



## Greyhound Welfare and Integrity Commission

### STUDY REPORT

**Study Title: A pilot observational study to assess drinking water consumption by racing greyhounds while kennelled during NSW race meetings.**

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## 1. OBJECTIVES

To assess drinking water consumption of racing greyhounds while kennelled during TAB greyhound race meetings.

To assess the effect of environmental temperature and humidity on water consumption of racing greyhounds during TAB race meetings.

To assess the effect of race distance and race result (i.e. performance) on water consumption of racing greyhounds.

To assess the effect of the distance travelled to the racetrack and 'pre-hydration' measures by trainers on the water consumption of racing greyhounds.

To assess the impact of study procedures on race-day operations during TAB race meetings; and the acceptance of racing industry participants (i.e. greyhound trainers) in partaking in GWIC research activities.

## 2. JUSTIFICATION

The Greyhound Welfare and Integrity Commission (GWIC) is the independent regulator of the greyhound racing industry in New South Wales. GWIC is responsible for initiating, implementing and developing policies related to the welfare of greyhounds and is able to enforce these policies under the Greyhound Racing Act, 2017. One such policy is the Race Day Hydration and Hot Weather Policy. This policy was developed and instituted by Greyhound Racing NSW (GRNSW) in January 2017. The policy was adopted unchanged by GWIC on the 1<sup>st</sup> July 2018, when GWIC assumed regulatory functions in relation to greyhound racing from GRNSW. The policy applies throughout the year at all NSW greyhound race meetings.

The Race Day Hydration and Hot Weather Policy requires that all NSW greyhounds must be provided with between 250 mL and 500 mL of drinking water while kennelled during NSW race meetings. New South Wales is the only greyhound racing jurisdiction in Australia which requires greyhounds to be provided with drinking water while kennelled during race meetings.

The requirement to provide drinking water is aimed at ensuring the welfare, health, safety and comfort of greyhounds, throughout the year and particularly during hot weather. Canines do not sweat freely like humans and their main form of cooling is through panting. Greyhounds not allowed access to water may suffer from dehydration which can be a serious health and welfare concern. Dehydration is a risk factor for conditions such as hyperthermia, muscle cramping and acidosis (rhabdomyolysis) and may negatively impact on performance.

The requirement to provide drinking water was initially viewed as controversial by the greyhound racing industry in NSW. Some racing industry participants were concerned that the provision of water may adversely impact performance; may lead to health issues such as gastric dilatation-volvulus (GDV or 'bloat') due to greyhounds drinking excessively; or injuries resulting from greyhounds chewing or playing with their water bowls. The current policy has been in place for over 4 years with most greyhounds acclimatised to the presence of water in their kennels.

This study was conducted to provide information on the utilisation of the drinking water resource provided to greyhounds, by quantifying the water consumption of greyhounds during race meetings. In addition, parameters such as environmental temperature and humidity, race result and race

distance were analysed in relation to water consumption. The data generated by this study may be used to guide future policy developments. The results of this study will be published on the GWIC website ([www.gwic.nsw.gov.au](http://www.gwic.nsw.gov.au)) and may be shared with other greyhound racing jurisdictions.

### 3. COMPLIANCE STANDARDS

Not applicable. This study is a non-GCP<sup>1</sup> pilot study. The data generated by this study is for GWIC use only and will be published on the GWIC website for the information of greyhound racing industry participants.

<sup>1</sup> GCP = Good Clinical Practice, referring to VICH Guideline 9 (issued June 2000) produced by the International Cooperation on Harmonisation of Technical Requirements for Registration of Veterinary Medicinal Products (VICH).

### 4. TEST SITE(S)

The study was conducted at the following three (3) test sites, all of which are TAB greyhound racing venues in New South Wales:

- Bathurst Greyhound Racing Club located on Upfold Street, in Bathurst NSW 2795
- Casino Greyhound Club located on Hartley Street, Casino NSW 2470
- Ladbrokes Park Lismore Greyhound Club located at 1 Molesworth Street, Lismore NSW 2480

### 5. STUDY DATES

Start date (animal phase): 9<sup>th</sup> March 2020

Finish date (animal phase): 13<sup>th</sup> April 2021

### 6. STUDY DESIGN

This study was a prospective observational *in vivo* pilot study utilising racing greyhounds participating in TAB race meetings held at Bathurst, Casino and Lismore greyhound racetracks in New South Wales (NSW). The study was conducted over 12 TAB race meetings held at these venues – 1 race meeting at Bathurst, 8 race meetings at Casino and 3 race meetings at Lismore (refer to Table 1 below).

The first study day at Bathurst on 9<sup>th</sup> March 2020, utilised a team of 5 GWIC staff members as study personnel. All GWIC personnel involved with the study were trained in performing the study procedures outlined in the Study Protocol prior to participating in study activities.

Due to the COVID-19 pandemic, the study was placed on hold for approximately 5 months during 2020. It was not possible to collect study data and maintain social distancing between study personnel and greyhound trainers/handlers within the confines of the kennels. Although greyhound racing continued in NSW during this time, restrictions were in place at NSW greyhound racetracks to ensure social distancing was maintained and to limit the number of attendees at racetracks. Travel restrictions within NSW were also in place limiting movement of greyhound industry participants and GWIC personnel.

The study recommenced in August 2020, with the addition of Casino and Lismore racetracks as study sites. Due to ongoing COVID restrictions in place at the time, henceforth only the Study Investigator was involved in study data collection, rather than a team of trained GWIC study personnel. This planned change of the study test sites (locations) and study staffing was required to limit the number of study personnel in the race day kennels. This necessary change resulted in the study being conducted over a larger number of race meetings and over a longer period of time than initially planned.

A proportion of the greyhounds participating in each race meeting were randomly selected on the day prior to the race meeting from the nominations list on Ozchase ([www.ozchase.com.au](http://www.ozchase.com.au)). Ozchase is the online greyhound nomination, racing performance and administrative race day software system utilised in NSW.

At the Bathurst race meeting on the 9<sup>th</sup> March 2020, a maximum of 2 greyhounds were randomly selected from each race using the Microsoft Excel random number generation function. To minimise delays or disruptions to race-day procedures, and to avoid potential integrity issues within the kennels, no more than 2 greyhound were involved in study procedures per race.

At the Lismore and Casino race meetings, 1 greyhound was randomly selected using the Microsoft Excel random number generator function from every second race for enrolment into the study. This was necessary as study data collection was conducted by one person. Either odd or even numbered races were selected for the study by the Investigator by flipping a coin, i.e. heads - odd numbered races; tails - even numbered races were included in the study. It was not possible to collect data from sequential races without causing delays for trainers/handlers, as greyhounds are retrieved from the kennels for the next race at the same time that greyhounds are being placed back into the kennels from the prior race. The Study Investigator could not be in both places at once.

Informed consent was sought from the trainer of each greyhound to participate in the study. Enrolment into the study was voluntary. Participating trainers were also surveyed as part of this study, to obtain data on greyhound hydration measures utilised prior to and after racing.

The total maximum number of greyhounds enrolled into this study was seventy (70).

*Table 1: Date, Racetrack, Meeting Type, Number of Greyhounds Enrolled and Season.*

Meeting No.	Date	Location / Racetrack	Meeting Type	No. of races at this race meeting	No. of greyhounds enrolled into the study at this race meeting	Season
1	9 March 2020	Bathurst	Twilight	10	13	Autumn
2	27 August 2020	Casino	Day	10	5	Winter
3	3 September 2020	Casino	Day	12	6	Spring
4	24 September 2020	Casino	Day	12	6	Spring
5	13 October 2020	Lismore	Night	10	5	Spring
6	12 November 2020	Casino	Day	12	6	Spring
7	24 November 2020	Lismore	Night	10	5	Spring
8	10 December 2020	Casino	Day	12	6	Summer
9	28 January 2021	Casino	Day	12	5	Summer
10	25 February 2021	Casino	Day	10	5	Summer
11	11 March 2021	Casino	Day	10	5	Autumn
12	13 April 2021	Lismore	Night	10	3	Autumn
<b>TOTAL:</b>					<b>70 greyhounds</b>	

### ***a. Experimental Unit:***

The experimental unit was the individual greyhound.

### ***b. Animal Model:***

The study utilised fit and healthy racing greyhounds, of no less than 16 months of age (the minimum age permitted under the Rules of Racing) and no greater than 7 years of age. Male and female, desexed or entire greyhounds were enrolled into the study. Each greyhound was identified by its official racing name. The microchip number and ear brand of each greyhound was checked and confirmed by Stewards at kennelling.

### ***c. Inclusion Criteria:***

Racing greyhounds deemed to be fit and healthy (as assessed at kennelling by the on-track veterinarian) of either sex were enrolled into the study. Greyhounds originating from within NSW or from interstate were permitted to be included in the study, as long as the greyhounds were eligible to nominate and race in NSW.

Informed consent was granted by the trainer for their greyhound to be enrolled. Trainers' of selected greyhounds were contacted via telephone (where possible) on the day prior to each study day to seek consent for the enrolment of their greyhound into the study.

