

# Once-daily feeding is associated with better cognitive function and health in companion dogs:

## Results from the Dog Aging Project

Emily E. Bray<sup>1,2</sup>, Zihan Zheng<sup>3</sup>, M. Katherine Tolbert<sup>4</sup>, Brianah M. McCoy<sup>5</sup>, Dog Aging Project Consortium, Matt Kaerberlein<sup>6</sup>, & Kathleen F. Kerr<sup>3</sup>

<sup>1</sup>Arizona Canine Cognition Center, University of Arizona <sup>2</sup>Canine Companions for Independence <sup>3</sup>Department of Biostatistics, University of Washington <sup>4</sup>College of Veterinary Medicine, Texas A&M University <sup>5</sup>School of Life Sciences, Arizona State University <sup>6</sup>Department of Laboratory Medicine and Pathology, University of Washington



### Introduction

- Time-restricted feeding has been linked to better health outcomes in rodents<sup>1</sup>, but **do these results translate out of the laboratory?**
- As animals who share their environment with humans (and who humans care about), dogs can help address this question<sup>2</sup>
- The Dog Aging Project follows thousands of companion dogs over many years to understand healthy aging



### Instruments

Participating dogs joined the Dog Aging Project pack

#### 1. Health and Life Experience Survey (HLES)

Meal frequency (once daily vs. more frequent)

Sex (spayed females and neutered males)

Breed

Age

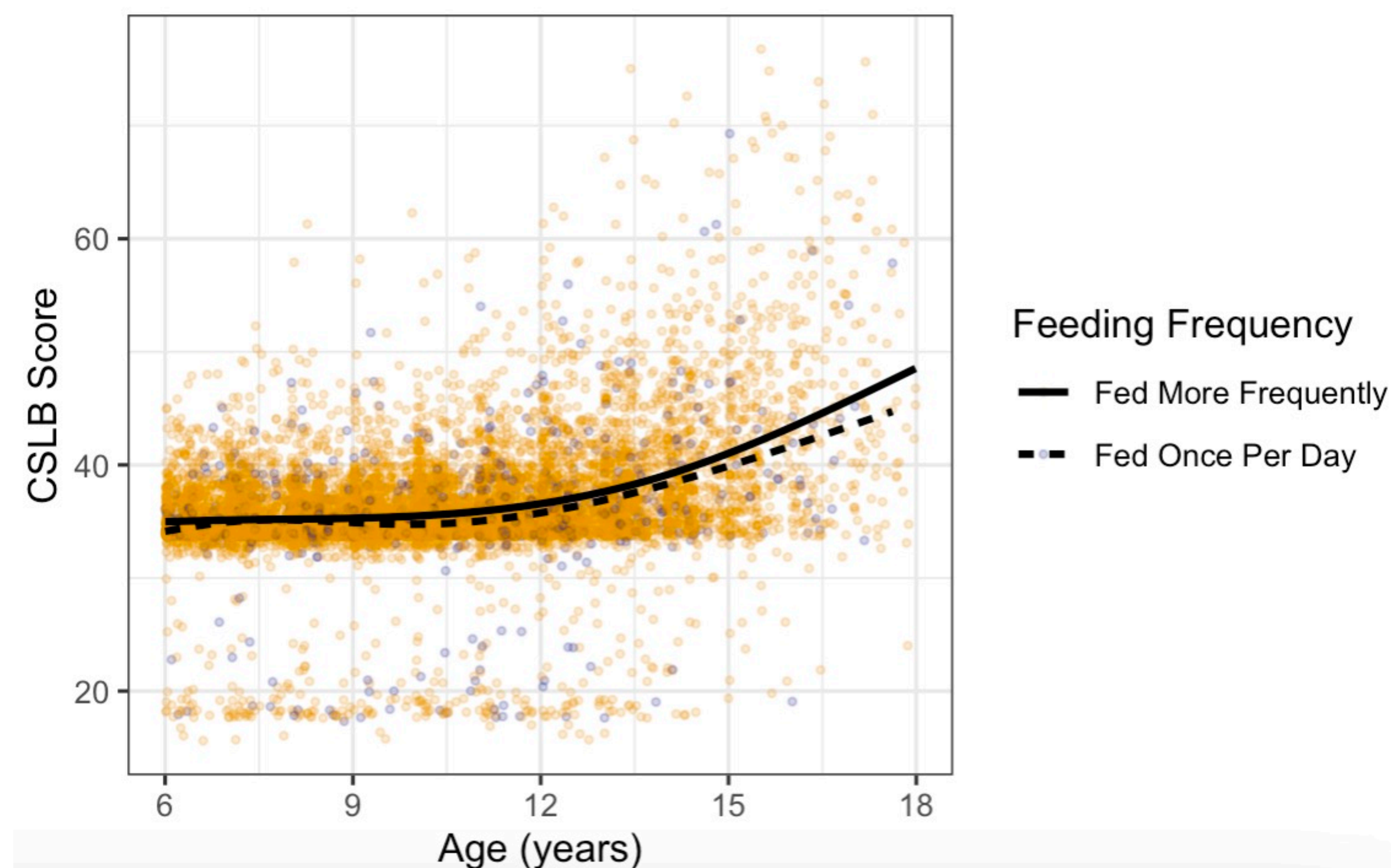
Health conditions (9 categories)

#### 2. Canine Social and Learned Behavior Survey (CSLB)<sup>3</sup>

Cognitive function (higher scores = worse)

