UTS greyhound safety and welfare research update
Grafton 3 June 2018

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UTS interim recommendations (5 June 2017)

1. GRNSW work collaboratively with GRV on a third generation lure design with a reach that is greater than 2 m by incorporating a travelling counter balance into the design.

2. In the longer term the Australian greyhound racing industry modify the lure design so that the lure travels along the centre-line of the track.

3. Australian greyhound industry conduct a feasibility study into the viability of a centrally located lure system.

4. For the Wentworth Park 520 m start install a pseudo shute-like start.

5. Progressively remove bend starts and discontinue the associated race distances.

6. Conduct a trial using a ‘movable’ box start located at the beginning of a straight.

7. Increase the height of the starting box grilles to at least 400 mm.

8. Conduct one or more trials with a delayed starting box opening.

9. Upgrade lure drives and add a braking system.

10. Reduce the number of starts from 8 to 6.

11. Optimise the track surface.

3 June 2018
Qualification statement

- It should be noted that the interim recommendations contained within the Report were based on data that were statistically insignificant (12 months from GRNSW tracks only)

- Some of the interim recommendations contained therein may be ‘noise’ in the data due to the small size of the data set

- Nevertheless it still remains the intent of the UTS Project Research Team that the final greyhound track design will be evidence-based and UTS will use the data that flows from recommendations to adjust, fine-tune and optimise the design during Phase II of this study
## UTS injury category

<table>
<thead>
<tr>
<th>Rating</th>
<th>Incapacitation Period</th>
<th>Typical injury types</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minor injuries-1 (MINa)</td>
<td>0 days</td>
<td>Mild skin abrasion/grazes</td>
</tr>
<tr>
<td>Minor injuries-2 (MINb)</td>
<td>1-10 days</td>
<td>Grade 1 muscle injury</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mild skin laceration</td>
</tr>
<tr>
<td>Medium injuries (MED)</td>
<td>11-21 days</td>
<td>Join/ligament sprain</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Skin laceration</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Grade 2 muscle injury</td>
</tr>
<tr>
<td>Major injuries (MAJ)</td>
<td>Greater than 21 days</td>
<td>Grade 3 muscle injury</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bone fracture</td>
</tr>
<tr>
<td>Catastrophic (CATb)</td>
<td>Euthanised post-race</td>
<td>Euthanised post-race, unable to be retired or unable to race</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NB: does not include all data (deaths)</td>
</tr>
<tr>
<td>Catastrophic (CATa)</td>
<td>Deceased or euthanised on race day</td>
<td>Severe skull or spinal trauma</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Complex / Open / Join fracture</td>
</tr>
</tbody>
</table>

NB: does not include all data (deaths)

3 June 2018
Grafton greyhounds racing track
Grafton greyhound racing track
Track overview

**Track specification at a glance**

Bends radius: 51.7 m

Length of straight sections: 110.6 m

Straight to bend length ratio: 0.68 m

Inner track cross fall for bends apexes: 7.4% (4.23°)

Inner track cross fall on the straights: 3.5% (2.00°)

Track path has no transition between straight and bend

Track has a combination of straight and bend starts
Grafton greyhound racing track

Interventions date

Hoop lure introduced on 29th January 2017 at Grafton track

3 June 2018
<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1</td>
<td>CATa + CATb</td>
</tr>
<tr>
<td>Level 2</td>
<td>CATa + CATb + MAJ</td>
</tr>
<tr>
<td>Level 3</td>
<td>CATa + CATb + MAJ + MED</td>
</tr>
<tr>
<td>Level 4</td>
<td>CATa + CATb + MAJ + MED + MINa + MINb</td>
</tr>
</tbody>
</table>

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Level 1 normalised injuries in 2017

Number of injuries per 1000 starts

NSW Tracks

Euthanized at track (CATa)
Level 1 normalised injuries in 2016

Number of injuries per 1000 starts

NSW Tracks

- Death: Euthanised post-race, unable to be retired or unable to race (CATb) #CATb may not include all data (deaths)
- Euthanized at track (CATa)
Level 2 normalised injuries in 2017

Number of injuries per 1000 starts

NSW Tracks

- Major Injuries (MAJ)
- Death: Euthanised post-race, unable to be retired or unable to race (CATb) #CATb may not include all data (deaths)
- Euthanized at track (CATa)
Level 2 normalised injuries in 2016

Number of injuries per 1000 starts

NSW Tracks

Major Injuries (MAJ)

Death: Euthanised post-race, unable to be retired or unable to race (CATb) #CATb may not include all data (deaths)

Euthanized at track (CATa)
Grafton greyhound racing track
Level 1 injuries 2016 and 2017
Grafton greyhound racing track
Level 2 injuries 2016 and 2017
Grafton greyhounds racing track
Injury locations 2016 and 2017