The Study Protocol inclusion criteria stated that the greyhound's trainer had to be present at the race meeting in order for their greyhound to be eligible to be enrolled into the study. Prior to study race day 2 (in August 2020), the Protocol was amended so that a trainer did not have to be in attendance at the race meeting in order for their greyhound to be enrolled (Amendment 4). Greyhounds which were handled by a direct family member (e.g. spouse, partner, child) were permitted to be enrolled into the study, in the trainer's absence. However, the trainer had to provide informed verbal consent for this to occur. This study amendment enabled a greater number of greyhounds to be enrolled into the study.

Greyhounds which were handled on race day by a licenced attendant who was not a direct family member (e.g. friend, acquaintance), without the trainer present at the race meeting, were not permitted to be enrolled into the study.

### ***d. Exclusion and Removal Criteria:***

Greyhounds were excluded from the study if they have been selected by the Stewards for a pre-race swab at the Bathurst meeting on the 9<sup>th</sup> March 2020. Thereafter, following a study amendment (Amendment 2), greyhounds selected for a pre-race swab were permitted to be enrolled into the study, with the permission of the greyhound's trainer.

Two (2) greyhounds were enrolled into the study which were selected for pre-race swabs by the Stewards. Once informed by the Stewards that their greyhound was selected for a pre-race swab, the trainers were given the option of withdrawing from the study, if they wished. Permission was granted by the two trainers to continue to participate in the study despite being selected for a pre-race swab.

Greyhounds were excluded from further continuation in the study if they were selected by the Stewards for a post-race swab. This was a necessary measure to ensure the integrity of swabbing

procedures was maintained and to eliminate the real or perceived risk of potential ‘contamination’ of the greyhound’s drinking water due to study procedures.

One (1) greyhound was excluded/removed from the study after its race due to being selected for a post-race swab. Only partial study data (prior to its race) was available from this greyhound for analysis.

Any greyhound which had been granted a water exemption under the Race Day Hydration and Hot Weather Policy were excluded from the study.

Two (2) greyhound were selected but were not enrolled into the study, as the trainers’ advised that these greyhounds had water exemptions in place.

Greyhounds which were ‘late scratchings’ at the race meeting were also excluded from participation in the study. Greyhounds may be a late scratching due to a body weight variation of greater than 1.0 kg from their previous racing weight; or due to an injury or illness identified by the on-track-veterinarian during kennelling veterinary examinations or pre-race inspections of the greyhounds. No greyhounds were excluded from the study due to being a ‘late scratching’ at the race meeting.

### *e. Randomisation and Blinding:*

Greyhounds were randomly selected for enrolment into the study from the OzChase nominations list prior to each study day using the Microsoft Excel random number generation function.

Blinding was not applicable to this study.

## 7. SCHEDULE OF EVENTS

*Table 2: Schedule of Events*

<b>Study Day</b>	<b>Event</b>
Pre-Study	Confirm Protocol; Obtain Animal Ethics Committee (AEC) approval.
Race Meeting 1 - 12 <i>Day Prior</i>	Select greyhounds for potential study enrolment from OzChase using Microsoft Excel random number generator. Contact trainers of selected greyhounds to discuss participation in the study. Obtain informed consent from trainers. If convenient, survey trainers regarding pre-race and post-race hydration measures.
Race Meeting 1 - 12	Confirm trainer consent via signature on Study Consent Form. Survey trainers regarding pre-race and post-race hydration measures (if survey had not been completed the day prior). Record kennel (inside) and ambient (outside) temperature and humidity at the start, middle and end of the race meeting. Record greyhound water consumption pre-race and post-race.
Race Meeting 1 - 12 <i>Day After</i>	Obtain the official recorded racing bodyweight (measured at kennelling) and race result (i.e. performance) for each enrolled greyhound from Ozchase. Calculate the distance travelled to the racetrack using Google Maps and trainer address details listed in Ozchase or OneGov for each enrolled greyhound.
Post-Study	Submit report to Animal Ethics Committee. Collate and analyse study data. Coordinate Statistical Analysis. Compile Study Report.



## 8. TEST SYSTEM

Greyhound details (racing name, sex, age and bodyweight) were recorded. Each greyhound's identity was checked and confirmed by the Stewards at kennelling via the greyhound's microchip number and ear brand. Greyhounds were eligible for enrolment into the study in accordance with the criteria outlined in Table 3:

*Table 3 - Test system / Greyhound details for enrolment into the study:*

<b>Species:</b>	Dog ( <i>Canis lupus familiaris</i> )
<b>Breed:</b>	Greyhound
<b>Number:</b>	70
<b>Source:</b>	Privately owned registered racing greyhounds eligible to nominate and race in NSW.
<b>Health:</b>	In good general health and fit racing condition.
<b>Age (at time of participation in the study):</b>	16 months – 7 years
<b>Racing bodyweight (recorded at kennelling):</b>	20 – 45 kg
<b>Sex:</b>	Male or female, desexed or entire.

## 9. ANIMAL MANAGEMENT AND HOUSING

### *a. Animal Health and Welfare:*

Animals were managed similarly and with due regard for their welfare. Animal Ethics Committee (AEC) approval was obtained prior to commencement of this study. Animal Ethics Committee approval was provided by the Wongaburra Research Centre Animal Ethics Committee of Invetus Pty Ltd (study no. GWIC19177V).

A trained and experienced greyhound on-track-veterinarian (OTV) was present at each race meeting, in accordance with the Rules of Racing. The OTV inspected every racing greyhound at kennelling to ensure the greyhound was fit and healthy and able to compete in its race event. The OTV also ensured each greyhound was free of contagious conditions, external parasites and was not in season (entire females only). The OTV was in attendance for the duration of the race meeting to monitor greyhound health and welfare and to tend to any greyhounds injured during racing. The greyhounds were visually inspected by the OTV prior to racing and after racing (when possible), and where necessary physically examined to check for injuries, poor recovery post-racing or heat-related conditions.

Each NSW greyhound racetrack has a veterinary treatment room for the OTV to use for examining and treating greyhounds. First aid medications, bandaging materials, IV fluids and all necessary first aid equipment is provided at each track and/or supplied by the attending OTV.

The rostered OTV at each race meeting was not involved in any study procedures. The OTVs focus and attention remained on monitoring the health and welfare of the racing greyhounds.

Greyhounds were also monitored by the Racing Club kennel staff and stewards. Any abnormalities in a greyhound's appearance, demeanour or behaviour were notified to the OTV on course and the greyhound was examined and treated accordingly.

### *b. Animal Management:*

Routine race-day management practices in accordance with the Rules of Racing and GWIC Policies continued during each race meeting.

In accordance with the Rules of Racing, greyhounds were kennelled for a maximum time of 4.5 hours from the close of kennels to the last race. Greyhounds intended to race were brought to the kennels no later than 45 minutes prior to the advertised starting time of the first race at that meeting. Therefore, greyhounds were kennelled for a maximum period of approximately 5.25 hours at each race meeting.

#### *c. Housing:*

Greyhounds were housed in individual purpose-built race day kennels during the race meeting. The kennels are constructed of a solid concrete or metal floor, metal frame and solid steel mesh. The kennels are large enough to allow the greyhound to stand, turn-around and lie down comfortably. Each of the individual kennels at each of the three racetracks (Bathurst, Casino and Lismore) have identical dimensions and construction. The kennels are air-conditioned with the aim of maintaining the temperature between 19°C and 22°C (refer to the GWIC Race Day Hydration and Hot Weather Policy). Greyhounds are provided with bedding by their trainer or handler, typically a rectangular foam bed with fabric covering.

The kennels are thoroughly cleaned with water and disinfectant before and after each race meeting. The kennels are inspected by the stewards prior to each race meeting commencing to ensure the kennels are suitably air-conditioned and presented in a clean and well-maintained state.

#### *d. Feed and Water:*

In accordance with the Race Day Hydration and Hot Weather Policy every greyhound must be provided with a clean water bowl capable of holding a minimum of 250 mL of water. Sealed water bottles are supplied by the Racing Club providing at least 250 mL and up to 500 mL (see Figure 1). The trainer or attendant will use this water to fill their greyhound's water bowl during the meeting. Club kennel staff supervise the greyhounds during kennelling to ensure that each greyhound is provided with a minimum of 1 bottle (250 mL) of water.

*Figure 1 – Example of sealed 250 mL water bottle provided by Racing Clubs:*



Multiple taps and hoses are provided in a number of locations at each racetrack, therefore trainers and attendants may provide their greyhound with a drink when they first arrive at the racetrack prior to kennelling.

After each greyhound has raced they are hosed down in the 'wash-down bays' and given a drink to assist in cooling the dogs down quickly and to remove sand on the dog's coat from the racetrack surface. There are a minimum of 8 wash down bays available, therefore each of the 8 greyhounds racing can be washed down and given a drink immediately after racing.

No food is permitted to be given to any greyhounds during a race meeting. No food items are permitted in the greyhound kennel areas to avoid the risk of any greyhound accidentally ingesting any dropped food.

#### *e. Adverse Events:*

Any adverse events (AEs) which occurred during the study were recorded.

The most likely adverse events anticipated during the conduct of this study were racing-related musculoskeletal injuries (e.g. muscle strains etc.). Any greyhound which performed below expectation, fell or collided heavily with another greyhound during a race was examined by the OTV and received immediate veterinary treatment as required.

#### *f. Mortalities*

In accordance with the Rules of Racing, any greyhound which dies either before, during or after a race event will be examined by the OTV and samples collected as appropriate under the direction of the OTV and stewards. The cadaver will be submitted for a post-mortem if required. A blood and/or urine sample may also be collected and submitted for prohibited substance testing as determined by the stewards.

