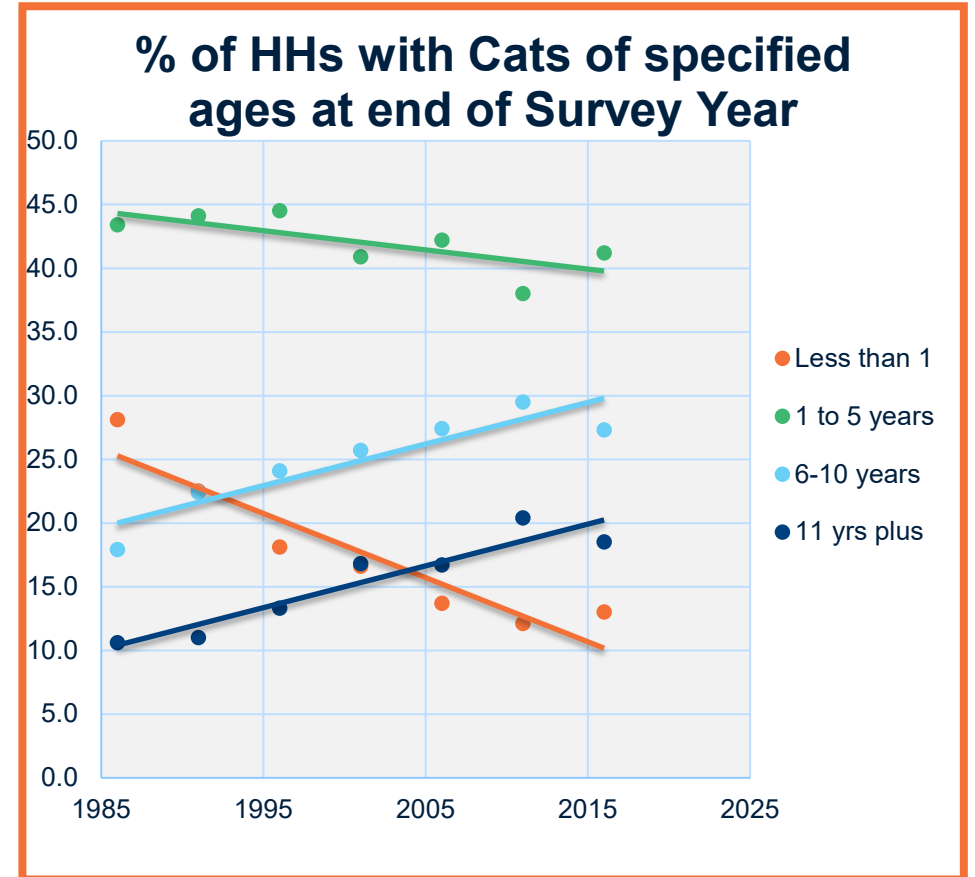
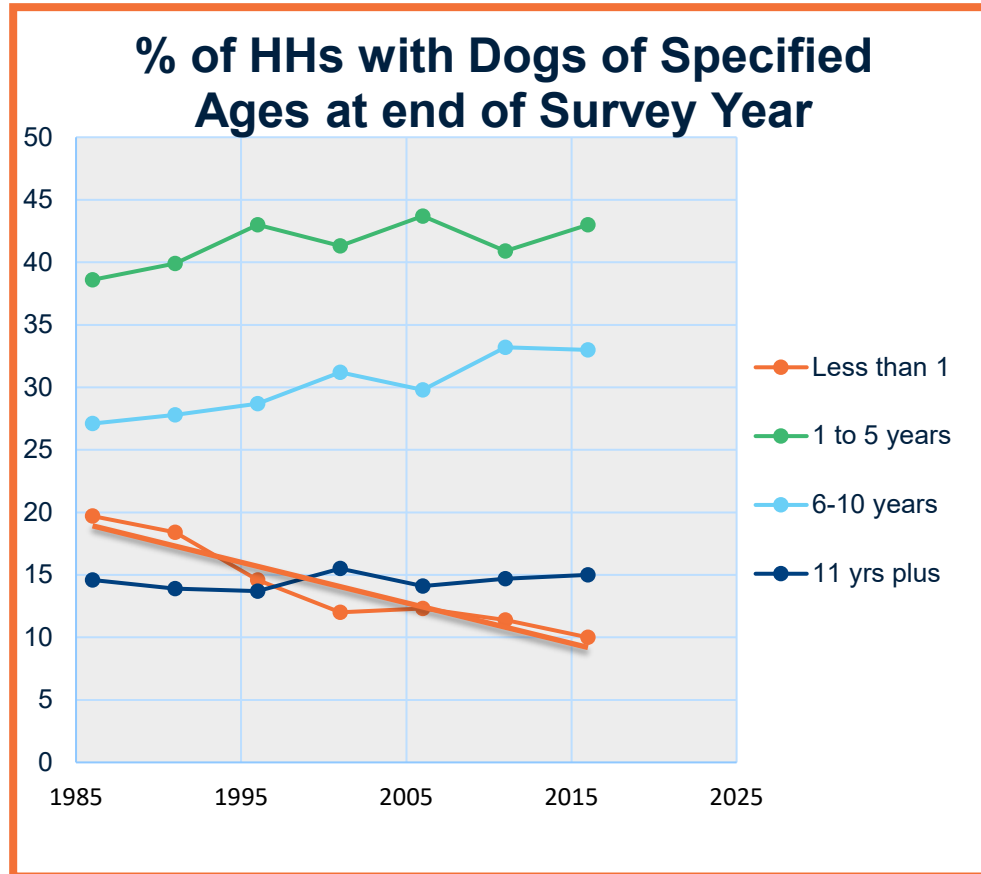
- .Using Dog owning rates (% households with dogs or dogs per 1,000 people) has several useful properties.
- Many **Unexamined** Implications for Human-Animal Bond Studies & Shelter Operations.

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# Puppy/Kitten Acquisition in USA: 1986-2016

Significant changes in sourcing puppies and kittens in the USA from 1986 to 2016. Big drop (halving) in rate of acquisition. (Data from AVMA surveys).



# Puppy supply

- In 1986, US households acquired 10.3 million dogs and 15.3 million cats less than 1 year of age.
- In 2016, US households acquired 7.68 million dogs and 7.59 million cats less than 1 year of age.
- In 2016, “only” around 590,000 dogs and 910 cats euthanized in shelters – maybe 25% of 830,000 dogs (205,000) and 40% of 3.6 million cats (1.4 million) entering shelters in 2016 were less than one year of age. Not many “unwanted” young dogs and cats.