

AUDIT OF THE COMPUTER BOXDRAW PROGRAM

ON BEHALF OF

GREYHOUND RACING VICTORIA

GREYHOUND RACING SOUTH AUSTRALIA

RACING SERVICES TASMANIA

BMM Australia Pty Ltd

16 December 2008

The content of this document is strictly confidential. It has been prepared by BMM International Pty Ltd (BMM) exclusively for the perusal of Greyhound Racing Victoria, Greyhound Racing South Australia, Racing Services Tasmania and may not be disclosed to any other party without the prior written approval of these bodies.

Executive Summary

Greyhound Racing Victoria has engaged BMM Australia Pty Ltd (BMM) on behalf of itself, Greyhound Racing South Australia and Racing Services Tasmania to carry out an audit of the Computer Box Draw program.

BMM's findings were as follows:

1. The Box Draw programs, both the "BOXDRAW" automated program and the "BOX_DRAW" manual draw entry program, operate in accordance with the rules for Box Draw in Greyhound Racing.
2. There is no evidence that the method of operation of the programs has any influence on the outcome of the programs.
3. There is no evidence that the programs are influenced by details of the connections of the entrants nor any previous performance or draws for the entrants.



Anna Fernando

VP – Technical Services

Table of Contents

1	INTRODUCTION	2
2	SCOPE OF WORK.....	2
3	THE REVIEW PROCESS	3
4	EVALUATION	3
4.1	State Controls	3
4.2	Box Draw Criteria	3
4.3	Box Draw Security and Audit Trail	4
4.4	Box Draw Random Number Generator.....	4
4.5	Re-draws and manual overriding of Draws.....	4
4.6	Addressing some General Observations.....	5
4.7	Specific Examples	5
5	SUGGESTIONS FOR TIGHTER CONTROL	8
6	CONCLUSIONS.....	8

1 INTRODUCTION

The Greyhound Racing Victoria computer system operates a computerised Box Draw program to randomly allocate starting boxes for entrants in the races it conducts. Greyhound Racing Victoria on behalf of itself, Greyhound Racing South Australia and Racing Services Tasmania has engaged BMM Australia Pty Ltd (BMM) to carry out an audit of the Box Draw program.

BMM has reviewed the programs used for computerised Box Draw previously in 2004, 2001 and 2000. Since the last audit of the "BOXDRAW" program, the same "BOXDRAW" program is now used for Greyhound Racing Victoria (GRV), Greyhound Racing South Australia (GRSA) and Racing Services Tasmania (RST).

This is a report of our findings.

2 SCOPE OF WORK

The following is our understanding of the issues that were considered in the review: -

- Confirm that all 3 states operate the same program to perform the boxdraw process and that there are controls in place that protect one state from performing a boxdraw for another states race meeting.
- Ensure that there are sufficient validation steps to ensure that the automated boxdraw program is used for each boxdraw
- Check that the order in which greyhounds are entered in the input screen does not influence the boxdraw
- Address the requirements outlined by the Greyhound Owners Trainers and Breeders Association (GOTBA) with regards to resetting the Random Number Generator (RNG) after each draw
- Ascertain the answers to some generic questions, including:
 - Does the program make any references to anything else other than randomly selecting the 8 numbers, eg: dog name, owner, trainer, etc?
 - Does the program stop the operator from continually re-running the program for the same meeting? How?
 - Do the processes behind the entry of a manual boxdraw, interfere or allow manipulation of the automatic boxdraw using the RNG?
- Some general observations to consider, or confirm:
 - There seems to be a regular occurrence when a trainer has the 1st reserve (no 9) and has another dog in the field, the dog in the field often draws box 8. Can anything be detected that may cause this to happen?
 - When a greyhound with race form relocates states (ie: going to SA) for the first time (majority with race form) can anything influence the greyhound drawing box 1? This seems to happen often.
 - Visiting Interstate trainers seem to always draw boxes 5-8. Is there anything that could influence this?
 - When a boxdraw is performed on qualifying trials, does the box draw then influence a normal race meeting? (does it keep a memory)
- Determine whether the program has any influence or bias over some specific examples of irregularities and if possible determine the likelihood or probability, including:
 - The greyhound 'Bomber Bandit' had 19 consecutive boxdraw's without box 1,2,3,4
 - The greyhound 'Why Not Me' had 10 consecutive boxdraw's of 1 & 8.
 - The greyhound Brooke's Record had 13 consecutive boxdraw's of 3,4,5,6.
 - A leading Victorian Trainer (name to be provided during audit) had 8 dogs engaged at Geelong for seven box 1's and one box 8.
- Provide recommendations as appropriate where tighter controls in the process can be implemented.

