

Racehorse Stride Changes And Workload During Training

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By determining whether the workload and changes in stride characteristics associated with injury during racing are also present during training, this project may identify injuries prior to race-day.



Understanding the development of limb injuries is important for improving both the welfare of athletic animals and humans alike. Limb injuries in racehorses are the main reason for enforced rest and early retirement and may reduce the likelihood of a secondary career after racing. These injuries account for the majority of racehorses fatalities and have also been identified as the most common reason for serious jockey injuries. Detecting early signs of injury development could therefore help reduce this burden on the horse racing industry, as well as improve our knowledge of injury development more broadly. Most fatal injuries in racehorses are due to repeated high impact to the bone resulting in accumulation of damage and subsequent fracture. While past injury risk models simply classified horses as injured or not injured at a single point in time, new inertial sensor technology allows for the monitoring of workloads and physiological changes over time. This monitoring provides us with a novel way of assessing signs of injury development.

Our group has demonstrated the potential utility of monitoring speed and strides from race-to-race. We previously found a reduction in stride length and speed occurring approximately six races prior to injury, as well as more varied speeds linked to injury, and no improvement in stride length linked to horses requiring long periods of rest from racing. We have also demonstrated the utility of speed and stride data from racing for calculation of acute and chronic workloads. What we are missing is being able to monitor workloads and physiological changes day-to-day during training.

The proposed research will utilize a large database containing training and veterinary data of over 500 racehorses from Australia's largest training establishment from 2020 and 2024. The specific aims are: (1) To determine the characteristics of racehorse strides during training and whether any changes in these characteristics are correlated with changes observed during racing; and (2) To develop protocols for estimation and visualization of training and racing workloads based on inertial sensor and training logbook data. These aims are relevant not only to racehorses, but also other animal and human athletes.

Our goal is to develop practical and scalable methods for early injury detection and prevention by using data easily accessible to trainers, veterinarians or regulators for routine monitoring of racehorses. The outcomes of this project may facilitate earlier identification of horses at high risk of injury, resulting in the timely modification of workloads by informing safer training practices, and may lead to the implementation of real-time monitoring systems.

Importance to the Equine Industry: The horse racing industry faces public pressure to improve, in large part due to high-profile cases of racehorse injuries resulting in death. However, these cases are just one part of a much larger problem. Aside from accounting for the majority of deaths, racehorse injuries are the key reason for forced absence from racing as well as early retirement. These injuries may also affect the possibility of the horse having a career beyond racing and compromise the safety of the jockey.

Identifying early signs of injury development, such as changes in a horse's speed and stride length over time, could help reduce this burden. Using inertial sensor data from racing, our previous research showed that horses decreased their speed and stride length several races before injury. Monitoring these changes during training, not just racing, could allow for even earlier detection of potential injuries, as well as the ability to monitor horses that are yet to have their first race start.

This project will take advantage of a large database containing training, racing, and veterinary data from Australia's largest training establishment, including detailed information on horses' speed and stride characteristics collected via sensor and global positioning systems.

The findings from this research will advance our understanding of how injuries develop in racehorses and improve our ability to detect such injuries based on changes in a horse's speed and stride during both training and racing. We aim to develop methods for early detection and prevention of limb injuries in racehorses using data that are accessible for routine monitoring.

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