Refer to the GWIC Rules of Racing, Rule 78 – Conduct of autopsy, which states:

If a greyhound dies, either before, during or after an Event, the Stewards may, or the Controlling Body may direct the Stewards, to cause to be carried out such test as they deem necessary. If an authorised person is unable to determine the cause of the death of a greyhound without performing an autopsy, then an autopsy may later be performed by an appropriately qualified person in the presence of a Steward authorised by the Controlling Body and/or the owner or trainer or some person representing the owner or trainer.

For the purposes of this Rule the Stewards may take possession of and keep in custody the carcass of a greyhound for such period and pursuant to such conditions as the Stewards may think proper, and no liability shall lie against the club, the Controlling Body or their servants or agents for any loss or damage howsoever sustained.

The 'Controlling Body' referred to in the rules is GWIC.

In the rare instance where euthanasia of a greyhound may be necessary during a race meeting, for example due to a catastrophic racing injury, this procedure will be performed by an experienced on-track-veterinarian (OTV) via intravenous (IV) administration of pentobarbitone sodium (e.g. Lethabarb Euthanasia Injection). Opioid pain relief (methadone, buprenorphine) and sedation (acepromazine, medetomidine) will typically be administered prior to euthanasia, in accordance with GWIC on-track veterinarian standard policies and procedures. A Euthanasia Consent Form will be signed by either the owner, trainer or owner's authorised representative.

## 10. INFORMED CONSENT

Greyhounds were not enrolled into the study without the informed consent of their trainer. A Study Consent Form was signed by each greyhound's trainer or handler (family member) in order for their greyhound to participate in this study. Participation in the study was voluntary. Trainers had the right to decline involvement in the study.

If a trainer declined involvement in the study, this was recorded. The proportion of trainers who decline involvement in study procedures was used as an indicator of the willingness of trainers to be involved in GWIC research activities.

## 11. STUDY PROCEDURES, ASSESSMENTS AND OBSERVATIONS

### *a. Water Consumption*

During kennelling each greyhound was placed into its kennel by the trainer or handler, in the presence of the Club kennel staff and GWIC study personnel. The greyhound's water bowl was filled by the trainer/handler with the sealed bottled water provided by the Club. A volume of water between 250 mL and 500 mL was provided to the greyhound, in accordance with the Policy.

The filled water bowl was placed by the trainer/handler onto the calibrated digital scales – House & Home glass Digit Kitchen Scales, product number: 660447 (see Figure 2). The weight of the filled water bowl was recorded by GWIC study personnel. The filled water bowl was then placed in the greyhound's kennel by the trainer/handler. GWIC study personnel did not handle the water bowls themselves, due to the perceived risk of 'contamination'. This was particularly important should the greyhound later be selected for a swab. Water bowl weights were recorded in grams (g), with 1 g equivalent to 1 mL of water.

Figure 2 – House & Home glass Digit Kitchen Scales



Once the greyhound was retrieved from its kennel prior to its race event, the water bowl was weighed again using the digital scales. The amount of water consumed (if any) was then calculated based on the change in water bowl weight. This provided a measure of the amount of water consumed by each

greyhound prior to the greyhound competing (i.e. pre-race water consumption). If the water bowl had been knocked over or spilt in the kennel by the greyhound, this was recorded.

Following the greyhound's race, the greyhound was observed while being hosed down by the trainer/handler. If the greyhound was observed to drink from the hose, this was recorded as 'yes' or 'no'. The amount of water consumed while being hosed down cannot be ascertained.

If the greyhound was selected for a post-race swab, the greyhound would take no further part in the study and would be removed at this point in time. One (1) greyhound was removed/withdrawn from the study due to being selected for a post-race swab (Study Dog 2).

For study greyhounds which were not involved in any post-race swabbing procedures, the study process would continue. GWIC study personnel would follow the trainer/handler and Club kennel attendant into the kennels after the greyhound had raced. If the trainer/handler wished to add more water to the greyhound's water bowl this would be recorded. The water bowl would be re-filled by the trainer/handler with the sealed bottled water provided by the Club. The re-filled water bowl would be placed by the trainer/handler on the digital scales and the weight recorded.

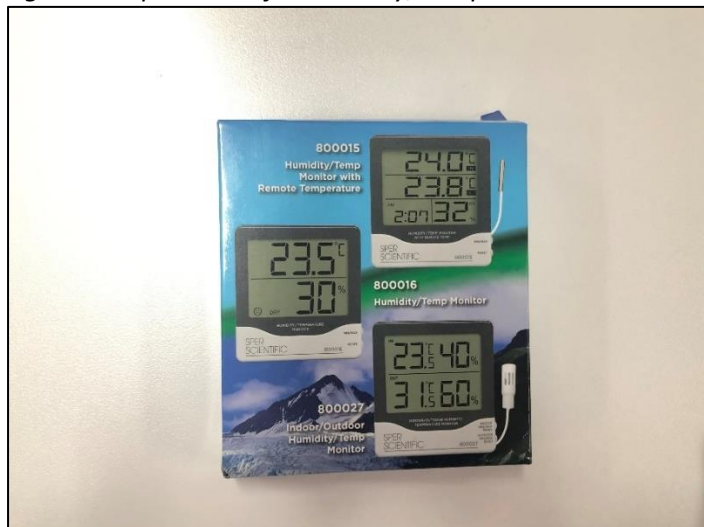
At the time of departure from the racetrack, GWIC study personnel would again follow the trainer/handler and Club kennel attendant into the kennels. The water bowl would be retrieved from the kennel by the trainer/handler and placed on the digital scales and weighed. The amount of water consumed by the greyhound after the greyhound had raced would be recorded. This provided a measure of the amount of water consumed by the greyhound after the greyhound had competed (i.e. post-race water consumption). If the water bowl has been knocked over or spilt in the kennel in the post-race period, this would also be recorded.

#### *b. Ambient (outside) Temperature and Humidity*

The ambient (outside) temperature and humidity was recorded using the portable Sper Scientific Humidity/Temperature Monitor, model number 800016 (see Figure 3). The temperature and humidity readings were taken in a shaded area adjacent to the kennel block, not in direct sunlight.

The ambient (outside) temperature and humidity readings were recorded at the start of the race meeting (i.e. prior to race 1), mid-way through the race meeting and at the end of the race meeting (i.e. after the last race).

Figure 3 – Sper Scientific Humidity/Temperature Monitor 800016



### *c. Kennel (inside) Temperature and Humidity*

The kennel (inside) temperature and humidity were also recorded using the portable Sper Scientific Humidity/Temperature Monitor, model number 800016. The temperature and humidity readings were taken inside the race kennels, in the main corridor between the kennel bays.

The kennel (inside) temperature and humidity readings were recorded at the start of the race meeting (i.e. prior to race 1), mid-way through the race meeting and at the end of the race meeting (i.e. after the last race).

### *d. Bodyweight*

In accordance with the Rules of Racing, each greyhound was weighed under the supervision of the stewards during kennelling with its racing muzzle, but without its lead and collar. The weight was recorded by the stewards and entered into OzChase.

In accordance with the Rules of Racing, the stewards ensured that the weighing instrument (i.e. digital scales) were checked for accuracy, using the test weights, prior to the commencement of kennelling.

Each enrolled greyhounds' official kennelling bodyweight was retrieved from OzChase and used for data analysis for this study.

### *e. Racing Result and Race Distance*

The official race result (i.e. each greyhounds' placing; 1<sup>st</sup> through to 8<sup>th</sup>) and race distance (in meters) was retrieved from OzChase and used for data analysis purposes.

### *f. Distance Travelled to Race Track*

The distance travelled to the racetrack was calculated using Google Maps. OzChase and/or OneGov electronic records were used to determine each greyhounds' current kennel address and the distance to the racetrack in kilometres (km) was calculated. Where Google Maps provided multiple route options with different kilometre distances, the 'fastest route' was selected and recorded for study purposes.

The trainer of each greyhound was surveyed to ensure that their greyhound commenced its journey to the racetrack from its registered kennel address and not from an alternate location (e.g. friend or relative's property). This situation can sometimes occur when greyhounds travel long distances and/or interstate for a specific race meeting (e.g. feature race) and may be temporarily kennelled at an alternate address near the racetrack.

### *g. Trainer Survey*

Each trainer participating in this study was surveyed by study personnel in order to collect data on the hydration measures trainers were utilising prior to and after racing their greyhounds. Survey responses were recorded and analysed.

The trainers were surveyed regarding:

- Whether they provide water to their greyhound during transportation (i.e. transit) to the racetrack
- Whether they offer water to their greyhound on arrival at the racetrack prior to kennelling (e.g. from the wash down bays)
- Whether they provide any hydration products, flavourings or electrolyte products prior to the race meeting (e.g. milk, coconut water, Recharge etc.)
- Whether they provide any hydration products, flavourings or electrolyte products after the race meeting.

Products such as milk or coconut water are sometimes given to racing greyhounds either alone or mixed with water to encourage greyhounds to drink prior to or after a race event to ensure they are adequately hydrated. Similarly, flavourings such as chicken or beef stocks, stews, or electrolyte products may be added to a greyhound's water or meals to increase fluid intake prior to or after racing.

## **12. DATA VERIFICATION AND DATA ANALYSIS**

All study data was entered into a Microsoft Excel spreadsheet, and was reviewed and verified by the Investigator for accuracy and completeness.

