Objective: A primary objective of the New Zealand Racing Board is to promote the health and welfare of the equine participants. As part of this programme the current project utilised a two prong approach to identify if, and how many, horses suffer an injury during racing that would be classified as a catastrophic musculoskeletal injury.

Method: The initial strategy was to use an epidemiological study to examine historical racing records and quantify the number of, and reasons why, horses fail to finish a race. This data was then examined to compare differences between horses that fail to finish (i.e. have a career limiting injury, or precursor event) and those that did not, to identify possible risk factors. This data can then be used to modify or change management or practises to reduce the risk to the horse. In association with this data describing the racing production process and the then environment (racing tracks and surfaces) were generated.

The second and parallel component of the study is a post-mortem examination of those few horses that required euthanasia due to severe injury. The patho-physiology of these injuries were examined using the sophisticated pathology and imaging technology within the Massey Veterinary Teaching Hospital.

Results: The study included 188,616 race starts for 16,646 horses, representing 6,072 2-year-old starts, 43,228 3-year-old starts and 139,316 4-year-old+ starts. During the study period there were 544 failure to finish events, of which just under half were pulled up (49%), 33% were lost rider events and 13% fell (Figure 1). The overall incidence of failure to finish events was 2.88 (95% CI 2.64-3.12) per 1,000 horse starts. Approximately 50% of these events were due to musculoskeletal injury (1.4 / 1000 horse starts). The rate of catastrophic musculoskeletal injury was low at 0.4 / 1000 horse starts. Internationally, the rates of musculoskeletal injury alone on race-day range from 3.1 per 1,000 starts to 4.4 per 1,000 starts, which is greater than the New Zealand rate for failure to finish events reported in this study. The lowest rate (2.66 per 1,000) occurred in the 2009/10 racing season and there was no significant effect of horse age on failure to finish events.

Failure to finish and lost rider events were less likely to occur in autumn and winter compare to spring. Horses racing in fields of 12–13 runners and 14–18 runners had a higher rate of failure compared to horses in fields of 3–9 runners. Horses racing over longer distances (1671 metres+) were more likely to fail to finish or be pulled up compared to horses racing over 1200 metres or less (Figure 2). The failure to finish,
pulled up and lost rider rates were lower at all ratings bands 55 or greater compared to rating band 50-54.

Computer tomography (CT) and spatial analysis of the This preliminary data of the limited cases of catastrophic injury has highlighted the significant role variation in training load, rather than just racing exposure, has on the patho-physiology observed. This data emphasises the need for accurate training data to understand the precursor remodelling responses that are occurring prior to the advent of a catastrophic musculoskeletal injury.

**Implications:** As with previous studies, the results highlighted the many factors that can contribute to race-day events. Factors such as race distance and size of the field have been identified in overseas studies of musculoskeletal injury. The association with season and low ratings bands may reflect younger, inexperienced horses at the start of a racing campaign. This pattern of greater risk with the less experienced / lower grade horses has been reported in studies of jockey falls in Australia. However, further investigation to better understand the race and environmental factors that contribute to the lower rate observed in New Zealand is now needed. Contributing factors to the low failure to finish rate may relate to the structure and pattern of training and racing in New Zealand. Investigation of the biological and industry based drivers is required to identify pragmatic management changes that could reduce the risk of failure to finish.

**RESEARCH OUTPUTS (Abstracts, Presentations, Papers, Industry Stories)**

**PAPERS:**


Conference proceedings


**THESIS**

MVS Thesis - Ms Sophie Bogers. Quantitative analysis of the bone density characteristics of the Third Metacarpal and Third Metatarsal distal epiphysis of Thoroughbred horses using image analysis. Massey University, Palmerston North, New Zealand.

Veterinary MSc Thesis - Ms Charlotta Kronander. Spatial mapping of sclerosis in Thoroughbred horses with and without condylar fracture. Faculty of Health and Medical Sciences, University of Copenhagen, Denmark.