305 m
Number of starts 2016: 1071
Total injury 2016: 27
Number of starts 2017: 1512
Total injury 2017: 44

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Grafton greyhounds racing track
Injury locations 2016 and 2017

407 m
Number of starts 2016: 2220
Total injury 2016: 48
Number of starts 2017: 2610
Total injury 2017: 83
Grafton greyhounds racing track
Injury locations 2016 and 2017

480 m
Number of starts 2016: 870
Total injury 2016: 24
Number of starts 2017: 986
Total injury 2017: 23
Greyhounds stride analysis
Greyhounds stride pattern
Acceleration data acquisition

Sandy-loam track way (≈ 7.9% or 4.5° cross fall)

Greyhound

Jacket

Fore-legs

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Greyhounds stride analysis

Straight running
Greyhounds stride analysis
Straight running

0.0  0.8  2.22  2.93  5.36
Left foreleg  Right foreleg  Right hindleg  Left hindleg

Distance (m)

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Track design investigation
Track design investigation
Greyhounds on the bends

Weight of greyhound

Frictional force
From the track / Shear strength of track

Normal force from the ground

Reference frame

Major forces acting on a greyhound on the straight side view

Accelerations of a greyhound on the bend top view

- $a_x$: Forward acceleration
- $a_y$: Centripetal acceleration
- $a$: Resultant acceleration

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Track design investigation
Greyhounds on the bends

Maximum constant galloping speed possible for greyhounds

R  Bend
\( g \)  Acceleration due to gravity
Track’s coefficient of static friction
\( \theta \)  Cross fall of the track
\( v \)  Greyhounds maximum constant speed

Friction from the ground \((\mu_s)\) / ground’s shear strength

Greyhound’s weight
Greyhound’s centre of gravity
Centrifugal force

Normal force from the ground

Forces acting on a greyhound on the bend front view

3 June 2018
Track design investigation
What can be done for cross falls at the tracks

Optimum cross falls

<table>
<thead>
<tr>
<th>Track bend (m)</th>
<th>Track cross falls (%)</th>
<th>Track cross falls (deg.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>45</td>
<td>78.1</td>
<td>38</td>
</tr>
<tr>
<td>50</td>
<td>70</td>
<td>35</td>
</tr>
<tr>
<td>55</td>
<td>62.5</td>
<td>32</td>
</tr>
<tr>
<td>60</td>
<td>57.7</td>
<td>30</td>
</tr>
<tr>
<td>65</td>
<td>53.2</td>
<td>28</td>
</tr>
<tr>
<td>70</td>
<td>46.6</td>
<td>25</td>
</tr>
</tbody>
</table>

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Track design investigation
What can be done for cross falls at the tracks

Track surface grades from surveyed data

Track surface grades existing

Track surface grades improved

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Track design investigation
Continuity of a track path

First order
A

Second order
A
Track design investigation
Straight to bend path types in GRNSW tracks

Grafton
305 m start

Richmond
535 m start

No transition (N)

Part transition (P)

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Track design investigation
Case study Richmond 400 m starts immediate bend
Most injury prone GRNSW tracks starts and corners
Most injury prone GRNSW tracks starts and corners in 2016

Worst five starts and corresponding corners

1. Grafton 480 m starts Back turn exit corner
2. Nowra 365 m starts Back turn exit corner
3. Grafton 305 m starts Home turn in corner
4. Casino 484 m starts Back turn in corner
5. Gosford 515 m starts Back turn in corner

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Most injury prone GRNSW tracks starts and corners in 2016

Grafton 480 m starts Back turn exit corner

Number of starts: 847
Number of races: 111

Catastrophic
Major injury
Medium injury
Minor injury

3 June 2018
Most injury prone GRNSW tracks starts and corners in 2016
Nowra 365 m starts Back turn exit corner

Number of starts: 2396
Number of races: 311

3 June 2018
Most injury prone GRNSW tracks starts and corners in 2016
Grafton 305 m starts Home turn in corner

Number of starts: 1071
Number of races: 138

3 June 2018
Most injury prone GRNSW tracks starts and corners in 2016
Casino 484 m starts Back turn in corner

Number of starts: 1943
Number of races: 252

Catastrophic
Major injury
Medium injury
Minor injury

3 June 2018
Most injury prone GRNSW tracks starts and corners in 2016
Gosford 515 m starts Back turn in corner

Number of starts: 2130
Number of races: 277

Catastrophic
Major injury
Medium injury
Minor injury
UTS phase I recommendations
Average injury rate for Level 2 injuries 2016

12% difference

Injuries per 1000 starts

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