## **13. STATISTICAL ANALYSIS**

Statistical analysis of the study data was conducted by Professor David Brynn Hibbert, Emeritus Professor of Analytical Chemistry, University of New South Wales. The Statistical Analysis Report is provided in Appendix 1.

## **14. DATA RECORDS**

### *a. Data Capture Forms:*

Data capture forms (DCFs) were created and supplied by the Investigator. Study data capture forms were added or amended during the study without the need for a Protocol Amendment or Deviation.

Below is a list of the data capture forms (DCFs) used in this study:

GWIC.1.1	Protocol Amendment / Deviation
GWIC.2.1	Note to File
GWIC.3.1	Study Consent Form
GWIC.4.1	Water Consumption Record

- GWIC.5.1 Temperature and Humidity Record
- GWIC.6.1 Greyhound Bodyweight, Race Result and Race Distance Record
- GWIC.7.1 Trainer Survey (Travel Distance and Pre-Hydration)
- GWIC.8.1 Study Personnel List

*b. Amendments/Deviations:*

An amendment is a planned change or modification of the Study Protocol made prior to execution of the change or modification. There were five (5) amendments during the conduct of this study.

A deviation is an unplanned change or modification of the Study Protocol made after the execution of the change or modification. There were two (2) deviations during the conduct of this study.

All amendments and deviations were recorded, numbered sequentially based on the date of occurrence and are summarised herein. The impact of the amendments or deviations on the outcome of the study are detailed.

Table 4 - Study Amendments:

Amendment No.	Details
1	<p>13-Feb-2020: Study Protocol Section <b>11.g. Pre-Hydration</b> was amended to include an additional survey question on ‘post-hydration’ measures undertaken by trainers with their greyhounds after the greyhound has raced. This amendment enabled data to be collected regarding hydration measures employed by greyhound trainers after race meetings (i.e. ‘post-hydration’). This amendment ensured a more complete picture of the hydration measures utilised by greyhound trainers both prior to and after racing. This amendment was implemented prior to the study animal phase commencing.</p> <p>The impact of this amendment on the study was positive. This amendment provided a more complete data set of hydration measures (pre-hydration and post-hydration) used by greyhound trainers during racing.</p>
2	<p>10-Mar-2020: Following the first study day at Bathurst on 9-March-2020, the Investigator amended one of the exclusion criteria of the study (<b>Protocol Section 6.d. Exclusion and Removal Criteria</b>) which stated:</p> <p><i>Greyhounds will be excluded from the study if they have been selected by the Stewards for a pre-race swab.</i></p> <p>The Protocol was amended so that greyhounds selected for a pre-race swabs by the Stewards <u>were permitted</u> to be enrolled into the study. Greyhounds selected for a pre-race swab are kennelled in accordance with normal kennelling procedures, with the remainder of the dogs from their particular race. Pre-race swab dogs are not placed in a designated ‘swabbing kennel’ in the separately locked and secured ‘swabbing room’. Therefore, participating in the study would not interfere with any swabbing procedures conducted during the race meeting. Once the trainer had been notified by the Stewards that his or her greyhound had been selected for a pre-race swab, the Investigator asked the trainer again whether they were still willing to allow their greyhound to participate in the study. If permission was still granted by the trainer, then the greyhound was able to be enrolled into the study.</p>



	<p>This amendment had a positive impact on the study, as it enabled more greyhounds to be enrolled on each study day.</p>
3	<p>10-Jul-2020: Casino and Lismore were added to the study as additional study locations. COVID-19 travel restrictions would not permit the Investigator to travel to Bathurst to conduct study activities at the original selected study site (Bathurst). The Casino Greyhound Club and Ladbrokes Park Lismore Greyhound Clubs were added as 2 additional study sites, to enable the study to continue.</p> <p>This amendment had a positive impact on the study, as it enabled the study to be completed.</p>
4	<p>26-Aug-2020: The inclusion criteria of the study were amended by the Investigator. <b>Protocol Section 6.c. Inclusion Criteria</b>, which stated:</p> <p><i>The greyhound's trainer must be present at the race meeting for the greyhound to be enrolled into the study. Informed consent must be granted by the trainer for their greyhound to be enrolled. Greyhounds which are being handled by a licenced attendant (e.g. authorised friend or relative) without the trainer in attendance will not be enrolled into the study.</i></p> <p>The Protocol inclusion criteria were amended so that a trainer <u>did not have to be in attendance</u> at the race meeting in order for their greyhound to be enrolled. Greyhounds which were being handled by a licenced attendant who was a direct family member of the trainer (e.g. spouse, partner, child) were permitted to be enrolled into the study. The trainer had to grant permission for this to occur. If permission was not granted by the trainer, the greyhound was not enrolled.</p> <p>This amendment had a positive impact on the study, as it enabled more greyhounds to be enrolled on each study day.</p>
5	<p>9-Sep-2020: The Animal Ethics Committee, Animal Research Authority (ARA) approval period for the study was amended. Due to the COVID-19 pandemic, the study was placed on hold for approximately 5 months, from March 2020 to August 2020. The ARA was due to expire on the 21-Nov-2020. An ARA Amendment was submitted to extend the expiration date on the ARA to enable the study to be completed.</p> <p>This amendment had a positive impact on the study, as it enabled the study to be completed.</p>

Table 5 - Study Deviations:

Deviation No.	Details
1	<p>24-Nov-2020 at Lismore. Study greyhound 44 was removed from the study by the Investigator. Greyhound 44 was in race 5 at Lismore on this day. The Investigator was unavailable to collect data from this greyhound due to being required to assist with the provision of veterinary first aid to two serious injured greyhound in a prior race (race 4). Two greyhounds were seriously injured during a fall in race 4. The Investigator (also a veterinarian) assisted the OTV in the provision of first aid treatment to the injured greyhounds in race 4 and was therefore not available to collect study data. Pre-race and post-race study data was missing for study greyhound 44, consequently this greyhound was removed from the study by the Investigator due to insufficient data being available from this greyhound for analysis.</p> <p>This deviation had a negative impact on the study, as data was not available from greyhound 44 for analysis in the study.</p>
2	<p>13-Apr-2021. Final water bowl weight recordings were omitted for three (3) greyhounds during the study:</p> <ul style="list-style-type: none"> <li>- Study greyhound 6 at Bathurst on 9-Mar-2020</li> <li>- Study greyhound 7 at Bathurst on 9-Mar-2020</li> <li>- Study greyhound 64 at Casino on 11-Mar-2021</li> </ul> <p>The trainers of these greyhounds departed the racetrack prior to the final water bowl weight being recorded by study personnel. This Deviation occurred due to human error; study personnel omitted to record the final water bowl measurements when these three (3) greyhounds were removed from their kennels to go home. Therefore, only pre-race data was available from these three (3) greyhounds for analysis in the study.</p> <p>This deviation had a negative impact on the study, as only partial data was available from these three (3) greyhounds for analysis.</p>

### *c. Notes To File*

Notes To File were to be prepared using a standardised template to clarify any events or circumstances during the study that may not be otherwise apparent from the raw data. There were no Notes To File required during the conduct of this study.

### *d. Confidentiality*

Confidentiality of the study data will be maintained during and after the study. Identifying names of enrolled greyhounds and participating trainers will be kept confidential and will not be published.

Publication of the Study Report and any study-related material is at the sole discretion of the Sponsor, the Greyhound Welfare and Integrity Commission (GWIC).

## 15. RESULTS

### *a) Study Greyhound Information*

#### *i. Selection and Screening*

A total of fifteen (15) greyhounds were selected and screened for the study but were not enrolled (i.e. did not participate), as they did not meet the study inclusion criteria, or met one of the study exclusion criteria (refer to Table 6 below).

*Table 6: Greyhounds selected and screened for the study, but which were not enrolled:*

No.	Date	Track	Race No.	Reason
1	9-Mar-20	Bathurst	7	Pre-race swab. Ineligible to participate due to study exclusion criteria.
2	9-Mar-20	Bathurst	1	Scratched prior to race meeting.
3	9-Mar-20	Bathurst	2	Water exemption. Ineligible to participate due to study exclusion criteria.
4	9-Mar-20	Bathurst	4	Trainer declined participation in study - dog is timid. Ineligible to participate due to study inclusion criteria.
5	9-Mar-20	Bathurst	7	Scratched prior to race meeting.
6	9-Mar-20	Bathurst	8	Scratched prior to race meeting.
7	9-Mar-20	Bathurst	10	Pre-race swab. Ineligible to participate due to study exclusion criteria.
8	3-Sep-20	Casino	4	Trainer will not be at the track during this race meeting. Ineligible to participate due to study inclusion criteria.
9	3-Sep-20	Casino	8	Water exemption. Ineligible to participate due to study exclusion criteria.
10	24-Sep-20	Casino	5	Trainer will not be at the track during this race meeting. Ineligible to participate due to study inclusion criteria.
11	24-Sep-20	Casino	7	Trainer will not be at the track during this race meeting. Ineligible to participate due to study inclusion criteria.
12	24-Sep-20	Casino	7	Trainer declined participation in study - no reason requested/given. Ineligible to participate due to study inclusion criteria.
13	28-Jan-21	Casino	9	Trainer declined to participate in the study after having already previously participated in the study on two (2) prior occasions. Ineligible to participate due to study inclusion criteria.
14	25-Feb-21	Casino	3	Trainer will not be at the track during this race meeting. Ineligible to participate due to study inclusion criteria
15	13-Apr-21	Lismore	5	Trainer declined to participate in study - dog is hyperactive and difficult to handle. Ineligible to participate due to study inclusion criteria.