3 THE REVIEW PROCESS

BMM reviewed the computer program source code for the “BOXDRAW”, “BOX-DRAW” and associated subroutines supplied by Greyhound Racing Victoria. The program called ‘BOXDRAW’ is used for the automatic box draw and the one called ‘BOX-DRAW’ is used to enter details of manual box draws.

In addition, the reviewer observed the “BOXDRAW” program being used for the box draw for a meeting. The reviewer also interviewed a Victorian grader and a senior programmer.

4 EVALUATION

4.1 State Controls

GRV, GRSA and RST operate the same program (BOXDRAW) to perform the automatic box draw process. There are controls in place that protect one state from performing a box draw for another states’ race meeting. These controls include the use of separate accounts for each state and a control list of track codes per state.

GRV and RST use the BOX-DRAW program for manual entry of box draws while GRSA use the BOX-DRAW-SA program.

The BOX-DRAW program for manual entry does not influence the BOXDRAW program for automatic box draws in any way.

4.2 Box Draw Criteria

The only criteria used by the “BOXDRAW” program for allocating starting boxes are those provided for in the rules of Greyhound Racing. Each dog has equal standing and is randomly allocated a box from those available. Where there is less than a full field, nominated boxes are excluded from the Draw.

The order of entry of dogs into meetings and/or races has no influence on the Draw. The “BOXDRAW” program does not use any information about the dogs to influence the fairness of the Draw. This includes dog name, owner, trainer, past draws and their race form.

The “BOX-DRAW” program does not consider past performance or previous box draw information when performing the Box Draw.

It should be noted that the rules of Greyhound Racing Victoria require that the draws be random, not that they be fair. We confirm that each draw is carried out in complete isolation of all other draws and, in particular, of the draw history for a given dog, trainer or owner.

4.3 Box Draw Security and Audit Trail

The "BOX-DRAW" program operates under sufficient security and an audit trail is kept for all draws. This functionality remains as observed in previous reviews of this program.

4.4 Box Draw Random Number Generator

The random number generator used for the "BOXDRAW" program is the same as observed in previous reviews and is utilised in the same way as before. We confirm that the Random number generator is reset after drawing the box numbers and then reset after drawing the Greyhound.

In the 2001 review, BMM conducted an audit of the RNG where it took 625,000 combinations of 8 random numbers and found that all tests performed yielded results in the expected statistical ranges, which indicates absence of bias in the draws. We therefore concluded that the RNG was suitable for use in the application. This same RNG remains in use and BMM is satisfied that it meets the definition of random.

4.5 Re-draws and manual overriding of Draws

We confirm that the functionality exists to prevent races from being re-drawn. Both programs write a non-editable flag against each race record after the completion of a draw. Manual intervention by the IT department is required to reset these flags and enable the draw to be re-done, which is accompanied by a paper-based audit trail signed by Senior Management. Processes are in place to ensure that this is only done where absolutely necessary. If any form of bypassing were attempted then the attempt would be logged in the audit files.

There are two methods of performing a box draw – the automatic box draw program "BOXDRAW" or the manual box draw program "BOX-DRAW". The automatic box draw program is used in most instances. The manual box draw program is used for grading races and in the case where the draw has been done at the track. Whenever the manual box draw program is used in Victoria and Tasmania, an e-mail is automatically sent to senior management informing them that the manual program has been, asking management to verify the validity of the manual boxdraw. The attempt is also captured in the audit files.

It should be noted that BOX-DRAW-SA does not have this functionality implemented and is recommended to have this added.

In addition, when a manual boxdraw is performed, the race record is flagged as being completed and the automatic boxdraw for the remainder of the program will simply bypass that race. The automated races are not influenced by the one race that has been done manually.

4.6 Addressing some General Observations

The boxdraw programs do not make any reference to the trainer of a dog or previous draws. The following examples have not been shown to have any influence on the outcome of a boxdraw:

- RESERVE dogs influence another dog by the same trainer in the field
- Interstate trainers
- Qualifying trial meetings

4.7 Specific Examples

Bomber Bandit

The following table shows box selections for “Bomber Bandit” in 97 starts (excluding qualifying races) up to 11/08/2008.

Box Number	Frequency
1	10
2	8
3	10
4	11
5	16
6	13
7	15
8	14
Total	97

The overall box selections for these 97 starts are unremarkable. With 50 selections of boxes 3-4-5-6 and 47 of boxes 1-2-7-8 the distribution is quite balanced and is not at all unexpected. It is claimed that there were 19 consecutive box draws without boxes 1-2-3-4. The record shows that during this series of starts the longest run was 8 consecutive box selections without boxes 1-2-3-4. The chance of this is 1 / 128, and would be expected to happen about 31 times per year, assuming 8,000 races overall. The same odds would apply to a run of 8 draws with or without any given set of four boxes.

