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Calculation of muscles forces in Labrador retriever hind legs during stance.

Reasons for performing the study: In dogs, osteochondrosis is a multifactorial disease with a poorly understood pathophysiology. Joint biomechanics and joint loading are likely to be one of the contributing factors to the development of osteochondral lesions. The study presented is part of a research project investigating the role of biomechanics and joint loading on the development of osteochondral lesions in the tarsal joint in dogs. **Objectives:** Calculate muscle forces generated by the hind limb muscles during stance phase of gait in the Labrador Retriever. **Study design:** In silico evaluation based on integrated 3D motion capture data. **Methods:** Integrated 3D gait analysis was conducted in eight dogs. These data served as input to a breed-specific musculoskeletal model, defined in Opensim, based on CT. The muscle-tendon units were represented by path-actuators with force generating capacities based on the muscle physiological cross sectional area (PSCA). Inverse kinematics and inverse dynamics workflows, based on integrated 3D mocap data were used to calculate joint kinematics and kinetics. These served as input for a static optimisation workflow. **Results:** The glutei, semimembranosus, semitendinosus, adductor and gracilis muscles are contributing the most to the external flexion moment of the hip present at the first two-third of the stance phase. At the knee, the biceps, semimembranosus, rectus femoris, vasti and gastrocnemius muscles contribute to the external flexion moment. The gastrocnemius and superficial digital flexor play a similar role at the level of the ankle joint. **Conclusions:** The muscle recruitment during the stance phase aims at supporting the bodyweight after the swing phase and propelling of the body in the late stance phase. The muscle recruitment shows similarities with previously reported EMG data in dogs. There is some co-activity of flexor and extensor muscles especially at the level of the hip and knee, which most likely has a stabilising function. **Ethical animal research:** Informed owner consent was obtained. **Sources of funding:** Research was funded by agency for Innovation by Science and Technology (IWT).