Two (2) greyhound were selected but were not enrolled into the study, as the trainers' advised that these greyhounds had water exemptions in place.

#### *ii. Enrolled Greyhounds*

A total of seventy (70) greyhounds were enrolled into the study. Five (5) greyhounds were enrolled into the study twice, therefore sixty-five (65) individual greyhounds participated in the study. The greyhounds enrolled into the study all originated from within NSW.

The bodyweight (at kennelling), age and sex of each greyhound was recorded.

A summary of the enrolled greyhounds' details is presented in Table 7.

Table 7 - Study greyhound details:

<b>Species:</b>	Dog ( <i>Canis lupus familiaris</i> )
<b>Breed:</b>	Greyhound
<b>Number:</b>	70 (5 greyhounds were enrolled into the study twice, therefore 65 individual greyhounds were enrolled into the study)
<b>Source:</b>	Privately owned racing greyhounds eligible to nominate and race in NSW. All greyhounds enrolled into the study originated from within NSW.
<b>Health:</b>	In good general health and fit racing condition.
<b>Age (at time of participation in the study):</b>	1.7 years – 6.2 years
<b>Racing bodyweight (recorded at kennelling):</b>	22.0 – 36.0 kg
<b>Sex:</b>	Male or female, desexed or entire greyhounds were eligible to be enrolled into the study.  41 female greyhounds and 29 male greyhounds were enrolled into the study.

Six (6) of the enrolled study greyhounds had incomplete data sets, refer to Table 8 below:

Table 8 – Study greyhounds with incomplete data sets:

Study Dog No.:	Date	Track	Reason
2	9-Mar-20	Bathurst	Greyhound was selected for a post-race swab. Greyhound was withdrawn/removed from the study at this time point. Only partial data (pre-race data) was available from this greyhound.
6	9-Mar-20	Bathurst	Human error. Final water bowl weight recording was omitted as the trainer/greyhound departed the racetrack to go home without the final water bowl weight being recorded. Only partial data (pre-race data) was available from this greyhound.
7	9-Mar-20	Bathurst	Human error. Final water bowl weight recording was omitted as the trainer/greyhound departed the racetrack to go home without the final water bowl weight being recorded. Only partial data (pre-race data) was available from this greyhound.
31	13-Oct-20	Lismore	Trainer chose to take greyhound home immediately after racing and greyhound was not re-kennelled post-race. This was permitted under COVID protocols in place at the time. Only partial data (pre-race data) was available from this greyhound.
44	24-Nov-20	Lismore	Greyhound was withdrawn/removed from the study by the Investigator due to a serious incident in a prior race. Pre-race and post-race study data was missed for this greyhound. Consequently, this greyhound was removed from the study by the Investigator due to insufficient data being available for analysis (Study Deviation 1).
64	11-Mar-21	Casino	Human error. Final water bowl weight recording was omitted as the trainer/greyhound departed the racetrack to go home without the final water bowl weight being recorded. Only partial data (pre-race data) was available from this greyhound.

The six (6) greyhounds with incomplete data sets were excluded from the statistical analysis. Refer to Appendix 1 (Statistical Analysis Report).

However, pre-race water consumption data was available from Study Dogs 2, 6, 7, 31 and 64 and will be included in the summary below (see *Section 15.c.i. Pre-Race Water Consumption*).

### b) Adverse Events

Two (2) adverse events occurred during the study involving enrolled greyhounds. Details of the adverse events are provided in Table 9 below.

Table 9 - Adverse Events:

Study Dog No.	Description	Treatment	Outcome	Duration
21	Casino, 3-Sept-2020:  The greyhound was found to have fracture his tail tip, approximately 5cm from the end of the tail. The injury likely occurred in the catching pen at the end of the race, due to a collision with another greyhound. The fracture was a closed fracture (i.e. not compound or 'open').	The greyhound was examined and treated by the OTV.  The greyhound had the fractured tail tip surgically amputated under general anaesthetic the next morning by the greyhound's private veterinarian.	Resolved.  The greyhound was not removed from the study due to this adverse event.	The greyhound was prohibited from racing for 21 days (incapacitation period given by the OTV) to allow the tail/surgical site to heal prior to the greyhound returning to racing.
69	Lismore, 13-Apr-2021:  The greyhound ran last in its race. On steward's request, the greyhound was examined by the OTV and found to have a muscle injury to the right hip region (right <i>tensor fascia latae</i> muscle).	The greyhound was examined and treated by the OTV.  The trainer was advised to rest the greyhound and avoid strenuous exercise for the next 4 weeks. The trainer was advised to seek further veterinary care from his private veterinarian, if he had any concerns.	Resolved.  The greyhound is recovering well and is expected to return to racing once fully recovered.	The greyhound was prohibited from racing for 28 days (incapacitation period given by the OTV), to allow the injury to heal prior to the greyhound returning to racing.

There were no adverse events recorded during the study relating to the presence of water bowls in the kennels of the study greyhounds. There were no study greyhounds which sustained any type of injury (e.g. laceration, abrasion) or illness relating to consuming water, or as a result of chewing, playing with or knocking over their water bowl in this study.

### c) Water Consumption Results

#### i. Pre-Race Water Consumption

Table 10 provides an overview of the pre-race water consumption data.

This summary table includes pre-race water consumption data from Study Dogs 2, 6, 7, 31 and 64 (refer to Table 8 above). While post-race data was not available from these five (5) greyhounds for various reasons, pre-race data was collected and is included in the summary table below.

Table 10 – Summary of pre-race water consumption data:

70 enrolled	
1 removed (Study Dog 44)	
69 greyhounds	
6/69 (8.7%) knocked over bowl	
3/69 (4.3%) partially spilt some water	
15/69 (21.7%) did not drink any water	
45/69 (65.2%) drank some water (> 0mL consumption)	
5 greyhounds drank > 100mL	
1 greyhound drank > 300mL	

Due to the removal of Study Dog 44 (Study Deviation 1), pre-race data from 69 greyhounds was available for interpretation.

Six (6) out of 69 (8.7%) greyhounds knocked over their water bowl prior to racing. It was not possible to determine whether any of these 6 greyhounds drank some water prior to knocking over their bowl in the pre-race period.

Three (3) out of 69 (4.3%) greyhounds spilt a small amount of water in their kennel prior to racing but did not knock over their water bowl. In each of these three instances, a few spots of water were observed on either the greyhounds' bed (2 greyhounds) or on the floor in front of the kennel (1 greyhound).

Fifteen (15) out of 69 (21.7%) greyhounds did not drink any water from their water bowl prior to racing (i.e. water consumption was 0 mL).

Forty-five (45) out of 69 (65.2%) greyhounds drank some water from their water bowl prior to racing. This indicates that the majority of greyhounds will drink some water while kennelled prior to racing.

Five (5) greyhounds consumed greater than 100 mL of water prior to racing.

One greyhound, Study Dog 19 (Casino 3-September-2020), consumed 305 mL prior to racing. The trainer of this greyhound noted that the greyhound had been panting and barking and was unsettled while in transit to the racetrack, which may have resulted in increased fluid loss prior to the race meeting. The greyhound travelled 124 km to the racetrack on this date.

Mean water consumption prior to racing was 29 mL of water, with a range of 0 mL to 305 mL (refer to Appendix 1 – Statistical Analysis Report).

#### ii. *Post-Race Water Consumption*

Table 11 provides an overview of the post-race water consumption data.

Table 11 – Summary of post-race water consumption data:

70 enrolled	
1 removed (Study Dog 44)	
69 greyhounds	
63/69 (91.3%) drank from the hoses in the wash-down bays	
6/69 (8.7%) did not drink from the hoses in the wash-down bays	
5 removed (Study Dogs 2, 6, 7, 31 & 64) due to lack of post-race data	
64 greyhounds	
3/64 (4.7%) knocked over bowl	
2/64 (3.1%) did not drink any water	
59/64 (92.2%) drank some water (> 0mL consumption)	

Sixty-three (63) out of 69 (91.3%) greyhounds drank from the hoses in the wash-down bays while being washed down immediately after racing. It is not possible to determine the quantity of water each greyhound consumed from the hoses in the wash bays. Six (6) greyhounds (8.7%) did not drink from the hoses in the wash-down bays.

As outlined in Table 11 above, post-race water consumption while in the kennels was unavailable for six (6) greyhounds. Water consumption data while kennelled post-race was available from sixty-four (64) greyhounds for interpretation.

Three (3) out of 64 (4.7%) greyhounds knocked over their water bowl while in their kennel after racing. It was not possible to determine whether any of these three (3) greyhounds drank some water prior to knocking over their bowl in the post-race period.

Two (2) out of 64 (3.1%) greyhounds did not drink any water from their water bowl while kennelled after racing (i.e. water consumption was 0 mL). These two dogs (Study Dog 28 and 29) belonged to the same trainer and participated in the study on the same day (Casino, 24-September-2020). They were in race numbers 7 and 9, respectively. Both dogs raced over a distance of 411 metres on this day and travelled 24 km to the racetrack. Their trainer stated that no pre-race hydration products were used prior to racing, likewise the trainer does not routinely use any post-race hydration products. The trainer stated that these two dogs typically do not drink much, if any water, while kennelled when racing.

