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What scaled canine muscle parameters can tell about their functional properties.

Reasons for performing study: As part of a musculoskeletal modeling effort, muscle parameters from the canine hind limb are collected, including fiber length and physical cross-sectional area (PCSA). **Objectives:** To examine a ratio of PCSA to fiber length to evaluate muscle function. **Study Design:** This study reports a data set of optimal fiber lengths and muscle volumes acquired in 6 canine hind limbs, and examines the use of a PCSA/fiber length ratio in discerning muscle function. **Methods:** 24 muscles were dissected from the right hind limb in six dogs weighing between 28 and 52 kg, weighted and treated with 10% formaldehyde solution for 48-72h, 0.4M phosphate-buffered saline solution (pH 7.2) for 24-48h and 20% sulphuric acid solution for 3-7 days. Once the muscle fibers were loosened, depending on the size of the muscle, 3-8 individual muscle fibers were removed from different muscle sites to ensure a representative sample. Muscle fibers were then measured based on photographs taken on grid paper. Fiber length was normalized to limb length (L^M_{norm}), being the summed length of femur, tibia and foot. PCSA was calculated as muscle volume (determined by weight) divided by fiber length and normalized by dog weight ($PCSA_{norm}$). L^M_{norm} and $PCSA_{norm}$ where then respectively normalized by their muscle group medians. A ratio of $PCSA_{norm}$ / L^M_{norm} is proposed to identify muscle specializations towards higher force production or contraction speed. **Results:** Our results show muscles associated with muscle force production, i.e. presenting a high $PCSA_{norm}$ / L^M_{norm} ratio (>6.68) are gastrocnemius, deep and superficial digital flexors and quadriceps. Muscles associated with high contraction velocity, i.e. a low $PCSA_{norm}$ / L^M_{norm} (<0.25) ratio, include the cranial & caudal sartorius, cranial tibial, semimembranosus and semitendinosus muscles. **Conclusions:**. The use of a $PCSA_{norm}$ / L^M_{norm} ratio may prove a valuable tool to classify muscles by function. **Ethical Animal Research:** not applicable **Sources of funding:** Scholarship **Competing interests:** None declared.