



# A preliminary investigation into laterality differences of range of motion during flexion and extension of canine proximal limb joints

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# Disclosure:

- I have no actual or potential conflict of interest in relation to this presentation.



# Research Rationale:

- Research into musculoskeletal imbalance and differences between left and right hand side joint ROM in *C.familiaris* is limited.
- Relationships between thoracic and pelvic limb structure and function have been observed, however, there is little peer reviewed research.
- Passive joint ROM provides a measure of the limits that a particular joint can move in its physiological planes of motion without influence of muscle activity



# Research aim:

To assess and compare left and right-side flexion and extension of the:

- glenohumeral(shoulder) joint
- humeroulnar/humeroradial(elbow) joint
- coxofemoral(hip) joint
- femorotibial(stifle) joint

and for laterality ROM differences.





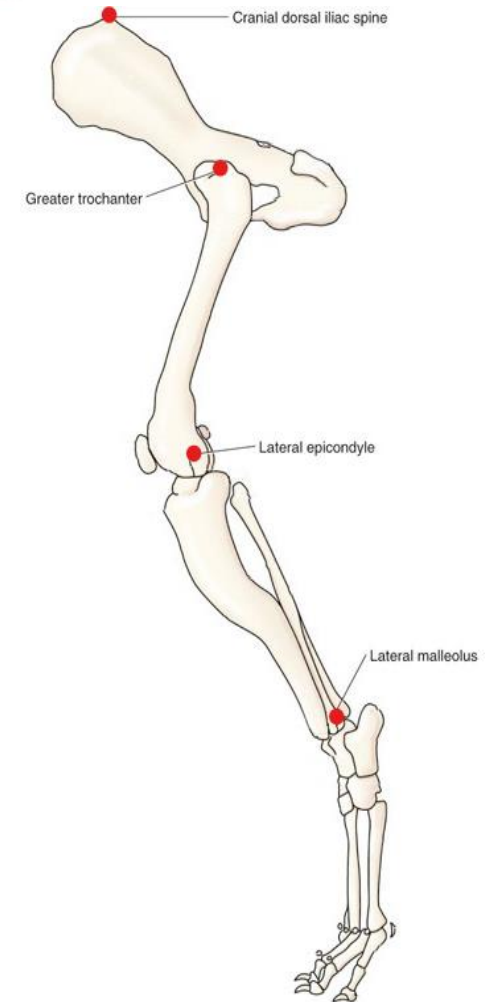
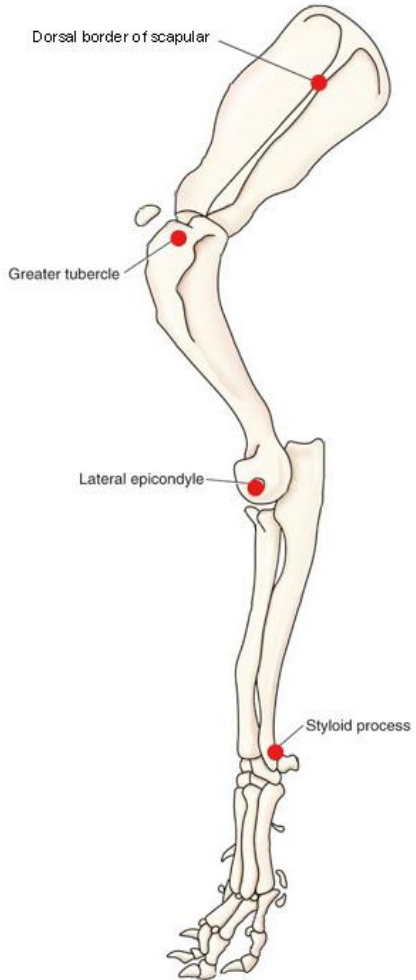
# Animals:

- Healthy and sound single breed dogs (Working Siberian Husky) ( $n=18$ )
- Kennelled and worked together
- Mixed Gender 55.5% Male ( $n=10$ ) and 45.5% females ( $n=8$ )
- Age >1 year (mean $\pm$ S.D.(range):  $5.1 \pm 3.2$  (1.4-11.8).
- 61%( $n=11$ ) were aged between 1.4 years and 5.1 years of age (<6 year group)
- 39% ( $n=7$ ) were aged between 6.1 years and 11.8 years (> 6 year group)



# Methodology:

- Dogs were conscious and placed in a standing position
- Specific bony landmarks were identified via palpation
- Sticky marker dots enabled measurement?