Fifty-nine (59) out of 64 (92.2%) drank some water from their water bowl after racing. This indicates that the majority of greyhounds will drink some water while kennelled after racing.

No spills of water were recorded in the post-race period. As wet greyhounds were placed back into their kennels after being hosed down post-race, resulting in wet floors within the kennels and wet bedding, it was not possible to observe for spilt water in the kennels post-race.

Mean water consumption post-race was 234 mL, with a range of 0 mL to 508 mL (refer to Appendix 1 – Statistical Analysis Report).

### iii. Total Water Consumption

The total water consumption during a race meeting was calculated for the enrolled greyhounds by adding each greyhound's pre-race water consumption to its post-race water consumption.

Table 12 provides an overview of the total water consumption data.

Table 12 – Summary of total water consumption data:

70 enrolled	
1 removed (Study Dog 44)	69 greyhounds
5 removed (Study Dogs 2, 6, 7, 31 & 64) due to lack of post-race data	64 greyhounds
10 removed (Study Dogs 3, 15, 20, 26, 35, 45, 51, 53, 55 & 69) as they knocked over or partially spilt their water bowl pre-race, post-race or both.	54 greyhounds
54/54 (100%) drank some water either pre-race or post-race	

Total water consumption was able to be calculated for 54 out of 70 greyhounds in the study. Of the 70 greyhounds enrolled, 6 were removed for various reasons – Study Dog Number 2, 6, 7, 31, 44 and 64 (refer to Table 8). A further ten (10) greyhounds knocked over or partially spilt their water bowl pre-race or post-race (or both) and were excluded from the total water consumption analysis due to having incomplete data.

One greyhound was enrolled into the study twice on two separate occasions, as Study Dog 20 and 51. This greyhound knocked over its water bowl pre-race and post-race on both occasions on which it participated in the study. Pre-race, post-race and total water consumption was not able to be calculated for this greyhound due to lack of data.

The mean total water consumption during a race meeting was 263 mL, with a range of 2 mL to 606 mL (refer to Appendix 1).

*d) Racing Result and Race Distance*

The greyhounds in this study exhibited race results between 1<sup>st</sup> place through to 8<sup>th</sup> place. The mean (average) placing of the greyhounds in this study was 4<sup>th</sup>.

The race distances of the study greyhounds were between 259 m to 618 m. The mean (average) race distance of the enrolled greyhounds was 385.3 metres.

*e) Distance Travelled to Racetrack*

Trainers / study greyhounds travelled a mean distance of 49 km to the race meetings in this study, with a range of 3 km to 150 km. The maximum distance travelled by an enrolled trainer / greyhound was 150 km.

*f) Ambient (outside) Temperature and Humidity Results*

Ambient temperature ranged between 13.9°C and 31.5°C during the study. There were no ‘heat affected’ days included in the study, which are defined as days where the temperature reaches or exceeds 32°C (GWIC Race Day Hydration and Hot Weather Policy). The ambient (outside) humidity ranged between 10% and 99%.

Refer to Appendix 2 – Temperature and Humidity Data.



### *g) Kennel (inside) Temperature and Humidity Results*

Kennel temperatures ranged between 16.2°C to 21.5°C during the study. This indicates appropriate adherence to the ideal temperature range specified in the Race Day Hydration and Hot Weather Policy (19 – 22°C). Kennel humidity ranged between 54% and 84%.

Refer to Appendix 2 – Temperature and Humidity Data.

### *h) Trainer Participation*

A total of forty-five (45) individual trainers participated in this study. Nineteen (19) trainers were enrolled into the study on more than one occasion, i.e. they had 2 or more greyhounds which participated in this research project.

One trainer had six (6) greyhounds enrolled into the study, over 4 separate race meetings.

Three (3) trainers declined to participate in the study when initially contacted by the Investigator at study screening, prior to race day. A reason for declining to participate in the study was not required, as participation in the study was voluntary. Two of the three trainers volunteered a reason for not wishing to be enrolled. One trainer noted that his greyhound was timid and was concerned that study procedures may cause additional stress. Another trainer stated that his greyhound was hyperactive and difficult to handle.

The overall participation rate in the study was very high 94% (45/48). The percentage of trainers declining to participate was 6% (3/48).

One trainer declined to participate in the study after having previously been enrolled and participating in the study on two prior occasions.

### *i) Trainer Survey Results*

Each of the forty-five (45) individual trainers who participated in the study completed the Trainer Survey.

The survey findings were as follows:

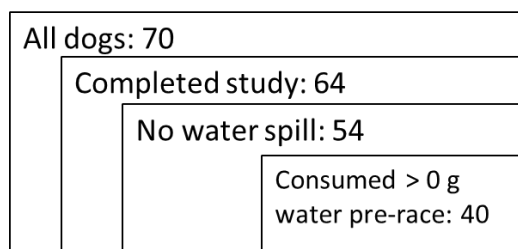
- 20% of trainers (9/45) provided water to their greyhounds while being transported (i.e. in transit) to the racetrack.
- 80% of trainers (36/45) did not provide water to their greyhounds while being transported to the racetrack.
- Of these 36 trainers who did not provide water while transporting their greyhounds, 42% (15/36) mentioned that they provide water while transporting their greyhounds on longer trips, but not on the shorter trips involved in this study.
- 56% of trainers (25/45) stated that they provide water to their greyhounds when they arrive at the racetrack prior to kennelling (i.e. from the hoses in the wash down bays or from their own water supply).

- 44% of trainers (20/45) stated that they do not routinely provide water to their greyhounds when they arrive at the racetrack prior to kennelling.
- The above trainer survey results equate to a total of 60% (42/70) of study greyhounds which were provided water by their trainers while in transit to the racetrack and/or on arrival at the racetrack prior to kennelling. While 40% (28/70) of greyhounds in the study were not provided with water while in transit to the racetrack or on arrival at the racetrack prior to kennelling.
- 49% of trainers (22/45) stated that they use hydration products, flavourings or electrolyte products prior to racing. This represented 29/70 (41.4%) greyhounds in the study.
- 51% of trainers (23/45) stated that they do not use any hydration products, flavourings or electrolyte products prior to racing. This represented 41/70 (58.6%) greyhounds in the study.
- 73% of trainers (33/45) stated that they use hydration products, flavourings or electrolyte products after racing. This represented 45/70 (64.3%) greyhounds in the study.
- 27% of trainers (12/45) stated that they do not use any hydration products, flavourings or electrolyte products after racing. This represented 25/70 (35.7%) greyhounds in the study.
- A wide range of hydration products, flavourings and electrolyte products were being used either pre-race and/or post-race. These products were used alone or in combination, depending on the trainer:
  - Milk
  - Coconut water
  - Home-made stews or soups
  - Ice-cream
  - Beta-Cel Electrolyte Replacer for Greyhounds (Virbac)
  - Recharge For Dogs Oral Rehydration Concentrate Solution (Virbac)
  - Troy Dynajec Injection (Troy)
  - Vytrate Liquid Concentrate (Jurox)
  - Inca Baladene Body Acid Neutralizer and Urinary Alkalizer (Inca)
  - Potassium Tablets
  - Neutradex Mild Diuretic and Urinary Buffer for Greyhounds (Virbac)
  - Troy Nutripet High-Energy Vitamin Concentrate (Troy)
  - Hiprex Tablets (iNova Pharmaceuticals)
  - White-E Vitamin Supplement for Dogs (Virbac)
  - Sustagen (Nestle)
  - Troy Electrolyte Replacer Salt Mixture for Horses (Troy)
  - Hydralyte (Care Pharmaceuticals)

## 16. STATISTICAL ANALYSIS RESULTS

The complete Statistical Analysis Report is provided in Appendix 1.

Seventy (70) dogs were chosen for the study, six (6) did not complete the study for different reasons and were excluded from the statistical analysis. A further ten (10) dogs partially spilt or knocked over their water bowls either pre-race, post-race, or both and were excluded from some statistical analysis parameters (see Appendix 1), leaving 54 dogs with measurable water consumption. Of the 54 dogs with measurable water consumption, fourteen (14) did not drink any water in the pre-race period, leaving 40 greyhounds which drank some water (> 0 mL) in the pre-race period.



Continuous variables (e.g. distance to track) were fitted by a linear model, while categorical variables (e.g. sex) were modelled by one-way ANOVA (Analysis of Variance).

The test of significance was a probability value less than 0.05 (i.e.  $p < 0.05$ ).

Temperature and humidity data recorded in the kennels (inside) and ambient (outside) conditions were linearly interpolated for each greyhound using the available data points (i.e. start of the race meeting, mid-point of the meeting and at end of the race meeting).

Pre-race water consumption was skewed by the 14 dogs which did not drink any water, hence a normal distribution could not fit the data. Pre-race water consumption greater than 0 mL (40 dogs) did fit a lognormal distribution. The implications for modelling are that the logarithm of the pre-race water consumption was a more appropriate variable. It will be seen that graphs of analysis of pre-race water consumption in the Statistical Report are mostly in the log scale. The post-race water consumption and total water consumption better fitted a normal distribution. Statistical modelling was performed according to data 'best fit' and results reported accordingly.

