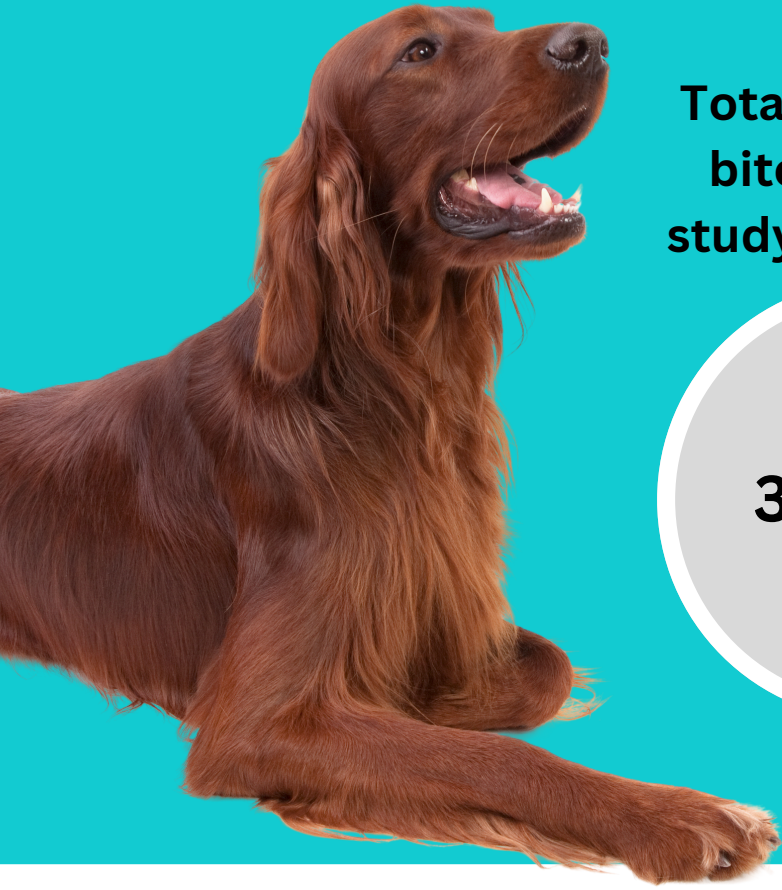


# Delaying spaying of female dogs reduces risk of urinary incontinence

Spaying female dogs (bitches) offers some health-related benefits to the bitch and behavioural benefits to owners, but has been associated with increased risk of urinary incontinence. But does the age at spaying affect this level of risk?

This study used novel causal inference statistical methods to determine whether delaying spaying to 7 - 18 months of age in bitches causes reduced urinary incontinence risk compared to early-age spay at 3 - 6 months old.



Total number of bitches in the study population

30,953

Number of bitches randomly sampled for inclusion in the analysis

1500

## Target Trial Emulation Methods

Randomised controlled trials (clinical trials) are considered “gold standard” for estimating causal treatment effects by evening out differences between treatment groups. However, real-world clinical trials on experimental animals are not always feasible or ethical.

Therefore, this study achieved the best of both worlds by using causal inference “target trial emulation” to emulate (i.e., replicate) a randomised controlled trial using real-world VetCompass anonymised electronic clinical records.

Urinary Incontinence Target Trial Emulation - key steps:



**Eligibility criteria**  
Bitches born January 1st, 2010 to December 31st, 2012, and spayed between 3 and 18 months

**Spay Strategies**



Spay between 3 and 6 months of age



Spay between 7 and 18 months of age

**Outcome**  
Early-onset urinary incontinence diagnosis (defined as urinary incontinence diagnosed before 8.5 years)

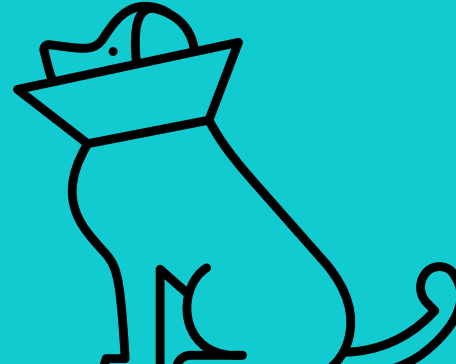
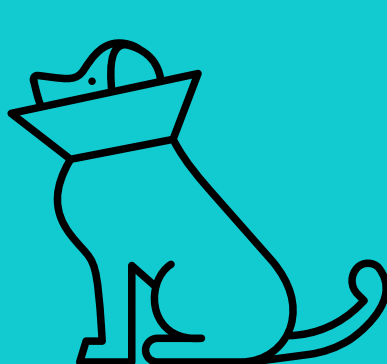


**Data Analysis**  
The two treatment groups were balanced during analysis for data including breed and insurance status.

## Target Trial Emulation Results

612 bitches (40.8%) spayed between 3 and 6 months

888 bitches (59.2%) spayed between 7 and 18 months



After accounting statistically for differences between the two treatment groups, bitches spayed between 7 - 18 months old had **0.8 times the odds** of early-onset urinary incontinence compared with dogs spayed between 3 - 6 months.

This can be interpreted as meaning that spaying at 7 to 18 months caused a 20% reduction in the risk of early-onset urinary incontinence compared with spaying at 3 to 6 months across all dog breeds.

## Conclusions

Spaying at 7 to 18 months of age caused a reduced risk of early-onset urinary incontinence compared with spaying at 3 to 6 months across all dog breeds.

Delaying neutering until after 7 months of age should be considered unless there are other major reasons justifying earlier surgery.

The study used an exciting new approach, causal inference “target trial emulation”, that allowed inference about “cause” rather than being limited to “association”.

### [CLICK TO READ THE FULL STUDY](#)

Pegram et al. (2024) “Later-age neutering causes lower risk of early-onset urinary incontinence than early neutering – a VetCompass target trial emulation study” PLOS ONE

RVC VetCompass <https://www.rvc.ac.uk/vetcompass> carries out welfare research based on anonymised information shared from over 30% of UK veterinary practices. We are very grateful to the owners and veterinary professionals who contribute to VetCompass research. We are also grateful to the Dogs Trust Canine Welfare Grants for funding of this research.