Why Not Me

The following table shows box selections for “Why Not Me” in 54 starts (excluding qualifying trials) up to 06/10/08.

Box Number	Frequency
1	13
2	7
3	6
4	6
5	5
6	5
7	5
8	7
Total	54

A series of draws such as this is quite unusual. Firstly, box 1 was selected 13 times and the next highest box frequency was 7 (boxes 2 and 8). A single box standing out like this is not in itself extremely rare, and would be expected to happen around once per year. More remarkable is that in the 54 starts there was a run of 10 consecutive selections of boxes 1 and 8.

It is estimated that such a run would only occur about once in 23 years. This is unusual, but not outside the reasonable bounds of possibility.

Brooke's Record

The following table shows box selections for “Brooke's Record” in 28 starts (excluding qualifying trials) up to 27/07/08.

Box Number	Frequency
1	3
2	3
3	3
4	6
5	6
6	4
7	0
8	3
Total	28

It was claimed that this series of draws contained a run of 13 consecutive draws of the unfavourable boxes 3-4-5-6. In fact the longest such sequence was 5 starts, with a probability of 1 in 32. This is not particularly unusual and would be experienced by many owners each year.

Leading Trainer

There was a claim that a leading trainer had disproportionate box 1 and box 8 selections. The following tables show the box draw statistics for three leading trainers. In each case the proportion of choices of boxes 1 and 8 is shown. On average it is expected that 25% of draws will result in boxes 1 or 8.

Also, a chi-squared test has been used to evaluate the uniformity (or otherwise) of the overall box selections. The result of each chi-squared test is a percentage value that is expected to fall between 5% and 95%. Simply stated, 90% of all box draw series can be considered "normal". The other 10% are less usual and include distributions that are more even or more uneven than "normal".

The following is a summary of Graeme Bates' dogs collectively from 1st January 08 until 30 June 08.

Graeme Bate (Vic)

Box	1	2	3	4	5	6	7	8	Box1&8	Chi-Sq
Draws	78	77	71	105	85	80	74	65	23%	92%

The following is a summary of Shaun Matcott's dogs collectively from 1st January 08 until 30 June 08.

Shaun Matcott (SA)

Box	1	2	3	4	5	6	7	8	Box1&8	Chi-Sq
Draws	90	88	92	91	66	90	100	88	25%	62%

The following is a summary of Anthony Bullock's dogs collectively from 1st January 08 until 30 June 08.

Anthony Bullock (TAS)

Box	1	2	3	4	5	6	7	8	Box1&8	Chi-Sq
Draws	57	70	66	73	67	72	77	63	22%	23%

It can be seen that none of these trainers has enjoyed more than the average 25% box 1 and 8 draws. Furthermore, the overall distribution of boxes for each trainer falls in the "normal" 90% of box draw distributions.

Four Owners with Two Dogs, Each Pair Adjacent

There was a query regarding a case where four owners had two dogs each in a race and the boxes for each pair of dogs were adjacent. The statistics for this are as follows:

Number of Adjacent Pairs	Probability
0	34%
1	39%
2	20%
3	6%
4	1%

It can be seen that of all occasions where four owners have two dogs each in a race, about 1% will end up with all four pairs adjacent.

5 SUGGESTIONS FOR TIGHTER CONTROL

The person who grades the dogs cannot do the box-draw. This is known to all the graders but it is not documented anywhere and there is nothing to prevent it from occurring.

The manual box-draw program sends an e-mail to senior management when it is run, asking for authority to be verified. The grader told me that he needed two e-mails giving him authority before he could continue. When looking at his e-mails to show me the e-mails for a previous manual box draw run, he was only able to show me one e-mail. The process needs regular auditing to ensure that the controls in place are adhered to. One method is to require the grader to print out the two e-mails and store it with the records for the race.

If the boxdraw needs to be re-drawn, the reviewer was told that this needed to be done by a steward. The IT department needs to be involved in the process as the "already drawn" flag needs to be reset before the re-draw can take place. There was no evidence to show that the IT department checks that the appropriate authority has been given before doing this.

Although an audit trail facility has been implemented, there is no facility in the GRV system to easily extract and print reports from the Audit Trail files. Regular review of the audit files is recommended.

6 CONCLUSIONS

We are able to confirm that the Box Draw programs, both the "BOXDRAW" automated program and the "BOX-DRAW" manual draw entry program, operate in accordance with the rules for Box Draw in Greyhound Racing.

There is no evidence that the method of operation of the programs has any influence on the outcome of the programs. There is no evidence that the programs are influenced by details of the connections of the entrants nor any previous performance or draws for the entrants.