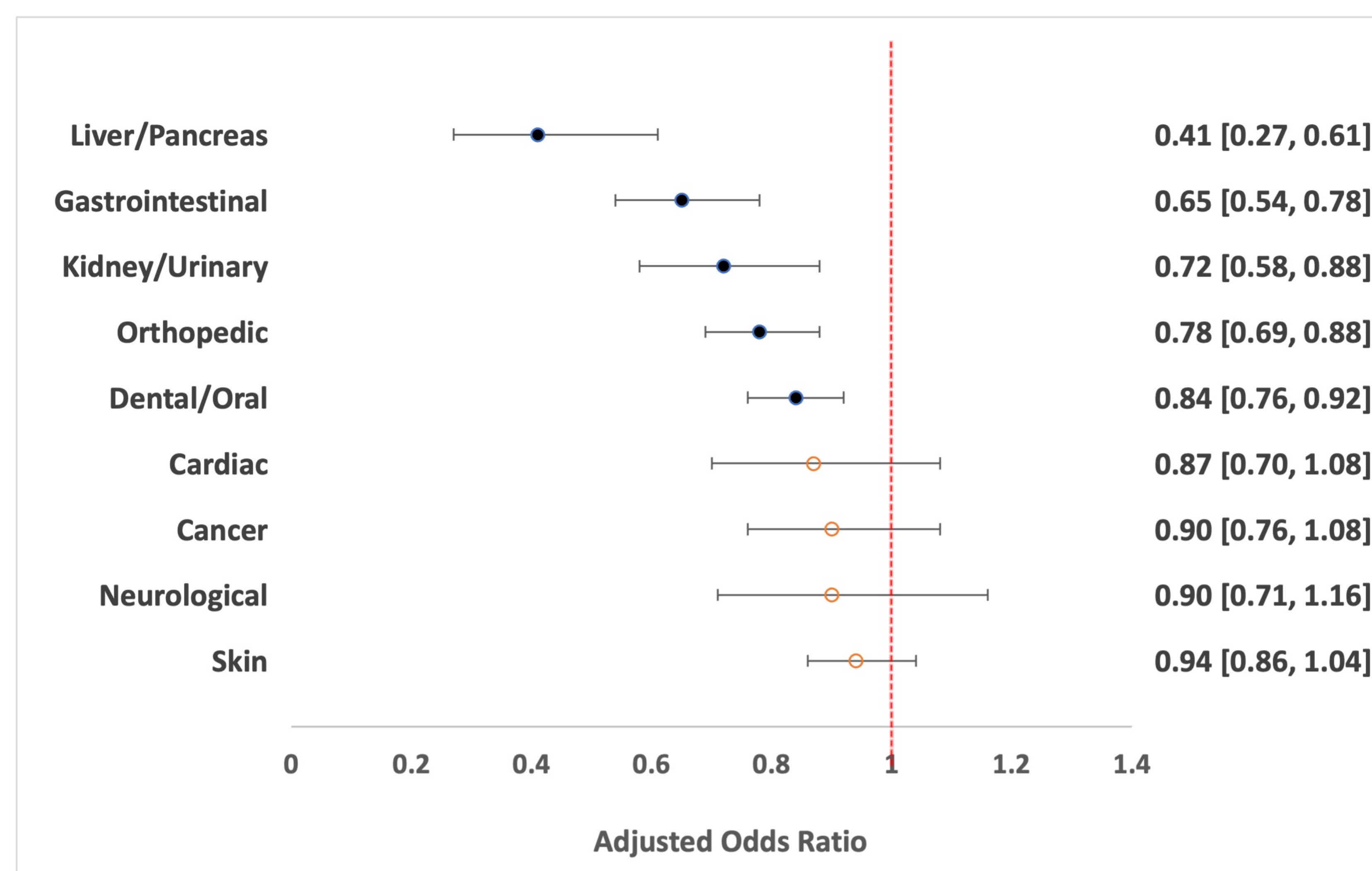
### Results of cognitive function analysis (*n* = 10,474)

Dogs fed once per day had, on average, a 0.63-point lower CSLB score than dogs fed more often (95%: 0.28, 0.98: *p* < 0.001)



Gray dots represent dogs fed once daily and orange dots represent dogs fed more frequently. Trend lines were constructed separately for the two groups using restricted cubic splines.

### Results of health conditions analysis (*n* = 24,238)



Circles represent point estimates of adjusted odds ratios, with filled circles indicating statistically significant results. Bars represent 95% confidence intervals. Odds ratios less than 1 indicate lower odds of the condition among dogs fed once daily, whereas odds ratios greater than 1 indicate higher odds.

### Methods

**Cognitive function analysis**  
Linear regression

CSLB score ~ meal frequency + sex + breed (purebred) / body size (mixed breed) + age + omega-3 + training history + physical activity

**Health conditions analysis**  
Logistic regression

Disorder ~ meal frequency + sex + breed (purebred) / body size (mixed breed) + age + omega-3

### Conclusions

- Dogs fed once per day had, on average, better cognitive scores than dogs fed more often
- For 5 of 9 health conditions analyzed, being fed once per day vs. more often was associated with lower odds of having the condition
- Observational and cross-sectional data limit inference on causality – e.g., owners might have shifted to more frequent feeding in response to health conditions. Future work with prospective data can provide stronger evidence of causal effect.

### References

- <sup>1</sup>Mitchell et al (2019) Daily Fasting Improves Health and Survival in Male Mice Independent of Diet Composition and Calories. *Cell Metab* 29:221–228
- <sup>2</sup>Ruple et al (2021). Dog Models of Aging. *Annu Rev Anim Biosci*. Online ahead of print.
- <sup>3</sup>Salvin et al (2011) The canine cognitive dysfunction rating scale (CCDR): a data-driven and ecologically relevant assessment tool. *Vet J* 188:331–336