A summary of the main statistical analysis findings are provided below:

### Significant Effects

- The distance to the racetrack (km) correlated strongly with pre-race water consumption ( $p = 0.018$ ) and less strongly with total water consumption ( $p = 0.047$ ). However, the effect is not great – about 2 mL of water more, on average, for 10 km greater distance to the racetrack, at the median distance of ~30 km.
- The race number (therefore time spent in the kennel) together with the distance travelled to the racetrack (km) gave a significant correlation ( $p = 0.004$ ) on pre-race water consumption.
- Post-race water consumption correlated with the race distance in metres ( $p = 0.014$ ). Dogs drank more water after a longer race by, on average, 50 mL for every 100 m extra distance.

- Heavier dogs drank more water than lighter dogs ( $p = 0.016$ ), on average 17 mL of water in total per kilogram of additional bodyweight. This correlation shows up as an effect of sex ( $p = 0.013$ ), male greyhounds weigh on average 5.3 kg more than female greyhounds in this study.
- Total water consumption correlated with distance to the track (km) and this can be divided into male and female effects ( $p = 0.004$ ). Male greyhounds drank proportionately more per km distance travelled than females.
- A significant two-factor effect, weight and distance to track, on total water consumption was also found ( $p = 0.006$ ). This mirrors the effect of sex described above.

**Non-Significant Effects:**

- A greyhound's placing in the race (i.e. performance) was not correlated with pre-race or total water consumption.
- The race number (therefore time spent in the kennel) of itself did not correlate with pre-race water consumption. However, as stated above, race number together with distance to the racetrack gave a significant correlation.
- Provision of water by trainers while in transit to the racetrack or on arrival at the racetrack prior to kennelling was not correlated with water consumption.
- Provision of hydration products by trainers prior to racing was not correlated with water consumption.
- Kennel (inside) temperature or humidity was not correlated with pre-race water consumption. It is noted that the range of temperatures in the kennels was only about 5°C.
- Ambient (outside) temperature or humidity was not correlated with post-race water consumption.
- Post-race water consumption did not correlate with pre-race water consumption, but tended to be greater.
- Distance to the racetrack in km did not correlate with post-race water consumption, but did correlate significantly with pre-race water consumption and total water consumption (see above).
- There was no significant effect of each racetrack (Bathurst, Casino, Lismore) on total water consumption.

A summary of the statistical results is presented in the tables below.

Table 13 – Statistical Analysis Results – Probability Values

		MODELLED VARIABLE				
		log(preWater)	postWater	totalWater	Weight	Place in race
EXPLANATORY VARIABLE	log(preWater)					x (p=0.125)
	preWater		x (p=0.352)			x (p=0.622)
	postWater					
	totalWater					x (p=0.637)
	Age			x (p=0.964)		
	Weight			x (p=0.016)		
	Sex	c (p=0.303)		c (p=0.013)	c (p=0.000)	
	Trainer Water	c (p=0.253)		c (p=0.619)		
	Trainer Hyd	c (p=0.683)		c (p=0.652)		
	Track			c (p=0.154)		
	Distance to track	x (p=0.018)		x (p=0.047)		
	Race Number	x (p=0.338)		x (p=0.787)		
	Race Distance		x (p=0.014)	x (p=0.080)		
	T (kennel)	x (p=0.177)				
	H (kennel)	x (p=0.320)				
	T (air)		x (p=0.896)			
	H (air)		x (p=0.278)			
	Sex x Dist to track			xc (p=0.004)		
	Weight + Dist to track			xx (p=0.006)		
	Race number + Dist to track	xx (p=0.004)				
x = continous variable; c = categorical variable						
Statistically significant findings are highlighted in yellow						

Table 14 – Summary statistics of continuous data

Data	n*	mean	standard deviation	median	maximum	minimum
Race number	64	6	3	6	12	1
Race Dist /m	64	385.3	87.2	411	618	259
Place	64	4.3	2.0	4	8	1
Weight /kg	64	28.8	3.1	28.1	36	22
Age /y	64	2.9	1.0	2.7	6.2	1.7
Dist to track /km	64	49.4	43.3	29.2	150	3.1
Pre-race water /g	54	28.9	54.6	5.5	305	0
ln(pre-race water /g)	40	16.2	1.6	2.7	5.7	0
Post-race water /g	54	234.2	141.8	251	508	0
Total Water /g	54	263.1	159.3	271	606	2
T (kennel) /°C†	64	18.9	1.3	18.5	21.4	16.3
T (air) /°C†	64	23.3	3.7	22.3	29.7	18.4
Humidity (kennel) %†	64	65.8	7.1	64.4	83	54
Humidity (air) %†	64	54.6	18.6	54.3	97.7	13.3

\* Dogs completing study n = 64; Dogs not spilling water n = 54; Dogs drinking >0 g pre-race n = 40.

† Interpolated temperature and humidity data.

Table 15 – Count of categorial data

Data	<i>n</i> *	N(TRUE)	N(FALSE)
Sex = Female	64	36	28
Trainer gives water prior to race meeting commencing (i.e. <i>en route</i> to track or on arrival prior to kennelling)	64	38	26
Trainer gives hydration products prior to racing	64	26	38
Dog drank from hose bay after racing <sup>†</sup>	64	59	5
Bowl refilled <sup>†</sup>	64	46	18

\* Dogs completing study  $n = 64$ ;

<sup>†</sup> Not used in this analysis.

## 17. DISCUSSION

To our knowledge this is the first study evaluating water consumption of racing greyhounds while kennelled during greyhound race meetings. New South Wales is currently the only racing jurisdiction in Australia which permits and requires greyhounds to be provided with drinking water while kennelled during race meetings, in accordance with the GWIC Race Day Hydration and Hot Weather Policy (version: October 2019).

The data from this 70-greyhound observational pilot study indicates that most greyhounds will drink some water while kennelled prior to racing. 65.2% of greyhounds (45/69) drank some water from their water bowl prior to racing. Water consumption volumes were generally quite low prior to racing, with only 5 out of 69 greyhounds drinking more than 100 mL prior to racing. This indicates that greyhounds do not typically consume large volumes of water while kennelled prior to racing. Statistical analysis of the greyhounds with complete data sets ( $n = 54$ ) indicated that the mean water consumption pre-race was 29 mL with a range of 0 mL to 305 mL. Importantly, there was no statistically significant effect of water consumption on the greyhounds' race result or placing in the race (i.e. performance). Therefore, access to water in the kennels in the pre-race period did not have any adverse effects on racing performance based on the data from this study.

91.3% (63/69) of greyhounds drank from the hoses in the wash-down bays while being washed down immediately after racing. Interestingly, despite the vast majority of greyhounds drinking some water while being hosed down after racing, the majority of the study greyhounds, 92.2% (59/64) still drank some water from their water bowl while kennelled after racing. This finding demonstrates that the amount of water provided while washing down greyhounds immediately post-race is insufficient to completely quench their thirst after racing. Perhaps unsurprising, given that greyhounds are often panting heavily in the immediate post-race period, therefore they cannot efficiently drink sufficient volumes of water while panting. Trainers also often have limited time to water their greyhounds immediately post-race as they may have greyhounds competing in subsequent races.

Post-race water consumption volumes were much greater than pre-race consumption. Statistical analysis of the greyhounds with complete water consumption data sets ( $n = 54$ ) indicated that the mean water consumption post-race was 234 mL with a wide range of 0 to 508 mL.

The race distance (in metres) completed by the greyhound was significantly correlated with post-race water consumption ( $p = 0.014$ ). Greyhounds which ran further in their race, drank more water in the post-race period. On average, the study greyhounds drank 50 mL more water for every 100 m of extra distance raced. This finding may have practical implications for water provision in distance races.

Heavier, male greyhounds competing in distance races may benefit from the provision of additional water post-race.

Statistical analysis of total water consumption (pre-race + post-race;  $n = 54$ ) demonstrated a mean total water consumption of 263 mL with a range of 2 mL to 606 mL. The total water consumption results were higher than anticipated by the Investigators. 100% (54/54) of greyhounds with complete data sets drank some water while kennelled during a race meeting, either pre-race, post-race or both.

The total water consumption data also indicated that some trainers provided greater than 500 mL of water to their greyhounds while kennelled during race meetings, above the volume stipulated in the Policy (250–500 mL). Notably the greyhounds are indeed utilising this water resource and will in some instances drink > 500 mL of water during a race meeting, if available.

The number of greyhounds who partially spilt or knocked over their water bowl was recorded. Nine (9) greyhounds either partially spilt or knocked over their water bowl pre-race and three (3) greyhounds knocked over their water bowl post-race. This is a relatively small number in the total study of 70 greyhounds. Some trainers have made attempts to reduce the likelihood of their greyhound spilling or knocking over its water bowl using clips to secure the bowl in place (see Figure 4 below). This intervention should be encouraged.

*Figure 4 – Greyhound water bowl with securing clip.*



No adverse events (e.g. injuries or illnesses) resulting from the presence of the water bowls in the greyhounds' kennels were observed during the conduct of this study.