# Methodology:

PHOT of GONIOMETERS

- Goniometry was used to measure the Joint angles (degrees) in flexion and extension
- Triplicate measures taken in flexion and extension on both sides
- Paired t tests and Pearson Correlation Coefficient compared laterality of joint ROM, and effects of gender and age (<6yrs vs >6yrs)
- $P < 0.05$  was considered significant



# Results:

- There was no significant difference ( $p > 0.05$ ) between left and right side flexion and extension measures for all joints.
- Gender had no significant effect ( $p > 0.05$ ) on joint ROM measures for flexion or extension of all joints.
- Age (<6yrs vs >6yrs) had a significant effect on specific joint ROM measures





# Results: Age groups (<6yrs vs > 6yrs)

- Hip flexion (R)p=0.0009
- Shoulder flexion (L)p=0.0002, (R)p=0.0004
- Elbow flexion (L)p=0.001, (R)p=0.0006
- Hip extension (L)p=0.02, (R)p=0.009

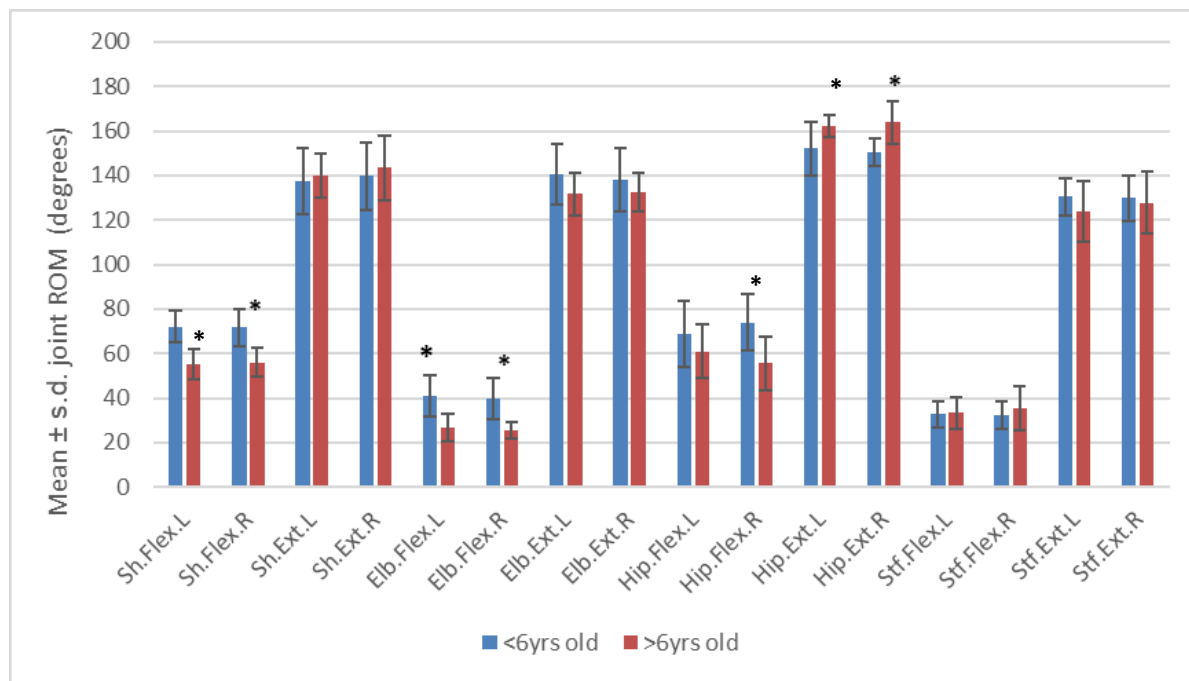
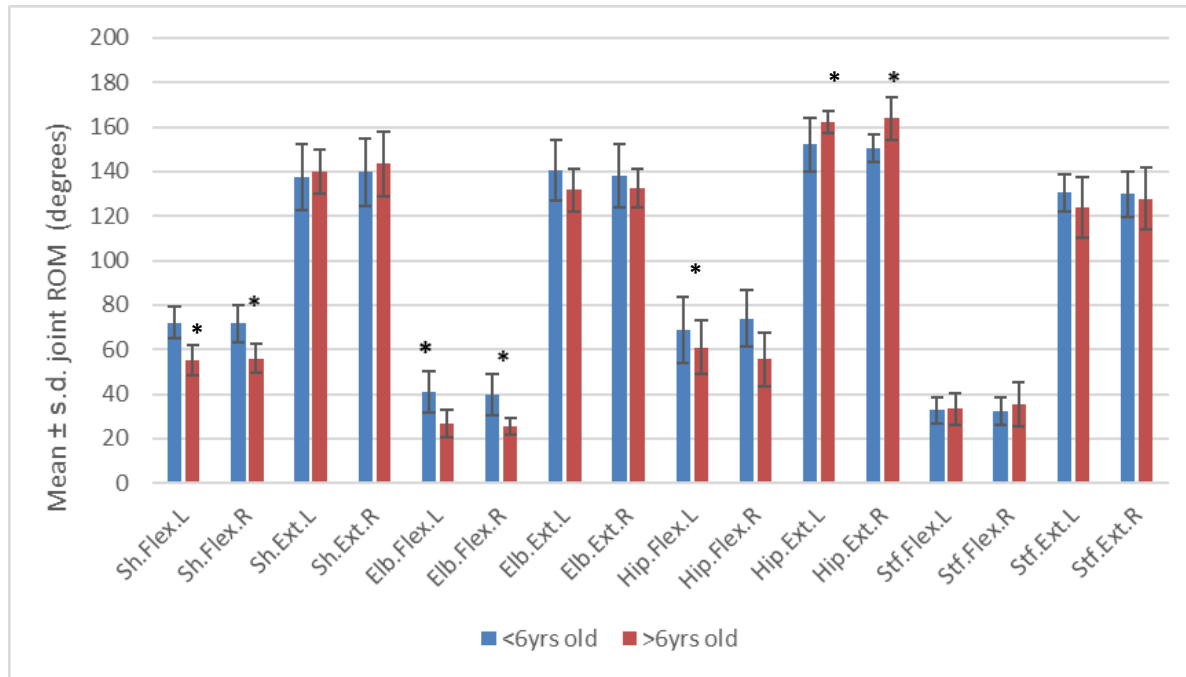


Figure 1. Bar chart of mean joint flexion and extension ROM for age groups \*denotes significance difference between groups



# Results: Age groups (<6yrs vs > 6yrs)



	Shoulder	Elbow	Hip
Flex (L)	P=0.0002	P=0.001	P=0.0009
Flex (R)	P=0.0004	P=0.0006	
Ext (L)			P=0.02
Ext (R)			P=0.009

Bar chart of mean joint flexion and extension ROM for age groups \*denotes significance difference between groups

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## Results:

$$SI = \frac{X_L - X_R}{0.5 * (X_L + X_R)} \times 100$$

Joint	Range of Motion (ROM) (°)	Symmetry Indices (SI)
Shoulder	LHS=72.9 RHS=75.6	3.63%
Elbow	LHS = 102 RHS = 102	0.1%
Hip	LHS = 89.7 RHS = 88.9	1%
Stifle	LHS = 94.9 RHS = 95.5	0.63%



# Conclusion:

- Bilateral joint range of motion of both fore and hind quarters are important considerations in joint movement assessment
- Joints can show asymmetry in passive joint range of motion
- Deviation from 'normal' could allow for early intervention to pathological changes
- Particularly important for older dogs



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## Future Work:

- Further investigation with a larger cohort
- Defined age groups
- Other breeds of dogs

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# Thank You Any Questions?



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