

**Epidemiology of musculoskeletal injuries in two- and
three-year-old Australian Thoroughbred racehorses**

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I hereby certify that the thesis has not been submitted for a higher degree at any University or Institution and work embodied in this thesis is my work unless noted otherwise in the acknowledgements.

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This thesis is dedicated to the trainers and their staff. Without their commitment this research would not have been possible.

Abstract

The aim of this research was to describe the epidemiology of musculoskeletal (MS) injuries in two- and three-year-old Thoroughbred racehorses. A 27 month longitudinal study commencing in May 2000 was conducted. The study convenience sampled 14 trainers with facilities at metropolitan and provincial racetracks in New South Wales, Australia. In the 2000/01 and 2001/02 racing season, 323 and 128 two-year-olds, respectively, were enrolled in the study.

The 451 Thoroughbred horses contributed, 1, 272 preparations and 78, 154 training days to the study. Of the 323 horses enrolled in the 2000/01 racing season, 219 contributed three-year-old data to the study. During the study period 8%, of training days had missing training data and 3% of the 1, 986 starts in the races or barrier trials were incorrectly recorded. The rate of incorrect entries varied with both study month and trainer. Similarly, the rate of training days with missing data varied between trainers and with study month.

Four hundred and twenty-eight MS injuries were recorded in association with 395 preparations in 248 two- and three-year-old Thoroughbred racehorses. The IR for all categories of MS injuries, except for tendon and ligament injuries, were higher in two-year-olds than three-year-olds, although the differences were only significant for shin soreness. Seventy-eight percent of horses enrolled in the study started, in a barrier trial or race, within one year on entering the study. After accounting for other confounders, horses that had sustained a MS injury were 0.50 times less likely to start, in a race or trial, race than those that did not sustain an injury. Seventy percent of horses returned to training after their first MS injury, and the cumulative percentage of these horses that had recovered within six months of the initial MS injury was 55%. After adjusting for clustering at the level of the trainer, the analysis showed that horses that exercised at a gallop pace ≥ 890 m/minute (but had not started in a race) prior to the onset of MS injury, were 2.14 times more likely to recover than horses whose maximum speed, prior to the onset of the first MS injury, was less than 890 m/minute. Similarly, horses that had started in a race or barrier trial were 4.01 times more likely to recover than horses whose maximum speed was less than 890 m/minute.

Training days were grouped into units referred to as preparations. A preparation began on the day that the horse was enrolled in the study, or when a horse returned to training after an absence of more than seven days from the stable. The preparation continued until the horse was lost to follow-up or left the stable for a period of more than seven consecutive days. Univariable and multivariable analytical methods were used to examine the association between a range of independent variables and four preparation-level measures of performance: (i) the duration of preparations, (ii) length of time from the beginning of the preparation until the first start in a race or barrier trial, (iii) length of time from the first start until the end of the preparation and (iv) rate of starts in races or barrier trials. After adjusting for confounders, younger horses tended to have shorter preparations, took longer to start in a race or barrier trial, had a shorter interval from the first start to the end of the preparation and fewer starts per 100 training days. MS injury was not conditionally associated with any of the outcomes considered in this chapter.

Multivariate statistical models were used to explore risk factors for MS injuries. The results suggest that MS injuries involving structures in the lower forelimb (carpus to fetlock inclusive) could be reduced by limiting exposure to high-speed exercise. This supports the proposition that training injuries are caused by the accumulation of micro damage. The results suggest there are a number of other factors that vary at the trainer level that may be risk factors for injuries, in particular joint injuries. These include unmeasured variables such as the rate of increase in distance galloped at high-speed, conformation of the horse, skill of the riders and farrier and veterinary involvement.

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List of Abbreviations

>	Greater than
≥	Greater than or equal to
<	Less than
≤	Less than or equal to
95% CI	95% Confidence interval
HS	High-speed
IR	Incidence rate
IRR	Incidence rate ratio
MS	Musculoskeletal