The distance a greyhound travelled to the racetrack (in kilometres) had a statistically significant effect on pre-race water consumption ( $p = 0.018$ ) and on total water consumption ( $p = 0.047$ ). Greyhounds which travelled further to the racetrack drank more water. This finding was surprising to the Investigators, as the overall distances travelled by the greyhounds in this study were not extensive, yet nonetheless these distances did produce a measurable effect on water consumption. The mean

distance travelled was 49.4 km with a range of 3.1 to 150 km. Travel restrictions or a reluctance to travel due to the COVID pandemic, may have played a role in reducing the amount of travel undertaken by trainers during this study. It is not uncommon for trainers to travel 4 to 5 hours (or more) for race meetings, however such long trips were not observed in the data collected for this study. It is reasonable to expect that longer travel distances and travel times may have a further effect on pre-race and total water consumption on track.

Statistical analysis demonstrated that pre-hydration measures by trainers prior to racing, such as providing water during transit to the race track; providing water on arrival at the race track prior to kennelling or the use of hydration products prior to racing had no significant effect on the amount of water greyhounds drank while kennelled. This was an unexpected finding as it might be assumed that these pre-hydration interventions by trainers could have an impact on water intake by greyhounds while kennelled. This was not the case in this pilot study.

The effects of environmental temperature and humidity on water consumption were explored. There was no significant effect of kennel temperature or kennel humidity on pre-race water consumption. This was an expected finding as greyhound racing kennels in NSW (TAB and non-TAB tracks) must be air-conditioned, with the aim of maintaining a cool temperature within the ideal range of 19 – 22°C (GWIC Race Day Hydration and Hot Weather Policy). The range of kennel temperatures recorded in this study was 16.2°C (minimum) to 21.5°C (maximum), a fluctuation of only about 5°C. The purpose of maintaining cool, air-conditioned kennels is to ensure the health, safety and comfort of greyhounds and reduce the likelihood of dehydration.

There was also no significant effect of ambient (outside) temperature or humidity on post-race water consumption. Therefore, the ambient temperature and humidity which the greyhounds were exposed to at the time of their race (interpolated data) did not effect water consumption when they were returned to their kennel post-race. However, it should be noted that there were no 'heat affected' days during the conduct of this study. Heat affected days are described in the Policy as those with a temperature of 32°C or higher. A maximum ambient temperature of 31.5°C was recorded during the study (Casino 10-December-2020). Additionally, due to the small data set (70 greyhounds) with only 16 of these greyhounds enrolled over the summer months (refer to Table 1), it is unlikely that this small data set would be sufficient to show an effect. A larger study conducted specifically during the summer months would be required to explore the effects of higher temperatures on greyhound water intake.

Trainer participation during the study was very high, 94% (45/48 trainers) agreed to participate in the study when contacted by the Investigator, with only 3 trainers (3/48, 6%) declining to participate. This indicates that the acceptance level of industry participants to be involved in GWIC research activities was high.

Each of the forty-five (45) individual trainers who participated in the study completed the trainer survey. Only a small percentage of trainers (20%, 9/45 trainers) in this study provided water to their greyhounds while in transit to the racetrack. This is likely because trainers were only travelling relatively short distances to the race meetings in this study (i.e. maximum of 150 km). Several of the trainers who did not provide water stated that they do typically provide water while in transit on longer trips (42%, 15/36 trainers). Whether trainers did or did not provide water on long trips (e.g. > 150 km or 2 hours) was not a specific question included as part of this study. Most trainers, 56% (25/45) provided water to their greyhounds when they arrived at the racetrack prior to kennelling. The above results equated to a total of 60% of study greyhounds (42/70 greyhounds) which were provided with water while in transit to the racetrack and/or on arrival prior to kennelling. Conversely 40% of greyhounds (28/70) were not provided with water while in transit or prior to kennelling.



The use of hydration products by trainers in this study was commonplace. This is not surprising to those who are familiar with the industry. 49% of trainers (22/45) stated that they use hydration products prior to racing. This represented 41.4% (29/70) of the greyhounds in the study. The use of hydration products after racing was more common, with 73% of trainers (33/45) stating that they use hydration products after racing. This equated to 64.3% of study greyhounds (45/70) being given hydration products after racing. A wide range of hydration products are being used, such as coconut water, milk, home-made soups/stews, in addition to commercially manufactured products such as Recharge, Vytrate, Beta-Cel, Nutradex etc. The majority of the commercial hydration products being used by trainers have been specifically formulated for dogs/greyhounds.

## 18. CONCLUSIONS

The objectives of this study were achieved. Water consumption by racing greyhounds during TAB race meetings was evaluated indicating that the majority of greyhounds will drink some water while kennelled prior to racing (65.2%, 45/69 greyhounds), with overall pre-race water consumption being relatively low (mean = 29 mL, range: 0 – 305 mL).

The number of greyhounds observed to drink in the kennels post-racing was much higher, 92.2% (59/64 greyhounds) and post-race water consumption volumes were greater (mean = 234 mL, range: 0 – 508 mL). Total water consumption (pre-race + post-race) during an entire race meeting demonstrated a mean total water intake of 263 mL (range: 2 – 606 mL).

The data from this 70-greyhound pilot observational study indicates that drinking water is a valuable and well-utilised resource when provided to racing greyhounds while kennelled during race meetings.

Further research evaluating the effects of high ambient temperatures on racing greyhound water intake would be beneficial.

## 19. ACKNOWLEDGMENTS

GWIC would like to thank the staff and management of the Bathurst, Casino and Lismore Greyhound Clubs for their support of this research project.

GWIC would also like to sincerely thank and acknowledge the many greyhound trainers who consented to participate in this study.

## 20. CONFLICTS OF INTEREST AND SOURCES OF FUNDING

This study was funded by the Greyhound Welfare and Integrity Commission (GWIC).

The Investigator (Dr Hunter) and Co-Investigator (Dr Ledger), are employed by GWIC. Dr Hunter designed and supervised the conduct of this study. Dr Hunter also performed most of the observations in this study.

## 21. APPENDICES

1. Appendix 1 - Statistical Analysis Report
2. Appendix 2 – Temperature and Humidity Data
3. Appendix 3 – Personnel List

## 22. REFERENCES

GWIC Race Day Hydration and Hot Weather Policy (version: October 2019) -

<https://www.gwic.nsw.gov.au/integrity/rulesandpolicies/race-day-hydration-and-hot-weather-policy>

GWIC Greyhound Racing Rules (version: 12 November 2018) -

<https://www.gwic.nsw.gov.au/integrity/rulesandpolicies>

**APPENDIX 1 – STATISTICAL ANALYSIS REPORT**

APPENDIX 2 – TEMPERATURE AND HUMIDITY DATA

GWIC.2019.1					TEMPERATURE AND HUMIDITY DATA											
Date	Meeting No.	Track	Meeting Type	No. of races at this meeting	Temperature (°C) - Inside (kennels)			Temperature (°C) - Outside (ambient)			Humidity (%) - Inside (kennels)			Humidity (%) - Outside (ambient)		
					Prior to Race 1	Mid-way	After last race	Prior to Race 1	Mid-way	After last race	Prior to Race 1	Mid-way	After last race	Prior to Race 1	Mid-way	After last race
9-Mar-20	1	Bathurst	Twilight	10	19.8	17.4	19.4	20.4	19.9	18.2	56	71	70	51	53	59
27-Aug-20	2	Casino	Day	10	17.6	17.2	17.4	19.5	20.8	20.5	76	83	79	47	37	32
3-Sep-20	3	Casino	Day	12	17.1	16.9	16.2	25.5	27.8	26.1	55	64	65	70	39	48
24-Sep-20	4	Casino	Day	12	18.0	18.2	17.5	25.5	26.9	27.8	62	59	62	25	20	10
13-Oct-20	5	Lismore	Night	10	20.2	18.8	17.8	23.4	20.4	17.7	55	72	74	50	65	77
12-Nov-20	6	Casino	Day	12	19.6	19.8	20.2	26.1	29.2	28.4	61	60	66	48	32	47
24-Nov-20	7	Lismore	Night	10	19.2	18.6	18.4	24.8	22.5	22.4	64	73	74	63	97	99
10-Dec-20	8	Casino	Day	12	20.9	20.2	20.8	28.9	30.1	31.5	59	54	57	41	35	29
28-Jan-21	9	Casino	Day	12	21.5	21.1	20.8	28.9	29.1	28.7	60	61	62	57	64	58
25-Feb-21	10	Casino	Day	10	20.8	20.5	20.3	30.1	30.5	28.7	64	61	69	57	52	65
11-Mar-21	11	Casino	Day	10	18.8	18.4	18.2	25.1	25.4	23.9	62	61	69	83	83	95
13-Apr-21	12	Lismore	Night	10	18.5	18.3	18.0	19.0	15.5	13.9	62	77	84	63	72	77
					RANGE:	Minimum:	16.2			13.9			54			10
						Maximum:	21.5			31.5			84			99

## APPENDIX 3 – PERSONNEL LIST

<b>Name</b>	<b>Role</b>
Kasia Hunter (GWIC)	Investigator
Michelle Ledger (GWIC)	Co-Investigator
Jenn Arnold (GWIC)	Study personnel
Kirsty Hayes (GWIC)	Study personnel
Amanda Lake (GWIC)	Study personnel
Rebecca Lake (GWIC)	Study personnel

<b>Name</b>	<b>Role</b>
Professor David Brynn Hibbert	Statistical Analysis

<b>Name</b>	<b>Role</b>
Dr Fiona Pinder	OTV (Bathurst)
Dr Jayne Dwyer	OTV (Lismore)
Dr Joe McErlean	OTV (Casino)